

FLENDER COUPLINGS

ZAPEX

Assembly and operating instructions M3500-01en
Edition 09/2022

ZWN, ZWNA, ZWD, ZWDA, ZZS, ZZSA, ZZSD, ZZDA, ZWNV, ZZSV



Original assembly and operating instructions

M3500-01
Edition 09/2022

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Table of contents

1	Introduction.....	11
1.1	Legal information	11
1.2	About these instructions.....	12
1.3	Text attributes	12
1.4	Copyright.....	13
2	Safety information	15
2.1	General information	15
2.2	Intended use	17
2.3	Safety information for a coupling when used in potentially explosive atmospheres	17
2.3.1	Marking	17
2.3.2	Conditions of use	18
2.4	General warning notices	19
3	Description	21
4	Application planning	25
4.1	Transport of the coupling	25
4.2	Storage of the coupling	25
5	Assembly.....	27
5.1	Preparatory work.....	27
5.1.1	Mill the finished bore	28
5.1.2	Mill the parallel keyway	29
5.1.3	Machining an axial locking mechanism.....	29
5.1.4	Balancing the coupling.....	32
5.2	Mounting the coupling	33
5.2.1	Assembling cover and DUO sealing ring	34
5.2.2	Assembling coupling parts with shaft-hub connection using a parallel key	34
5.2.3	Assembling coupling parts with shaft-hub connection using a pressurised oil interference fit	35
5.2.4	Assembling the coupling	36
5.3	Aligning the coupling	37
5.3.1	Purpose of alignment	37
5.3.2	Possible misalignment	37
5.3.2.1	Axial misalignment	38
5.3.2.2	Angular misalignment	38

5.3.2.3	Radial misalignment.....	38
5.3.2.4	Angular and radial misalignment.....	38
5.4	Fill with lubricant	39
5.4.1	Lubricant	39
5.4.2	Filling quantity	41
5.4.3	Fill with lubricant	43
6	Commissioning.....	45
7	Operation.....	47
7.1	Normal operation of the coupling	47
7.2	Fault – causes and correction	47
7.2.1	Procedure in the event of faults	47
7.2.2	Identifying the fault cause	47
7.2.2.1	Possible faults	48
7.2.2.2	Possible causes	49
7.2.2.2.1	Unsuitable coupling.....	49
7.2.2.2.2	Assembly-related causes	49
7.2.2.2.3	Maintenance-related causes	50
7.2.2.2.4	Specific assembly-related and maintenance-related causes	50
7.2.3	Resolving faults.....	50
7.2.3.1	Resolving lubricant shortage.....	50
7.2.3.2	Correcting the changed alignment	51
8	Maintenance	53
8.1	Maintenance intervals	53
8.2	Lubricant replacement	53
8.3	Replace the DUO sealing ring	54
8.3.1	Replace DUO sealing rings (12) with size 910	55
8.3.2	Replacing DUO sealing ring (12) from size 1020.....	55
8.4	Dismantling the coupling	56
8.4.1	Dismantling coupling part 1 (1) or 2 (2) with shaft-hub connection using a parallel key	57
8.4.2	Dismantling coupling part 1 (1) or 2 (2) with shaft-hub connection using pressurised oil interference fit	57
9	Service and support	61
9.1	Contact.....	61
10	Disposal.....	63
11	Replacement parts	65
11.1	Ordering replacement parts	65

11.2	Spare parts drawing and spare parts list	66
11.2.1	Spare parts list	66
11.2.2	Spare parts drawing for ZWN, ZWNA, ZWD, ZWDA and ZWNV types	68
11.2.3	Spare parts drawing for ZZS, ZZSA, ZZSD, ZZDA and ZZSV types	69
11.2.4	Two section cover	69
11.2.5	Screw plug	70
A	Technical specifications	71
A.1	Speeds, geometry data and weights	71
A.1.1	Dimension drawing for ZWN, ZWNA, ZWD and ZWDA types	71
A.1.2	Dimension drawing for ZZS, ZZSA, ZZSD and ZZDA types	73
A.1.3	Dimension drawing ZWNV type	74
A.1.4	Dimension drawing ZZSV type	75
A.1.5	Dimension table	77
A.2	Clearance S	79
A.3	Distances between teeth VA and recommended alignment values for angular and radial misalignment	80
A.4	Tightening torques and widths A/F	82
A.5	Tightening procedure	83
A.6	DUO sealing rings	83
A.6.1	Use and storage of the DUO sealing rings (12)	83
A.6.2	DUO sealing rings	84
B	Declaration of conformity	85
B.1	EU Declaration of Conformity	85

List of tables

Table 2-1	General warnings	15
Table 2-2	Temperature classes for explosive atmospheres as a result of gases, vapours or mists	18
Table 4-1	Types of preservative agents for long-term storage.....	26
Table 5-1	Recommended assigned fits for bores with parallel key connection.....	28
Table 5-2	Diameter and axial position of the threaded hole, tightening torque and width A/F	30
Table 5-3	Oil filling quantity for coupling sizes 112 to 375	42
Table 5-4	Oil filling quantity for coupling sizes 415 to 910	42
Table 5-5	Oil filling quantity for coupling sizes 1020 to 1540	42
Table 7-1	Table of faults.....	48
Table 8-1	Operating temperatures, operating hours and years of use.....	53
Table 11-1	Spare parts list for ZWN, ZWNA, ZWD, ZWDA, ZZS, ZZSA, ZZSD, ZZDA, ZWNV and ZZSV types	66
Table A-1	Speeds, geometry data and weights for coupling sizes 112 to 1540	77
Table A-2	Clearance S.....	79
Table A-3	Distances between teeth VA and recommended alignment values for radial and angular misalignment	80
Table A-4	Tightening torques and widths A/F	82
Table A-5	Tightening procedure	83
Table A-6	DUO sealing rings	84

List of figures

Figure 3-1	Models without spacer (4)	22
Figure 3-2	Models with spacer (4)	23
Figure 4-1	Transport symbols.....	25
Figure 5-1	Tolerances for the finished bore in coupling part 1 (1) or 2 (2)	29
Figure 5-2	Diameter and axial position of the threaded hole in the hub	30
Figure 5-3	Position of the balancing bore for two-plane balancing.....	33
Figure 5-4	Inserting the DUO sealing rings	34
Figure 5-5	Possible misalignment.....	37
Figure 5-6	Fill with lubricant.....	43
Figure 8-1	Draining the lubricant	54
Figure 11-1	Spare parts drawing for ZWN, ZWNA, ZWD, ZWDA, ZWNV types	68
Figure 11-2	Spare parts drawing for ZZS, ZZSA, ZZSD, ZZDA, ZZSV types	69
Figure 11-3	Two-part cover (21)	69
Figure 11-4	Screw plug (22)	70
Figure A-1	Dimension drawing for ZWN, ZWNA, ZWD and ZWDA types	72
Figure A-2	Dimension drawing for ZZS, ZZSA, ZZSD and ZZDA types	74
Figure A-3	Dimension drawing ZWNV type	75
Figure A-4	Dimension drawing ZZSV type	76

Introduction

1

1.1 Legal information

Warning system

These instructions contain information you must observe for your own personal safety as well as to avoid damage to property and persons. The information regarding your personal safety is highlighted with a warning triangle. Information exclusively regarding property damage alone is not marked with a warning triangle. Depending on the hazard class, the warnings shall be depicted as follows, in descending order.

DANGER

means that death or severe physical injury **will** occur if the relevant precautionary measures are not taken.

WARNING

means that death or severe physical injury **may** occur if the relevant precautionary measures are not taken.

CAUTION

means that mild physical injury may occur if the relevant precautionary measures are not taken.

NOTICE

means that damage to property may occur if the relevant precautionary measures are not taken.

If multiple hazard classes come into play, the warning for the highest level in question shall always be used. If a warning containing the warning triangle warns of harm to individuals, the same warning may also include a warning regarding damage to property.

Information



Information

Information offers additional notes, assistance and tips for handling the product.

Qualified personnel

The product/system associated with this documentation may only be used by **qualified personnel** trained to perform the relevant tasks, taking into account the associated documentation for the relevant tasks, particularly the safety information and warnings included therein. Due to their qualification and experience, qualified personnel are capable of detecting risks and avoiding potential hazards when dealing with these products/systems.

Intended use of Flender products

Please note the following:

WARNING

Flender products are only suitable for the uses set out in the catalogue and associated technical documentation. If third-party products and components are used, these must be recommended and/or authorised by Flender. Safe and flawless operation of the products requires proper transport, proper storage, setup, assembly, installation, commissioning, operation and maintenance. The permissible environmental conditions must be adhered to. Instructions in the associated documentation must be followed.

Trademarks

All designations marked with the trademark symbol ® are registered trademarks of Flender GmbH. Other designations in this document may be trademarks whose use by third parties for their own purposes may violate the rights of the owner.

Liability disclaimer

We have assessed the contents of these instructions for compliance with the hardware and software described. However, deviations cannot be ruled out, so we are unable to accept liability for full compliance. The details in these instructions are regularly reviewed and necessary corrections are contained in subsequent editions.

1.2 About these instructions

These instructions describe the coupling and provide information about its handling - from assembly to maintenance. Please keep these instructions for later use.

Please read these instructions prior to handling the coupling and follow the information in them.

1.3 Text attributes

The warning notice system is explained on the back of the inner cover. Always follow the safety information and notices in these instructions.

In addition to the warning notices, which have to be observed without fail, you will find the following text attributes in these instructions:

1. Procedural instructions are shown as a numbered list. Always perform the steps in the order given.
 - Lists are formatted as bulleted lists.
 - The dash is used for lists at the second level.
- (1) Numbers in brackets are part numbers.

1.4 Copyright

The copyright of these instructions is held by Flender.

These instructions must not be used wholly or in parts without our authorisation or be given to third parties.

If you have any technical queries, please contact our factory or one of our service outlets (refer to Service and support (Page 61)).

Safety information

2

2.1 General information

Instructions

These instructions are part of the delivery. Always keep these instructions close to the coupling.

Please make sure that every person who is commissioned to work on the coupling has read and understood these instructions prior to handling the coupling and observes all of the points.

Only the knowledge of these instructions can avoid faults on the coupling and ensure fault-free and safe operation. Non-adherence to the instructions can cause product or property damage or personal injury. Flender does not accept any liability for damage or operating failures that are due to non-adherence to these instructions.

State of the art

The coupling described here has been designed in consideration of the latest findings for demanding technical requirements. This coupling is state-of-the-art at the time of printing these instructions.

In the interest of further development, Flender reserves the right to make such changes to the individual assembly units and accessories that increase performance and safety while maintaining the essential features.

Symbols

ISO	ANSI	Warning
		Warning – hazardous electrical voltage
		Warning – explosive substances
	---	Warning – entanglement hazard
	---	Warning – hot surfaces
	---	Warning – corrosive substances
	---	Warning – suspended load

2.1 General information

ISO	ANSI	Warning
	---	Warning – hand injuries
		Explosion protection approval

Table 2-1: General warnings

Explanation regarding Machinery Directive 2006/42/EC

The couplings described here are “components” in accordance with the Machinery Directive and do not require a Declaration of Incorporation.

Explosion Protection Directive

The term “Explosion Protection Directive” used in these instructions refers to the harmonization legislation of the European Union relating to equipment and protective systems intended for use in potentially explosive atmospheres complied with in accordance with the co-applicable EU Declaration of Conformity.

Protective clothing

In addition to the generally prescribed personal protective equipment (safety shoes, overalls, helmet, etc.), also wear suitable protective gloves and safety glasses when handling the coupling.

Using the coupling

The relevant occupational safety and environmental protection regulations must be complied with at all times during transport, assembly, installation, dismantling, operation and maintenance of the coupling.

Only qualified personnel may operate, assemble, maintain and repair the coupling. Information about qualified personnel can be found in the legal notes at the beginning of these instructions.

If hoisting gear or load lifting devices are used for transporting, these have to be suitable for the weight of the coupling.

If the coupling has visible damage, it may not be assembled or put into operation.

The coupling may only be operated in a suitable housing or with touch protection according to applicable standards. This also applies to test runs and rotational direction checks.

Work on the coupling

Only carry out work on the coupling when it is not in operation and is not under load.

Take measures to prevent the accidental restarting of the drive aggregate. Attach an information notice to the start switch stating clearly that work is being carried out on the coupling. Ensure that the entire unit is not under load.

2.2 Intended use

Only use the coupling according to the conditions specified in the service and delivery contract and the technical data in the annex. Deviating operating conditions are considered improper use. The user or operator of the machine or system is solely liable for any resulting damage.

When using the coupling please specifically observe the following:

- Do not make any modifications to the coupling that go beyond the permissible machining described in these instructions. This also applies to touch protection facilities.
- Use only original replacement parts from Flender. Flender only accepts liability for original replacement parts from Flender.
Other replacement parts are not tested and approved by Flender. Non-approved replacement parts may possibly change the design characteristics of the coupling and thus impact active and/or passive safety.
Flender will accept no liability or warranty whatsoever for damage occurring as a result of the use of non-approved replacement parts. The same applies to any accessories that were not supplied by Flender.

If you have any queries, please contact our customer service organisation (see Service and support (Page 61)).

2.3 Safety information for a coupling when used in potentially explosive atmospheres



Information

Declaration of conformity

A declaration of conformity required according to the respective Explosion Protection Directive can be found in chapter Declaration of conformity (Page 85)

2.3.1 Marking

You can find a description of the coupling parts in chapter Description (Page 21).

A coupling designed in accordance with the Explosion Protection Directive has a marking on the coupling parts.

The following marking is visible on the outer diameter of a coupling part (e.g. the flanged sleeve):

Flender GmbH

D 46393 Bocholt

ZAPEX



<Year of manufacture>



II 2G Ex h IIC T6 ... T5 Gb X



II 2D Ex h IIIC T85 °C ... 100 °C Db X



I M2 Ex h Mb X

2.3.2 Conditions of use

Note also the material-dependent permissible ambient temperature of the DUO sealing ring (12) according to chapter DUO sealing rings (Page 84).

A coupling designed in accordance with the Explosion Protection Directive is suitable for the following conditions of use:

- Equipment group I
 - Category M2
- Equipment group II
 - Category 2 and 3
 - Group of substances G, zone 1 and 2
 - Group of substances D, zone 21 and 22
 - Explosion group IIA, IIB and IIC

1. Gases, vapours or mists

Check the ambient temperature for use of the coupling in the relevant temperature class.

The maximum surface temperature of the coupling for a potentially explosive atmosphere as a result of gas/vapour/mist mixtures is obtained from the maximum ambient temperature and/or the maximum temperature of the adjacent components. The self-heating of the coupling is minor. In normal atmospheric conditions for explosion protection applications, a maximum surface temperature <85 °C can be expected.

Max. ambient temperature	Temperature class	Max. surface temperature
-45 °C to +80 °C	T4	<135 °C
-45 °C to +60 °C	T5	<100 °C
-45 °C to +45 °C	T6	<85 °C

Table 2-2: Temperature classes for explosive atmospheres as a result of gases, vapours or mists

2. Dust/air mixtures

Check the ambient temperature.

The maximum surface temperature of the coupling for a potentially explosive atmosphere as a result of dust/air mixtures is obtained from the maximum ambient temperature and/or the maximum temperature of the adjacent components. The self-heating of the coupling is minor. In normal atmospheric conditions for explosion protection applications, a maximum surface temperature <85 °C can be expected.

Notes concerning operation of the coupling in potentially explosive atmospheres

- Only use the coupling in potentially explosive atmospheres together with drive motors that can be switched off in the event of the formation of an explosive atmosphere.
- Earth machines that are connected via the coupling with a leakage resistance of less than $10^6 \Omega$.

