

# ZS 600

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## Operating and Maintenance Instructions

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ZS 618 - 59  
Item-No.:

# ZS 600 OPERATING AND MAINTENANCE INSTRUCTIONS

During the preparation of this maintenance manual we made every effort to make it as clear as possible so you can find the information you are looking for quickly and easily. We hope you are happy with this documentation.

If, however, you do have suggestions on how we can improve this maintenance manual to meet your needs, just call us.

We will be pleased to hear your opinion.

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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.

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# ZS 600 OPERATING AND MAINTENANCE INSTRUCTIONS

- 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 centrifugal 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.
- Pay special attention to the sections labelled "**DANGER**" and "**CAUTION**". These provide information on work safety and on the correct use of the machine.



Incorrect use of the machine can lead to injury, serious injury and/or situations which pose a threat to life.



Incorrect use of the machine can lead to injury.



Transport, installation, lubrication, operation, maintenance and inspection may only be carried out by trained technical personnel. Otherwise there is a risk of injury or of damage to the machine.

Never touch moving parts. Keep them free of foreign bodies. Otherwise there is a risk of injury or of damage to the machine.

The equipment may only be used for the prescribed purpose. Otherwise there is a risk of injury or of damage to the 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.

# ZS 600 OPERATING AND MAINTENANCE INSTRUCTIONS

## 1. Inspection upon Delivery



**CAUTION**

- 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 centrifugal 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.

## 1.1 Checking the type designation

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

**ZS<sup>1)</sup> 617<sup>2)</sup> - 25<sup>3)</sup>** (for example)

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

The serial number is a six-figure number. 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.

## 1.2 Checking the lubrication information

### 1.2.1 Grease-lubricated 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.

### 1.2.2 Oil-lubricated reducers

These reducers are delivered without lubricant filling. Make sure that it is filled with the correct lubricant according to chapter 6 of these Operating and Maintenance Instructions before start-up.

# ZS 600 OPERATING AND MAINTENANCE INSTRUCTIONS

## 2. Storage

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

### 2.1 Short-term storage

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

### 2.2 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 centrifugal 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 centrifugal 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.

## 3. Transport



**CAUTION**

Take special care that the CYCLO DRIVE centrifugal reducer does fall over during transport. If possible, stop screws or bore holes should be used. The reducer should never be hung by the drive shaft, the bearings could otherwise be damaged.

Before slinging the reducer to lifting gear, make sure that the capacity given on the type plate, the box, the dimensioned drawing, in the catalogue or anywhere else is sufficient. Never sling the CYCLO DRIVE centrifugal reducer to a crane or to lifting gear if the maximum load capacity of the equipment being used will be exceeded. There is otherwise a risk of injury or of damage to the reducer or lifting gear.

## **4. 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 centrifugal 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 centrifugal reducer must not be replaced with any other screws, the quality of the balance set at works will otherwise not be guaranteed.

## 5. 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.

### 5.1 Delivery

#### 5.1.1 Grease-lubricated reducers

These reducers are delivered with grease filling. A sticker has been attached to these reducers indicating the designation of the lubricant which has been used. Recommended grease is shown in table 6.5. Check carefully whether the lubricant used corresponds with the prescribed lubricant.

#### 5.1.2 Oil-lubricated reducers

These reducers are delivered without lubricant filling. Make sure that you fill it with the correct lubricant.

### 5.2 Grease lubrication



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.

#### 5.2.1 Regreasing during start-up

Regreasing is done via the grease inlet in the CYCLO DRIVE centrifugal reducer drive shaft<sup>1)</sup> (see Figure 1). At least one of the inspection screws<sup>2)</sup> 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).

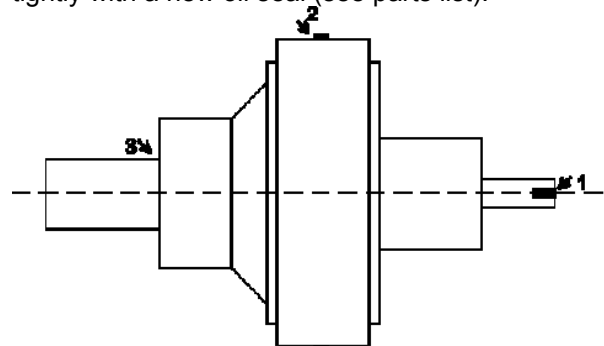


Figure 1

# ZS 600 OPERATING AND MAINTENANCE INSTRUCTIONS

## 5.2.2 Regreasing during operation

### 5.2.2.1 Completely sealed reducer

Completely sealed CYCLO DRIVE centrifugal reducers can only be regreased when the machine is at a standstill. Regreasing is done via the grease inlet in the drive shaft<sup>1)</sup> (see Figure 1). At least one of the inspection screws<sup>2)</sup> 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 (see chapter 6). Recommended lubricating intervals approx. 1x a month or 500 operating hours or according to the instruction from the manufacturer of centrifuges.

