Lamiflex Couplings
Altra Industrial Motion

Installation and Maintenance Manual

Disc Coupling

“PWFS & PWF0”

(Mounting on keyed cylindrical shaft)

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1. Introduction

1.1. Company Information

Lamiflex Couplings® is a manufacturer of flexible disc couplings, elastomeric, gears, transmission shafts, bearing guards and coupling guards. The company was founded in 1999 under the name Powerflex Transmission, but after restructuring it became Lamiflex do Brasil Equipamentos Industriais Ltda.

In July 2012, Lamiflex do Brasil Equipamentos Industriais Ltda merged with the group ***Altra Industrial Motion SA.*** This acquisition allowed Lamiflex to provide the market with a wide range of products related to the power transmission segment.

➢ **Registration data**

Company name	Altra Industrial Motion do Brasil Equipamentos Industriais Ltda.
Tel.	+55 (11) 4615-6300 / Fax: +55 (11) 4625-6300
Address	Avenida João Paulo Ablas, 2970, Jardim da Glória, Cotia – São Paolo ZIP CODE: 06711-250 - Brazil
Federal Tax No.	03.324.310/0001-50
State Registration	278.236.973.114
Municipal Registration	6.010.387
Website	*www.altrabrasil.com* *www.lamiflexcouplings.com* *www.altramotion.com*

1.2. Introduction

The PWF coupling line was developed to support more economical designs and its incorporation helps to reduce maintenance costs.

These parts do not require readjustment, cleaning or replacement during operation, except in cases when intervention is required because of fatigue or system overload.

Hubs and shafts must be correctly realigned when any displacement occurs.

Under normal running conditions, couplings from the PWF line will have a long and problem-free life.

Two types of PWF line couplings are supplied, according to item (3.2.1) or (3.2.2): AGMA Class 8 and ISO Gr.6.3, both of which are compliant with the factory standard. For both types of components, the flexible disc unit and the fastening bolts ensure a good balance.

1.3. Safety

1.3.1. Notes and Symbols

In accordance with the safety standards, we use indications and symbols in some points of this manual that define the relevant points to be applied in the procedures, in order to guarantee the safety of the equipment and the people involved.

	**HAZARD!**	This symbol refers to people's safety. It indicates situations that can lead to death or serious injuries.

	**WARNING!**	This symbol refers to the use of equipment. It indicates situations that can cause damage or destroy equipment.

 **NOTE!**	This symbol relates to information that can facilitate the installation and use of the equipment
 **HOT!**	Indicates hot surfaces and/or components that may cause bodily injury to persons involved in the operations referred to in this manual.
 **ELECTRICITY!**	Indicates the risk of electric shock. The necessary safety actions must be implemented in order to prevent injuries.
 **WARNING!**	Risk of crushing or cutting of limbs, or parts of them.
 **WARNING!**	Indicates rotational movement of the entire component. It must be enclosed to prevent accidents harm to people in its vicinity.
 **POLLUTION!**	This symbol refers to materials which when discarded can cause pollution or have a negative impact on the natural environment. Their disposal must be performed in accordance with current environmental laws.

1.3.2. Personal Protection and Safety Equipment

The entire mechanical installation of the transmission unit must be carried out by a trained and qualified worker, in compliance with safety standards. During installation and maintenance, the service engineer responsible for carrying out work must be properly equipped with PPE that is suitable for the tasks carried out:

- Safety shoes and gloves to prevent injuries;
- Eye protection: to prevent contact with any particles that can harm the eyes and cause injuries and/or accidents;
- Face mask: must be worn if there are particles in the environment and/or in the performance of the work;
- Protective helmet: to prevent injuries that may occur during installation or maintenance;
- Hearing protectors (or mufflers) if the environment is subject to noise exceeding the limit allowed by the standard (85 dB);
- If cleaning products are used (solvents, degreasers, etc.), make sure the manufacturer's instructions are followed before use;
- Disposable protective gloves: to prevent contact with skin if cleaning products (solvents, degreasers, etc.) are used.

	**POLLUTION!**	Disposable gloves: gloves and their waste must be disposed of in a suitable place, in compliance with environmental laws. Cleaning products: must be used in a way that does not have a negative impact on the environment, according to the manufacturer's instructions for use.

	**HAZARD!**	Cleaning products: before use, read the instructions on use and safety to prevent the occurrence of serious injuries. Make sure there are no reactions in case of contact with other chemicals, as they may emit toxic gases.

1.3.3. Important notes

Do not start installation/maintenance tasks without first reading and taking note of the following pages, as they are intended to provide safety guidelines for those involved and to prevent damage to equipment.

This product line was developed to be assembled in a torque transmission system, that is, rotating equipment. In view of this, it is important to note the following:

Heavy equipment

Be careful when lifting the coupling, as it is heavy equipment and should not be lifted by hand. Use suitable equipment to prevent injuries. NOTE: ensure that lifting accessories comply with safety standards.

During lifting, ensure that there are no people below the equipment.

Watch your hands and fingers

WARNING! Never place your fingers between the coupling and hubs during assembly, as there is a risk of crushing.

- Always use original spare parts in order to maintain the design conditions and ensure operation.
- Consult Altra Brasil before using tools or any other equipment not recommended/specified in this manual.
- The customer/user is responsible for ensuring that the transmission unit is installed according to the information included in this manual.
- Always ensure that at least one copy of this manual is provided to the service engineers who provide maintenance/inspections.
- The area in which the coupling is installed must be designed/constructed to ensure adequate lighting and safe access for carrying out installation and maintenance work.
- The service engineers must be trained and able to carry out the necessary tasks (mechanics, alignment, electrical, etc.) in complete safety.

Coupling:

- When installing the coupling, the drive must be completely non-operational and adequately locked to guarantee safety.
- Make sure that the power supply has been disconnected and blocked in accordance with safety regulations.
- The drive cannot start operating without being properly adjusted according to the installation and alignment procedures described in this manual.
- Never change the size, quantity or type of the disc packs in the flexible units, as they have a direct impact on torque transmission.
- As the equipment is rotating equipment, it must be enclosed in order to prevent the occurrence of injuries or accidents during operation.

1.3.4. Disclaimers

Lamiflex Couplings® reserves the right to revise this document without prior notice. These documents were revised in order to enhance accuracy and correct errors, although technical and typographical divergences may still occur.

This document is regularly updated and any changes will be published in future editions. Improvements and/or changes to the products described or to the manual may be implemented at any time, without notice.

Under no circumstances will ***Lamiflex Couplings®*** be responsible for any special, incidental, consequential or punitive damages. This includes but is not limited to: damage to third-party property or the Installation and Maintenance Manual, inconvenience, loss of profits or revenue, loss of use of this product or any associated equipment, cost of replacement of equipment, downtime costs, or claims from any party whose damage is caused by any misspelling or inaccurate information in this user guide.

Under no circumstances may this document or parts thereof be copied, reproduced, altered or translated, without the explicit written permission of ***Lamiflex Couplings®***.

2. Hibernation

2.1. Shipping

Couplings are supplied correctly packaged and locked so that the assembly will not be damaged during movement.

