

Operating Instructions

Operating Instructions for Drive modification Vetter Screw Press CPE-N

Customer : Heinkel Filtering System, Inc.
: Swedesboro / New Jersey
P.O. Number : 0025091
Project : Nestle Plt Freehold
Comment : 311-239-19174-Nestle

Order number – VetterTec : BA 118204
: BA 5735 (1982)
Project number – VetterTec : VP 09/02/1-10

Operating Instructions

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Operating Instructions

2.0 Operating instructions



The operating instructions have to be considered part of the plant; therefore:

- the instructions have to be kept during the entire service life of the plant,
- the instructions have to be handed over to each subsequent owner or user of the plant,
- the owner or user has to make sure that supplements to the operating instructions are always added to the instructions!

It is therefore possible to reorder the operating instructions of your plant like a spare part at any time.

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3.0 Delivery

Caution:



Inspect the equipment for transport damages and completeness according to delivery note / packing list **immediately** on receipt.
Contact the supplier **at once** in case of claims!

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4.0 Safety notes and symbols

(acc. to BGV A8 (regulation imposed by the German employer's liability insurance association) – DIN 4844)



Beware of a dangerous spot!
Possible consequences: slight or serious injuries



Beware of dangerous electric voltage!
Possible consequences: death or heavy injuries



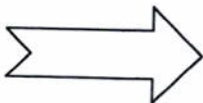
Beware of hot surface!
Possible consequences: slight or serious injuries



Do not switch!
Possible consequences: death or heavy injuries



General mandatory sign:
Important information – to be strictly observed by the operating personal
Possible consequences: slight/serious damage to the object



Notice:
Advice for application and other useful information

Operating Instructions

5.0 Preface

Give your close attention to these instructions:

- **before unpacking!**
- **before assembly!**
- **before commissioning!**



Compliance with all instructions, especially all safety regulations, is obligatory and must be controlled by the user!

The machine may only be assembled, run, inspected and repaired by persons who have read and fully understand these operating instructions, and who are acquainted with rules of safety and prevention of accidents.

To make things clear, the chapters are short.
In case of questions or unclear items, please do not hesitate to contact our service department!

When running the machine, take special care that the required protection devices and covers are installed according to the rules for prevention of accidents and to the special laws being in force in the user's country.

Be sure not to disassemble / fail to assemble the protective and safety devices supplied!

It is imperative for users that the machine is only run in perfect condition!

If machine or operation are changing, thus affecting the safety, immediately shut down the machine and report the trouble to the responsible person of department.

Always keep the operating instructions at the place where the machine is operated!

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6.0 Safety notes - Assembly



Observe the following safety regulations:

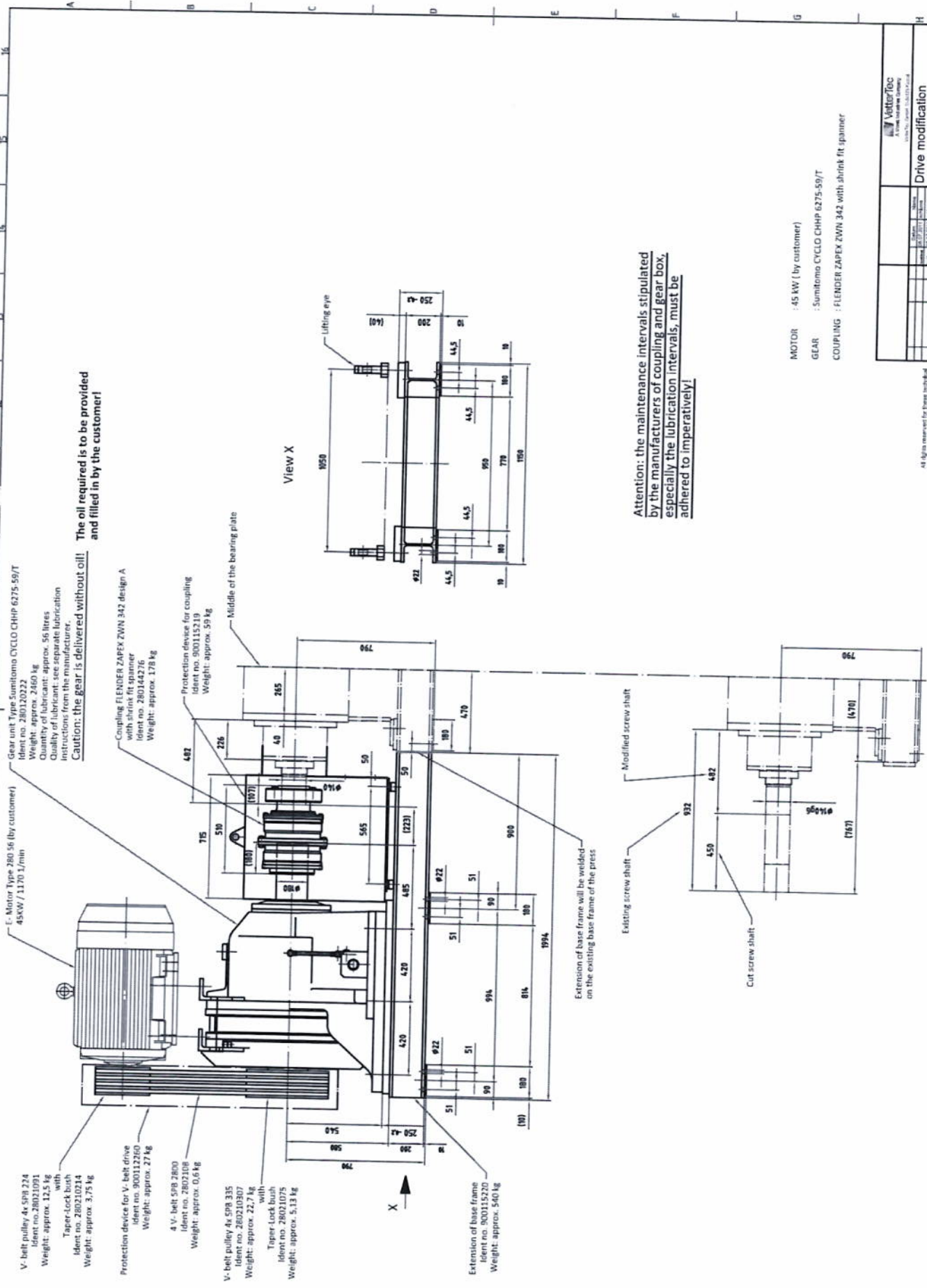
As far as internal transport and storage are concerned, users are fully responsible that their staff or contractors carry out all work and measures strictly to safety regulations.

Only use appropriate lifting equipment of sufficient load capacities!

Always disconnect external main electrical power supply even if machine is only slightly displaced!

Before restarting, reconnect the machine correctly to the main electrical power supply!

Make sure that operating instructions are strictly observed when restarting.



Attention: the maintenance intervals stipulated by the manufacturers of coupling and gear box, especially the lubrication intervals, must be adhered to imperatively!

MOTOR : 45 kW (by customer)
GEAR : Sumitomo CYCLO CHHP 6375-59/T
COUPLING : FLENDER ZAPEX ZWN 342 with shrink fit spanner

| VetterTec | | Drive modification | |
|-----------------|-----------|--------------------|-----------|
| A 1000 113 | | 901115218 | |
| VetterTec GmbH | | VetterTec GmbH | |
| VetterTec GmbH | | VetterTec GmbH | |
| Order no. | 901115218 | Order no. | 901115218 |
| Part no. | | Part no. | |
| Material | | Material | |
| Quantity | 1 | Quantity | 1 |
| Unit of measure | 000 | Unit of measure | A1 |

All rights reserved for items technical drawing. The drawing is for information only. The drawing is not a contract. The drawing is subject to order. VetterTec GmbH

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8.0 Screw connections

All screw connections have to be checked and tightened approximately one week after start-up the machine.

For this purpose, keep strictly to the values of the following chart!

Starting torque [Nm]

| Dimension d | 3.6 | 5.6 | 6.9 | 8.8 | 10.9 | 12.9 | Stainless steel A2 - 70 | Stainless steel A4 - 70 |
|-------------|-----|-----|------|------|------|------|-------------------------|-------------------------|
| M6 | 4 | 4,8 | 8,5 | 10 | 14 | 17 | 5 | 5 |
| M8 | 9 | 12 | 21 | 25 | 35 | 41 | 13 | 13 |
| M10 | 17 | 22 | 41 | 49 | 69 | 83 | 25 | 25 |
| M12 | 29 | 39 | 72 | 86 | 120 | 145 | 43 | 43 |
| M14 | 46 | 62 | 115 | 135 | 190 | 230 | 75 | 75 |
| M16 | 71 | 95 | 180 | 210 | 295 | 355 | 105 | 105 |
| M20 | 138 | 184 | 345 | 410 | 580 | 690 | 205 | 205 |
| M24 | 235 | 315 | 600 | 710 | 1000 | 1200 | 355 | 355 |
| M30 | 475 | 835 | 1200 | 1450 | 2000 | 2400 | 725 | 725 |

Operating Instructions

9.0 General maintenance



Completely inspect the whole plant at least twice a year!

Do not extend your inspection only to the working parts.
Also inspect all other components.

Advantage of overall checking: You will notice in time whether a screw, a screen or a housing have to be replaced.

Such parts should be stored as spares in time.
This will help avoiding long shutdown periods in case of repair work.

10

RIEMENTRIEB

V-BELT DRIVE

COMMANDE A COURROIES TRAPEZOIDALES

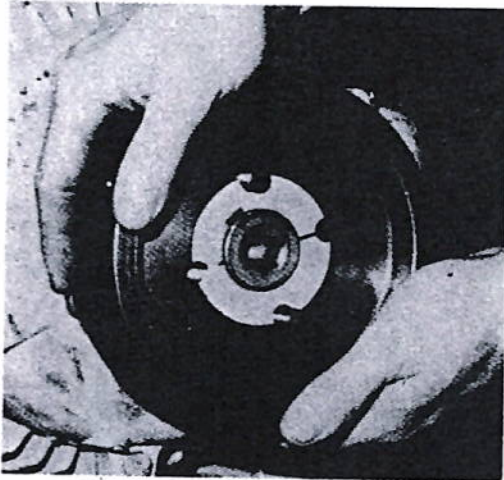
TRANSMISION POR CORREA TRAPEZOIDAL

ПЛОСКОРЕМЕННАЯ ПЕРЕДАЧА

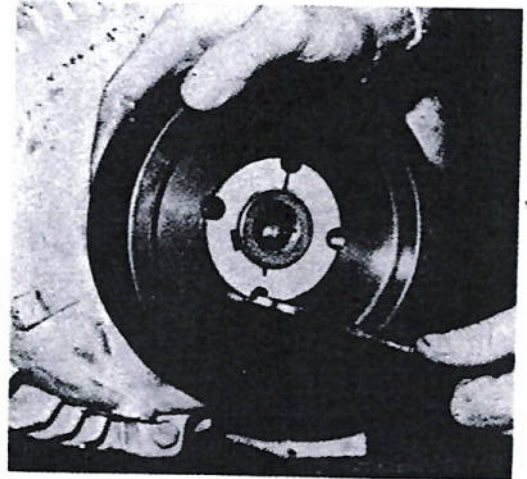


1. Assembly of BLAURI-wedge belt pulleys with Taper-bush

Mounting the pulley

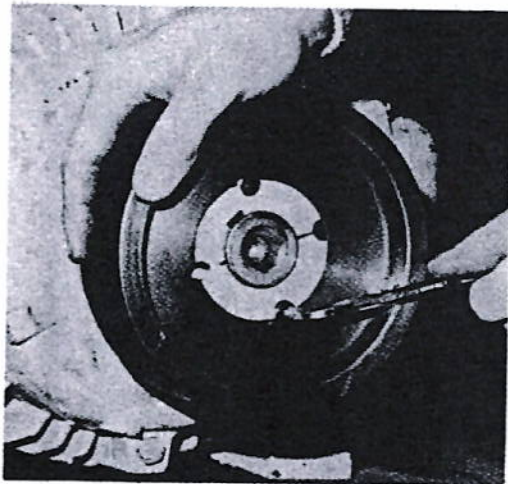


Clean and degrease the machined surfaces. Insert bush in hub of pulley, line up holes and thread screws loosely into holes.*



Slip pulley and bush on to shaft, bring into alignment, and fasten screws uniformly and alternately with the torques stated in table 2.1.

Removing the pulley



Remove screws, insert one of them as a forcing screw into the hole of the bush with the half thread and tighten it. By this, the Taper-bush will get loose.



The loose unit can be removed by hand without hammering or damage to the machine.

* Prior to assembly of the bush, the tapered bore of the pulley including the half bores (with and without threads) in it are to be cleaned with NITRO (nitrocellulose).

For BLAURI-wedge belt pulleys, the manner of fastening as described under fig. 1 and 2 is generally sufficient for power transmission. A key connection is necessary, where the operating torque of the pulley is higher than the corresponding slip torque of the bush, and for shock loads. Therefore, all Taper-bushes are provided with a keyway.

The operating torque can be calculated by applying the formula $T = 9550 \times P/n$

Table 2.1 Slip- and screw tightening torque for Taper-bushes

| s | Bush no. | Bush bore mm | Slip torque Nm | Screw tightening torque Nm | s | Bush no. | Bush bore mm | Slip torque Nm | Screw tightening torque Nm |
|---|--------------|----------------|-------------------|----------------------------|---|--------------|------------------|----------------------|----------------------------|
| 3 | 1108 | 12 19 28 | 28 49 79 | 5.6 | 8 | 3020 3030 | 38 55 75 | 520 890 1300 | 90 |
| 5 | 1210 | 16 24 32 | 82 142 210 | 20 | 10 | 3535 | 42 75 90 | 1000 2150 2600 | 113 |
| 5 | 1310 1315 | 14 25 35 | 85 135 220 | 20 | 12 | 4040 | 48 75 100 | 1700 3150 4400 | 170 |
| 5 | 1610 1615 | 19 24 42 | 98 135 265 | 20 | 14 | 4545 | 55 75 110 | 2500 3900 6300 | 192 |
| 6 | 2012 | 24 42 50 | 165 340 420 | 31 | 14 | 5050 | 75 100 125 | 3950 5650 7370 | 271 |
| 6 | 2517 | 24 48 60 | 220 510 670 | 48 | s = width across flats of wrench according to DIN 911 | | | | |

Slip torques for bushes with bores which are not mentioned in the table can be linearly interpolated.

The screws of the bushes have to be tightened with the torque stated in the table.

2. Assembly of BLAURI-wedge and V-belt pulleys

2.1 For fitting the pulleys to the shaft ends, it is necessary that they are firmly seated. The following tolerance zone combinations are recommended as fits:

| Shafts, form shafts ISO | | solid BLAURI-pulleys for shaft ends ISO bores | | split BLAURI-pulleys for middle shaft part ISO bores | |
|-------------------------|----|---|----|--|----|
| | | | | | |
| Dia. up to 50 mm | h8 | N7 | T7 | J7 | T7 |
| Dia. above 50 mm | h8 | N7 | U7 | K7 | U7 |
| Dia. up to 50 mm | h6 | K7 | T7 | H7 | T7 |
| Dia. above 50 mm | h6 | M7 | U7 | J7 | U7 |
| Dia. up to 50 mm | k6 | H7 | U7 | - | - |
| Dia. above 50 mm | m6 | H7 | U7 | - | - |
| Dia. up to 50 mm | j6 | J7 | S7 | - | - |
| Dia. above 50 mm | j6 | K7 | T7 | - | - |

2.2 When machining the finished bores, the pulley has to be aligned in such a way that the radial eccentricity on the outside dia. and the axial run out on the groove flanks do not exceed the values as per DIN 2211 and 2217 in the table below:

| | | | | | | | | | |
|--------------------------------|------------|-----------|------------|------------|------------|------------|-------------|--------------|--------------|
| effective diameter | from up to | 50 100 | 106 160 | 170 250 | 280 400 | 450 630 | 710 1000 | 1120 1600 | 1800 4000 |
| Perm. radial and axial run out | | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.8 | 1.0 | 1.2 |

- 2.3 Before the pulleys are fitted and after the bores have been finish machined, the pulleys have to be balanced according to requirements either statically or dynamically.
- 2.4 For assembly of solid pulleys, fitting aids should be used. If no such aids are available, the ends of the hubs should be protected by suitable material, and the pulleys are to be mounted by applying light blows.
- 2.5 Solid pulleys should be secured against axial displacement by means of set screws.

3. Aligning the BLAURI-drive

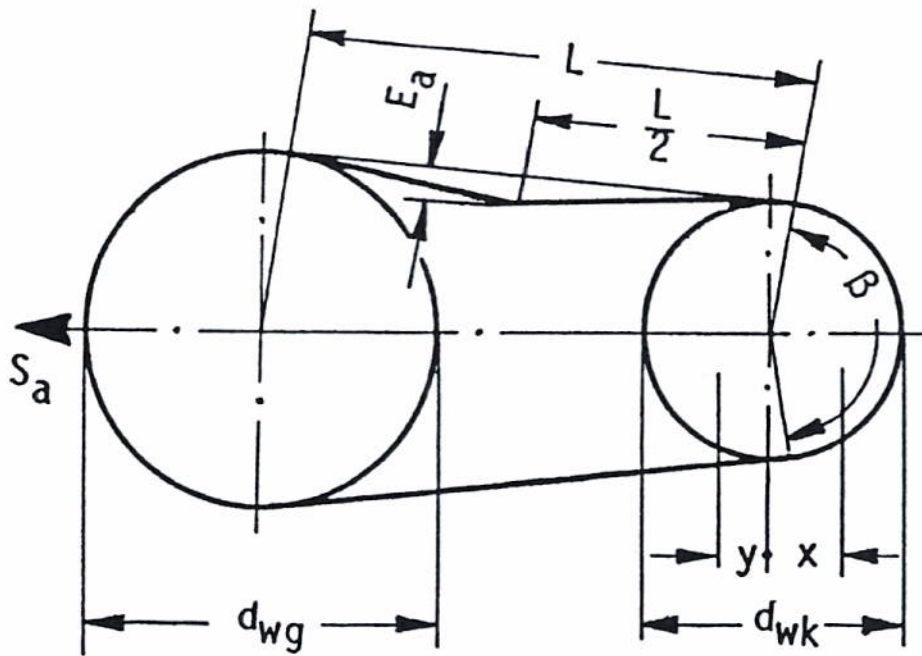
- 3.1 Shafts and pulleys must be accurately aligned by using spirit level and cord, maximum permissible deviation of the pulley alignment is 1° .
- 3.2 It is recommended to mark the position of the screwheads on the tensioners so that the properly aligned drive cannot be misaligned by nonuniform retightening (points 5.1, 5.3 and 7.1).

4. Fitting BLAURI-wedge belts and V-belts

- 4.1 Operational reliability and a maximum service life can be guaranteed only by using original BLAURI-wedge belt and V-belt sets of equal length.
- 4.2 The pulleys are equally suitable for accepting V-belts acc. to DIN 2215 and 2216, and wedge belts acc. to DIN 7753, however, the lower power transmission capacity of V-belts as per DIN 2215 and 2216 should be taken into consideration.
- 4.3 In order to facilitate fitting of the belts, the adjustable shaft of the BLAURI-drive should be set to the smallest possible center distance (point 14.).
- 4.4 The individual belts must always be fitted in the same direction. We recommend that belts are first placed on the smaller pulley and then uniformly turned on to the larger pulley. Under no circumstances may sharp tools be used, as belts may be damaged.
- 4.5 **Safety precautions**
 - 4.5.1 All rotating parts must be guarded to prevent accidents according to local and national safety codes.
- 4.6 **Changing BLAURI-wedge belts and V-belts.**
 - 4.6.1 On multi-groove belt drives the belts should not be replaced individually. Only sets matched to the correct length should be used.

5. Putting the drive into operation

- 5.1 After the belts have been fitted, the BLAURI-drive should, in any case, run without load for several minutes. The tensioners must be tightened so that all belts are tight without being overstretched (see point 5.3).
- 5.2 Light sagging of individual belts in the slack side has no influence on the efficiency of the drive.
- 5.3 **Tensioning BLAURI-wedge belts and V-belts**
 - 5.3.1 Prior to putting the drive into operation, it has to be checked whether the initial tension of the belts is correct. The required values like minimum belt tension, belt deflection and test force are to be determined by means of the following tables and formulae.



Explanations of Symbols

- E = Belt deflection per 100 mm span length mm
- E_a = Belt deflection for a given span length mm
- f = Load used to check belt deflection (see page 8) N
- k = Constant for calculation centrifugal force (see page 8)
- L = Span length of the drive mm
- S_a = Min. static shaft load N
- v = Belt velocity m/s
- P = Power to be transmitted by the belt drive kW
- P_B = Calculated power rating kW
- c₁ = Arc of contact factor (table 5.I)
- c₂ = Service factor (table 5.II)
- x/y = Take up and installation allowance e_{nom} mm
- z = Number of belts
- B = Arc of contact of the smaller pulley °
- T = Min. static belt tension N

$$P_B = P \times c_2$$

Minimum static belt tension:

$$T \approx \frac{500 \times (2.02 - c_1) \times P_B}{c_1 \times z \times v} + k \times v^2$$

On initial assembly multiply by factor 1.3

Minimum static shaft load:

$$S_a \approx 2 T \times \sin \frac{B}{2} \times z$$

On initial assembly multiply by factor 1.3

Table 5.I Arc of contact factors c_1

The arc of contact β at the smaller pulley d_{wk} is taken into account by the arc of contact factor c_1 .

| $\frac{d_{wg} - d_{wk}}{e_{nom}}$ | β | c_1 | $\frac{d_{wg} - d_{wk}}{e_{nom}}$ | β | c_1 | $\frac{d_{wg} - d_{wk}}{e_{nom}}$ | β | c_1 |
|-----------------------------------|---------|-------|-----------------------------------|---------|-------|-----------------------------------|---------|-------|
| 0 | 180° | 1.00 | 0.55 | 147° | 0.98 | 1.10 | 112° | 0.93 |
| 0.05 | 177° | 1.00 | 0.60 | 144° | 0.98 | 1.15 | 109° | 0.93 |
| 0.10 | 174° | 1.00 | 0.65 | 141° | 0.97 | 1.20 | 106° | 0.92 |
| 0.15 | 171° | 1.00 | 0.70 | 139° | 0.97 | 1.25 | 103° | 0.91 |
| 0.20 | 168° | 0.99 | 0.75 | 136° | 0.97 | 1.30 | 100° | 0.91 |
| 0.25 | 165° | 0.99 | 0.80 | 133° | 0.96 | 1.35 | 96° | 0.90 |
| 0.30 | 162° | 0.99 | 0.85 | 130° | 0.96 | 1.40 | 92° | 0.88 |
| 0.35 | 160° | 0.99 | 0.90 | 126° | 0.96 | 1.45 | 88° | 0.87 |
| 0.40 | 156° | 0.99 | 0.95 | 123° | 0.95 | 1.50 | 84° | 0.86 |
| 0.45 | 153° | 0.98 | 1.00 | 119° | 0.94 | 1.55 | 80° | 0.84 |
| 0.50 | 150° | 0.98 | 1.05 | 115° | 0.94 | 1.60 | 77° | 0.83 |

Intermediate values can be determined by linear interpolation.

Table 5.II - Service factors c_2

The service factor c_2 takes account of the daily operating period as well as of the type of prime mover and driven machine with speed reducing ratios, but not of any other working conditions (e.g. drives with tensioning and adjusting rollers, abnormal ambient conditions, high starting torques and inertia moments). The values stated are standard values. For speed increasing ratios, c_2 has to be increased according to table 6.I.

| Examples of driven machines | Examples of prime movers | | | | | |
|--|--|----------------------|----------|--|----------------------|----------|
| | A.C. and three-phase current motors with standard starting torques (up to 1.8 times the nominal torque) e.g. synchronous and single-phase motors with auxiliary winding, three-phase current motors with direct switching starter, Star-delta-switch or slip ring starter; D.C. shunt motors; internal combustion engines and turbines, speed above 600 r.p.m. | | | A.C. and three-phase current motors with high starting torque (above 1.8 times the nominal torque) e.g. single-phase motors with high starting torque; D.C. series and compound wound motors; internal combustion engines and turbines, speed up to 600 r.p.m. | | |
| | Service factor c_2 - for daily operating time in h | | | | | |
| | up to 10 | above 10 up to 16 | above 16 | up to 10 | above 10 up to 16 | above 16 |
| Light duty Centrifugal pumps and compressors, belt conveyors (light materials), fans and pumps up to 7.5 kW | 1 | 1.1 | 1.2 | 1.1 | 1.2 | 1.3 |

| | Service factor c ₂ - for daily operating time in h | | | | | |
|---|---|----------------------|----------|----------|----------------------|----------|
| | up to 10 | above 10 up to 16 | above 16 | up to 10 | above 10 up to 16 | above 16 |
| Medium duty Plate cutting machines, power presses, chain and belt conveyors (heavy materials), swing screens, generators and exciters, kneaders, machine tools (lathes and grinding machines), washing-, printing machines, fans and pumps above 7.5 kW | 1.1 | 1.2 | 1.3 | 1.2 | 1.3 | 1.4 |
| Heavy duty Crushing mills, piston compressors, heavy duty conveyors, throwers, (screw-, plate-, bucket-, shovel conveyors), elevators, textile and paper machinery, piston and dredger pumps, saw mills, hammer mills | 1.2 | 1.3 | 1.4 | 1.4 | 1.5 | 1.6 |
| Very heavy duty Heavy duty crushing mills, stone crushers, calanders, mixers, winches, cranes, excavators, wood-working machines, briquette presses | 1.3 | 1.4 | 1.5 | 1.5 | 1.6 | 1.8 |

Table 6.I Increase of service factor c₂ for speed increasing ratios

| Ratios | from | 1 | 0.67 | 0.5 | 0.4 |
|------------------------------|------|------|------|-----|-----|
| | to | 0.67 | 0.5 | 0.4 | 0.4 |
| Increase c ₂ in % | | 5 | 11 | 18 | 25 |