- If you want to use a coated coupling in potentially explosive atmospheres, please note the requirements concerning the conductivity of the paint and the limitation on the paint layer thickness applied in accordance with EN 80079-36. No build-up of electrostatic charges is to be expected with a paint layer thickness of less than 200 µm.

2.4 General warning notices



DANGER

Danger due to bursting of the coupling

The coupling may burst if it is not used properly. There is a risk of fatal injury from flying fragments. Personal injury, property damage and fire damage caused by sparks may occur. If a coupling bursts in an area at risk of explosion, then this can result in an explosion.

- Use the coupling for the purpose for which it is intended.



DANGER

Risk of explosion when using coupling parts without Ex marking

Coupling parts without Ex marking have not been approved for use in potentially explosive atmospheres. These coupling parts can lead to an explosion during operation.

- Only use couplings with Ex marking in potentially explosive atmospheres.



DANGER

Danger

Risk of injury due to the use of unsuitable and/or damaged components. The use of unsuitable and/or damaged components can lead to an explosion in potentially explosive atmospheres.

- Observe the information regarding conditions of use.



DANGER

Danger of explosion

Improper operation of the coupling can lead to an explosion in potentially explosive atmospheres.

- Please observe the notes concerning operation of the coupling in potentially explosive atmospheres.



DANGER

Danger from hot coupling parts

Risk of injury due to hot surfaces. Hot coupling parts can lead to an explosion in potentially explosive atmospheres.

- Wear suitable protective equipment (gloves, safety glasses).
- Ensure that the area is not at risk of explosion.

2.4 General warning notices

**⚠ WARNING****Risk of chemical burns from chemical substances**

There is a risk of chemical burns when handling aggressive cleaning agents.

- Please observe the manufacturer's instructions on how to handle cleaning agents and solvents.
- Wear suitable protective equipment (gloves, safety glasses).

⚠ CAUTION**Physical injury**

Risk of injury due to falling coupling parts.

- Secure the coupling parts to prevent them from falling.

Description

3

The ZAPEX couplings described here are universally applicable, torsionally rigid gear couplings that are available in various types and sizes. The couplings can be used in accordance with the Explosion Protection Directive in potentially explosive atmospheres if they have a corresponding marking.

These instructions describe the assembly and operation of a ZAPEX coupling arranged horizontally with a shaft-hub connection made by a cylindrical or conical bore with parallel key or by a pressurised oil interference fit. Please consult Flender if you want to use a different type of installation. The ZWNV and ZZSV types are arranged vertically.

Application

ZAPEX couplings are designed for use in all kinds of machines. They are designed to withstand high torques and harsh operating conditions.

Structure

The ZAPEX coupling consists of the two hub parts (1) and (2) with external teeth, which are fitted onto the machine shafts. The external teeth engage in a flanged sleeve (5) in each case, which has corresponding internal teeth. The flanged sleeves (5) are bolted together with fitting bolts (8) and nuts (9) or with fitting bolts (8), nuts (9) and a spacer (4). The external teeth of the hub parts (1), (2) are not arranged in the centre of the hub. Depending on the mounting position, this results in the A, B or AB variants with the different shaft distance dimensions S.

The gear is lubricated using oil or grease. In the ZWN, ZWNA, ZWNV, ZZS, ZZSA and ZZSV types, DUO sealing rings (12) are used to seal the oil or grease spaces to the outside. The parallel keyways must be sealed against lubricant leakage during assembly. The ZWD, ZWDA, ZZSD and ZZDA types are intended for oil flow lubrication, which means they are equipped without DUO sealing rings (12).

For the ZWNA and ZWDA types, the axial backlash is restricted by the two-part retaining ring (51), for the ZZSA and ZZDA types by the two-part retaining rings (52).

The spare parts drawings and spare parts list can be found at Spare parts drawing and spare parts list (Page 66).

The diagrams show the various types with their constituent parts and their part numbers.

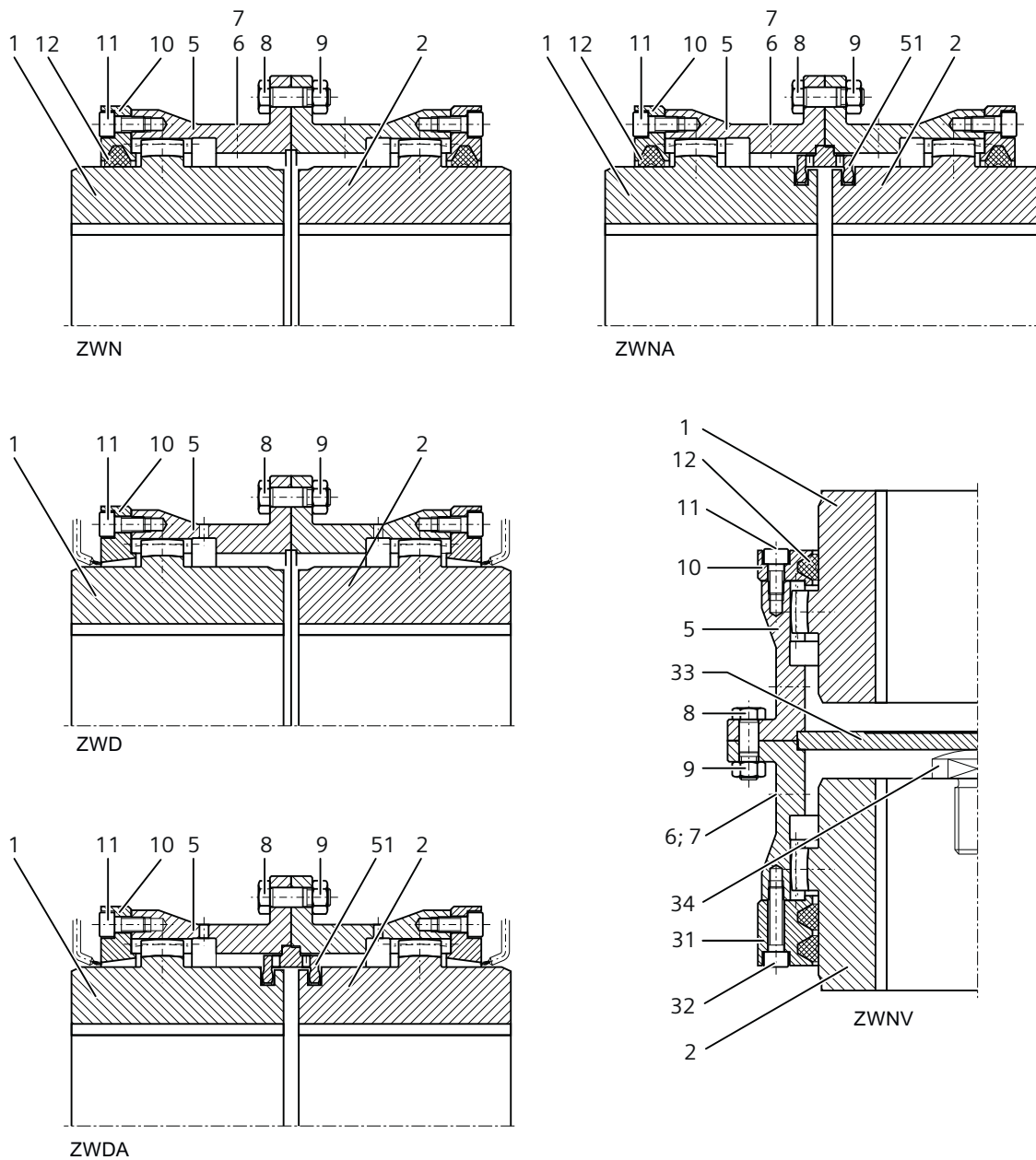


Figure 3-1: Models without spacer (4)

- | | | | |
|----|-----------------------------------|----|-------------------------|
| 1 | Coupling part 1/2 | 11 | Bolt |
| 2 | Coupling part 1/2 | 12 | DUO sealing ring |
| 5 | Flanged sleeve | 31 | Cover |
| 6 | Screw plug | 32 | Bolt |
| 7 | Sealing ring in sizes 112 and 128 | 33 | Support ring |
| 8 | Fitting bolt | 34 | Thrust element |
| 9 | Hexagon nut | 51 | Two-part retaining ring |
| 10 | Cover | | |

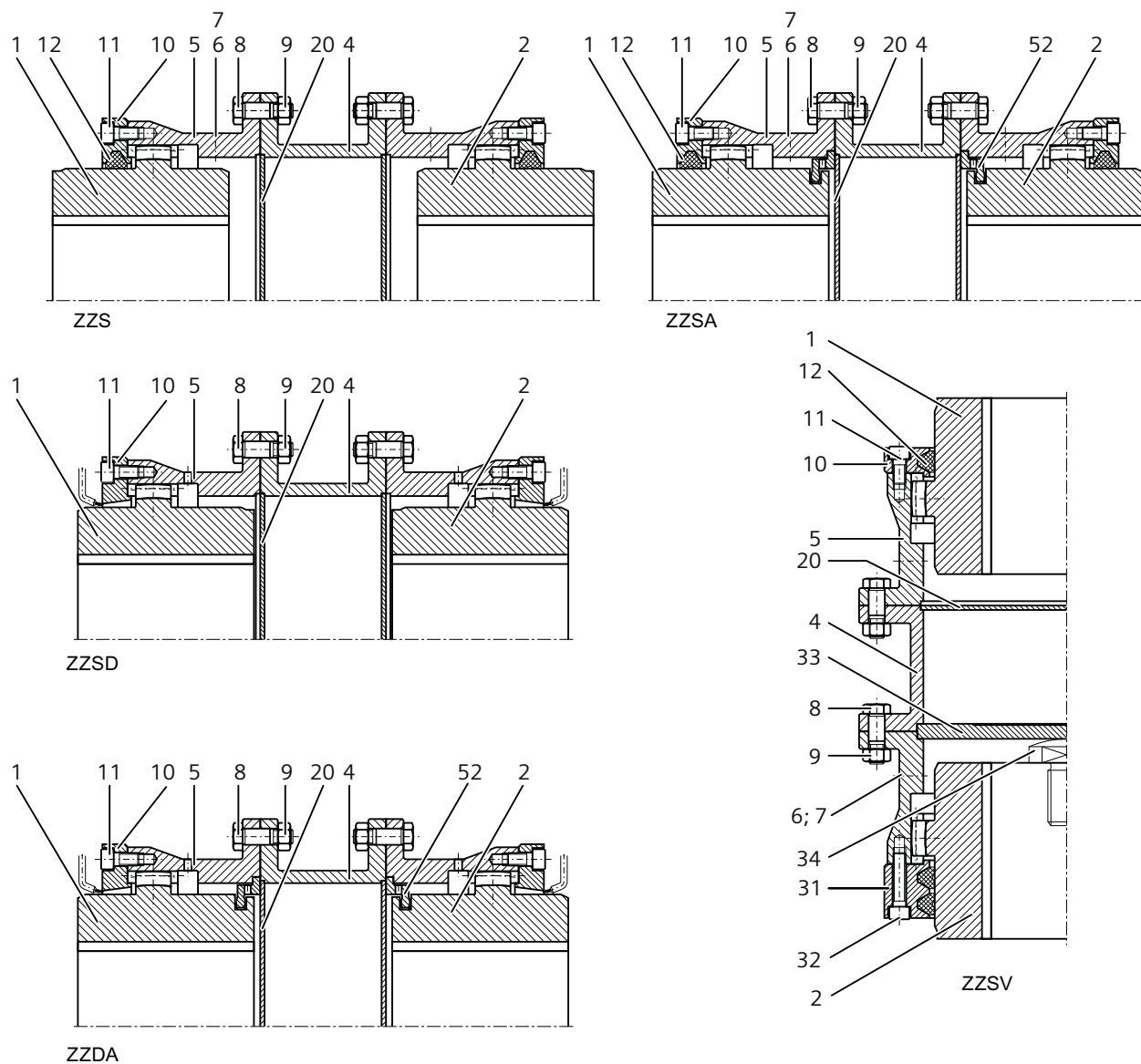


Figure 3-2: Models with spacer (4)

- | | | | |
|----|-----------------------------------|----|-------------------------|
| 1 | Coupling part 1/2 | 11 | Bolt |
| 2 | Coupling part 1/2 | 12 | DUO sealing ring |
| 4 | Spacer | 20 | Plate pulley |
| 5 | Flanged sleeve | 31 | Cover |
| 6 | Screw plug | 32 | Bolt |
| 7 | Sealing ring in sizes 112 and 128 | 33 | Support ring |
| 8 | Fitting bolt | 34 | Thrust element |
| 9 | Hexagon nut | 52 | Two-part retaining ring |
| 10 | Cover | | |

Check the delivery for damage and for completeness. Report any damage and/or missing parts to Flender immediately.

The coupling is delivered in individual parts and preassembled groups.

4.1 Transport of the coupling



WARNING

Severe personal injury due to improper transport

Severe personal injury due to falling components or due to crushing. Damage to coupling parts possible due to use of unsuitable means of transport.

- Only use hoisting gear and load lifting devices with sufficient load bearing capacity for transport.
- The symbols which appear on the packaging must be observed.

If not specifically contractually agreed otherwise, the packaging complies with the HPE Packaging Directive.



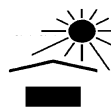
Oben



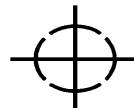
Zerbrechliches
Gut



Vor Nässe
schützen



Vor Hitze
schützen



Schwerpunkt



Handhaken
verboten



Anschlagen

Figure 4-1: Transport symbols

4.2 Storage of the coupling

NOTICE

Property damage due to improper storage

Negative changes to the physical properties of the coupling and/or coupling damage.

- Please observe the procedure for storing the coupling.

The coupling, unless specifically ordered otherwise, is supplied with preservation and can be stored for up to 3 months.

Information about storing the coupling

- Ensure that the storage room is dry (relative humidity < 65 %) and free of dust.
- Ensure that there is no condensation.
- Do not store the coupling together with corrosive chemicals, acids, caustic solutions, etc.

4.2 Storage of the coupling

- If the coupling contains elastomer components, ensure that there are no devices in the storage room that produce ozone, such as fluorescent lights, mercury vapour lamps or high-voltage electrical equipment.
- Store the coupling on suitable supports or in suitable containers.

Long-term storage

NOTICE**Property damage due to improper long-term storage**

Negative changes to the physical properties of the coupling and/or coupling damage.

- Carefully observe the specifications for long-term storage.

1. You can find the required type of preservative agent in the following table (types of preservative agents for long-term storage).
2. Remove the elastomer components. These must not come into contact with cleaning agents and long-term preservative agents.
3. Clean the coupling parts.
4. Apply the stipulated preservative agent.
5. Store the coupling parts and the elastomer components separately.

Preservative agent	Features	Indoor storage	Outdoor storage
Oil spray	Corrosion protection	Up to 12 months	Up to 4 months
Tectyl 846 or similar	Long-term preservative agent on wax basis	Up to 36 months	Up to 12 months
Emulsion cleaner + VCI foil	Active system, reusable	Up to 5 years	Up to 5 years

Table 4-1: Types of preservative agents for long-term storage

Assembly of the coupling comprises the following steps:

- Preparatory work (Page 27)
- Mounting the coupling (Page 33)
- Aligning the coupling (Page 37)
- Fill with lubricant (Page 39)



DANGER

Danger due to bursting of the coupling

If you do not observe the information stipulated here regarding assembly, this can lead to bursting of the coupling during operation. There is a risk of fatal injury from flying fragments. If a coupling bursts in an area at risk of explosion, then this can result in an explosion.

- Carefully observe all of the specifications relating to assembly.

