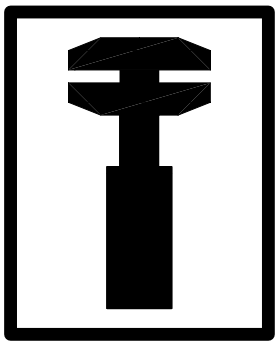

Ordering-No.: 5871 214 002 E

ZF – DROP CENTER AXLE AV-132

Version: wheel head with compact bearing

ZF Passau GmbH
Donaustr. 25 - 71
D-94034 Passau

REPAIR MANUAL

ZF – DROP CENTER AXLE AV-132

Version: wheel head with compact bearing

Note:

The great variety of ZF units compels a restriction of the Disassembly and Reassembly Manuals to a standard ZF production unit.
This documentation has been developed for the skilled Serviceman, trained by ZF Passau for the repair on ZF-units.
Continuous technical improvement of the ZF units as well as extensions concerning design possibilities might require deviating work steps as well as deviating setting and test data.

This Disassembly and Reassembly Manual is based on the design level of a ZF production unit at the time of preparation of the Repair Manual**.**

ZF Passau GmbH reserves the right to replace this Disassembly and Reassembly Manual by an updated edition at any time without prior notice. Upon request, ZF Passau GmbH shall advise which edition is currently valid.

Observe the specifications of the Lubrication and Maintenance Instructions (ZF order no. 5871 214 902) and ZF List of Lubricants TE-ML 12 when carrying out repair works.

The ZF List of Lubricants will be constantly updated – To order it or have a look at it, please contact:

- Any ZF plant
- Any ZF After Sales Service Center
- Internet http://www.zf.com/ **Service / Techn. Information**

Observe the specifications of the relevant brake manufacturer and vehicle manufacturer for service and maintenance works on the brake facility.

ATTENTION:

Observe the vehicle manufacturer's instructions and specifications for installation and commissioning of the unit!

ZF Passau GmbH
Donaustr. 25 - 71
94034 Passau
Dept : ASD

1. Edition: 2004/09

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PREFACE

The present document was prepared for expert staff trained by the ZF Passau regarding maintenance and repair of ZF-systems.

Documented is a ZF series product representing the design state at the date of publication of this document.

However, in view of technical further developments of the product, the repair of the system available to you can require deviating working steps as well as deviating settings and test data.

Therefore, we recommend to you, to give your ZF-product into the hand of masters and qualified fitters whose practical and theoretical training is permanently updated and supplemented in our after-sales service training centre.

The service stations established all over the world by the Zahnradfabrik Friedrichshafen are offering to you the following:

1. Continuously trained staff

2.Specified equipment, e.g. special tools

3.Genuine-ZF spare parts representing the latest state of development

All works are carried out here with utmost care and reliability.

Within the scope of the respectively valid contract terms, repair works performed by ZF service stations are additionally covered by the ZF warranty.

Damage occurring due to works carried out improperly or in a non-workmanlike manner by others than ZF staff with possibly resulting consequential costs are excluded from this contractual liability.

The same applies, if the use of genuine ZF parts is renounced.

ZF Passau GmbH

After-sales Service

GENERAL

The Service Manual covers all works required for dismantling and the pertaining installation.
When repairing the transmission, ensure utmost cleanliness and that the works are carried out in an expert-like manner.
The transmission should only be disassembled for renewing damaged parts. Covers and housing parts installed with seals must be loosened by slight blows with a plastic mallet after screws and nuts have been removed. For removing parts being in tight contact with the shaft such as antifriction bearings, bearing races, and similar, use suitable pulling devices.

Dismantling and mounting works must be carried out at a clean working place. Use the special tools developed for this purpose. Prior to the re-installation of the parts, clean the contact surfaces of housings and covers from the residues of old seals. Remove burrs, if any, or similar irregularities with an oil stone. Clean housings and locking covers with a suitable detergent, in particular corners and angles. Damaged parts or parts heavily worn down must be renewed. Here, the expert must assess, whether parts such as antifriction bearings, thrust washers etc. subjected to normal wear during operation, can be installed again.
Parts such as sealing rings, lock plates, split pins etc. must generally be renewed. Radial sealing rings with worn down or torn sealing lip must also be renewed. Particularly ensure that no chips or other foreign bodies remain in the housing. Lube oil bores and grooves must be checked for unhindered passage.
All bearings must be treated with operating oil prior to installing them:

REFE-RENCE: For heating up parts such as bearings, housings etc., only a heating furnace or an electric drier is permitted to be used!

CAUTION
When assembling the transmission, absolutely observe the indicated torque limits and adjustment data. Screws and nuts must be tightened according to the enclosed standard table, unless otherwise specified.
In view of the risk of functional failures in the control unit, the use of liquid sealing agents is not permitted.
By no means, Molykote is permitted to be used.
Lined plates must not be washed. They must be cleaned with a leather cloth.

DANGER
When using detergents, observe the instructions given by the manufacturer regarding handling of the respective detergent.

Structure of the Repair Manual

The structure of this Repair Manual reflects the sequence of the working steps for completely disassembling the dismantled transmission. Dismantling and installing as well as the disassembly and assembly of a main group are always summarized in one chapter.
Special tools required for performing the respective repair works are listed under „Special tools“.

Important information on industrial safety

Generally, the persons repairing ZF-sets are responsible on their own for the industrial safety.

The observation of all valid safety regulations and legal impositions is the pre-condition for avoiding damage to persons and to the product during maintenance and repair works.
Persons performing repair works must familiarize themselves with these regulations.

The proper repair of these ZF-products requires the employment of suitably trained and skilled staff.
The repairer is obliged to perform the training.
The following safety references are used in the present Repair Manual:

☞	Serves as **reference** to special working procedures, methods, information, the use of auxiliaries etc..

CAUTION	Is used, if a deviating and improper working procedure can **damage the product**.

⚠ DANGER	Is used, if lacking care can lead to **personal injury or danger to life**.

REFE-RENCE	Prior to starting the checks and repair works, thoroughly study the present instructions.

CAUTION:	Illustrations, drawings and parts do not always represent the original; the working procedure is shown. The illustrations, drawings, and parts are not drawn to scale; conclusions regarding size and weight must not be drawn (not even within one representation). The works must be performed according to the description..

REFE-RENCE:	After the repair works and the checks, the expert staff must convince itself that the product is properly functioning again. .

TRAGBILDBEISPIELE ZUR GLEASONVERZAHNUNG

EXAMPLES OF GEAR-TOOTH-CONTACT PATTERNS FOR THE GLEASON GEAR-TOOTH SYSTEM

EXEMPLES POUR LA DENTURE GLESON

Ideales Tragbild d.h. die Ritzeldistanz stimmt

Ideal tooth-contact pattern i.e. pinion distance is correct

L'engrènement idéal, c'est-à-dire, la distance du pignon est correcte

Bild / Figure 1/3/5

Schubflanke (Konkav)

Coast side (concave)

Côté poussé (concave)

Bild / Figure 1

Bild / Figure 2/4/6

Zugflanke (Konvex)

Drive side (convex)

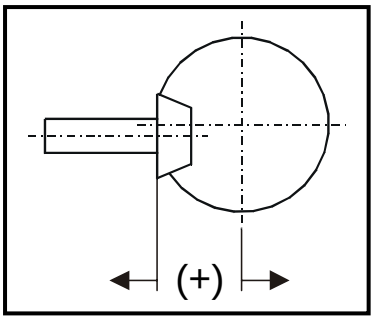
Côté entraîné (convexe)

Bild / Figure 2

Ritzeldistanz muß größer werden

Pinion distance must be increased

La distance du pignon doit être augmentée



Ritzeldistanz muß kleiner werden

Pinion distance must be decreased

La distance du pignon doit être diminuée

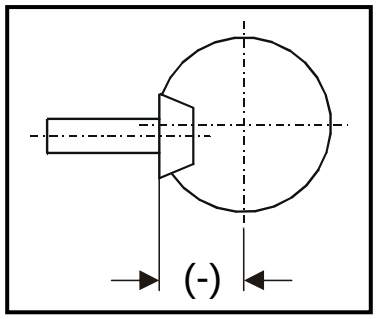


Bild / Figure 3

Bild / Figure 5

Bild / Figure 4

Bild / Figure 6

VERGLEICHSTABELLE FÜR MASSEINHEITEN
CONVERSION TABLE
TABLEAU DE CONVERSION

25,40 mm	=	1 in (inch)
1 kg (Kilogramm)	=	2,205 lb (pounds)
9,81 Nm (1 kpm)	=	7,233 lbf x ft (pound force foot)
1,356 Nm (0,138 kpm)	=	1 lbf x ft (pound force foot)
1 kg / cm	=	5,560 lb / in (pound per inch)
1 bar (1,02 kp/cm^2)	=	14,5 psi (pound force per squar inch lbf/in^2)
0,070 bar (0,071 kp/cm^2)	=	1 psi (lbf/in^2)
1 Liter	=	0,264 Gallon (Imp.)
4,456 Liter	=	1 Gallon (Imp.)
1 Liter	=	0,220 Gallon (US)
3,785 Liter	=	1 Gallon (US)
1609,344 m	=	1 Mile (Landmeile)
0° C (Celsius)	=	+ 32° F (Fahrenheit)
0 ° C (Celsius)	=	273,15 Kelvin

BEZEICHNUNG DER GESETZLICHEN EINHEITEN
DENOMINATION OF STANDARD DIMENSIONS
DENOMINATION DES DIMENSIONS STANDARDISEES

Hinweis : längenbezogene Maße in kg/m; flächenbezogene Maße in t/m^2

Note : linear density in kg/m; areal density in t/m^2

Nota : Density lineaire en kg/m; Density superficielle en t/m^2

Begriff **Unit** **Uniteo**	**Formelzeichen**	**neu** **New** **Nouveau**	**alt** **old** **Vieu**	**Umrechnung** **Conversion** **Conversion**	**Bemerkungen** **Not** **e** **Nota**
Masse Mass Mass	m	kg (Kilogramm)	kg		
Kraft Force Force	F	N (Newton)	kp	1 kp = 9,81 N	
Arbeit Work Travail	A	J (Joule)	kpm	0,102 kpm = 1J = 1 Nm	
Leistung Power Puissance	P	KW (Kilowatt)	PS (DIN)	1 PS = 0,7355 KW 1 KW = 1,36 PS	
Drehmoment Torque Couple	T	Nm (Newtonmeter)	kpm	1 kpm = 9,81 Nm	T (Nm) = F (N) . r (m)
Kraftmoment Moment (Force) Moment (Force)	M	Nm (Newtonmeter)	kpm	1 kpm = 9,81 Nm	M (Nm) = F (N) . r (m)
Druck (Über-) Pressure (Overpress) Pression (Sur-)	pü	bar	atü	1,02 atü = 1,02 kp/cm^2 = 1 bar = 750 torr	
Drehzahl Speed Nombre de Tours	n	min^{-1}			

TIGHTENING TORQUES FOR PLUGS (IN Nm) ACC. TO ZF-STANDARD 148

Friction coefficient: μ tot.= 0.12 for plugs and nuts without rework. as well as phosphated nuts. Tighten manually!