Table 7.I Belt velocity v in m/s

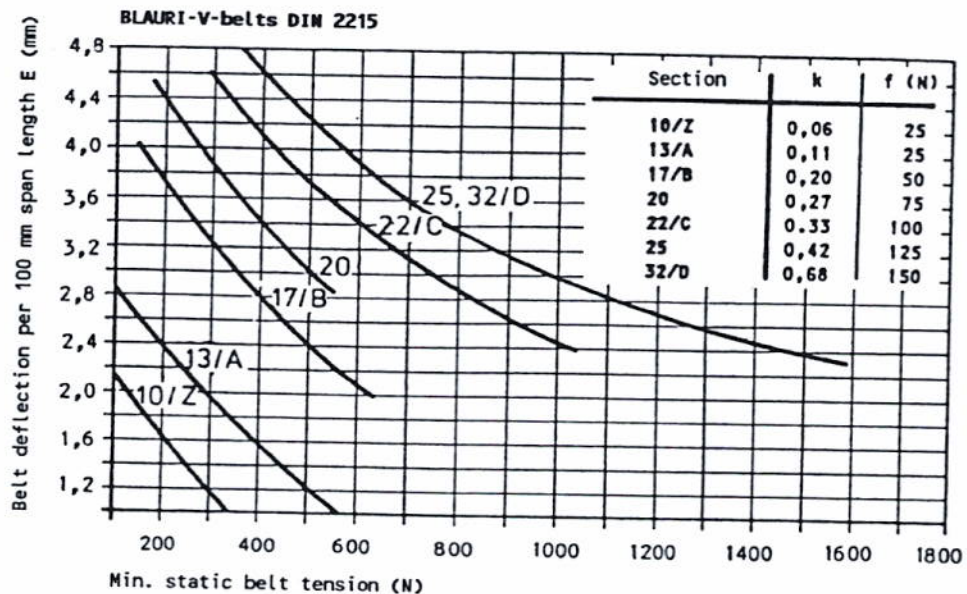
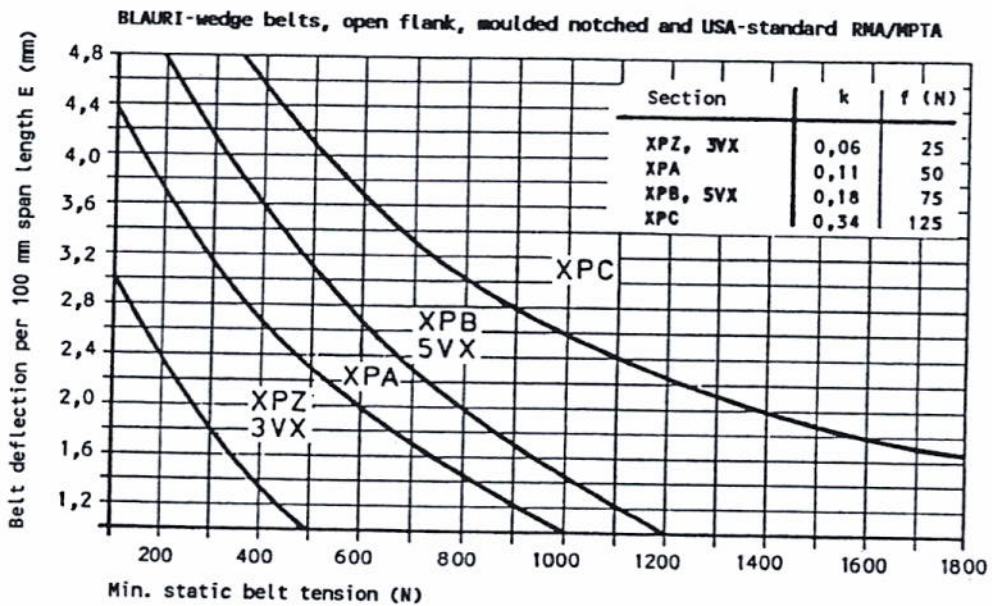
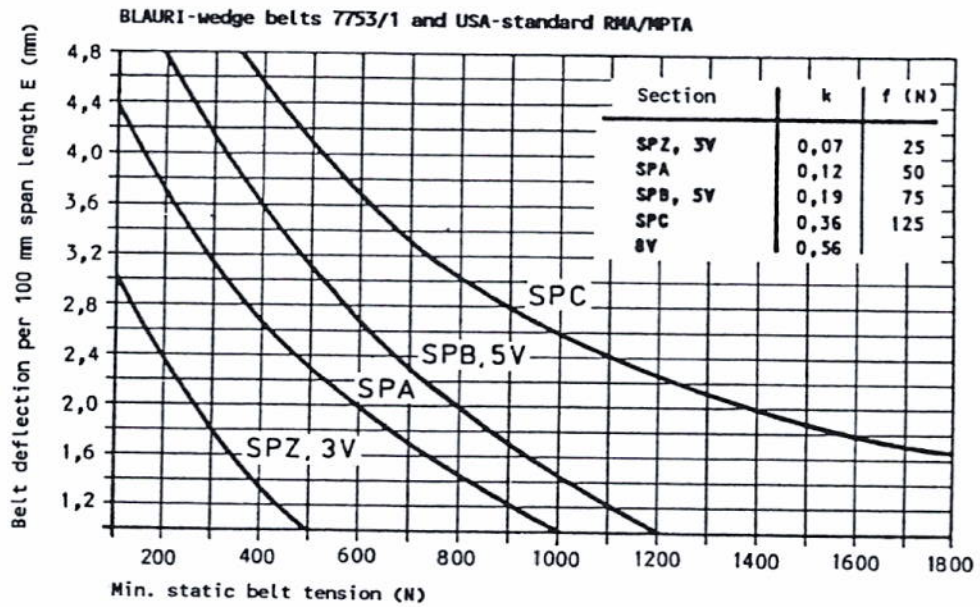
| d _w (mm) | Speed n of the pulley in r.p.m. | | | | | | | | | |
|------------------------|---------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | 200 | 300 | 400 | 500 | 600 | 700 | 800 | 950 | 1200 | 1450 |
| 50 | 0,52 | 0,79 | 1,05 | 1,31 | 1,57 | 1,83 | 2,09 | 2,49 | 3,14 | 3,80 |
| 56 | 0,59 | 0,88 | 1,17 | 1,47 | 1,76 | 2,05 | 2,35 | 2,79 | 3,52 | 4,25 |
| 63 | 0,66 | 0,99 | 1,32 | 1,65 | 1,98 | 2,31 | 2,64 | 3,13 | 3,96 | 4,78 |
| 71 | 0,74 | 1,12 | 1,49 | 1,86 | 2,23 | 2,60 | 2,97 | 3,53 | 4,46 | 5,39 |
| 80 | 0,84 | 1,26 | 1,68 | 2,09 | 2,51 | 2,93 | 3,35 | 3,98 | 5,08 | 6,07 |
| 90 | 0,94 | 1,41 | 1,88 | 2,36 | 2,83 | 3,30 | 3,77 | 4,48 | 5,65 | 6,83 |
| 100 | 1,05 | 1,57 | 2,09 | 2,62 | 3,14 | 3,66 | 4,19 | 4,97 | 6,28 | 7,59 |
| 112 | 1,17 | 1,76 | 2,35 | 2,93 | 3,52 | 4,10 | 4,69 | 5,57 | 7,04 | 8,50 |
| 125 | 1,31 | 1,96 | 2,62 | 3,27 | 3,93 | 4,58 | 5,24 | 6,22 | 7,85 | 9,49 |
| 140 | 1,47 | 2,20 | 2,93 | 3,66 | 4,40 | 5,13 | 5,86 | 6,96 | 8,80 | 10,63 |
| 160 | 1,68 | 2,51 | 3,35 | 4,19 | 5,03 | 5,86 | 6,70 | 7,96 | 10,05 | 12,15 |
| 180 | 1,88 | 2,83 | 3,77 | 4,71 | 5,65 | 6,60 | 7,54 | 8,95 | 11,31 | 13,66 |
| 200 | 2,09 | 3,14 | 4,19 | 5,24 | 6,28 | 7,33 | 8,38 | 9,95 | 12,57 | 15,18 |
| 224 | 2,35 | 3,52 | 4,69 | 5,86 | 7,04 | 8,21 | 9,38 | 11,14 | 14,07 | 17,01 |
| 250 | 2,62 | 3,93 | 5,24 | 6,54 | 7,85 | 9,16 | 10,47 | 12,43 | 15,71 | 18,98 |
| 280 | 2,93 | 4,40 | 5,86 | 7,33 | 8,80 | 10,26 | 11,73 | 13,93 | 17,59 | 21,26 |
| 315 | 3,30 | 4,95 | 6,60 | 8,25 | 9,90 | 11,54 | 13,19 | 15,67 | 19,79 | 23,91 |
| 355 | 3,72 | 5,58 | 7,43 | 9,29 | 11,15 | 13,01 | 14,87 | 17,66 | 22,30 | 26,95 |
| 400 | 4,19 | 6,28 | 8,38 | 10,47 | 12,57 | 14,66 | 16,75 | 19,90 | 25,13 | 30,37 |
| 450 | 4,71 | 7,07 | 9,42 | 11,78 | 14,14 | 16,49 | 18,85 | 22,38 | 28,27 | 34,16 |
| 500 | 5,24 | 7,85 | 10,47 | 13,09 | 15,71 | 18,32 | 20,94 | 24,87 | 31,41 | 37,96 |
| 560 | 5,86 | 8,80 | 11,73 | 14,66 | 17,59 | 20,52 | 23,46 | 27,85 | 35,18 | 42,51 |
| 630 | 6,60 | 9,90 | 13,19 | 16,49 | 19,79 | 23,09 | 26,39 | 31,34 | 39,58 | 47,83 |
| 710 | 7,43 | 11,15 | 14,87 | 18,59 | 22,30 | 26,02 | 29,74 | 35,31 | 44,61 | 53,90 |
| 800 | 8,38 | 12,57 | 16,75 | 20,94 | 25,13 | 29,32 | 33,51 | 39,79 | 50,26 | |
| 900 | 9,42 | 14,14 | 18,85 | 23,56 | 28,27 | 32,98 | 37,70 | 44,76 | | |
| 1000 | 10,47 | 15,71 | 20,94 | 26,18 | 31,41 | 36,65 | 41,88 | 49,74 | | |
| 1120 | 11,73 | 17,59 | 23,46 | 29,32 | 35,18 | 41,05 | 46,91 | | | |
| 1250 | 13,09 | 19,63 | 26,18 | 32,72 | 39,27 | 45,81 | 52,36 | | | |
| 1400 | 14,66 | 21,99 | 29,32 | 36,65 | 43,98 | 51,31 | | | | |
| 1600 | 16,75 | 25,13 | 33,51 | 41,88 | 50,26 | | | | | |
| 1800 | 18,85 | 28,27 | 37,70 | 47,12 | | | | | | |
| 2000 | 20,95 | 31,41 | 41,88 | 52,36 | | | | | | |

| d _w (mm) | Speed n of the pulley in r.p.m. | | | | | | | | |
|------------------------|---------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| | 1600 | 1800 | 2000 | 2200 | 2400 | 2850 | 3200 | 3600 | 4000 |
| 50 | 4,19 | 4,71 | 5,24 | 5,76 | 6,28 | 7,33 | 8,38 | 9,42 | 10,47 |
| 56 | 4,69 | 5,28 | 5,86 | 6,45 | 7,04 | 8,21 | 9,38 | 10,55 | 11,73 |
| 63 | 5,28 | 5,94 | 6,60 | 7,26 | 7,92 | 9,24 | 10,55 | 11,87 | 13,19 |
| 71 | 5,95 | 6,69 | 7,43 | 8,18 | 8,92 | 10,41 | 11,90 | 13,38 | 14,87 |
| 80 | 6,70 | 7,54 | 8,38 | 9,21 | 10,05 | 11,73 | 13,40 | 15,08 | 16,75 |
| 90 | 7,54 | 8,48 | 9,42 | 10,37 | 11,31 | 13,19 | 15,03 | 16,96 | 18,85 |
| 100 | 8,38 | 9,42 | 10,47 | 11,52 | 12,57 | 14,66 | 16,75 | 18,85 | 20,94 |
| 112 | 9,38 | 10,55 | 11,73 | 12,90 | 14,07 | 16,42 | 18,76 | 21,11 | 23,46 |
| 125 | 10,47 | 11,78 | 13,09 | 14,40 | 15,71 | 18,32 | 20,94 | 23,56 | 26,18 |
| 140 | 11,73 | 13,18 | 14,66 | 16,13 | 17,59 | 20,52 | 23,46 | 26,39 | 29,32 |
| 160 | 13,40 | 15,08 | 16,75 | 18,43 | 20,10 | 23,46 | 26,81 | 30,16 | 33,51 |
| 180 | 15,08 | 16,96 | 18,85 | 20,73 | 22,62 | 26,39 | 30,16 | 33,93 | 37,70 |
| 200 | 16,75 | 18,85 | 20,94 | 23,04 | 25,13 | 29,32 | 33,51 | 37,70 | 41,88 |
| 224 | 18,76 | 21,11 | 23,46 | 25,80 | 28,15 | 32,84 | 37,53 | 42,22 | 46,91 |
| 250 | 20,94 | 23,56 | 26,18 | 28,80 | 31,41 | 36,65 | 41,88 | 47,12 | 52,36 |
| 280 | 23,46 | 26,39 | 29,32 | 32,25 | 35,18 | 41,05 | 46,91 | 52,77 | |
| 315 | 26,39 | 29,69 | 32,98 | 36,28 | 39,58 | 46,18 | 52,77 | | |
| 355 | 29,74 | 33,46 | 37,17 | 40,89 | 44,61 | 52,04 | | | |
| 400 | 33,51 | 37,70 | 41,88 | 46,07 | 50,26 | | | | |
| 450 | 37,70 | 42,41 | 47,12 | 51,83 | | | | | |
| 500 | 41,88 | 47,12 | 52,36 | | | | | | |
| 560 | 46,91 | 52,77 | | | | | | | |
| 630 | 52,77 | | | | | | | | |

Belt velocities for intermediate diameters d_w and speeds n can be calculated according to the following formula:

$$v = \frac{d_w \times \pi \times n}{1000 \times 60} \quad (d_w \text{ in mm})$$

6. Belt tension for wedge- and V-belts



7. Re-tensioning

7.1. After a run of approximately 4 hours under full load the BLAURI-drive must be re-tensioned. Thus, the initial stretch is taken up.

8. Re-tensioning by means of a tension roll

8.1. If the shafts of the BLAURI-drive cannot be adjusted, we recommend to fit a fixed but adjustable tension roll.

8.2. The profiled tension roll should be located inside the loose span and press the belts from the inside to the outside in such a way that the roll deflects the belts as little as possible. The outer diameter of the tension roll should be at least d_{wk} .

9. Protection against influences of temperature, moisture and chemicals

9.1. BLAURI-drives are unaffected by high or low ambient temperatures. They can easily be used at temperatures from $-30\text{ }^{\circ}\text{C}$ to $+70\text{ }^{\circ}\text{C}$.

9.2. BLAURI-drives must be protected by guards from radiated heat, vapors, splashes of water or chemicals etc.

9.3. BLAURI-belts according to DIN 2215 and 2216 as well as DIN 7753 in standard design are oil resistant (they are also partially resistant to weak acids), heat resistant (from $-30\text{ }^{\circ}\text{C}$ to $+70\text{ }^{\circ}\text{C}$), electrically conductive (according to DIN 53596) and dustproof.

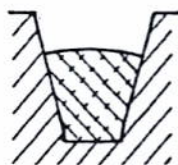
10. Maintenance and operational reliability

10.1. We recommend to check the BLAURI-drive regularly. The initial stretch must be checked and corrected, if necessary. BLAURI-V-belts require no special maintenance.

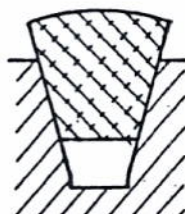
10.2. Wax or similar agents are harmful and should not be used under any circumstances.

10.3. The groove surfaces of the pulleys must be rust-free and, in the same way as the belts, must be kept free of dirt.

11. Position of the BLAURI-wedge belt and V-belt in the groove



incorrect



incorrect



correct

12. Center distance

12.1. We recommend the shortest possible center distance e ; a value of $e = 0.7 \dots 1 \times (d_{wg} + d_{wk})$ is recommended.

12.2. The maximum dimension $e = 2 \times (d_{wg} + d_{wk})$ should not be exceeded.

12.3. The center distance e for a given BLAURI-drive can be calculated by means of the following formula:

$$e \approx p + \sqrt{p^2 - q}$$

$p = 0.25 \times L_w - 0.393 \times (d_{wg} + d_{wk})$
 $q = 0.125 (d_{wg} - d_{wk})^2$
 d_{wk} and d_{wg} = effective dia. of the BLAURI-pulleys
 L_w = effective length of a BLAURI-belt

13. Adjustability of the center distance

13.1 The center distance e of a BLAURI-drive should be adjustable in order to facilitate fitting of the BLAURI-belts, and to permit tensioning and subsequent re-tensioning, see points 5.1, 5.3, 7.1 and 8.

14. Minimum adjustment x/y of center distance e_{nom}

Wedge belts and V-belts

| Inside length resp. Effective length mm | Min. take-up allowance x mm | Min. installation allowance y | | | | | | | |
|--|---------------------------------------|----------------------------------|--------------------|------------|------|----|--------------------|----|------|
| | | SPZ XPZ 10/Z | SPA XPA 13/A | SPB XPB | 17/B | 20 | SPC XPC 22/C | 25 | 32/D |
| 315 < 670 | 10 | 10 | 10 | | 10 | | | | |
| > 670 < 1000 | 15 | 15 | 15 | | 15 | | | | |
| > 1000 < 1250 | 20 | 15 | 15 | | 15 | 20 | 20 | | |
| > 1250 < 1800 | 25 | 20 | 20 | 20 | 20 | 20 | 25 | 25 | |
| > 1800 < 2240 | 25 | 20 | 20 | 20 | 20 | 25 | 25 | 30 | 35 |
| > 2240 < 3000 | 35 | 20 | 20 | 20 | 20 | 25 | 30 | 30 | 35 |
| > 3000 < 4000 | 45 | 20 | 20 | 20 | 20 | 25 | 30 | 30 | 35 |
| > 4000 < 5000 | 55 | 20 | 20 | 25 | 20 | 30 | 30 | 30 | 35 |
| > 5000 < 6300 | 70 | 25 | 25 | 30 | 25 | 35 | 35 | 35 | 40 |
| > 6300 < 8000 | 85 | 25 | 25 | 35 | 25 | 40 | 40 | 40 | 45 |
| > 8000 < 10000 | 110 | 30 | 30 | 35 | 25 | 40 | 45 | 45 | 45 |
| > 10000 < 12500 | 135 | - | - | 35 | 30 | 40 | 45 | 45 | 50 |
| > 12500 < 15000 | 150 | - | - | 45 | 40 | 50 | 55 | 55 | 60 |
| > 15000 < 18000 | 190 | - | - | 45 | 40 | 50 | 55 | 55 | 60 |

Narrow V-belts

| Length designation | Outside length mm | Min. take-up allowance x mm | Min. installation allowance y mm | | |
|-----------------------|--------------------------|---------------------------------------|--|-----------|----|
| | | | 3V 3VX | 5V 5VX | 8V |
| 265 < 400 | 673 < 1 016 | 15 | 15 | | |
| > 400 < 475 | > 1 016 < 1 206 | 20 | 15 | | |
| > 475 < 710 | > 1 206 < 1 803 | 25 | 20 | 20 | |
| > 710 < 850 | > 1 803 < 2 159 | 25 | 20 | 20 | |
| > 850 < 1 180 | > 2 159 < 2 997 | 35 | 20 | 20 | 40 |
| > 1 180 < 1 600 | > 2 997 < 4 064 | 45 | 20 | 20 | 40 |
| > 1 600 < 2 000 | > 4 064 < 5 080 | 55 | 20 | 25 | 40 |
| > 2 000 < 2 500 | > 5 080 < 6 350 | 70 | | 30 | 45 |
| > 2 500 < 3 150 | > 6 350 < 8 001 | 85 | | 35 | 45 |
| > 3 150 < 4 000 | > 8 001 < 10 160 | 110 | | 35 | 50 |
| > 4 000 < 5 000 | > 10 160 < 12 700 | 135 | | 35 | 50 |
| > 5 000 < 6 000 | > 12 700 < 15 240 | 150 | | 45 | 60 |
| > 6 000 < 7 100 | > 15 240 < 18 034 | 190 | | 45 | 60 |

The more carefully and conscientiously assembly and commissioning is carried out, the more reliably will the drive work, and the longer is the service life of the BLAURI-drives

| Trouble | Cause | Remedy |
|---|---|--|
| V-belts turn over in pulleys | Pulleys are misaligned Wrong belt-/groove section | Align pulleys Adjust belt- and groove sections Replace pulleys |
| | Excessively worn pulley grooves | |
| | Excessive belt flap | Mount idler pulley on slack side acting from inside to outside; Use BLAURI-multiple V-belts |
| Excessive wear on belt flanks | Too low belt tension, Foreign bodies in the pulley grooves | Retension belts Remove foreign bodies and protect drive |
| | Too high starting torque | Check drive conditions and dimension anew |
| | Wrong pulley groove angle | Rework or replace pulleys |
| | Worn pulley grooves | Replace pulleys |
| | Wrong belt-/groove section | Adjust belt- and groove sections |
| | Pulleys are misaligned Pulley diameter below recommended minimum | Align pulleys Increase pulley diameter (new drive dimensioning); Use BLAURI special design or BLAURI-FO-V-belts |
| | Low belt tension | Check tension and retention |
| Belt catching on other components | Remove disturbing parts; align drive anew | |
| Excessive running noises | Pulleys are misaligned | Align pulleys |
| | Low belt tension | Check tension and retention |
| | Drive is overloaded | Check drive conditions and dimension anew |
| Belts are swelling and sticky | Contamination by oil, grease, chemicals | Protect drive from contamination; use extremely oilresistant BLAURI-V-belts in special design Clean pulley grooves with petrol or benzol prior to use of new belts! |
| Unequal stretch of belt | Faulty pulley grooves | Replace pulleys |
| | Used and new belts combined in one set | Replace belt set completely |
| | Different belt makes combined in one set | Use belts of one manufacturer only as constant set of V-belts |
| Breakage of belt after short running period (belt torn) | Assembly by force caused damage of cord and cover | Permit fitting without applying force |
| | Influence of foreign bodies during operation | Mount a guard |
| | Drive underdimensioned, insufficient number of belts | Check drive conditions and dimension anew |
| | Drive stalled | Eliminate the cause |

| Trouble | Cause | Remedy |
|--|--|--|
| Fractures and cracks in the base (embrittlement) | Influence of an outside idler, the arrangement of which does not correspond to our recommendations | Enlarge diameter, mount idler in slack side; use BLAURI special design |
| | Pulley diameter too small | Keep to the min. pulley diameter; use BLAURI special design or BLAURI-open-flank-V-belts |
| | Excessive influence of heat | Remove heat source, protect drive; improve air circulation; use heat-resistant BLAURI-V-belts in special design |
| | Excessive influence of cold Increased belt slip | Use cold resisting BLAURI-V-belts in special design Retension drive; check drive conditions and dimension anew, if necessary |
| | Chemical influences | Protect drive; use BLAURI special design |
| Severe belt vibrations | Drive underdimensioned | Check drive conditions and dimension anew |
| | Center distance considerably larger than recommended | Reduce center distance; mount inside idler in the slack side; use BLAURI-multiple V-belts |
| | High shock loads | Use BLAURI-multiple V-belts; use idler roll; use BLAURI special design |
| | Too low belt tension | Correct tension |
| | Pulleys not balanced | Balance pulleys |
| Belts can no longer be re-tensioned | Adjustment possibility of center distance too small | Change re-adjustment conditions |
| | Excessive stretch of belt caused by insufficient drive capacity | Carry out drive calculation and dimension anew |
| | Wrong belt length | Use shorter belts |

11

SIEMENS / FLENDER

KUPPLUNG

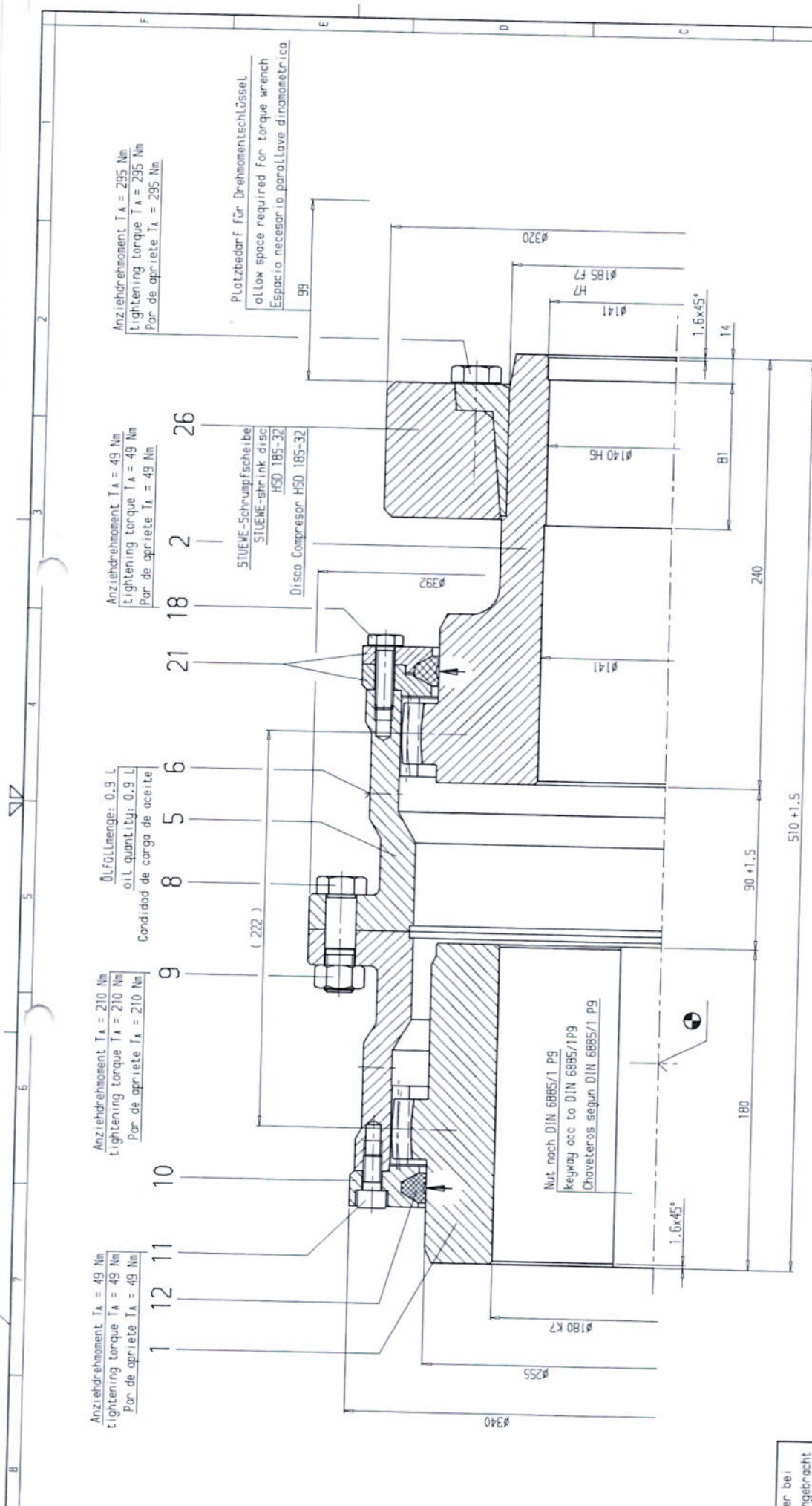
COUPLING

ACCOUPLEMENT

ACOPLAMIENTO

МУФТЫ

SPOJKY



Teff = 45 000 Nm

Anziehdrehmoment $T_A = 49$ Nm
Tightening torque $T_A = 49$ Nm
Par de apriete $T_A = 49$ Nm

Anziehdrehmoment $T_A = 210$ Nm
Tightening torque $T_A = 210$ Nm
Par de apriete $T_A = 210$ Nm

ÖL Füllmenge: 0.9 L
oil quantity: 0.9 L
Cantidad de carga de aceite

Anziehdrehmoment $T_A = 49$ Nm
Tightening torque $T_A = 49$ Nm
Par de apriete $T_A = 49$ Nm

Anziehdrehmoment $T_A = 295$ Nm
Tightening torque $T_A = 295$ Nm
Par de apriete $T_A = 295$ Nm

Platzbedarf für Drehmomentschlüssel
allow space required for torque wrench
Espacio necesario lo parafloave dinamometrica

Nut nach DIN 6885/1 P9
keyway acc to DIN 6885/1P9
Chaveteros segun DIN 6885/1 P9

olster bei
de angebracht
a padding
ad an assembly
de grasa a
duerir durante
ntaje.

sdichtung der Paßfedernuten Stellschraubenbohrungen
dem Aufsetzen der Kupplungsteile ca. 2/3 mit Dicht-
gefüllt. Stellschrauben eingedreht und festgezogen.
went lubricant leakage through keyway mount coupling
in the shaft. Fill in sealing paste up to about 2/3
of setscrew hole. Insert and tighten setscrew.
veteros se obturan introduciendo junto plastica a tra-
taladro ragdad de fijacion, llenando 2/3 del mismo.
nacion se introducen los tornillos y se aprietan.

Umlaufende Teile müssen vom
Käufer gegen unbeabsichtigtes
Berühren gesichert werden!
The purchaser is responsible for
the provision of safety guards.
Para evitar accidentes, el
comprador debe proteger los
piezas giratorias de acuerdo
con la legislación vigente.

| | | | | | | | | |
|---|-----------------------|---|-----------------------|--|------------|----------------------------|------|------------|
| 9 | Spanische Texte hinzu | | Änderungsbeschreibung | | 2003-09-25 | HN | HN | 2003-09-25 |
| KL | Feld | | | Datum | base | base | base | 2003-09-16 |
| Zul. Abweichungen für Maße ohne Teil.-Angaben mittel DIN 7168 | | Auftr.-Nr. | | 4.095.349/20 | | gezeichnet | | |
| FLENDER | | Werk- staff | | Benennung | | Schl.-Nr.: 0756 | | |
| Nicht genehmigte Änderungen | | Ezr. KU 2003-09-16 | | Hein | | Maßstab: 1:1 | | |
| Eggr. KU 2003-09-16 | | Hein | | Richtteil nach Zeichnung | | sonst nach Zeichnung | | |
| Raumwerte für in µm | | Norm KU 2003-09-16 | | Hein | | Format Art. Zeichnungs-Nr. | | |
| Abt. Datum | | Abt. Datum | | base | | 7 M 6 036 169 0 | | |
| Maßstab: 1:1.5 | | Gewicht (kg) | | 178 | | Aus Zeichnung | | |
| Fragezeichen | | 2.5 | | Ersatz für | | R 206.571 | | |
| Maße in mm | | Observe protection marks/Schutzvermerk 150 160161 | | R 011-0410M_25-SEP-2003_03r-05r16 H_Hein/PZ6 | | | | |

SIEMENS**Stückliste (SL)**

Parts list

Bauart ZWN
 Type
Größe 342,0
 Size
Übersetzung
 ratio

 Seite
 Page
 1/1
Bei Korrespondenz bitte angeben

Please quote in correspondence

90536 / 118204

SL 4606503-020 DE/EN**Hierzu gehört Zeichnungs-Nr.**

Please refer to DWG No.

6036169

| Teil-Nr. | Menge | Benennung | Zeichnungs-Nr. | Material-Nr. | Gw(kg) |
|----------|---------|--|------------------------|-----------------|--------|
| Part No. | No. off | Description | Drawings No. | Ident no. | Weight |
| E 0001 | 1 | ST ZAPEX ZW TEIL 1/2 VARI (I) ZAPEX ZW PART 1/2 VARI (I) | | 000.009.900.027 | |
| E 0002 | 1 | ST TEIL 1/2 342 NL240 C60+N PART 1/2 342 NL240 C60+N | ***** | 000.001.248.945 | 43,5 |
| E 0005 | 2 | ST MITNEHMERRING 342KOMPL SLEEVE 342KOMPL C45+N | C45+N 5214271/E | 000.000.501.650 | 25,0 |
| E 0008 | 14 | ST SCHR-B-PASS M16X055 FIT BOLT M16X055 | D 610 8.8 D 610 8.8 | 000.000.320.584 | 0,1 |
| E 0009 | 14 | ST MUTTER-SKT M16 HEXAGON NUT M16 D 934 10 | D 934 10 | 000.000.340.358 | 0,0 |
| E 0010 | 1 | ST DECKEL 342 COVER 342 EN-JS1030 | EN-JS1030 501310/J | 000.000.501.310 | 5,0 |
| E 0011 | 14 | ST SCHR-B-ZYL M10X020 HEX.SOCKET HEAD CAP SCREW M10X020 D 912 | D 912 8.8 | 000.000.322.320 | 0,0 |
| E 0012 | 2 | ST DUO-DIRG 0252X0280X16 DUO SEALING RING 0252X0280X16 W 5711 | W 5711 79NBR716 | 000.000.243.302 | 0,2 |
| E 0016 | 14 | ST SCHR-B-SKT M10X035 HEXAGON HEAD SCREW M10X035 D 933 10.9 | D 933 10.9 | 000.000.321.609 | 0,0 |
| E 0021 | 1 | ST DECKEL-2T 342 SPLIT COVER 342 S355J2G3 | S355J2G3 5242696/B | 000.000.821.097 | 6,5 |
| E 0026 | 1 | ST SCHB-SCHR GR.185 SHRINK DISC GR.185 | F 3233 ST F 3233 ST | 000.000.309.486 | 32,7 |
| E 0050 | 1 | ST FLUESS-KST LOCTITE 5922 FAG 2 LIQUID PLASTICS LOCTITE 5922 FAG 2 | | 000.001.443.780 | 0,1 |

Die mit * gekennzeichneten Teile gehören zu einer Baugruppe (G). Die Baugruppe ist nur komplett auszutauschen.
 The parts marked with * belong to a subassembly (G). The subassembly must be replaced complete.