Notes regarding assembly of the coupling

- Only use undamaged components when assembling the coupling.
- Follow the assembly sequence.
- Please ensure that there is sufficient space at the assembly location and that the location is tidy and clean in order to be able to assemble and maintain the coupling without any risk.
- If a dimension drawing has been created for the coupling, please observe the information it contains as a matter of priority.

5.1 Preparatory work

Please consult Flender if you want to machine a conical finished bore.

Carry out the following steps if the coupling does not have a finished bore:

- Mill the finished bore (Page 28)
- Mill the parallel keyway (Page 29)
- Machining an axial locking mechanism (Page 29)
- Balancing the coupling (Page 32)



Information

The customer is responsible for execution of the finishing work on the coupling. Flender shall have no liability whatsoever for claims under warranty arising from finishing work that has not been carried out adequately.

5.1.1 Mill the finished bore

The diameter of the finished bore depends on the shaft used.

Recommended assigned fits

In the following table you can find the recommended assigned fits for bores with a parallel key connection.

Description	Interference fit					
Shaft tolerance	h6	k6	m6	n6	p6	s6
Bore tolerance	P7	M7	K7	J7	H7	F7

Table 5-1: Recommended assigned fits for bores with parallel key connection

Bore diameter



WARNING

Danger due to bursting of the coupling

If you exceed the maximum diameter of the finished bore, then this can cause the coupling to burst in operation. There is a risk of fatal injury from flying fragments. If a coupling bursts in an area at risk of explosion, then this can result in an explosion.

- Adhere to the maximum diameters specified.

The maximum diameters are listed in Section Speeds, geometry data and weights (Page 71)

Procedure

1. Remove the preservation and clean the coupling parts 1 (1) and/or 2 (2) to be machined.
2. Clamp the coupling according to the following figure.

NOTICE

Damage to the functional surface due to incorrect clamping

Never clamp the coupling part at the sealing surface of the DUO sealing ring (12).

3. Machine the finished bore D according to the following figure.

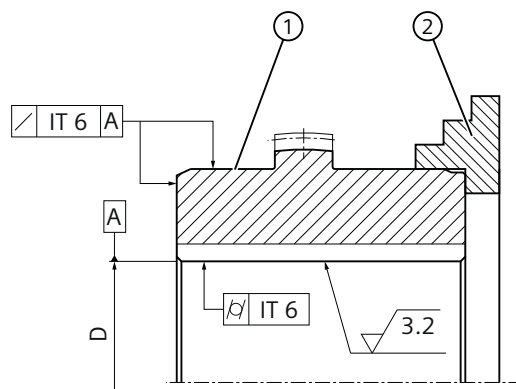


Figure 5-1: Tolerances for the finished bore in coupling part 1 (1) or 2 (2)

- ① Sealing surface
- ② Clamping chuck

5.1.2 Mill the parallel keyway

Applicable standards

- For one parallel keyway, machine it according to DIN 6885/1 ISO P9.
- For two parallel keyways, machine them according to DIN 6885/1 ISO JS9.
- If you want to mill a parallel keyway that does not correspond to DIN 6885/1, please consult Flender.

5.1.3 Machining an axial locking mechanism

The coupling part 1/2 (1 or 2) is secured by a set screw or an end plate to prevent axial movements.

Please consult Flender if you want to use an end plate.

Note the following when using a set screw:

- Diameter and axial position of the threaded hole in the hub
- Position of the threaded hole with respect to the parallel keyway
- Selection of the set screw

Diameter and axial position of the threaded hole in the hub

The following diagram shows the axial position of the threaded hole.

5.1 Preparatory work

When arranging the threaded hole, note the difference between the A or B variant of the coupling part 1 (1) or 2 (2). For size 112, drill the threaded hole in the unground hub side.

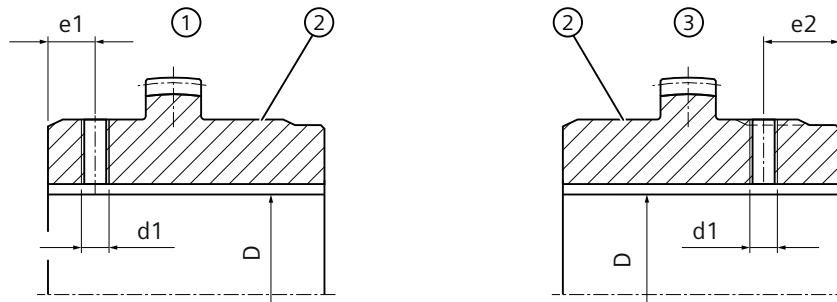


Figure 5-2: Diameter and axial position of the threaded hole in the hub

- ① Coupling part 1 or 2, B variant
- ② Sealing surface
- ③ Coupling part 1 or 2, A variant, only the e2 dimension from size 545 (extended shoulder)

The following table contains the values for the diameter of the threaded hole depending on the coupling size and the finished bore D and the axial position of the threaded hole on the hub.

Coupling size	Finished bore D		Threaded hole d1	Tightening torque TA	Width A/F internal hexagon	e1	e2
	Over	Up to					
	mm	mm		Nm	mm	mm	mm
112	10	17	M5	3	2.5	15	-
	17	49	M6	4	3		
128	10	17	M5	3	2.5	14	20
	17	61	M6	4	3		
146	10	17	M5	3	2.5	16	26
	17	30	M6	4	3		
	30	72	M8	8	4		
175	10	17	M5	3	2.5	20	26
	17	22	M6	4	3		
	22	30	M8	8	4		
	30	85	M10	15	5		
198	10	17	M5	3	2.5	22	36
	17	22	M6	4	3		
	22	30	M8	8	4		
	30	44	M10	15	5		
	44	100	M12	25	6		

Coupling size	Finished bore D		Threaded hole d1	Tightening torque TA	Width A/F internal hexagon	e1	e2
	Over	Up to					
	mm	mm		Nm	mm	mm	mm
230	10	17	M5	3	2.5	25	38
	17	22	M6	4	3		
	22	30	M8	8	4		
	30	38	M10	15	5		
	38	58	M12	25	6		
	58	120	M16	70	8		
255	10	17	M5	3	2.5	30	45
	17	22	M6	4	3		
	22	30	M8	8	4		
	30	38	M10	15	5		
	38	50	M12	25	6		
	50	140	M16	70	8		
290	10	17	M5	3	2.5	30	48
	17	22	M6	4	3		
	22	30	M8	8	4		
	30	38	M10	15	5		
	38	50	M12	25	6		
	50	160	M16	70	8		
315	80	175	M20	130	10	40	55
342	90	195	M20	130	10	40	60
375	100	220	M20	130	10	35	70
415	120	240	M20	130	10	40	90
465	140	270	M24	230	12	40	110
505	160	300	M24	230	12	45	130
545	180	330	M24	230	12	-	80
585	210	360	M24	230	12	-	90
640	230	390	M24	230	12	-	100
690	250	420	M24	230	12	-	120
730	275	450	M24	230	12	-	140
780	300	490	M24	230	12	-	140
852	325	535	M24	230	12	-	150
910	350	570	M24	230	12	-	180
1,020	375	600	M24	230	12	-	180
1,080	400	650	M24	230	12	-	190

5.1 Preparatory work

Coupling size	Finished bore D		Threaded hole d1	Tightening torque TA	Width A/F internal hexagon	e1	e2
	Over	Up to					
	mm	mm		Nm	mm	mm	mm
1,150	425	705	M24	230	12	-	200
1,160	450	750	M24	230	12	-	220
1,240	475	800	M24	230	12	-	215
1,310	500	850	M24	230	12	-	230
1,380	525	890	M24	230	12	-	250
1,440	550	940	M24	230	12	-	270
1,540	575	995	M24	230	12	-	250

Table 5-2: Diameter and axial position of the threaded hole, tightening torque and width A/F

Apply the specified tightening torques as listed in Section Tightening procedure (Page 83).

Position of the threaded hole with respect to the parallel keyway

Position the threaded hole for the set screw on the parallel keyway.

Selection of the set screw

CAUTION

Physical injury

Risk of injury from protruding set screw.

- Please observe the information about selecting the set screw.

Use set screws in accordance with ISO 4029 with a toothed cup point. The size of the set screw is determined by the bore made. The set screw should fill out the threaded hole as much as possible and must not protrude beyond the hub.

5.1.4 Balancing the coupling

Notes on balancing

NOTICE

Property damage to coupling part 1 (1) or 2 (2)

If you damage the gear or the sealing surface for the DUO sealing ring (12) on coupling part 1 (1) or 2 (2), the coupling part 1 (1) or 2 (2) is no longer allowed to be used for operation.

- Please observe the stipulations about machining the balancing bore.

- Select the balancing quality according to the application (but at least G16 in accordance with DIN ISO 21940).
- Observe the balancing specification according to DIN ISO 21940-32.
- Machine the balancing bore on a large radius with adequate clearance to the outer circumference.

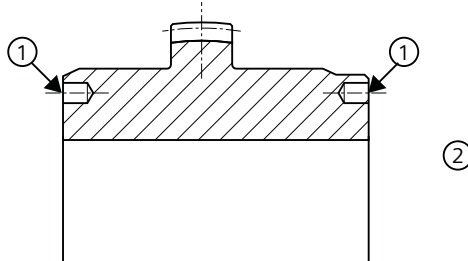


Figure 5-3: Position of the balancing bore for two-plane balancing

- ① Balancing bore
- ② Coupling part 1/2

5.2 Mounting the coupling

NOTICE

Coupling damage, damage to further components

Damage to the bore and the sealing surface of the sealing ring is possible.

- Ensure that the bore and the sealing surface of the sealing ring are not damaged by hoisting gear or similar equipment.

NOTICE

Damage to property

Risk of damage to sealing rings from cleaning agents.

- Ensure that the sealing rings do not come into contact with cleaning agents.

NOTICE

Damage to property

Damage to the shaft end, the coupling parts and/or the parallel key.

- Note the handling instructions regarding assembly of the coupling parts.

Assembly of the coupling comprises the following steps:

- Assembling cover and DUO sealing ring (Page 34)
- Assembling coupling parts with shaft-hub connection using a parallel key (Page 34)
- Assembling coupling parts with shaft-hub connection using a pressurised oil interference fit (Page 35)
- Assembling the coupling (Page 36)

5.2.1 Assembling cover and DUO sealing ring

Procedure

1. Lubricate the back and/or sides of the DUO sealing ring (12) and the keyway in the cover (10), (21) and/or (31) thoroughly.
2. Insert the DUO sealing ring into the cover (10), (21) and/or (31) according to the illustration.

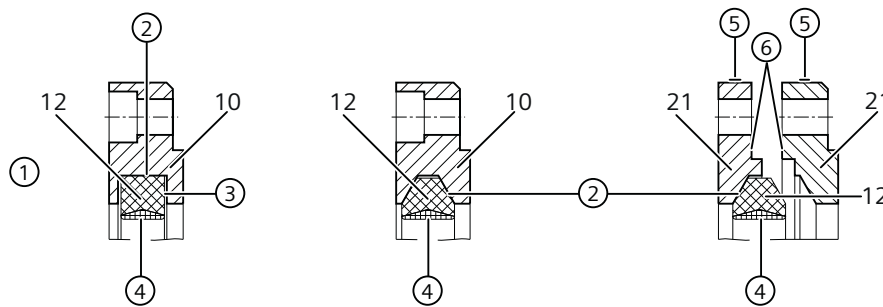


Figure 5-4: Inserting the DUO sealing rings

- ① From size 1020, with hub diameter 800
DUO sealing ring, rectangular
- ② Back
- ③ Side
- ④ Grease pads
- ⑤ Marking
- ⑥ Liquid plastic

3. Place a grease pad in the ring-shaped cavity between the sealing lips.
4. For the axially split cover (21), carefully smear the joining edge of both cover halves on both sides with liquid plastic (50).
5. Join the cover halves together, being careful to cover the through holes and marking.
6. Check the space needed to insert the bolts (11), (18) and/or (32). If there's not enough space, insert the bolts (11), (18) and/or (32) into the cover (10), (21) and/or (31).
7. Position the cover (10), (21) and/or (31) with the inserted DUO sealing ring (12) onto the shaft. When doing this, carefully observe the mounting position.
8. Ensure that the DUO sealing ring (12) cannot be damaged when fitting coupling part 1 (1) and 2 (2).

5.2.2 Assembling coupling parts with shaft-hub connection using a parallel key

Procedure

1. Unscrew the set screw until a collision with the parallel key or the shaft is no longer possible.
2. Clean the bores and shaft ends.
3. Coat the bores of coupling parts 1 (1) and 2 (2) and the shafts with MoS₂ assembly paste (e.g. Microgleit LP 405).
4. Smear the parallel keyway in the area of the set screw using sealing compound (50).

5. Mount coupling parts 1 (1) and 2 (2) on the shaft.



! WARNING

Danger due to bursting of the coupling

If you do not observe the information stipulated here when assembling coupling parts with a tapered bore, then this can cause the coupling to burst in operation. There is a risk of fatal injury from flying fragments. If a coupling bursts in an area at risk of explosion, then this can result in an explosion.

- Mount coupling parts 1 (1) and 2 (2) with conical bore and parallel keyway on the shaft in cold condition. Apply sealing compound (50) to the front of the hub on the shaft face. Secure the coupling parts 1 (1) and 2 (2) with suitable end plates without pulling the coupling parts 1 (1) and 2 (2) further onto the taper (fitting dimension = 0) or according to the dimension drawing provided.



Information

Coupling parts with cylindrical bore

To make assembly easier, you can heat coupling parts 1 (1) and 2 (2) with cylindrical bore up to a maximum of 80 °C if required.

6. Secure the coupling parts using a set screw or an end plate. When securing with a set screw, the shaft must not protrude or be set back from the inner side of the hub. After cooling to room temperature, fill the threaded hole for the set screw 2/3 full with sealing compound (50) to prevent the lubricant from escaping through the parallel keyway. When securing with an end plate, smear the hub face on the shaft face with sealing compound (50) and bolt on the end plate.
7. Tighten up the set screw or the screw to attach the end plate to the specified tightening torque T_A (for the set screw please see Section Machining an axial locking mechanism (Page 29)).

5.2.3 Assembling coupling parts with shaft-hub connection using a pressurised oil interference fit

Procedure

1. Remove the screw plugs (22) from the coupling parts 1 (1) and 2 (2).
2. Clean, degrease, de-oil and dry the bores and shaft ends.
3. Clean and dry the oil channels and the oil circulation grooves.
4. Protect adjacent components against damage and heating to temperatures above 80 °C.
5. Heat up the coupling parts 1 (1) and 2 (2) to the temperature specified in the dimension drawing.
Make sure that no dirt or contaminants can soil the bores again during the heating process.
6. Mount the coupling parts 1 (1) and 2 (2) quickly on the shaft according to the instructions in the dimension drawing.
7. Secure the coupling parts 1 (1) and 2 (2) to stop them from moving until they have cooled down.

5.2 Mounting the coupling

8. Allow the coupling parts 1 (1) and 2 (2) to cool down to the ambient temperature.
9. Use an end plate to secure the coupling parts 1 (1) and 2 (2) that have a non-self-locking, tapered pressurised oil interference fit.
10. In order to protect the oil channels of the coupling parts 1 (1) and 2 (2) against corrosion, fill them with a suitable pressurised oil and seal the oil channels with the screw plugs (22).

