

FLENDER ZAPEX® couplings

ZWTR

Operating instructions
BA 3528 EN 09/2011

FLENDER couplings

SIEMENS

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ZWTR

Operating instructions

Translation of the original operating instructions

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Notes and symbols in these operating instructions

Note: The term "operating instructions" will in the following also be shortened to "instructions" or "manual".

Legal notes

Warning-note concept

This manual comprises notes which must be observed for your personal safety and for preventing material damage. Notes for your personal safety are marked with a warning triangle or an "Ex" symbol (when applying Directive 94/9/EC), those only for preventing material damage with a "STOP" sign.



WARNING! Imminent explosion!

The notes indicated by this symbol are given to prevent **explosion damage**.
Disregarding these notes may result in serious injury or death.



WARNING! Imminent personal injury!

The notes indicated by this symbol are given to prevent **personal injury**.
Disregarding these notes may result in serious injury or death.



WARNING! Imminent damage to the product!

The notes indicated by this symbol are given to prevent **damage to the product**.
Disregarding these notes may result in material damage.



NOTE!

The notes indicated by this symbol must be treated as general **operating information**.
Disregarding these notes may result in undesirable results or conditions.



WARNING! Hot surfaces!

The notes indicated by this symbol are made to prevent **risk of burns due to hot surfaces** and must always be observed.
Disregarding these notes may result in light or serious injury.

Where there is more than one hazard, the warning note for whichever hazard is the most serious is always used. If in a warning note a warning triangle is used to warn of possible personal injury, a warning of material damage may be added to the same warning note.

Qualified personnel

The product or system to which these instructions relate may be handled only by persons qualified for the work concerned and in accordance with the instructions relating to the work concerned, particularly the safety and warning notes contained in those instructions. Qualified personnel must be specially trained and have the experience necessary to recognise risks associated with these products or systems and to avoid possible hazards.

Intended use of Siemens products

Observe also the following:



Siemens products must be used only for the applications provided for in the catalogue and the relevant technical documentation. If products and components of other makes are used, they must be recommended or approved by Siemens. The faultfree, safe operation of the products calls for proper transport, proper storage, erection, assembly, installation, start-up, operation and maintenance. The permissible ambient conditions must be adhered to. Notes in the relevant documentations must be observed.

Trademarks

All designations indicated with the registered industrial property mark ® are registered trademarks of Siemens AG. Other designations used in these instructions may be trademarks the use of which by third parties for their own purposes may infringe holders' rights.

Exclusion of liability

We have checked the content of the instructions for compliance with the hard- and software described. Nevertheless, variances may occur, and so we can offer no warranty for complete agreement. The information given in these instructions is regularly checked, and any necessary corrections are included in subsequent editions.

Note on the EC Machinery Directive 2006/42/EC

Siemens couplings in the "FLENDER couplings" product range must be treated as "components" in the sense of the EC Machinery Directive 2006/42/EC.

Therefore, Siemens needs not issue a declaration of incorporation.

Information on safe fitting, safe startup and safe operation can be found in this instruction manual; in addition the "warning-note concept" therein must be observed.

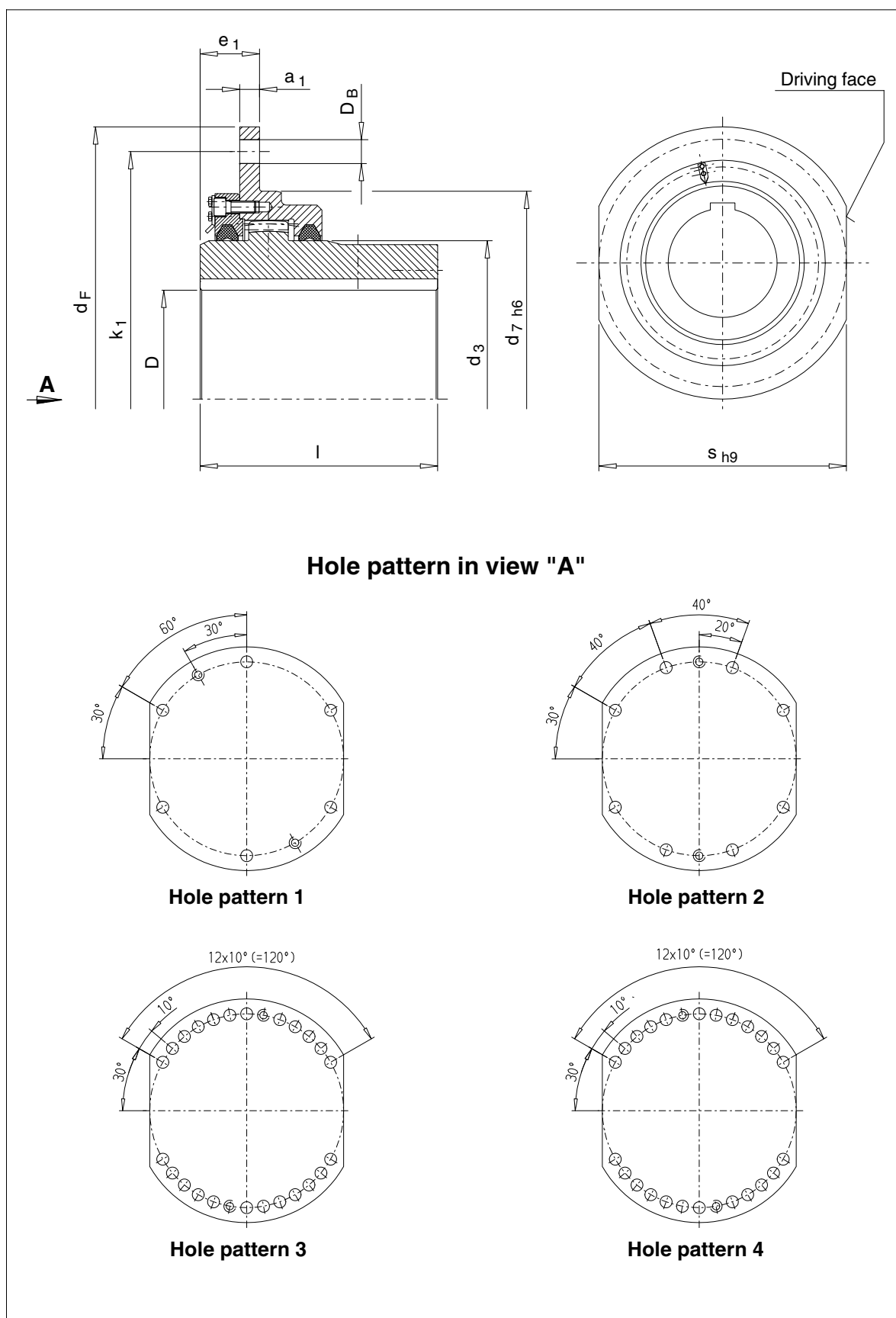
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1. Technical data

1.1 Type ZWTR



Size	Perm. torque T 1) Nm	Perm. radial load F _R N	2) D max. mm	l mm	d _F mm	d ₇ mm	d ₃ mm	s mm	e ₁ mm	a ₁ mm	k ₁ mm	D _B mm	Hole pat- tern	Mass moment of inertia J 3) kgm ²	Wght. 3) kg
198	14500	32500	95	125	340	220	135	300	45	15	300	15	1	0.23	25
230	17500	36500	110	130	360	240	160	320	45	15	320	15	1	0.31	32
255	24000	45500	125	145	380	260	185	340	45	15	340	19	1	0.43	42
290	31500	50000	145	170	400	280	210	360	45	15	360	19	1	0.63	55
315	42000	70000	160	175	420	310	230	380	60	20	380	24	1	1.2	76
342	55000	90000	180	185	450	340	255	400	60	20	400	24	1	1.4	80
375	78000	110000	200	220	510	400	290	460	60	20	460	24	1	2.5	120
415	104000	150000	220	240	550	420	320	500	60	20	500	24	1	4	155
465	155000	165000	250	260	580	450	360	530	60	20	530	24	2	5.7	195
505	235000	200000	275	315	650	530	400	580	65	25	600	24	2	11	295
545	390000	325000	300	350	680	560	440	600	65	25	630	24	3	16	380
585	460000	380000	330	380	710	600	480	640	81	35	660	28	4	23	460
640	600000	420000	360	410	780	670	520	700	81	35	730	28	4	35	570
730	880000	500000	415	450	850	730	600	760	81	35	800	28	4	60	800

Table 1.1: Torques T, radial loads F_R, dimensions, weights and mass moments of inertia

- 1) The specified torques relate to the teeth and **not** to the shaft-hub connection. This must be checked separately.
- 2) Max. bore with keyway to DIN 6885/1.
- 3) Weights and mass moments of inertia apply to mean bores.