Siemens AG, D 46393 Bocholt,

Tel.+49(0)2871/92-0. Fax+49(0)2871/922596

Datum Date

HEIN, WOLFGANG

2562

ZAPEX® couplings

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

Operating instructions
BA 3500 EN 11/2010



FLENDER couplings

SIEMENS

SIEMENS

ZAPEX® couplings

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

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

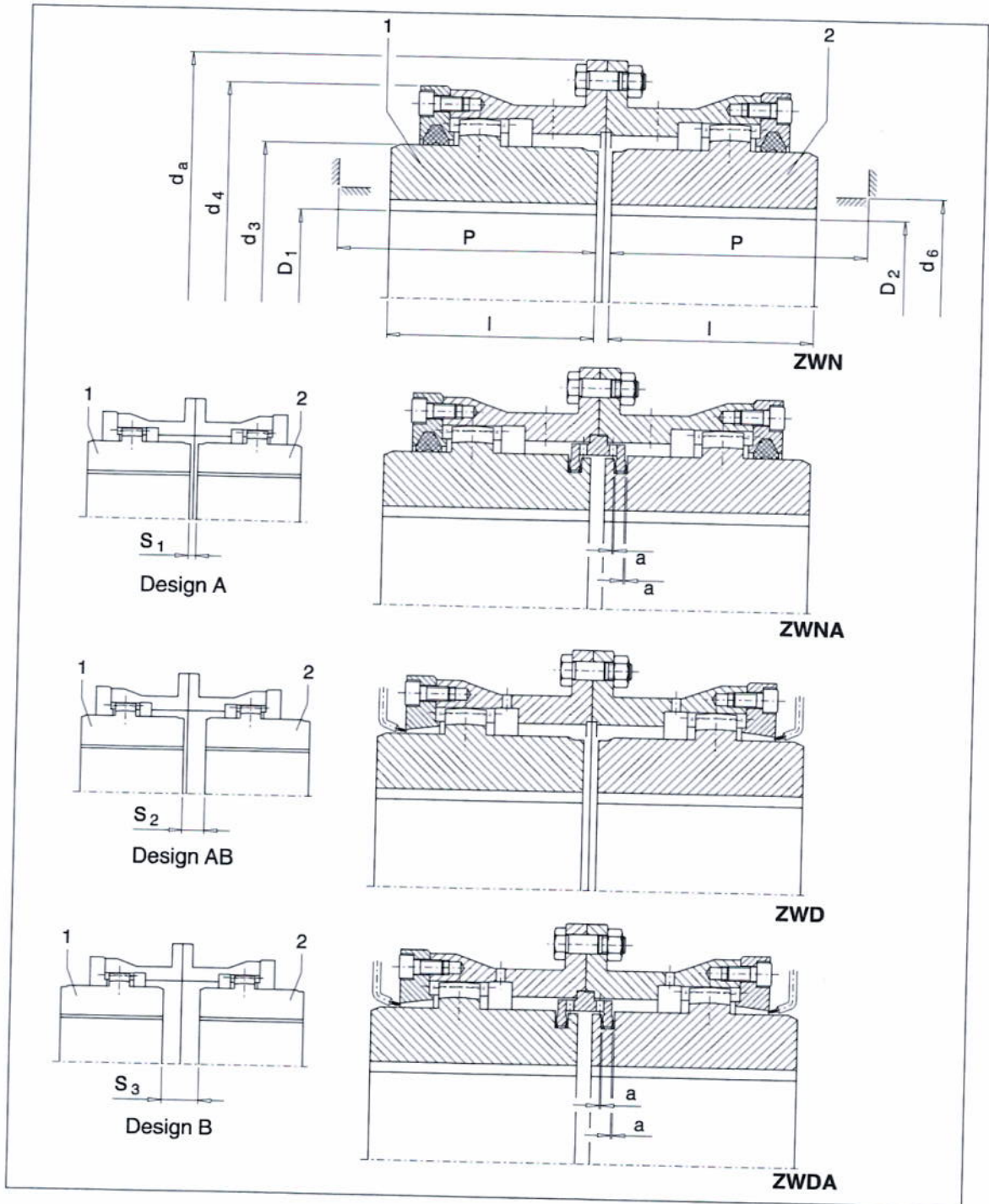


If a dimensioned drawing has been made out for the coupling, the data in this drawing must be given priority. The dimensioned drawing should be made available to the user of the system.

1.1 Types ZWN, ZWNA, ZWD, ZWDA

The types ZWNA and ZWDA are only available in configuration A (S_1). The distance dimensions S_1 to S_3 will be found in section 6, item 6.9.

For dimension table, see item 1.5.



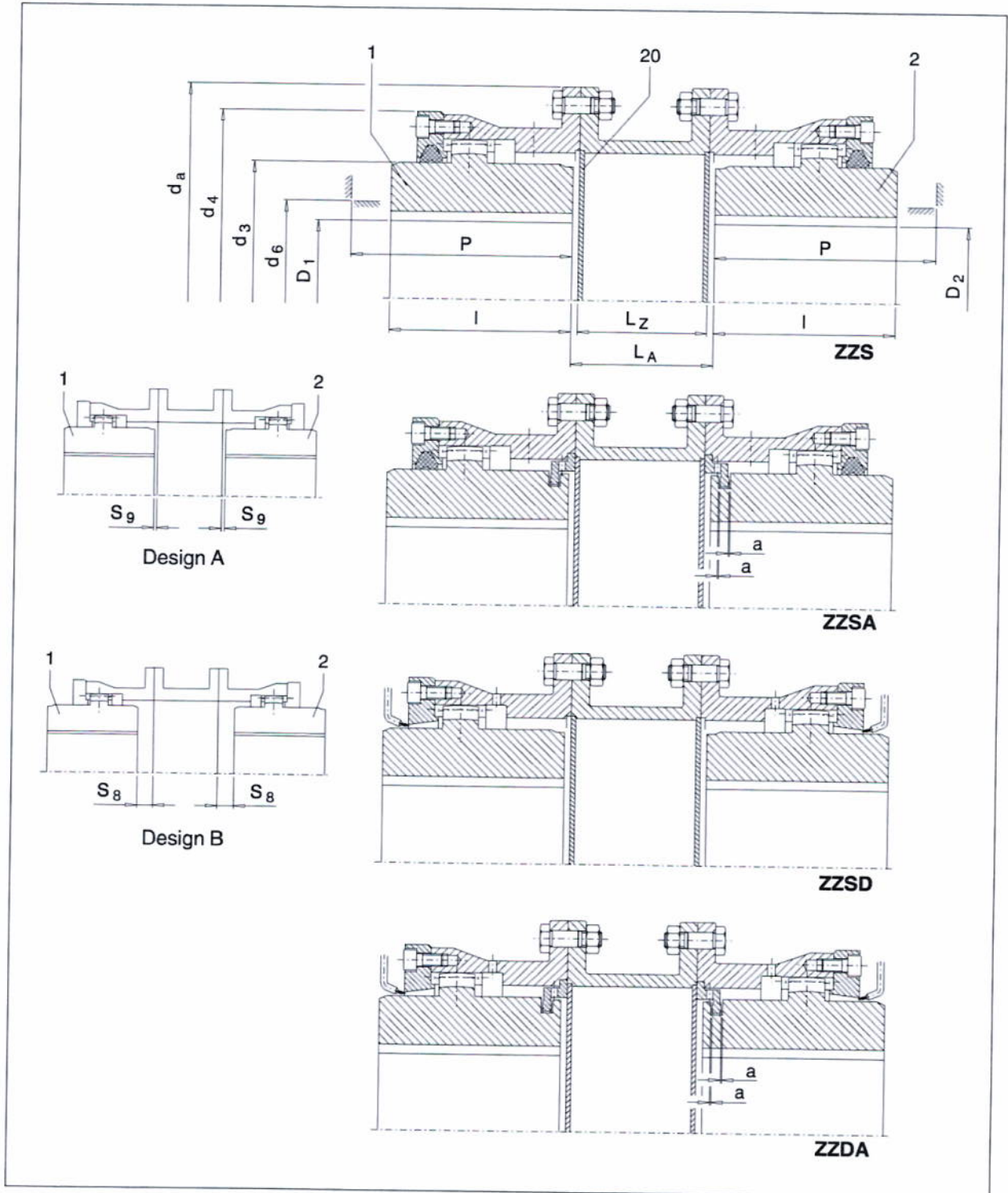
1.2 Types ZZS, ZZSA, ZZSD, ZZDA

The types ZZSA and ZZDA are only available in configuration A (S_9). The distance dimensions S_8 and S_9 will be found in section 6, item 6.9.

L_A dimensions according to the specifications of the customer.

L_Z dimensions ≤ 200 are delivered without part 20 ($L_A = L_Z + 2 \times S_{8/9}$)

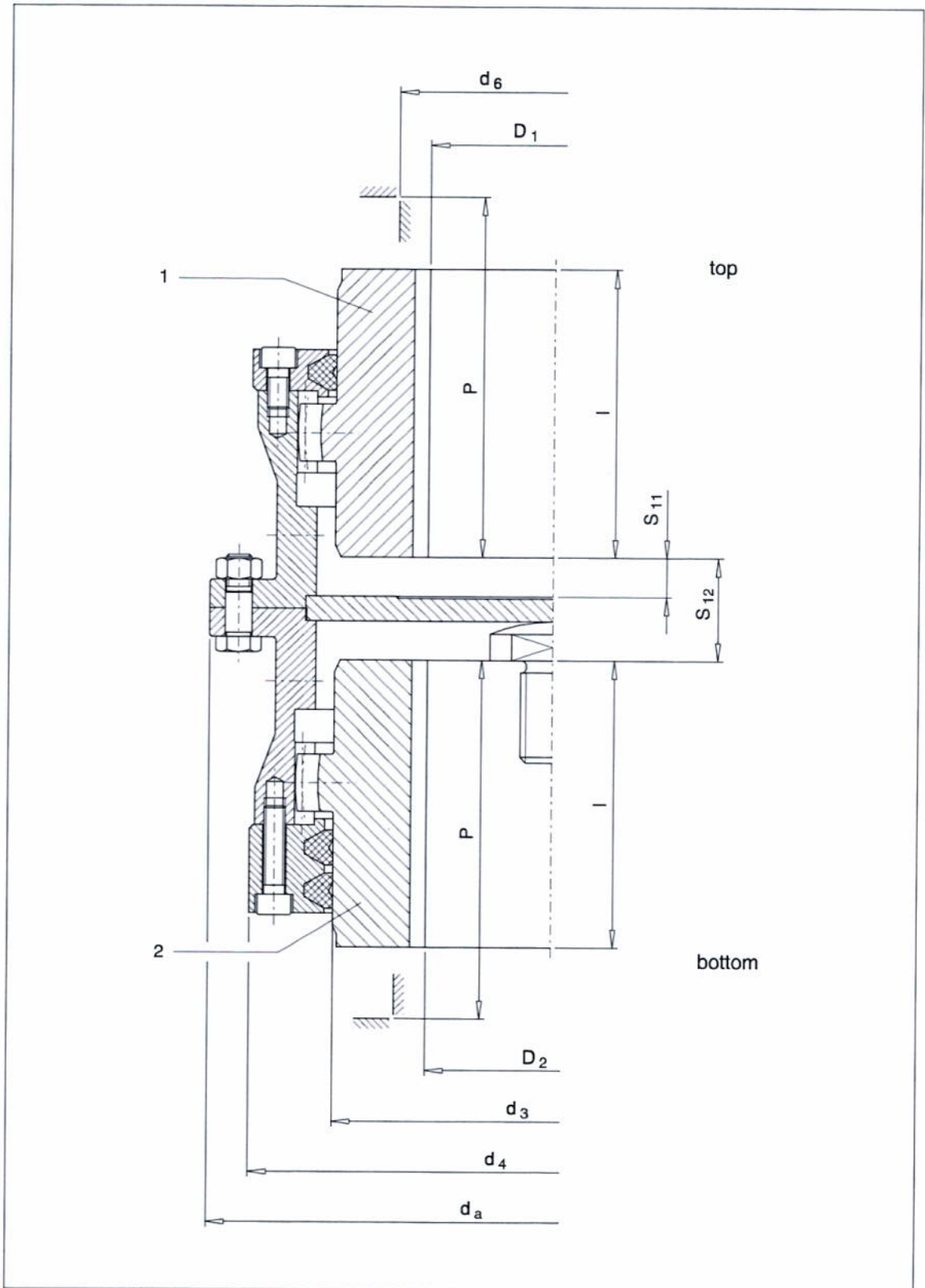
For dimension table, see item 1.5.



1.3 Type ZWNV

The distance dimensions S_{11} and S_{12} will be found in section 6, item 6.9.

For dimension table, see item 1.5.

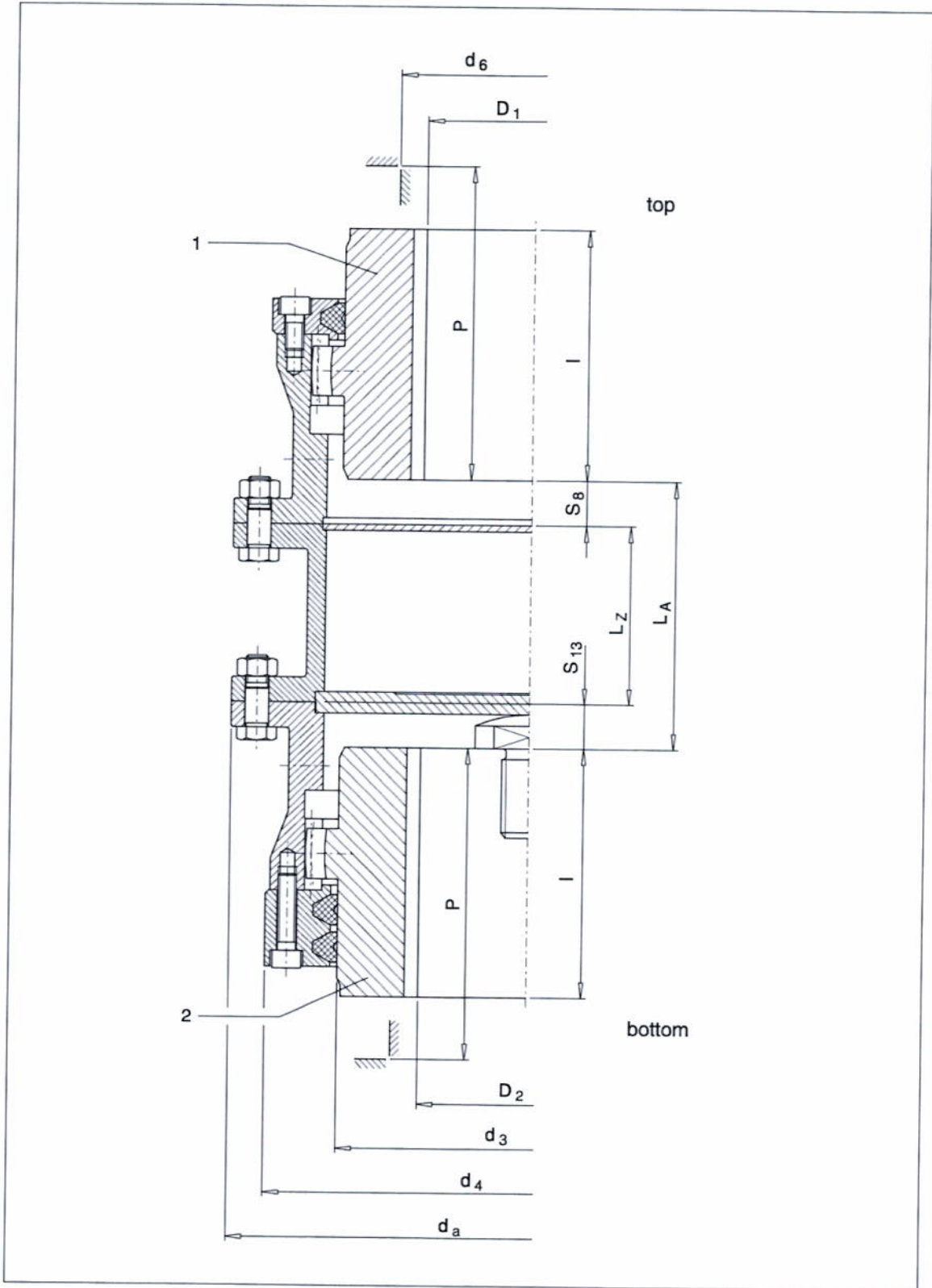


1.4 Type ZZSV

The distance dimensions S_8 and S_{13} will be found in section 6, item 6.9.

L_A dimensions according to the specifications of the customer.

For dimension table, see item 1.5.



1.5 Dimension table

| Size | Rated torque T_N 1) Nm | Speed $n_{max.}$ 1/min | Hole D_1 / D_2 | | d_a mm | d_3 mm | d_4 mm | d_6 3) mm | l mm | P 3) mm | Axial back-lash a mm | L_z min. mm | Weight 4) kg |
|------|-----------------------------------|------------------------------|-----------------------|-------------------|-------------|--------------------|----------------------|-------------------|-----------|-----------------|------------------------------|---------------------|----------------------|
| | | | from mm | up to 2) mm | | | | | | | | | |
| 112 | 1300 | 9400 | 0 | 45 | 143 | 65 | 110 | 45 | 50 | 85 | - | 120 | 7.2 |
| 128 | 2500 | 8300 | 0 | 55 | 157 | 80 | 128 | 60 | 60 | 105 | - | 120 | 10 |
| 146 | 4300 | 7300 | 0 | 65 | 177 | 95 | 146 | 75 | 75 | 120 | 0.5 | 120 | 15 |
| 175 | 7000 | 6400 | 0 | 80 | 215 | 112 | 175 | 85 | 90 | 140 | 0.5 | 130 | 26 |
| 198 | 11600 | 5500 | 0 | 95 | 237 | 135 | 198 | 110 | 100 | 150 | 0.5 | 130 | 37 |
| 230 | 19000 | 4700 | 0 | 110 | 265 | 160 | 230 | 135 | 110 | 160 | 0.5 | 130 | 53 |
| 255 | 27000 | 4100 | 0 | 125 | 294 | 185 | 255 | 160 | 125 | 175 | 1.0 | 140 | 74 |
| 290 | 39000 | 3700 | 70 | 145 | 330 | 210 | 290 | 180 | 140 | 200 | 1.0 | 140 | 100 |
| 315 | 54000 | 3300 | 80 | 160 | 366 | 230 | 315 | 200 | 160 | 220 | 1.0 | 180 | 130 |
| 342 | 69000 | 3000 | 90 | 180 | 392 | 255 | 340 | 225 | 180 | 240 | 1.0 | 180 | 170 |
| 375 | 98000 | 2700 | 100 | 200 | 430 | 290 | 375 | 260 | 200 | 260 | 1.0 | 180 | 235 |
| 415 | 130000 | 2500 | 120 | 220 | 478 | 320 | 415 | 285 | 220 | 300 | 1.0 | 200 | 300 |
| 465 | 180000 | 2200 | 140 | 250 | 528 | 360 | 465 | 325 | 240 | 320 | 1.0 | 200 | 400 |
| 505 | 250000 | 2000 | 160 | 275 | 568 | 400 | 505 | 365 | 260 | 340 | 1.5 | 200 | 510 |
| 545 | 320000 | 1800 | 180 | 300 | 620 | 440 | 545 | 405 | 280 | 360 | 1.5 | 220 | 670 |
| 585 | 400000 | 1700 | 210 | 330 | 660 | 480 | 585 | 445 | 310 | 390 | 1.5 | 220 | 830 |
| 640 | 510000 | 1600 | 230 > 330 | 330 360 | 738 | 480 520 | 640 | 445 | 330 | 420 | 1.5 | 250 | 990 930 |
| 690 | 660000 | 1450 | 250 > 360 | 360 390 | 788 | 520 560 | 690 | 475 | 350 | 440 | 1.5 | 250 | 1200 1100 |
| 730 | 790000 | 1350 | 275 > 390 | 390 415 | 834 | 560 600 | 730 | 515 | 380 | 470 | 1.5 | 250 | 1450 1400 |
| 780 | 1000000 | 1250 | 300 > 415 | 415 450 | 900 | 600 650 | 780 | 555 | 400 | 510 | 2.0 | 280 | 1750 1750 |
| 852 | 1200000 | 1150 | 325 > 450 | 450 490 | 970 | 650 710 | 850 | 595 | 420 | 530 | 2.0 | 280 | 2200 2150 |
| 910 | 1600000 | 1050 | 350 > 490 | 490 520 | 1030 | 710 750 | 910 | 655 | 450 | 560 | 2.0 | 280 | 2700 2550 |
| 1020 | 1900000 | 1000 | 375 > 520 | 520 550 | 1112 | 750 800 | 1020 | 695 | 480 | 610 | 2.0 | 380 | 3300 3200 |
| 1080 | 2200000 | 950 | 400 > 550 | 550 600 | 1162 | 800 860 | 1080 | 735 | 500 | 635 | 2.0 | 380 | 3800 3700 |
| 1150 | 2700000 | 900 | 425 > 600 | 600 650 | 1222 | 860 930 | 1150 | 795 | 520 | 655 | 2.0 | 380 | 4600 4400 |
| 1160 | 3350000 | 850 | 450 > 600 > 650 | 600 650 690 | 1292 | 860 930 990 | 1160 1160 1210 | 795 | 550 | 685 | 2.0 | 380 | 5000 4900 5100 |
| 1240 | 3800000 | 800 | 475 > 650 > 690 | 650 690 730 | 1400 | 930 990 1055 | 1240 1240 1290 | 865 | 580 | 735 | 2.0 | 400 | 6200 5800 6300 |

| Size | Rated torque T_N 1) Nm | Speed $n_{max.}$ 1/min | Hole D_1 / D_2 | | d_a mm | d_3 mm | d_4 mm | d_6 3) mm | l mm | P 3) mm | Axial back-lash a mm | L_z min. mm | Weight 4) kg |
|------|-----------------------------------|------------------------------|--------------------------------|--------------------------|-------------|------------------------------|------------------------------|-------------------|-----------|-----------------|------------------------------|---------------------|----------------------------------|
| | | | from mm | up to 2) mm | | | | | | | | | |
| 1310 | 4600000 | 750 | 500 > 650 > 690 > 730 | 650 690 730 780 | 1470 | 930 990 1055 1120 | 1310 1310 1310 1370 | 850 | 610 | 765 | 2.5 | 400 | 6900 6600 7000 7400 |
| 1380 | 5300000 | 700 | 525 > 690 > 730 > 780 | 690 730 780 810 | 1540 | 990 1055 1120 1170 | 1380 1380 1380 1430 | 910 | 640 | 795 | 2.5 | 400 | 8000 7700 8100 8300 |
| 1440 | 6250000 | 670 | 550 > 730 > 780 > 810 | 730 780 810 860 | 1600 | 1055 1120 1170 1240 | 1440 1440 1440 1510 | 975 | 670 | 825 | 2.5 | 400 | 9400 8800 9000 9700 |
| 1540 | 7200000 | 630 | 575 > 780 > 810 > 860 | 780 810 860 910 | 1710 | 1120 1170 1240 1310 | 1540 1540 1540 1610 | 1030 | 700 | 875 | 2.5 | 600 | 11000 10000 10500 12000 |

Table 1.5: Torques T_N , speeds $n_{max.}$, dimensions and weights



The max. speed for types ZZS, ZZSA, ZZSD, ZZDA and ZZSV is limited by the weight and the critical speed of the adapter. Speed $n_{max.}$ on request.

- 1) The specified torques relate to the teeth and **not** the shaft/hub connection. This must be checked separately.
- 2) Max. bore with keyway to DIN 6885/1
- 3) Space required for alignment of the coupling parts and replacement of the sealing rings.
- 4) Weights are valid for medium bores of type ZWN

The rated torques T_N apply to:

- 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 or temperature of shaft ends).
- up to 25 starts per hour, where double the rated torque is permissible during the start.



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 serves to transmit power and torque between two shafts or flanges connected by this coupling.

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

The coupling has been manufactured in accordance with the state of the art and is delivered in a condition for safe and reliable use. It complies with the requirements in Directive 94/9/EC.

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:

Siemens AG
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 (BA) 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, dismantling, 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 despatch 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.



The coupling in design in accordance with the Directive 94/9/EC is provided with the CE identification mark as described in section 5.

4.2 Transport



When transporting our products, 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:

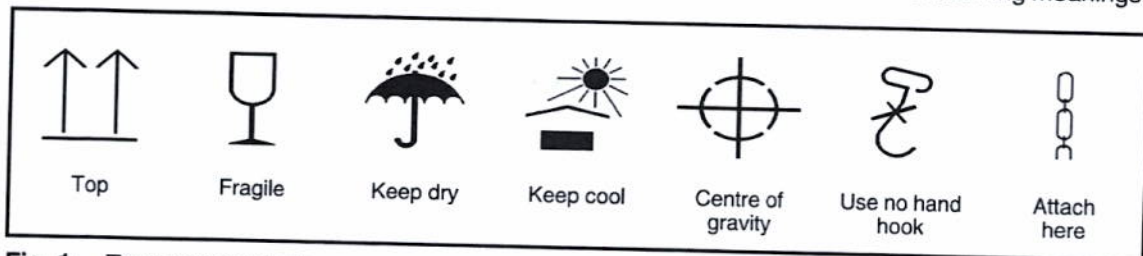


Fig. 1: Transport symbols

4.3 Storage of the coupling

4.3.1 Storage of the coupling parts

Unless otherwise expressly agreed, 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 (1/2).

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 dimensioned drawing should be made available to the user of the system.

5.1 General description

ZAPEX couplings types ZWN, ZWNA, ZWD, ZWDA, ZWNV, ZZS, ZZSA, ZZSD, ZZDA and ZZSV are designed for connecting two shafts. The shaft ends to be connected must be supported immediately upstream of and downstream of the coupling.

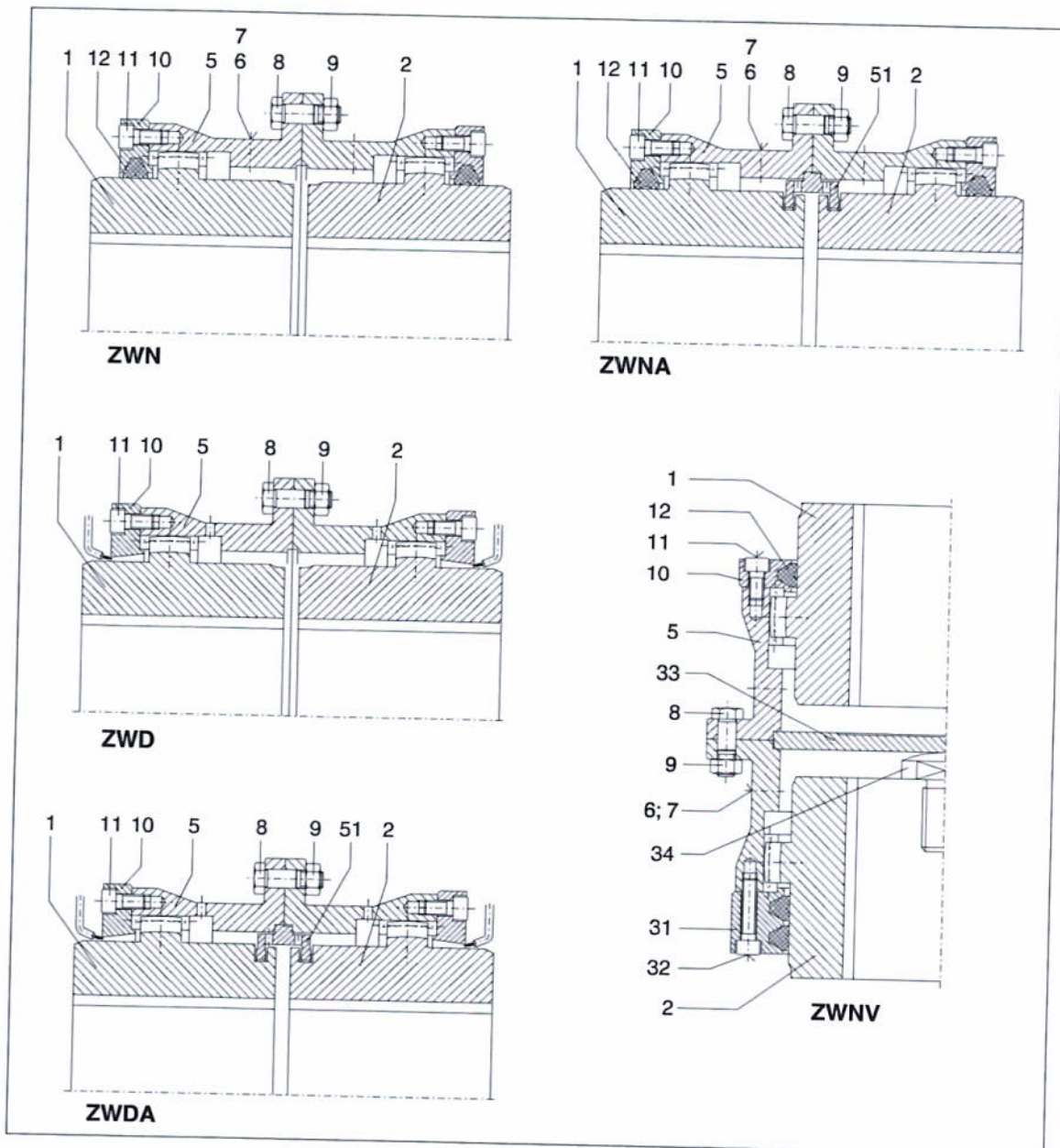
ZAPEX couplings are suitable for clockwise and anticlockwise rotation and reversing operation.

