

ZS 600

Operating Manual

ZSPR 621/190-172

PB036809

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We have taken great care to check that the information in this maintenance manual is correct. Nevertheless, we cannot assume liability for any incorrect or incomplete information.

Subject to technical changes.

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1. General information

Before working with the machine (installation, operation, maintenance, inspection, etc.), read this operating manual carefully so you know exactly how to operate the CYCLO DRIVE centrifuge reducer and are familiar with the safety requirements to be met and the warning signs to obey. Keep this manual in a convenient place so you can refer to it at any time.



Imminent danger

Misapplication of the machine may be dangerous, risk of severe or fatal injury.



Dangerous situation

Risk of physical injury.



Damaging situation

Risk of machine damage.



Helpful information



Disposal

Please observe legal/environmental regulations.

2. Safety advice



Transportation, assembly, lubrication, operation, maintenance and inspection should only be done by qualified personnel, so as to avoid personal injury or damage to property.

Do not touch moving mechanical components and make sure these parts are clear of obstructions. Failure to follow these instructions may result in personal injury or damage to property.

Only operate the unit in the application it was intended. Misapplication may result in physical injury or damage to machine.

If damage occurs, the equipment in question should be put out of operation and only used again once it has been repaired properly.



Any tampering with or modification to the equipment will lead to loss of all guarantee claims and of any rights ensuing from this.

The type plate must not be removed, nor the embossed type designation be made indecipherable. Before dispatch, the reducer was provided with a sticker giving information on the lubricant it has been filled with, or on the lubricant it should be filled with. This sticker must not be removed.

3. Transportation



The units must be checked for any transportation damage immediately upon receipt. Any damage should be reported to the carrier without delay. If there is any evidence of damage which may put at risk the function of the centrifuge reducer, do not install the unit.



Lifting harnesses of suitable and adequate size are to be used; these are to be hooked into the eye bolts or laid round the flange connections. Eye bolts on the reducer are dimensioned for the weight of the unit, no additional loads are allowed.



Caution: Do not use the central bores in the shaft ends for lifting the reducer with hooked bolts, etc. This could result in damage to the bearings.

4. Inspection upon delivery



Before removing the transport packaging ensure that the correct side of the reducer is at the top; there could otherwise be a risk of injury.
Check whether you have actually received the reducer you ordered. Installing an unsuitable type can lead to injury or damage.

On receipt of the CYCLO DRIVE centrifuge reducer check:



- That the information on the type plate or the embossed type designation corresponds with the information on the order.
- That all parts are intact.
- That all screws and nuts have been tightened properly.

If you think that you have not received the correct reducer, please contact the nearest representative, dealer or the nearest service office.

4.1. To check the type designation

The type designation and the serial number of your reducer has been stamped onto the pin ring.

ZS¹⁾ 217²⁾ – 25³⁾ (for example)



- 1) Type code for centrifuge reducer
- 2) Size designation
- 3) Transmission ratio

Check whether the serial number corresponds with the serial number given on the invoice.
If the customer wishes, additional information, e.g. the machine manufacturer's part numbers, can also be stamped on the reducer. If this has been done, check carefully that these also correspond.

4.2. To check the lubrication

4.2.1. Grease lubricated centrifuge reducers



These reducers are delivered with grease filling. A sticker has been attached to these reducers with the designation of the lubricant used. Check carefully whether the lubricant used corresponds with the prescribed lubricant.

4.2.2. Oil lubricated centrifuge reducers



These reducers are delivered without lubricant filling. Make sure that it is filled with the correct lubricant according to chapter 8 of these Operating and Maintenance Instructions before start-up.

5. Storage



If the CYCLO DRIVE centrifuge reducer is to be put into storage for a long period before start-up, please observe the following.

5.1. Short term storage



Keep the CYCLO DRIVE centrifuge reducer covered in a clean and dry environment.
Do not store the CYCLO DRIVE centrifuge reducer outside or in a damp environment.

5.2. Long term storage



The condition of the seals is impaired at high temperatures and under the effect of UV rays. For this reason, after long periods of storage, check the seals and replace them if they are damaged or cracked.

After start-up of the CYCLO DRIVE centrifuge reducer, check whether there are any unusual noises or vibrations or whether the operating temperature becomes too high. If there are any irregularities, contact the nearest representative, dealer or the nearest service office immediately.