Torques T are valid for:

- Daily operating cycle of up to 24 h
- Operation within the specified alignment
- Operation over the temperature range of between - 20 °C and + 80 °C (ambient temperature and/or temperature of shaft ends).



For sustained faultfree operation the coupling must be designed with an application factor appropriate to the application. In the event of a change in operating conditions (output, speed, changes to the prime mover and driven machine) the design must always be checked.

2. General notes

2.1 Introduction

These instructions are an integral part of the delivery of the coupling and must be kept in its vicinity for reference at all times.



All persons involved in the installation, operation, maintenance and repair of the coupling must have read and understood these operating instructions and must comply with them at all times. Siemens accepts no responsibility for damage or disruption caused by disregard of these instructions.

The "**FLENDER coupling**" described in these instructions has been developed for stationary use in general engineering applications.

The coupling is designed only for the application described in section 1, "Technical data". Other operating conditions must be contractually agreed.

The coupling must be used and operated strictly in accordance with the conditions laid down in the contract governing performance and supply agreed by Siemens and the customer.

The coupling described in these instructions reflects the state of technical development at the time these instructions went to print.

In the interest of technical progress we reserve the right to make changes to the individual assemblies and accessories which we regard as necessary to preserve their essential characteristics and improve their efficiency and safety.

2.2 Copyright

The copyright to these instructions is held by **Siemens AG**.

These instructions must not be wholly or partly reproduced for competitive purposes, used in any unauthorised way or made available to third parties without our agreement.

Technical enquiries should be addressed to the following works or to one of our customer services:

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Schlavenhorst 100
46395 Bocholt

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

3. Safety instructions



Any changes on the part of the user are not permitted. This applies equally to safety features designed to prevent accidental contact.

3.1 Obligations of the user

- The operator must ensure that all persons involved in installation, operation, maintenance and repair have read and understood these operating instructions and comply with them at all times in order to:
 - avoid injury or damage,
 - ensure the safety and reliability of the coupling,
 - avoid disruptions and environmental damage through incorrect use.
- During transport, assembly, installation, demounting, operation and maintenance of the unit, the relevant safety and environmental regulations must be complied with at all times.
- The coupling may only be operated, maintained and/or repaired by persons qualified for the work concerned (see "Qualified personnel" on page 3 of this manual).
- All work must be carried out with great care and with due regard to safety.
- All work on the gear unit must be carried out only when it is at a standstill.
The drive unit must be secured against being switched on accidentally (e.g. by locking the key switch or removing the fuses from the power supply). A notice should be attached to the ON switch stating clearly that work is in progress.
- The coupling must be fitted with suitable safeguards to prevent accidental contact. The operation of the coupling must not be impaired by the safeguard.
- The drive unit must be shut down as soon as changes to the coupling are detected during operation.
- If the coupling is intended for installation in plant or equipment, the manufacturer of such plant or equipment must ensure that the contents of the present operating instructions are incorporated in his own instructions.
- All spare parts must be obtained from Siemens.

4. Transport and storage

Observe the instructions in section 3, "Safety instructions"!

4.1 Scope of supply

The products supplied are listed in the dispatch papers. Check on receipt to ensure that all the products listed have actually been delivered. Parts damaged during transport or missing parts must be reported in writing immediately.

The ZAPEX coupling is delivered in separate parts and/or subassemblies (for transport) ready for installation, but **without** oil or grease charge.

4.2 Transport



When transporting the unit, use only lifting and handling equipment of sufficient load-bearing capacity!



The coupling must be transported using suitable transport equipment only.

Different forms of packaging may be used depending on the size of the coupling and method of transport. Unless otherwise agreed, the packaging complies with the **HPE Packaging Guidelines**.

The symbols marked on the packing must be observed at all times. These have the following meanings:

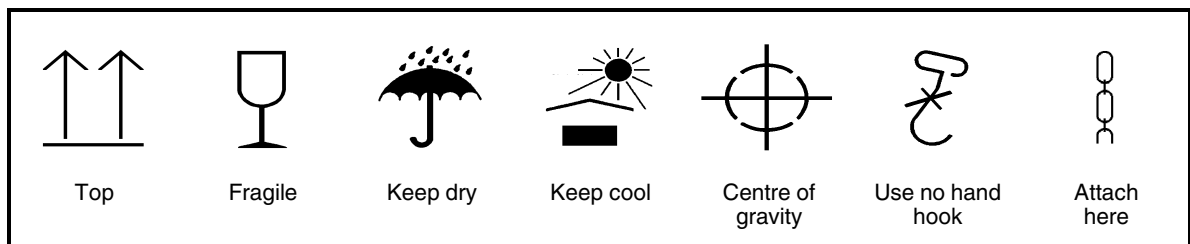


Fig. 1: Transport symbols

4.3 Storage of the coupling

4.3.1 Storage of the coupling parts

The coupling is delivered in a preserved condition and can be stored in a covered, dry place for up to 3 months. If the unit is to be stored for a protracted period, it should be treated with a long-term preservative agent (Siemens must be consulted).

4.3.2 Storage of DUO sealing rings

4.3.2.1 General

Correct storage will preserve the service life of the DUO sealing rings (12). Unfavourable storage conditions and improper treatment will negatively affect the physical properties of the DUO sealing rings (12). Such negative effects may be caused by e.g. the action of ozone, extreme temperatures, light, moisture, or solvents.



The DUO sealing rings (12) must not be stored while still fastened on the coupling part (1).

4.3.2.2 Storage area

The storage area must be dry and free from dust. The DUO sealing rings (12) must not be stored with chemicals, solvents, motor fuels, acids, etc. Furthermore, they should be protected against light, in particular direct sunlight and bright artificial light with a high ultraviolet content.



The storage areas must not contain any ozone-generating equipment, e.g. fluorescent light sources, mercury vapour lamps, high-voltage electrical equipment. Damp storage areas are unsuitable. Ensure that no condensation occurs. The most favourable atmospheric humidity is below 65 %.

5. Technical description

Observe the instructions in section 3, "Safety instructions"!



If a dimensioned drawing has been made out for the coupling, the data in this drawing must be given priority. The user of the system must make the dimensioned drawing available.

5.1 General description

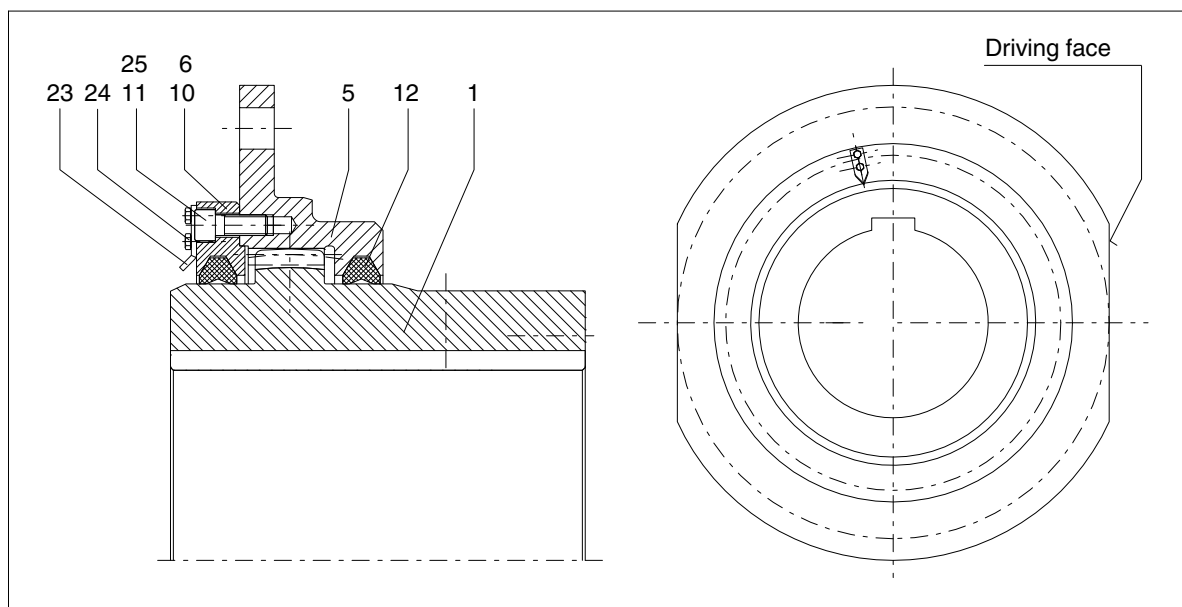
ZAPEX type ZWTR couplings are provided for direct flange mounting. They are equipped with a tooth wear monitoring device.