For types ZWN, ZWNA, ZWNV, ZZS, ZZSA and ZZSV DUO sealing rings (12) are used for sealing the oil/grease chambers on the outside.



Where overload moments are excessively high, the result may be breakage of the coupling or irreparable damage to the connected machine. The coupling then becomes an explosion hazard.

5.1.1 Types ZWN, ZWNA, ZWD, ZWDA and ZWNV



Torque transmission is effected from the shaft over parallel key, shrink fit or a comparable connection to the coupling part (1), then over the tooth system to the flanged sleeve (5) and then via the close-fitting bolt connection (8; 9) to the second flanged sleeve (5), over the tooth system to the coupling part (2) and then again via the parallel key, shrink fit or a comparable connection to the shaft.

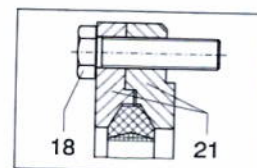
In case of types ZWNA and ZWDA the axial backlash is restricted by the two-part retaining ring (51).

Types ZWD and ZWDA are designed for flow lubrication and are thus not equipped with DUO sealing rings (12).

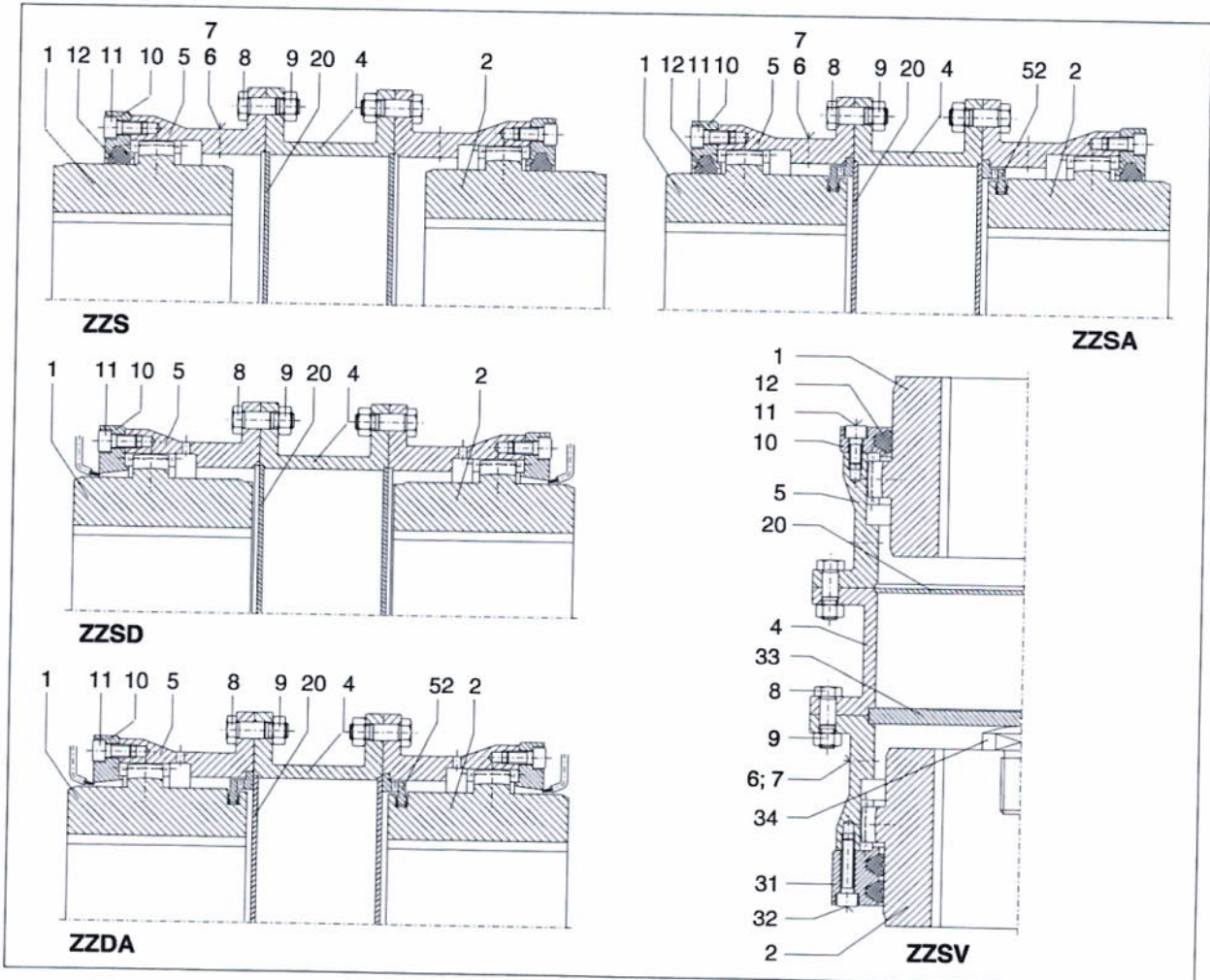
The type ZWNV is a vertical version. The covers (10+31) and flanged sleeves (5) are supported by means of the spacer washer (33) and thrust piece (34) on the shaft.

On types ZWN, ZWNA and ZWNV the cover (10) can, if required by the customer, also be designed as a two-piece split cover (21). The two-piece split cover (21) is fastened to the flanged sleeve (5) with the bolts (18).

The cover (31) to type ZWNV can also be designed as a multi-piece split cover.



5.1.2 Types ZZS, ZZSA, ZZSD, ZZDA and ZZSV



Torque is transmitted from the shaft through a parallel key, shrink fit or a comparable connection to the coupling part (1), then through the teeth to the flanged sleeve (5), then through the close-fitting bolt connection (8; 9), the adapter (4) and through another close-fitting bolt connection (8; 9) to the second flanged sleeve (5), through the teeth to the coupling part (2) and then again through a parallel key, shrink fit or a comparable connection to the shaft.

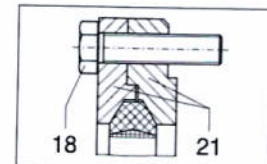
In case of types ZZSA and ZZDA the axial backlash is restricted by the two-part retaining rings (52).

Types ZZSD and ZZDA are designed for flow lubrication and are thus not equipped with DUO sealing rings (12).

The type ZZSV is a vertical version. The covers (10+31), flanged sleeves (5) and the adapter (4) are supported by means of the spacer washer (33) and the thrust piece (34) on the shaft.

On types ZZS, ZZSA and ZZSV the cover (10) can, if required by the customer, also be designed as a two-piece split cover (21). The two-piece split cover (21) is fastened to the flanged sleeve (5) with the bolts (18).

The cover (31) to type ZZSV can also be designed as a multi-piece split cover.



5.2 Marking the coupling parts for explosion protection



Couplings which are intended for use in potentially explosive areas must bear the following markings on the flanged sleeve (5):


Siemens AG

CE  II 2GD c 120 °C (T4)

D 46393 Bocholt

CE  I M2

FLENDER couplings ZAPEX <year built> - 20 °C ≤ T_a ≤ 80 °C

The second flanged sleeve (5) and the coupling parts (1/2) must bear the marking  stamped on.

The marking is in one or two lines.

If, in addition to the CE mark, the letters "UB" together with the Siemens order number are stamped on, the coupling part has been delivered by Siemens un- or prebored.



Siemens supplies unbored and prebored couplings with CE marking only under the condition that the customer assumes the responsibility and liability for correct refinishing in a declaration of exemption.

5.3 Service conditions

The coupling is suited for service conditions in accordance with Directive 94/9/EC:

- Equipment group II (use above ground) of categories 2 and 3 for areas where there are explosible gas, vapour, mist, air mixtures as well as for areas where dust can form explosible atmospheres.
- Equipment group I (underground applications) of the category M2



If they are to be used below ground in potentially explosive areas the couplings must only be used with drive motors, which can be switched off on occurring of an explosible atmosphere.

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 dimensioned drawing should be made available to the user of the system.

The necessary refinishing must be carried out in strict compliance with the following specifications and with particular care!



Responsibility for carrying out the refinishing is borne by the customer. Siemens will accept no guarantee claims arising from unsatisfactory refinishing!

6.1 Instructions for machining the finished bore, parallel keyway, axial retaining means, set screws and balancing

According to the order placed, the coupling parts (1/2) for removal by oil hydraulic shrinking are delivered with finished bores.

6.1.1 Finished bore for parallel key connection

Depreserve coupling parts (1/2).



Note manufacturer's instructions for handling solvent.

For making the finished bore, the coupling parts (1/2) must be clamped as shown in the following figure.



Never clamp on the sealing surface.

The coupling part must be aligned carefully. For the permissible radial and axial runout errors and the permissible cylindricity tolerances, see DIN ISO 286.

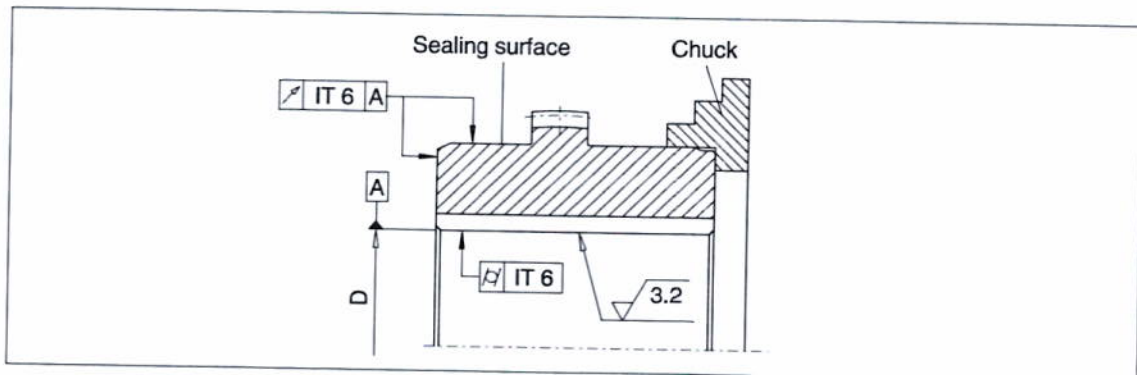


The maximum permissible boring diameters (see section 1, item 1.5) are designed for parallel key connections without tightening according to DIN 6885/1 and must not be exceeded in any case.

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

The finish-machined bores must be 100 % checked with suitable measuring equipment.

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



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

| | | | | | | |
|-----------------------------|----|----|----|----|----|----|
| Shaft end tolerances | h6 | k6 | m6 | n6 | p6 | s6 |
| Bore tolerances | P7 | M7 | K7 | J7 | H7 | F7 |

Table 6.1.1: Fit pairs



The assigned fits must be adhered to in each case. Failure to adhere to the fits may impair the shaft-hub connection.
If the tolerance values of the shafts deviate from those in table 6.1.1, Siemens must be consulted.



Failure to observe these instructions may result in breakage of the coupling.
Danger from flying fragments!
The coupling then becomes an explosion hazard.

6.1.2 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.

6.1.3 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.

If the clutch part mounted on the shaft does not lie up against the shaft shoulder, we recommend using spacer rings.

6.1.4 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!

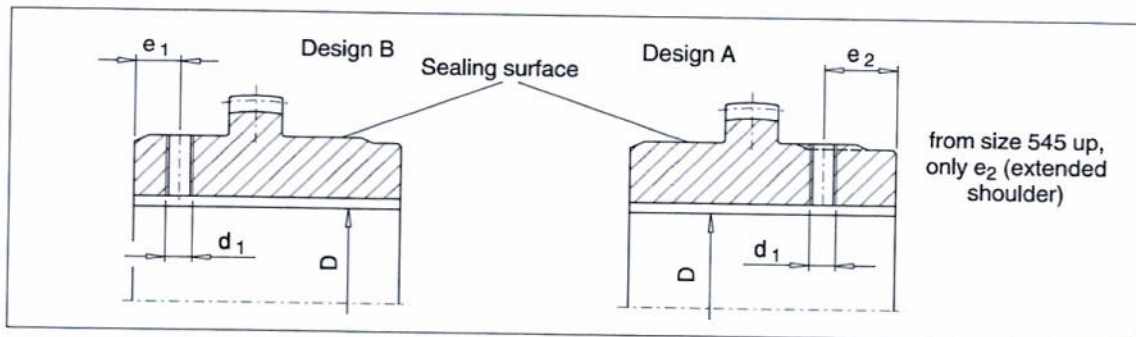


The length of the set screw must be selected so that it fills the threaded hole, but does not project from the hub ($L_{min.} = d_1$).



The set screws must be arranged on the parallel keys. Check the length of the parallel keys.

The threaded holes are to be arranged in accordance with the drawing considering the used configuration A or B for the coupling parts (1/2).
In case of size 112, the set screws must generally be arranged in the hub side which has not been ground.



| Size | Bore D | d_1 | Tightening torque T_A | Wrench width Hexagon socket wrench mm | e_1 | e_2 |
|------|-------------|-------|-------------------------|---|-------|-------|
| | mm | | | | | |
| 112 | 10 ... 17 | M 5 | 3 | 2.5 | 15 | - |
| | > 17 ... 45 | M 6 | 4 | 3 | | |
| 128 | 10 ... 17 | M 5 | 3 | 2.5 | 14 | 20 |
| | > 17 ... 30 | M 6 | 4 | 3 | | |
| | > 30 ... 55 | M 8 | 8 | 4 | | |

| Size | Bore D | d ₁ | Tightening torque T _A | Wrench width Hexagon socket wrench | e ₁ | e ₂ |
|------|---------------|----------------|----------------------------------|---------------------------------------|----------------|----------------|
| | mm | mm | Nm | mm | mm | mm |
| 146 | 10 ... 17 | M 5 | 3 | 2.5 | 16 | 26 |
| | > 17 ... 30 | M 6 | 4 | 3 | | |
| | > 30 ... 38 | M 8 | 8 | 4 | | |
| | > 38 ... 65 | M10 | 15 | 5 | | |
| 175 | 10 ... 17 | M 5 | 3 | 2.5 | 20 | 26 |
| | > 17 ... 22 | M 6 | 4 | 3 | | |
| | > 22 ... 30 | M 8 | 8 | 4 | | |
| | > 30 ... 80 | M10 | 15 | 5 | | |
| 198 | 10 ... 17 | M 5 | 3 | 2.5 | 22 | 36 |
| | > 17 ... 22 | M 6 | 4 | 3 | | |
| | > 22 ... 30 | M 8 | 8 | 4 | | |
| | > 30 ... 44 | M10 | 15 | 5 | | |
| | > 44 ... 95 | M12 | 25 | 6 | | |
| 230 | 10 ... 17 | M 5 | 3 | 2.5 | 25 | 38 |
| | > 17 ... 22 | M 6 | 4 | 3 | | |
| | > 22 ... 30 | M 8 | 8 | 4 | | |
| | > 30 ... 38 | M10 | 15 | 5 | | |
| | > 38 ... 58 | M12 | 25 | 6 | | |
| | > 58 ... 110 | M16 | 70 | 8 | | |
| | | | | | | |
| 255 | 10 ... 17 | M 5 | 3 | 2.5 | 30 | 45 |
| | > 17 ... 22 | M 6 | 4 | 3 | | |
| | > 22 ... 30 | M 8 | 8 | 4 | | |
| | > 30 ... 38 | M10 | 15 | 5 | | |
| | > 38 ... 50 | M12 | 25 | 6 | | |
| | > 50 ... 110 | M16 | 70 | 8 | | |
| | > 110 ... 125 | M20 | 130 | 10 | | |
| 290 | > 70 ... 75 | M16 | 70 | 8 | 30 | 48 |
| | > 75 ... 145 | M20 | 130 | 10 | | |
| 315 | 80 ... 160 | M20 | 130 | 10 | 40 | 55 |
| 342 | 90 ... 170 | M20 | 130 | 10 | 40 | 60 |
| | > 170 ... 180 | M24 | 230 | 12 | | |
| 375 | 100 ... 110 | M20 | 130 | 10 | 35 | 70 |
| | > 110 ... 200 | M24 | 230 | 12 | | |
| 415 | 120 ... 220 | M24 | 230 | 12 | 40 | 90 |
| 465 | 140 ... 250 | M24 | 230 | 12 | 40 | 110 |
| 505 | 160 ... 275 | M24 | 230 | 12 | 45 | 130 |
| 545 | 180 ... 300 | M24 | 230 | 12 | | 80 |
| 585 | 210 ... 330 | M24 | 230 | 12 | | 90 |
| 640 | 230 ... 360 | M24 | 230 | 12 | | 100 |
| 690 | 250 ... 390 | M24 | 230 | 12 | | 120 |
| 730 | 275 ... 415 | M24 | 230 | 12 | | 140 |
| 780 | 300 ... 450 | M24 | 230 | 12 | | 140 |
| 852 | 325 ... 490 | M24 | 230 | 12 | | 150 |
| 910 | 350 ... 520 | M24 | 230 | 12 | | 180 |
| 1020 | 375 ... 550 | M24 | 230 | 12 | | 180 |
| 1080 | 400 ... 600 | M24 | 230 | 12 | | 190 |
| 1150 | 425 ... 650 | M24 | 230 | 12 | | 200 |
| 1160 | 450 ... 690 | M24 | 230 | 12 | | 220 |

| Size | Bore D mm | d ₁ mm | Tightening torque T _A Nm | Wrench width Hexagon socket wrench mm | e ₁ mm | e ₂ mm |
|------|--------------|----------------------|--|---|----------------------|----------------------|
| 1240 | 475 ... 730 | M24 | 230 | 12 | | 215 |
| 1310 | 500 ... 780 | M24 | 230 | 12 | | 230 |
| 1380 | 525 ... 810 | M24 | 230 | 12 | | 250 |
| 1440 | 550 ... 860 | M24 | 230 | 12 | | 270 |
| 1540 | 575 ... 910 | M24 | 230 | 12 | | 250 |

Table 6.1.4: Set screw assignment, tightening torques and wrench widths of the set screws

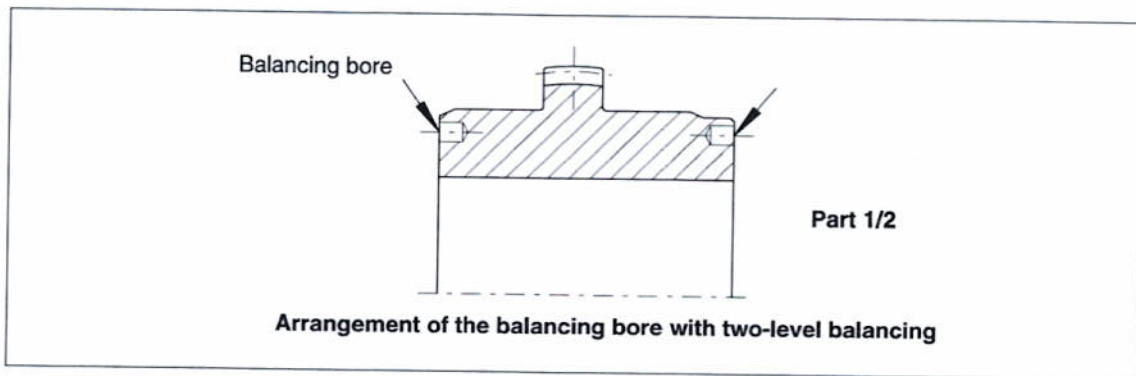
6.1.5 Balancing

Prebored coupling parts (1/2) are delivered unbalanced. It is recommended that these parts are balanced to suit the application after finish-boring (see DIN ISO 1940 and DIN 740/2).

Balancing is normally done by drilling material away.

If balancing is to be done after cutting the keyways, Siemens must be consulted.

Finished-bored couplings are only balanced if requested by the customer.



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 dimensioned drawing should be made available to the user of the system.



If lacquered couplings are used in potentially explosive areas, the requirements made of the conductivity of the lacquer and the limitation on the thickness of the lacquer applied must be observed in accordance with EN 13463-1. Where lacquer coatings have a thickness less than 200 µm, no electrostatic charge is to be expected.



The machines connected by the coupling must be earthed by a earth leakage resistance <math>< 10^6 \Omega</math>.

6.3 Mounting the coupling parts (1/2) in the case of shaft-hub connection with parallel key

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 cleansing agents.

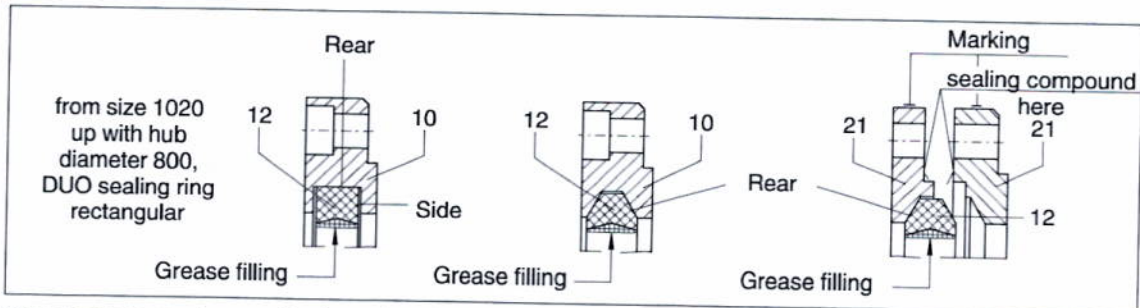


Note manufacturer's instructions for handling solvent and cleansing agent.

Grease the back and/or the sides of the DUO sealing ring (12) and the groove in the cover (10; 21; 31) thoroughly and fit it/them in the cover (10; 21; 31).

Insert a quantity of grease in the ring-shaped space between the seal lips.

In case of axially split covers (21), carefully smear both sides of the parting line of the two cover halves with sealing compound and join them. Doing so ensure that the through-holes are aligned and note the marks.



Check space requirement for inserting the bolts (11; 18; 32), and, if necessary, insert the bolts (11; 18; 32) in the cover (10; 21; 31).

Position the cover (10; 21; 31) with the fitted DUO sealing ring (12) on the shaft so that the DUO sealing ring (12) cannot be damaged by the coupling parts (1/2) to be fitted.



Note mounting position.



**Unscrew set screws from the coupling parts (1/2).
Protect DUO sealing rings (12) and seals for the input and output side against damage and heating to over + 80 °C.**



Coupling parts (1/2) with tapered bore and parallel key connection must be mounted in cold condition.

Slightly heating (max. + 80 °C) the coupling parts (1/2) 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.



Heated coupling parts form an explosion hazard, therefore a non-explosive environment must be ensured.



Take precautions to avoid burns from hot parts!



**The coupling parts (1/2) should be fitted with the aid of suitable equipment to avoid possible 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 (1/2) with a tapered bore must be secured with suitable end plates. For this, smear the hub end face on the shaft end face with sealing compound and screw on the end plate.

On coupling parts (1/2) with keyway and set screw the threaded hole for the set screw 2/3 must be filled with sealing compound after cooling down to room temperature to prevent lubricant from escaping through the parallel keyway. Screw in the set screw (set screw must be above the parallel key).



Tightening the set screws to a tightening torque in accordance with item 6.1.4.



**Failure to observe these instructions may result in breakage of the coupling.
Danger from flying fragments!
The coupling then becomes an explosion hazard.**

6.4

Mounting of coupling parts (1/2) in the case of a cylindrical and tapered interference fit set up for removal by oil-hydraulic shrinking



The information specified on the dimensioned drawing must be observed.

Before assembly, the screw plugs (22) must be unscrewed from the coupling parts (1/2) and all parts and the shaft ends carefully cleaned and dried. The oil channels and oil circulation grooves must also be free from dirt.



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



Note manufacturer's instructions for handling solvent and cleansing agent.

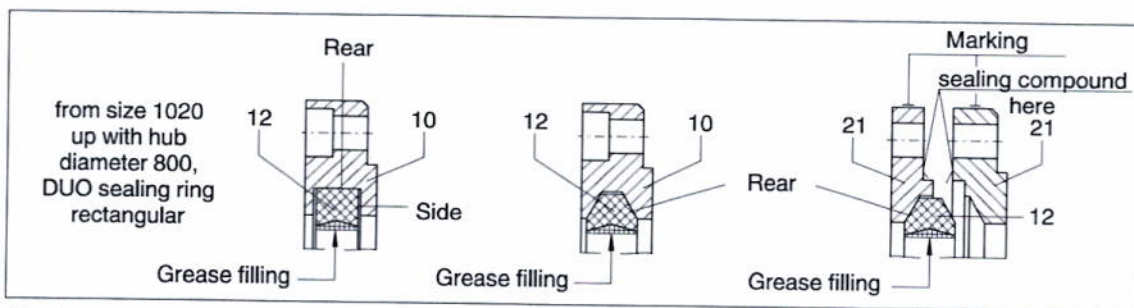


Under no circumstances must the fitting surfaces be lubricated with grease containing molybdenum sulphite (Molykote, etc.).

Grease the back and/or the sides of the DUO sealing ring (12) and the groove in the cover (10; 21; 31) thoroughly and fit it/them in the cover (10; 21; 31).

Insert a quantity of grease in the ring-shaped space between the seal lips.

In the case of axially split covers (21), carefully smear both sides of the parting line of the two cover halves with sealing compound and join them. Doing so ensure that the through-holes are aligned and note the marks.



Check space requirement for inserting the bolts (11; 18; 32), and, if necessary, insert the bolts (11; 18; 32) in the cover (10; 21; 31).

Position the cover (10; 21; 31) with the fitted DUO sealing ring (12) on the shaft so that the DUO sealing ring (12) cannot be damaged by the coupling parts (1/2) to be fitted.



Note mounting position.



**Protect DUO sealing rings (12) and seals for the input and output side against damage and heating to over + 80 °C.
(Use heat shields to protect against radiant heat).**

The coupling parts (1/2) must be mounted in hot condition and, depending on the shrink dimension, heated to the temperature indicated on the dimensioned drawing.

Heating may be done inductively, in a stove or with a burner.



Heated coupling parts form an explosion hazard, therefore a non-explosive environment must be ensured.



Take precautions to avoid burns from hot parts!

Before mounting, the bore size of the heated coupling parts (1/2) must be checked, e.g. with a bore hole gauge.



The heated coupling parts (1/2) should be fitted with the aid of suitable equipment to avoid possible damage to the shaft bearings through axial joining forces. Always use suitable lifting equipment. Care must be taken that the bore and the sealing surface for the DUO sealing ring (12) are not damaged by lifting gear, etc.

The couplings parts (1/2) should be pushed smartly onto the shaft up to the position specified in the dimensioned drawing.



The coupling parts (1/2) must be held in position on the shaft with the aid of a suitable retaining device, until they cool down and seat firmly.

After the coupling parts (1/2) have cooled down to ambient temperature the oil channels must be filled with clean forcing oil, e.g. ISO VG 150, and re-sealed with the screw plugs (22) (rust protection).



Failure to observe these instructions may result in breakage of the coupling. Danger from flying fragments! The coupling then becomes an explosion hazard.

6.5 Installation of the coupling

Oil the teeth of the coupling parts (1/2) and of the flanged sleeves (5) and the hub diameters of the coupling parts (1/2) (sealing surfaces).

Screw the thrust piece (34) into the lower machine shaft in case of types ZWNV and ZZSV.

Push the flanged sleeves (5) onto the teeth of the coupling parts (1/2) and hold and/or brace them in position.

In case of types ZWNA, ZWDA, ZZSA and ZZDA the axial backlash limitation (51/52) should be placed into the recess of the coupling parts (1/2) and the flanged sleeve (5) be pulled over the axial backlash limitation (51/52).

In case of types ZWNV and ZZSV the spacer washer (33) should be placed on the thrust piece (34) and into the flanged sleeve (5).

Move together and align the machines to be coupled (see item 6.6).

Smear the sealing surfaces of the flanged sleeves (5) and the adapter (4), if any, with sealing compound. Align the fitting holes of the flanges, noting any marks. Insert close-fitting bolts (8) and tighten the nuts (9) (for tightening torques, see item 6.10).

Smear the sealing surfaces of the covers (10; 21; 31) and flanged sleeves (5) with sealing compound.

Using suitable tools, pull the covers (10; 21; 31) onto the hub.

Bolt the covers (10; 21; 31) and flanged sleeves (5) together (for tightening torques, see item 6.10).