2.2. Receipt

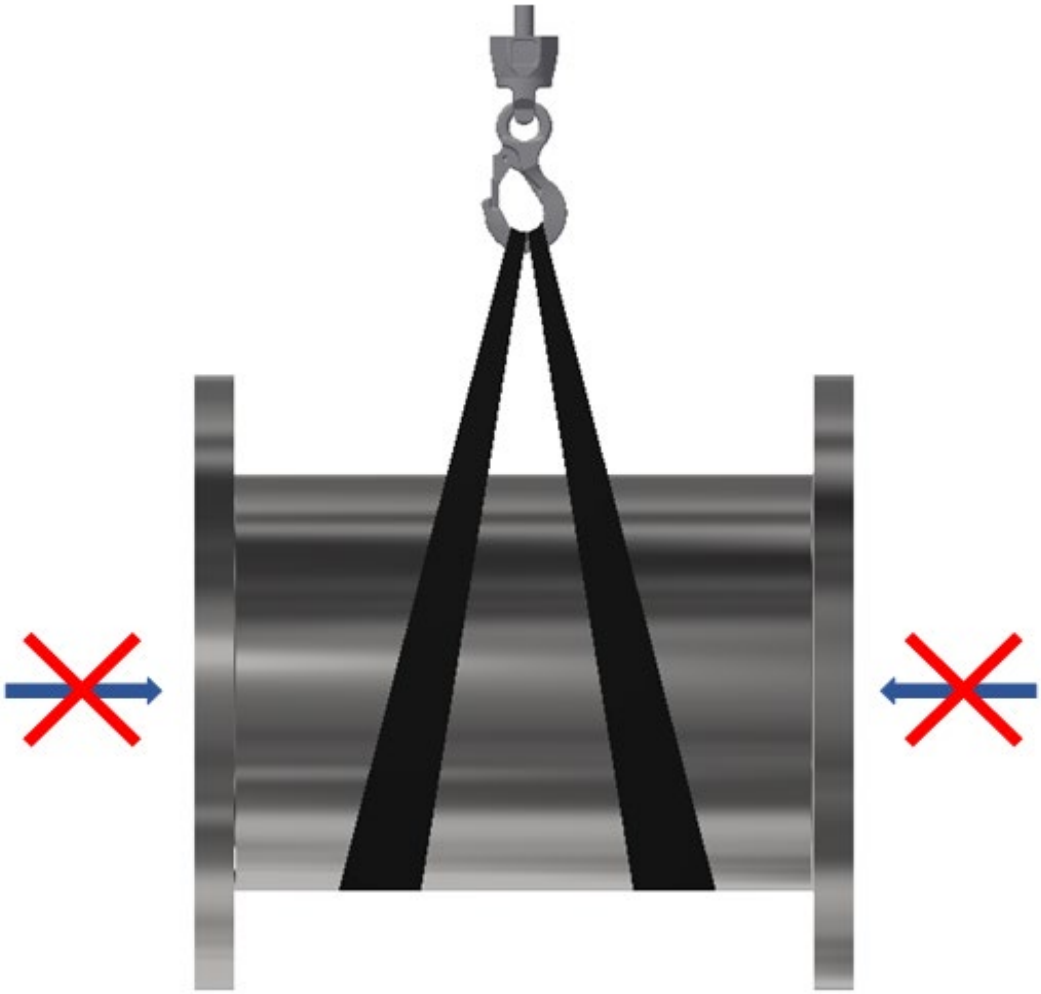
Upon receipt of the coupling, inspect it carefully to ensure that no damage has been caused during shipping. Upon receipt, the following procedures should be followed:

- Make sure that the packaging has not been tampered with during shipping.
- Compare the volume described on the invoice to the physical volume.
- Inspect the entire product to verify that no damage has been caused during shipping.

Log any damage in writing (with photos) with the shipping agent and immediately inform the insurance company and ***Lamiflex Couplings®***. Failure to notify the relevant entities that damage has occurred may result in the cancellation of the warranty.

2.3. Handling

Shocks of any kind must be avoided during handling or assembly. Forcing in the axial direction must be avoided, in order to prevent damage from occurring to the flexible units.



WARNING! Ensure the coupling is correctly handled and transported, and that axial force is not be applied during assembly, as it may cause deformation to the entire component and invalidate the warranty

2.4. Storage

- Store the coupling in a horizontal direction (resting on the flanges). It should not be kept on one end (balanced) for a long time when handling.
- Preferably keep the equipment in the box with its cover for protection if it is stored for long periods prior to its installation.
- Protect against corrosion when stored for long periods.
- The storage place must be sheltered and clean, with relative humidity of up to 65%.
- Ensure that there is no possibility of falling objects, forklift passage or similar.

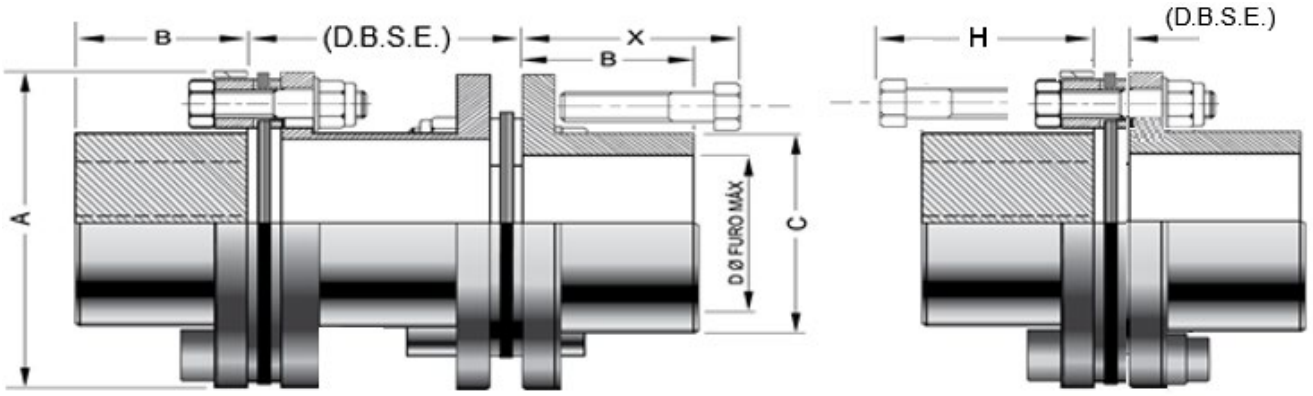
NOTE: for the disposal of packaging waste, consult topic 6.1 Disposal of Components).