### 5.2.2.2 Reducers with grease outlets

Some types of reducer have a proper outlet for the excess grease from regreasing. These reducers can also be regreased during operation. Regreasing can also be done continuously using a centralised lubricating system. Regreasing is done via the grease inlet in the drive shaft<sup>1)</sup> (see Figure 1). The excess grease escapes via the provided opening<sup>3)</sup> (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 specification tables (see chapter 6). Recommended lubricating intervals approx. 1x a month or 500 operating hours or according to the instruction from the manufacturer of centrifuges.

## 5.3 Oil lubrication



**CAUTION**

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.

## 5.3.1 Oil splash lubrication

### 5.3.1.1 Filling with lubricant

On the CYCLO DRIVE centrifugal 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).

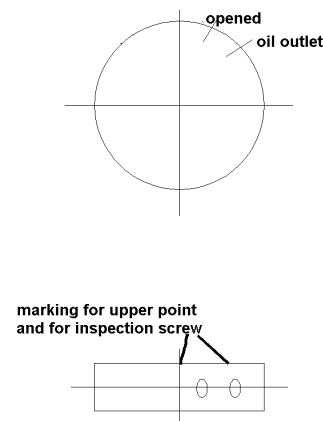


Figure 2

Some reducers with oil splash lubrication have a surge tank connected to the drive shaft which uses a simple rotary transmission leadthrough. 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.

### 5.3.1.2 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.



# ZS 600 OPERATING AND MAINTENANCE INSTRUCTIONS

## 5.3.1.3 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 6.3. 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 proceed as described in Chapter 5.3.1.1.

## 5.3.2 Oil circular lubrication

In CYCLO DRIVE centrifugal reducers with oil circular lubrication, the oil is conducted via a double rotary transmission leadthrough 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 6.4. The correct viscosity has to be selected according to the information in Table 6.1. Suitable lubricating oils are listed in Table 6.2. 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.

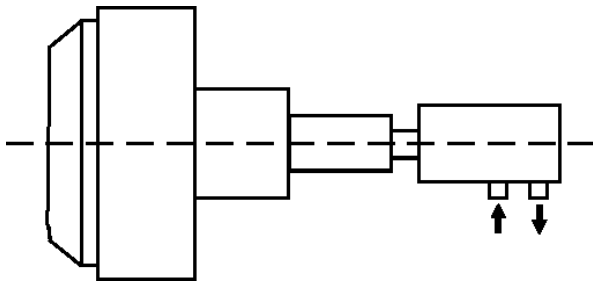


Figure 3

## 5.3.3 Oil once-through lubrication

Some CYCLO DRIVE centrifugal 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 leadthrough (see Figure 4). The minimum oil quantities required for sufficient lubrication can be found in Table 6.4. The correct viscosity has to be selected according to the information in Table 6.1. Suitable lubricating oils are listed in Table 6.2.

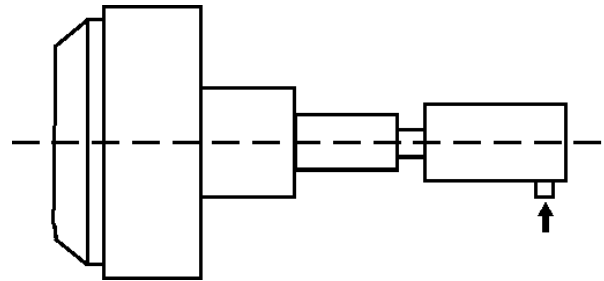


Figure 4 Simple rotary transmission leadthrough

# ZS 600 OPERATING AND MAINTENANCE INSTRUCTIONS

## 6. Tables

### 6.1 Lubricating oil viscosity

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

### 6.2 Recommended lubricating oils

Lubricant according to DIN 51517 Part 3	← possible operating temperatures →							
	Ambient temperature				Operating temperature			
	-20°	0°	+20°	+40°	+60°	+80°	+100°	+120°
CLP 68	[Shaded area from -20° to +80°]							
CLP 100	[Shaded area from 0° to +80°]							
CLP 150	[Shaded area from 0° to +100°]							
CLP 220	[Shaded area from +20° to +100°]							
CLP 320	[Shaded area from +40° to +120°]							