5.2.4 Assembling the coupling

Procedure

1. Smear the gear of the coupling part 1 (1), 2 (2) and the flanged sleeve (5) with a lubricant coating (e.g. Castrol Opticoating N) to minimise running-in wear.
2. For ZWNV and ZZSV types, screw the thrust element (34) into the lower machine shaft.
3. Push the flanged sleeves (5) onto the gear of coupling parts 1 (1) and 2 (2). Hold the flanged sleeves (5) or support them.
4. For ZWNA, ZWDA, ZZSA and ZZDA types, place the axial backlash limitation (51) or (52) in the recess of the coupling parts 1 (1) and 2 (2). Pull the flanged sleeve (5) over the axial backlash limitation (51) or (52).
5. For ZWNV and ZZSV types, place the support ring (33) in the flanged sleeve (5) and on the thrust element (34).
6. Move the machines to be coupled close to one another. Observe the clearance S (see Clearance S (Page 79))
7. Align the coupling (see chapter Aligning the coupling (Page 37)).
8. Smear the sealing surfaces of the flanged sleeve (5) and, if fitted, of the spacer (4), with liquid plastic (50). This work step can be skipped for types (ZWD, ZWDA, ZZD, ZZDA) with flow lubrication.
9. Align the fitting holes of the flanges. Observe any markings that might be provided.
10. Insert the fitting bolts (8) and tighten the nuts (9) to the specified tightening torque T_A (see chapter Tightening torques and widths A/F (Page 82)).
11. Oil the hub diameters of the coupling parts 1 (1) and 2 (2).
12. Smear the sealing surfaces of the covers (10), (21) or (31) and the flanged sleeve (5) with sealing compound (50).
13. Use suitable tools to pull the covers (10), (21) or (31) onto the hub of the coupling parts 1 (1) and 2 (2).
14. Tighten the bolts (11), (18) or (32) with the specified tightening torque T_A (see Section Tightening torques and widths A/F (Page 82)).

5.3 Aligning the coupling

5.3.1 Purpose of alignment

The shafts that are joined by the coupling are never on an ideal precise axis but have a certain amount of misalignment.

The misalignment values in operation result from the following:

- Misalignment due to assembly
Incorrect position due to a lack of precision when aligning
- Misalignment due to operation
Example: Load-related deformation, thermal expansion

You can minimise misalignment by aligning after assembly. A lower misalignment in the coupling has the following advantages:

- Reduced wear
- Reduced restoring forces
- Misalignment reserves for operation of the coupling

To achieve the longest possible coupling service life, Flender recommends running the coupling with 10% of the possible misalignments during operation (see Possible misalignment (Page 37)).

The recommended alignment values are specified as numerical values in Distances between teeth VA and recommended alignment values for angular and radial misalignment (Page 80) . Do not align the coupling more accurately than this, as the lubrication film formation will then be compromised.

5.3.2 Possible misalignment

The following types of misalignment can occur:

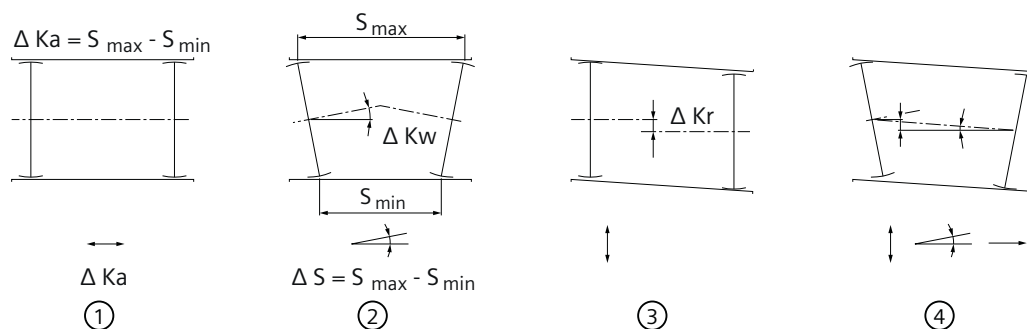


Figure 5-5: Possible misalignment

- ① Axial misalignment (ΔK_a)
- ② Angular misalignment (ΔK_w)
- ③ Radial misalignment (ΔK_r)
- ④ Axial, angular and radial misalignment

5.3 Aligning the coupling

5.3.2.1 Axial misalignment

Set the axial misalignment ΔK_a to a value within the permissible tolerance range for the S clearance.

The values for the S clearance are to be considered as the maximum permissible increase in the hub distance of the coupling.

You can find the values for clearance S under Clearance S (Page 79).

5.3.2.2 Angular misalignment

The ZWN, ZWD, ZZS, ZZSD, ZWNV and ZZSV types compensate for positional deviations of the shaft ends to be connected up to a maximum angular misalignment of $\Delta K_w = 1^\circ$.

The ZWNA, ZWDA, ZZSA and ZZDA types compensate for positional deviations of the shaft ends to be connected up to a maximum angular misalignment of $\Delta K_w = 0.2^\circ$.

Determine the value ΔS ($\Delta S = S_{\max} - S_{\min}$).

ZWN, ZWD, ZZS, ZZSD, ZWNV, ZZSV types:

$$\Delta S = S_{\max} - S_{\min} \leq ND \times \tan 1^\circ \approx ND / 60$$

ZWNA, ZWDA, ZZSA, ZZDA types:

$$\Delta S = S_{\max} - S_{\min} \leq ND \times \tan 0.2^\circ \approx ND / 300$$

For ND, the smallest hub diameter of ND1 or ND2 is to be used. ND1 or ND2 in mm see Speeds, geometry data and weights (Page 71)

The alignment value for ΔS can be found in Section Distances between teeth VA and recommended alignment values for angular and radial misalignment (Page 80).

5.3.2.3 Radial misalignment

For the ZWN, ZWD, ZZS, ZZSD, ZWNV and ZZSV types, the maximum possible radial misalignment $\Delta K_{r_{\max}}$ corresponds to a maximum angular deviation for each coupling half of $\Delta K_{w_{\max}} = 1^\circ$.

For the ZWNA, ZWDA, ZZSA and ZZDA types, the maximum possible radial misalignment $\Delta K_{r_{\max}}$ corresponds to a maximum angular deviation for each coupling half of $\Delta K_{w_{\max}} = 0.2^\circ$.

Determine the value ΔK_r .

ZWN, ZWD, ZZS, ZZSD, ZWNV, ZZSV types:

$$\Delta K_r \leq VA \cdot \tan 1^\circ \approx VA / 60$$

ZWNA, ZWDA, ZZSA, ZZDA types:

$$\Delta K_r \leq VA \cdot \tan 0.2^\circ \approx VA / 300$$

The values for VA and the alignment value for ΔK_r can be found in Section Distances between teeth VA and recommended alignment values for angular and radial misalignment (Page 80).

5.3.2.4 Angular and radial misalignment

Angular and radial misalignment can occur at the same time. Comply with the following condition:

ZWN, ZWD, ZZS, ZZSD, ZWNV, ZZSV types:

$$\arctan (\Delta K_r / VA) + \Delta K_w \leq 1^\circ$$

ZWNA, ZWDA, ZZSA, ZZDA types:
 $\arctan (\Delta K_r / V_A) + \Delta K_w \leq 0.2^\circ$

You can find the values for V_A in Distances between teeth V_A and recommended alignment values for angular and radial misalignment (Page 80).

5.4 Fill with lubricant

5.4.1 Lubricant



DANGER

Risk of explosion due to an unsuitable lubricant

Using a lubricant that is not approved for use in potentially explosive atmospheres will cause an explosion.

- Use a lubricant that is approved for use in potentially explosive atmospheres.
- Observe country-specific regulations.
- Observe the manufacturer's instructions on handling the lubricant.
- Observe all lubricant specifications.



Information

For normal operating conditions, we recommend oil lubrication that is easy to replenish.

NOTICE

Coupling damage due to impairment of the lubricant characteristics

Do not mix different lubricants.

If you still want to mix different lubricants, ask the manufacturer about how compatible the lubricants are with each other. Contact the supplier of the new lubricant to confirm the compatibility of the new lubricant with the old one in writing.

Lubricant requirements

For ZAPEX couplings from the ZW series, only greases or oils which contain active substances for improving corrosion protection and resistance to ageing as well as reducing wear in the mixed friction area are permitted.

- Only use greases or oils that are suitable for sealing rings made of elastomer materials NBR, FKM and FPM.
- Only use greases or oils that are suitable for liquid seals made of Loctite 5910 or Loctite 5922.

Special oil requirements:

- Use mineral oils with viscosity class ISO VG 460 or ISO VG 680 according to DIN ISO 3348.

5.4 Fill with lubricant

- Use mineral oils with viscosity class ISO VG 460 at an ambient temperature of -10 °C to +30 °C.
- Use mineral oils with viscosity class ISO VG 680 at an ambient temperature of +10 °C to +80 °C.

Special grease requirements:

- Greases must be produced using mineral oil.
- Use greases of viscosity class NLGI 00 or NLGI 0 according to DIN 51818.
- Use greases of viscosity class NLGI 00 or NLGI 0 at an ambient temperature of -10 °C to +80 °C.

List of lubricants

To make it easier for users to select lubricants, Flender recommends products which have been properly tested and that satisfy Flender requirements.

The recommended lubricants are available on the following link:

<https://www.flender.com/de/approvedlubricants>

- The list of mineral oils with viscosity class ISO VG 460 or ISO VG 680 can be found in the document "A-A MINERAL OILS, STANDARD".
- The list of greases with viscosity class NLGI 00 or NLGI 0 according to DIN 51818 can be found in the document "K SEMI-FLUID GREASES".

An excerpt from the table can be found here:

Lubricant recommendation – oils

Manufacturer	Ambient temperature +10 °C to +80 °C	Ambient temperature -10 °C to +30 °C
	Type	Type
ARAL	Degol BG 680 Plus	Degol BG 460 Plus
BP	Energol GR-XF 680	Energol GR-XF 460
Castrol	Optigear BM 680 ; Tribol 1100 / 680	Optigear BM 460 ; Tribol 1100 / 460
Fuchs	Renolin CLP 680 Plus	Degol CLP 460 Plus
Klüber Lubrication	Structovis BHD MF	
ExxonMobil	Mobilgear XMP 680	Mobilgear XMP 460
Shell	Omala S2 GX 680	Omala S2 GX 460
TotalEnergies	Carter XEP 680	Carter XEP 460

Lubricant recommendation – greases

Manufacturer	Ambient temperature -10 °C to +80 °C
	Type
ARAL	Aralub FDP 00
BP	Energrease LS-EP 00
Castrol	Tribol GR 100 - 00 PD
Flender	Flender high-performance grease
Fuchs	Renolit SO-GFB
	Grafloscon C-SG 500 Plus
ExxonMobil	Mobilux EP004
Shell	Gadus S2 V220 00
TotalEnergies	Multis EP 00

NOTICE

The quality and purity of the lubricant dictate the service life of the sealing rings.

5.4.2 Filling quantity



WARNING

Severe personal injury due to flying fragments

Severe personal injury due to flying fragments and/or damage to coupling possible.
If a coupling bursts in an area at risk of explosion, then this can result in an explosion.

- Observe the prescribed filling quantities.



Information

Refer to the dimension drawings for the oil filling quantities/grease filling quantities for the ZWNV and ZZSV types.

Refer to the dimension drawings for the oil flow quantities for the ZWD, ZWDA, ZZSD and ZZDA types.

The following table lists the oil filling quantities for the ZWN, ZWNA, ZZS and ZZSA types.
If you use semi-fluid grease, use 1.3 times the stipulated oil filling quantity.

5.4 Fill with lubricant

	Coupling size										
	112	128	146	175	198	230	255	290	315	342	375
Oil filling quantity ZWN, ZWNA dm ³	0.04	0.05	0.1	0.2	0.2	0.3	0.3	0.55	0.8	0.9	1.1
Oil filling quantity ZZS, ZZSA ¹⁾ dm ³	0.02	0.03	0.05	0.1	0.1	0.15	0.15	0.3	0.4	0.5	0.6

Table 5-3: Oil filling quantity for coupling sizes 112 to 375

¹⁾ For the ZZS and ZZSA types, the oil filling quantities apply for one coupling side

	Coupling size										
	415	465	505	545	585	640	690	730	780	852	910
Oil filling quantity ZWN, ZWNA dm ³	1.7	2.7	3	3.5	4.5	5	7	7.5	8.5	9	10.5
Oil filling quantity ZZS, ZZSA ¹⁾ dm ³	0.9	1.4	1.5	1.8	2.3	2.5	3.5	3.8	4.3	4.5	5.3

Table 5-4: Oil filling quantity for coupling sizes 415 to 910

¹⁾ For the ZZS and ZZSA types, the oil filling quantities apply for one coupling side

	Coupling size								
	1,020	1,080	1,150	1,160	1,240	1,310	1,380	1,440	1,540
Oil filling quant- ity ZWN, ZWNA dm ³	13.5	14.5	16	18.5	23	24.5	34	40	44
Oil filling quant- ity ZZS, ZZSA ¹⁾ dm ³	6.8	7.3	8	9.3	11.5	12.3	17	20	22

Table 5-5: Oil filling quantity for coupling sizes 1020 to 1540

¹⁾ For the ZZS and ZZSA types, the oil filling quantities apply for one coupling side

5.4.3 Fill with lubricant

NOTICE

Risk of injury and danger to the environment from lubricant

Collect spilled lubricant and dispose of it according to the valid regulations.

Procedure

1. Rotate the coupling until it reaches the position of the screw plugs (6) according to the illustration.
2. Remove the two screw plugs (6) at the top.
3. Measure the correct quantity of lubricant.
4. Fill the lubricant into one of the holes for the screw plugs (6).
5. Screw the screw plugs (6) with the underlaid/integrated sealing ring back in.

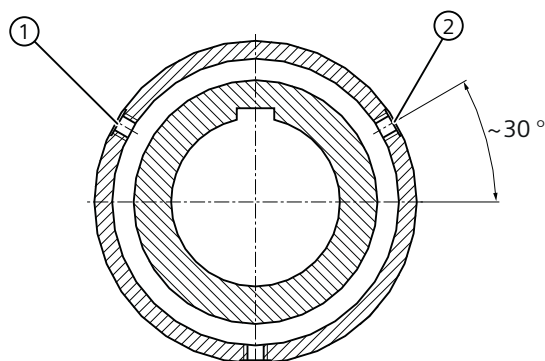


Figure 5-6: Fill with lubricant

- ① Filling hole
- ② Venting hole



DANGER

Danger due to igniting deposits

During use in potentially explosive atmospheres deposits from heavy metal oxides (rust) can ignite due to friction, impact or friction sparks and lead to an explosion.

- Ensure through the use of an enclosure or other suitable measures that heavy metal oxide (rust) deposits on the coupling are not possible.

In order to ensure safe commissioning, carry out various tests prior to commissioning.

Testing before commissioning



DANGER

Danger

Overload conditions can occur during the commissioning of the coupling. The coupling can burst and metal parts can be flung out. There is a risk of fatal injury from flying fragments. Bursting of the coupling can lead to an explosion in potentially explosive atmospheres.

- Carry out the tests prior to commissioning.
- Do not touch the rotating coupling.

1. Check the tightening torques of the screws of the coupling in accordance with section Tightening torques and widths A/F (Page 82).
2. Check the tightening torques of the foundation bolts of the coupled machines.
3. Check whether the enclosures (ignition protection, coupling guard, touch protection) have been installed and that the function of the coupling has not been adversely affected by the enclosure. This also applies to test runs and rotational direction checks.

7.1 Normal operation of the coupling

The coupling runs quietly and shock-free during normal operation.

7.2 Fault – causes and correction

A form of behaviour which is different to normal operation is classed as a fault and has to be rectified immediately.