3. Installation

3.1.1. Technical data

			Weight (kg)		(PWFS) - Maximum Misalignment with Spacer (mm)		(PWF0) - Maximum Misalignment without Spacer (mm)	
Model	**Rating (HP/1,000 RPM)**	**Rotation Maximum RPM**	**Min DBSE**	**Per extra meter**	**Axial (±)**	**Parallel (with 1/2° angle)**	**Axial (±)**	**Parallel (with 1/2° angle)**
PWF-00004	4	5000	1.009	4.050	2.0	1.0	1.0	N/A
PWF-00012	12	5000	2533	5715	3.0	1.0	1.5	N/A
PWF-00028	28	4500	4582	7.047	3.5	1.0	1.7	N/A
PWF-00040	40	4000	7764	9156	4.5	1.0	2.2	N/A
PWF-00110	110	4000	14,278	12,041	5.5	1.0	2.7	N/A
PWF-00230	230	3600	25,275	18,034	6.0	1.0	3.0	N/A
PWF-00350	350	3600	32,315	15,259	7.5	1.0	3.7	N/A
PWF-00540	540	3600	25,063	13,515	3.0	1.0	3.0	N/A
PWF-00750	750	3600	37,827	17,479	3.5	1.5	3.5	N/A
PWF-01000	1000	3600	48,530	21,578	4.0	1.5	4.0	N/A
PWF-01500	1500	3600	64,900	30,537	5.0	1.5	5.0	N/A
PWF-02000	2000	3600	50.883	37.510	2.5	1.5	2.5	N/A
PWF-02500	2500	2000	64.415	44.884	3.0	1.5	3.0	N/A
PWF-04000	4000	2000	104,316	61,684	4.0	1.5	4.0	N/A
PWF-05500	5500	2000	148,131	70,476	4.5	1.5	4.5	N/A
PWF-08000	8000	1800	214,300	94,946	4.5	1.5	4.5	N/A
PWF-12000	12,000	1800	319,327	148,536	5.5	1.5	5.5	N/A
PWF-16000	16,000	1500	415,748	183,191	6.5	2.0	6.5	N/A
PWF-20000	20,000	1500	520,203	224,321	7.0	2.0	7.0	N/A

3.1.2. Dimensions (mm)

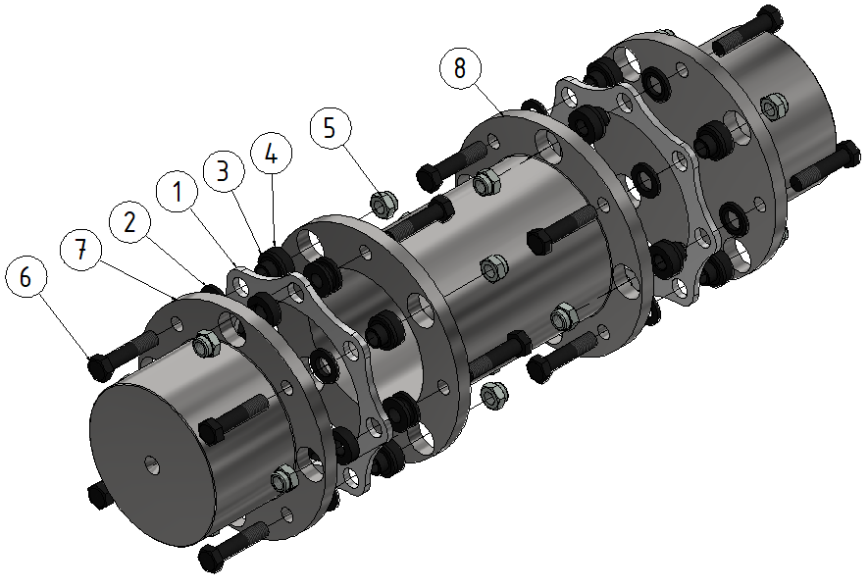


Model	A	B	C	D Max. bore (*)	X	DBSE Minimum	(PWFS) DBSE - Standard with Spacer				(PWF0) DBSE Without Spacer	H
PWF-00004	74	30	40	30	40	40	100	140	-	-	9.0	40
PWF-00012	97	37	55	40	62	56	100	140	-	-	11.5	62
PWF-00028	117	48	67	50	76	70	100	140	-	-	15.5	76
PWF-00040	144	55	85	57	82	76	100	140	180	250	16.5	82
PWF-00110	175	75	110	76	98	88	100	140	180	250	18.5	98
PWF-00230	204	90	125	90	123	100	100	140	180	250	19.5	123
PWF-00350	228	95	146	100	124	100	100	140	180	250	20.5	124
PWF-00540	222	97	140	102	-	122	-	140	180	250	20.1	-
PWF-00750	248	108	160	116	-	138	-	140	180	250	20.9	-
PWF-01000	272	117	178	130	-	151	-	-	180	250	21.4	-
PWF-01500	297	132	196	138	-	158	-	-	180	250	23.1	-
PWF-02000	266	127	177	127	-	129	-	140	180	250	22.0	-
PWF-02500	292	138	190	139	-	139	-	140	180	250	22.8	-
PWF-04000	341	165	227	163	-	155	-	-	180	250	24.3	-
PWF-05500	384	188	260	186	-	170	-	-	180	250	25.4	-
PWF-08000	429	207	288	208	-	197	-	-	-	250	27.0	-
PWF-12000	486	242	335	242	-	218	-	-	-	250	28.9	-
PWF-16000	535	263	366	263	-	238	-	-	-	250	30.4	-
PWF-20000	571	290	402	288	-	248	-	-	-	250	31.5	-

NOTE! * The maximum bores shown are based on cylindrical bores and DIN or AGMA standard rectangular keys. For special projects, consult the design set.

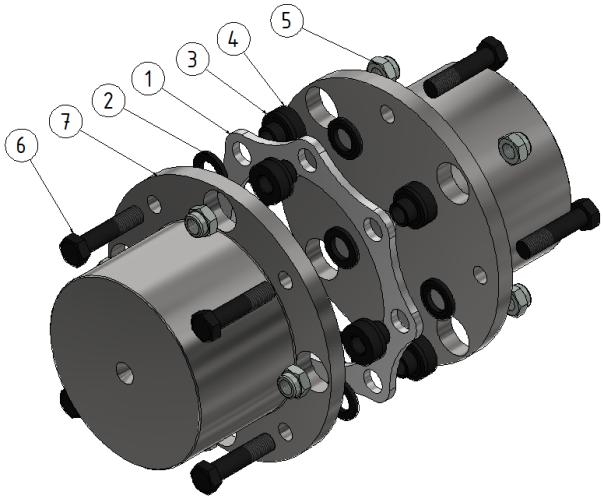
3.2. Component identification

3.2.1. Complete Drive with Spacer (PWFS)



Item	Description
1	Blade or Disc
2	Bushing
3	Bushing
4	Overload collars
5	Nut
6	Bolt
7	Hub
8	Spacer

3.2.2. Complete Drive without Spacer (PWF0)



Item	Description
1	Blade or Disc
2	Bushing
3	Bushing
4	Overload collars
5	Nut
6	Bolt
7	Hub

3.3. Hubs

WARNING!	Hubs must be manufactured in compliance with the project's dimensional and geometric tolerances. Noncompliance may cause possible failures during the operation.