From the day of delivery, operate the CYCLO DRIVE centrifuge reducer for several minutes every 2 to 3 months using the recommended lubricant. If this is not possible, please consult the nearest representative, dealer or the nearest service office immediately.

6. Installation

To avoid risk to life, never stand or work under suspended loads.

To avoid injury, do not touch the rotating shaft ends or the rotating reducer.



If the CYCLO DRIVE centrifuge reducer is used for the production of food, a suitable device should be fitted which will catch any lubricant escaping due to a faulty seal or lack of maintenance and will prevent the food from being contaminated by the lubricant.

The screws used to assemble the CYCLO Drive centrifuge reducer must not be replaced with any other screws, the quality of the balance set at works will otherwise not be guaranteed.

7. Lubrication

When carrying out maintenance work on the reducer always keep hands well clear of rotating parts. Never touch rotating parts. If loose fitting clothing gets caught in rotating parts, there is a risk of injury and/or to life.



The reducer gets hot during operation and due to a risk of burns must not be touched.

Do not change lubricant during operation or immediately after the equipment has been switched off. Hot lubricant could cause burns.

On systems which are equipped with a separate lubricant pump, the pump motor should be operating before the drive motor is switched on. This is the only way of ensuring sufficient lubrication of the reducer before the machine is starts. The reducer could otherwise be damaged.



Use a circulation switch and/or make a visual check to ensure that the lubricant is circulating in the system. If necessary switch off the machine.

7.1. Grease lubrication

7.1.1. Re-greasing during start-up

When the centrifuge is operated for the first time the grease filled at works is catapulted outwards. For this reason, regreasing will be necessary after a test run of approx. 10 minutes until the reducer has been filled completely with grease. The reducer could otherwise be damaged due to a lack of lubricant.

Regreasing is done via the grease inlet in the CYCLO DRIVE centrifuge reducer drive shaft (1) (see Figure 1). At least one of the inspection screws (2) on the pin ring must also be opened. Grease must be filled in until it starts to flow constantly out of the opened inspection screw. The reducer must then be turned by hand with open inspection screw until no more grease comes out of the inspection screw. This pushes the grease out from inside the rolling bearings and from the gaps in the cam disk carrier bore holes and prevents overpressure being created during operation. Once regreasing has been completed, the inspection screw must be screwed in again tightly with a new oil seal (see parts list).

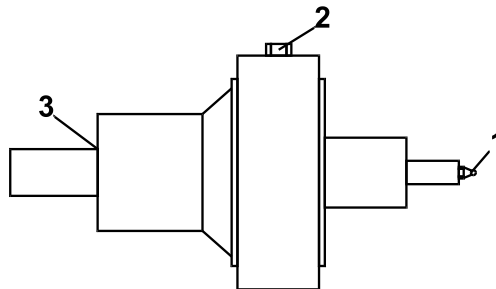


Figure 1

7.1.2. Re-greasing during operation

7.1.2.1. Completely sealed reducer

Completely sealed CYCLO DRIVE centrifuge reducers can only be regreased when the machine is at a standstill. Regreasing is done via the grease inlet in the drive shaft (1) (see Figure 1). At least one of the inspection screws (2) on the pin ring must also be opened. The amount of grease required should be measured so that all of the lubricant will have been changed within half (1/2) a year according to the prescribed lubricating interval. The amounts of lubricant for the reducer can be found in the reducer specification tables. Recommended lubricating intervals approx. 1x a month or 500 operating hours or according to the instruction from the manufacturer of centrifuges.



7.1.2.2. Reducer with grease outlet

Some types of reducer have a proper outlet for the excess grease from regreasing. These reducers can also be regreased during operation. Re-greasing can also be done continuously using a centralised lubricating system. Regreasing is done via the grease inlet in the drive shaft (1). (see Figure 1). The excess grease escapes via the provided opening (3) (Gap seal on the drive shaft, outward sealing shaft seal, bore holes in housing etc.). The amount of grease required should be measured so that all of the lubricant will have been changed within half (1/2) a year according to the prescribed lubricating interval. The amounts of lubricant for the reducer can be found in the reducer assembly drawing. Recommended lubricating intervals approx. 1x a month or 500 operating hours or according to the instruction from the manufacturer of centrifuges.