Producer	Lubricating oil types	Producer	Lubricating oil types
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

### 6.3 Oil change intervals

	Time of oil change		Operating conditions
First oil fill	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

#### **6.4 Flow with oil circular and oil once-through lubrication**

<b>Reducer size</b>	<b>Oil flow [l/min]</b>	<b>Reducer size</b>	<b>Oil flow [l/min]</b>
ZS 610, 611	0,025 - 0,05	ZS 620, 621	0,6 - 1,2
ZS 612	0,04 - 0,08	ZS 622	0,7 - 1,4
ZS 613, 614	0,07 - 0,14	ZS 623	0,9 - 1,8
ZS 616	0,1 - 0,2	ZS 624	1,2 - 2,4
ZS 617	0,17 - 0,34	ZS 625	1,8 - 3,6
ZS 618	0,3 - 0,6	ZS 626	2,5 - 5,0
ZS 619	0,5 - 1,0		

The amounts given here are reference values for the CYCLO DRIVE centrifugal 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.

#### **6.5 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 5.3.1.

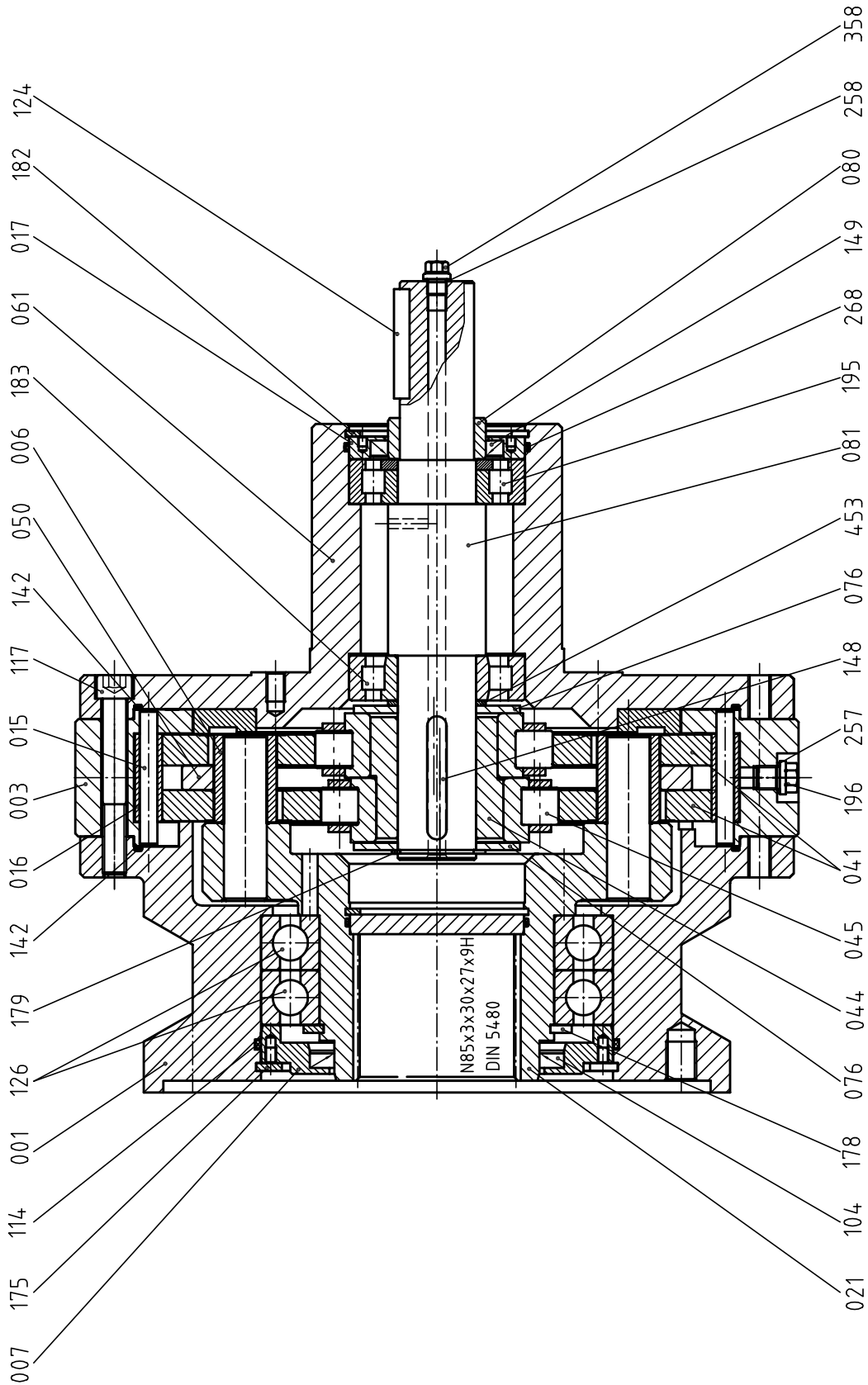
#### **6.6 Recommended grease**

- SHELL Alvania R2
- SHELL Darina 2

# ZS 600 OPERATING AND MAINTENANCE INSTRUCTIONS

ZS 618 – 59

Article-No.:



# ZS 600 OPERATING AND MAINTENANCE INSTRUCTIONS

## ZS 618 – 59

<b>ZeP</b>	<b>Art.-No.</b>	<b>Parts name</b>	<b>Standard</b>	<b>Qty.</b>
001	130413	casing		1
021	130414	slow speed shaft		1
007	119441	seal cover		1