Look out specifically for the following faults during coupling operation:

- Unusual coupling noise
- Sudden occurrence of shocks
- Lubricant leakage

7.2.1 Procedure in the event of faults



DANGER

Danger due to bursting of the coupling

There is a risk of fatal injury from flying fragments. Bursting of the coupling can lead to an explosion in potentially explosive atmospheres.

- Switch off the unit at once if any faults occur.
- Note during the repair work the possible causes of faults and the notes on rectifying them.

Proceed as described below if there is a fault of the coupling during operation:

1. Turn the drive off immediately.
2. Initiate the required action for repair taking into consideration the applicable safety regulations.

If you cannot determine the cause or if you cannot carry out repair work with your own means, request one of our customer service technicians.

7.2.2 Identifying the fault cause

Faults occur frequently due to application errors or they occur due to operational circumstances such as wear of wearing parts or changes to the system.

The faults and fault causes listed below only serve as an indication for troubleshooting. In the case of a complex system be sure to include all the system components in the search for the fault.



WARNING

Physical injury

Injury from rotating parts.

- Only carry out work on the coupling when it is at a standstill.
- Secure the drive aggregate against unintentional startup.
- Attach an information notice to the start switch stating clearly that work is being carried out on the coupling.
- Before starting any work, make sure that the unit is free from loads.

Intended use

The coupling is only approved for the applications specified in these instructions. Please observe all the stipulations in Section Intended use (Page 17).

7.2.2.1 Possible faults

Fault	Cause	Rectification
Sudden changes in the noise level and/or sudden occurrences of shocks	Lubricant shortage	Follow the instructions given in Section Fill with lubricant (Page 39).
	Alignment changes	Follow the instructions given in Section Correcting the changed alignment (Page 51).
	Coupling not suitable for the operating conditions. Check the possible causes given in section Unsuitable coupling (Page 49).	Use a coupling that is suitable for the operating conditions.
	Incorrect coupling assembly. Check the possible causes given in sections Assembly-related causes (Page 49) and Specific assembly-related and maintenance-related causes (Page 50).	Reassemble the coupling in compliance with these instructions. Please observe all the stipulations and requirements given in chapter Assembly (Page 27).
	Incorrect maintenance of the coupling. Check the possible causes given in sections Maintenance-related causes (Page 50) and Specific assembly-related and maintenance-related causes (Page 50).	Please observe all the stipulations and requirements given in chapter Maintenance (Page 53).
Presence of vibrations	Coupling not suitable for the operating conditions. Check the possible causes given in section Unsuitable coupling (Page 49).	Use a coupling that is suitable for the operating conditions.

Fault	Cause	Rectification
Presence of vibrations	Incorrect coupling assembly. Check the possible causes given in sections Assembly-related causes (Page 49) and Specific assembly-related and maintenance-related causes (Page 50).	Reassemble the coupling in compliance with these instructions. Please observe all the stipulations and requirements given in chapter Assembly (Page 27).
	Incorrect maintenance of the coupling. Check the possible causes given in sections Maintenance-related causes (Page 50) and Specific assembly-related and maintenance-related causes (Page 50).	Please observe all the stipulations and requirements given in chapter Maintenance (Page 53).

Table 7-1: Table of faults

7.2.2.2 Possible causes

7.2.2.2.1 Unsuitable coupling

- Important information on the description of the drive unit and the environment were not available when the coupling was chosen.
- System torque too high and/or torque dynamics not permissible.
- System speed too high.
- Application factor not selected correctly.
- Chemically aggressive environment not taken into consideration.
- Coupling not suitable for the ambient temperature.
- Diameter and/or assigned fit of the finished bore not permissible.
- Width across corners of the parallel keyways greater than the width across corners of the parallel keyways in accordance with DIN 6885/1 for the maximum permissible bore.
- Shaft-hub connection incorrectly sized.
- Maximum permissible load conditions not taken into consideration.
- Maximum permissible overload conditions not taken into consideration.
- Dynamic load conditions not taken into consideration.
- Coupling and the machine and/or drive train form a critical torsional, axial or bending vibration system.

7.2.2.2.2 Assembly-related causes

- Damaged component installed.
- Shaft diameter outside the stipulated tolerance range.
- Coupling parts interchanged and hence not assigned to the specified shaft.
- Stipulated locking elements to prevent axial movements not installed.
- Stipulated tightening torques not adhered to.
- Bolts inserted dry or greased.

- Flange surfaces of screwed connections not cleaned.
- Alignment and/or shaft misalignment values not set in accordance with the instructions.
- Coupled machines were not correctly connected to the foundation so that a shifting of the machines leads to an impermissible displacement of the coupling parts.
- Coupled machines not earthed adequately.
- Coupling guard used is not suitable.

7.2.2.2.3 Maintenance-related causes

- Stipulated maintenance intervals not adhered to.
- Replacement parts that were used were not original replacement parts from Flender.
- Flender replacement parts that were used were old or damaged.
- Leak in the area of the coupling not detected so that chemically aggressive substances damage the coupling.
- Indications of faults, such as noise or vibration, were not heeded.
- Stipulated tightening torques not adhered to.
- Alignment and/or shaft misalignment values not set in accordance with the instructions.

7.2.2.2.4 Specific assembly-related and maintenance-related causes

- DUO sealing rings (12) not fitted.
- DUO sealing rings (12) heated up excessively when applying heat to the coupling parts.
- Sealing surfaces smeared or damaged.
- Lubricant not applied correctly.
- Missing sealing compound (50) in the set screw hole.

7.2.3 Resolving faults

7.2.3.1 Resolving lubricant shortage

Lubricant shortage is caused by the coupling leaking or overaged lubricant.

Procedure

1. Drain the lubricant in accordance with Lubricant replacement (Page 53).
2. Correct the cause of the leakage.
3. Carry out a visual inspection of the gears and the seals for damage.
4. Check the locking elements that prevent axial movements and correct these as required.
5. Realign the coupling.
6. Fill with new lubricant according to Fill with lubricant (Page 39).

7.2.3.2 Correcting the changed alignment

A changed alignment of the coupling during operation often occurs when the coupled machines shift compared to one another. A cause of this can be loose foundation bolts.

Procedure

1. Correct the cause for the change in alignment.
2. Carry out a visual inspection of the coupling for damage.
3. Check the locking elements that prevent axial movements and correct these as required.
4. Realign the coupling.

8.1 Maintenance intervals



DANGER

Danger due to bursting of the coupling

The coupling can burst if the maintenance intervals are not adhered to. There is a risk of fatal injury from flying fragments. Bursting of the coupling can lead to an explosion in potentially explosive atmospheres.

- Please observe all the stipulations concerning maintenance of the coupling in this section.



DANGER

Danger due to sparking or bursting of the coupling

If the lubricant quantity does not correspond to the quantity stipulated, then the coupling becomes an ignition source. Lubricant shortage can lead to sparking. Sparks can lead to an explosion in potentially explosive atmospheres.

- Carefully observe the specified lubricant quantity.



WARNING

Physical injury

Injury from rotating parts.

- Only carry out work on the coupling when it is at a standstill.
- Secure the drive aggregate against unintentional startup.
- Attach an information notice to the start switch stating clearly that work is being carried out on the coupling.
- Before starting any work, make sure that the unit is free from loads.

Check the coupling every 3 months for any for leakage, heating and change in noise level.

8.2 Lubricant replacement

Replace the lubricant at the specified maintenance intervals.

Operating temperature/ Special measures	Maximum operating hours	Maximum years of use
to 70 °C	8,000	2
above 70 °C	3,000	1

Table 8-1: Operating temperatures, operating hours and years of use

8.3 Replace the DUO sealing ring

NOTICE**Risk of injury and danger to the environment from lubricant**

Collect spilled lubricant and dispose of it according to the valid regulations.

**Information**

- When replacing the lubricant, keep the amount of remaining lubricant in the coupling as low as possible.
- It's easier to change the grease if you add low-viscosity oil to the old grease. Contact the manufacturer to confirm the compatibility of the oil with the grease in writing.

Procedure

1. Rotate the coupling to the position according to the illustration.

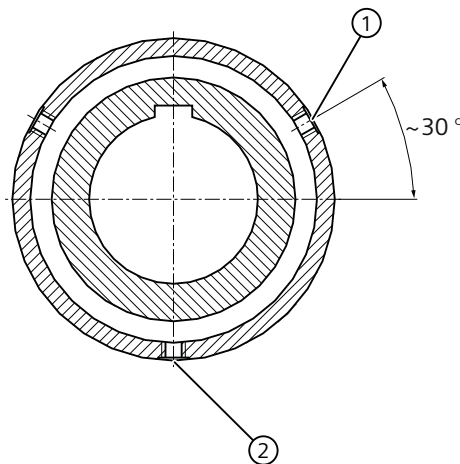


Figure 8-1: Draining the lubricant

- ① Venting hole
- ② Drainage hole

2. Place a suitable container under the drainage hole.
3. Unscrew all of the screw plugs (6).
4. Make sure you capture all of the lubricant.
5. Disposal of the lubricant. When doing this, carefully observe applicable regulations.
6. Fill with lubricant according to Section Fill with lubricant (Page 39).

8.3 Replace the DUO sealing ring

NOTICE**Damage to property**

Risk of damage to sealing rings from cleaning agents.

- Ensure that the sealing rings do not come into contact with cleaning agents.



Information

If dimensions Q and P from Speeds, geometry data and weights (Page 71) are complied with, you can replace the DUO sealing rings (12) with cut DUO sealing rings (12) without having to move the coupling apart.

Drain the lubricant in accordance with Lubricant replacement (Page 54).

The method used to replace the DUO sealing rings (12) varies according to the coupling size.

- Replace DUO sealing rings (12) with size 910 (Page 55)
- Replacing DUO sealing ring (12) from size 1020 (Page 55)

8.3.1 Replace DUO sealing rings (12) with size 910

1. Loosen the screws (11, 18 or 32).
2. Slide the cover (10, 21 or 31) off the hub until you can remove the DUO sealing ring(12) from the cover.
3. Clean the liquid plastic (50) off the cover (10, 21 or 31) and the flanged sleeve (5).
4. Cut the new DUO sealing ring (12) radially at one point.
5. Lubricate the keyway in the cover (10, 21 or 31) and the DUO sealing ring (12) from all sides.
6. Lay the cut end of the DUO sealing ring (12) flush into the keyway.
7. Starting from the cut end, insert the DUO sealing ring (12) on both sides into the keyway.
8. If you have a coupling with a split cover (21), carefully coat both halves of the cover with liquid plastic (50) and join them on the hub.

NOTICE

Carefully observe the marking on the cover and make sure that the through holes are congruent.

9. Place a grease pad in the ring-shaped cavity between the sealing lips of the DUO sealing rings (12).
10. Smear the sealing surfaces of the covers (10, 21 or 31) and the flanged sleeves (5) with liquid plastic (50).
11. Screw the cover (10, 21 or 31) to the flanged sleeve (5) with the bolts (11, 18 or 32).
Observe the tightening torque T_A according to Section Tightening torques and widths A/F (Page 82) .
12. Fill with lubricant according to Section Fill with lubricant (Page 39).

8.3.2 Replacing DUO sealing ring (12) from size 1020

1. Loosen the screws (11, 18 or 32).
2. Slide the cover (10, 21 or 31) off the hub until you can remove the DUO sealing ring(12) from the cover.
3. Clean the liquid plastic (50) off the cover (10, 21 or 31) and the flanged sleeve (5).

8.4 Dismantling the coupling

4. Cut the new DUO sealing ring (12) radially at one point at an angle of less than 45 °.
5. Smear the cut ends with adhesive (e.g. Loctite 401).
6. Place the DUO sealing ring around the shaft and join the cut ends evenly.
7. Lubricate the keyway in the cover (10, 21 or 31) and the DUO sealing ring (12) from all sides.
8. Lay the cut end of the DUO sealing ring (12) into the keyway.
9. Starting from the cut end, insert the DUO sealing ring (12) on both sides into the keyway.
10. If you have a coupling with a split cover (21), carefully coat both halves of the cover with liquid plastic (50) and join them on the hub via the DUO sealing ring (12).

NOTICE

Carefully observe the marking on the cover and make sure that the through holes are congruent.

11. Place a grease pad in the ring-shaped cavity between the sealing lips of the DUO sealing rings (12).
12. Smear the sealing surfaces of the covers (10, 21 or 31) and the flanged sleeves (5) with liquid plastic (50).
13. Screw the cover (10, 21 or 31) to the flanged sleeve (5) with the bolts (11, 18 or 32).
Observe the tightening torque T_A according to Section Tightening torques and widths A/F (Page 82).
14. Fill with lubricant according to Section Fill with lubricant (Page 39).

8.4 Dismantling the coupling

Procedure

1. Drain the lubricant in accordance with Section Lubricant replacement (Page 53).
2. Loosen the screws (11, 18 or 32).
3. Pull the covers (10, 21 or 31) off the hub and prop up the covers over the shaft.
4. Prop up the flanged sleeves (5) and, if fitted, the spacer (4).
5. Loosen the fitting bolt connection (8, 9).
6. Move the coupled machines apart.
7. Remove the spacer (4), the axial backlash limitation (51 or 52), the flanged sleeve (5), and the support ring (33), if fitted.
8. For ZWNV and ZZSV types, unscrew the thrust element (34).
9. Check the gear, sealing surfaces, hub bore and shaft for damage and protect them against corrosion.
10. Replace damaged parts.

8.4.1 Dismantling coupling part 1 (1) or 2 (2) with shaft-hub connection using a parallel key



! WARNING

Danger from burners and hot coupling parts

Risk of injury due to burners and hot surfaces. Burners or hot coupling parts can lead to an explosion in potentially explosive atmospheres.

- Wear suitable protective equipment (gloves, safety glasses).
- Ensure that the area is not at risk of explosion.

Procedure

1. Secure the coupling parts to prevent them from falling.
2. Remove the axial locking element (set screw, end plate).
3. Use a suitable pulling fixture.
4. Heat up the coupling part 1 (1) and/or 2 (2) using a burner above the parallel key along its length to maximum 80 °C.
5. Pull off the coupling part 1 (1) and/or 2 (2). Use suitable lifting gear when doing this.
6. Check the gear, the sealing surfaces, hub bore and shaft for damage and protect them against corrosion.
7. Replace damaged parts.

When reinstalling the coupling parts, please observe the information in Chapters Assembly (Page 27) and Commissioning (Page 45).

8.4.2 Dismantling coupling part 1 (1) or 2 (2) with shaft-hub connection using pressurised oil interference fit



! DANGER

Oil pressure in excess of maximum permissible value

The coupling could burst if the maximum pressure indicated in the dimension drawing is exceeded. There is a risk of fatal injury from flying fragments. If a coupling bursts in an area at risk of explosion, then this can result in an explosion.

- Do not exceed the maximum oil pressure specified in the dimension drawing.
- Keep the oil pressure constant in all oil channels during the entire procedure.

8.4 Dismantling the coupling

**! DANGER****Danger as a result of improper handling of fixtures and pumps**

Failure to handle fixtures and pumps properly can result in injuries. The coupling can burst. There is a risk of fatal injury from flying fragments. If a coupling bursts in an area at risk of explosion, then this can result in an explosion.

- Please observe the manufacturer's instructions on handling the following tools:
 - ⇒ Pulling fixtures
 - ⇒ Pumps

! WARNING**Risk of injury as a result of coupling parts or the pulling fixture working loose.**

Coupling parts or pulling fixtures can work loose and fall when dismantling work is in progress.

- Use suitable hoisting gear to hold the coupling part 1 (1) or 2 (2) and the pulling fixture in position.
- Attach an axial locking element if the pressurised oil interference fit is tapered.

NOTICE**Risk of injury and danger to the environment from escaping oil.**

- Catch any oil which escapes.
- Dispose of the oil according to the valid regulations.