Take tightening torques from the chart below. unless otherwise specified :

Metric ISO-standard thread DIN 13. page 13

Size	8.8		10.9		12.9
M4	2.8		4.1		4.8
M5	5.5		8.1		9.5
M6	9.5		14		16.5
M7	15		23		28
M8	23		34		40
M10	46		68		79
M12	79		115		135
M14	125		185		215
M16	195		280		330
M18	280		390		460
M20	390		560		650
M22	530		750		880
M24	670		960		1100
M27	1000		1400		1650
M30	1350		1900		2250
M33	1850		2600		3000
M36	2350		3300		3900
M39	3000		4300		5100

Metric ISO- fine thread DIN 13. page 13

Size	8.8		10.9		12.9
M 8 x 1	24		36		43
M 9 x 1	36		53		62
M 10 x 1	52		76		89
M 10 x 1.25	49		72		84
M 12 x 1.25	87		125		150
M 12 x 1.5	83		120		145
M 14 x 1.5	135		200		235
M 16 x 1.5	205		300		360
M 18 x 1.5	310		440		520
M 18 x 2	290		420		490
M 20 x 1.5	430		620		720
M 22 x 1.5	580		820		960
M 24 x 1.5	760		1100		1250
M 24 x 2	730		1050		1200
M 27 x 1.5	1100		1600		1850
M 27 x 2	1050		1500		1800
M 30 x 1.5	1550		2200		2550
M 30 x 2	1500		2100		2500
M33 x 1.5	2050		2900		3400
M 33 x 2	2000		2800		3300
M 36 x 1.5	2700		3800		4450
M 36 x 3	2500		3500		4100
M 39 x 1.5	3450		4900		5700
M 39 x 3	3200		4600		5300

LIST OF TOOLS FOR DISASSEMBLY AND REASSEMBLY

1. ZF – DROP-CENTER AXLE AV - 132
Disassembly and reassembly
4472 036 072

Disassembly Chapter/Fig.	Reassembly Chapter/Fig.	Designation and Application	Part number
1 / 1		**Assembly truck cpl.** with tilting device **Support** Universal use. For clamping the cpl. axle on the assembly truck.	**5870 350 000** **5870 350 093**
1 / 6	2 / 93	**Slotted nut wrench#** To loosen and tighten the slotted nut M105x1.5 0637 504 083 on the hub carrier.	**5870 401 146**
1 / 7	2 / 92	**Lifting device#** Universal use. Facilitates disassembly and reassembly of the preassembled hub on the hub carrier.	**5870 281 043**
1 / 9 1/32		**Pry bar** 2 pieces necessary Universal use. To separate components, disassembly of seal rings, bearings etc.	**5870 345 071**
1 / 15		**Lifting strap** Universal use. Facilitates the disassembly and reassembly of the hub or of the complete hub carrier.	**5870 281 026**
1 / 16 1 / 29		**Striker#** Universal use. To remove the bearing outer rings from the hub carrier or the housing hole.	**5870 650 004**
1 / 18		**Rapid grip** To pull off the bearing inner ring 27695= 0750 117 141 from the output gear. Can be used together with: **Basic device**	**5873 012 013** **5873 002 001**

LIST OF TOOLS FOR DISASSEMBLY AND REASSEMBLY

1. ZF – DROP-CENTER AXLE AV - 132
Disassembly and reassembly
4472 036 072

Disassembly Chapter/Fig.	Reassembly Chapter/Fig.	Designation and Application	Part number
1 / 19	2 / 38 2 / 75	**Lifting chain** **3 parts** Universal use. For various lifting works.	**5870 281 047**
1 / 20		**Assembly truck cpl.** with tilting device **Clamping plate** Universal use. For clamping the complete portal drive onto the assembly truck.	**5870 350 000** **5870 350 119**
1 / 20	2 /56	**Adjusting screws** 1 set = 2 pieces Universal use. To position and align the bearing bolts in the drop center housing / intermediate gear bearing.	**5870 204 022**
1 / 26		**Rapid grip** To pull bearing inner ring JLM710949 = 0750 117 210 off from the differential carrier. Can be used together with : **Back-off insert**	**5873 011 012** **5870 026 100**
1 / 26		**Pry bar** To pull bearing inner ring 32213 = 0635 373 018 off from the differential carrier. Crown gear side. Can be used together with : **Basic device**	**5873 002 025** **5873 002 001**
1 / 30		**Hot air blower** **230 V** **Hot air blower** **115 V** Universal use. To warm housing and bearings as well as connections fixed with LOCTITE.	**5870 221 500** **5870 221 501**

LIST OF TOOLS FOR DISASSEMBLY AND REASSEMBLY

1. ZF – DROP-CENTER AXLE AV - 132
Disassembly and reassembly
4472 036 072

Disassembly Chapter/Fig.	Reassembly Chapter/Fig.	Designation and Application	Part number
1 / 30	2 / 12 2 / 43	**Slotted nut wrench #** **ø 86 mm** **Slotted nut wrench #** **ø 81 mm** To loosen and tighten the slotted nut 0737 502 146 on the pinion shaft. Attention: Differing flange diameters 4460 305 255 / 441 / 468 / 477 = ø 86 mm necessitate different tools. Can be used together with: **Clamping yoke** **Centering flange**	**5870 401 093** **5870 401 139** **5870 240 002** **5870 912 015**
1 / 33		**Press off tool#** To press off the bevel gear shaft from the axle housing.	**5870 080 044**
1 / 35		**Gripping insert** To pull the bearing inner ring JH913848 = 0750 117 619 off from the bevel gear shaft. Can be used together with: **Reducer** Size 3/ Size 2 **Basic device**	**5873 003 022** **5873 003 011** **5873 002 001**
1 / 36		**Internal extractor** Universal use. To remove the bearing outer ring JW6010 = 0750 117 003 from the axle housing input pinion. Can be used together with: **Counter support**	**5870 300 019** **5870 300 020**
	2 / 4 2 /64 2 /73	**Straightedge #** Universal use. For various measuring processes. **Digital depth gauge #** 200 mm **Gauge blocks**# 70mm 1 set of 2	**5870 200 022** **5870 200 072** **5870 200 066**

LIST OF TOOLS FOR DISASSEMBLY AND REASSEMBLY

1. ZF – DROP-CENTER AXLE AV - 132
Disassembly and reassembly
4472 036 072

Disassembly Chapter/Fig.	Reassembly Chapter/Fig.	Designation and Application	Part number
	2 / 7	**Assembly fixture#** To pull the bearing outer ring JH913848 = 0750 117 619 into the axle housing.	**5870 345 080**
	2 / 13 2 / 40	**Slotted nut wrench** **1 – 12 Nm** **Reducer** **½“ – ¼“** Universal use. To calculate and check rolling resistance in the pinion bearing.	**5870 203 031** **5870 656 056**
	2 / 25	**Driver** To insert bearing outer ring JLM710949 = 0750 117 210 into the axle housing (differential bearing). Can be used with : **Handle**	**5870 058 078** **5870 260 002**
	2 / 28 2 / 30 2 / 31	**Measuring cover #** To preclamp the differential in the axle housing. Calculate backlash as well as bearing preload = rolling torque in the differential bearing.	**5870 200 121**
	2 / 31 2 / 33 2 / 34	**Magnetic stand #** **Dial indicator #** **Straightedge #** Universal use. To calculate and measure the backlash in the bevel gear set.	**5870 200 055** **5870 200 057** **5870 200 022**
	2 / 41	**Driver #** To insert the shaft seal 90x125x12/19 = 0734 319 589 into the axle housing hole (input).	**5870 048 216**
	2 / 42	**Driver** To press the protective shield 4460 311 206 onto input flange 4460 305 477 . Can be used with: **Handle**	**5870 056 008** **5870 260 004**

LIST OF TOOLS FOR DISASSEMBLY AND REASSEMBLY

1. ZF – DROP-CENTER AXLE AV - 132
Disassembly and reassembly
4472 036 072

Disassembly Chapter/Fig.	Reassembly Chapter/Fig.	Designation and Application	Part number
	2 / 47	**Assembly fixture#** To preclamp cup spring 0750 106 080 to facilitate the assembly of the drive wheel.	**5870 345 103**
	2 / 52	**Plug gauge#** **Magnetic stand #** **Dial indicator #** **Pry bar#** 2 pieces To calculate and adjust the backlash in the intermediate gear bearing.	**5870 200 094** **5870 200 055** **5870 200 057** **5870 345 071**
	2 / 56	**Adjusting screws** 1 set = 2 pcs Universal use. To position and align the bearing bolt in the drop center housing / intermediate gear bearing.	**5870 204 022**
	2 / 61 2 / 63 2 / 64 2 / 73	**Measuring ring#** **Digital depth gauge #** **Measuring bar#** **Straightedge #** To calculate and adjust the output gear bearing.	**0730 161 832** **5870 200 072** **5870 200 127** **5870 200 022**
	2 /68	**Pressing fixture#** To press protective shield 4472 335 730 onto the hub carrier.	**5870 506 162**
	2 / 77	**Wheel bolt puller** In connection with : **Insert** M22x1.5 **Insert** 7/8 – 11 BSF to insert the wheel bolts 4474 306 180 M22x1,5 4472 335 281 / 461 7/8 – 11 BSF into the hub hole. Repair solution.	**5870 610 010** **5870 610 002** **5870 610 008**