A suitable counteracting joint (self-aligning roller bearing) is required to compensate for parallel displacement.

ZAPEX couplings are suitable for clockwise and anticlockwise rotation and reversing operation.

The coupling part (1) with external teeth engages with the internal teeth of the flanged sleeve (5).

DUO sealing rings (12) serve to seal off the oil/grease chambers from outside influences.



The torque is transmitted from the shaft via parallel key, spline, etc. to the coupling part (1), then via the teeth to the flanged sleeve (5) and via the driving face on the flanged sleeve (5) to the flange-mounted cable drum.

6. Fitting

Observe the instructions in section 3, "Safety instructions"!



If a dimensioned drawing has been made out for the coupling, the data in this drawing must be given priority. The user of the system must make the dimensioned drawing available.

6.1 Instructions for applying the finished bore and fitting the axial retaining means, set screws and balancing

6.1.1 Finished bore for parallel-key connection

- Depreserve coupling part (1).



Note manufacturer's instructions for handling solvent.

For making the finished bore, the coupling parts must be clamped as shown in the following figure.



The sealing surfaces must not be damaged.

The coupling part must be aligned carefully. For the permissible radial eccentricity see DIN ISO 286 degree of fundamental tolerance IT 6 (see table 6.1.1 a).



The maximum permissible bore diameters (see section 1) are designed for drive-type fastenings without taper action to DIN 6885/1 and must not under any circumstances be exceeded.

When the keyway is to be designed deviating from DIN 6885/1 for a parallel-key connection, Siemens should be consulted.

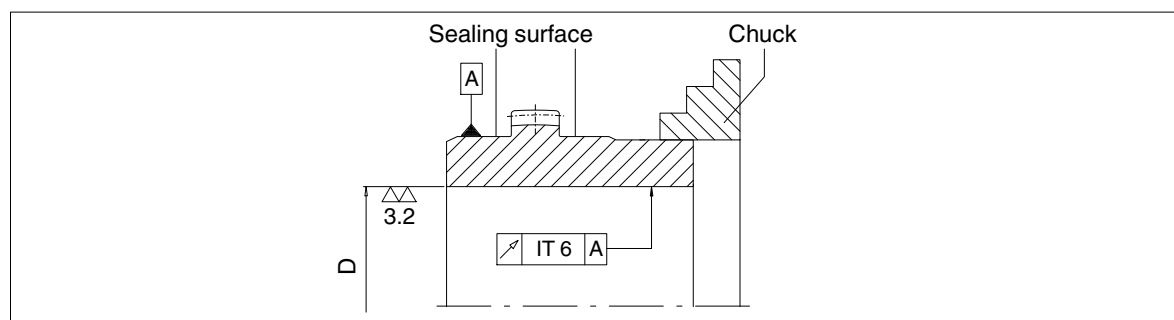
If other shaft-hub connections (e.g. spline bore hub profile, tapered or stepped bores, parallel-key connections with tightening) are to be used instead of the provided parallel-key connection, Siemens should be consulted.



**Failure to observe these instructions may result in breakage of the coupling.
Danger from flying fragments!**

Diameter or nominal dimension range	> 18 up to 30	> 30 up to 50	> 50 up to 80	> 80 up to 120	> 120 up to 180	> 180 up to 250	> 250 up to 315	> 315 up to 400	> 400 up to 415
Perm. deviation according to DIN ISO 286/1, IT6	0.013	0.016	0.019	0.022	0.025	0.029	0.032	0.036	0.040

Table 6.1.1 a: Permissible radial run-out



In case of a parallel-key connection the following is recommended for bore and shaft:

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

Table 6.1.1 b: Fit pairs



The tolerance must be observed in order to restrict the hub tension resulting from the oversize to the permissible load. Failure to adhere to the assigned tolerance may impair the shaft-hub connection.



**Failure to observe these instructions may result in breakage of the coupling.
Danger from flying fragments!**

6.1.1.1 Parallel keyway

With the parallel-key connection to DIN 6885/1 and **a single keyway** the tolerance zone of the hub keyway width **ISO P9** is recommended.

With the parallel-key connection to DIN 6885/1 and **two keyways** the tolerance zone of the hub keyway width **ISO JS9** is recommended.

6.1.2 Axial securing in case of parallel-key connection

A set screw or end plate must be provided to secure the coupling parts axially. If end plates are used, Siemens must be consulted with regard to machining the recesses in the coupling parts.

6.1.3 Set screws in case of parallel-key connection

Hexagon socket set screws with cup points to DIN 916 must be used for set screws.

The following guidelines must be observed!

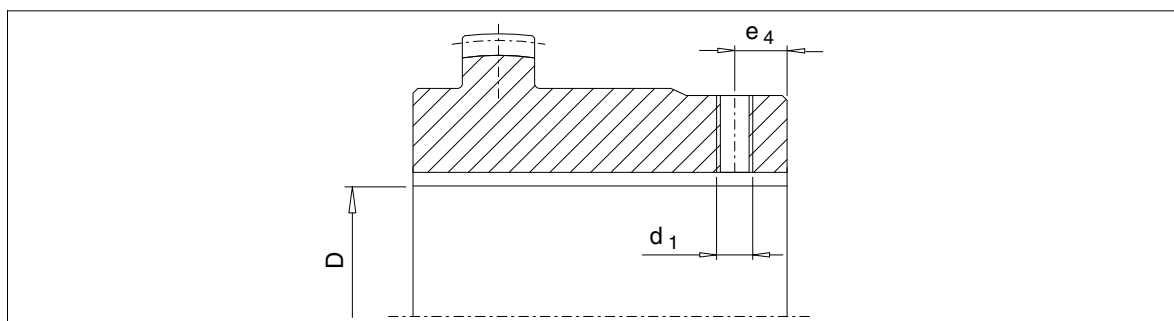


The length of the set screw must be selected so that it fills the threaded hole, but does not project from the hub ($L_{\min.} = d_1$).



The set screws should generally be arranged on the parallel key. Check the length of the parallel key.

The threaded holes must be arranged as shown on the diagram.



Size	Bore D mm	d ₁ mm	e ₄ mm
198	10 ... 17	M 5	25
	> 17 ... 22	M 6	
	> 22 ... 30	M 8	
	> 30 ... 44	M10	
	> 44 ... 95	M12	
230	10 ... 17	M 5	25
	> 17 ... 22	M 6	
	> 22 ... 30	M 8	
	> 30 ... 38	M10	
	> 38 ... 58	M12	
	> 58 ... 110	M16	
255	10 ... 17	M 5	30
	> 17 ... 22	M 6	
	> 22 ... 30	M 8	
	> 30 ... 38	M10	
	> 38 ... 50	M12	
	> 50 ... 110	M16	
	> 110 ... 125	M20	
290	70 ... 75	M16	48
	> 75 ... 145	M20	
315	80 ... 160	M20	40
342	90 ... 170	M20	40
	> 170 ... 180	M24	
375	100 ... 110	M20	70
	> 110 ... 200	M24	
415	120 ... 220	M24	65
465	140 ... 250	M24	84
505	160 ... 275	M24	120
545	180 ... 300	M24	160
585	210 ... 330	M24	180
640	230 ... 360	M24	165
730	250 ... 415	M24	200

Table 6.1.3: Set-screw assignment

6.1.4 Balancing

ZAPEX type ZWTR couplings are not balanced owing to the low speeds. If balancing is desired, Siemens must be consulted.

6.2 General information on fitting

During fitting, the "Safety instructions" in section 3 must be observed.

Fitting work must be done with great care by trained and qualified personnel.

As early as during the planning phase it must be ensured that sufficient space is available for installation and subsequent care and maintenance work.

Adequate lifting equipment must be available before beginning the fitting work.