6.6 Alignment

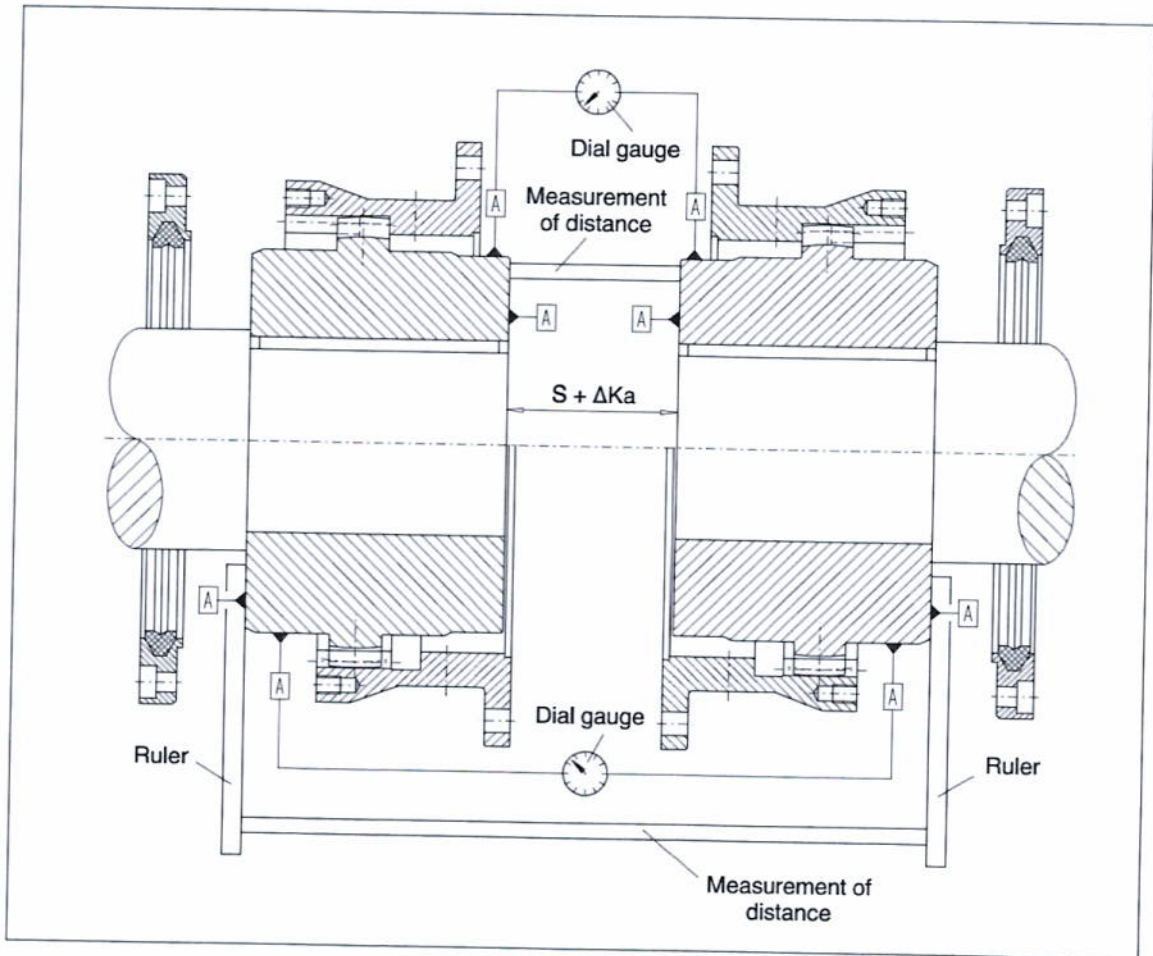
To obtain the longest possible service life for the coupling, we recommend alignment with 10 % of the offsets possible in operation specified in item 6.7. The recommended alignment values in numerical values are specified in item 6.8. Very precise alignment must not be aimed at, as this will impair the formation of the lubricant film in the coupling teeth.

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

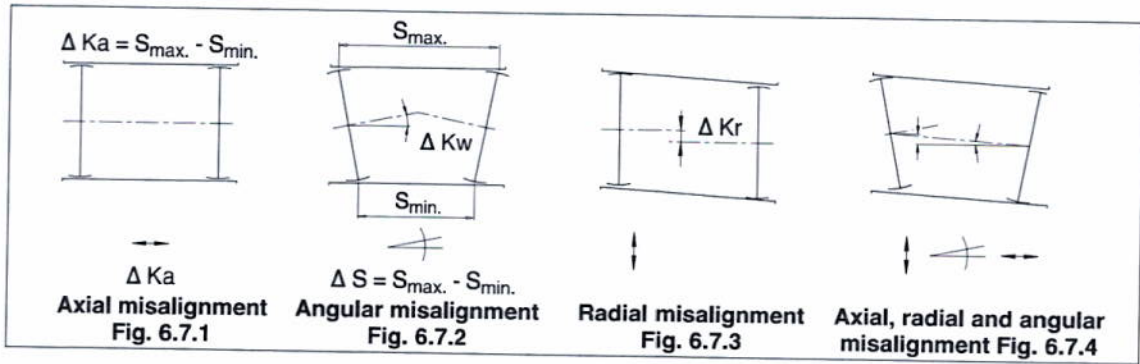


Siemens recommendation:

To prevent measuring errors caused by sagging of the clock gauge, it is recommended that the coupling be aligned using laser technology.



6.7 Possible misalignments



Misalignments of the machine shafts 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.

6.7.1 Axial misalignment

Axial misalignment ΔK_a (Fig. 6.7.1) of the coupling parts relative to one another is possible within the "permissible error" for dimension "S" (see item 6.9).

The permissible error for dimension "S" is specified as the maximum permissible increase in the hub distance of the coupling.

6.7.2 Angular misalignment

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

Due to the axial backlash limitation types ZWNA, ZWDA, ZZSA and ZZDA compensate for positional errors of up to a maximum angular misalignment of $\Delta K_w = 0.2^\circ$ in the shaft ends to be connected.

The angular misalignment ΔK_w (Fig. 6.7.2) can usefully be measured as the difference in the gap dimension "S" ($\Delta S = S_{\max} - S_{\min}$).

$$\begin{aligned} \text{ZWN, ZWD, ZZS, ZZSD, ZWNV, ZZSV:} & \quad \Delta S = S_{\max} - S_{\min} \leq d_3 \tan 1^\circ \approx d_3 / 60 \\ \text{ZWNA, ZWDA, ZZSA, ZZDA:} & \quad \Delta S = S_{\max} - S_{\min} \leq d_3 \tan 0.2^\circ \approx d_3 / 300 \end{aligned}$$

For the hub diameter d_3 (smallest hub diameter), see section 1, "Technical Data".

6.7.3 Radial misalignment

On types ZWN, ZWD, ZZS, ZZSD, ZWNV and ZZSV the max. possible radial misalignment $\Delta K_{r_{\max}}$ (Fig. 6.7.3) corresponds to an angular error per coupling half of $\Delta K_{w_{\max}} = 1^\circ$.

On types ZWNA, ZWDA, ZZSA, ZZDA the max. possible radial misalignment $\Delta K_{r_{\max}}$ (Fig. 6.7.3) corresponds to an angular error per coupling half of $\Delta K_{w_{\max}} = 0.2^\circ$.

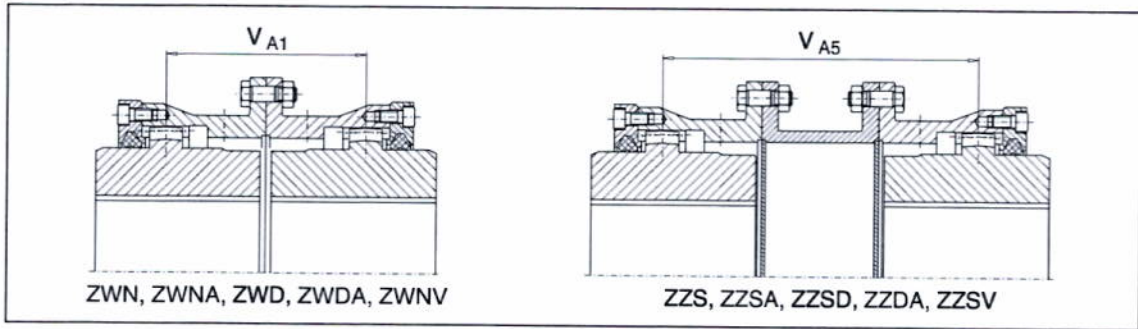
$$\begin{aligned} \text{ZWN, ZWD, ZZS, ZZSD, ZWNV, ZZSV:} & \quad \Delta K_r \leq V_A \times \tan 1^\circ \approx V_A / 60 \\ \text{ZWNA, ZWDA, ZZSA, ZZDA:} & \quad \Delta K_r \leq V_A \times \tan 0.2^\circ \approx V_A / 300 \end{aligned}$$



Angular and radial misalignment can occur simultaneously. The following condition must be adhered to:

$$\begin{aligned} \text{ZWN, ZWD, ZZS, ZZSD, ZWNV, ZZSV:} & \quad \arctan \left(\frac{\Delta K_r}{V_A} \right) + \Delta K_w \leq 1^\circ \\ \text{ZWNA, ZWDA, ZZSA, ZZDA:} & \quad \arctan \left(\frac{\Delta K_r}{V_A} \right) + \Delta K_w \leq 0.2^\circ \end{aligned}$$

6.8 Distance between teeth V_A and recommended alignment values for angular and radial misalignment



| Size | Distance between teeth | | Radial misalignment ΔKr at | | Angular misalignment ΔS mm |
|------|------------------------|----------------|------------------------------------|--|---------------------------------------|
| | V_{A1} mm | V_{A5} mm | V_{A1} mm | V_{A5} mm | |
| 112 | 56 | $V_{A1} + L_Z$ | 0.10 | $\Delta Kr = V_{A5} \times \tan 0.1^\circ$ | 0.11 |
| 128 | 73 | | 0.12 | | 0.14 |
| 146 | 88 | | 0.15 | | 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 | | |
| 1020 | 693 | 1.21 | 1.30 | | |
| 1080 | 726 | 1.27 | 1.40 | | |
| 1150 | 758 | 1.32 | 1.50 | | |
| 1160 | 810 | 1.41 | 1.50 | | |
| 1240 | 830 | 1.45 | 1.62 | | |
| 1310 | 875 | 1.53 | 1.62 | | |
| 1380 | 915 | 1.60 | 1.72 | | |
| 1440 | 965 | 1.68 | 1.84 | | |
| 1540 | 975 | 1.70 | 1.95 | | |

Table 6.8: Distance between teeth, recommended alignment values for angular and radial misalignment



Due to the limited axial backlash, in the case of types ZWNA, ZWDA, ZZSA and ZZDA the alignment values must be cut by half.

6.9 Distance dimensions "S"

| Size | S ₁ mm | S ₂ mm | S ₃ mm | perm. misalign- ment S ₁ , S ₂ , S ₃ mm | S ₈ mm | S ₉ mm | perm. misalign- ment S ₈ , S ₉ mm | S ₁₁ mm | S ₁₂ mm | perm. misalign- ment S ₁₁ , S ₁₂ mm | S ₁₃ mm |
|------|----------------------|----------------------|----------------------|--|----------------------|----------------------|---|-----------------------|-----------------------|---|-----------------------|
| 112 | 6 | - | - | + 1 | 3 | 3 | + 0.5 | - | - | + 0.5 | - |
| 128 | | 13 | 20 | | 10 | 3 | | 6.5 | 26 | | 16 |
| 146 | | 13 | 20 | | 10 | 3 | | 6.0 | 28 | | 18 |
| 175 | 8 | 14 | 20 | + 1 | 10 | 4 | + 0.5 | 5.5 | 33 | + 0.5 | 23 |
| 198 | | 19 | 30 | | 15 | 4 | | 10 | 40 | | 25 |
| 230 | | 20 | 32 | | 16 | 4 | | 11 | 32 | | 16 |
| 255 | 10 | 25 | 40 | + 1.5 | 20 | 5 | + 0.8 | 14 | 40 | + 0.8 | 20 |
| 290 | | 30 | 50 | | 25 | 5 | | 19 | 50 | | 25 |
| 315 | | 30 | 50 | | 25 | 5 | | 18 | 50 | | 25 |
| 342 | 12 | 42 | 72 | + 1.5 | 36 | 6 | + 0.8 | 29 | 72 | + 0.8 | 36 |
| 375 | | 42 | 72 | | 36 | 6 | | 29 | 72 | | 36 |
| 415 | | 74 | 136 | | 68 | 6 | | 60 | 136 | | 68 |
| 465 | 16 | 96 | 176 | + 2 | 88 | 8 | + 1 | 80 | 176 | + 1 | 88 |
| 505 | | 106 | 196 | | 98 | 8 | | 89 | 196 | | 98 |
| 545 | | 126 | 236 | | 118 | 8 | | | | | |
| 585 | 20 | 150 | 280 | + 2 | 140 | 10 | + 1 | | | | |
| 640 | | 149 | 278 | | 139 | 10 | | | | | |
| 690 | | 166 | 312 | | 156 | 10 | | | | | |
| 730 | | 180 | 340 | | 170 | 10 | | | | | |
| 780 | 25 | 176 | 327 | + 3 | 163 | 12.5 | + 1.5 | | | | |
| 852 | | 185 | 345 | | 172 | 12.5 | | | | | |
| 910 | | 215 | 405 | | 202 | 12.5 | | | | | |
| 1020 | | 213 | 401 | | 200 | 12.5 | | | | | |
| 1080 | 30 | 226 | 422 | + 3 | 211 | 15 | + 1.5 | | | | |
| 1150 | | 238 | 446 | | 223 | 15 | | | | | |
| 1160 | | 260 | 490 | | 245 | 15 | | | | | |
| 1240 | | 250 | 470 | | 235 | 15 | | | | | |
| 1310 | 35 | 265 | 495 | + 4 | 247 | 17.5 | + 2 | | | | |
| 1380 | | 275 | 515 | | 257 | 17.5 | | | | | |
| 1440 | | 295 | 555 | | 277 | 17.5 | | | | | |
| 1540 | | 275 | 515 | | 257 | 17.5 | | | | | |

Table 6.9: Distance dimensions "S" for types ZWN, ZWNA, ZWDA (S₁, S₂, S₃), for types ZZS, ZZSA, ZZD, ZZDA (S₈, S₉) and for types ZWNV, ZZSV (S₈, S₁₁, S₁₂, S₁₃)



On types ZWNA, ZWDA (S₁, S₂, S₃) and on types ZZSA, ZZDA (S₈, S₉) errors in the "S" dimensions of up to ± 0.1 mm are permissible.

6.10 Assignment of the tightening torques and wrench widths

| Size | Tightening torques T_A for bolts of the strength class 8.8 to DIN ISO 898 Part 1 (with $\mu = 0.14$) | | Wrench width S_w | | | | |
|------|--|------------------------|-----------------------------------|-----------------------|-----------------------|-----------------------------------|-----------------------|
| | Part no. 9 | Part no. 11; 18; 32 | Part no. 6 | Part no. 9 | Part no. 18 | Part no. 11, 32 | |
| | Nm | Nm | Hexagon socket wrench mm | Hexagon head mm | Hexagon head mm | Hexagon socket wrench mm | Hexagon head mm |
| 112 | 25 | 10 | 3 | 13 | 10 | 5 | |
| 128 | 25 | 10 | 3 | 13 | 10 | 5 | |
| 146 | 25 | 10 | 5 | 13 | 10 | 5 | |
| 175 | 49 | 25 | 5 | 17 | 13 | 6 | |
| 198 | 49 | 25 | 6 | 17 | 13 | 6 | |
| 230 | 49 | 25 | 6 | 17 | 13 | 6 | |
| 255 | 86 | 25 | 8 | 19 | 13 | 6 | |
| 290 | 86 | 49 | 8 | 19 | 17 | 8 | |
| 315 | 210 | 49 | 8 | 24 | 17 | 8 | |
| 342 | 210 | 49 | 8 | 24 | 17 | 8 | |
| 375 | 210 | 49 | 10 | 24 | 17 | 8 | |
| 415 | 410 | 86 | 10 | 30 | 19 | 10 | |
| 465 | 410 | 86 | 10 | 30 | 19 | 10 | |
| 505 | 410 | 86 | 10 | 30 | 19 | 10 | |
| 545 | 710 | 86 | 10 | 36 | 19 | 10 | |
| 585 | 710 | 86 | 10 | 36 | 19 | 10 | |
| 640 | 1450 | 210 | 10 | 46 | 24 | 14 | |
| 690 | 1450 | 210 | 10 | 46 | 24 | 14 | |
| 730 | 1450 | 210 | 12 | 46 | 24 | 14 | |
| 780 | 2530 | 210 | 12 | 55 | 24 | 14 | |
| 852 | 2530 | 210 | 12 | 55 | 30 | 14 | |
| 910 | 2530 | 410 | 12 | 55 | 30 | 17 | |
| 1020 | 4070 | 410 | 12 | 65 | 30 | 17 | 30 |
| 1080 | 4070 | 410 | 17 | 65 | 30 | | 30 |
| 1150 | 4070 | 410 | 17 | 65 | 30 | | 30 |
| 1160 | 4070 | 410 | 17 | 65 | 30 | | 30 |
| 1240 | 6140 | 710 | 17 | 75 | 36 | | 36 |
| 1310 | 6140 | 710 | 17 | 75 | 36 | | 36 |
| 1380 | 6140 | 710 | 17 | 75 | 36 | | 36 |
| 1440 | 6140 | 710 | 17 | 75 | 36 | | 36 |
| 1540 | 7350 | 1450 | 17 | 80 | 46 | | 46 |

Table 6.10: 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.



The tightening torques and wrench widths of the set screws are specified in item 6.1.4.

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 dimensioned drawing should be made available to the user of the system.

7.1 Recommended lubricants

The following recommended lubricants apply to the ZAPEX couplings described in these operating instructions:

| Lubricant |  |  |  |  | FLENDER |
|--------------------------|---|---|--|---|------------------------------|
| Mineral oils | Degol BG 680 Plus | Energol GR-XF 680 | Tribol 1100 / 680 Optigear BM 680 | SPARTAN EP 680 ¹⁾ | |
| | Degol BG 460 Plus | Energol GR-XF 460 | Tribol 1100 / 460 Optigear BM 460 | SPARTAN EP 460 ¹⁾ | |
| Liquefied greases | Aralub Fließfett AN 0 | Energrease LS-EP 00 | Tribol 3020/1000-00 Longtime PD 00 | | FLENDER Hochleistungsfett |

| Lubricant |  |  | Mobil |  | |
|--------------------------|---|---|------------------------------------|---|--|
| Mineral oils | Renolin CLP 680 PLUS | STRUCTOVIS BHD-MF | Mobilgear 636 Mobilgear XMP 680 | Shell Omala 680 Shell Omala F 680 | |
| | Renolin CLP 460 PLUS | | Mobilgear 634 Mobilgear XMP 460 | Shell Omala 460 Shell Omala F 460 | |
| Liquefied greases | RENOLIT SO-D 6024 | GRAFLOSCON C-SG 500 Plus | Mobilux EP 004 | Alvania GL 00 | |

¹⁾ ESSO guarantees the qualities required by Siemens only for products from Europe

For normal operating conditions we recommend the filling with oil which can be changed easily.

The specified mineral oils are suitable for operating temperatures of between - 10 °C and + 80 °C.

In case of conditions of use in ambient temperatures exceeding + 30 °C oils with viscosity VG 680 should be used.

All liquefied greases and the mineral oil "Castrol Tribol 1100" are suitable for use in ambient temperatures from - 20 °C to + 80 °C.



Observe manufacturer's instructions for handling oils/greases!

7.2 Oil quantity/grease quantity



If the oil quantity or grease quantity is not in accordance with the specified quantity, the coupling may become an explosion hazard.

| Size | Oil filling quantity ¹⁾ | | Size | Oil filling quantity ¹⁾ | | Size | Oil filling quantity ¹⁾ | |
|------|------------------------------------|------------------------------|------|------------------------------------|------------------------------|------|------------------------------------|------------------------------|
| | ZWN, ZWNA dm ³ | ZZS, ZZSA dm ³ | | ZWN, ZWNA dm ³ | ZZS, ZZSA dm ³ | | ZWN, ZWNA dm ³ | ZZS, ZZSA dm ³ |
| 112 | 0.04 | 0.02 | 415 | 1.7 | 0.9 | 1020 | 13.5 | 6.8 |
| 128 | 0.05 | 0.03 | 465 | 2.7 | 1.4 | 1080 | 14.5 | 7.3 |
| 146 | 0.1 | 0.05 | 505 | 3 | 1.5 | 1150 | 16 | 8 |
| 175 | 0.2 | 0.1 | 545 | 3.5 | 1.8 | 1160 | 18.5 | 9.3 |
| 198 | 0.2 | 0.1 | 585 | 4.5 | 2.3 | 1240 | 23 | 11.5 |
| 230 | 0.3 | 0.15 | 640 | 5 | 2.5 | 1310 | 24.5 | 12.3 |
| 255 | 0.3 | 0.15 | 690 | 7 | 3.5 | 1380 | 34 | 17 |
| 290 | 0.55 | 0.3 | 730 | 7.5 | 3.8 | 1440 | 40 | 20 |
| 315 | 0.8 | 0.4 | 780 | 8.5 | 4.3 | 1540 | 44 | 22 |
| 342 | 0.9 | 0.5 | 852 | 9 | 4.5 | | | |
| 375 | 1.1 | 0.6 | 910 | 10.5 | 5.3 | | | |

Table 7.2: Oil quantities

¹⁾ In case of types ZZS and ZZSA the oil quantities are valid for one coupling side.

If liquefied grease is used, 1.3 times the quantity of the specified oil quantity must be specified.



For the oil quantities / grease quantities for types ZWNV and ZZSV, refer to the dimensioned drawings.



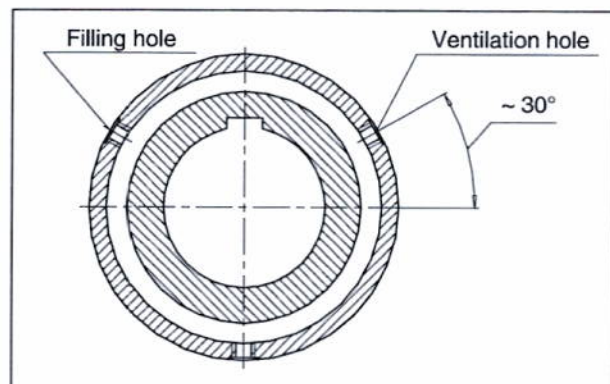
For the oil flow quantities for types ZWD, ZWDA, ZZSD, and ZZDA, refer to the dimensioned drawings.

For easier filling, proceed as follows:

Rotate coupling until the screw plugs (6) are in the position shown in the diagram opposite.

Remove the two top screw plugs (6) and put in oil/grease. Measure the correct oil/grease quantity with the measuring beaker.

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



Any oil/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 assembly, alignment and oil or grease filling, any errors remedied and all screw connections checked for correct tightening torques.



Then fit the coupling guard to prevent unintentional contact.



If they are to be used below ground in potentially explosive areas the couplings must only be used with drive motors, which can be switched off on occurring of an explosible atmosphere.

8. Operation

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

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 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"!

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 coupling must be carried out only by the Siemens Customer Service.

In the 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 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 misalignments. | Take the installation out of service. If necessary, re-align as described in section 6. |
| | Insufficient lubricant. | Take the installation out of service. 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. Directive 94/9/EC requires the manufacturer and user to exercise especial care.



**Failure to observe these instructions may result in breakage of the coupling.
Danger from flying fragments!
Through incorrect use the coupling may become an explosion hazard.**



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 and designing 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 not permissible. For this observe section 1, "Technical data".
- Finished bore with impermissible diameter (see section 1, "Technical data") and/or impermissible fit assignment (see section 6, "Fitting").
- Machining of keyways of which the width across corners is greater than the width across corners of keyways to DIN 6885/1 with a maximum permissible bore.
- The transmission capacity of the shaft-hub connection is not appropriate to the operating conditions.

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, ZAPEX DUO sealing rings (12) are being excessively heated.
- The shaft diameter is beyond the specified tolerance range.
- Coupling parts are being interchanged, i.e. their assignment to the specified shaft is incorrect.
- The design of the coupling parts is not observed and the coupling parts are thus placed incorrectly.
- Specified axial fastenings are not fitted.
- Prescribed tightening torques are not being adhered to.
- Alignment and/or shaft-misalignment values do not match the 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.
- Sealing surfaces are being painted.
- The oil/grease has not been correctly put in (see section 7, "Start-up").
- The back clearance of the parallel key has not been filled with sealing compound (when inserting the set screw no sealing compound has been put into the threaded hole).
- The coupling protection used is not suitable for operation within the meaning of the explosion-protection requirements and/or in accordance with Directive 94/9/EC.
- 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.
- Leakage in the vicinity of the coupling is not being identified and as a result chemically aggressive media are damaging the coupling.

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 dimensioned drawing should be made available to the user of the system.



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 and heating, and any change in the noise level, 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 or grease change

During the regular inspections the coupling must be checked for leaks.



If the oil quantity or grease quantity is not in accordance with the specified quantity, the coupling may become an explosion hazard.

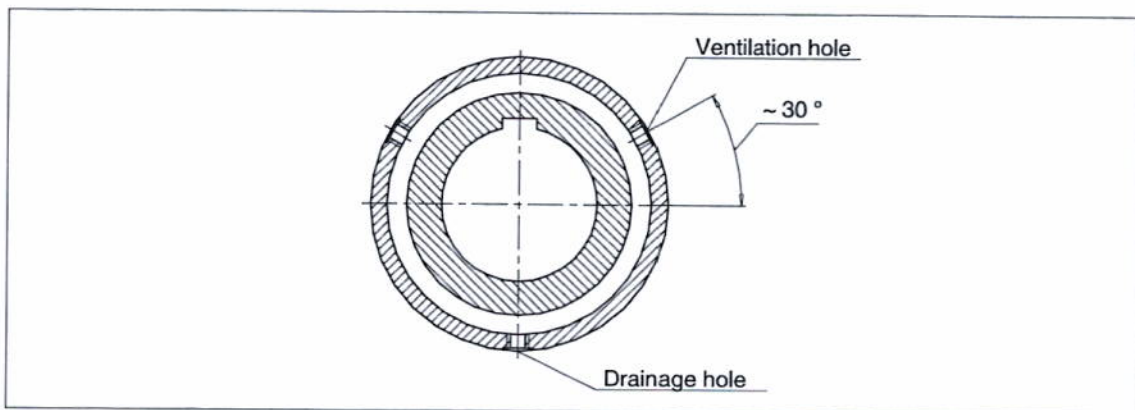
Lubricant change approx. every 8000 operating hours or at latest every 2 years in case of operation at up to 70 °C; in case of operation at over 70 °C approx. every 3000 operating hours or at the latest at yearly intervals.

When changing lubricant of the same type, the quantity of lubricant remaining in the coupling should be kept as low as possible. Generally speaking, a small residual quantity will cause no particular problems. Lubricants of different types and manufacturers must not be mixed together. If necessary, confirmation that the new lubricant is compatible with residues of the old lubricant should be obtained from the manufacturer.

Unscrew screw plugs (6) and drain off the oil or grease into a suitable container, as shown in the diagram. In the case of grease, to facilitate the process, add low-viscosity oil to the used grease and mix. Observe compatibility of the oil with the grease!



All the oil/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 Replacement of DUO sealing rings

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

The DUO sealing rings (12) can, if the dimensions d_g and P are adhered to (see section 1, "Technical data") without having to detach the coupling, be replaced with open-ended (cut) DUO sealing rings (12).

For this, undo the cover screw connection (11; 18; 32) and push the cover (10; 21; 31) away off the hub until the DUO sealing ring (12) can be removed.

Clean the sealing compound off the cover (10; 21; 31) and flanged sleeve (5).



Note manufacturer's instructions for handling solvent.

Cut the new DUO sealing ring (12) radially at one point. Before inserting the DUO sealing ring (12) grease the groove in the cover (10; 21; 31) and the DUO sealing ring (12) thoroughly from all sides.

DUO sealing rings (12) with trapezium-shaped back section can be fitted without adhesive. For this, place the cut ends together in the groove and then, working from the cut ends, insert the DUO sealing ring (12) on both sides.

DUO sealing rings (12) with rectangular back section (from size 1020 up with hub diameter 800) must be placed on the shaft after cutting and the cut ends glued so that they exactly match together. Adhesive e.g. LOCTITE 401.



Observe manufacturer's instructions for handling adhesive.

Then place the cut section into the groove and, working outwards from there, insert the DUO sealing ring (12) from both sides.

In the case of split covers (21), carefully smear the parting line of the two cover halves with sealing compound. Join the cover halves together on the hub over the DUO sealing ring (12), ensuring that the through-holes are aligned and noting the marks.



Observe manufacturer's instructions for handling sealing compound!



Note marks.

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

Smear the sealing surfaces of the covers (10; 21; 31) and flanged sleeves (5) with sealing compound and bolt them together (for tightening torques, see section 6, item 6.10).

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.

Undo the close-fitting bolt connection (8; 9) and the screw connection of the cover (11; 18; 32). Pull off the covers (10; 21; 31) and support them over the shafts.

Move the coupled machines apart. Remove the adapter (4), the axial backlash-limiting device (51; 52), the flanged sleeves (5) and the spacer washer (33). Unscrew the thrust piece (34).



Always use suitable lifting equipment!



Danger of squeezing!

Examine the teeth, the sealings (12) and the sealing surfaces for damage and protect against rust. Damaged parts must be replaced.

10.5 Demounting the coupling parts (1/2) in case of shaft-hub connection with parallel key

Remove set screw and/or axial retaining means. Mount suitable detaching device. Using a burner, heat coupling parts (1/2) along its length and above the parallel keyway (max. + 80 °C).



Heated coupling parts form an explosion hazard, therefore a non-explosive environment must be ensured.



Take precautions to avoid burns from hot parts!



Protect DUO sealing rings (12) and seals for the input and output side against damage and heating to over + 80 °C.



**Pull off coupling parts (1/2) 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.

For re-fitting, the instructions in section 6, "Assembly", and section 7, "Start-up", must be carefully observed.

10.6 Demounting of coupling parts (1/2) in case of cylindrical and taper interference fit set up for hydraulic shrinking

For demounting the following tools are needed:

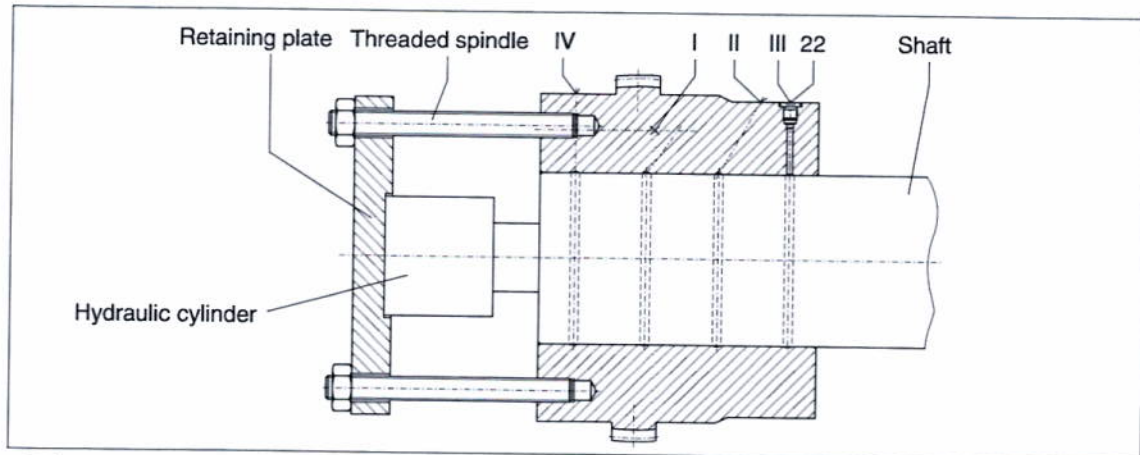
- for each oil channel (for number, see the dimensioned drawing) an oil pump with pressure gauge (min. 2500 bar) and/or motor pump with corresponding number of independently closable connections
- suitable connections and pipes
- 1 detaching device or retaining plate with retaining screws or threaded spindles with nuts (material of screws and spindles min. 10.9, material of nuts identical to that of the screws).
- 1 hydraulic cylinder with oil pump. Note displacement and pressure of the hydraulic cylinder (for axial force, consult Siemens and/or refer to dimensioned drawing).