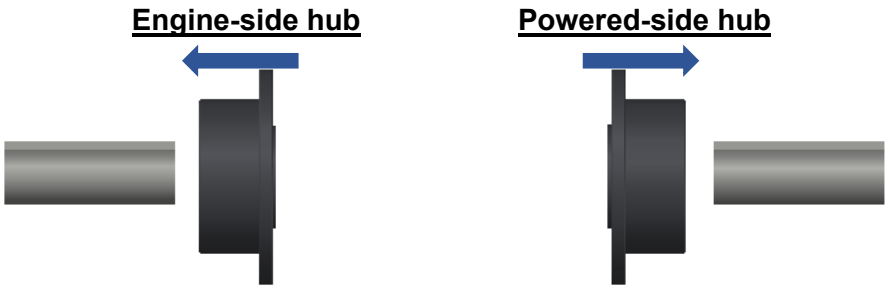
NOTE!	Hub design: Before starting assembly of the hubs, establish whether they were manufactured in compliance with the dimensions, tolerances and interference of the project. Coupling design: check the coupling length (free space between the “DBSE” hubs) before mounting the hubs.

➢ **STEP 1: Installation of Hubs on Cylindrical Keyed Shaft**

HOT!	When handling components during assembly, take the necessary precautions to prevent accidents/burns.

This type of assembly is performed with little interference between hubs/axes.

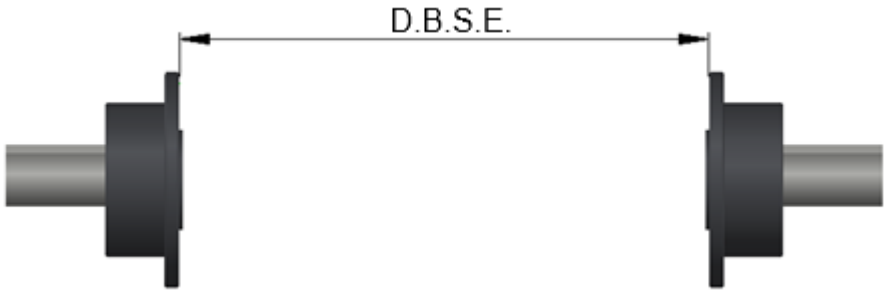
- Clean the axles and hub bores, removing any existing particles.
- Heat the hubs to facilitate assembly, avoiding the use of localized heating so as not to cause deformations, using the following methods:
  - Inductive heater (do not exceed 175°C)
  - Oil bath (do not exceed 175°C)
- Assemble the hubs according to the “DBSE” distance noted for the project.



Hub installation

- **STEP 2: Distance between Faces**

WARNING!	DBSE distance: must comply with the project, conforming to the indicated tolerances so that there is no distortion of the flexible units and therefore a reduction of their useful life. Take into account any axial movement that may occur during operation.

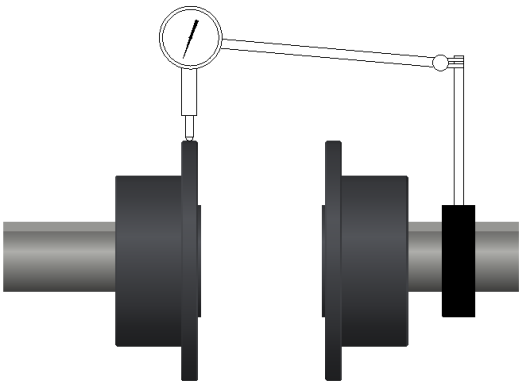


DBSE distance is the distance between the hub faces

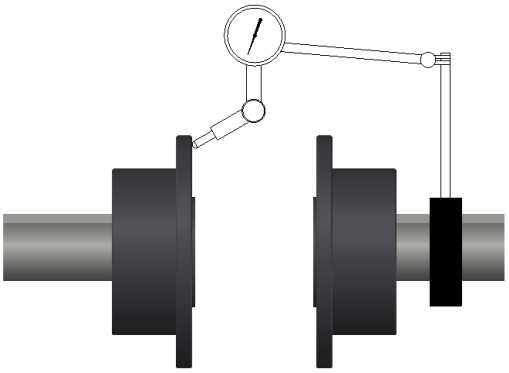
- **STEP 3: Confirm Alignments**

Take the measurements below before installing the transmission unit against the project's stipulated limits. If the values found in the installation are outside the design limits, the necessary corrections must be made.

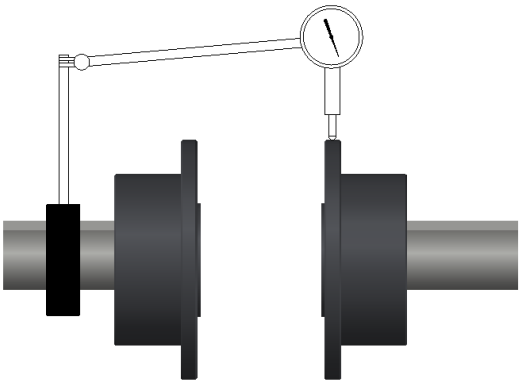
WARNING!	To ensure the service life of the transmission unit, axial, radial and angular misalignment values must be strictly adhered to.



Check the concentricity with the dial indicator mounted on the driving-side hub



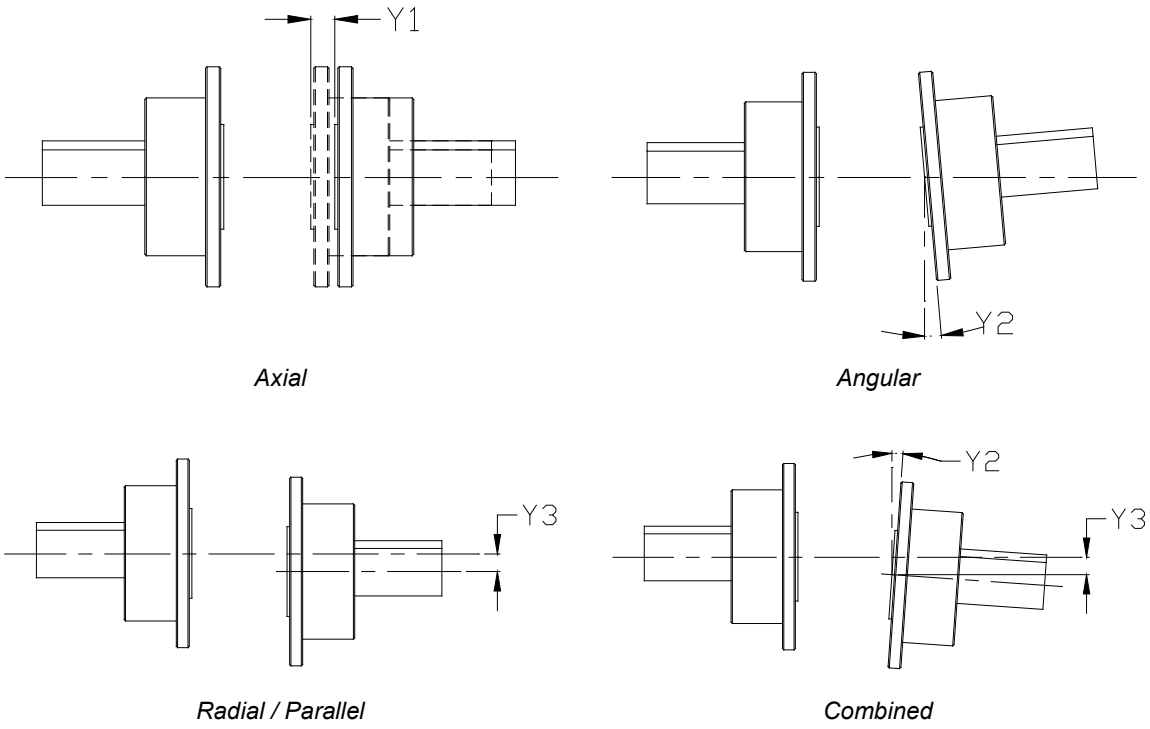
Check the parallelism on one face with the dial indicator mounted on the driving-side hub



Check the concentricity with the dial indicator mounted on the driven-side hub

If necessary, our ***Powershim*** calibrated shims can be purchased for necessary system corrections; please contact us.