178	201562	retaining ring	471 A 120X4	1
175	201608	retaining ring	472 I 180X4	1
126	200042	cusc. radiale a sfera	625 6024	2
104	201921	oil seal	BABSL 105X130X 7,5	1
142	206891	O-ring	304X3 Viton	1
114	206893	O-ring	180X4 Viton	1
003	130392	ring gear housing		1
006	130121	slow speed shaft roller		12
015	AU9281G	ring gear pin		60
016	AW6270G	ring gear roller		60
041	AN9427	cycloid disc		2
044	941EC418-59EG	eccentric bearing		1
050	121700	spacer		1
076	DU261LG	support ring		2
196	202381	plug	910 M 12X 1,5	2
257	205668	seal ring	7603A 12,0X15,5X1,5 CU	2
061	119438	flange		1
081	119439	high speed shaft		1
017	117899	seal cover		1
080	119440	ring		1
179	203450	retaining ring	A 40X1,75L	1
183	200229	cylidrical roller bearing	5412 NJ308 P	1
195	204880	cylidrical roller bearing	5412 NUP308 EP	1
453	201391	support ring	988 SS 40X 50X 2,5	1
146	203227	key	A 10X 8X 63	1
182	241K090-NG	retaining ring	472 I 90	1
149	202502	oil seal	3760BA 50X 68X 8	1
117	200437	fillister socket head screw	4762 M 12X 90 8.8	8
142	206891	O-ring	304X3 Viton	1
268	202980	O-ring	90X3 Viton	1
124	200864	key	A 10X 8X 56	1
358	202382	plug	910 M10x1,0	1
258	204111	seal ring	7603A 10x13,5x1,0 Cu	1
	204558	shim	988 PS 40x50x0,2	1
	204330	shim	988 PS 40x50x0,1	2
	204559	shim	988 PS 40x50x0,5	1