Tools required

- One oil pump with pressure gauge (at least 2500 bar) per oil channel.
Or: One motor-driven oil pump. One connection that can be closed independently is required for each oil channel.
Refer to the dimension drawing for the number of oil channels.
- With a stepped bore:
A motor-driven oil pump at the oil channel located at the point of transition from the smaller to the larger bore. A large quantity of oil per unit of time is needed here.
- Suitable connections and pipes.
- Suitable pulling fixture.
Or: Retaining plate with retaining screws or threaded spindles with nuts. Material of the screws and spindles must have at least strength class 10.9; material of the nuts depending on the material of the screws or spindles.
- Hydraulic cylinder with oil pump. Note displacement and pressure of the hydraulic cylinder. Refer to the dimension drawing for the required axial force.

Procedure

1. Use a suitable pulling fixture.
2. Secure the coupling part 1 (1) or 2 (2) and the pulling fixture in position to prevent them from falling.
3. Remove the screw plugs (22) from the oil ducts.

4. Deaerate an oil pump and connect it to the oil channel in the centre.
5. Pressurise the oil pump to the pressure specified in the dimension drawing until oil starts to escape from the adjacent connections or the front faces. Keep the pressure constant.
6. Deaerate the next oil pump and connect it to the adjacent oil channel.
7. Repeat steps 5 and 6 for the remaining oil ducts.
8. If so much oil escapes when pressure is applied that the pump cannot maintain the pressure, use a higher-viscosity oil.
9. Pressurise the hydraulic cylinder if oil escapes from both front faces as a closed oil ring. Make sure that the coupling part 1 (1) or 2 (2) is pulled immediately off the shaft in a swift, smooth movement.

NOTICE

Removal in several strokes

If several strokes of the hydraulic cylinder are required to remove the part, make sure that the shaft end is positioned between two oil channels at the end of the stroke.

10. Dismantle the oil pumps and the pulling fixture from the coupling part 1 (1) or 2 (2).
11. Check the gear, sealing surfaces, hub bore and shaft for damage and protect them against corrosion.
12. Replace damaged parts.

When reinstalling the coupling parts, please observe the information in chapters Assembly (Page 27) and Commissioning (Page 45).

8.4 Dismantling the coupling

Service and support

9

9.1 Contact

When ordering replacement parts, requesting a customer service technician or if you have any technical queries, contact our factory or one of our Customer Service addresses:

Flender GmbH
Schlavenhorst 100
46395 Bocholt
Germany

Tel.: +49 (0)2871/92-0
Fax.: +49 (0)2871/92-2596

Flender GmbH (<http://www.flender.com/>)

More information

Further information about service and support can be found on the Internet:
Service & Support (<https://www.flender.com/service>)

Disposal

10

Disposal of the coupling

Dispose of the coupling parts according to applicable national regulations or recycle them.

11.1 Ordering replacement parts

By stocking the most important replacement parts at the installation site you can ensure that the coupling is ready for use at any time.

Use only original replacement parts from Flender. Flender only accepts liability for original replacement parts from Flender.

You can find the available replacement parts for the coupling described here at Spare parts drawing and spare parts list (Page 66).

You can find our contact data for ordering replacement parts at Service and support (Page 61).

Information required when ordering replacement parts

- Flender order number with item
- Flender drawing number
- Coupling type and size
- Part number (refer to Spare parts drawing and spare parts list (Page 66))
- Dimensions of the replacement part, for example:
 - Bore
 - Bore tolerance
 - Parallel keyway and balancing
- Special dimensions, for example, flange connection dimensions, intermediate sleeve length or brake drum dimensions
- Any special properties of the replacement part, such as, for example:
 - Temperature resistance
 - Electrical insulation
 - Operating fluid
 - Use in potentially explosive atmospheres
- Quantity

11.2 Spare parts drawing and spare parts list

11.2.1 Spare parts list

Part number	Designation	ZWN	ZWNA	ZWD	ZWDA	ZZS	ZZSA	ZZSD	ZZDA	ZWNV	ZZSV
1	Coupling part 1	x	x	x	x	x	x	x	x	x	x
2	Coupling part 2	x	x	x	x	x	x	x	x	x	x
4	Spacer					x	x	x	x		x
5	Flanged sleeve	x	x	x	x	x	x	x	x	x	x
6	Screw plug	x	x			x	x			x	x
7	Sealing ring ¹⁾	x	x			x	x			x	x
8	Fitting bolt	x	x	x	x	x	x	x	x	x	x
9	Hexagon nut	x	x	x	x	x	x	x	x	x	x
10	Cover ³⁾	x	x	x	x	x	x	x	x	x	x
11	Bolt	x	x	x	x	x	x	x	x	x	x
12	DUO sealing ring	x	x			x	x			x	x
18	Bolt ³⁾										
20	Plate pulley ²⁾					x	x	x	x		x
21	Two-part cover ³⁾	x	x			x	x				
22	Screw plug ⁴⁾										
31	Cover ⁵⁾									x	x
32	Bolt									x	x
33	Support ring									x	x
34	Thrust element									x	x
50	Sealing compound (Liquid plastic Loctite 5922)	x	x			x	x			x	x
51	Two-part retaining ring		x		x						

Part number	Designation	ZWN	ZWNA	ZWD	ZWDA	ZZS	ZZSA	ZZSD	ZZDA	ZWNV	ZZSV
52	Two-part retaining ring						x		x		

Table 11-1: Spare parts list for ZWN, ZWNA, ZWD, ZWDA, ZZS, ZZSA, ZZSD, ZZDA, ZWNV and ZZSV types

¹⁾ Sealing ring (7) is only available for sizes 112 and 128. For the other sizes, the sealing ring is incorporated into the screw plug (6).

²⁾ The plate pulley (20) is flanged into the spacer (4). As a replacement, Flender only supplies the complete spacer (4) with plate pullies (20). For spacer lengths $LZ \leq 200$, the spacer (4) is designed without plate pullies (20).

³⁾ For ZWN, ZWNA, ZZS and ZZSA types, the cover (10) can also be designed as a two-part cover (21) at the customer's request. The two-part cover (21) is attached to the flanged sleeve (5) with the bolts (18).

⁴⁾ Screw plugs (22) are only used in combination with a pressurised oil interference fit.

⁵⁾ The ZWNV type cover (31) can also be made in several parts.

You can find a description of the two-part cover (21) in Section Two section cover (Page 69). You can find a description of the screw plug (22) in Section Screw plug (Page 70).

11.2 Spare parts drawing and spare parts list

11.2.2 Spare parts drawing for ZWN, ZWNA, ZWD, ZWDA and ZWNV types

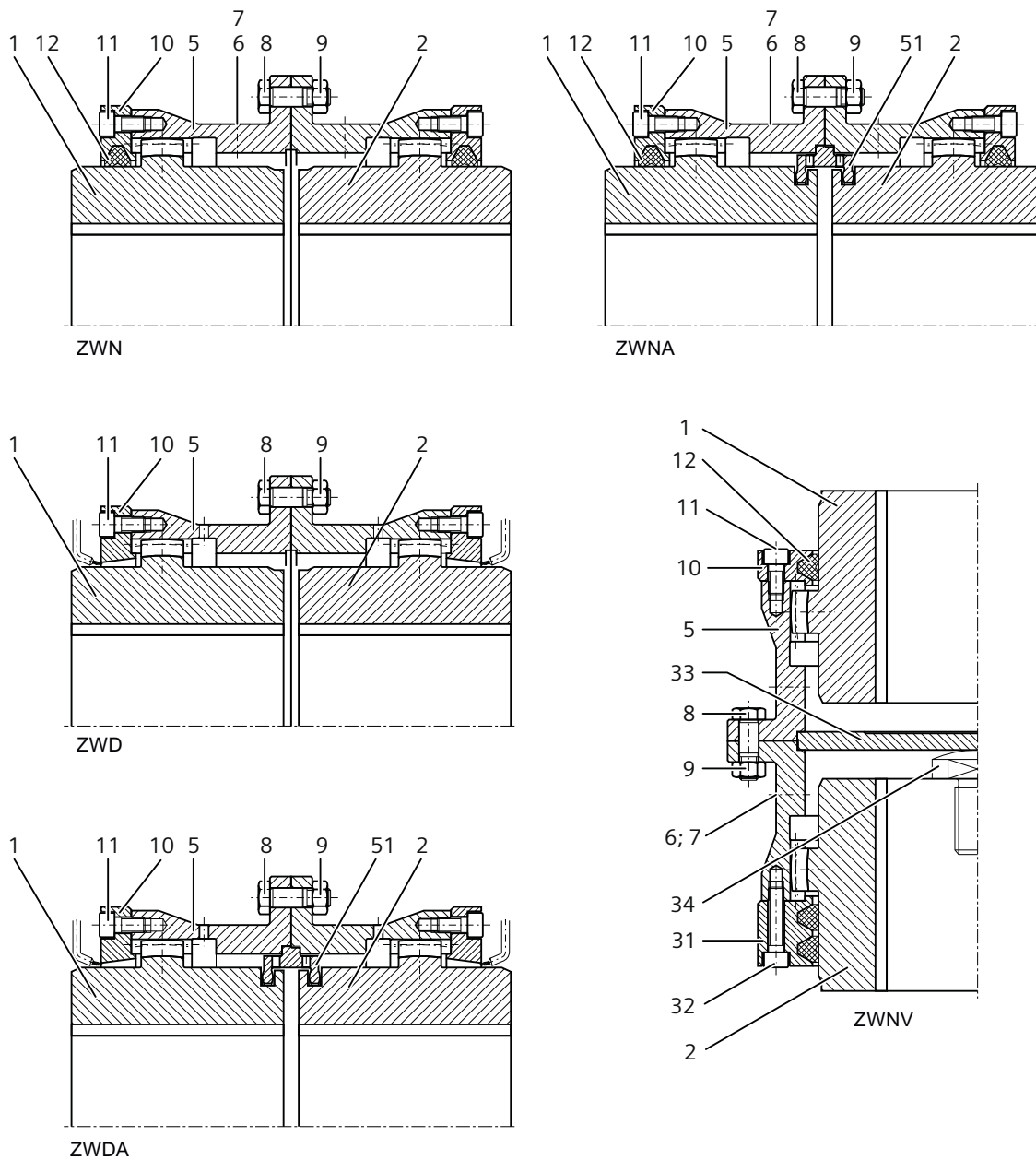


Figure 11-1: Spare parts drawing for ZWN, ZWNA, ZWD, ZWDA, ZWNV types

11.2.3 Spare parts drawing for ZZS, ZZSA, ZZSD, ZZDA and ZZSV types

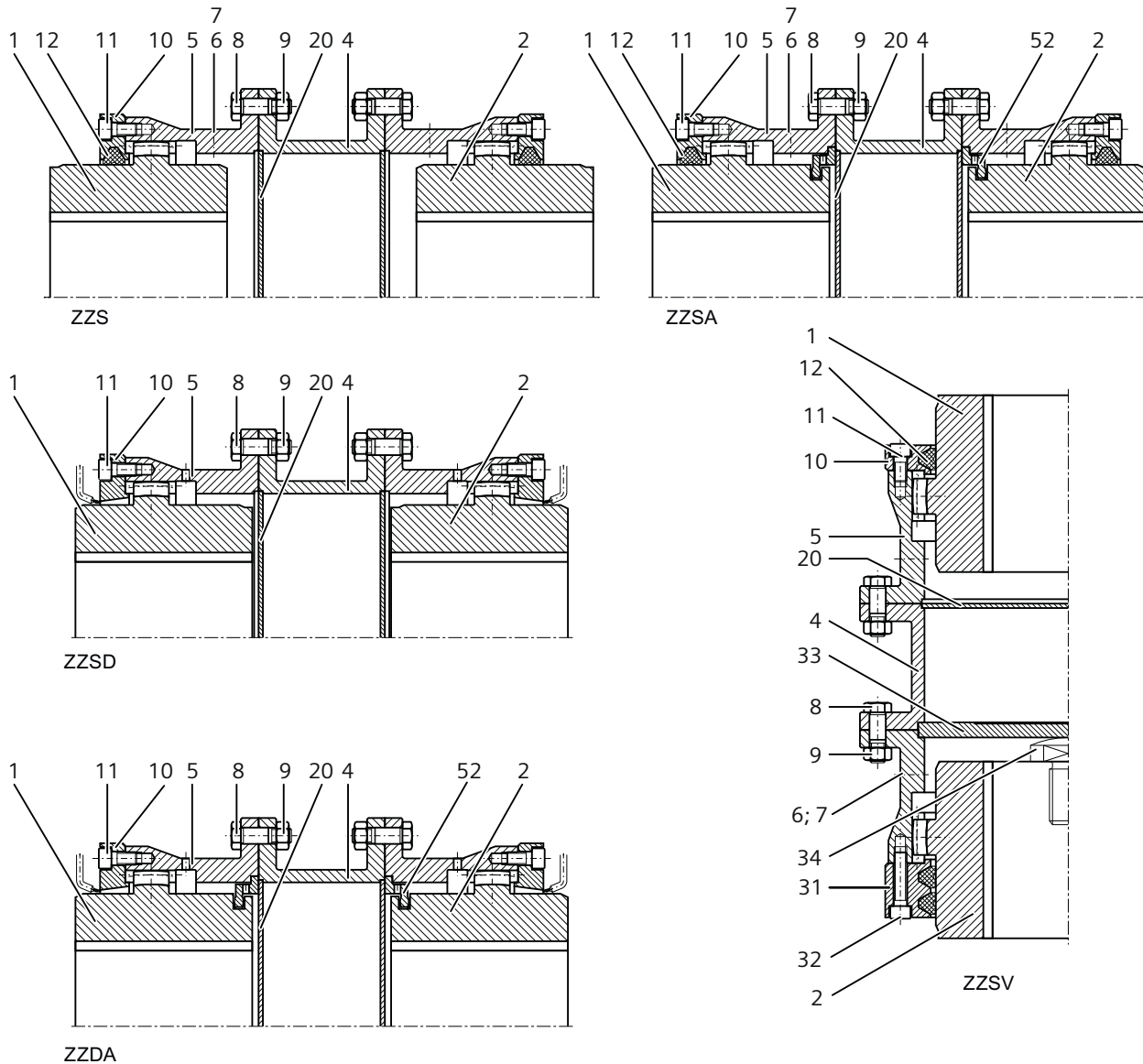


Figure 11-2: Spare parts drawing for ZZS, ZZSA, ZZSD, ZZDA, ZZSV types

11.2.4 Two section cover

The diagram below shows the two-part cover (21):

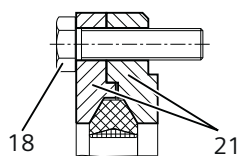


Figure 11-3: Two-part cover (21)

11.2.5 Screw plug

The diagram below shows the screw plug (22):

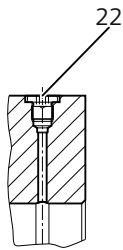


Figure 11-4: Screw plug (22)

A.1 **Speeds, geometry data and weights**

In this chapter you can find dimension drawings and technical data for ZAPEX couplings of the following types:

- Dimension drawing for ZWN, ZWNA, ZWD and ZWDA (Page 71) type
- Dimension drawing for ZZS, ZZSA, ZZSD and ZZDA (Page 73) type
- Dimension drawing for the ZWNV (Page 74) type
- Dimension drawing for ZZSV (Page 75) type
- Dimension table (Page 77)

A.1.1 **Dimension drawing for ZWN, ZWNA, ZWD and ZWDA types**

The ZWNA and ZWDA types are only produced in variant A (S1). For clearance S1 to S3, refer to Chapter Clearance S (Page 79).