If a dimensioned drawing has been made out for the coupling, the data in this drawing must be given priority. The user of the system must make the dimensioned drawing available.

6.3 Mounting the coupling part (1)

Before starting assembly all coupling parts and shaft ends must be carefully cleaned.



The DUO sealing rings (12) must not come into contact with solvents and cleaning agents.



Note manufacturer's instructions for handling solvent.

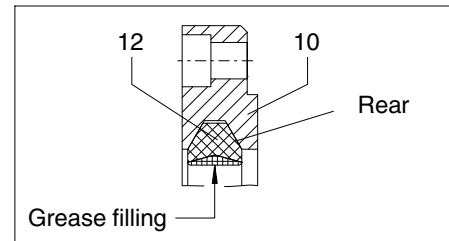
Screw indicator (23) onto the cover (10) with the hexagon head screws (24).



Secure screws (24) with Loctite 270/1.

Thoroughly grease the back of the DUO sealing ring (12) and the groove in the cover (10) and fit the DUO sealing ring (12) in the cover (10) as shown on the diagram. Insert a quantity of grease in the ring-shaped space between the seal lips.

Position the cover (10) with the fitted DUO sealing ring (12) on the shaft so that the DUO sealing ring (12) cannot be damaged by the coupling part 1 (1) to be fitted.



Check space requirement for inserting the cheese-head screws (11), and, if necessary, insert the screws (11) in the cover (10).



**Unscrew set screw from the coupling part (1).
Protect DUO sealing ring (12) and seals for the input and output side against damage and heating to over + 80 °C.**



Coupling parts (1) with tapered bore and parallel key connection must be fitted in cold condition.

Slightly heating (to max. + 80 °C) the coupling part (1) with cylindrical bore may facilitate the pulling-on process. Heating may be done inductively, in a stove or with a burner. If heating is done with a burner, it must be done along the length of the hub above the groove.



Take precautions to avoid burns from hot parts!



**The coupling part (1) should be fitted with the aid of suitable equipment to avoid damage to the shaft bearings through axial joining forces.
Always use suitable lifting equipment.
Care must be taken that the hole and the sealing surface for the DUO sealing ring are not damaged by lifting gear, etc.**



The coupling parts (1) with a tapered bore must be secured with suitable end plates.

In case of coupling parts (1) with groove and set screw the set screw must be screwed in after cooling to room temperature (the set screw must be positioned over the parallel key).



The set screws should be tightened only with a hexagon socket spanner to DIN 911, without extension tube.

6.4 Installation of the coupling

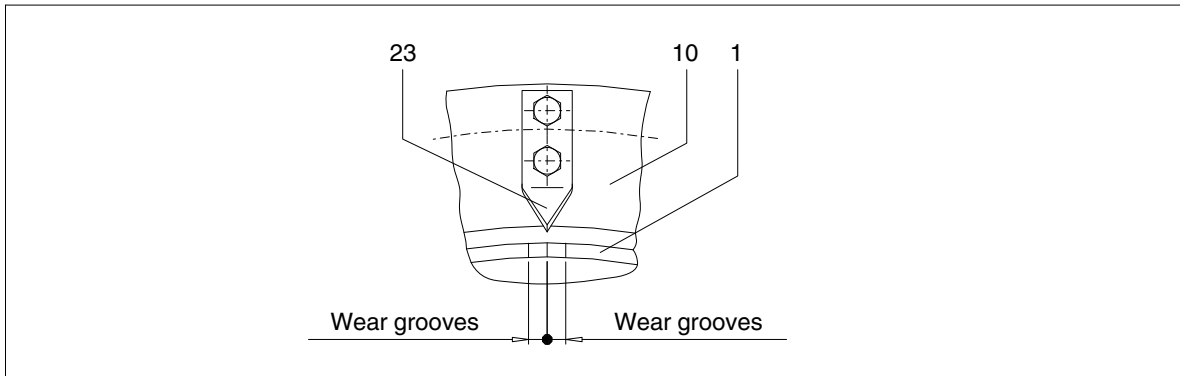
When filling with oil, oil the teeth of the coupling part (1) and of the flanged sleeve (5) and the hub diameter of the coupling part (1) (sealing surfaces).

When filling with liquefied grease, generously grease the teeth of the coupling part (1) and of the flanged sleeve (5) and oil the hub diameter of the coupling part (1) (sealing surfaces).



When assembling, the indicator (23) and the wear grooves on the coupling part (1) for wear monitoring (see item 10.5) must be checked for correct positioning.

The position of the wear monitoring device is fixed by the mark on the coupling part (1) and by the pin (25) in the flanged sleeve (5) and in the cover (10).



Drive parallel pin (25) halfway down into the flanged sleeve (5).

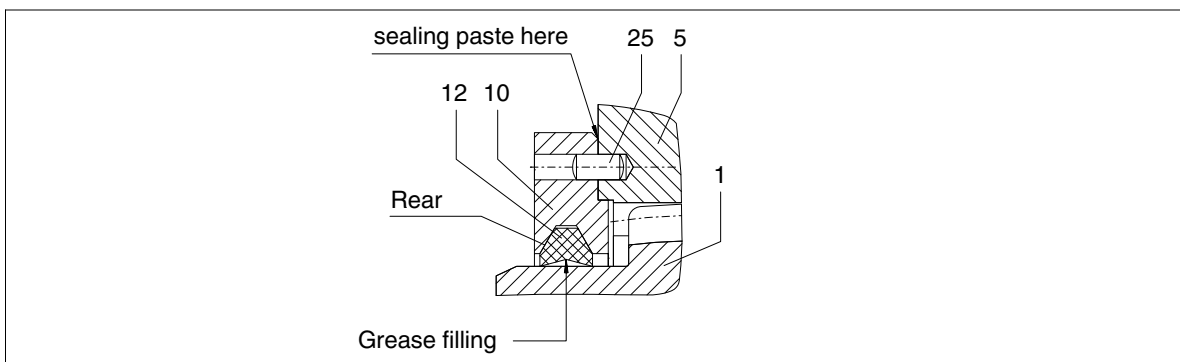
Thoroughly grease the back of the DUO sealing ring (12) and the groove in the flanged sleeve (5) and fit the DUO sealing ring (12) in the flanged sleeve (5). Insert a quantity of grease in the ring-shaped space between the seal lips.

Push the flanged sleeve (5) onto the teeth of the coupling part (1) and hold and/or brace it in position.

Smear the sealing surface of the flanged sleeve (5) and of the cover (10) with sealing compound.

Align parallel pin hole in the cover (10) with parallel pin (25).

Using suitable tools, pull the cover (10) onto the hub, locate it against the flanged sleeve (5) and screw it on with the cheese-head screws (11) (for tightening torques, see item 6.8).



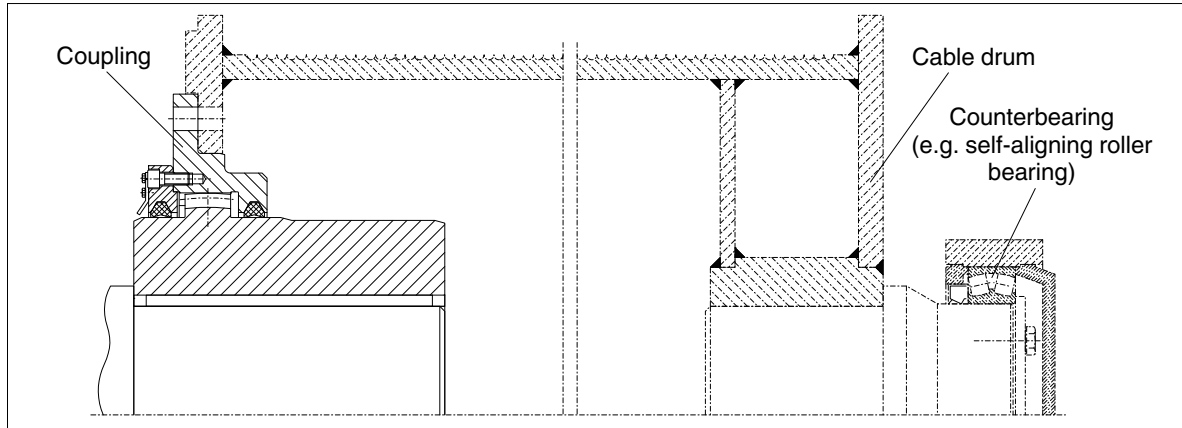
The cable drum must be fitted in accordance with the cable drum manufacturer's specifications.