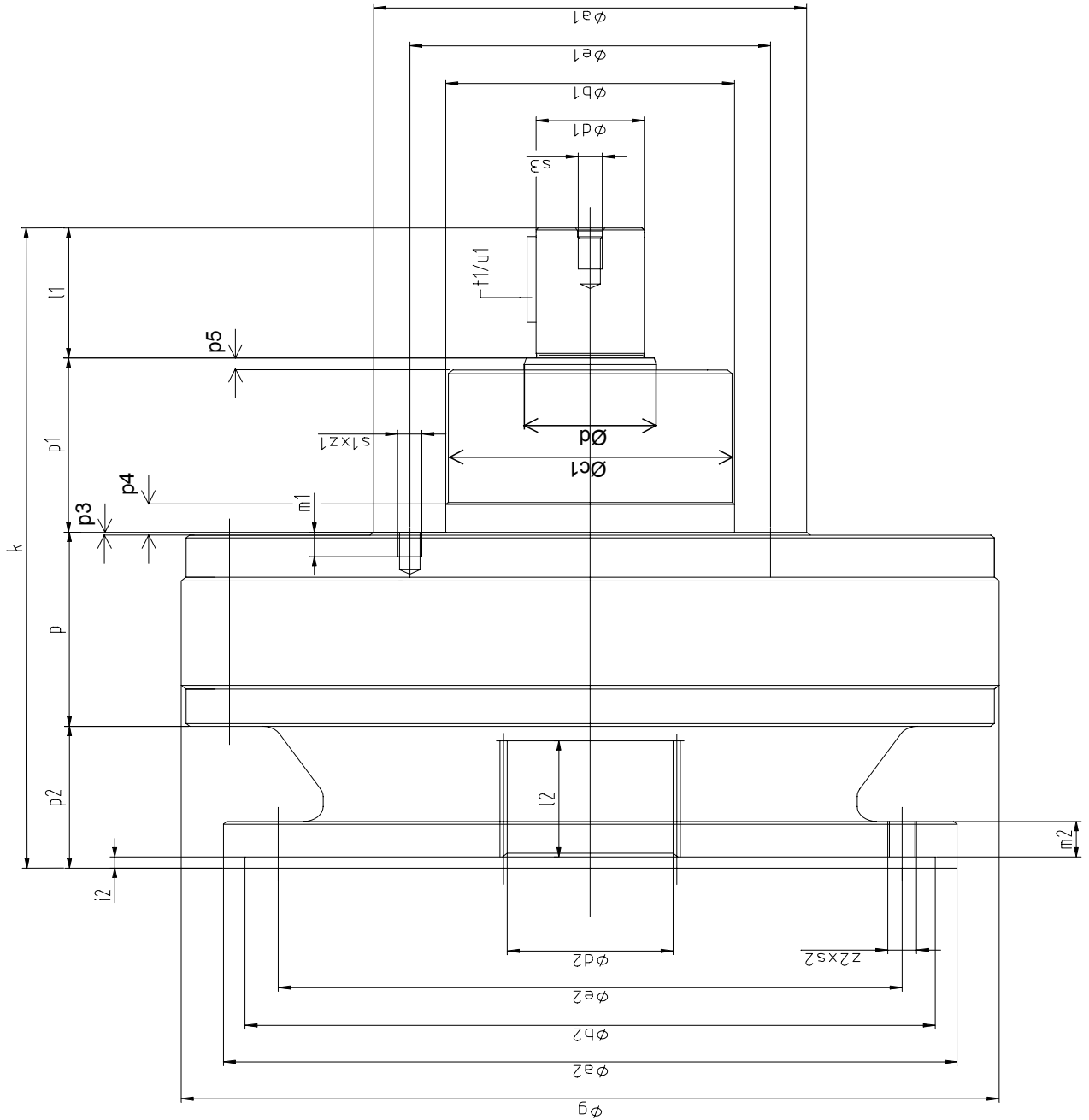
# ZS 600



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<b>Series ZS 600</b>	Anschlussmaße
	Tie-in Dimensions
<b>Abmessungen für Standardausführung</b>	<b>Z - 7002</b>
<b>Dimension of Standard Design</b>	Seite/Page 1/2

General outline drawing for ZS 600 reducers (dimensions on page 2)  
*Allgemeine Maßzeichnung für ZS 600 Getriebe (Maße auf Seite 2)*



Datum/Date: 31.03.2005	<b>Sumitomo Drive Technologies</b>	made by: cm
Datei/File: Z_7002_02		checked by: cm
Änderung/Change: 2		approved by: cm

<b>Series ZS 600</b>	Anschlussmaße
	Tie-in Dimensions
<b>Abmessungen für Standardausführung</b>	<b>Z - 7002</b>
<b>Dimension of Standard Design</b>	Seite/Page 2/2

**Nachfolgende Tabellen zeigen die Hauptabmessungen von ZS 600 Getrieben**  
*The following tables are showing the outline dimensions of ZS 600 reducers*