7.2. Oil lubrication



Before the first start-up, the reducer should be filled with a suitable lubricant according to the recommendations in the table. The reducer could otherwise be damaged due to a lack of lubricant.

7.2.1. Oil bath lubrication

7.2.1.1. Filling with lubricant

On the CYCLO DRIVE centrifuge reducer pin ring, there are both two (2) inspection screws at 180° to each other and two (2) markings (X). Turn the reducer until the separate marking (X) is at the top (see Figure 2). To fill the reducer, open the two screws at the top. Fill with lubricating oil through the top opening until lubricating oil comes out of the second opening. Once the reducer has been successfully filled, the inspection screws must be screwed in again tightly with new oil seals (see parts list).

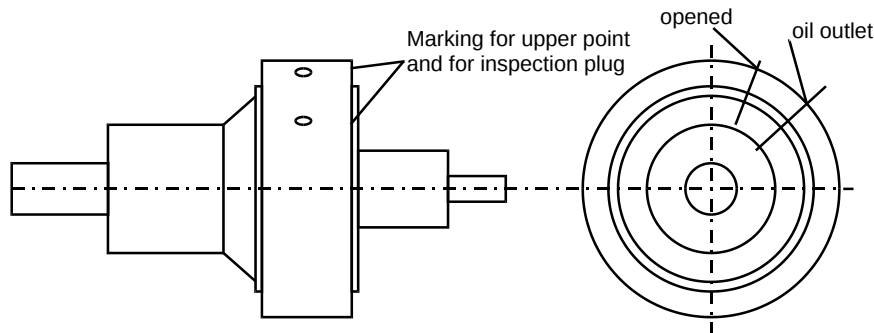


Figure 2

Some reducers with oil splash lubrication have a surge tank connected to the drive shaft which uses a simple rotary transmission lead through. Here the oil is filled in through the oil reservoir with the inspection screw at the top open. Once the reducer has been successfully filled, the inspection screw must be screwed in again tightly with a new oil seal.

7.2.1.2. Oil level check

To check the oil level, turn the reducer until the separate marking (X) is at the top (see Figure 2).



The inspection screw at the top to the side is unscrewed. The oil level is correct if oil flows out when reducer is rotated slightly in the direction of the opened screw. Once the reducer has been successfully filled, the inspection screw must be screwed in again tightly with a new oil seal.

7.2.1.3. Oil change

The oil in reducers with oil splash lubrication must be changed at regular intervals. You will find the oil change intervals in Table 8.3. To change the oil, turn the reducer until one of the inspection screws is directly at the top. First of all open the inspection screw at the top and then the one at the bottom. The oil flowing out must be caught in a suitable container. Once all the lubricating oil has run out, screw in the bottom inspection screw again tightly with a new oil seal. To fill the reducer with fresh lubricant proceeds as described in chapter 7.2.1.1.



7.2.2. Oil circular lubrication

In CYCLO DRIVE centrifuge reducers with oil circular lubrication, the oil is conducted via a double rotary transmission lead through screwed into the drive shaft, both into the reducer and also out of the reducer (see Figure 3). The minimum oil quantities required for sufficient lubrication can be found in Table 8.4. The correct viscosity has to be selected according to the information in Table 8.1. Suitable lubricating oils are listed in Table 8.2. The oil return line should be dimensioned so that the oil pressure in the reducer does not exceed the permitted pressure for the shaft seal thus preventing leaks.

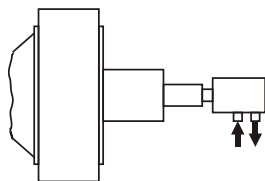


Figure 3

7.2.3. Oil once-through lubrication

Some CYCLO DRIVE centrifuge reducers are constructed in such a way that the lubricating oil is fed to further lubricating points on the centrifuge (e.g. main bearing) inside the reducer via provided openings. On these reducers the lubricating oil is fed into the reducer through the drive shaft via a simple rotary transmission lead through (see Figure 4). The minimum oil quantities required for sufficient lubrication can be found in Table 8.4. The correct viscosity has to be selected according to the information in Table 8.1. Suitable lubricating oils are listed in Table 8.2.