NOTE! Possible types of misalignment that may be encountered during installation.



Axial *Angular*

Radial / Parallel *Combined*

NOTE: In the combined misalignment, other combinations can be found, which must be carefully analyzed and, consequently, the necessary corrective actions must be taken.

The reported misalignments (catalogs, manuals or designs) allow variations according to the service conditions.

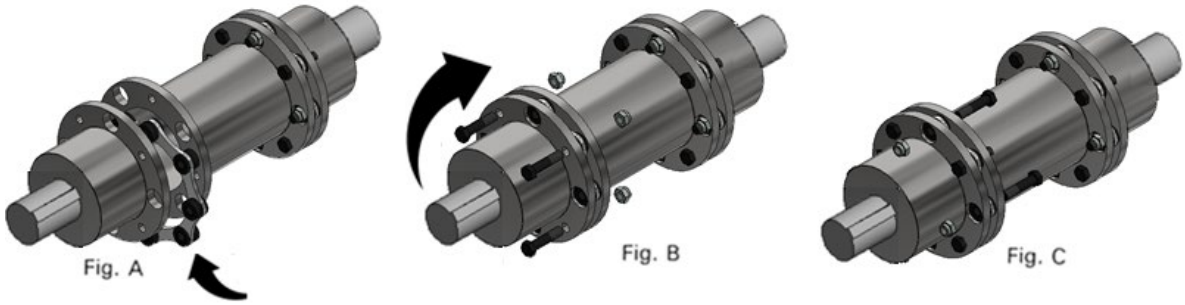
Therefore, in order to improve the performance of the transmission unit, we recommend that the discovered misalignments not exceed 10% of the values reported for the project.

For the PWF model without a spacer, only axial misalignment will be considered.

NOTE! Misalignments: for good alignment, possible movements that occur during the operation must be taken into account (for example, thermal expansion).

3.4. Installation

3.4.1. Version with Spacer (PWFS)



- **STEP 1: Hubs**

Install the two hubs on the driving-side and driven-side shafts as informed in item (3.3 Step 1), ensuring that both are correctly aligned and facing the shaft.

- **STEP 2: Distance between Shaft Faces (DBSE)**

Establish the correct distance between the shaft faces (DBSE) as mentioned in item (3.3 Step 2), ensuring that both shafts are aligned correctly. The useful life of the coupling depends on this alignment.

- **STEP 3: Transmission Unit - (Ref. 3.2.1)**

Carefully insert the spacer into the space between the hubs that are already installed and the flexible unit, ensuring that the bushing (3) is in contact with the overload collar (4). Insert the second flexible unit, as shown in Figure A, initially placing the bolts (6) in holes with a smaller diameter through the bushing (2) of the flexible unit, as shown in Figure B.

Check that the holes with the smaller diameter of the hub match the larger holes with the diameter in the spacer by duly rotating the shaft.

Place the other bolts (6) on each side, with their respective overload collars (4), and then tighten with the nuts (5), as shown in Figure C. The tightening torque must be performed according to the size of the coupling that is provided.

HAZARD!	When lifting, take the necessary precautions with regard to safety, as there is a risk of serious injury.

WARNING!	When lifting, use suitable, safe equipment in order to prevent the coupling from falling.

WARNING!	Take the necessary precautions so that there are no injuries at the time of installation, as crushing of the hands can occur.

3.4.2. Version without Spacer (PWF0)

- **STEP 1: Hubs**

Install the two hubs on the driving-side and driven-side shafts as described in item 3.3. (step 1), ensuring that both are correctly aligned and facing the shaft.

➢ **STEP 2: Distance between Shaft Faces (DBSE)**

Establish the correct distance between the shaft faces (DBSE), as described in item 3.3. (step 2), ensuring both shafts are correctly aligned. The useful life of the coupling depends on this alignment.

➢ **STEP 3: Flexible Unit - (Ref. 3.2.2)**

Insert a flexible unit as shown in Figure A, ensuring that the bushing (3) is in contact with the overload collar (4). Insert the bolts (6), in the smaller holes of the hub, which are inserted through the bushing (2) of the flexible unit.

Rotate the opposite hub until the bolts are positioned in the larger holes, as shown in Figure B.

Place the other bolts (6) with their respective overload collars (4), and then tighten with the nuts 5) as shown in Figure C. The tightening torque must be performed according to the coupling size provided.

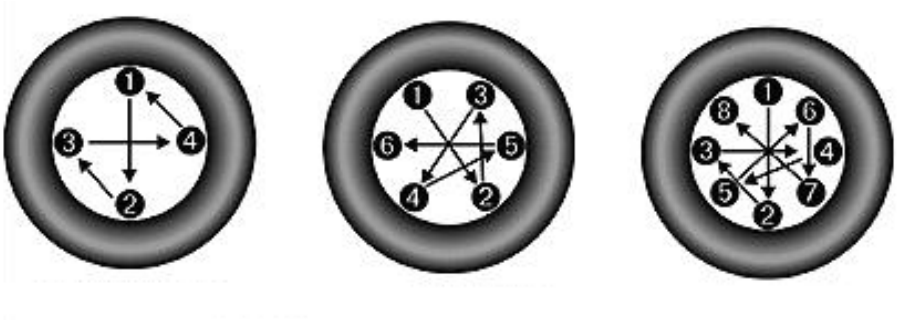
3.4.3. Fastening Flexible Units

Perform the cross torquing according to the respective values informed in the table below or in its assembly drawing.

Model	UF bolt (Nm)	Model	UF bolt (Nm)
PWF-00004	9	PWF-01500	330
PWF-00012	15	PWF-02000	200
PWF-00028	30	PWF-02500	275
PWF-00040	60	PWF-04000	375
PWF-00110	100	PWF-05500	465
PWF-00230	280	PWF-08000	950
PWF-00350	280	PWF-12000	1250
PWF-00540	110	PWF-16000	1650
PWF-00750	235	PWF-20000	1650
PWF-01000	240		

Follow the sequence below for tightening torque of the bolts:

- Start: 50% of the rated torque
- End: 100% of the rated torque



Insert the bolts and carry out the cross tightening torque according to the model above.