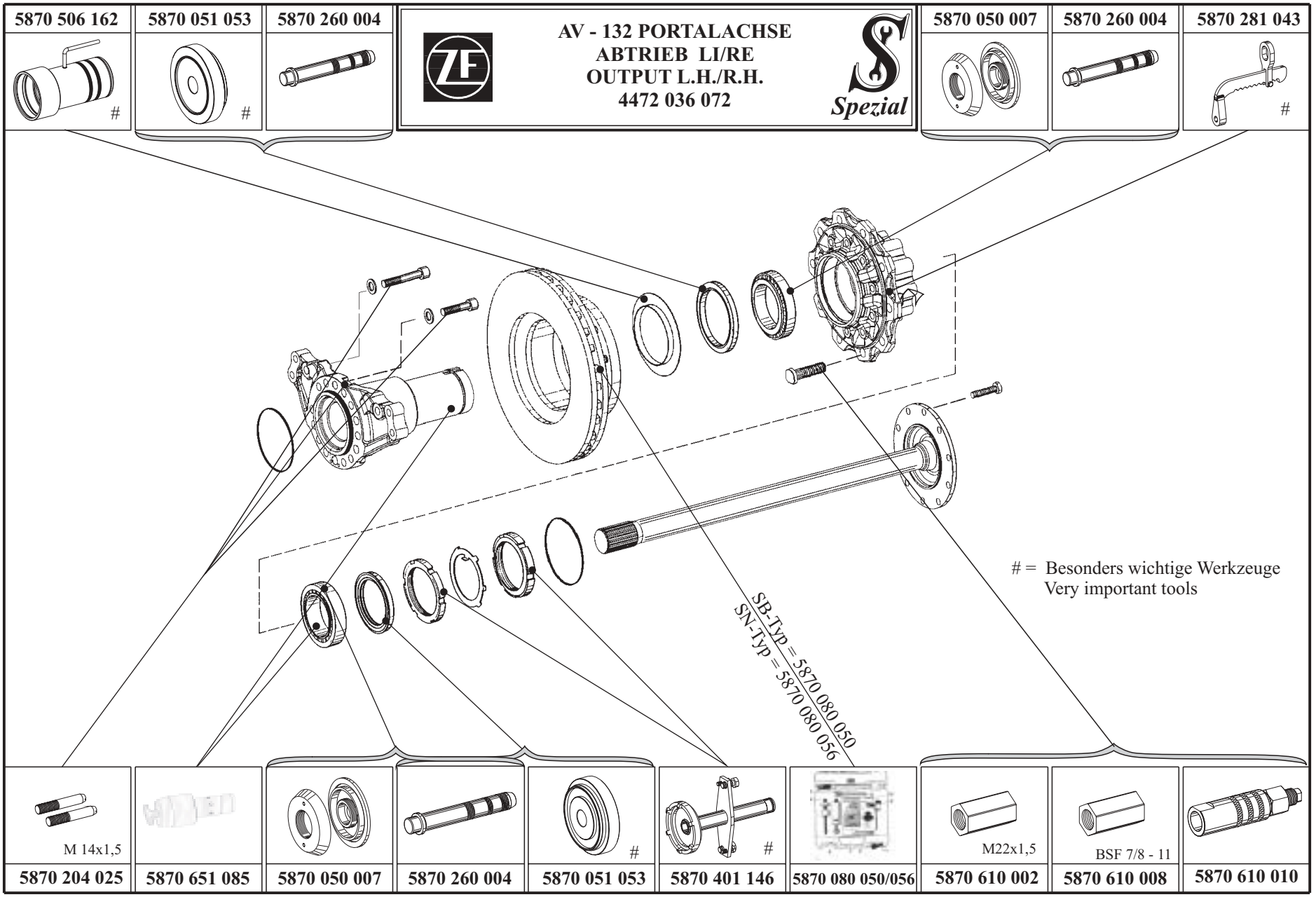
LIST OF TOOLS FOR DISASSEMBLY AND REASSEMBLY

1. ZF – DROP-CENTER AXLE AV - 132
Disassembly and reassembly
4472 036 072

Disassembly Chapter/Fig.	Reassembly Chapter/Fig.	Designation and Application	Part number
	2 / 80	**Driver#** To insert bearing outer ring 0735 371 966 into the hub hole. Can be used together with: **Handle**	**5870 050 007** **5870 260 004**
	2 / 87 2 / 88	**Driver #** To insert shaft seals 0734 319 643 and 0734 319 644 into the hub hole. Can be used with: **Handle**	**5870 051 053** **5870 260 004**
	2 / 91	**Inner installer** To align and position the preassembled hub onto the hub carrier.	**5870 651 085**
	2 / 99	**Air connection#** with reducer valve **Reducer #** M24 x 1.5 for leakage test of the complete output**.**	**5870 286 079** **5870 286 080**
		Plastic hammer **∅ 60 mm** Universal use. For careful disassembly and reassembly of sensitive parts. # = tools of particular importance.	**5870 280 004**

AV - 132 PORTALACHSE
ABTRIEB LI/RE
OUTPUT L.H./R.H.
4472 036 072

Spezial

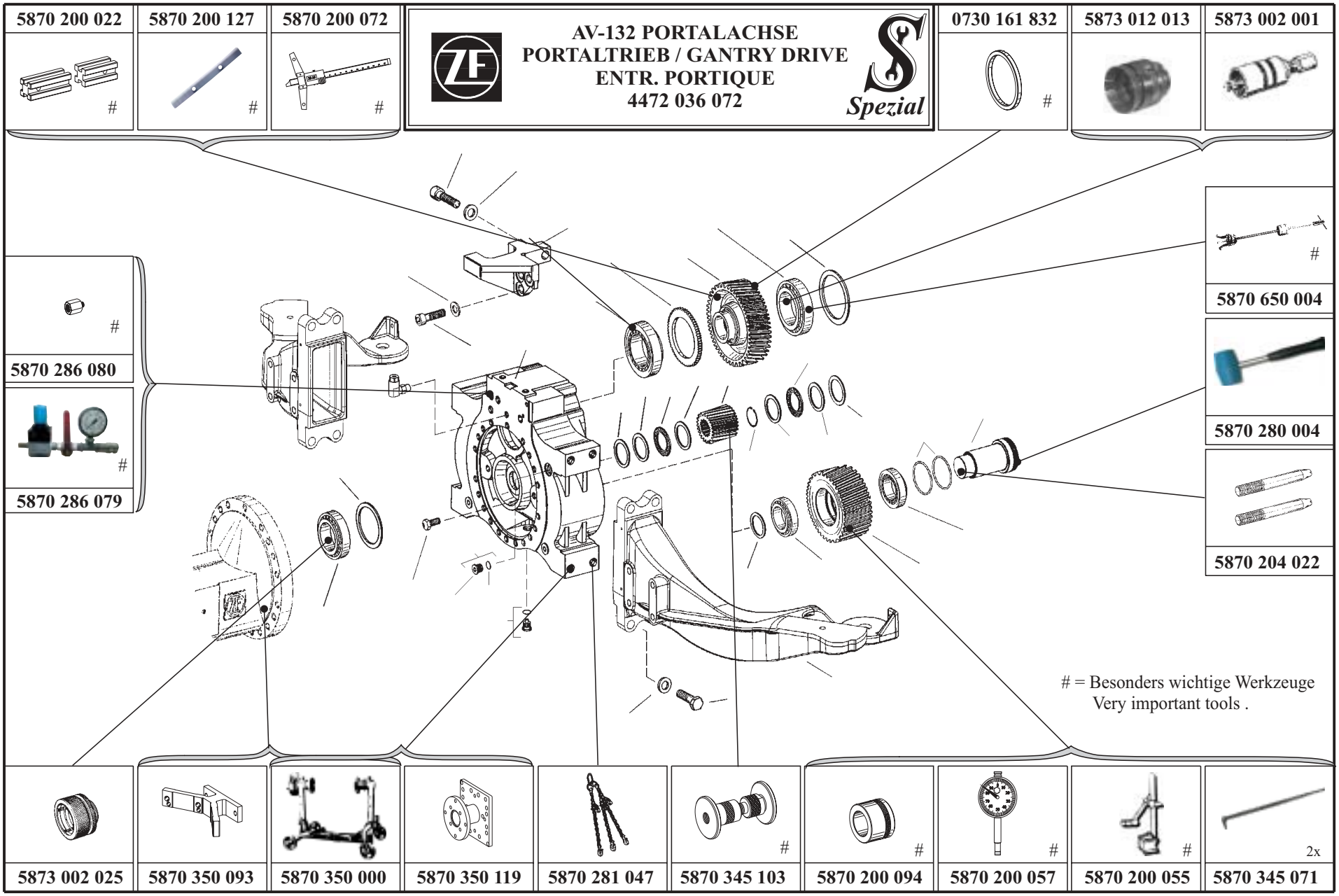


5870 506 162	5870 051 053	5870 260 004		5870 050 007	5870 260 004	5870 281 043
#	#					#

M 14x1,5				#	#		M22x1,5	BSF 7/8 - 11	
5870 204 025	5870 651 085	5870 050 007	5870 260 004	5870 051 053	5870 401 146	5870 080 050/056	5870 610 002	5870 610 008	5870 610 010

AV-132 PORTALACHSE
PORTALTRIEB / GANTRY DRIVE
ENTR. PORTIQUE
4472 036 072

Spezial



5870 200 022	5870 200 127	5870 200 072	0730 161 832	5873 012 013	5873 002 001
#	#	#	#		

5870 286 080	5870 286 079	5870 650 004	5870 280 004	5870 204 022
#	#	#		

= Besonders wichtige Werkzeuge
Very important tools .

5873 002 025	5870 350 093	5870 350 000	5870 350 119	5870 281 047	5870 345 103	5870 200 094	5870 200 057	5870 200 055	5870 345 071
					#	#	#	#	2x

WB/02

SERVICE

Repair Manual

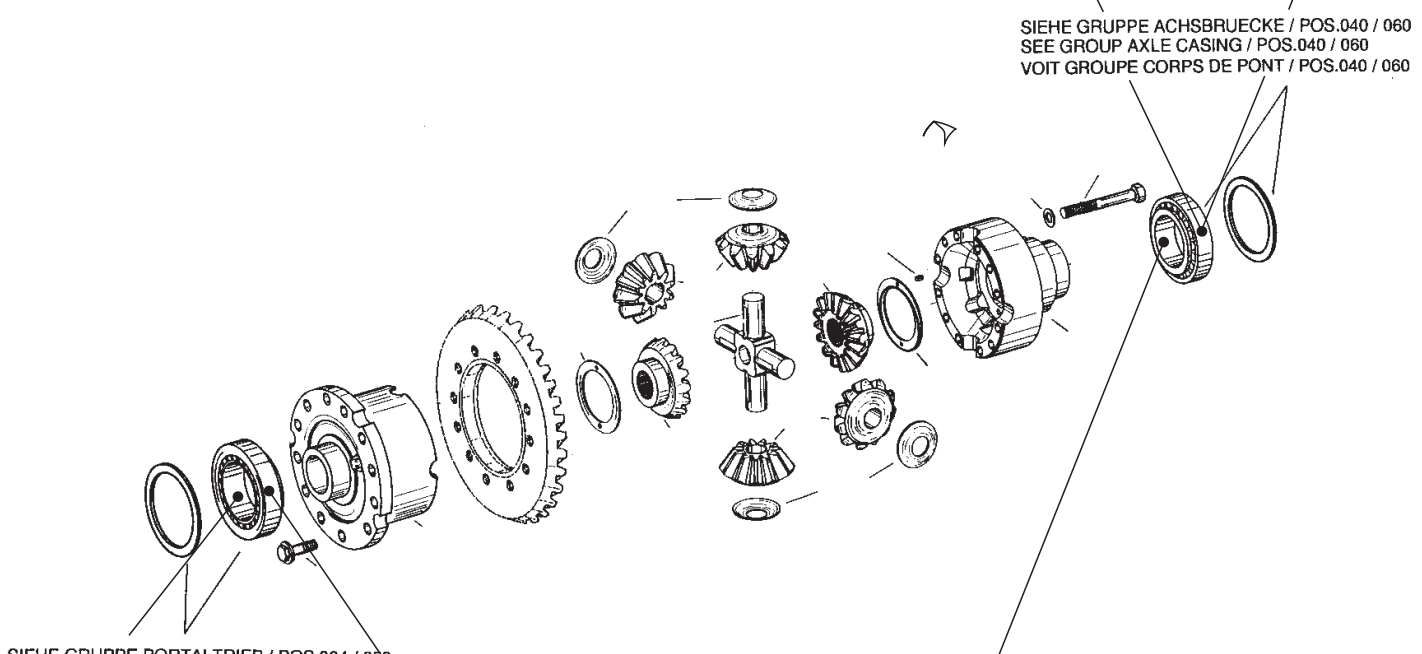
Off-Road Transmissions and Axle Systems Division

AV - 132 PORTALACHSE
DIFFERENTIAL
DIFFERENTIAL
4472 036 072

Spezial

5870 650 004	5870 058 078	5870 260 002
#		

VERSION “I”



Besonders wichtiges Werkzeug
Very important tool

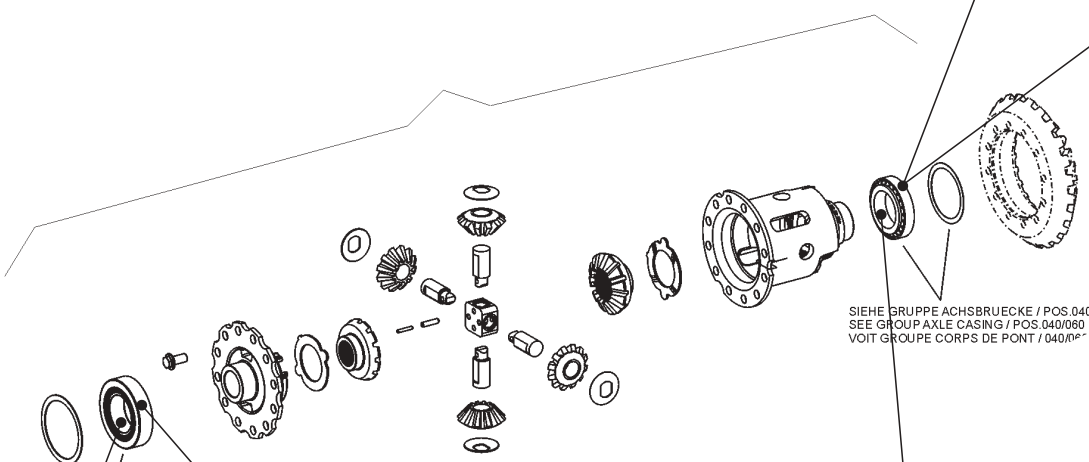
5873 002 025	5873 002 001		5870 650 004		5873 011 012	5870 026 100		5870 280 004
			#					