You can find the dimension table in Chapter Dimension table (Page 77).

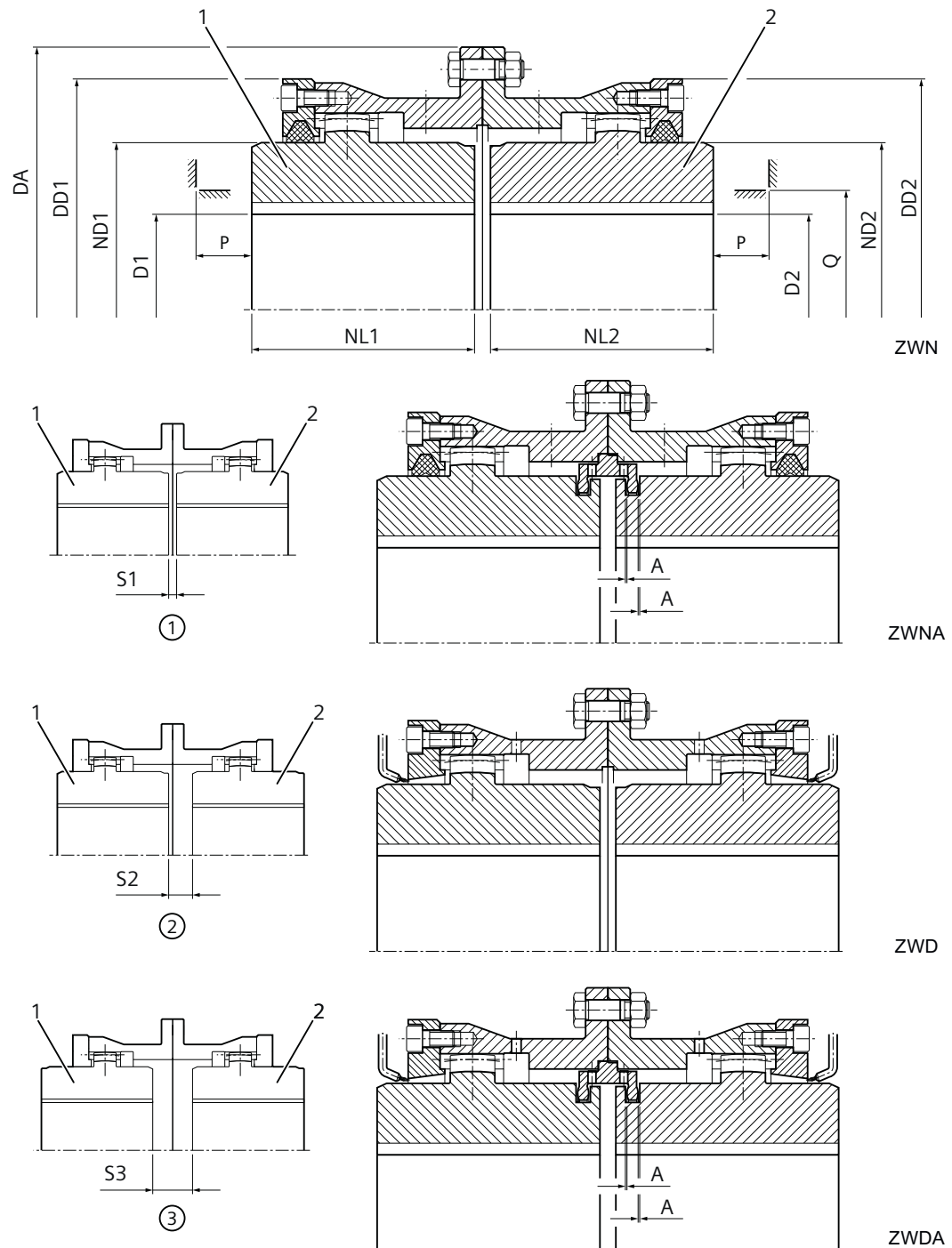


Figure A-1: Dimension drawing for ZWN, ZWNA, ZWD and ZWDA types

- ① Variant A
- ② Variant AB
- ③ Variant B

A.1.2 Dimension drawing for ZZS, ZZSA, ZZSD and ZZDA types

The ZZSA and ZZDA types are only produced in variant A (S9). For clearance S8 and S9, refer to Chapter Clearance S (Page 79).

LA - Dimensions according to the orderer's specifications.

LZ - Dimensions ≤ 200 are delivered without part 20 ($LA = LZ + 2 \times S8/9$)

You can find the dimension table in Chapter Dimension table (Page 77).

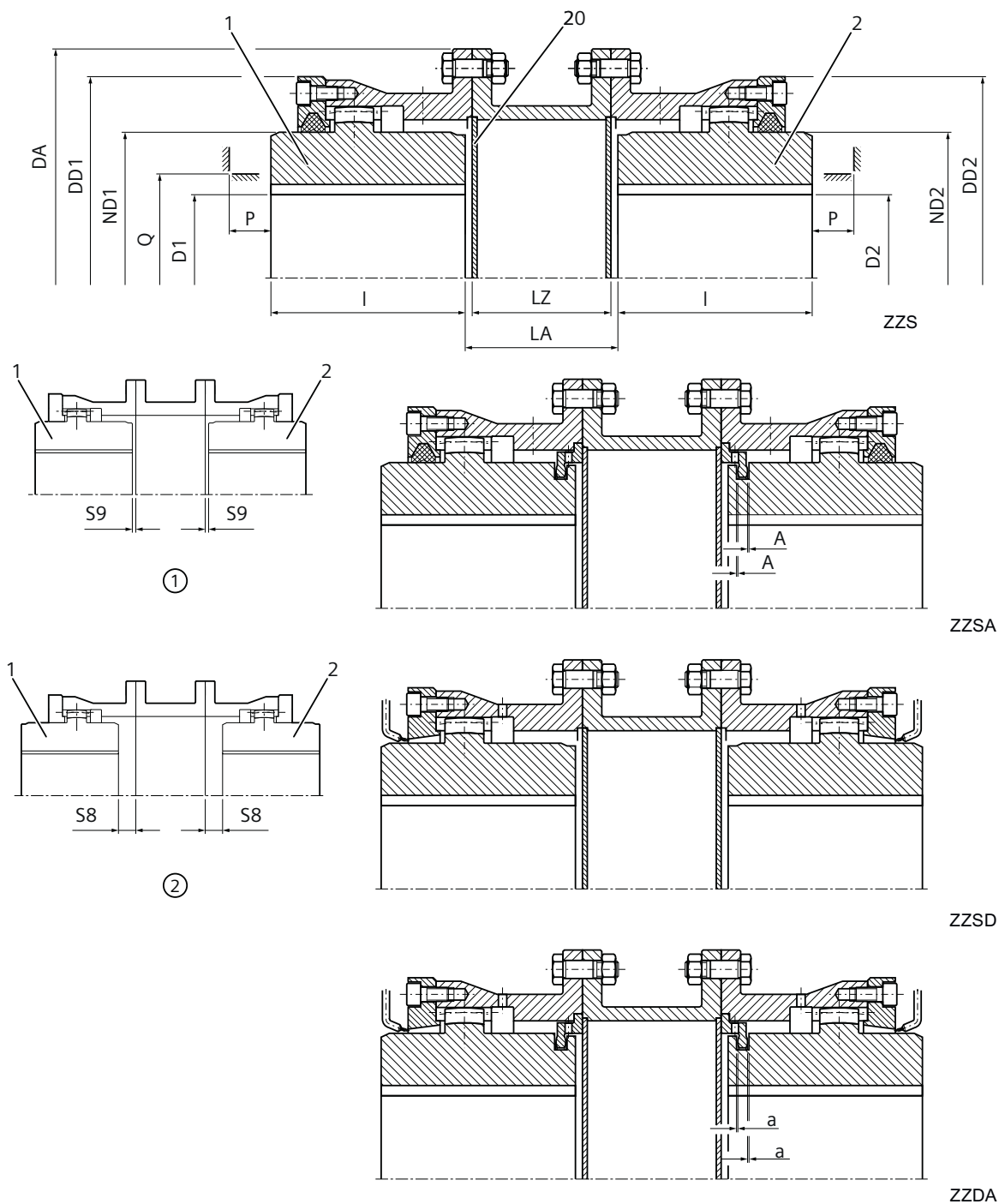


Figure A-2: Dimension drawing for ZZS, ZZSA, ZZSD and ZZDA types

- ① Variant A
- ② Variant B

A.1.3 Dimension drawing ZWNV type

For clearance S11 and S12, refer to Chapter Clearance S (Page 79).

You can find the dimension table in Chapter Dimension table (Page 77).

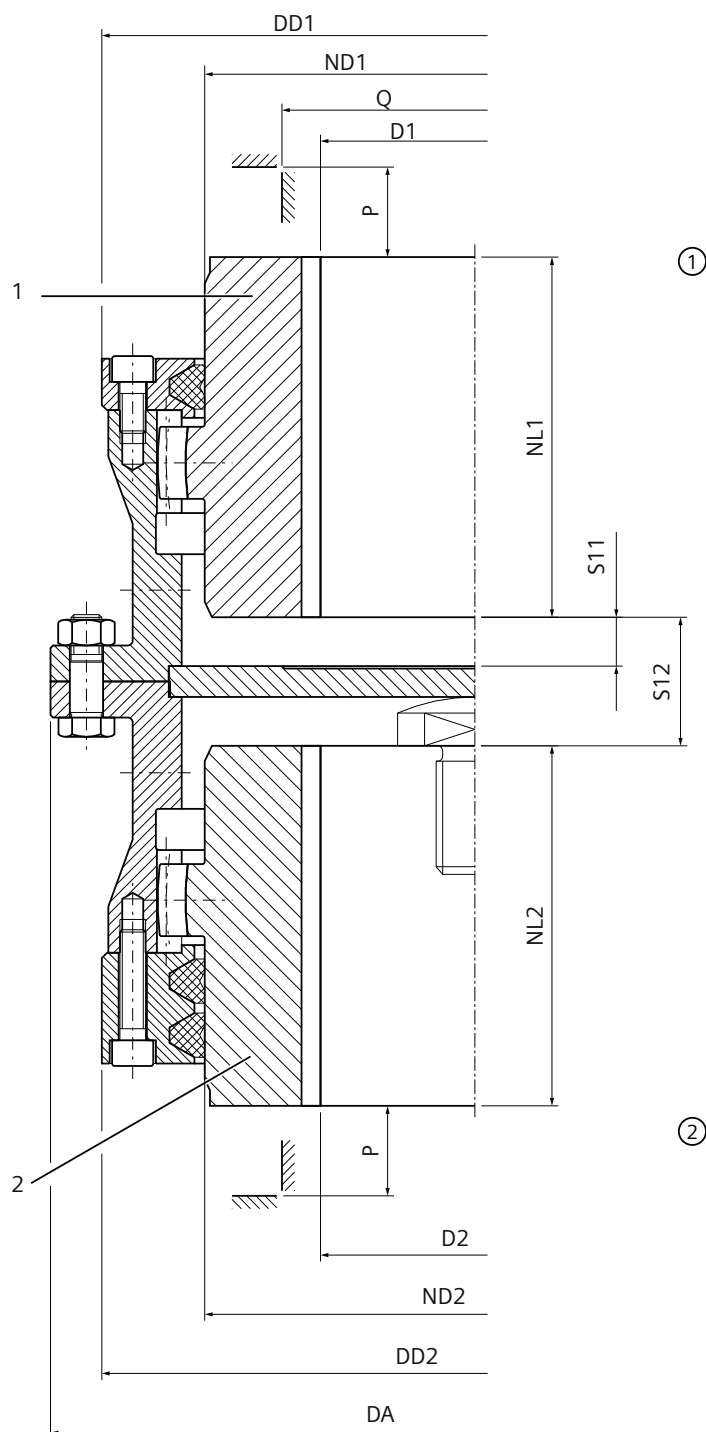


Figure A-3: Dimension drawing ZWNV type

- ① top
- ② bottom

A.1.4 Dimension drawing ZZSV type

For clearance S8 and S13, refer to Chapter Clearance S (Page 79).

LA - Dimensions according to the orderer's specifications.

You can find the dimension table in Chapter Dimension table (Page 77).