6.5 Alignment

The couplings, in conjunction with the counterbearing, compensate for errors of up to 1° (note displacement of the counterbearing).

When aligning, the angular misalignment of the shaft ends must be kept as small as possible, because, other conditions being equal, this increases the service life of the coupling. The misalignment must, however, be not less than 0.05° .

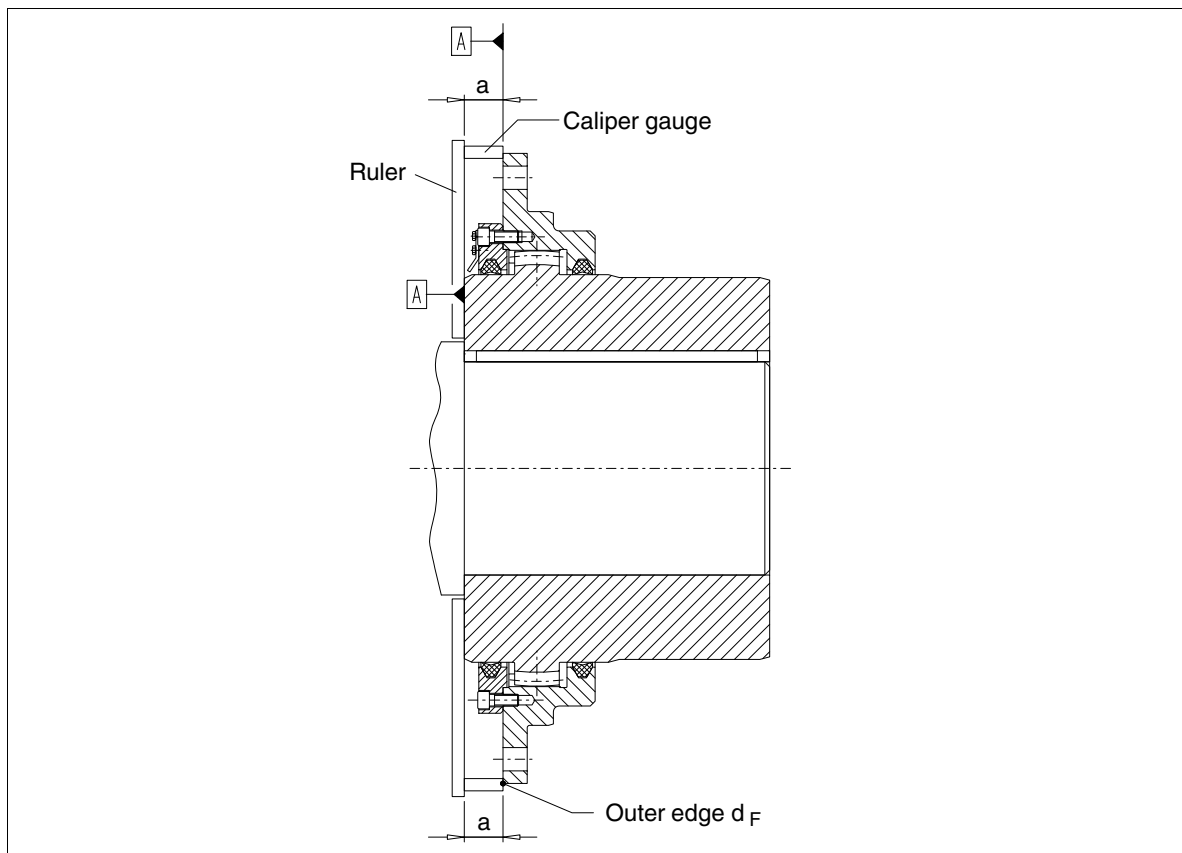
After fitting the cable drum, alignment must be carried out in accordance with the cable drum manufacturer's instructions.



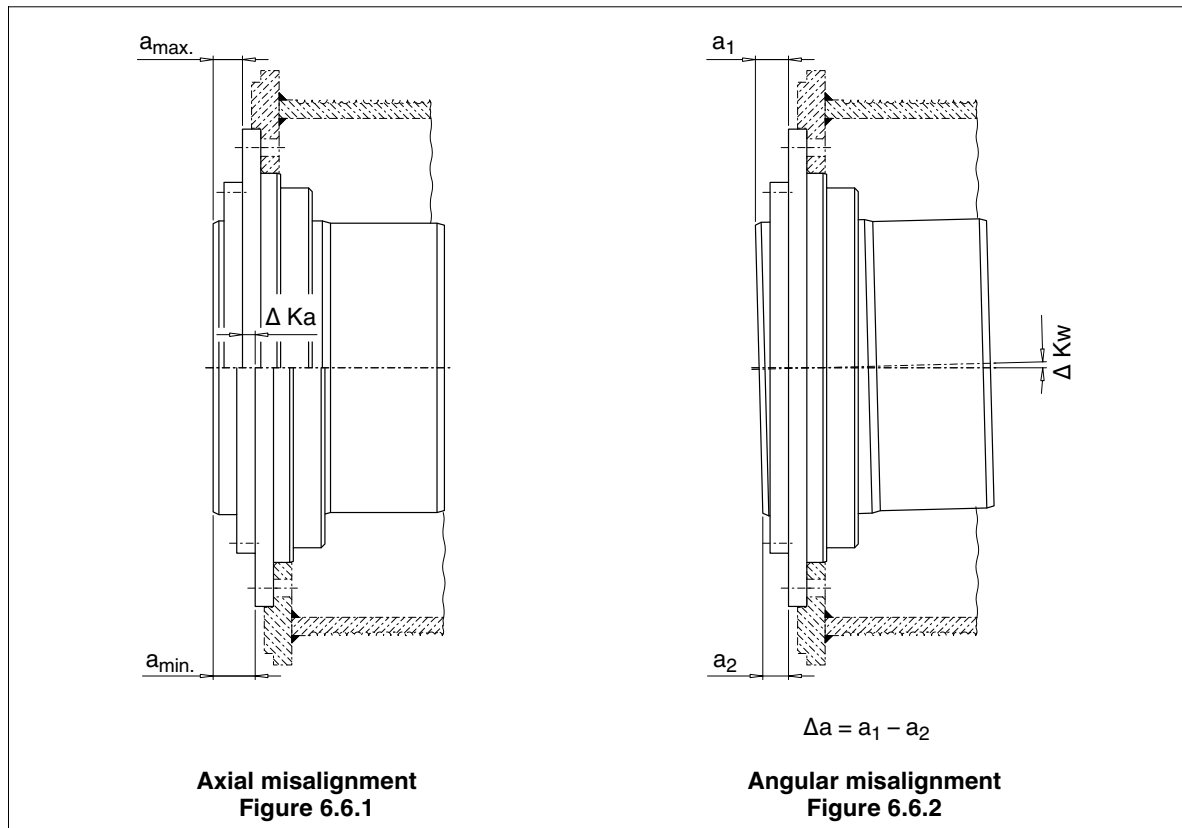
Alignment must be carried out using suitable measuring instruments. The following diagram shows alignment suggestions for the coupling side and points of alignment (**A**) on the coupling.



Since misalignments (expansion due to heat, shaft deflection, settling of foundations, etc.) can occur during operation, a misalignment of 0.1° must be aimed for when aligning. Misalignments during alignment must, however, be not less than 0.05° . For alignment values, see item 6.7.



6.6 Possible misalignments



Misalignments of the coupling parts in relation to each other can be caused by inaccurate alignment during assembly, but also by actual operation of the equipment (expansion due to heat, shaft deflection, insufficiently rigid machine frames, etc.).



The following maximum permissible misalignments must by no means be exceeded during operation. The maximum misalignment of the counterbearing must be noted.

6.6.1 Axial misalignment

Axial misalignment ΔK_a (Fig. 6.6.1) of the coupling part (1) relative to the flanged sleeve (5) is possible within the "permissible error" for dimension "a" (see item 6.7).

6.6.2 Angular misalignment

To simplify matters, the angular misalignment ΔK_w (Fig. 6.6.2) is calculated as the difference ($\Delta a = a_1 - a_2$) of dimension "a" (for point of alignment $\boxed{A}$, see item 6.5). The measurement must be taken at several points on the circumference (while stationary).

For permissible alignment values, see item 6.7.