4. Operation

Before operating equipment, the following points must be checked:

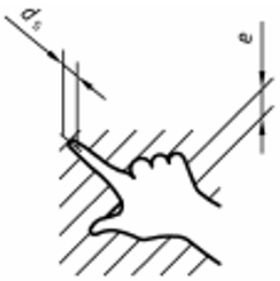
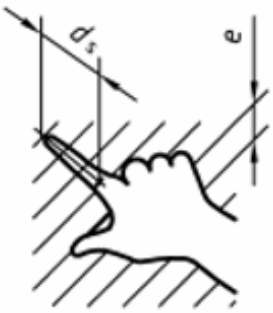
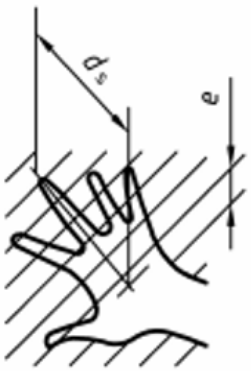
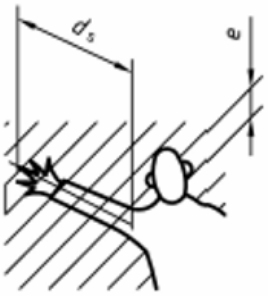
HAZARD! Follow the instructions below, ensuring that the steps are followed in order to prevent personal injury.

WARNING! Failure to follow the instructions below may result in damage to the equipment or the entire system.

- Ensure that the alignment and dimensions comply with the design data.
- Check if the fastening bolts of the flexible units have the correct torque.

As this is rotating equipment, a physical barrier must be installed to protect limbs in accordance with NR12.

HAZARD! Beware of rotating parts or equipment as they can cause serious injuries.

Parts of the body	Illustration	Opening *and* (mm)	Safe Distance s_d (mm)		
			Slit	Square	Circular
Fingertip		*and* ≤ 4	≥ 2	≥ 2	≥ 2
		4 < *and* ≤ 6	≥ 10	≥ 5	≥ 5
Finger to hand joint		6 < *and* ≤ 8	≥ 20	≥ 15	≥ 15
		8 < *and* ≤ 10	≥ 80	≥ 25	≥ 20
		10 < *and* ≤ 12	≥ 100	≥ 80	≥ 80
		12 < *and* ≤ 20	≥ 120	≥ 120	≥ 120
		20 < *and* ≤ 30	≥ 850*	≥ 120	≥ 120
Arm to shoulder joint		30 < *and* ≤ 40	≥ 850	≥ 200	≥ 120
		40 < *and* ≤ 120	≥ 850	≥ 850	≥ 850

Safety distances, to prevent upper limb access to danger zones.

If the length between the guard and the rotating component is 65 mm or less, the thumb will act as a limiter and the safety distance can be reduced.

Various types of construction and materials can be used to make the protective components. However, we recommend observing the following points for construction:

- Perforated steel material: to improve viewing by the maintenance team during inspections.
- Hinges for opening, if it is necessary to carrying out any work again (alignment, maintenance, etc.).
- Locks (padlocks) that make it impossible to open when the equipment is operating.
- Sufficient space between the guard and the coupling along the entire the circular perimeter.

If necessary, coupling guards can be purchased. ***Coupguard*** meets the NR12 standard providing safety for the installation. Please contact us to find out more.

When operating the coupling, observe the points below:

- Strange noises that may occur;.
- Excessive vibration.

WARNING! If irregularities are encountered when in operation, immediately stop the operation. Find out the cause of the irregularity and correct it, and make sure that no damage has occurred to the coupling.

5. Maintenance

5.1. Visual inspection

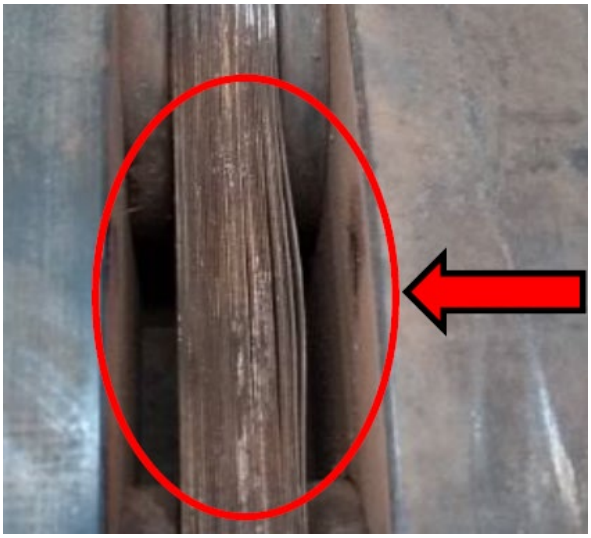
WARNING! Failure to follow the instructions below may result in damage to the system and/or premature equipment failure.

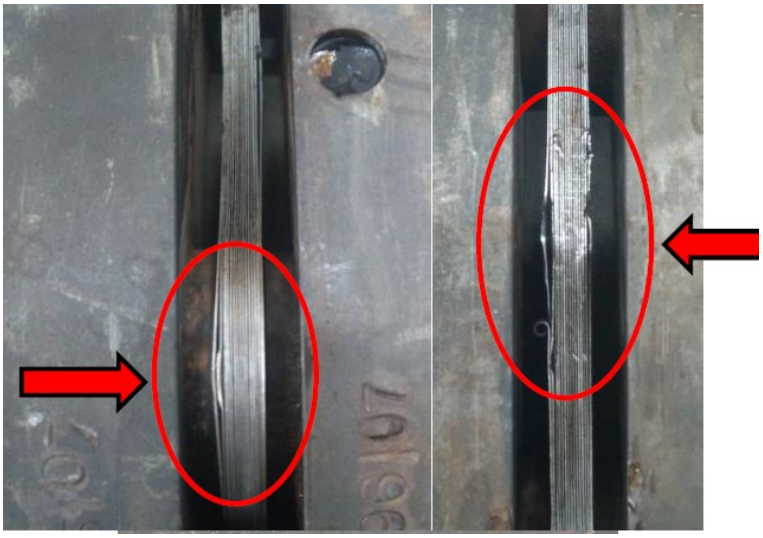
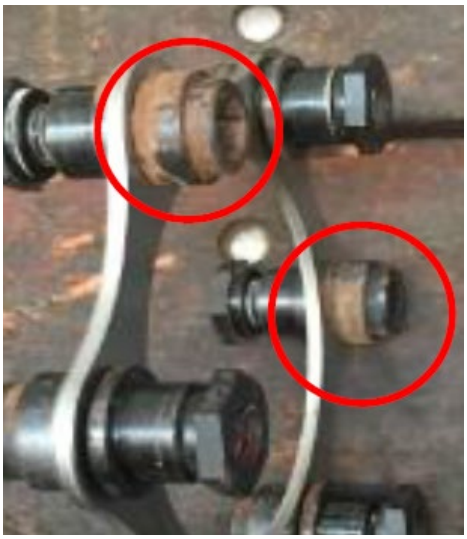
HAZARD! Beware of rotating parts or equipment as they can cause serious injuries.