AV - 132 PORTALACHSE
DIFFERENTIAL
DIFFERENTIAL
4472 036 072

Spezial

5870 650 004	5870 058 078	5870 260 002
#		

VERSION “II”

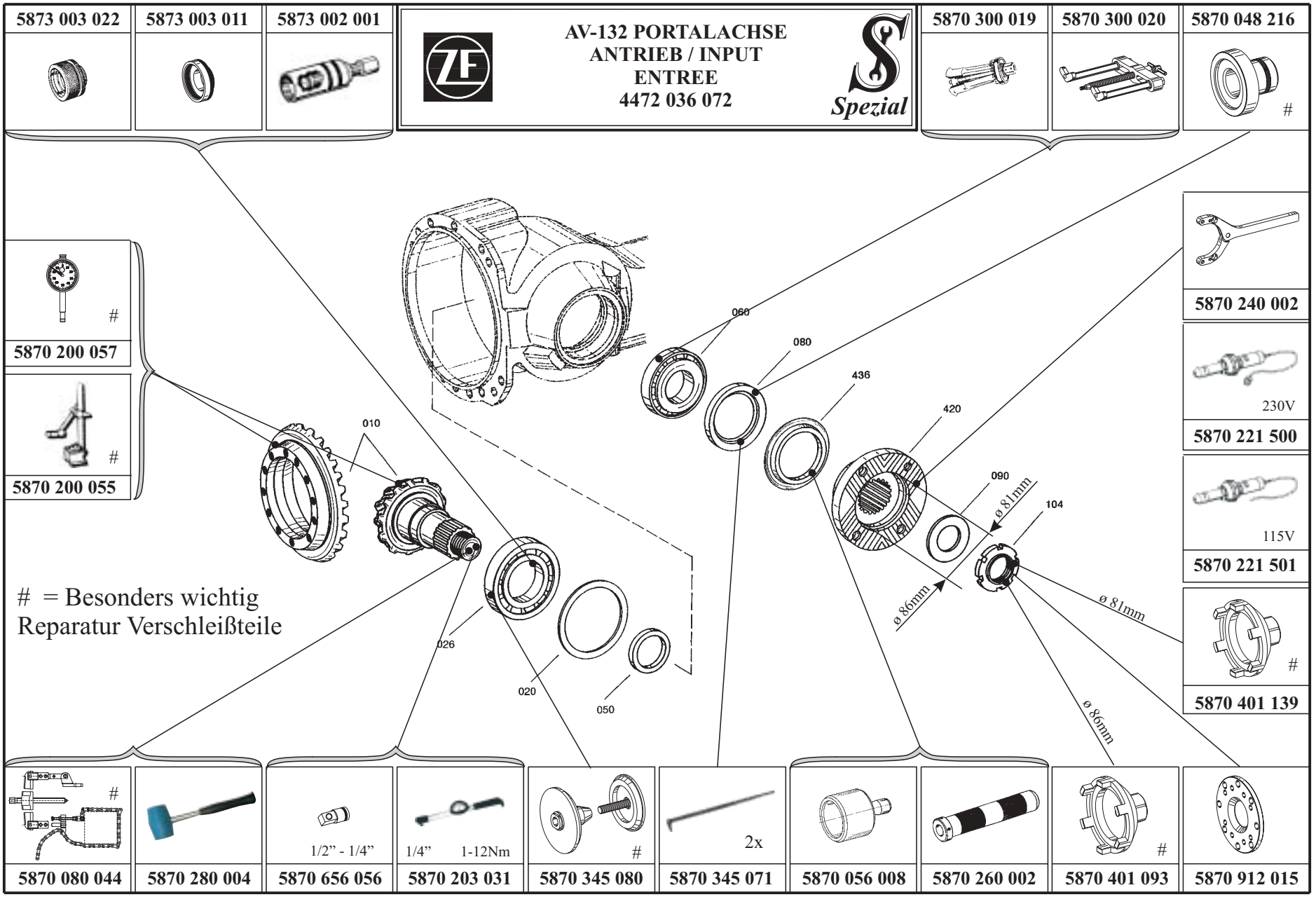


Besonders wichtiges Werkzeug
Very important tool

5873 002 025	5873 002 001		5870 650 004		5873 011 012	5870 026 100		5870 280 004
			#					

AV-132 PORTALACHSE
ANTRIEB / INPUT
ENTREE
4472 036 072

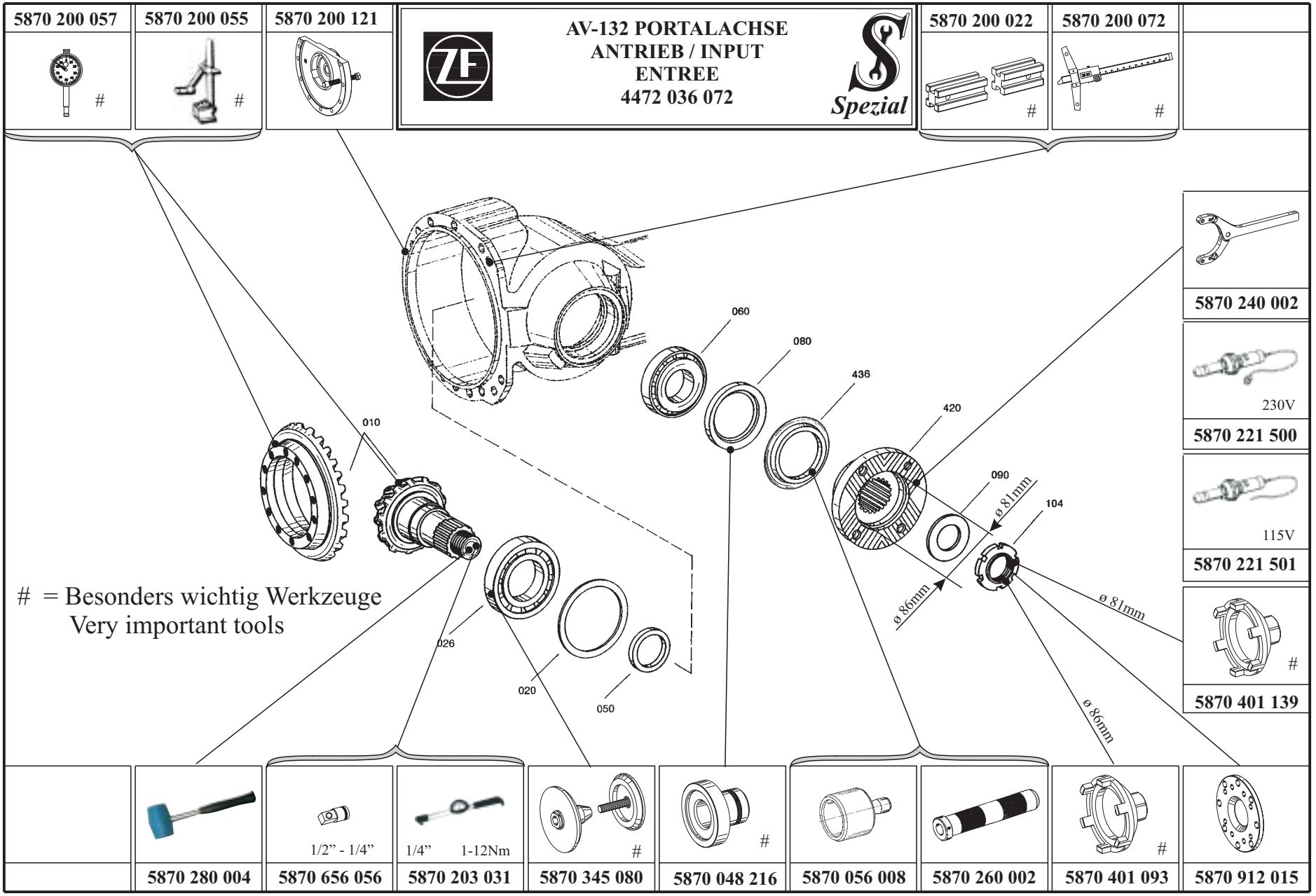
Spezial



5873 003 022	5873 003 011	5873 002 001				5870 300 019	5870 300 020	5870 048 216	5870 240 002
								#	
									230V
									5870 221 500
									115V
									5870 221 501
									#
									5870 401 139
5870 200 057									
#									
5870 200 055									
#									
#			1/2" - 1/4"	1/4" 1-12Nm	#	2x		#	
5870 080 044	5870 280 004	5870 656 056	5870 203 031	5870 345 080	5870 345 071	5870 056 008	5870 260 002	5870 401 093	5870 912 015

AV-132 PORTALACHSE
ANTRIEB / INPUT
ENTREE
4472 036 072

Spezial



5870 200 057 #	5870 200 055 #	5870 200 121				5870 200 022 #	5870 200 072 #	
	5870 280 004	5870 656 056 1/2" - 1/4"	5870 203 031 1/4" 1-12Nm	5870 345 080 #	5870 048 216 #	5870 056 008	5870 260 002	5870 401 093 #	5870 912 015

5870 240 002

5870 221 500 230V

5870 221 501 115V

5870 401 139 #

1. DISASSEMBLY

Figure 1

Fix axle on the assembly truck.

(S) Assembly truck with tilting device 5870 350 000

(S) Support 5870 350 093

Drain oil.

Dispose of oil environmentally safe and in accordance with the legal specifications!

Figure 2

If necessary, separate spring carrier (4x) from the axle.

Mark the installation position of the different spring carriers!

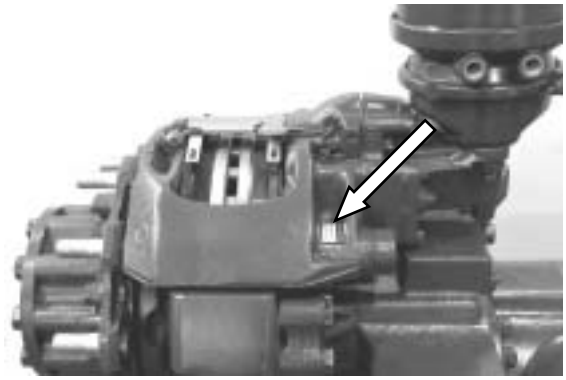


Figure 3

Separate brake from the axle (figure 3 and 4):

When working on the brake system, the instructions and specifications of the respective brake manufacturer are binding!
The relevant information is included in the repair and maintenance instructions of the component manufacturer!
The latest updates of the individual instructions can be ordered by the brake manufacturer or looked up at the available internet site!
Brake manufacturer and brake type can be taken from the identification plate of the brake caliper!
Figure 3 shows the position of the identification plate (arrow) with the example of a KNORR brake!

Figure 4

Loosen hexagon screws and separate brake caliper from the axle.

Figure 5

1.1 OUTPUT

Loosen hexagon screws and separate flange shaft from the axle.

Watch out for low quantities of residual oil.

Unlock and loosen outer slotted nut.
Remove retaining plate and loosen inner slotted nut.

(S) Slotted nut wrench 5870 401 146

Figure 6

Figure 7

Separate hub/brake disk from the hub carrier.

(S) Lifting bracket 5870 281 043

Figure 8

Locate hub/brake disk by means of press.
Loosen threaded connection and separate hub from the brake disk.

Locate components by means of press.