#	g	p	p <sub>1</sub>	p <sub>2</sub>	p <sub>3</sub>	p <sub>4</sub>	p <sub>5</sub>	a <sub>2</sub>	b <sub>2</sub>	e <sub>2</sub>	d <sub>2</sub>	l <sub>2</sub>	i <sub>2</sub>	s <sub>2</sub>	z <sub>2</sub>	m <sub>2</sub>
610	150	60	43	65	1	5	1,5	130	120	105	N30x1,25x30x22x9H	30	4	M8	8	14
611																
612	204	70	48	72	1	8	2	160	150	135	N40x2x30x18x9H	45	5	M10	8	15
614	230	80	50	75	1	8	2	170	160	145	N50x2x30x24x9H	45	5	M10	8	15
616	300	102	94	69	1	12	2,5	240	230	205	N60x3x30x18x9H	64	5	M12	8	18
617	340	104	105	99	2	12	2,5	275	260	230	N75x3x30x24x9H	65	6	M16	8	20
618	370	105	130	105	2	12	3	300	280	250	N85x3x30x27x9H	70	6	M16	8	20
619	430	118	140	117	2	12	3	320	300	265	N85x3x30x27x9H	78	7	M16	12	21
620																
621	485	131	150	119	2	15	3	400	380	340	N100x3x30x32x9H	80	8	M24	6	24
622	526	150	160	115	5	25	4	400	380	340	N100x3x30x32x9H	80	8	M24	6	27
623	562	160	170	150	5	25	4	400	380	340	N120x3x30x38x9H	90	8	M24	6	30
624	614	170	190	170	5	25	4	400	380	340	N120x3x30x38x9H	90	8	M24	12	30
625	670	205	220	180	5	25	4	400	380	340	N130x3x30x42x9H	110	10	M24	12	35
626	736	230	220	180	5	25	4	400	380	340	N130x3x30x42x9H	110	10	M24	12	35

#	a <sub>1</sub>	b <sub>1</sub>	c <sub>1</sub>	e <sub>1</sub>	d <sub>1</sub>	d	l <sub>1</sub>	u <sub>1</sub>	t <sub>1</sub>	s <sub>1</sub>	z <sub>1</sub>	m <sub>1</sub>	s <sub>3</sub>	k	k <sub>1</sub>	Masse
610	95	65	64	80	19	25	25	6	21,5	M6	4	9	M10x1	193		13
611																
612	105	75	74	90	24	35	35	8	27	M6	6	9	M10x1	225		25
614	115	80	79	95	24	35	45	8	27	M6	6	10	M10x1	250		35
616	150	110	109	130	32	50	60	10	35	M6	6	12	M10x1	326		66
617	170	120	118	145	32	50	60	10	35	M8	6	12	M10x1	368		90
618	190	130	128	165	38	50	70	10	41	M10	6	15	M10x1	410		125
619	210	150	148	180	45	60	75	14	48,5	M10	8	15	M10x1	450		195
620																
621	230	160	159	200	50	70	80	14	53,5	M12	8	20	G1/2	480	130	270
622	250	180	179	220	55	80	90	16	59	M12	8	20	G1/2	515	130	340
623	260	190	189	230	60	100	100	18	65	M12	8	20	G1/2	580	130	430
624	270	200	199	240	65	100	110	18	70	M12	8	20	G3/4	640	150	520
625	320	240	239	290	80	120	140	22	85	M16	8	24	G3/4	745	150	730
626	340	260	259	310	85	120	150	22	90	M16	8	24	G3/4	780	150	900

**k<sub>1</sub> gibt die Länge einer Zweige-Drehdurchführung an (≥ # 621; nicht in Zeichnung Seite 1)**  
**k<sub>1</sub> is the length of a two way rotary transmission (≥ #621; not shown in drawing page 1)**

Tolerances/Toleranzen:  
b<sub>2</sub>:H7  
d<sub>1</sub>:j6  
b<sub>1</sub>:h7

**Alle Abmessungen sind unverbindlich; gültige Ausführung nur Maßzeichnung mit Kundenfreigabe**  
**all dimensions subject to change; valid design only dimensional drawing with customer's release**

Änderung 2: Maße p<sub>2</sub> und k für Größe 624 geändert  
change 2: dimensions p<sub>2</sub> and k for size 624 changed

Datum/Date: 31.03.2005	<b>Sumitomo Drive Technologies</b>	made by: cm
Datei/File: Z_7002_02		checked by: cm
Änderung/Change: 2		approved by: cm