6.6.3 Radial misalignment

Radial misalignment is possible only with the counterbearing (e.g. self-aligning roller bearing). Alignment must be carried out in accordance with the cable drum manufacturer's instructions.



Angular and radial misalignments may occur at the same time. The sum of two misalignments must not exceed ΔK_w .

6.7 Alignment values

Size	Axial misalignment ΔK_a		Angular misalignment ΔK_w $\Delta a = a_1 - a_2$	Size	Axial misalignment ΔK_a		Angular misalignment ΔK_w $\Delta a = a_1 - a_2$
	a	perm. misalignment			a	perm. misalignment	
	mm	mm			mm	mm	
198	30	± 1	0.59	415	40	± 2.5	0.96
230	30	± 1.5	0.63	465	40	± 2.5	1.01
255	30	± 1.5	0.66	505	40	± 3	1.13
290	30	± 1.5	0.7	545	40	± 3.5	1.19
315	40	± 1.5	0.73	585	46	± 4	1.24
342	40	± 2	0.79	640	46	± 4.5	1.36
375	40	± 2	0.89	730	46	± 5	1.48

Table 6.7: Alignment values



During operation, up to ten times the values are permissible for the angular misalignment.

6.8 Assignment of the tightening torques and wrench widths

Size	Tightening torque T_A for bolts of strength class 8.8 to DIN ISO 898 Part 1 (with $\mu = 0.14$)		Wrench width SW	
	Part no. 24	Part no. 11	Part no. 24 Hexagon head	Part no. 11 Hexagon socket wrench
	Nm	Nm	mm	mm
198	6	25	8	6
230	6	25	8	6
255	6	25	8	6
290	6	49	8	8
315	6	49	8	8
342	6	49	8	8
375	6	49	8	8
415	6	86	8	10
465	6	86	8	10
505	6	86	8	10
545	6	86	8	10
585	10	86	10	10
640	10	210	10	14
730	10	210	10	14

Table 6.8: Tightening torques and wrench widths



Tightening torques apply to bolts with untreated surfaces which are not or only lightly oiled (coefficient of friction $\mu = 0.14$). The use of lubricant paint or the like, which affects the coefficient of friction " μ ", is not permitted.

7. Start-up

Observe the instructions in section 3, "Safety instructions"!



If a dimensioned drawing has been made out for the coupling, the data in this drawing must be given priority. The user of the system must make the dimensioned drawing available.

7.1 Recommended lubricants

The following recommendation of lubricants applies to the ZAPEX couplings described in these operating instructions.

Lubricant	Code no.	Oil: Viscosity in cSt at 40 °C DIN 51519 Grease: Consistency DIN 51818					
Mineral oils (MIN oil)	I11	ISO class	VG 1000				
	I12		VG 680	CLP 680 S ECO GEAR 680 M	Degol BG 680 Plus	GEAR RSX 680	ECO GEAR 680 M
	I13		VG 460	CLP 460 S ECO GEAR 460 M	Degol BG 460 Plus	GEAR RSX 460	ECO GEAR 460 M
Liquefied greases (MIN-FLF) Mineral-oil base	J16	NLGI class	0		Aralub Fließfett AN 0		
	J17		00				
	J18		000				

Lubricant	Code no.	Oil: Viscosity in cSt at 40 °C DIN 51519 Grease: Consistency DIN 51818					
Mineral oils (MIN oil)	I11	ISO class	VG 1000				CEPSA AEROGear 1000
	I12		VG 680	Energol GR-XF 680	BESLUX GEAR XP 680	Alpha SP 680	CEPSA AEROGear 680
	I13		VG 460	Energol GR-XF 460	BESLUX GEAR XP 460	Alpha SP 460 Alpha MAX 460	CEPSA AEROGear 460
Liquefied greases (MIN-FLF) Mineral-oil base	J16	NLGI class	0				
	J17		00	Energol LS-EP 00		CLS Grease	
	J18		000				

Lubricant	Code no.	Oil: Viscosity in cSt at 40 °C DIN 51519 Grease: Consistency DIN 51818					FLENDER
Mineral oils (MIN oil)	I11	ISO class	VG 1000				
	I12		VG 680	Falcon CLP 680		SPARTAN EP 680	
	I13		VG 460	Falcon CLP 460	EP Industrial 460	SPARTAN EP 460	
Liquefied greases (MIN-FLF) Mineral-oil base	J16	NLGI class	0	Orona FG EP 0		FIBRAX EP 370	FLENDER Hochleistungsfett
	J17		00				
	J18		000				

Lubricant	Code no.	Oil: Viscosity in cSt at 40 °C DIN 51519 Grease: Consistency DIN 51818					
Mineral oils (MIN oil)	I11	ISO class	VG 1000				
	I12		VG 680	Renolin EPX 680 Renolin CLP 680 PLUS	GEARMASTER CLP 680	STRUCTOVIS BHD-MF	609 ALMASOL Vari-P- urpose Gear Lubricant
	I13		VG 460	Renolin EPX 460 Renolin CLP 460 PLUS	GEARMASTER CLP 460		608 ALMASOL Vari-P- urpose Gear Lubricant
Liquefied greases (MIN-FLF)	J16	NLGI class	0			GRAFLOSKON C-SG 500 Plus	
Mineral-oil base	J17		00	RENOLIT SO-D 6024			
	J18		000				

Lubricant	Code no.	Oil: Viscosity in cSt at 40 °C DIN 51519 Grease: Consistency DIN 51818					
Mineral oils (MIN oil)	I11	ISO class	VG 1000				Optigear BM 680
	I12		VG 680	Mobilgear XMP 680 Mobilgear 636	GEAR COMPOUND PLUS 680	OMV gear HST 680	Optigear BM 460
	I13		VG 460	Mobilgear XMP 460 Mobilgear 634	GEAR COMPOUND PLUS 460	OMV gear HST 460	
Liquefied greases (MIN-FLF)	J16	NLGI class	0				
Mineral-oil base	J17		00	Mobilux EP 004			Lontime PD 00
	J18		000				

Lubricant	Code no.	Oil: Viscosity in cSt at 40 °C DIN 51519 Grease: Consistency DIN 51818					
Mineral oils (MIN oil)	I12	ISO class	VG 680		Shell Omala 680		
	I13		VG 460		Shell Omala 460 Shell Omala F 460		
	I14		VG 320			LoadWay EP 320	Meropa WM 460 Auriga EP 460
Liquefied greases (MIN-FLF)	J16	NLGI class	0				
Mineral-oil base	J17		00		Alvina GL 00		
	J18		000				

Lubricant	Code no.	Oil: Viscosity in cSt at 40 °C DIN 51519 Grease: Consistency DIN 51818					
Mineral oils (MIN oil)	I11	ISO class	VG 1000			VECO MATRANOL XP 1000	
	I12		VG 680	Tribol 1100 / 680	TUNGEAR 680 ¹⁾	VECO MATRANOL XP 680	
	I13		VG 460	Tribol 1100 / 460	TUNGEAR 460 ¹⁾	VECO MATRANOL XP 460	
Liquefied greases (MIN-FLF)	J16	NLGI class	0				
Mineral-oil base	J17		00	Tribol 3020/1000-00			
	J18		000				

¹⁾ TUNGEAR is approved for Brazil under the name of GEAROIL in VG 460, 680. Distributor: TRIBOTECHNICA Lubrificantes Sintéticos São Paulo.
TUNGEAR is approved for India under the name of Mo_x-Active Gear oil in VG 460, 680. Distributor: OKS Speciality Lubricants Bombay.

For normal operating conditions we recommend oil. This has the advantage of easy oil changing and good surface wetting.

The lubricants are suitable for operating temperatures of between - 10 °C and + 80 °C. If temperatures deviate from these, consult Siemens.

If liquefied grease is used, the max. peripheral speed, measured on the outer diameter (d_4) of the cover, must not exceed 35 m/s.