Observe manufacturer's instructions for using forcing-off/detaching device and pumps.

Before detaching the coupling hub the detaching device must be mounted as shown in diagrams, illustrations, etc.

10.6.1 Dismounting the coupling parts (1/2) in case of cylindrical interference fit



STOP Secure coupling part (1/2) and detaching device, using suitable equipment!

The screw plugs (22) must be removed from the oil channels. An oil pump must be bled and connected up to the middle oil channel (here oil channel I).

Then the pump must be operated at the pressure specified on the dimensioned drawing until oil emerges from the adjacent connections (oil channels IV and II).

STOP The max. pressure specified on the dimensioned drawing must not be exceeded.

STOP During the entire operation the pressure must be maintained at a constant level on all the oil channels to which pressure is applied.

Bleed the next oil pump, connect it up to oil channel II and operate it at the pressure specified on the dimensioned drawing until the oil emerges at oil channel III.

Bleed the next oil pump, connect it up to oil channel IV and operate it at the pressure specified on the dimensioned drawing until a ring of oil emerges at the end face.

Bleed the next oil pump, connect it up to oil channel III and operate it at the pressure specified on the dimensioned drawing until a ring of oil emerges at the end face.

STOP Always note the order!

If, when pressure is applied, oil emerges to the extent that pressure cannot be maintained, a thicker oil must be specified.

Only when an unbroken ring of oil emerges from both end faces and after a subsequent waiting period of approx. 30 minutes can pressure be applied to the hydraulic cylinder to slide the coupling hub smartly off the shaft.

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

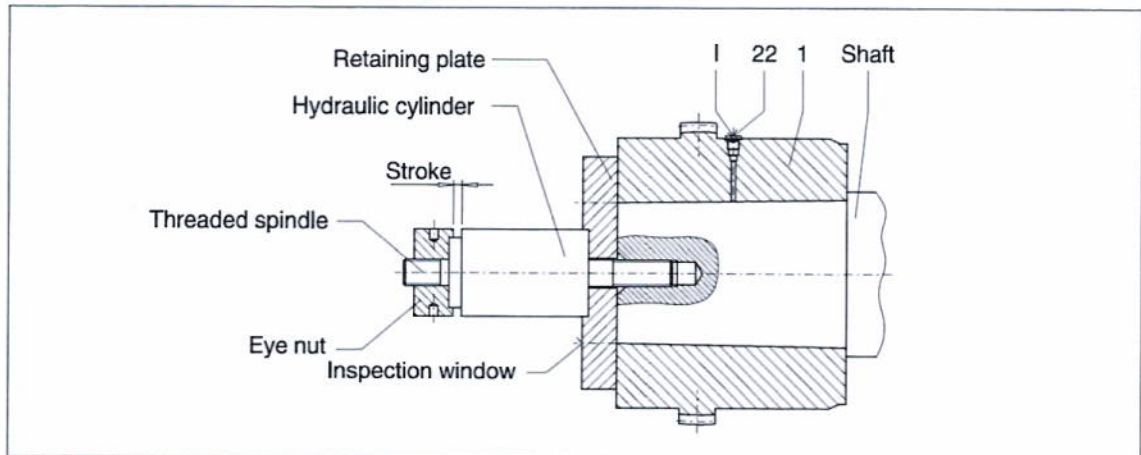
STOP Note stroke of hydraulic cylinder. If re-adjustment is necessary, the end face of the hydraulic cylinder must stop between 2 oil channels.

After detaching, the oil pumps and detaching device must be removed from the coupling part (1/2).

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

For re-fitting, the instructions in section 6, "Assembly", and section 7, "Start-up", must be carefully observed.

10.6.2 Demounting the coupling parts (1/2) in case of tapered interference fit



Secure coupling part (1/2) and detaching device, using suitable equipment! To prevent the coupling part (1/2) suddenly coming off, it must be secured axially as shown in the diagram.

The screw plugs (22) must be removed from the oil channels.

Sufficient pressure must be applied to the hydraulic cylinder for it to generate at least the axial force specified on the dimensioned drawing.

The oil pump must be bled, connected up to oil channel I and operated at the pressure indicated on the dimensioned drawing until a ring of oil emerges at the end face and/or from the adjacent connection.



The max. pressure specified on the dimensioned drawing must not be exceeded.

If, when pressure is applied, oil emerges to the extent that pressure cannot be maintained, a thicker oil must be specified.

The pressure must be maintained until a ring of oil emerges at both end faces. This must be monitored through the inspection window at the side of the detaching device.



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

The hydraulic cylinder must then be bled. The coupling part (1/2) slides off the shaft until there is no adhesion between the coupling part (1/2) and the shaft.

Detach the oil pump and detaching device. Remove coupling part (1/2).

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

For re-fitting, the instructions in section 6, "Assembly", and section 7, "Start-up", must be carefully observed.

10.7 Demounting the coupling parts (1/2) with stepped bore for removal by oil-hydraulic shrinking

Demounting is done as described in item 10.6, except that a motor-driven pump is connected up to the oil channel located at the point of transition from the smaller bore to the larger, as a large quantity of oil per unit of time is needed here.

For re-fitting, the instructions in section 6, "Assembly", and section 7, "Start-up", must be carefully observed.

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:

- Original order number
- Part number (see item 11.1, 11.2 and section 5.)
- 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

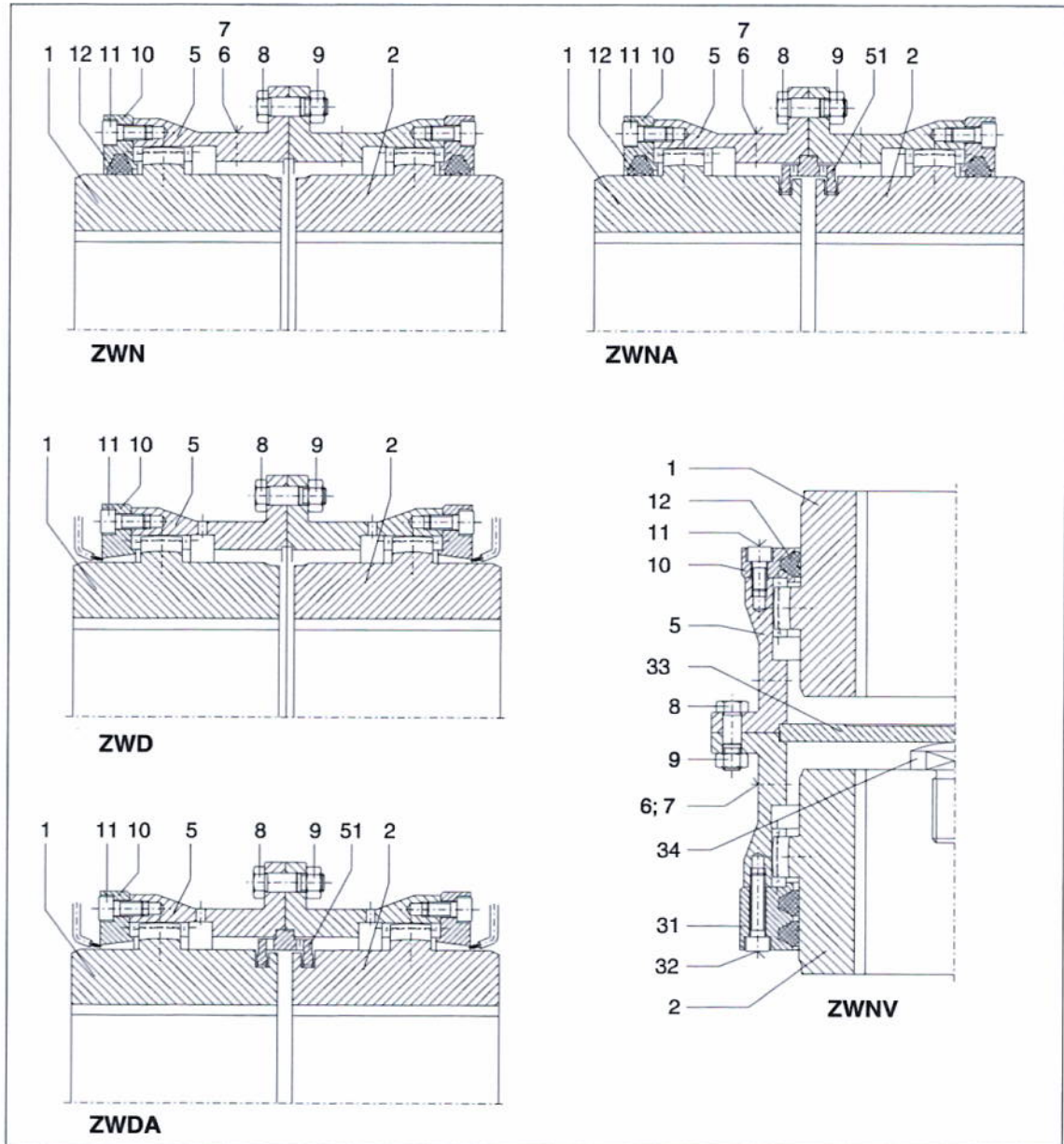
| Spare parts | | | | | | | | | | | |
|-------------|-------------------------------------|-----|------|------|-----|------|-----|------|------|------|------|
| Part number | Designation | ZWN | ZWNA | ZWNV | ZWD | ZWDA | ZZS | ZZSA | ZZSD | ZZSV | ZZDA |
| 1 | Part 1/2 | x | x | x | x | x | x | x | x | x | x |
| 2 | Part 1/2 | x | x | x | x | x | x | x | x | x | x |
| 4 | Adapter | | | | | | 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 | x | |
| 7 | Sealing ring ¹⁾ | x | x | x | | | x | x | x | x | |
| 8 | Close-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 | 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-piece split cover ³⁾ | | | | | | | | | | |
| 22 | Screw plug ⁴⁾ | | | | | | | | | | |
| 31 | Cover | | | x | | | | | | x | |
| 32 | Bolt | | | x | | | | | | x | |
| 33 | Spacer washer | | | x | | | | | | x | |
| 34 | Thrust piece | | | x | | | | | | x | |
| 50 | Sealing compound | x | x | x | x | x | x | x | x | x | x |
| 51 | Split retaining ring | | x | | | x | | | | | |
| 52 | Split retaining ring | | | | | | | x | | | x |

Table 11.1: Spare-parts list

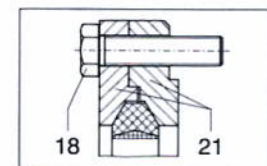
- 1) The sealing ring (7) is provided only on sizes 112 and 128. On the other sizes the sealing ring is integrated into the screw plug (6).
- 2) The plate pulley (20) is flanged into the adapter (4). For replacement, only the adapter (4) complete with the plate pulleys (20) can be ordered.
In case of adapter lengths $L_Z \leq 200$ the adapter (4) is designed without plate pulleys (20).
- 3) The two-piece split cover (21) is supplied only on request. It is fastened to the flanged sleeve (5) with the bolts (18).
- 4) The screw plugs (22) are used only with an hydraulic interference fit (see section 10, item 10.6.1 and 10.6.2).

11.2 Spare parts drawings

11.2.1 Types ZWN, ZWNA, ZWD, ZWDA and ZWNV

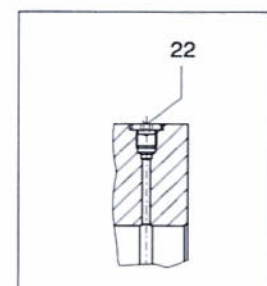


On types ZWN, ZWNA and ZWNV the cover (10) can, if required by the customer, also be designed as a two-piece split cover (21). The two-piece split cover (21) is fastened to the flanged sleeve (5) with the bolts (18).

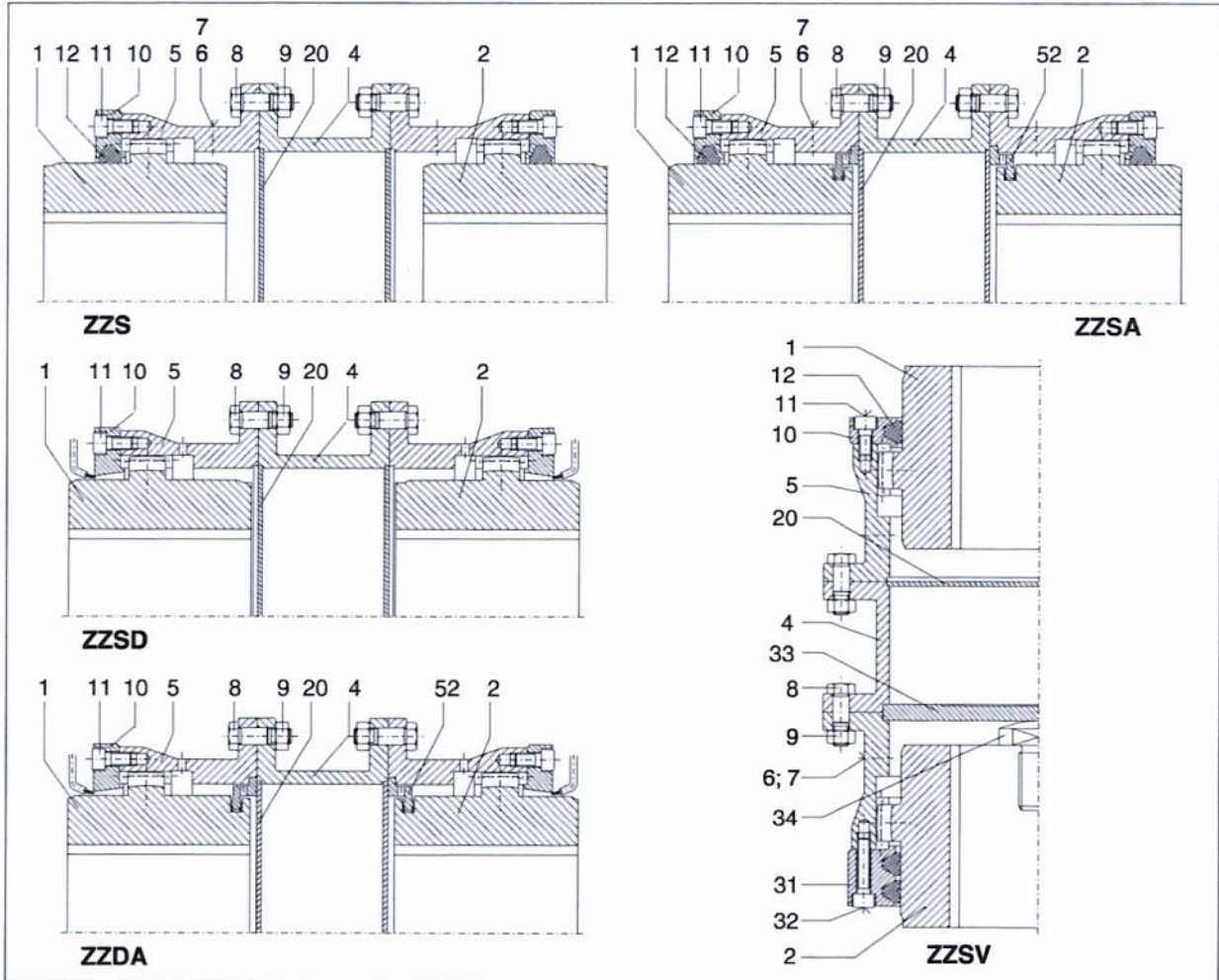


The cover (31) to type ZWNV can also be designed as a multi-piece split cover.

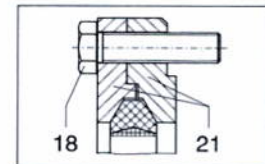
The screw plugs (22) are used only with an hydraulic interference fit (see section 10, items 10.6.1 and 10.6.2).



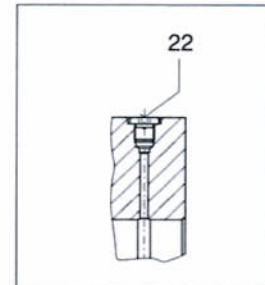
11.2.2 Types ZZS, ZZSA, ZZSD, ZZDA and ZZSV



On types ZZS, ZZSA and ZZSV the cover (10) can, if required by the customer, also be designed as a two-piece split cover (21). The two-piece split cover (21) is fastened to the flanged sleeve (5) with the bolts (18).



The cover (31) to type ZZSV can also be designed as a multi-piece split cover.



The screw plugs (22) are used only with an hydraulic interference fit (see section 10, items 10.6.1 and 10.6.2).

11.3 Spare parts and customer-service addresses

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

12. Declarations

12.1 Declaration of conformity



Declaration of conformity

within the meaning of EC Directive 94/9/EC of 23.03.1994 and the legal requirements laid down for its implementation

The manufacturer, Siemens AG, D - 46393 Bocholt, declares that the equipment described in these assembly and operating instructions:

**ZAPEX®
couplings
ZWN, ZWNA, ZWD, ZWDA,
ZZS, ZZSA, ZZSD, ZZDA,
ZWNV and ZZSV**


is in conformity with Article 1 and Article 8, Paragraph 1 b) ii) of Directive 94/9/EC and complies with the requirements of Directive 94/9/EC and the following standards:

DIN EN 1127-1 : 02-2008
DIN EN 60079-0 : 05-2007

The technical documentation has been delivered to the body named below:

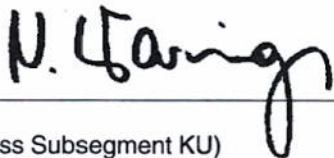
DEKRA EXAM GmbH, D - 44727 Bochum, code number: 0158.

Bocholt, 2010-11-25



Andre Jansen
(Director KUE Engineering)

Bocholt, 2010-11-25



Nicola Warning
(Director Business Subsegment KU)

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GERMANY

Subject to modifications

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12

SUMITOMO CYCLO DRIVE

GETRIEBE

GEAR UNIT

REDUCTOR

ENGRANAJE

РЕДУКТОР

Einbauerklärung

Sumitomo Drive Technologies
Sumitomo (SHI) Drive Germany GmbH
Cyclostraße 92
D-85229 Markt Indersdorf

erklärt in alleiniger Verantwortung, dass die grundlegenden Anforderungen der Richtlinie 2006/42/EG an unvollständige Maschinen für die nachstehenden Produkte eingehalten werden.

Getriebe
DRIVE # 6000
PARAMAX PX 9000

Die Getriebe und Getriebemotoren sind ausschließlich für den Einbau in eine Maschine bestimmt.

Die speziellen technischen Unterlagen wurden erstellt und sie werden von der bevollmächtigten Person den zuständigen Behörden auf begründetes Verlangen bereitgestellt.

Folgende harmonisierte Normen (oder Teile dieser Normen) wurden berücksichtigt:
DIN EN ISO 12100-1 : 2003
DIN EN ISO 12100-2 : 2003
DIN EN ISO 14121-1 : 2007

Diese Produkte dürfen erst dann in Betrieb genommen werden, wenn gegebenenfalls festgestellt wurde, dass die Maschine, in die die Produkte eingebaut werden sollen, den Bestimmungen der anwendbaren Richtlinie entspricht.

Markt Indersdorf, den 14.06.2010


i.V. Dr. J. Hopfner, Konstruktionsleitung *

*) Bevollmächtigter zur Zusammenstellung der technischen Unterlagen

Cyclo Drive 6000

**Getriebe und Getriebemotoren
Gearboxes and Gear Motors**

**Betriebsanleitung
Operating Manual**

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Reproduction, in whole or in part, is only permitted with the express permission of Sumitomo (SHI) Cyclo Drive Germany GmbH (here in after referred to as SCG).

The information in these installation and operating instructions have been checked very carefully for accuracy. However, we can assume no liability for incorrect or incomplete information.

We reserve the right to make technical changes.

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1. General Notes

Please make sure that you heed the safety notes in this documentation.



Electrical hazards

Using the machine incorrectly may lead to bodily injury, serious injuries and/or life-threatening situations.



Hazard

Using the machine incorrectly may lead to bodily injury, serious injuries and/or life-threatening situations.



Dangerous situation

Slight injury may result.



Harmful situation

Damage to the drive or the environment could be caused.



Helpful information



Disposal

Please obey the regulations in force.



Important information on ATEX explosion protection

Spare parts

Only use original spare parts. Any guarantee lapses should unauthorised spare parts be used.

2. Safety notes



Before working on the machine (assembling, operating, maintaining, inspecting etc.), please read these operating instructions through carefully so that you know exactly how to operate the gearbox properly, you know the safety regulations to be applied and the warnings to be heeded. Keep these instructions near by the machine so that you can refer to them at any time if necessary.



Transport, installation, lubrication, operation, maintenance and inspections should only be carried out by properly trained technicians, otherwise injury or damage to the machine may result. Keep hands and all foreign objects away from the internal moving parts of the unit, otherwise injury or damage to the machine may occur.



The gearbox unit must be put out of action and disconnected from the power supply for maintenance and assembly work.

The unit must only be used for the intended purpose, otherwise there is the risk of injury or damage to the machine.

2.1. Safety instructions for use in an ATEX area



Explosive gas mixtures or dust concentrations combined with hot, live and moving parts on the gears may cause serious or fatal injuries.

Installing, connecting, commissioning and maintaining and repairing the gearbox and additional electrical equipment must only be carried out by a qualified professional, taking account of

- these instructions
- the warning and instruction plates on the gearbox
- any other development documents and connection diagrams relating to the drive
- the plant-specific conditions and requirements
- the national and regional standards and regulations in force (explosion protection, safety, accident protection).

The gears are designed for industrial plants and must only be used in accordance with the information in the technical documentation from SCG and the data on the model plate. They comply with the standards and regulations in force and meet the requirements of Directive 94/9EG.

A drive motor connected to the gearbox must only be started up after ensuring that the measures set out in 6.3 - 8.1 have been carried out before installation.

A motor connected to the gearbox may only be operated on the frequency inverter if the information on the gearbox rating plate is obeyed.

3. Notes on transport



The consignment must be checked immediately after receipt for any transport damage. The carrier must be notified of this immediately. If it must be assumed that transport damage will restrict proper operation then the unit must not be started up.



Only prescribed slings of the correct size that can be hooked into the existing eyebolts or can be put round the flange connections must be used. The screwed in eyebolts are only designed for the weight of the drive. No additional loads must be suspended.



As a general rule: Do not use the centring holes on the shaft ends to lift the gearbox by the eyebolts etc. The bearings may be damaged.

4. Fitting transmission parts



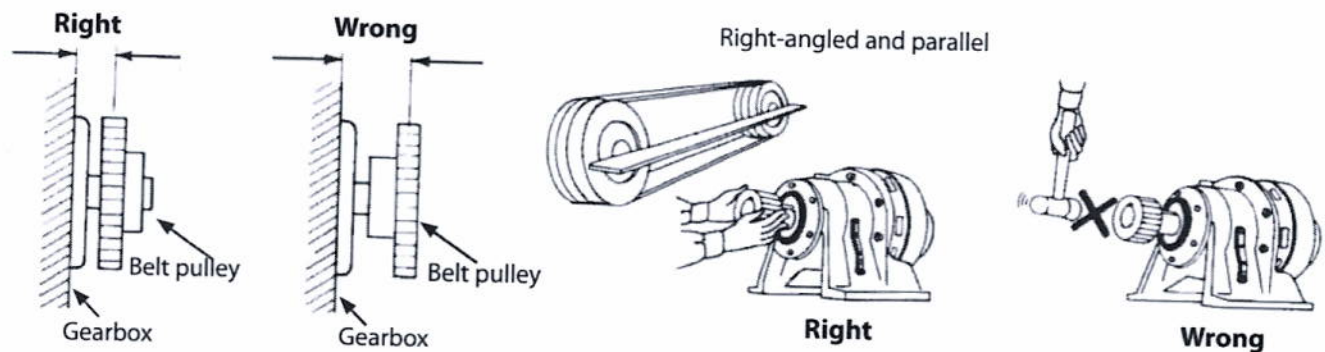
It is fitted using the centring holes on the shaft ends or by heating the parts to be fitted to a maximum of 100°C. The shafts are fitted with a groove for feather keys in accordance with DIN 6885, Sheet 1. The holes in parts that are fitted onto the gear shaft must be made with the tolerances recommended in the relevant product catalogue. An adjusting screw or similar must be fitted to prevent axial shifting. In order to keep the radial loads low, sprocket wheels, discs or gear wheels must be placed as close as possible to the bearing (see picture below). If the torque is transferred by pinions, chains etc., the drive must be installed in such a way that the gearbox housing is pushed onto the base-plate. With gearboxes with a hollow drive shaft, MoS2 paste or spray (e.g. molycote) must be applied to the motor shaft before the counter part is fitted.



Drive parts, such as belt pulleys, couplings etc. must be covered with a guard.



Any add-on parts must not obstruct the discharge of heat by convection and conduction of heat



Couplings, discs, gear wheels, chains etc. that are fitted to the gear shafts must not be pressed down or struck to avoid damage to the bearings.

5. Installing the gearbox/ gear motor

5.1 Tools required



- Spanner set
- Torque wrench for fixing screws to feet/ flange housing, motor lamp, terminal couplings etc.
- Mounting device
- Compensating tools
- Corrosion protection (e.g. Mos2 paste)

5.2 Installation tolerances on the gearbox/ gear motor



| | Shafts | | Flanges | |
|---|------------------------|------------------------|------------------------------|-----------------------------------|
| | Drive shafts | k6 for $\varnothing <$ | 30 mm | Spigot tolerance as per DIN 42948 |
| | h6 for $\varnothing >$ | 30 mm | IEC flange on the drive side | H8 |
| Drive shafts | k6 for $\varnothing <$ | 50 mm | Flange on the output side | j6 up to size 612 |
| | h6 for $\varnothing >$ | 50 mm | | f8 from size 613 |
| Hollow shaft in the drive | F7 | | Housing for F type | g6 |
| Centring holes as per DIN 332, DR shape | | | | |

5.3 Checks before starting installation



- Data on the model plate must agree with the existing documentation such as drawings, parts lists, etc.
- The power data of any existing motor must match that of the mains power supply.
- The drive must not be damaged in any way.
- The lubricants provided must be suitable and if necessary prepared for the environmental conditions.

5.4 Preparatory tasks



The anti-corrosive agent (Valvoline Tectyl 846/K19) used for transportation and storage on the shaft-ends or hollow shafts and on the central seats must be removed before start up. The corrosion protection can be removed with an alkaline cleaner. Never use mechanical aids (abrasives etc.). The alkaline solvent must not come into contact with gaskets.



When using lubricants, solvents and corrosion protection products, the protection guidelines for people and the environment as set out in the corresponding DIN 52 900 safety data sheets must be heeded.



Make sure that when fitting the gearbox there is no explosive atmosphere, oils, acids, gases, vapours or radiation. Check whether the ambient temperature is within the range of application in accordance with Section 5.7. Ensure that there is enough ventilation to the gear and there is no external heat source (e. g. from couplings). The cooling air must not exceed a temperature of 40°C.

Check that the configuration matches the configuration specified on the gear's model plate.

Please note: The design may only be changed after prior consultation with SCG, otherwise the ATEX approval will lapse.

Please check that all drive parts to be installed are ATEX approved.

With gears with adapters, make sure that the data given on the gear's model plate is not exceeded

With mains operated motors:

Check that the data given on the gear and motor model plates matches the environmental conditions of the installation location.



5.5. Check list for ATEX approved gears before commissioning

You must check whether the following data on the gear model plate agrees with the permissible explosive area on site:



- Equipment group
- Ex category
- Ex zone
- Temperature class
- Maximum surface temperature

| | |
|---|--------|
| Sumitomo Drive Technologies | |
| Sumitomo (SHI) Cyclo Drive Germany GmbH | |
| TYPE | CE |
| i | S.F1 |
| P ₁ | kW |
| n ₁ | 1/min |
| SERIAL NO: | |
| ○ XXXXXXXXXX ○ | 211527 |

ATEX ID

ATEX classification

5.6 Tests before commissioning in Ex area



- Does the data on the gear box's rating plate correspond to the permissible explosive area on site?
- Is the drive undamaged? (Check for any transport or storage damage).
- Is there an explosive atmosphere (oils, acids, gases, vapours, radiation, etc.)?
- Does the design correspond to the information on the model plate? Attention: If the design has not been changed by SCG, the ATEX approval will lapse.
- Is an unrestricted supply of cooling air guaranteed? Is any hot exhaust air being drawn in from other equipment? The cooling air must not exceed a temperature of 40 °C.
- Are all drive parts ATEX-approved?

If possible, the gear box is to be started without load. If it runs quietly and without any odd noises, the gearbox is attached to the driven machine.

Measure the surface temperature after about 3 hours. Maximum permissible difference from ambient temperature: 55 K. At a value of >55 K stop the drive immediately and contact SCG.



With frequency inverter operated gear motors:
Check that the gear motor can be operated by a frequency inverter. The frequency inverter's parameters must be set to prevent overloading of the gear box (see gear box model plate).

5.7 Installation



The drive must be installed so that it is easily accessible for any top up lubrication.
The fixing bolts must only be tightened firmly after a perfectly level, rigid, vibration-reducing base for the whole installation area has been carefully made and after the drive has been aligned.