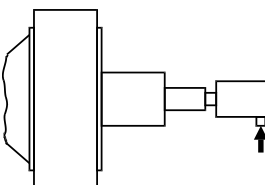


Figure 4

8. Tables

8.1. Lubricating oil viscosity

min. permitted viscosity	at operating temperature at least 20 mm ² /s	minimum viscosity to achieve the required lubricating film thickness for power transmission
max. permitted viscosity	below 4300 mm ² /s for oil splash lubricated reducers below 2200 mm ² /s for reducers with oil circular or oil once-through lubrication	maximum permitted viscosity when starting maximum permitted viscosity to operate the oil pump

8.2. Recommended lubricating oils

Lubricant according to DIN 51517 part 3	← possible operating temperature →							
	ambient temperature				operating temperature			
	-20°	0°	+20°	+40°	+60°	+80°	+100°	+120°
CLP 68								
CLP 100								
CLP 150								
CLP 220								
CLP 320								

Manufacturer	Oil type	Manufacturer	Oil type
ARAL	DEGOL BG	ESSO	SPARTAN EP
AVIA	AVILUB RSX	MOBIL	MOBOLGEAR
BP	ENERGOL GR-XP	OPTIMOL	ULTRA
DEA	FALCON CLP	SHELL	OMALA
ELF	REDUCTELF SP	TOTAL	CARTER EP



Synthetic oil types are also allowed to be used, if the chemical compatibility with the material of the oil seals is proofed. Otherwise damage can happen to the centrifuge reducer by oil leakage.

8.3. Oil change intervals

	Time of oil change		Operating conditions
First oil filling	before start-up		
Oil change	first oil change	after 500 hours	-
	further oil changes	every 6 months	up to 12 hours/day
		every 2500 hours	12 to 24 hours/day
		every 1 - 2 months	Extreme temperatures or moisture and other ambience conditions

8.4. Flow volume with oil circular and oil once-through lubrication

Reducer size	Oil flow [l/min]	Reducer size	Oil flow [l/min]
ZS 610, 611	0,05 – 0,10	ZS 620, 621	1,2 – 2,4
ZS 612	0,08 – 0,16	ZS 622	1,4 – 2,8
ZS 613, 614	0,14 – 0,28	ZS 623	1,8 – 3,6
ZS 616	0,20 – 0,40	ZS 624	2,4 – 4,8
ZS 617	0,34 – 0,68	ZS 625	3,6 – 7,2
ZS 618	0,60 – 1,20	ZS 626	5,0 – 10,0
ZS 619	1,0 – 2,0		



The amounts given here are reference values for the CYCLO DRIVE centrifuge reducer. If there should be other lubricating points, e.g. main cylinder bearing, worm bearing, in the oil circulation, these will have to be given special attention when the flow is being determined. Also ensure that this will not cause the oil pressure in the reducer to exceed the permitted values for the shaft seals.

8.5. Lead time of oil pump before machine start-up

The CYCLO DRIVE centrifuge reducer has to be filled with a sufficient oil volume before start-up to make sure that all bearings, especially the eccentric bearing have enough lubricant.



For units with oil circular lubrication according 7.2.2 the forerun time of the oil pump must be long enough, that an oil volume according to the complete cavity has been pumped into the reducer. The volume of the cavity is shown in the assembly drawing.

For units with oil once through lubrication according 7.2.3 the forerun time must be as long as it needs until the oil flows back to the tank. This makes sure, that necessary lubrication after the unit is also provided with oil.

8.6. Oil volume for oil bath lubrication



Reducers with oil bath lubrication must be correctly filled with lubricant before operation starts. The approximate oil volume, respectively the measured capacity is written at the drawing of the reducer. The correct oil volume has to be checked according 7.2.1.

8.7. Grease recommendation

The grease type is shown in the chapters 9 and 10.



Only the grease used at original filling may be used for re-greasing and new filling.

Otherwise decomposition of the mixed greases may happen and damages can occur by lack of lubrication ability.

9. Special regulations

Type: ZSPR 621/190-172

Article number: PB036809

Oil bath lubrication; shipment without lubricant



The gearbox has to be filled with lubricant according chapter 7.2.1. , with suitable oil acc. table 8.2.