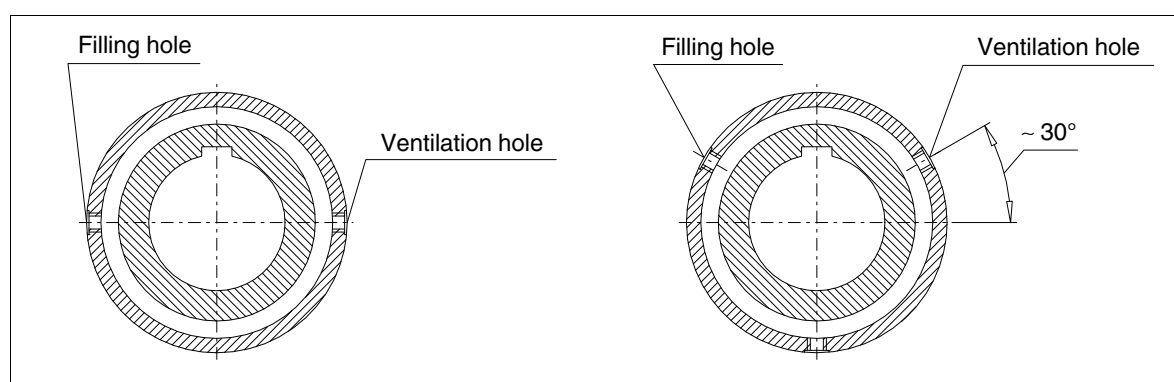


Observe manufacturer's instructions for handling oils and greases!

7.2 Oil quantity and grease quantity

Size	Oil quantity l	Grease quantity dm ³	Size	Oil quantity l	Grease quantity dm ³
198	0.05	0.05	415	0.3	0.3
230	0.06	0.06	465	0.4	0.4
255	0.08	0.08	505	0.6	0.6
290	0.11	0.11	545	0.6	0.6
315	0.14	0.14	585	0.9	0.9
342	0.15	0.15	640	1.1	1.1
375	0.2	0.2	730	1.5	1.5

Table 7.2: Oil-filling and grease-filling quantities



For easier filling, proceed as follows:

Rotate coupling until the screw plugs (6) are positioned as shown on the diagram, noting the number of screw plugs.

Remove the screw plugs (6) of the filling and ventilation holes, measure out the correct quantity of grease and inject it with the grease gun.

Screw in the screw plugs (6) with fitted/integrated sealing rings.



Any grease spillage must be completely collected and disposed of in accordance with the regulations applying.

7.3 Procedure before start-up

Before starting up, the unit must be checked for correct fitting, alignment and oil and/or grease filling, any errors remedied and all screw connections checked for correct tightening torques (for tightening torques, see section 6, item 6.8).



Then fit the coupling guard to prevent unintentional contact.

8. Operation

Observe the instructions in section 3, "Safety instructions"!



If a dimensioned drawing has been made out for the coupling, the data in this drawing must be given priority. The user of the system must make the dimensioned drawing available.

8.1 General operating data

During operation of the coupling watch for:

- Changes in running noise
- Leaks (escaping oil/grease)



If any irregularities are noticed during operation, switch the drive assembly off at once. Determine the cause of the fault, using the table in section 9.

The trouble-shooting table contains a list of possible faults, their causes and suggested remedies.

If the cause cannot be identified and/or the unit repaired with the facilities available, you are advised to contact one of the Siemens customer-service offices for specialist assistance (see section 2).

9. Faults, causes and remedy

Observe the instructions in section 3, "Safety instructions"!



If a dimensioned drawing has been made out for the coupling, the data in this drawing must be given priority. The user of the system must make the dimensioned drawing available.

9.1 General

The following irregularities can serve as a guide for fault tracing.

Where the system is a complex one, all the other component units must be included when tracing faults.

The coupling must run with little noise and without vibration in all operating phases. Irregular behaviour must be treated as a fault requiring immediate remedy.



Faults and malfunctions occurring during the guarantee period and requiring repair work on the gear unit must be carried out only by the Siemens Customer Service.
In case of faults and malfunctions occurring after the guarantee period and whose cause cannot be precisely identified we advise our customers to contact our customer service.



Siemens will not be bound by the terms of the guarantee or warranty nor otherwise be responsible in cases of improper use of the coupling, modifications carried out without the agreement of Siemens, or use of spare parts not supplied by Siemens.



**When remedying faults and malfunctions, the gear unit must always be taken out of service.
Secure the drive unit to prevent it from being started up unintentionally.
Attach a warning notice to the start switch!**

9.2 Possible faults

Faults	Causes	Remedy
Sudden changes in the noise level and/or sudden vibrations.	Exceeding the permissible misalignment values.	Stop the installation. If necessary align as described in section 6.
	Insufficient lubricant.	Stop the installation. Change the lubricant as described in section 10, making sure to check the teeth and the seals at the same time. If necessary, replace the seals as described in section 10.

Table 9.2: Faults, causes and remedy

9.3 Incorrect use

Experience has shown that the following faults can result in incorrect use of the ZAPEX coupling. In addition to observing the other instructions in these instructions, care must therefore be taken to avoid these faults.



Failure to observe these instructions may result in breakage of the coupling. Danger from flying fragments!



Incorrect use of the ZAPEX coupling can result in damage to the coupling.



Coupling damage may result in stoppage of the drive and the entire system.

9.3.1 Possible faults when selecting the coupling and/or coupling size

- Important information for describing the drive and the environment are not communicated.
- System torque too high.
- System speed too high.
- Application factor not correctly selected.
- Chemically aggressive environment not taken into consideration.
- The ambient temperature is too high.
- The machining of a finished bore with impermissible diameter and/or impermissible fit classification (see section 1 and section 6).

9.3.2 Possible faults when installing the coupling

- Components with transport or other damage are being fitted.
- When mounting coupling parts in a heated condition, already fitted ZAPEX DUO sealing rings (12) are being excessively heated.
- The shaft diameter is beyond the specified tolerance range.
- Specified tightening torques are not being adhered to.
- Alignment is not in accordance with the operating instructions.
- The coupled machines are not correctly fastened to the foundation, and as a result shifting of the machines e.g. through loosening of the foundation-screw connection is causing excessive displacement of the coupling parts.
- ZAPEX DUO sealing rings (12) are not being fitted or not being correctly positioned.
- The oil or grease filling has not been correctly put in (see section 7. "Start-up").
- Operating conditions are being changed without authorisation.

9.3.3 Possible faults in maintenance

- Maintenance intervals are not being adhered to.
- The sealing rings used are not genuine ZAPEX DUO sealing rings (12).
- Old or damaged ZAPEX DUO sealing rings (12) are being used.

10. Maintenance and repair

Observe the instructions in section 3, "Safety instructions"!



If a dimensioned drawing has been made out for the coupling, the data in this drawing must be given priority. The user of the system must make the dimensioned drawing available.



All work on the gear unit must be carried out only when it is at a standstill. The drive unit must be secured against being switched on accidentally (e.g. by locking the key switch or removing the fuses from the power supply). A notice should be attached to the ON switch stating clearly that work is in progress.

10.1 General

The coupling must be checked for leaks, heating and changes in noise level and the wear monitoring device (see item 10.5) must be checked at general maintenance intervals or at least every three months.

The coupling must run with little noise and without vibration in all operating phases. Irregular behaviour must be treated as a fault requiring immediate remedy.

10.2 Oil change and/or grease change

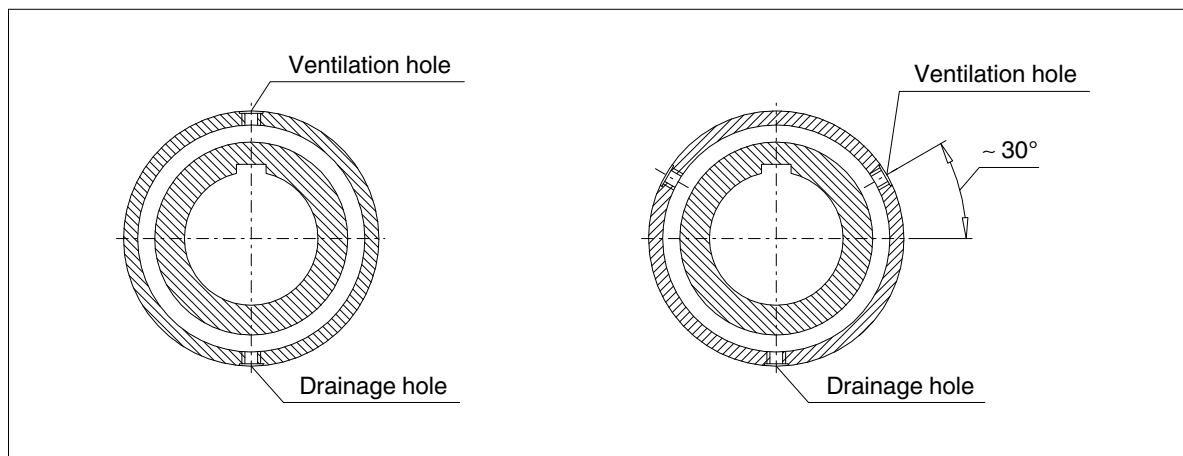
During regular inspections the coupling must be checked for leaks, and the lubricant level checked and, if necessary, topped up.