After approximately 4 weeks all fixing screws must be checked again to ensure they are tightened to the correct torque.

If the drive is loaded up to the maximum output drive torque or the max. shear force, not only must the feet be fixed with screws of strength category 8.8 but also additional positive locking connections (e.g. cylindrical pins DIN 6325) must be provided.



Drives that are installed in the open air or under very unfavourable environmental conditions, e.g. dirt, dust, splash water or heat, must be protected by a cover. If this is done the open air feed on the housing surface must not be adversely affected. Oil check and drain screws as well as breathing filters must be freely accessible.

If there is the risk of electrochemical corrosion between the gearbox and the driven machine (combination of different metals, such as cast iron/ stainless steel) use plastic intermediate layers (2 - 3 mm thick). Also fit screws with plastic washers. Also earth the housing. Use earthing screws on the motor.

A corrosion-inhibiting version of the drive is available for use in moisture-prone areas or in the open air. Any paint damage that occurs (e.g. on the bleed valve) must be touched up.

If the drive is painted or partially re-painted you must ensure that the bleed valve and the shaft seal rings are masked carefully. After you have finished painting the adhesive strips must be removed.



Conditions for installing in an ATEX area

Ambient temperature: $-10^{\circ} \dots +40^{\circ} \text{C}$
Maximum self-heating at nominal rating: 60 K
Installation height $\leq 1000 \text{ m}$
Maximum drive speed: 1500 min^{-1}
Short term maximum load: 200 % of the rated load torque
500 % shock overload is not permitted.

6. Electrical installation

6.1 Safety notes



Installation, connection and commissioning work as well as maintenance and repairs must only be carried out by qualified experts.

Before any work starts on the motor or the gear motor but particularly before covers are taken off active parts, the motor must be disconnected as prescribed.

The 5 safety rules as set out in DIN VDE 0105 must be obeyed.

These electric motors comply with the standards and regulations in force and meet the requirements of the Low Voltage Directive 73/23/EWG.



The installation is subject to all regulations in force and must be done by qualified personnel.

6.2 Area of application



The motors are completely sealed and air-cooled. Standard protection type: IP 55 with IP 44 brake.

Ambient temperature: -10°C to $+40^{\circ}\text{C}$

Installation height: $< 1000 \text{ m}$

The coil is designed to be in insulation class F (150°C). If operated properly the temperatures on the motor surface may reach more than 100°C . Do not touch. Temperature-sensitive parts must not be fixed on or rest against it.

6.3 Installing the motor

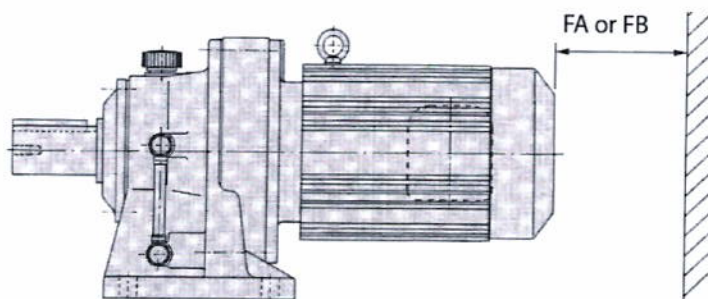


When connecting motors via brackets or an IEC flange, a suitable IP65 seal must be provided. The customer is responsible for fitting this seal.



The ventilation openings in the fan hood must not be blocked.

For sufficient cooling, the distance between the hood and the wall must not fall below the FB measurement. FA is the minimum distance required to remove the fan hood.



| Standard motor | | | | | | | | | | |
|----------------|-------|----|-----|-----|----------|-----------|------|------|------|-----|
| Motor size | 63-71 | 80 | 90 | 100 | 112-132S | 132M-160M | 160L | 180M | 180L | 220 |
| FB (mm) | 20 | 20 | 20 | 20 | 20 | 25 | 30 | 30 | 30 | 30 |
| FA (mm) | 48 | 49 | 52 | 56 | 60 | 75 | 130 | 155 | 170 | 230 |
| Brake motor | | | | | | | | | | |
| Motor size | 63-71 | 80 | 90 | 100 | 112-132S | 132M-160M | 160L | 180M | 180L | 220 |
| FB (mm) | 20 | 20 | 20 | 20 | 25 | 25 | 30 | 30 | 30 | 30 |
| FA (mm) | 61 | 93 | 115 | 121 | 132 | 170 | 220 | 367 | 370 | 445 |

6.4 Cable glands



Motors can be fitted with the following cable entry points:

| Frame | Conduit thread | Frame | Conduit thread |
|----------|-----------------------------|---------|----------------|
| 63-71 | 1 x M16 x 1,5 1 x M25 x 1,5 | 180 | 2 x M 40 x 1,5 |
| 80-132S | 2 x M25 x 1,5 | 200-225 | 2 x M50 x 1,5 |
| 132M-160 | 2 x M32 x 1,5 | 250 | 2 x M63 x 1,5 |

Cable glands must comply at least with the motor protection class specified on the model plate.

Unused cable glands must be closed depending on the type of motor protection. Existing plugs must be tightened firmly.

6.5 Electrical connection



Please refer to the rating plate and these operating instructions as well as the current catalogue for technical data and information on the permissible operating conditions. You will find information on special versions on your order confirmation. If anything is unclear, we urgently recommend you to contact the factory or your sales centre giving the model description and the serial number.

| | | | |
|---|---------|------------------|----------------|
| Sumitomo (SHI) Cyclo Drive Germany GmbH | | CE | |
| 3 PHASE INDUCTION MOTOR | | | |
| TYPE | P | kW | S1 CONT |
| Hz | | | |
| V | Δ | Y | Y |
| A | | | |
| 1/min | | | |
| cos | | | |
| IP | AMB °C | IEC/EN 60034 | MG1-12 SF 1,15 |
| INS CLASS | EFF 2 | NEMA nom. eff. % | DESIGN CODE |
| Brake | VAC | A | Nm IP |
| SN-Nr. | FACTORY | | |

Motor 0.12 - 4.0 kW

| | | | |
|---|---------|------------------|----------------|
| Sumitomo (SHI) Cyclo Drive Germany GmbH | | CE | |
| 3 PHASE INDUCTION MOTOR | | | |
| TYPE | P | kW | S1 CONT |
| Hz | | | |
| V | Δ | Δ | Δ |
| A | | | |
| 1/min | | | |
| cos | | | |
| IP | AMB °C | IEC/EN 60034 | MG1-12 SF 1,15 |
| INS CLASS | EFF | NEMA nom. eff. % | DESIGN CODE |
| Brake | VAC | A | Nm IP |
| SN-Nr. | FACTORY | | |

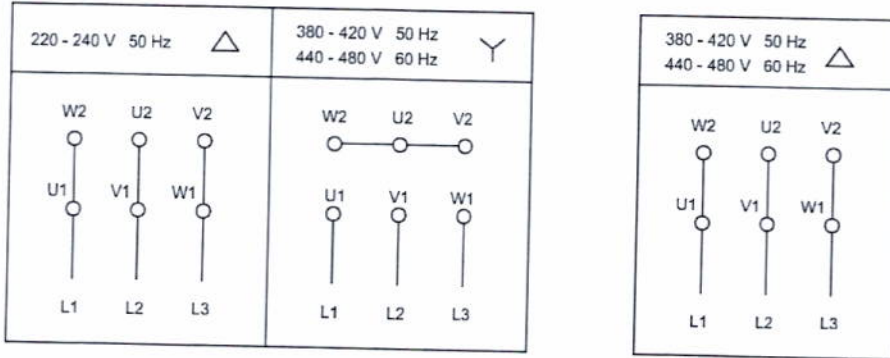
Motor 5.5 - 55 kW

Connect the protective earthing conductor to this terminal.





A circuit diagram is located in the terminal box. The motors can be connected to the terminal board depending on the connection voltage as follows:



The rated voltage range as set out in EN 60 034-1 applies to the specified voltages with a $\pm 5\%$ voltage or $\pm 2\%$ frequency deviation.

The following tightening torques apply to the threaded bolts on the terminal board:

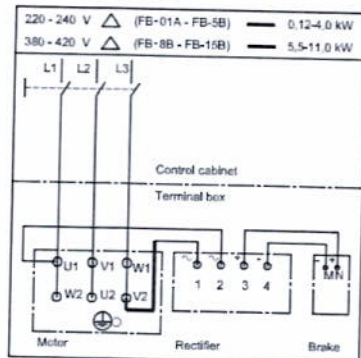
| Screw thread: | Permissible tightening torque in Nm |
|---------------|-------------------------------------|
| M4 | 1.2 |
| M5 | 2.5 |
| M6 | 4.0 |
| M8 | 7.5 |

6.6 Brake motors

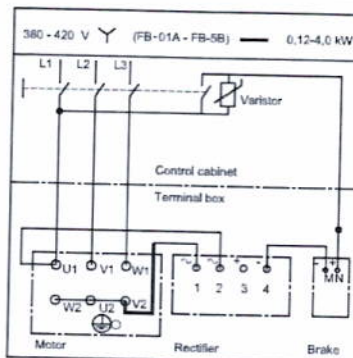
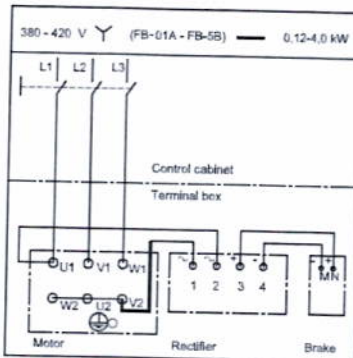
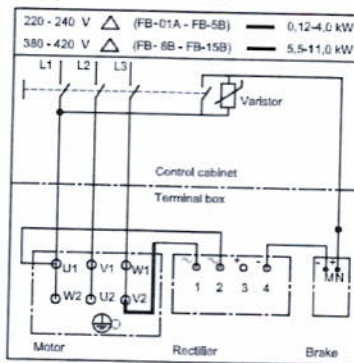
The brake motors are connected in accordance with the following circuit diagrams:



Standard brake



Rapid action brake



The brake control voltage is noted on the rating plate.

If the stop position of the application is not reached on starting up, this may not have anything to do with the brake torque.

If only the alternating current is switched off, the braking times as set out in the table below apply.

| P1 [kWxP] | Type | Brake torque [Nm] | Optional max. torque [Nm] | Brake reaction time | | Brake motor inertia [10 ⁻⁴ kg m ²] | Brake energy [10 ³ J] | Brake power | |
|--------------|--------|-------------------------|---------------------------------|---------------------|---------------|---|-------------------------------------|----------------|----------------|
| | | | | standard [sec] | fast [sec] | | | 230 V 50 Hz | 400 V 50 Hz |
| 0.12 x 4 | FB-01A | 1.0 | 1.3 | 0.15 - 0.2 | 0.015 - 0.02 | 3.50 | 120 | 0,1 | 0,04 |
| 0.18 x 4 | FB-02A | 2.0 | 2.7 | 0.15 - 0.2 | 0.015 - 0.02 | 5.50 | 120 | 0,1 | 0,05 |
| 0.25 x 4 | FB-02A | 2.0 | 2.7 | 0.15 - 0.2 | 0.015 - 0.02 | 5.50 | 120 | 0,1 | 0,05 |
| 0.37 x 4 | FB-05A | 4.0 | 5.4 | 0.1 - 0.15 | 0.01 - 0.015 | 6.75 | 120 | 0,1 | 0,05 |
| 0.55 x 4 | FB-1D | 7.5 | 10 | 0.2 - 0.3 | 0.01 - 0.02 | 11.1 | 330 | 0,1 | 0,1 |
| 0.75 x 4 | FB-1D | 7.5 | 10 | 0.2 - 0.3 | 0.01 - 0.02 | 13.0 | 330 | 0,1 | 0,1 |
| 1.1 x 4 | FB-2D | 15 | 20 | 0.2 - 0.3 | 0.01 - 0.02 | 20.8 | 380 | 0,3 | 0,1 |
| 1.5 x 4 | FB-2D | 15 | 20 | 0.2 - 0.3 | 0.01 - 0.02 | 23.5 | 380 | 0,3 | 0,1 |
| 2.2 x 4 | FB-3D | 22 | 30 | 0.3 - 0.4 | 0.01 - 0.02 | 37.3 | 450 | 0,3 | 0,1 |
| 3.0 x 4 | FB-5B | 37 | 50 | 0.4 - 0.5 | 0.01 - 0.02 | 81 | 2350 | 0,6 | 0,3 |
| 4.0 x 4 | FB-5B | 37 | 50 | 0.4 - 0.5 | 0.01 - 0.02 | 96 | 2350 | 0,6 | 0,3 |
| 5.5 x 4 | FB-8B | 55 | 74 | 0.3 - 0.4 | 0.01 - 0.02 | 125 | 2350 | - | 0,3 |
| 7.5 x 4 | FB-10B | 75 | 100 | 0.7 - 0.8 | 0.03 - 0.04 | 303 | 3430 | - | 0,4 |
| 11 x 4 | FB-15B | 110 | 110 | 0.5 - 0.6 | 0.03 - 0.04 | 410 | 3430 | - | 0,4 |
| 15 x 4 | FB-20 | 150 | 220 | 1.7 - 1.8 | 0.03 - 0.06 | 1070 | 10100 | - | 0,5 |
| 18.5 x 4 | FB-30 | 190 | 220 | 1.4 - 1.5 | 0.03 - 0.06 | 2430 | 10100 | - | 0,5 |
| 22 x 4 | FB-30 | 220 | 220 | 1.4 - 1.5 | 0.03 - 0.06 | 2430 | 10100 | - | 0,5 |
| 30 x 4 | FB-30 | 220 | 220 | 1.4 - 1.5 | 0.03 - 0.06 | 2620 | 10100 | - | 0,5 |

If the direct current circuit is cut off after the rectifier, the brake is applied up to 10 times faster. This is particularly important for lifting devices.



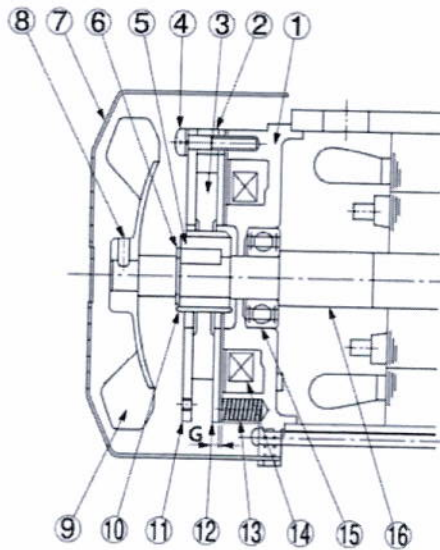
To ensure that the brake (connected to the DC side) is applied quickly, a separate cable must be run to an external contact. The contact must be protected by a Varistor (see Table 2).

Table 2 Varistor voltage range

| Motor voltage | | AC 200-240V | AC 380 - 460V |
|----------------------------------|----------------|-------------------|---------------|
| Corresponding Varistor range | | AC 260-AC 300V | AC 510V |
| Varistor voltage | | 430 - 470V | 820V |
| Corresponding Varistor output | Type of brakes | FB-01A, 02A, 05A | > 0.2 W |
| | | FB-1B, 1D | > 0.4 W |
| | | FB-2B, 3B, 2D, 3D | > 0.6W |
| | | FB-5B, 8B | > 1.5 W |
| | | FB-10B, 15B | > 1.0 W |

6.7 Checking for brake wear

The brake is normally assembled as shown in the picture below.



| Part no Teil Nr. | Part name | Name des Teils |
|---------------------|---|--------------------|
| 1 | Stator packet | Statorpaket |
| 2 | Spacer | Abstimmung |
| 3 | Brake lining | Bremsbelag |
| 4 | Assembling bolt | Screw |
| 5 | Boss | Nabe |
| 6 | Shaft retaining C-ring | Lock washer |
| 7 | Cover | Abdeckung |
| 8 | Fan set bolt | Sicherungsschraube |
| 9 | Fan (Not provided for FB-01A1 and FB-01A) | Lüfter |
| 10 | Leaf spring | Blattfeder |
| 11 | Brake disk | Bremsscheibe |
| 12 | Armature plate | Ankerscheibe |
| 13 | Spring | Feder |
| 14 | Electromagnetic coil | Magnetspule |
| 15 | Ball bearing | Kugellager |
| 16 | Motor shaft | Motorwelle |

The following air gaps apply to the FB brakes:

| Type of brake | Air gap G (mm) | |
|---|--------------------|-------|
| | Nominal dimensions | Limit |
| FB-01A1, FB-01A FB-02A1, FB-02A FB-05A1, FB-05A | 0.2~0.35 | 0.5 |
| FB-1D FB-2D | 0.3~0.4 | 0.6 |
| FB-3D | | 0.7 |
| FB-5B FB-8B | 0.4~0.5 | 1.0 |
| FB-10B FB-15B | 0.4~0.5 | 1.2 |
| FB-20 FB-30 | 0.6~0.7 | 1.5 |

If the air gap limit is exceeded it can be adjusted as set out in the table below.

| Type of brakes | Thickness of brake lining | Thickness limit |
|----------------------------|---------------------------|--------------------|
| | | x (mm) |
| FB-01A FB-02A FB-05A | | one-off adjustment |
| FB-1B, 1D | | 6.0 |
| FB-2B, 2D | | 7.2 |
| FB-3B, 3D | | 8.0 |
| FB-5B, 8B | | 6 |
| FB-10B, 15B | | 7 |
| FB-20, 30 | | 12 |



The air gap must be checked at at least three positions (each offset to 120).

If the adjustment is repeated the thickness of the brake lining must be checked.



Brakes are safety-related components.
Brake liners and friction discs are not sold as separate parts.
Brakes are only available as a complete set.

6.8 Converter operation



When operating the F motors on the frequency converter the converter manufacturer's EMC notes must be observed. Appropriate suppression measures must be taken. Metal shielded cables and cable glands should be provided.

The motor's torque depends on the respective converter.

With brake motors the brake's rectifier must be fitted with a separate, sinusoid voltage.

The motor must be protected from excessive overheating by cold conductors, thermo contacts and/ or by external fans.

6.9 Motor protection



Motor protection switches (overload protection) must be set to the current value specified on the rating plate depending on the voltage.

Thermo contacts are normally designed as openers.

The resistance of cold conductors (PTC's) at 20 °C is not significant. The value may vary between 60 Ω and a maximum of 750 Ω.

6.9.1 External fans



The voltage and wiring of the external fan are different depending on the type of fan.

The external fan has a separate terminal box.

Information on the voltage, frequency and wiring of the external fan is in this terminal box. These are different depending on the size.

ATTENTION : Depending on the controls, the external fan may operate even if the motor is not turning.

Some external fans can only be operated in single phase.

Other fan motors can be operated both in single phase in a Steinmetz circuit and also in triphase.

3 phase motor: In a star circuit or a triangular circuit, depending on the voltage as in the section "Electrical connection".

7. Commissioning the input drive

Ensure that all safety instructions have been explicitly obeyed once more.

Mains power conditions and the information on the rating plate must be the same. There is additional information in the motor terminal box for additional equipment, such as standstill heating.

The cross section of the connection cables must be adapted to the motor currents.

The installation is subject to all regulations in force and must be done by qualified personnel.



Before starting the gear motor, ensure that all safety regulations have been obeyed, the machine has been installed and aligned properly, all fastenings and earth connections have been tightened properly, the auxiliary and additional devices are working properly and have been connected properly and that the feather key on any second shaft end key cannot be flung out.

If possible, the gear box is to be started without load. If it runs quietly and without any odd noises, the motor is attached to the driven machine. On starting up it is advisable to look at the currents being used when the motor is connected to its driven machine so that potential overloads and asymmetries on the mains side can be detected immediately.



8. Lubrication notes

8.1 Lubrication



Grease lubricated CYCLO Drive 6000's are already filled with grease at the factory and are operated without topping up. The type of grease used must not be mixed with other types of grease. The standard ESSO Unirex N2 grease (for lifetime lubrication) and Shell Alvania EP2 grease are suitable for ambient temperatures of between -10 °C and +50 °C though the maximum surface temperature of the drive housing must not exceed 95°C. Please contact SCG if you wish to use standard greases outside this temperature range or if you wish to use other lubricants.

8.1.1 Lifetime grease lubrication

All type CN CYCLO Drive 6000's .. are greased for life and can be installed in any position. These gearboxes are filled at the factory with ESSO Unirex N2 and do not need topping up. The lifetime can be increased if the grease is replaced after 20000 hours or between 4 - 5 years.

Grease quantities (g) when replacing X = Means type 0 oder 5

| Size | 606X | 607X | 608X | 609X | 610X | 611X | 612X | 606XDA | 607XDA | 609XDA | 610XDA | 612XDA | 612XDB |
|-----------|------|------|------|------|------|------|------|--------|--------|--------|--------|--------|--------|
| 1st stage | 25 | 25 | 65 | 90 | 140 | 200 | 330 | 25 | 25 | 25 | 25 | 25 | 90 |
| 2nd stage | | | | | | | | 25 | 25 | 90 | 140 | 330 | 330 |
| Output | 35 | 35 | 70 | 100 | 100 | 90 | 120 | 35 | 35 | 100 | 100 | 120 | 120 |

8.1.2 Grease lubrication with top up



CYCLO Drive 6000's that are filled with Esso Unirex N2 must be topped up for the first time after 500 operating hours but at least after 2 months. Further top ups in accordance with the table below:

For lubrication quantities (g) when changing when topping up, see paragraph 9.1.

| | | | | | | | | | | |
|-----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Size | 613XDA | 613XDB | 613XDC | 614XDA | 614XDB | 614XDC | 616XDA | 616XDB | 617XDA | 617XDB |
| 1st stage | 25 | 90 | 140 | 25 | 90 | 140 | 90 | 140 | 90 | 140 |
| 2nd stage | 450 | 450 | 450 | 450 | 450 | 450 | 750 | 750 | 1000 | 1000 |
| Output | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 500 | 500 |

| | | | | | | | | | | |
|-----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Size | 618XDA | 618XDB | 619XDA | 619XDB | 6205DA | 6205DB | 6215DA | 6215DB | 6225DA | 6225DB |
| 1st stage | 100 | 450 | 150 | 450 | 150 | 450 | 450 | 750 | 450 | 1000 |
| 2nd stage | 1100 | 1100 | 1500 | 1500 | 1500 | 1500 | 2000 | 2000 | 2500 | 2500 |
| Output | 600 | 600 | 700 | 700 | 700 | 700 | 800 | 800 | 900 | 900 |

| | | | | | | | | | | |
|-----------|--------|--------|--------|--------|--------|--------|--------|---|---|---|
| Size | 6235DA | 6235DB | 6245DA | 6245DB | 6255DA | 6255DB | 6265DA | - | - | - |
| 1st stage | 750 | 1100 | 750 | 1100 | 1000 | 1500 | 1500 | - | - | - |
| 2nd stage | 4000 | 4000 | 4500 | 4500 | 6000 | 6000 | 8000 | - | - | - |
| Output | 1000 | 1000 | 1100 | 1100 | 1200 | 1200 | 1300 | - | - | - |

X = Means type 0 oder 5

Top up times

| Operating conditions | Time of topping up | Notes |
|------------------------|----------------------------|--|
| up to 10 hours/ day | every 3 - 6 months | Under difficult operating conditions the lubrication change intervals must be reduced. |
| 10 - 24 hours/ day | Every 500 - 1,000 hours | |
| Area | Time of lubrication change | Notes |
| Drive and transmission | every 2 - 3 years | Under difficult operating conditions the lubrication change intervals must be reduced. |
| Output | every 3 - 5 years | |

Filling with and changing lubricants:

CYCLO Drive 6000's from size 613 are lubricated in 2 stages and fitted with grease nipples for regular topping up.

8.2 Oil lubrication

8.2.1 Type of oil lubrication

8.2.1.1 Horizontal installation position



| | | | | | | | | | | | | | | | | |
|------|------------------------|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|
| Size | Single reduction units | | | | | | | | | | | | | | | |
| | 3 | 5 | 6 | 8 | 11 | 13 | 15 | 17 | 21 | 25 | 29 | 35 | 43 | 51 | 59 | 71 |
| 613X | Oil bath | | | | | | | | | | | | | | | |
| 614X | | | | | | | | | | | | | | | | |
| 616X | | | | | | | | | | | | | | | | |
| 617X | | | | | | | | | | | | | | | | |
| 618X | | | | | | | | | | | | | | | | |
| 619X | | | | | | | | | | | | | | | | |

X = Means type 0 oder 5

| | | | | | | | |
|------|------------------------|----|----|----|----|----|----|
| Size | Single reduction units | | | | | | |
| | 11 | 15 | 21 | 29 | 35 | 43 | 59 |
| 6205 | Oil bath | | | | | | |
| 6215 | | | | | | | |
| 6225 | | | | | | | |
| 6235 | | | | | | | |
| 6245 | | | | | | | |
| 6255 | | | | | | | |
| 6275 | | | | | | | |

| Size | Two stage units | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|------------------|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|--|
| | 104 | 121 | 143 | 165 | 195 | 231 | 319 | 357 | 377 | 425 | 473 | 525 | 559 | 649 | 731 | 841 | 1003 | 1015 | 1247 | 1479 | 1894 | 2065 | 2537 | 3045 | 3481 | 4437 | 5133 | 6177 | 7569 | |
| 616XDC | Oil bath | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 617XDC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 618XDB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 619XDA 619XDB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6205DA 6205DB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6215DA 6215DB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6225DA 6225DB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6235DA 6235DB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6245DA 6245DB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6255DA 6255DB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6265DA | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6275DA | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

X = Means type 0 oder 5

8.2.1.2 Vertical installation position



| Size | Single reduction units | | | | | | | | | | | | | | | | |
|------|------------------------|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|
| | 3 | 5 | 6 | 8 | 11 | 13 | 15 | 17 | 21 | 25 | 29 | 35 | 43 | 51 | 59 | 71 | 87 |
| 613X | Oil bath | | | | | | | | | | | | | | | | |
| 614X | | | | | | | | | | | | | | | | | |
| 616X | Forced oil lubrication | | | | | | | | | | | | | | | | |
| 617X | | | | | | | | | | | | | | | | | |
| 618 | Grease | | | | | | | | | | | | | | | | |
| 619X | | | | | | | | | | | | | | | | | |

X = Means type 0 oder 5

| Size | Single reduction units | | | | | | | |
|------|------------------------|----|----|----|----|----|----|----|
| | 11 | 15 | 21 | 29 | 35 | 43 | 59 | 87 |
| 6205 | Forced oil lubrication | | | | | | | |
| 6215 | | | | | | | | |
| 6225 | | | | | | | | |
| 6235 | | | | | | | | |
| 6245 | | | | | | | | |
| 6255 | | | | | | | | |
| 6275 | With trochoid pump | | | | | | | |

| Size | Two stage units | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|------------------|------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|
| | 104 | 121 | 143 | 165 | 195 | 231 | 319 | 357 | 377 | 425 | 473 | 525 | 559 | 649 | 731 | 841 | 1003 | 1015 | 1247 | 1479 | 1894 | 2065 | 2537 | 3045 | 3481 | 4437 | 5133 | 6177 |
| 616XDC | Forced oil lubrication | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 617XDC | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 618XDB | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 619XDA 619XDB | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6205DA 6205DB | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6215DA 6215DB | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6225DA 6225DB | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6235DA 6235DB | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6245DA 6245DB | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6255DA 6255DB | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6265DA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6275DA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

X = Means type 0 oder 5

8.2.2 Recommended lubrication oils



All lubrication oils that meet the requirements of DIN 51517 Part 3 are suitable. Depending on the ambient or operating temperature, the correct viscosity class must be selected in accordance with DIN 51519.

| lubricant as per DIN 57517 part 3 | possible operating temperatures °C | | | | | | |
|--------------------------------------|------------------------------------|----|------|------|------|------|-------|
| | ambient temperature °C | | | | | | |
| | -20°C | 0° | +20° | +40° | +60° | +80° | +100° |
| CLP 68 | | | | | | | |
| CLP 100 | | | | | | | |
| CLP 150 | | | | | | | |
| CLP 220 | | | | | | | |
| CLP 320 | | | | | | | |

| Manufacturer | Brand | Manufacturer | Brand | Manufacturer | Brand |
|--------------|---------------|--------------|-----------------|--------------|-----------|
| ARAL | Degol BG | DEA | Falcon CLP | MOBIL | Mobilgear |
| AVIA | Gear RSX | ELF | Reductelf SP | OPTIMOL | Ultra |
| BP | Energol GR-XP | ESSO | Spartan EP | SHELL | Omala |
| Castrol | Alpha MW | KLÜBER | Klüberoil GEM 1 | TOTAL | Carter EP |

8.2.3 Oil quantities



The quantities [l] specified are average guide values. The precise quantity must be checked using the prescribed oil level in addition to the oil feed quantity of the external oil pump. (See please Drive 6000 catalogue lubrication.)

| CHH..., CHHX..., CHV..., CHVX... | | | | | | | | | | | | | | |
|----------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Size | 613X | 614X | 616X | 617X | 618X | 619X | 6205 | 6215 | 6225 | 6235 | 6245 | 6255 | 6265 | 6275 |
| [l] | 0,7 | 0,7 | 1,4 | 1,9 | 2,5 | 4,0 | 5,5 | 8,5 | 10 | 15 | 16 | 21 | 29 | 56 |
| Size | 616XDC | 617XDC | 618XDA | 618XDB | 619XDA | 619XDB | 6205DB | 6205DB | 6215DA | 6215DB | 6225DA | 6225DB | 6235DA | 6235DB |
| [l] | 1,5 | 2,4 | 3,5 | 3,5 | 5,8 | 6,0 | 6,0 | 6,0 | 10 | 10 | 11 | 11 | 17 | 17 |
| Size | 6245DA | 6245DB | 6255DA | 6255DB | 6265DA | 6275DA | | | | | | | | |
| [l] | 18 | 18 | 23 | 23 | 32 | 70 | | | | | | | | |
| CVV..., CVVX... | | | | | | | | | | | | | | |
| Size | 613X | 614X | 616X | 617X | 618X | 619X | 6205 | 6215 | 6225 | 6235 | 6245 | 6255 | 6265 | 6275 |
| [l] | 1,1 | 1,1 | 1,0 | 1,9 | 2,0 | 2,7 | 5,7 | 7,5 | 10 | 12 | 15 | 42 | 51 | 60 |
| Size | 616XDC | 617XDC | 618XDA | 618XDB | 619XDA | 619XDB | 6205DB | 6205DB | 6215DA | 6215DB | 6225DA | 6225DB | 6235DA | 6235DB |
| [l] | 1,0 | 1,9 | 2,0 | 2,0 | 2,7 | 2,7 | 11 | 11 | 14 | 14 | 18 | 18 | 23 | 23 |
| Size | 6245DA | 6245DB | 6255DA | 6255DB | 6265DA | 6275DA | | | | | | | | |
| [l] | 29 | 29 | 42 | 42 | 51 | 60 | | | | | | | | |
| CHF..., CHFV... | | | | | | | | | | | | | | |
| Size | 613X | 614X | 616X | 617X | 618X | 619X | 6205 | 6215 | 6225 | 6235 | 6245 | 6255 | 6265 | 6275 |
| [l] | 0,25 | 0,25 | 0,9 | 1,5 | 1,3 | 2 | 3 | 4 | 5 | 7,5 | 8 | 11 | 14 | 30 |
| Size | 616XDC | 617XDC | 618XDA | 618XDB | 619XDA | 619XDB | 6205DB | 6205DB | 6215DA | 6215DB | 6225DA | 6225DB | 6235DA | 6235DB |
| [l] | 1,0 | 2,0 | 2,3 | 2,3 | 3,8 | 4,0 | 4,0 | 4,0 | 5,5 | 5,5 | 6,0 | 6,0 | 9,5 | 9,5 |
| Size | 6245DA | 6245DB | 6255DA | 6255DB | 6265DA | 6275DA | | | | | | | | |
| [l] | 10 | 10 | 13 | 13 | 17 | 44 | | | | | | | | |

X = Means type 0 oder 5

Positive Displacement (Trochoid) Pump Type

| Cyclo Drive | | | Trochoid Pump | | | |
|----------------|------------|-----------------|----------------|--------------------|------------|--------------|
| Typ | Frame Size | Reduction Ratio | Pump Type | Pump Motor | 50 Hz Zone | |
| | | | | | Flow | Max Pressure |
| | | | | | l/min | Bar |
| Vertical Shaft | 6275 | 29, 43, 59, 87 | TOP 216HA-VB3 | 1 HP (0,75 kW) 4P | 24,0 | 8 |
| | 6275 DA | All | TOP 204 HA-VB3 | 1/2 HP (0,4 kW) 4P | 6,0 | 16 |

Note: Consult the factory, when using an converter

Positive Displacement (Trochoid) Pump Lubrication:

Forced oil lubrication is accomplished by using a positive displacement pump and motor that requires an additional electric power source. It is recommended that the main motor be interlocked with the pump motor to avoid operation without lubrication. The pump must be started 30 seconds or longer before the main motor is operated.