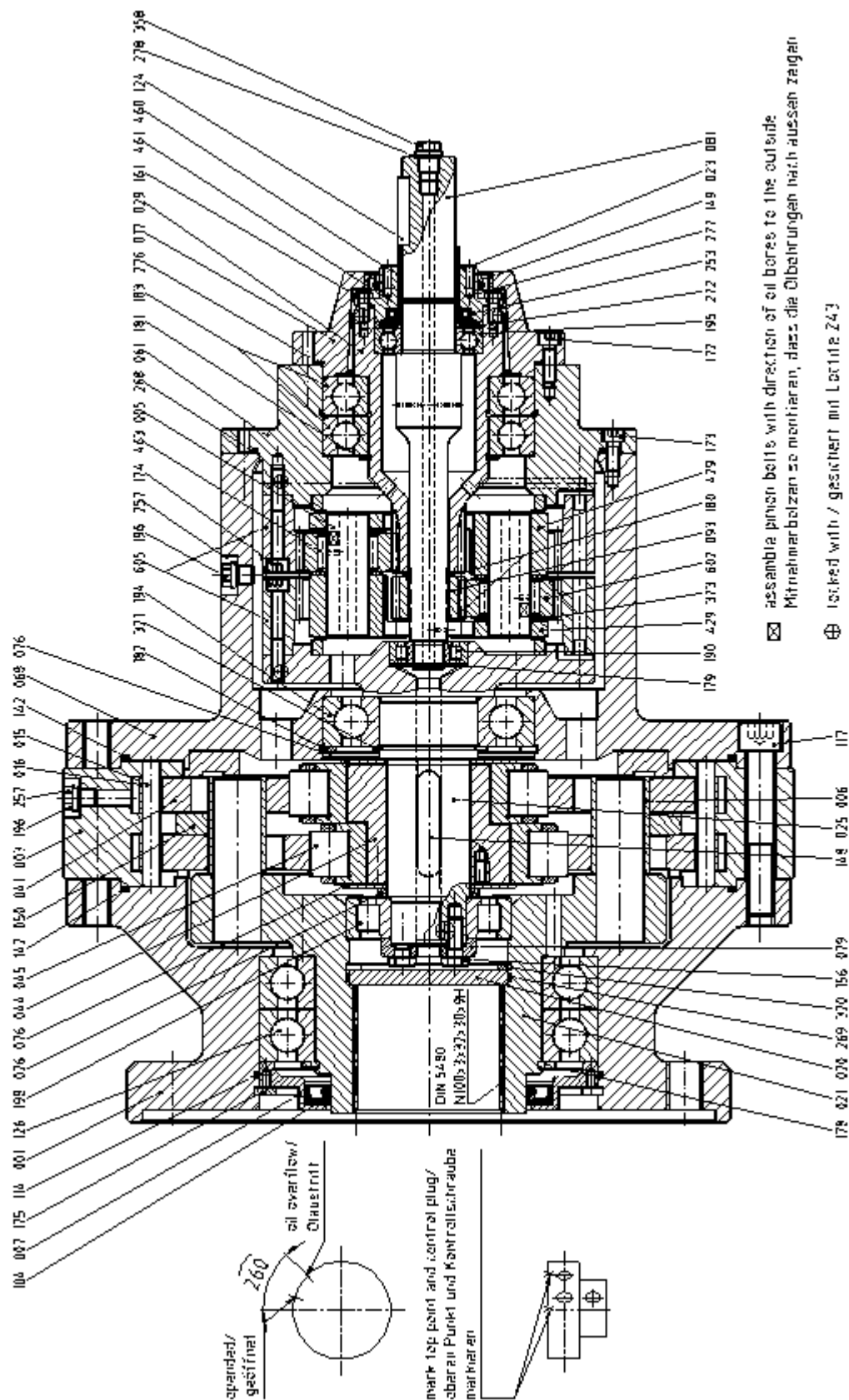
Oil quantity: approx. 7,0 l

10. Assembly drawing

Type: ZSPR 621/190-172

Article number: PB036809

Cavity: approx. 7800 cm³



11. Parts list

Type: ZSPR 621/190-172

Article number: PB036809

ZeP	Art.-No.	Designation	Standard	Qty.
001	131990	CASING		1
021	166912	ZS SLOW SPEEDSHAFT INCL. CUP	(INCL. 020,269,320)	1
007	132124	END CAP		1
178	201565	RETAINING RING ACC.TO DIN	471 A 150X4	1
175	210172	SICHERUNGSRING FÜR BOHRUNG	472 I 225X5	1
126	200047	GROOVED BALL BEARING DIN	625 6030	2
142	201518	O-RING	400X4 NBR	1
114	207029	O-RING	225X3 NBR	1
104	201817	OIL SEAL ZS	BABSL 130X160X12 CO	1
003	116710	RING GEAR HOUSING		1
006	121864	SLOW SPEED SHAFT ROLLERS		12
015	AU2401G	RING GEAR PIN 4215 11.5X84		44
016	AW6396G	RING GEAR ROLLER 621# 1/21-59		88
041	AN9595G	621# 1/43 CYCLOID DISC		2
044	165863	ZS ECCENTRIC BEARING ASS'Y		1
050	121702	SPACER RING		1
076	AU2389G	END PLATE 6215,4215 55X116X3		2
196	202381	HEX HEAD PLUG ACC. TO DIN	910 M 12X 1,5	4
257	205668	SEAL ACC. TO DIN	7603A 12,0X15,5X1,5 C	4
068	135563	INTERMEDIATE FLANGE		1
025	135564	INTERMEDIATE SHAFT		1
321	211341	RETAINING RING ACC.TO DIN 471	471 A 65X2,5	1
182	211307	RETAINING RING ACC.TO DIN 472	472 I 140X4	1
026	204135	SEEGER SUPPORTING PLATE	988 SS 55X 68X 3,0	2
194	5006313-----G	BEARING,BALL,DEEP GRV,6313,65	625 6313	1
198	210538	ROLLER BEARING ACC. TO DIN	5412 NJ 310 EM	1
142	201518	O-RING	400X4 NBR	1
148	AU3061G	KEY 6215,4215 ECC 16X10X70	A 15,91x10x70	1
117	200446	FILLISTER HEAD SCREW DIN	4762 M 18X110 12.9	12