Lubricant change approx. every 8000 operating hours or at latest every 2 years in case of operation at up to 70 °C; in case of operation at over 70 °C approx. every 3000 operating hours or at the latest at yearly intervals.

Unscrew screw plugs (6) and drain off the oil/grease into a suitable vessel, as shown in the diagram (note number of screw plugs) (in case of grease, to facilitate the process, add low-viscosity oil to the used grease and mix).



All the oil and grease must be completely collected and disposed of in accordance with the regulations applying.



Fill with oil/grease as described in section 7. "Start-up".

10.3 Replacing the DUO sealing rings

The oil/grease must be drained off as described in item 10.2.

Demount the cable drum. Undo the screw connection of the cover (11) and, with the aid of the forcing-off thread, pull the cover (10) off the flanged sleeve (5). Locate the cover (10) on the shaft and remove flanged sleeve (5). Remove DUO sealing rings (12).



Always use suitable lifting equipment!



Danger of squeezing!

Clean the sealing compound off the cover (10) and flanged sleeve (5).



Note manufacturer's instructions for handling solvent.

Cut the new DUO sealing ring (12) for the cover (10) radially at one point. Before inserting the DUO sealing ring (12) grease the groove in the cover (10) and the DUO sealing ring (12) thoroughly from all sides. Place the cut ends together in the groove and then, working outwards from the cut ends, insert the DUO sealing ring (12) on both sides.

Thoroughly grease the groove in the flanged sleeve (5) and the DUO sealing ring (12) on all sides and fit the DUO sealing ring (12) in the flanged sleeve (5).

Insert a quantity of grease in the ring-shaped space between the sealing lips of the DUO sealing rings (12).

Reassemble the coupling with the new DUO sealing rings (12) as described in section 6 "Assembly" and the cable drum in accordance with the cable drum manufacturer's specifications. Fill with oil/grease as described in section 7. "Start-up".

10.4 Demounting the coupling

The oil/grease must be drained off as described in item 10.2.

Demount the cable drum. Undo the screw connection of the cover (11) and, with the aid of the forcing-off thread, pull the cover (10) off the flanged sleeve (5). Locate the cover (10) on the shaft and remove flanged sleeve (5). Remove DUO sealing rings (12).



Always use suitable lifting equipment!



Danger of squeezing!

Clean the sealing compound off the cover (10) and flanged sleeve (5).



Note manufacturer's instructions for handling solvent.

Remove set screw and/or axial retaining means. Mount suitable detaching device. Using a burner, heat coupling part (1) along its length and above the parallel keyway (max. 80 °C).



Protect seals for the input and output side against damage and heating to over + 80 °C.



Take precautions to avoid burns from hot parts!



Pull off coupling parts (1) smartly.

Always use suitable lifting equipment and detaching device. The shaft bearings must not be overloaded.

Care must be taken that the hole and the sealing surface for the DUO sealing ring are not damaged by lifting gear, etc.

Examine the teeth, the sealing surfaces, the hub bore and the shaft for damage and protect against rust. Damaged parts must be replaced.

Reassemble the coupling as described in section 6 "Assembly" and the cable drum in accordance with the cable drum manufacturer's specifications. Fill with oil/grease as described in section 7. "Start-up".

10.5 Wear monitoring of the coupling teeth

The wear on the teeth is indicated by the shift of the indicator (23) relative to the wear grooves (see following diagram). The initial position is the middle groove. The permissible amounts of wear (dimension "m") in **one** direction of rotation are shown in the following table. If there is wear in both directions of rotation, the value "**m**", equal to 1/3 of the tooth, must not be exceeded. If the limit values (outer groove) are exceeded, the couplings must be replaced.

Size	m (equal to 1/3 of the tooth) mm
198	2
230	2
255	2
290	3
315	3
342	3
375	3
415	3
465	4
505	4
545	4
585	4
640	4
730	5

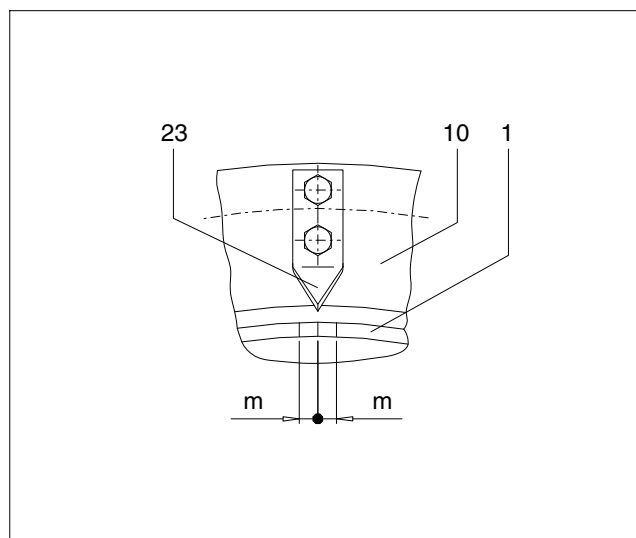


Table 10.5: Permissible tooth wear

11. Spare parts, customer service

By stocking the most important spare and wearing parts on site you can ensure that the coupling is ready for use at any time.

When ordering spare parts, always state the following:

- Number of original order
- Part number (see item 11.1)
- Description, size
- Quantity

We guarantee only the original spare parts supplied by us.



Please note that spare parts and accessories not supplied by us have not been tested or approved by us. The installation and/or use of such products may therefore impair essential characteristics of the coupling under certain circumstances and so pose an active or passive hazard. Siemens will assume no liability or guarantee for damage caused by non-genuine spare parts and accessories.

Please note that certain components often have special production and supply specifications and that we supply you with spare parts which comply fully with the current state of technical development as well as current legislation.

11.1 Spare-parts list

Spare parts	
Part number	Designation
1	Coupling part 1
5	Flanged sleeve
6	Screw plug
10	Cover
11	Cheese-head bolt
12	DUO sealing ring
23	Indicator
24	Hexagon-head bolt
25	Parallel pin

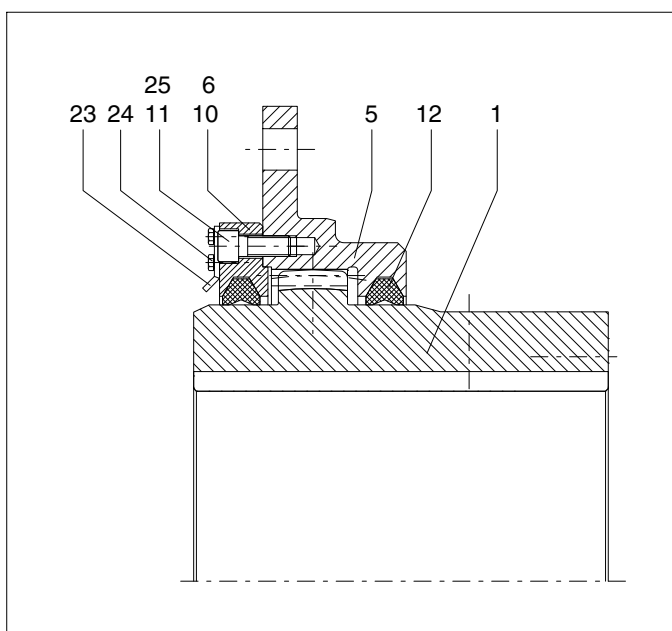


Table 11.1: Spare parts list, type ZWTR

11.2 Spare-parts and customer-service addresses

When ordering spare parts or requesting a service specialist, please contact Siemens first (see section 2, "General notes").

Further Information:

"FLENDER gear units" on the Internet

www.siemens.com/gearunits

"FLENDER couplings" on the Internet

www.siemens.com/couplings

Service & Support:

<http://support.automation.siemens.com/WW/view/en/10803928/133300>

Lubricants:

<http://support.automation.siemens.com/WW/view/en/42961591/133000>

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