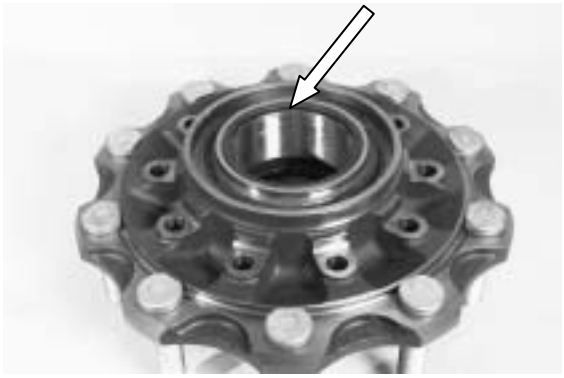


Figure 9

Remove O-ring (arrow).

Remove shaft seal of the brake disk with lever from the hub hole.

Figure 11

Remove outer shaft seal from the hub hole.

(S) pry bar 5870 345 071

Remove compact bearing (figures 12 to 14)

☞ **It is also necessary to check the compact bearing inside and the resulting grease change in the following cases:**

- **As part of the maintenance interval, see List of Lubricants TE-ML 12.**
- **In case of grease leakage on the shaft seals of the brake disks or when replacing the shaft seals.**
- **In case of overheated brake parts (e.g. burnt pressure piece – bellows)**

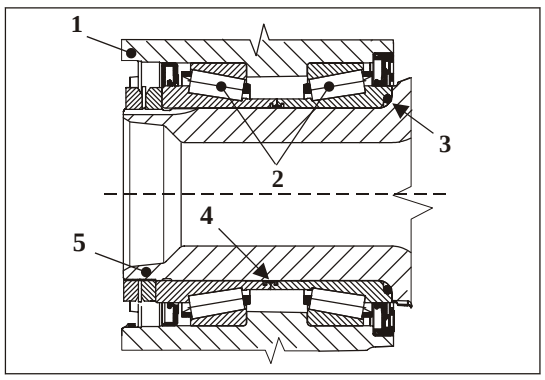


Figure 12

Legend to figure 12:

1 = Hub
2 = Compact bearing
3 = O-ring
4 = Retaining ring } Complete component
5 = Hub carrier

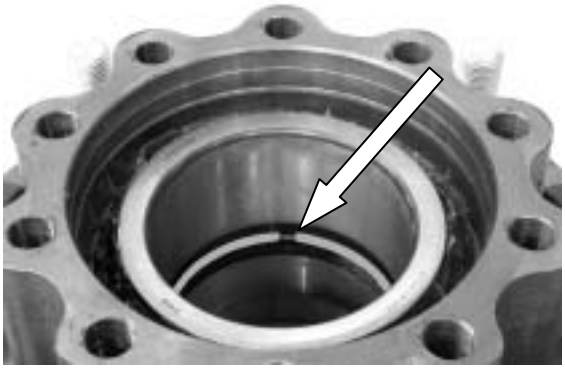


Figure 13

Unsnap retaining ring (arrow).

Figure 14

Remove both bearing inner rings.

If necessary, remove both bearing outer rings.

Figure 15

1.2 DROP CENTER DRIVE

Locate hub carrier by means of lifting device.
Loosen threaded connection and separate hub carrier from the drop center housing.

(S) Lifting strap 5870 281 026

Figure 16

Pull bearing outer ring out of the hole with a striker.

☞ **Pay attention to releasing shim!**

(S) Striker 5870 650 004

Figure 17

Remove output gear.

Figure 18

Remove both bearing inner rings from the output gear.

(S) Rapid grip 5873 012 013
(S) Basic device 5873 002 001

Figure 19

Locate drop center housing by means of lifting device.
Loosen threaded connection and separate drop center drive from the axle housing.

Pay attention to releasing differential and plug shaft!
Watch out for residual oil quantity!

(S) Lifting chain 5870 281 047

Figure 20

Fix drop center drive to the assembly truck.

For the subsequent removal of the two intermediate gears (figures 20 to 22), it is necessary to mark installation position and allocation of the components.

Loosen hexagon screw and assemble adjusting screw.
Drive out bearing bolt.
Remove second bearing bolt accordingly.

(S) Assembly truck 5870 350 000

(S) Clamping plate 5870 350 119

(S) Adjusting screws 5870 204 022

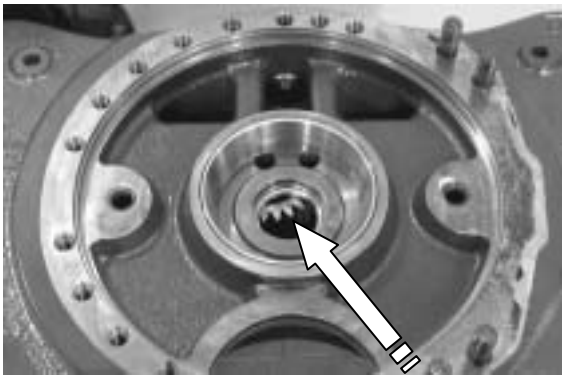


Figure 21

Shift drive gear diagonally (see arrow/figure 21) and remove releasing intermediate gear (figure 22)!

Remove second intermediate gear accordingly.

Now remove the complete drive gear.

Figure 22

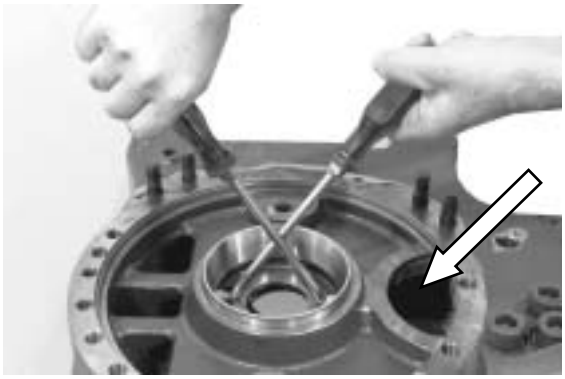


Figure 23

Pry bearing outer ring – differential bearing out of the housing hole.

☞ **Pay attention to releasing adjusting screw!**

If necessary, drive bearing outer ring - output gear bearing (arrow) out of the housing hole.

Figure 24

Pull plug shaft out of the differential.

⚠ **Differential is not fixed!**

Figure 25

1.3 DIFFERENTIAL

The following illustrations provide a description of the differential disassembly: Version I, Type "C"
Version II / Type "D" (new differential), only available as complete component.
Requested special tools to dride out the differential bearing, please take from WB/03!

Lift differential out of the axle housing by means of an appropriate assembly mandrel.

Figure 26

Remove both bearing inner rings.

(S) Rapid grip	5873 011 012
(S) Rapid grip	5873 002 025
(S) Basic tool	5873 002 001
(S) Back off insert	5870 026 100

Loosen hexagon screws.
Remove both differential carrier halves and single components.
If necessary, loosen threaded connection and press crown wheel out of the differential carrier.

Figure 27

Figure 28

Pull plug shaft out of the axle.

Figure 29

Drive bearing outer ring out of the housing hole by means of striker.

☞ **Pay attention to releasing adjusting screw!**

(S) Striker 5870 650 004

Figure 30

1.4 INPUT

Loosen slotted nut (figure 30 and 31).

☞ **Heat grooved nut before loosening it (secured with Loctite)!**

(S) Hot air blower 230 V		5870 221 500
(S) Hot air blower 115 V		5870 221 501
(S) Clamping yoke		5870 240 002
(S) Slotted nut wrench	Ø 86	5870 401 093
(S) Slotted nut wrench	Ø 81	5870 401 139
(S) Centering disk		5870 912 015

Figure 31

Pull out input flange and remove shaft seal.

(S) Pry bar 5870 345 071

Figure 32

Press drive pinion out of the bearing hole.

(S) Press off tool 5870 080 044

Figure 33

Figure 34

Remove adjusting ring.

Figure 35

Remove bearing inner ring from the drive pinion.

(S) Gripping insert	5873 003 022
(S) Reduction	5873 003 011
(S) Basic tool	5873 002 001

Figure 36

Pull outer bearing outer ring out of the hole.

(S) Internal extractor	5870 300 019
(S) Counter support	5870 300 020

Figure 37

Drive inner bearing outer ring out of the hole.

☞ **Pay attention to releasing adjusting disk!**

2. ASSEMBLY

2.1 INPUT - DIFFERENTIAL

General: **If crown wheel or drive pinion are damaged, both parts (bevel gear set) must be replaced!**

☞ **Make sure that mating numbers are identical!**

The following pages describe the setting of the assemblies being listed below.

- **A - Contact pattern - bevel gear set**
- **B - Backlash - bevel gear set**
- **C - Rolling torque – drive pinion bearing**
- **D - Rolling torque – differential bearing**

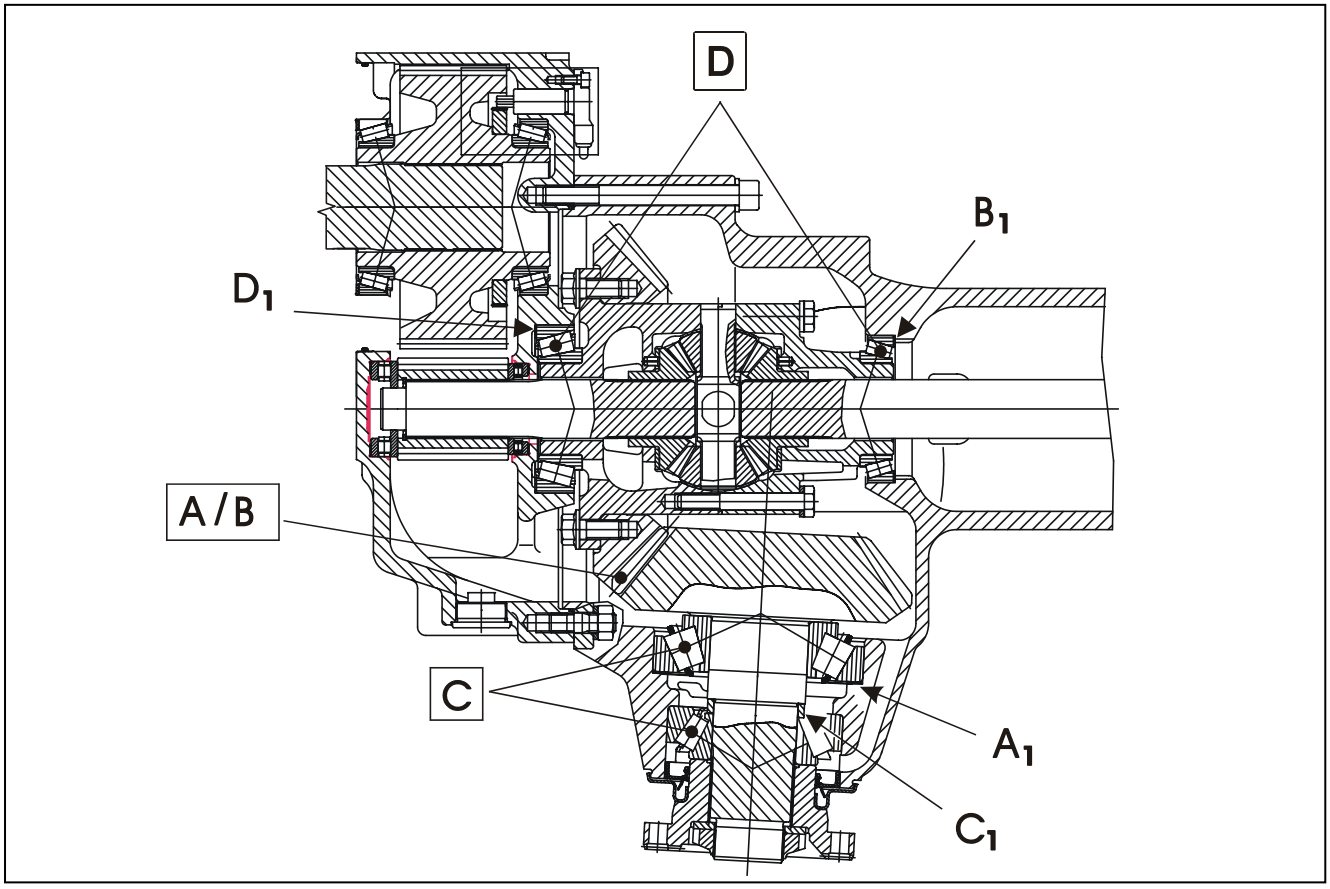


Figure 1

Legend:

- **A_1 - Shim-contact pattern**
- **B_1 - Shim-backlash**
- **C_1 - Adjusting ring-drive pinion bearing**
- **D_1 - Shim-differential bearing**

☞ **When reusing the shims being removed during disassembly, we know from experience that the required setting values are obtained!**
However, it is indispensable to check the values!