196	202381	HEX HEAD PLUG ACC. TO DIN	910 M 12X 1,5	2
257	205668	SEAL ACC. TO DIN	7603A 12,0X15,5X1,5 C	2
079	135561	THRUST RING FOR RETAINING RIN		1
156	200632	SPANNER BOLT ACC. TO DIN	4017 M 10X 25 8.8 Z	2
605	120176	INTERNAL GEAR		2
429	166917	PLANETARY ASSY	(INCL. 602,005,463,373)	1
093	120178	SUNGEAR		1
174	202363	FILLISTER HEAD SCREW DIN	4762 M 8X 60 8.8 Z	16
061	137951	HIGH SPEED END SHIELD		1
029	135655	SUNGEAR		1
081	135558	HIGH SPEED SHAFT		1
017	135560	END CAP		1
023	135698	END CAP		1
179	203722	RETAINING RING ACC.TO DIN 471	471 A 20X1,2 V	1
180	203034	RETAINING RING ACC.TO DIN 471	471 A 26X1,2	2
181	211368	RETAINING RING ACC.TO DIN	471 A 80X2,5	1
272	207549	SPALT-SEAL	35x 72 LSTO	1
268	207029	O-RING	225X3 NBR	1
276	206910	O-RING	142X3 NBR	1
277	213569	O-RING	32X1,5 NBR	1
253	210940	OIL SEAL ACC. TO DIN	BABSL 40X 55X 6 FK	1
149	205669	OIL SEAL ZS	BAUMX7 65X 85X10	1
124	200859	KEY ACC. TO DIN 6885	A 10X 8X 45	1
195	210315	GROOVED BALL BEARING DIN	625 6207 C3	1
183	212376	GROOVED BALL BEARING DIN	625 6216 C3	2
190	212356	ROLLER BEARING ACC. TO DIN	5412 NJ 304 M C3	1
172	200422	FILLISTER HEAD SCREW DIN	4762 M 8X 25 8.8 Z	8
173	204315	FILLISTER HEAD SCREW DIN	4762 M 8X 20 8.8 Z	8
161	203928	SPANNER BOLT ACC. TO DIN	4017 M 6X 16 8.8	6
460	204143	INNER RING OF BEARING	IR 35X40X30 EGS	1
461	204377	INNER RING OF BEARING	IR 35X40X20 EGS	1

278	201970	SEAL ACC. TO DIN	7603 14,0X20,0X1,0	1
358	DU154LG	HEX HEAD PLUG ACC. TO DIN	910 R 1/4	1

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