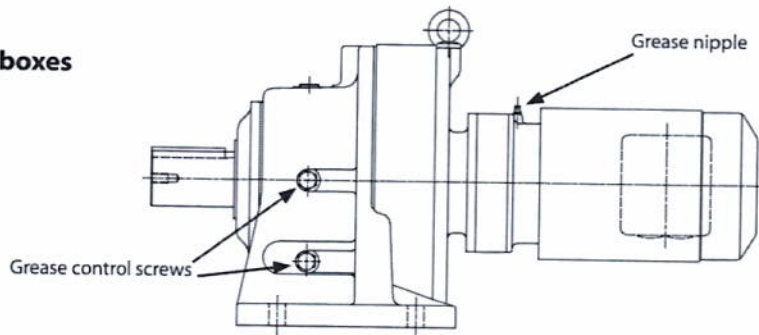
8.2.4 Oil change intervals



The correct oil level should be checked every 5000 hours. If the oil is dirty, burnt or viscous, change the oil immediately and, if necessary, flush out the gearbox.
 Under normal operating conditions we recommend changing the oil every 10,000 hours. The intervals should not be more than 2 years. Shorter oil change intervals (every 3,000 - 5,000 hours) increase the operating life. It is also very advisable to change the oil after the first 500 hours.
 The recommendations above may be changed under other operating conditions such as high temperature, high humidity or a corrosive environment. If one of these situations applies, the oil must be changed more frequently.

9. Inspection and maintenance work

9.1 Topping up grease lubricated gearboxes



Unscrew the lubrication control screw on the housing and, using a grease gun, top up the grease via the grease nipple on the flange on the drive side or on the motor flange.

Top the gearbox up slowly during operation to ensure that the lubricant circulates properly. At each top up about a third to a half of the quantity of grease in the table in Section 8.1.2 must be topped up for the first stage. If too much grease is used the lubricant may heat up to an unacceptable extent when the machine warms up or grease may get into the motor or may leak because of excess pressure.

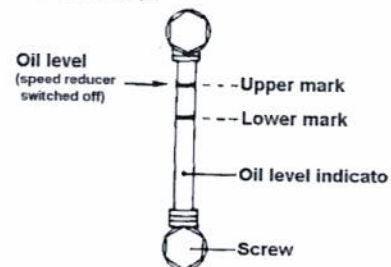


Wipe the excess grease off the lubrication control screws and dispose of properly.

9.2 Checking the oil level



The oil level can be checked on the oil level indicator.



With horizontally installed gearboxes the oil level indicator is normally located on the right hand side of the gearbox, viewed from the drive shaft. As the oil level indicator can be fitted both on the left and the right hand side, the best side for reading it must be selected.

During operation the lower mark on the oil level indicator is considered the guide for the normal oil level. Immediately after start up the oil level may fall below the red mark. However, this is not important as the oil level will go up again when the oil viscosity goes down as a result of the unit warming up.

9.3 Checking the oil



- Switch the gear motor off and ensure that it cannot be turned on again accidentally.
- Wait until the gearbox has cooled down - Risk of burning.



- Remove some oil from the oil drain plug.
- Check the composition of the oil.
- Check the viscosity.
- If the oil appears to be very dirty on visual inspection, it is advisable to change the oil outside the maintenance intervals set out in Section 8.2.4 "Oil change intervals".



The oil sample removed must be disposed of properly.

9.4 Changing the oil



- Switch the gear motor off and ensure that it cannot be turned on again accidentally.
- Wait until the gearbox has cooled down - **Risk of burning.**



- Only change the oil when the gearbox is at operating temperature.
- Put a receptacle under the oil drain plug.
- Remove the oil level indicator, the bleed screw/ valve and the oil drain plug.
- Drain the oil completely.
- Screw the oil drain plug in.
- Fill with new oil through the oil filling plug in accordance with the oil recommendations. Before using other types of oil please contact SCG.
- Fill the quantity of oil as set out in Section 8.2.3 "Oil quantities".
- Check on the oil level display.
- Replace the bleed screw/ valve.



The drained oil must be disposed of properly.

10. Notes on malfunctions

Possible malfunctions - Troubleshooting and action to be taken

| Malfunction | Possible cause | Troubleshooting |
|--|---|--|
| Abnormal, steady running noises | 1. Unwinding/ grinding noise: Damaged bearing 2. Knocking noise: Problem in the transmission | 1. Check oil (see inspection and maintenance work), change bearings 2. Call customer services |
| Abnormal, uneven running noises | Foreign bodies in the oil | Check oil (see inspection and maintenance work) Stop the drive and call customer services |
| Oil is leaking 1) - at the gearbox cover - at the motor flange - at the motor shaft sealing ring - at the gearbox flange - at the output side shaft sealing ring. | 1. Seal on the gearbox cover is leaking 2. Seal faulty 3. Gearbox has not been ventilated. | 1. Tighten screws on the gearbox cover and examine the gearbox. If oil continues to leak: Call customer services 2. Call customer services 3. Bleed the gearbox (see Configurations) |
| Oil leaks from the bleed valve | - too much oil - Drive installed in the wrong model - frequent cold start (oil foams up) and/ or oil level high | Correct oil level (see Checking oil level). Fit the bleed valve correctly and correct the oil level (see Correcting oil level). |
| Drive shaft doesn't turn although the motor is running or the drive shaft is turned | The shaft hub connection in the gearbox is broken | Send the gearbox/ gear motor for repair |

Small quantities of oil or grease escaping from the shaft sealing ring must be considered normal in the running in phase (24 hours' running time) (see also DIN 3761).

11. EC machinery directive



Reducers

Reducers are considered as “machinery components” and are not subject of the EC machinery directive 2006/42/EG.

The start of operation within the ambit of the EC machinery directive is forbidden, as long as it is not confirmed, that the machine, where the reducer is built in, complies with this directive.

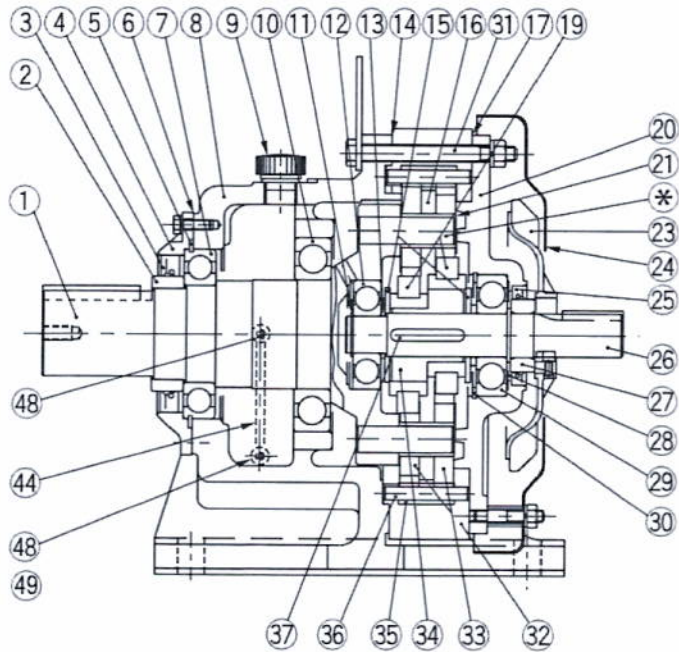
From 2010 no manufacturers declaration, EC conformity declaration and declaration of incorporation will be issued.

Gearmotors

For gearmotors a conformity declaration according low voltage directive will be issued.

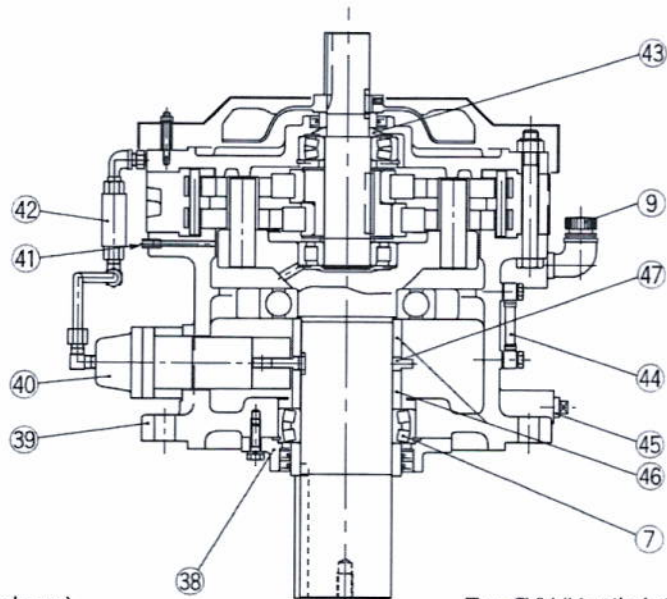
| | | machine directive 2006/42/EG | low voltage directive 73/23/EG | EMV 89/336/EG | ATEX 94/9/EG |
|-----------|------------------------------|---------------------------------|-----------------------------------|---------------|---------------|
| reducer | CE mark | no | no | no | yes |
| | declaration of conformity | no | no | no | yes |
| | declaration of incorporation | no | no | no | no |
| gearmotor | CE mark | no | yes (motor) | no | yes (reducer) |
| | declaration of conformity | no | yes (motor) | no | yes (reducer) |
| | declaration of incorporation | no | no | no | no |
| inverter | CE mark | no | yes (inverter) | yes | no |
| | declaration of conformity | no | yes (inverter) | yes | no |
| | declaration of incorporation | no | no | no | no |

12. Construction drawing - Schnittzeichnung



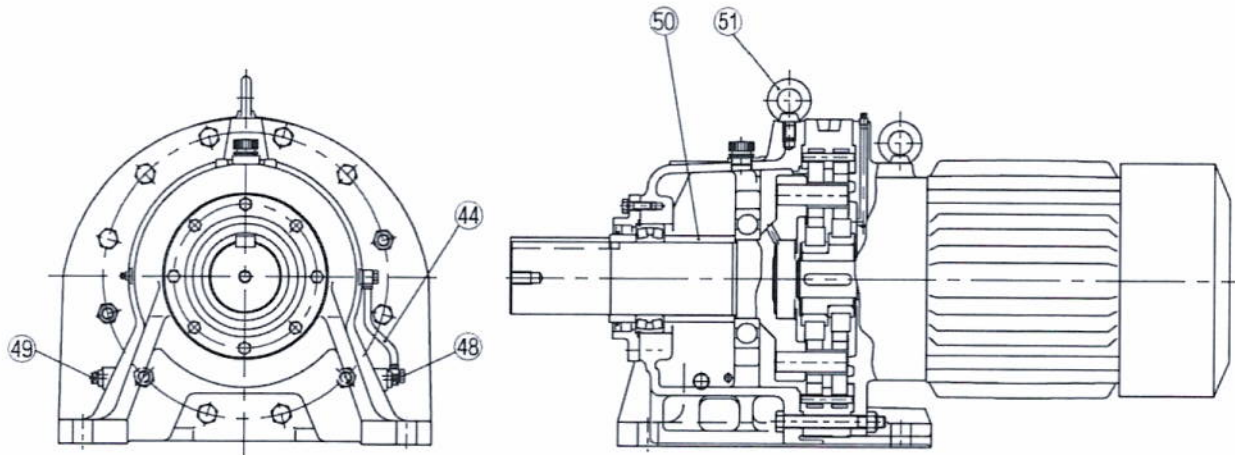
Type CHH (Horizontal, Reducer)
Single Reduction (Example: Frame size 6175)

Typ CHH (Horizontal, Getriebe)
Einstufig (Beispiel: Größe 6175)



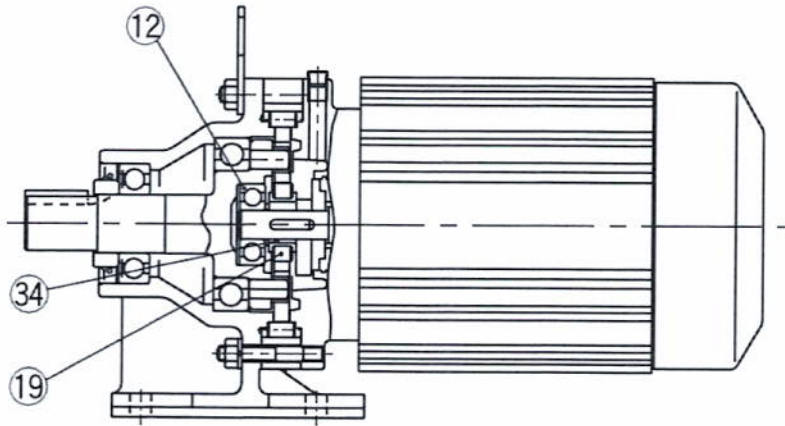
Type CVV (Vertical, Reducer)
Single Reduction (Example: Frame size 6225)

Typ CW (Vertikal, Getriebe)
Einstufig (Beispiel: Größe 6225)



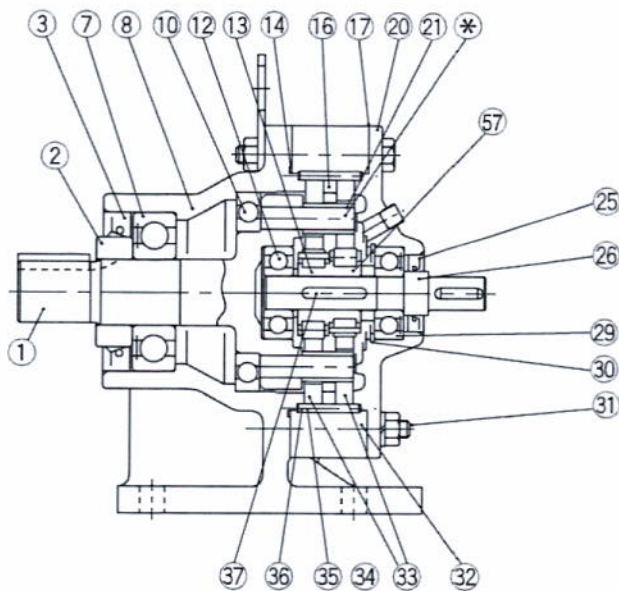
Type CHHM (Horizontal, Gearmotor)
Single Reduction (Example: Frame size 6225)

Type CHHM (Horizontal, Getriebemotor)
Einstufig (Beispiel: Größe 6225)



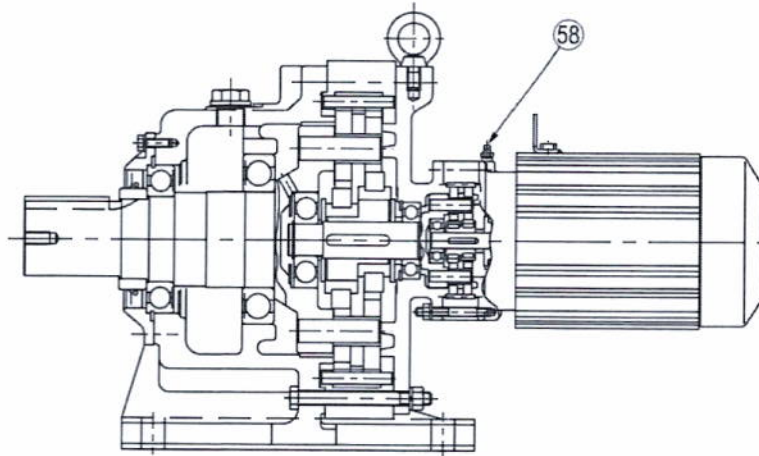
Type CNHM (Horizontal, Gearmotor)
Single Reduction (Example: Frame size 6095)

Type CNHM (Horizontal, Getriebemotor)
Einstufig (Beispiel: Größe 6095)



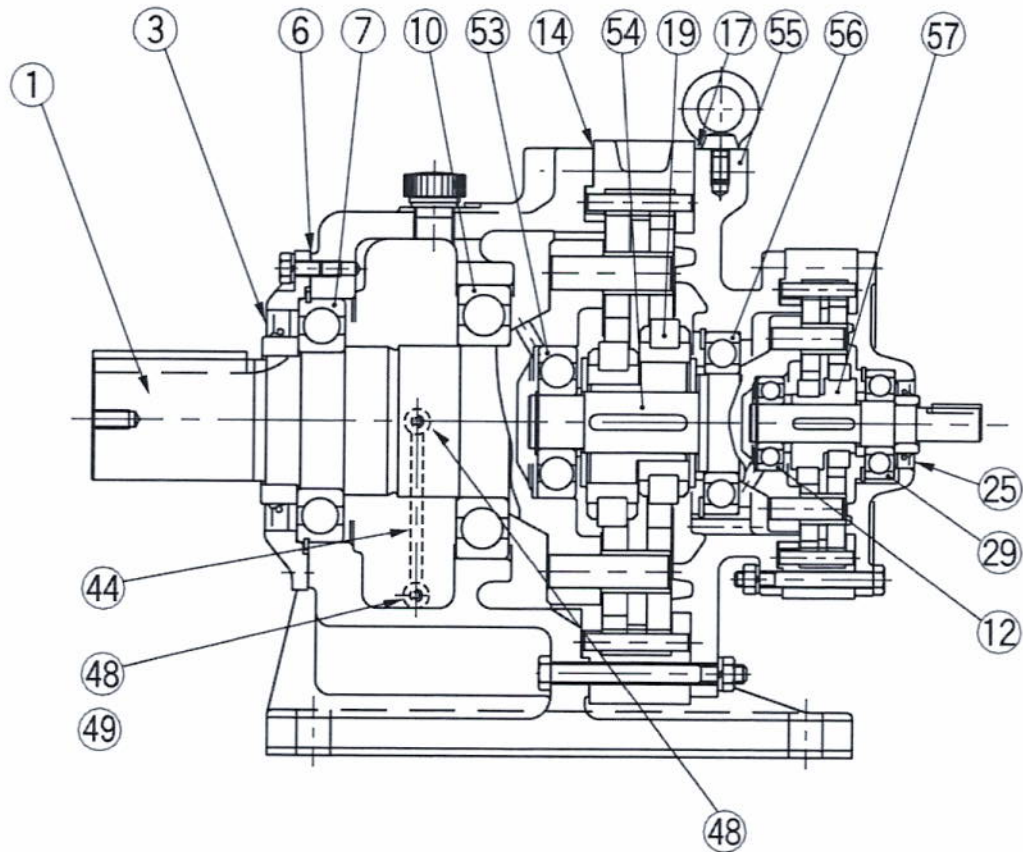
Type CNH (Horizontal, Gearmotor)
Single Reduction (Example: Frame size 6105)

Type CNH (Horizontal, Getriebemotor)
Einstufig (Beispiel: Größe 6105)



Type CHHM (Horizontal, Gearmotor)
Double Reduction (Example: Frame size 6225DB)

Type CHHM (Horizontal, Getriebemotor)
Zweistufig (Beispiel: Größe 6225DB)



Type CHH (Horizontal, Gear)
Double Reduction (Example: Frame size 6185DB)

Type CHH (Horizontal, Getriebe)
Zweistufig (Beispiel: Größe 6185DB)

13. Spare parts / Ersatzteile Liste

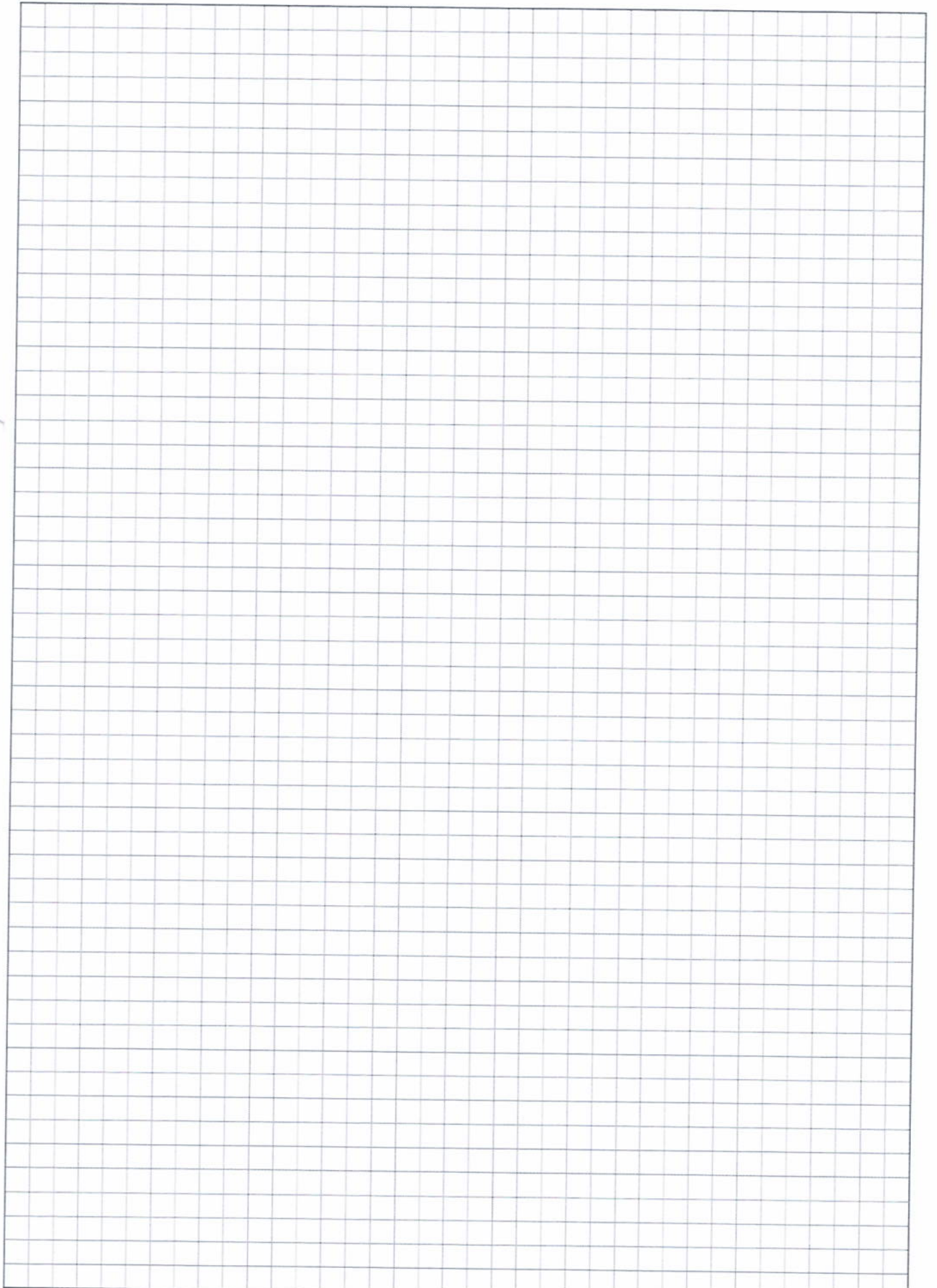
| No. /Nr. | Part Name | Teilebezeichnung | No. /Nr. | Part Name | Teilebezeichnung |
|----------|-------------------------|------------------------|----------|---------------------|---------------------|
| 1 | Slow speed shaft | Abtriebswelle | 31 | Bolt | Schraube |
| 2 | Collar | Ring für Abtriebswelle | 32 | Ring gear housing | Bolzenring |
| 3 | Oil seal | Wellendichtring | 33 | Cycloid discs | Kurvenscheiben |
| 4 | End cap | Dichtungsdeckel | 34 | Eccentric | Exzenter |
| 5 | Retaining ring | Sicherungsring | 35 | Ring gear rollers | Außenrollen |
| 6 | Paper gasket | Papierdichtung | 36 | Ring gear pins | Außenbolzen |
| 7 | Bearing | Lager | 37 | Key | Passfeder |
| 8 | Casing | Gehäuse | 38 | End cap | Dichtungsdeckel |
| 9 | Breather | Atmungsfilter | 39 | Casing | Gehäuse |
| 10 | Bearing | Lager | 40 | Oil pump | Ölpumpe |
| 11 | Retaining ring | Sicherungsring | 41 | Air vent plug | Entlüftungsschraube |
| 12 | Bearing | Lager | 42 | Oil flow control | Strömungswächter |
| 13 | Retaining ring | Abstimmring | 43 | Oil retainer | Ölstoppring |
| 14 | Paper gasket | Papierdichtung | 44 | Oil level gauge | Ölstandsschlauch |
| 15 | Spacer | Stützscheibe | 45 | Plug | Verschlusschraube |
| 16 | Spacer ring | Zwischenring | 46 | Spacer | Distanzrohr |
| 17 | Paper gasket | Papierdichtung | 47 | Cam plate | Nockenscheibe |
| 18 | Air vent plug | Atmungsfilter | 48 | Oil gauge plug | Öldurchlassschraube |
| 19 | Eccentric bearing | Exzenterlager | 49 | Plug | Verschlusschraube |
| 20 | Flange | Flansch | 50 | Spacer | Distanzring |
| 21 | Slow speed shaft roller | Mitnehmerrollen | 51 | Eye bolt | Ringschraube |
| * | Slow speed shaft pin** | Mitnehmerbolzen** | 52 | Oil filler | Ölbehälter |
| 23 | Cooling fan | Lüfterrad | 53 | Bearing | Lager |
| 24 | Fan cover | Lüfterhaube | 54 | Intermediate shaft | Stufenwelle |
| 25 | Oil seal | Wellendichtring | 55 | Intermediate flange | Stufenflansch |
| 26 | High speed shaft | Antriebswelle | 56 | Bearing | Lager |
| 27 | Collar | Ring für Antriebswelle | 57 | Eccentric | Exzenter |
| 28 | Spacer | Stützscheibe | 58 | Grease nipple | Schmiernippel |
| 29 | Bearing | Lager | - | - | - |
| 30 | Retaining ring | Sicherungsring | - | - | - |

** Supplied with slow speed shaft assembly only, not as individual items.

** Nur mit Abtriebswelle montiert, nicht separat lieferbar

(

(



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VetterTec GmbH -- Leipziger Straße 104 -- 108, 34123 Kassel Tel. 0561/50019-0 Fax 0561/50019-50

BA 118348

PACKLISTE / PACKINGLIST

| Kolli-Nr. / Colli-No | Verpackungsart/ Packing | Bruttogewicht/ grossweight | Nettogewicht/netweight | Länge/Length | Breite/Width | Höhe/Height | Datum/Date: |
|----------------------|----------------------------|-------------------------------|------------------------|--------------|--------------|-------------|-------------|
|----------------------|----------------------------|-------------------------------|------------------------|--------------|--------------|-------------|-------------|

07.07.2011

| Position | Menge | Beschreibung |
|----------|-------|------------------------|
| 1 | 1 | Lager 24052 |
| 2 | 1 | Gehäuse SNL 3052 |
| 3 | 2 | Dichtbacken TS 60 |
| 4 | 1 | FR 400 |
| 5 | 1 | Festring Dampfeintritt |

Empfänger:
 Jungsbunzlauer Austria AG
 Factory Pernhofen
 AT -- 2064 Wulzeshofen