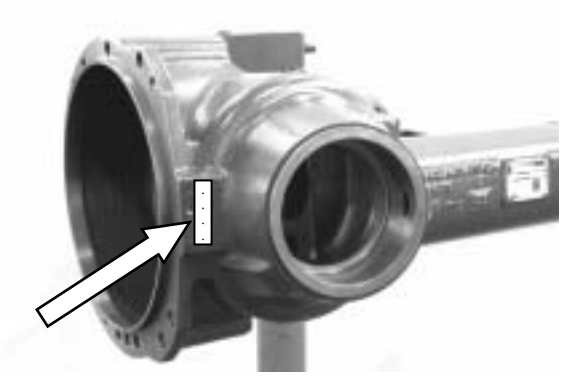


Figure 2

Contact pattern – adjustment of bevel gear set (fig. 1 to 6):

Read the installation dimension A on the axle housing (arrow).

Dimension A e.g. …….. 195.42 mm

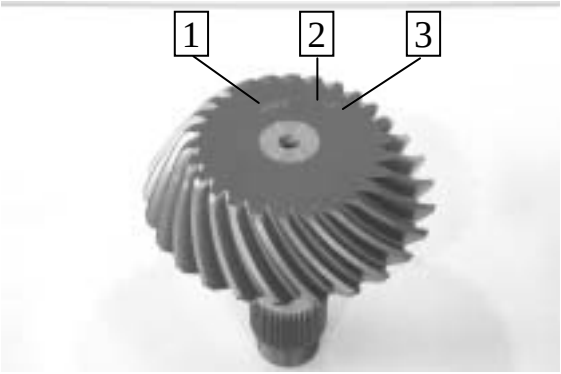


Figure 3

The figure left shows the drive pinion.

The following information is stamped or marked manually into the pinion head:

1 = Mating number (marked manually)
2 = Pinion basic dimension (stamped)
3 = Pinion distance deviation + or – (marked manually)

NOTE:
Distance deviation is indicated in $^{1}/_{100}$ mm.

Pinion dimension „X“ e.g.:

Dimension X 153 $_{-5}$ ($^{5}/_{100}$ = 0.05) = 152.95 mm

If no distance deviation is indicated, pinion basic dimension equals pinion dimension „X“!

Figure 4

Determine bearing height.

Dimension Y e.g. …….. 41.25 mm

(S) Straightedge	5870 200 022
(S) Gauge block	5870 200 066
(S) Digital depth gauge	5870 200 072

Calculation example A_1:

Dimension X (pinion dimension) e.g. ..... 152.95 mm
Dimension Y (bearing height) e.g. ..... + 41.25 mm
Equals dimension Z = 194.20 mm

Calculation example A_2:

Dimension A e.g. ..... 195.42 mm
Dimension Z e.g. ..... - 194.20 mm
Difference = shim s = 1.22 mm

☞ **The individual shims are available in 0.03 mm size intervals. Use the next available shim size e.g. s = 1.23!**

Supercool outer bearing outer ring and insert it until contact is obtained.

Figure 5

Mount shim (according to calculation example s = 1.23 mm). Supercool bearing outer ring and insert it with the fixture into the bearing hole until contact is obtained. (Figure 6 and 7).

Figure 6

(S) Assembly fixture 5870 345 080

Figure 7

Figure 8

Press bearing inner ring until contact is obtained.

Figure 9

<u>Adjust rolling torque of the input pinion bearing 1.5 to 4.5 Nm (figures 9 to 13):</u>

☞ **As per experience the required rolling moment is obtained by use of the adjusting ring available at disassembly!**
However, a later checking of the rolling moment is imperative!

Mount adjusting ring e.g. s = 10.32 mm.

Figure 10

Position drive pinion and mount the heated bearing inner ring until contact is obtained.

☞ **Before mounting the input flange and tightening the slotted nut (figures 11 and 12), let bearing inner ring cool down to ambient temperature.**

Figure 11

Mount input flange.

Figure 12

Mount shim and tighten slotted nut.

While tightening rotate the drive pinion several times in both directions.

Tightening torque …… M_A = 1000 Nm

(S) Slotted nut wrench	Ø 86 mm	5870 401 093
(S) Slotted nut wrench	Ø 81 mm	5870 401 139
(S) Centering disk		5870 912 015
(S) Clamping yoke		5870 240 002

Figure 13

Check bearing rolling torque between 1.5 and 4.5 Nm!

Bearing rolling torque e.g. …….. 3.5 Nm.

In case of deviations from the necessary rolling torque, corrections have to be carried out with the relevant adjusting ring (figure 9) as specified below:

Insufficient rolling torque – install thinner ring
Excessive rolling torque – install thicker ring

(S) Slotted nut wrench	5870 203 031
(S) Reducer ½“ – ¼““	5870 656 056

Secure the slotted nut (Loctite) and assemble the shaft seal after the contact pattern has been accepted (figure 41 ff)!

Figure 14

Differential (figures 14 to 23)

☞ **The following illustrations provide a description of the differential assembly: Version I, type "C" Version II / type "D" (new differential), is only available as complete component.**

Heat crown wheel and install it at the mounting face of the differential until contact is obtained.

⚠ **Pay attention to radial installation position!**
Use protective gloves!

Figure 15

Fix differential carrier by means of press.
Bolt crown wheel and differential carrier.

☞ **Permitted temperature for crown wheel and differential carrier when bolting max. + 30° C!**

Only new locking screws may be used!

Tightening torque …….. M_A = 250 Nm

Insert thrust washer.

Figure 16

☞ **Pay attention to installation position – lubricating groove showing upwards (to the axle bevel gear).**

Figure 17

Radial fixation of thrust washer by means of grooved pins (2 x).

☞ **Pay attention to the installation depth of the grooved pins! The front face of the grooved pins must be slightly below the contact face/thrust washer (approx. 1.0 mm).**

Pre-assemble differential carrier halve 2 accordingly!

Figure 18

Install axle bevel gear.

☞ **Oil all internal components of the differential according to ZF –List of lubricants TE ML 12!**

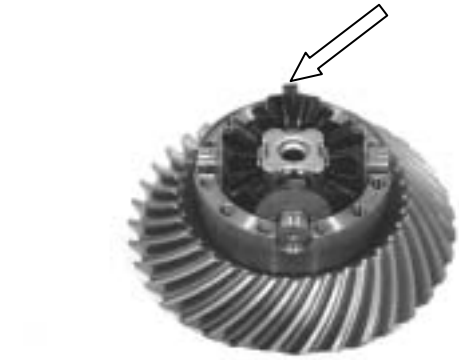


Figure 19

Mount complete differential spider.

☞ **Pay attention to radial installation position of the thrust washers – torsional stop in vertical position, see arrow!**

Figure 20

Mount second side gear.

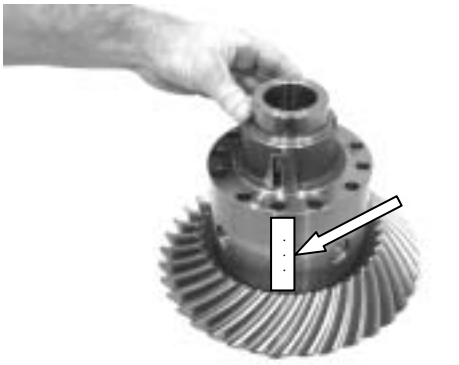


Figure 21

Mount pre-assembled differential carrier half II.

☞ Pay attention to radial installation position, see ZF-No .... (arrow)!

Figure 22

Fix differential carrier halves by means of hexagon screws and washers (s = 3.0 mm).

Tightening torque (M12x1.5/10.9) …… M_A = 120 Nm

Figure 23

Press both bearing outer rings until contact is obtained.

Figure 24

Adjust backlash– bevel gear set
and
bearing rolling torque – differential 2.5 to 5..5 Nm (figures 24 to 40):

☞ **Necessary backlash, see crown wheel (arrow)!**

Figure 25

Insert adjusting shim and bearing outer ring into the bearing hole until contact is obtained.

☞ **When reusing the shims being removed during disassembly, we know from experience that the required setting values are obtained.**
However, it is indispensable to check the values afterwards!

(S) Driver	5870 058 078
(S) Handle	5870 260 002

Insert pre-assembled differential into the axle housing.
Then pivot axle housing into vertical position.

Figure 26

Install bearing outer ring.

Figure 27

Insert measuring cover evenly until contact is obtained by means of hexagon screws (4 x).

(S) Measuring cover 5870 200 121

Figure 28

To ensure that the individual components are centered precisely, rotate bevel gear set several times in both directions.

Figure 29

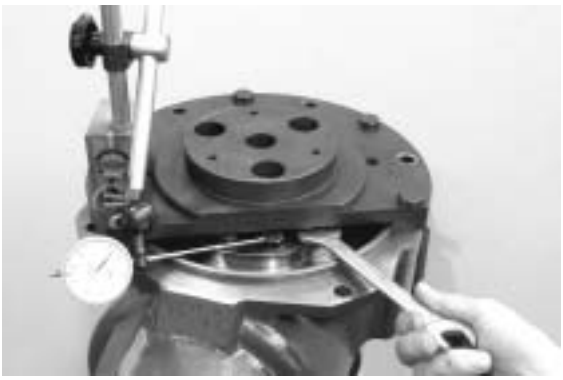


Figure 30

Check backlash!

☞ **Due to the installation situation, the acceptance of the backlash is not possible on the outer diameter of the crown wheel!**
When accepting on the crown wheel threaded connection (screw head), the necessary backlash (see manually marked value on the crown wheel) must be reduced by 30%.

In case of a necessary backlash of e.g. 0.2 mm the relevant calculation example reads as follows:

$$^{0.2\ mm}/_{100\ \%} \cdot 70\% = 0.14\ mm$$

Permitted tolerance deviation ± 0.02 mm

If backlash corrections are necessary, the following information must be taken into account:

1. **Insufficient backlash ⇒ mount thicker adjusting shim (figure 25).**

2. **Excessive backlash ⇒ mount thinner adjusting shim (figure 25).**

Figure 31

Position dial indicator to the crown wheel back and check max. axial runout 0.06 mm!

☞ **In case of deviations from the permitted axial runout, check the accurate contact between crown wheel and differential carrier and correct, if necessary.**

(S) Magnetic stand 5870 200 055
(S) Dial indicator 5870 200 057

Figure 32

Adjust rolling torque of the differential bearing between 2.5 and 5.5 Nm (figures 32 to 35):

Calculate dimension I, between the front face of the bearing outer ring and the mounting face of the axle housing (figures 32 and 33).

Dimension I is based on the measuring processes of figure 32 and figure 33 !

Measurement I (figure 32):
Insert digital caliper gauge until bearing outer ring and balance to 0.00 mm.
Then separate measuring cover from the axle housing.

Figure 33

Measurement II (figure 33):

Insert caliper gauge until straightedge and read dimension I.