Although the line of disc couplings makes periodic maintenance unnecessary, inspections must be performed regularly by the team to ensure perfect operating performance. The following points should be checked when carrying out inspections:

- Corrosion found in the transmission unit, fastening bolts and components of the flexible units;
- Flexible unit failures;
- Change in the transmission system vibration compared to at the start of the installation. Always monitor the system's vibration history.

For more information on failures, see topic 5.2 Troubleshooting.

Failure	Figure
Misalignment	
Corrosion in the spacer	

Failure	Figure
Broken discs	
Corrosion of flexible unit components	

➢ **Inspection frequency**

Below, we suggest an inspection schedule to be applied to the maintenance team's inspection routines to guarantee the sound performance of the system's operation.

NOTE! The purpose of the inspection schedule is to report the minimum points that must be observed in the team's inspection routine. These can then be adapted to the tasks that are performed.

Items to check	Complement	Commissioning and initial installation	After commissioning
Corrosion	-----	1st week	Monthly
Flexible units	-----	1st week	Monthly
Flexible unit fasteners	Tightening torque	1st week	Yearly
System vibration	Monitoring vibration history	1st week	Weekly
Misalignment	Log the history	1st week	Yearly

5.2. Troubleshooting

➢ **Corrosion**

As standard, the couplings and their components are provided with surface treatment according to our standard design. However, other treatments may be applied according to the scope of the project.

Although the couplings are given surface treatments, that protection is not applied in the long term and cannot be applied in harsh environments. In view of this, if oxidation is confirmed on all or part of the couplings, action must be taken so as not to compromise their structural integrity.

➢ **Misalignments**

It is possible that misalignments may gradually worsen over time and/or that the flexible unit discs have deformities.

Therefore, it is possible to check their condition using a strobe light during inspection, without stopping the equipment. Using this tool, check for any deformations in the flexible units.

➢ **Flexible units failures**

Flexible unit discs are pressed during assembly and if there is a failure, it will occur from the outside to the inside.

The coupling was developed to operate even when a few of the discs are faulty. However, if appropriate action is not taken, the other discs may become overloaded and this may compromise other parts of the coupling.

This failure can be observed during operation by using a strobe light.

➢ **Failure list**

Failure	Possible cause	Verification
Excessive noise during operation **System vibration**	Misalignment	□ Stop operation □ Find the cause of the misalignment □ Correct the misalignment source
	Fastening improperly torqued flexible units	□ Stop operation □ Ensure the alignment is within the design parameters □ Check the flexible unit bolts forwear □ Reinstall the bolts by torqueing them according to the design data

Failure	Possible cause	Verification
Flexible unit disc breakage	Overtorque	□ Stop operation □ Remove the coupling and analyze the reason for the overtorque in the operation history □ Analyze the components that have been damaged in the coupling and replace them □ Reinstall the coupling and monitor the operation
	Misalignment	□ Stop operation □ Find the cause and types of misalignment and correct them □ Ensure the alignment is within the design parameters □ Analyze the components that have been damaged in the coupling and replace them □ Reinstall the coupling and monitor the operation

Failure	Possible cause	Verification
Cracks/breaks of discs and/or bolts	Vibration	□ Stop operation □ Remove the coupling □ Analyze the development of system vibrations in the operation history □ Analyze the components that have been damaged in the coupling and replace them □ Reinstall the coupling and monitor the operation

5.3. General maintenance

One of the advantages of disc couplings, according to the information included in this manual, is that they do not require periodic maintenance if properly installed. Maintenance can be provided whenever there is downtime for routine maintenance (at least once a year) and it is recommended that the following items be checked:

- Flexible units
- Hubs
- Shafts (if the hubs are removed)
- Maintenance frequency

WARNING! Failure to follow the instructions below may result in damage to the system and/or premature equipment failure.

- **Flexible units:**
  - There should be no spaces between the flexible unit discs' springs.
  - Check for broken, cracked or compromised discs.
  - If spacing that is larger than normal, cracks or broken discs are found, the entire flexible unit must be replaced.
  - The components of the flexible unit must be in good condition and be free from corrosion. If this is not the case, they must be replaced.
- **Hubs:**
  - Evaluate the structural condition, visually checking that there are no cracks or corrosion.
  - The pilot must not be worn.
  - Check for possible hub fitting hole deformation.
  - Hole status and keyway (for hubs, for interference).
- **Shafts:**
  - Evaluate the circular perimeter, ensure there is no wear and check the condition of the keyway (for hubs, for interference).

WARNING! To guarantee the system's operational safety, only ***Lamiflex Couplings®*** original parts should be used.

➢ **Maintenance frequency**

- As mentioned earlier, couplings do not require periodic maintenance. However, we suggest some relevant points are applied during the yearly downtime:

Maintenance	Maintenance/services required	Supplier
1 year	Surface treatment	Lamiflex couplings
	Flexible unit replacement	Lamiflex couplings
	Alignment check	Customer
	Comparison of the vibration history	Customer
3 years	Surface treatment	Lamiflex couplings
	Flexible unit replacement	Lamiflex couplings
	Alignment check	Customer
	Comparison of the vibration history	Customer

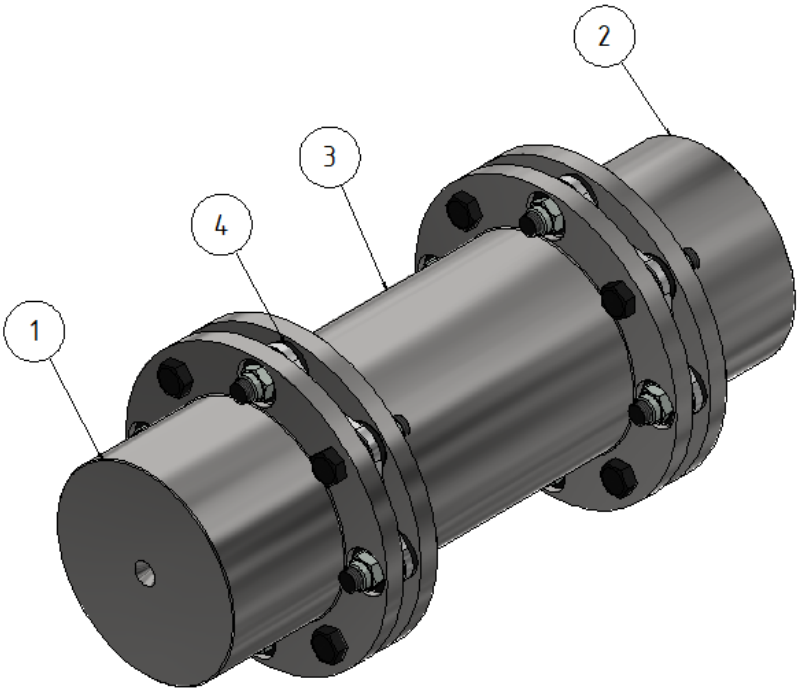
5.4. Spare parts

5.4.1. General information

The availability of replacement parts in stock for replacement when necessary will ensure reduced downtime and the operation-readiness of the coupling.