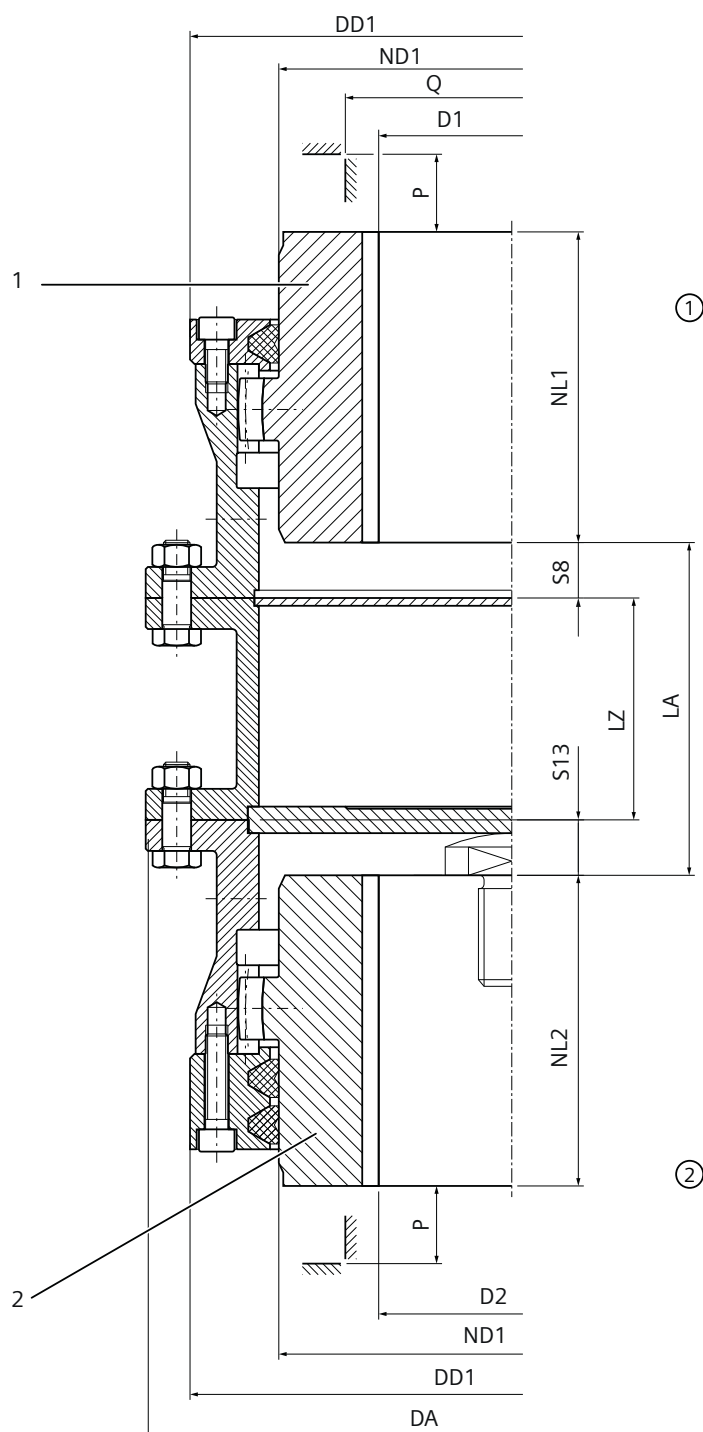


Figure A-4: Dimension drawing ZZSV type

- ① top
- ② bottom

A.1.5 Dimension table

Size	Rated torque T_N	Speed n_{max}	Bore D1, D2			DA	ND1 ND2	NL1 NL2	DD1 DD2	Axial back- lash A	$Q^{3)}$	$P^{3)}$	LZ min.	Weight ⁴⁾ m
			from	up to ¹⁾	up to ²⁾									
	Nm	rpm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	kg
112	1,300	9400	0	49	49	143	65	50	110	0.5	50	35	120	5.8
128	2,500	8300	0	61	61	157	80	60	128	0.5	65	45	120	7.9
146	4,300	7300	0	72	65	177	95	75	146	0.5	75	45	120	11.5
175	7,000	6400	0	85	80	215	112	90	175	0.5	85	50	130	19
198	11,600	5500	0	100	95	237	135	100	198	0.5	110	50	130	26.5
230	19,000	4700	0	120	117	265	160	110	230	0.5	135	50	130	37
255	27,000	4100	0	140	140	294	185	125	255	1.0	160	50	140	49
290	39,000	3700	70	160	155	330	210	140	290	1.0	180	60	140	72
315	54,000	3300	80	175	175	366	230	160	315	1.0	200	60	180	99
342	69,000	3000	90	195	195	392	255	180	340	1.0	225	60	180	125
375	98,000	2700	100	220	220	430	290	200	375	1.0	260	60	180	170
415	130,000	2500	120	240	240	478	320	220	415	1.0	285	80	200	225
465	180,000	2200	140	270	270	528	360	240	465	1.0	325	80	200	300
505	250,000	2000	160	300	300	568	400	260	505	1.5	365	80	200	380
545	320,000	1800	180	330	330	620	440	280	545	1.5	405	80	220	490
585	400,000	1700	210	360	360	660	480	310	585	1.5	445	80	220	620
640	510,000	1600	230	360	360	738	480	330	640	1.5	445	90	250	780
			> 360	390	390		520				475			800
690	660,000	1450	250	390	390	788	520	350	690	1.5	475	90	250	950
			> 390	420	420		560				515			980
730	790,000	1350	275	420	420	834	560	380	730	1.5	515	90	250	1,150
			> 420	450	450		600				555			1,200
780	1,000,000	1250	300	450	450	900	600	400	780	1.5	555	110	280	1,450
			> 450	490	490		650				595			1,450
852	1,200,000	1150	325	490	490	970	650	420	850	2.0	595	110	280	1,750
			> 490	535	535		710				655			1800
910	1,600,000	1050	350	535	535	1,030	710	450	910	2.0	655	110	280	2100
			> 535	570	570		750				695			2,150
1,020	1,900,000	1000	375	570	570	1,112	750	480	1,020	2.0	695	130	380	2,600
			> 570	600	600		800				735			2,800

Size	Rated torque T_N	Speed n_{max}	Bore D1, D2			DA	ND1 ND2	NL1 NL2	DD1 DD2	Axial back- lash A	$Q^{3)}$	$P^{3)}$	LZ min.	Weight $^{4)}$ m
			from	up to $^{1)}$	up to $^{2)}$									
	Nm	rpm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	kg
1,080	2,200,000	950	400	600	600	1,16	800	500	1,080	2.0	735	135	380	3,100
			> 600	650	650	2	860				795			3,200
1,150	2,700,000	900	425	650	650	1,22	860	520	1,150	2.0	795	135	380	3,600
			> 600	705	705	2	930				865			3,700
1,160	3,350,000	850	450	650	650	1,29	860	550	1,160	2.0	795	135	380	4,000
			> 650	705	705	2	930		1,160		865			4,100
			> 705	750	750		990		1,210		910			4,300
1,240	3,800,000	800	475	705	705	1,40	930	580	1,240	2.0	865	155	400	4,900
			> 705	750	750	0	990		1,240		910			5,000
			> 750	800	800		1,055		1,290		975			5,300
1,310	4,600,000	750	500	705	705	1,47	930	610	1,310	2.5	865	155	400	5,600
			> 705	750	750	0	990		1,310		910			5,700
			> 750	800	800		1,055		1,310		975			5,900
			> 800	850	850		1,120		1,370		1,030			6,200
1,380	5,300,000	700	525	750	750	1,54	990	640	1,380	2.5	910	155	400	6,500
			> 750	800	800	0	1,055		1,380		975			6,800
			> 800	850	850		1,120		1,380		1,030			6,900
			> 850	890	890		1,170		1,430		1,080			7,100
1,440	6,250,000	670	550	800	800	1,60	1,055	670	1,440	2.5	975	155	400	7,500
			> 800	850	850	0	1,120		1,440		1,030			7,600
			> 850	890	890		1,170		1,440		1,080			7,700
			> 890	940	940		1,240		1,510		1,150			8,200
1,540	7,200,000	630	575	850	850	1,71	1,120	700	1,540	2.5	1,030	175	400	8,800
			> 850	890	890	0	1,170		1,540		1,080			8,900
			> 890	940	940		1,240		1,540		1,150			9,200
			> 940	995	995		1,310		1,610		1,220			9,600

Table A-1: Speeds, geometry data and weights for coupling sizes 112 to 1540

¹⁾ Maximum bore for parallel keyway in accordance with DIN 6885/1 for the ZWN, ZWD, ZZS, ZZSD, ZWNV, ZZSV types.

²⁾ Maximum bore for parallel keyway in accordance with DIN 6885/1 for the ZWNA, ZWDA, ZZSA, ZZDA types.

³⁾ Space required for aligning the coupling parts and replacing the sealing rings (12).

⁴⁾ Weight applies to one coupling type ZWN with maximum bore.

A.2 Clearance S

The following table lists the clearances S for types ZWN, ZWNA, ZWD, ZWDA (S1, S2, S3), for types ZZS, ZZSA, ZZD, ZZDA (S8, S9), and for types ZWNV, ZZSV (S8, S11, S12, S13).

You can find a description of the types in Section Speeds, geometry data and weights (Page 71).

NOTICE

Property damage due to non-compliance with the S clearance and the permitted deviations

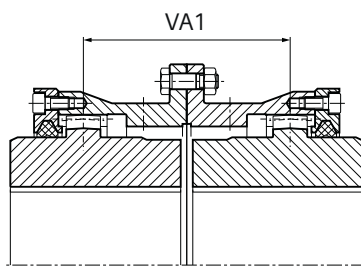
For types ZWNA, ZWDA (S1, S2, S3) and types ZZSA, ZZDA (S8, S9) deviations in the S clearance of ± 0.1 mm are permitted due to the axial backlash limitation.

Size	S1	S2	S3	perm S1, S2, S3 de- viation	S8	S9	perm S8, S9 devi- ation	S11	S12	perm S11, S12 devi- ation	S13
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
112	6	-	-	+1	3	3	+0.5	-	-	+0.5	-
128		13	20		10			6.5	26		16
146		13	20		10			6.0	28		18
175	8	14	20	+1	10	4	+0.5	5.5	33	+0.5	23
198		19	30		15			10	40		25
230		20	32		16			11	32		16
255	10	25	40	+1.5	20	5	+0.8	14	40	+0.8	20
290		30	50		25			19	50		25
315		30	50		25			18	50		25
342	12	42	72	+1.5	36	6	+0.8	29	72	+0.8	36
375		42	72		36			29	72		36
415		74	136		68			60	136		68
465	16	96	176	+2	88	8	+1	80	176	+1	88
505		106	196		98			89	196		98
545		126	236		118						
585	20	150	280	+2	140	10	+1				
640		149	278		139						
690		166	312		156						
730		180	340		170						
780	25	176	327	+3	163.5	12.5	+1.5				
852		185	345		172.5						
910		215	405		202.5						
1,020		213	401		200.5						

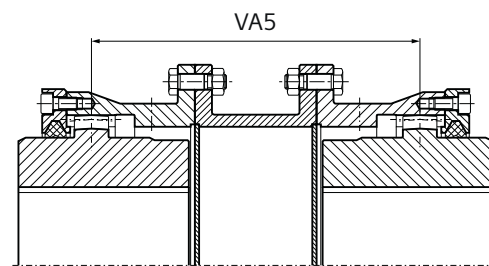
Size	S1	S2	S3	perm S1, S2, S3 de- viation	S8	S9	perm S8, S9 devi- ation	S11	S12	perm S11, S12 devi- ation	S13
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
1,080	30	226	422	+3	211	15	+1.5				
1,150		238	446		223						
1,160		260	490		245						
1,240		250	470		235						
1,310	35	265	495	+4	247.5	17.5	+2				
1,380		275	515		257.5						
1,440		295	555		277.5						
1,540		275	515		257.5						

Table A-2: Clearance S

A.3 Distances between teeth VA and recommended alignment values for angular and radial misalignment



ZWN, ZWNA, ZWD, ZWDA, ZWNV



ZZS, ZZSA, ZZSD, ZZDA, ZZSV

The following table contains the distances between teeth VA and recommended alignment values for angular and radial misalignment:

NOTICE

As a result of the limited axial clearance, halve the alignment values for ZWNA, ZWDA, ZZSA and ZZDA types.

Size	Distance between teeth		Alignment values for radial misalignment		Alignment values for angular misalign- ment
	VA1	VA5	ΔK_r for VA1	ΔK_r for VA5	ΔS
	mm	mm	mm	mm	mm
112	56	VA1 + LZ	0.10	$\Delta K_r = VA5 \times \tan 0.1^\circ$	0.11
128	73		0.12		0.14

Size	Distance between teeth		Alignment values for radial misalignment		Alignment values for angular misalign- ment
	VA1 mm	VA5 mm	ΔK_r for VA1 mm	ΔK_r for VA5 mm	ΔS mm
146	88	VA1 + LZ	0.15	$\Delta K_r = VA5 \times \tan 0.1^\circ$	0.16
175	104		0.18		0.19
198	119		0.20		0.23
230	130		0.22		0.28
255	150		0.26		0.32
290	170		0.29		0.36
315	190		0.33		0.40
342	222		0.38		0.44
375	242		0.42		0.50
415	294		0.51		0.55
465	336		0.58		0.62
505	366		0.64		0.70
545	406		0.71		0.76
585	460		0.80		0.83
640	479		0.84		0.83
690	516		0.90		0.90
730	560		0.98		0.97
780	576		1.01		1.04
852	605		1.06		1.13
910	665		1.16		1.24
1,020	693		1.21		1.30
1,080	726		1.27		1.40
1,150	758		1.32		1.50
1,160	810		1.41		1.50
1,240	830		1.45		1.62
1,310	875		1.53		1.62
1,380	915		1.60		1.72
1,440	965		1.68		1.84
1,540	975		1.70		1.95

Table A-3: Distances between teeth VA and recommended alignment values for radial and angular misalignment

A.4 Tightening torques and widths A/F

Use bolts of strength class 8.8.

Size	Tightening torque TA			Width A/F SW				
	Part no.			Part no.				
	6 Nm	9 Nm	11, 18, 32 Nm	6 ¹⁾ mm	9 ²⁾ mm	18 ²⁾ mm	11, 32 ¹⁾ mm	11, 32 ²⁾ mm
112	2	25	10	3	13	10	5	
128	2	25	10	3	13	10	5	
146	13	25	10	5	13	10	5	
175	13	49	25	5	17	13	6	
198	30	49	25	6	17	13	6	
230	30	49	25	6	17	13	6	
255	60	86	25	8	19	13	6	
290	60	86	49	8	19	17	8	
315	60	210	49	8	24	17	8	
342	60	210	49	8	24	17	8	
375	80	210	49	10	24	17	8	
415	80	410	86	10	30	19	10	
465	80	410	86	10	30	19	10	
505	80	410	86	10	30	19	10	
545	80	710	86	10	36	19	10	
585	80	710	86	10	36	19	10	
640	80	1,450	210	10	46	24	14	
690	80	1,450	210	10	46	24	14	
730	140	1,450	210	12	46	24	14	
780	140	2,530	210	12	55	24	14	
852	140	2,530	410	12	55	30	17	
910	140	2,530	410	12	55	30	17	
1,020	140	4,070	410	12	65	30	17	30
1,080	200	4,070	410	17	65	30		30
1,150	200	4,070	410	17	65	30		30
1,160	200	4,070	410	17	65	30		30
1,240	200	6,140	710	17	75	36		36
1,310	200	6,140	710	17	75	36		36
1,380	200	6,140	710	17	75	36		36
1,440	200	6,140	710	17	75	36		36

Size	Tightening torque TA			Width A/F SW				
	Part no.			Part no.				
	6 Nm	9 Nm	11, 18, 32 Nm	6 ¹⁾ mm	9 ²⁾ mm	18 ²⁾ mm	11, 32 ¹⁾ mm	11, 32 ²⁾ mm
1,540	200	7,350	1,450	17	80	46		46

Table A-4: Tightening torques and widths A/F

¹⁾ Hexagon socket

²⁾ Hexagon head

Apply the specified tightening torques as listed in Section Tightening procedure (Page 83).

A.5 Tightening procedure

Tightening torques must be observed taking into account the following table:

Scatter of the torque applied at the tool	Tightening procedure (As a rule, the tightening procedures listed are within the specified tool torque scatter.)
±5 %	- Hydraulic tightening with mechanical screwdriver - Torque-controlled tightening with a torque wrench or a torque wrench that gives a signal - Tightening with a precision mechanical screwdriver with dynamic torque measurement

Table A-5: Tightening procedure

The tightening torques apply to screws/bolts with untreated surfaces that are not oiled or are only lightly oiled, and for screws/bolts that are used with a liquid screw locking agent in accordance with these instructions. Use with lubricant paint or lubricant is not permitted.

A.6 DUO sealing rings

A.6.1 Use and storage of the DUO sealing rings (12)

Note the following concerning the use and storage of the DUO sealing rings (12):

- Storage possible for up to 5 years
- Protect against direct sunlight, artificial light with a high UV-content and extreme temperatures
- Avoid contact with aggressive media
- Protect the DUO sealing ring (12) from becoming deformed during storage
- Do **not** mount the DUO sealing ring (12) for storage onto the coupling part (1/2)

A.6.2 DUO sealing rings

Material	Hardness	Comment	Marking	Ambient temperature	Approved for explosion group
79NBR716	80 Shore A	Standard	blue	-20 °C to +80 °C	IIA, IIB, IIC
Viton (85 FKM)	85 Shore A	Special higher temperatures	black	-20 °C to +150 °C	not approved
85NBR891	85 Shore A	Special for lower temperatures	black	-45 °C to +80 °C	IIA, IIB, IIC

Table A-6: DUO sealing rings

Declaration of conformity

B

EU Declaration of Conformity

Product:

FLENDER ZAPEX® couplings
ZWN, ZWNA, ZWD, ZWDA, ZZS, ZZSA, ZZSD, ZZDA, ZWNV, ZZSV types

Name and address of the manufacturer:

Flender GmbH
Schlavenhorst 100
46395 Bocholt
Germany

This Declaration of Conformity is issued under the sole responsibility of the manufacturer.

This declaration refers to the product mentioned above.

The object of the declaration described above is in conformity with the relevant EU harmonisation legislation:

– Directive 2014/34/EU, Official Journal L 96, 29 March 2014, Pages 309-356

Harmonised standards or other technical specifications on which the Declaration of Conformity is based:

EN 1127-1 : 2019

EN 1127-2 : 2014

EN ISO 80079-36 : 2016

EN ISO 80079-37 : 2016

EN ISO/IEC 80079-38 : 2016

Notified Body, DEKRA Testing and Certification GmbH (0158) has received the technical documentation.

Signed for and on behalf of:

Flender GmbH



Bocholt, 2022-09-01

Dr Dennis Geers, President, Business Line Couplings

FLENDER COUPLINGS

ZAPEX

Assembly and operating instructions M3500-01en

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