Dimension I e.g.…… 26.68 mm

(S) Straightedge	5870 200 022
(S) Digital depth gauge	5870 200 072

Figure 34

Calculate dimension II, between the mounting face of the drop center housing and the locating face/bearing outer ring (figure 34).

Measurement I:
Position digital caliper gauge between straightedge and mounting face and balance to 0.00 mm.

Measurement II:
Now insert caliper gauge to the mounting face/bearing outer ring and read dimension II.

Dimension II e.g. ……27.69 mm

Calculation example B:

Dimension II……	27.69 mm
Dimension I……. ……	- 26.68 mm
Difference	= 1.21 mm

Difference ≙ installation dimension of the adjusting shim!
The individual shims are available in 0.05 mm size intervals.
When using the next available shim size, e.g.
s = 1.20 mm, the necessary rolling torque of the differential bearing is between 2.5 and 5.5 Nm!

Figure 35

Insert the calculated adjusting shim (e.g. s = 1.20 mm) and install the bearing outer ring until contact is obtained.

Figure 36

Contact pattern – check bevel gear set (figures 36 to 40):

Cover some drive and coast flanks of the crown wheel with marking ink.

Figure 37

Insert differential into the axle housing.

Position the drop center housing on the axle housing and locate it provisionally with hexagon nuts as well as with cylindrical screws.

Tightening torque …….. M_A = 200 Nm

(S) Lifting chain 5870 281 047

Figure 38

Figure 39

Roll drive pinion several times in both directions over the crown gear.

Figure 40

<u>Check total rolling torque (pinion and differential bearing)!</u>

☞ **Total rolling torque must be approx. 2 – 3 Nm above the previously measured rolling torque of the pinion bearing (figure 13)!**
If a completely preassembled drop center drive is mounted, it is necessary to increase the rolling torque by 3-4 Nm.

(S) Torque spanner	5870 203 031
(S) Reducer $^1/_2$ " - $^1/_4$ "	5870 656 056

Now disassemble differential again and compare the contact pattern result with the contact pattern examples of page 0/4 and 0/5.

☞ **In case of a contact pattern deviation, it is imperative to correct the measuring fault which has occurred during the calculation of the adjusting shim (figure 6)!**

Figure 41

Pivot axle housing into horizontal position.
Loosen slotted nut and remove input flange.

Assemble shaft seal with the seal lip showing to the oil chamber (figure 41).

☞ **Wet outer diameter with spirit!**
The use of the specified special tool (S) ensures the precise installation position!

(S) Driver 5870 048 216

Figure 42

Press the protective shield over the collar of the input flange until contact is obtained.

(S) Driver 5870 056 008
(S) Handle 5870 260 002

Figure 43

Insert input flange.
Final fixation of input flange by means of disk and slotted nut.

☞ **Wet thread of the slotted nut sporadically with Loctite, type no. 262!**

Tightening torque ……. M_A = 1000 Nm

(S) Slotted nut wrench Ø 86 mm 5870 401 093
(S) Slotted nut wrench Ø 81 mm 5870 401 139
(S) Centering shim 5870 912 015
(S) Clamping yoke 5870 240 002

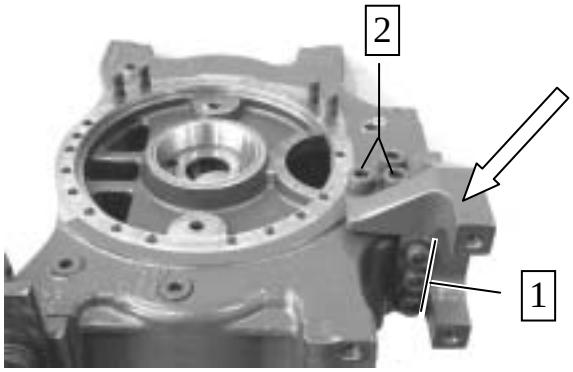


Figure 44

2.2 DROP CENTER DRIVE

Fix the longitudinal rod bracket (arrow) by means of cylindrical screws and washers on the drop center housing as specified below:

☞ **Secure screws with Loctite 243!**

1. Position the bracket on the housing.
   Provisionally tighten the cylindrical screws (pos. 1) on the side of the rod connection finger-tight (3 … 5 Nm)!

2. Now mount cylindrical screws (pos.2) and tighten them with the necessary tightening torque M_A = 440 Nm.

3. Finally tighten cylindrical screws (pos. 1) with the necessary tightening torque M_A = 440 Nm!

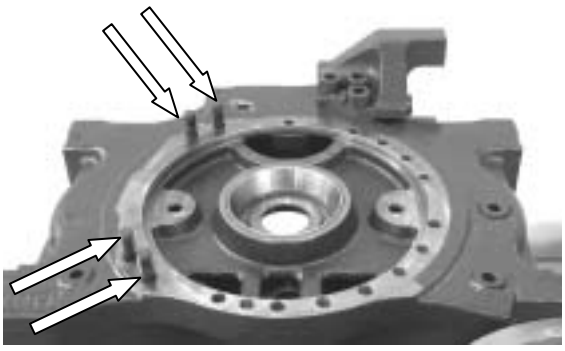


Figure 45

Mount stud bolts, see arrows!

Tightening torque …….. M_A = 33 Nm

☞ **Wet thread with Loctite 262!**
Mount stud bolts only on the drop center housing of the differential.

Mount drive gear (figures 46 to 50)

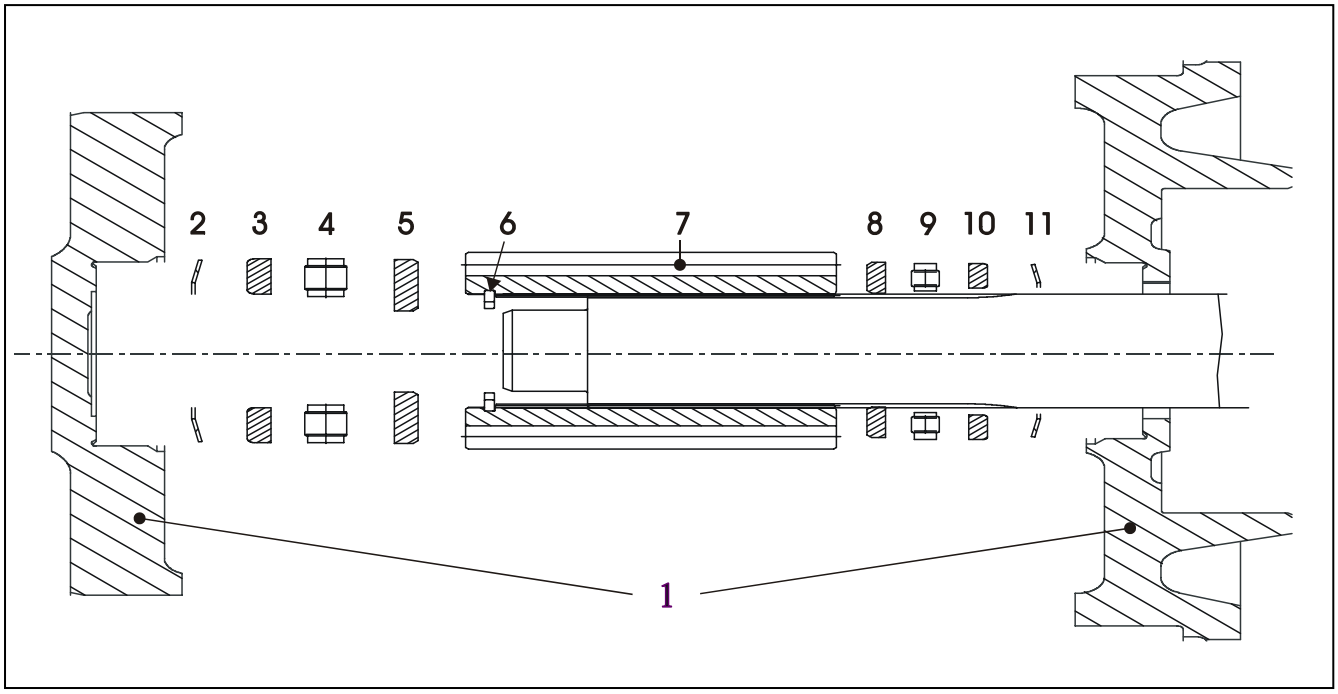


Figure 46

Legend to figure 46 :

1 = housing
2 = cup spring (67.5 x 50.5 x 0.7)
3 = housing shim (68 x 42 x 5)
4 = axial bearing (68 x 40 x 9)
5 = plate (68 x 30 x 5)
6 = retaining ring
7 = drive gear
8 = plate (42 x 65 x 4)
9 = axial bearing (65 x 45 x 6)
10 = housing disk (47 x 65 x 4)
11 = cup spring (63.8 x 50.5 x 0.7)

☞ **Pay attention to the installation position of the cup springs (pos. 2 and pos. 11), refer to sketch!**

Mount plates (pos. 5 and pos. 8) with the larger chamfer or radius showing to the drive gear!

Mount housing disks (pos. 3 and pos. 10) with the larger chamfer or radius showing to the housing!

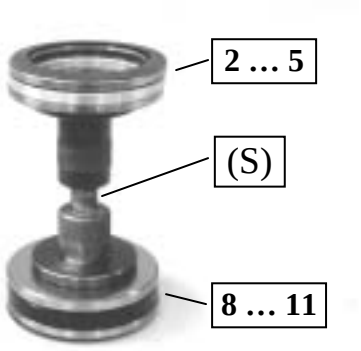


Figure 47

Position individual components pos. 2 to 5 and pos. 8 to 11 by means of assembly fixture (figure 47) in the drop center housing (arrow/figure 48).

(S) Assembly fixture 5870 345 103

☞ **The cup springs are pre-stressed with the fixture, until the drive gear can be assembled (figure 50)!**
Pay attention to the installation position of the individual components, refer to figure 46!

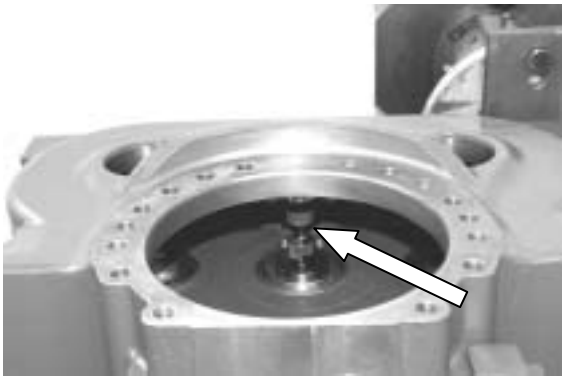


Figure 48

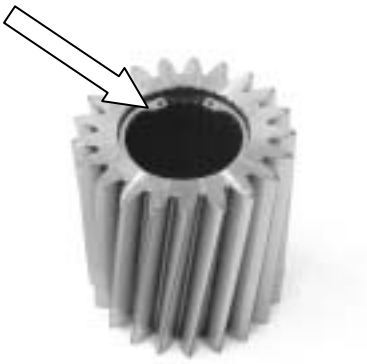


Figure 49

Engage retaining ring (arrow) into the groove of the drive gear.

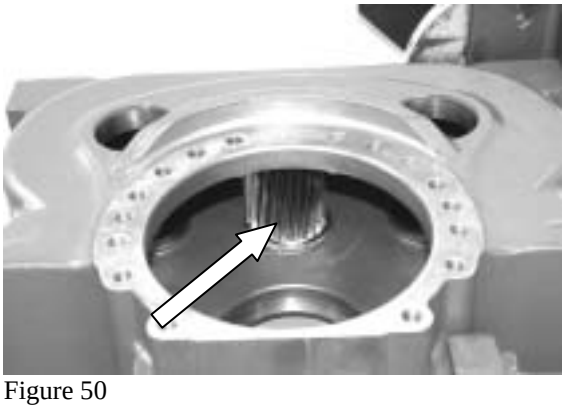


Figure 50

Position the drive gear in the housing (arrow) and thereby remove the assembly fixture again.