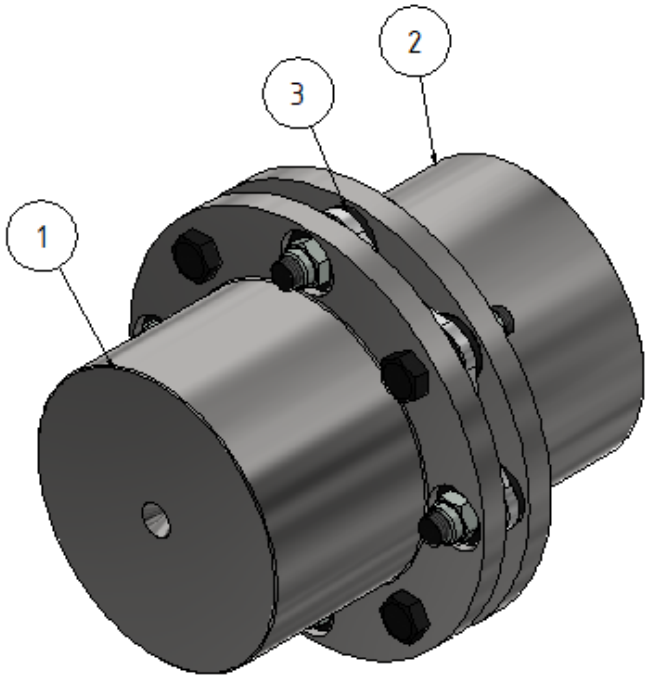
We recommend keeping the following spare parts in stock, with their respective quantities:

➢ Version with Spacer (PWFS)



Item	Description	Quantity to keep in stock
1	Hub	N.A.
2	Hub	N.A.
3	Spacer	N.A.
4	Flexible Unit	02

➢ Version without Spacer (PWF0)



Item	Description	Quantity to keep in stock
1	Hub	N.A.
2	Hub	N.A.
3	Flexible Unit	01

5.4.2. Storage

To store spare parts correctly, some precautions must be taken to ensure that there is no damage to the assemblies:

- Preferably keep the items packaged and, if possible, with the original packaging, until installation.
- Avoid shocks of any kind during handling.
- Protect against corrosion when stored for long periods.
- The storage place must be sheltered and clean, with relative humidity of up to 65%.
- Ensure there is no likelihood of falling objects (particularly for flexible units) or something similar.

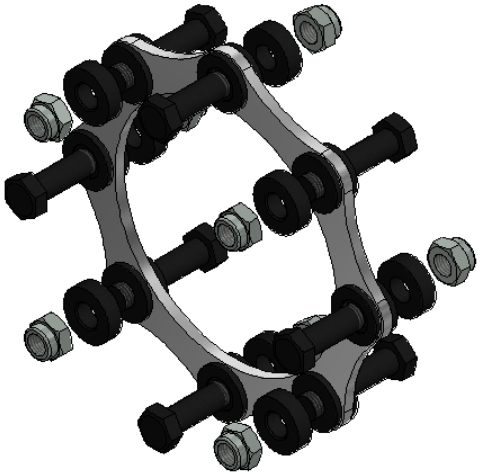
NOTE: for the disposal of packaging waste, consult item 6.1 Disposal of components.

5.4.3. Replacement of flexible units

WARNING! To guarantee the system's operational safety, only ***Lamiflex Couplings®*** original parts should be used.

NOTE! Ensure that the flexible units in stock are the same model as the existing coupling.

- Flexible units for spare parts include overhead bolts, nuts and collars.
- Remove any spacers that may be found in the drive system
- Dismantle the damaged flexible units and dispose of them according to the guidelines mentioned in item 6.1 Disposal of components.
- Install the new flexible units as described in item (3.4.1) or (3.4.2)
- Follow the sequence below for tightening torque of the bolts (cross shape).
    - Start: 50% of the rated torque
    - End: 100% of the rated torque



Model	UF bolt (Nm)	Model	UF bolt (Nm)
PWF-00004	9	PWF-01500	330
PWF-00012	15	PWF-02000	200
PWF-00028	30	PWF-02500	275
PWF-00040	60	PWF-04000	375
PWF-00110	100	PWF-05500	465
PWF-00230	280	PWF-08000	950
PWF-00350	280	PWF-12000	1250
PWF-00540	110	PWF-16000	1650
PWF-00750	235	PWF-20000	1650
PWF-01000	240		

6. General information

6.1. Disposal of Components

POLLUTION!

In compliance with current laws regarding environmental issues, it is necessary to respect the environment when disposing of waste.

Waste must be collected by an authorized company for proper disposal with no negative environmental impact.

Materials used for the packaging and composition of the equipment that must be considered when disposing of waste are shown below.

- **Coupling Packaging**

Upon receipt, the couplings are packed and comprise the following materials:

Smaller Couplings	Cardboard box
	Plastic (smooth or bubble-wrap)
	Metal clamps
Larger couplings	Wooden box
	Plastic (smooth or bubble-wrap)
	Metal latches

- **Spare part packaging**

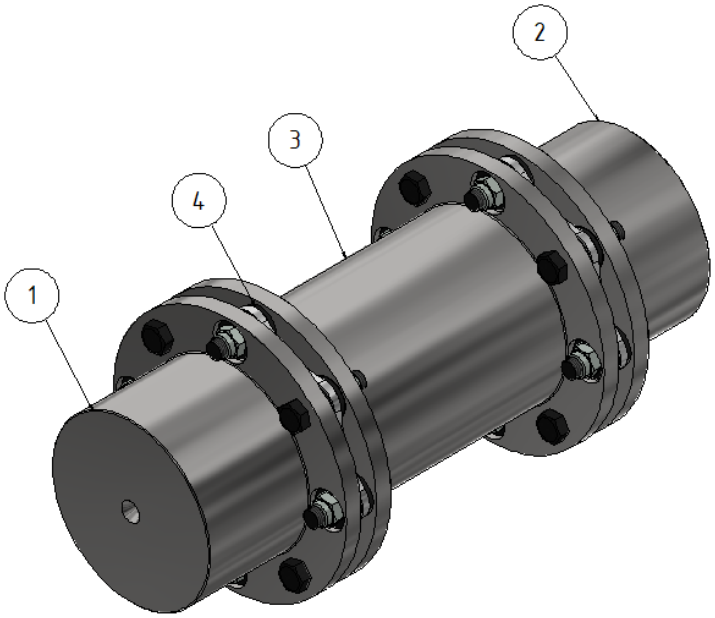
Upon receipt, spare parts are packed and can be made of the following materials:

Flexible units (spare part)	Cardboard box
	Plastic (smooth or bubble-wrap)
	Metal clamps

➢ **Couplings (PWFS / PWF0)**

For disposal of the couplings, it is necessary to:

- Clean all parts.
- Disassemble the equipment and destroy it so can no longer be used.



Item	Description	Material
1	Hub	Metal
2	Hub	Metal
3	Spacer	Metal
4	Flexible Unit	Metal

NOTE: Both hubs and flexible units must also be taken into consideration when discarding of waste, as they are made of metal and follow the same guidelines as are stated in this section.

6.2. Additional information

This manual was developed based on the standard conditions of the product catalog. In the case of special projects, the information included in the technical documentation for the project or in the special designs made available by Altra will prevail.