☞ **Pay attention to installation position - retaining ring shows upwards, see also figure 46 !**

Preassemble intermediate gears and check axial play 0.01 to 0.05 mm (figures 51 and 52):

☞ **When reusing already run intermediate gears, pay attention to allocation and installation position of the individual components!**
When reusing the shims being removed during disassembly, we know from experience that the required axial play of the intermediate gear bearing is obtained.
However, it is indispensable to check the values afterwards!!

Assemble individual components and insert adjusting shim.

Figure 51

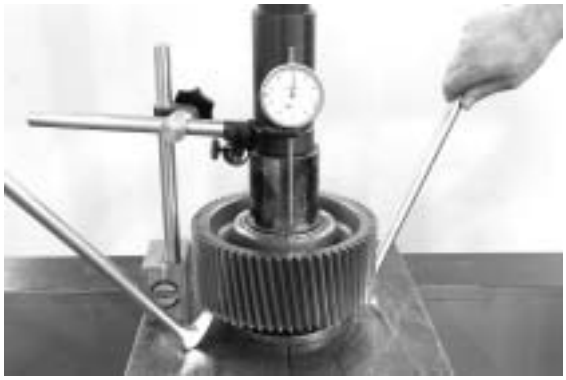


Figure 52

Insert plug gauge (S) and fix intermediate gear bearing by means of press. Contact pressure approx. 10 000 N (1 to.).

Check axial play!

☞ **In case of deviations from the necessary axial play, correct with the relevant adjusting shim (figure 51).**

(S) Plug gauge	5870 200 094
(S) Magnetic stand	5870 200 055
(S) Dial indicator	5870 200 057
(S) Pry bar	5870 345 071

Then disassemble bearing bolt again.

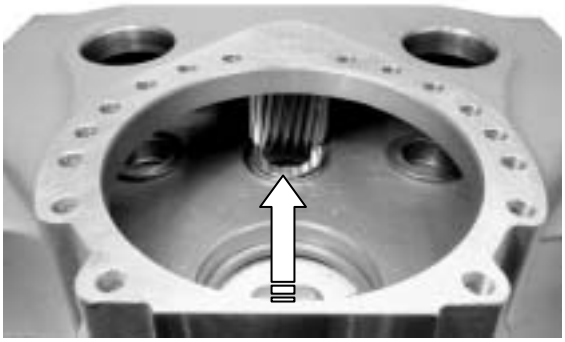


Figure 53

Install intermediate gears (figures 53 to 58):

In order to enable the assembly of both intermediate gears, move drive gear preliminarily in direction of arrow.

☞ **When putting back the drive gear, make sure that the installation position of the components is maintained!**

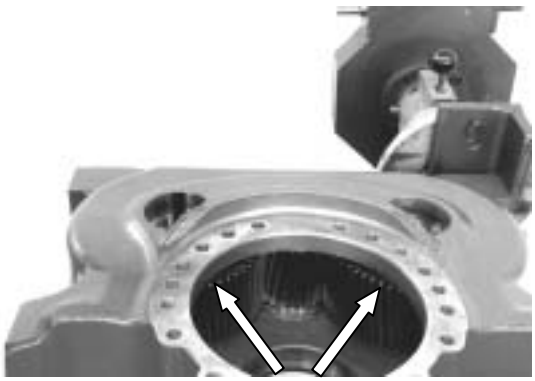


Figure 54

Position both intermediate gears (arrows) in the drop center housing.
Then align intermediate gears and side gear centrally to the bearing holes.

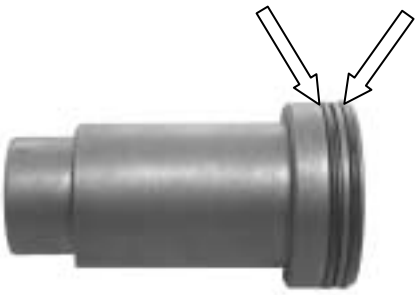


Figure 55

Insert O-rings (arrows) in both annular grooves of the bearing bolt and grease them.

Figure 56

Use assembly grease to glue the calculated adjusting shim and mount the adjusting screw.

(S) Adjusting screws 5870 204 022

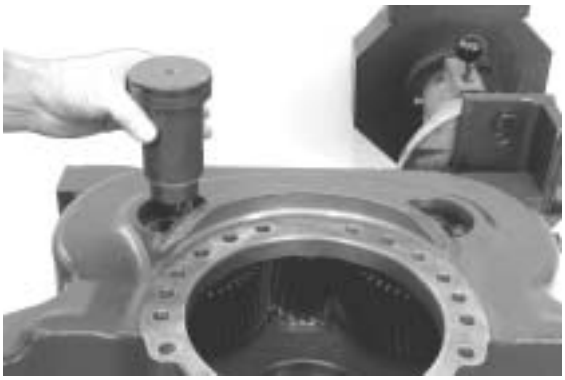


Figure 57

Locate both intermediate gears by means of bolts.


Figure 58

Pivot drop center housing 180°.

Locate both bearing bolts by means of hexagon screws.

Tightening torque (M14/10.9) …… M_A = 185 Nm


Figure 59

<u>Pre-assemble and install output gear (figures 59 to 71)</u>

Heat impulse disk and press it until contact is obtained.


Figure 60

Press both bearing inner rings until contact is obtained.

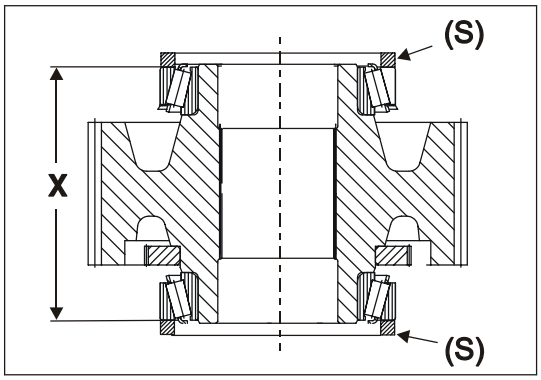


Figure 61

Adjust axial play – output bearing 0.00 to 0.03 mm (figures 61 to 65):

Determine the total height of the output gear bearing, figure 61 and 62!

(S) Measuring ring (2x)	0730 161 832
(S) Digital depth gauge	5870 200 072
(S) Measuring bar	5870 200 127
(S) Straightedge	5870 200 022


Figure 62

Dimension X e.g. ……. 135.12 mm

☞ **Roll bearing several times in both directions in order to ensure that the individual components are centered precisely!**


Figure 63

Drop center housing:

Measure dimension I between the mounting face/flange and the locating face of the bearing outer ring.

Dimension I e.g. …….. 136.48 mm

(S) Digital depth gauge	5870 200 072
(S) Measuring bar	5870 200 127


Figure 64

Hub carrier:

Measure dimension II, between the mounting face of the flange and the locating face of the bearing outer ring.

Dimension II e.g. ……... + 0.02 mm

☞ **Dimension II, can be + or – !**

(S) Digital depth gauge	5870 200 072
(S) Measuring bar	5870 200 022
(S) Gauge blocks	5870 200 066

Calculation example C:

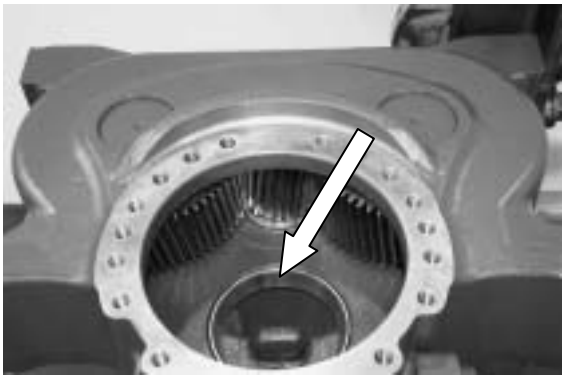
Dimension I ……		136.48 mm
Dimension II ……..	+	0.02 mm
Equals dimensionY	=	136.50 mm

Dimension Y……		136.50 mm
Dimension X……..	-	135.12 mm
Difference	s =	1.38 mm

☞ **The individual shims are available in 0.03 mm size intervals. When using the next available thinner adjusting shim, e.g. 1.37 mm, the axial play is 0.01 mm!**

Figure 65

Insert the calculated adjusting shim and mount bearing outer ring until contact is obtained.



Figure

Insert bearing outer ring (arrow) into the bearing hole until contact is obtained.

Figure 67

Insert output gear.

☞ **Pay attention to installation position – impulse disk shows downwards!**

Figure 68

Mount protective shield.

(S) Press device 5870 506 162

☞ **Wet the contact surface hub/screen shield with Loctite (type-no. 574)!**
Pay attention to installation dimension 4^{+1} mm , refer to figure 69!
The use of the specified special tool ensures that the installation position is precise!

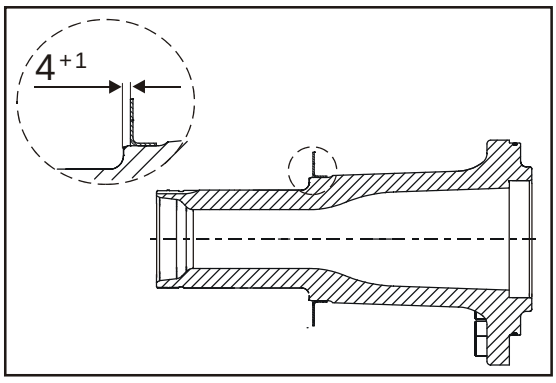


Figure 69

Figure 70

Assemble and grease O-ring (arrow).

Figure 71

Fix hub carrier on the drop center housing.

☞ **Assemble washers s = 3.0 mm!**
For the Torx screw version the assembly of washers is not applicable!
Secure screws with Loctite 243!

Tightening torque (cylindrical screws)	M_A = 200 Nm
or (depending on individual version)	
Tightening torque (Torx screws)	M_A = 185 Nm

Figure 72

Insert plug shaft until contact is obtained (figure 72 and 73).

☞ **An installation dimension between 109 and 112 mm (see figure 73) ensures that all individual components of the drive gear bearing are being assembled and centered!**

Figure 73

(S) Digital depth gauge 5870 200 072

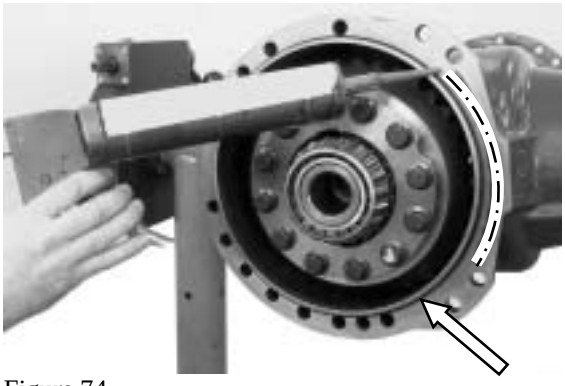


Figure 74

Put sealing agent DREI-BOND SILIKON 1207 onto the mounting face of the section without holes.

Mount and grease O-ring (arrow).

Figure 75

Mount drop center housing by means of lifting device onto the axle housing until contact is obtained and fix it.

Assemble washers s = 3.0 mm!
For the Torx screw version the assembly of washers is not applicable!
Secure screws with Loctite 243!

Tightening torque

Hexagon screws	M_A = 200 Nm
Cylindrical screws	M_A = 200 Nm
or	
Torx screws	M_A = 185 Nm

(S) Lifting chain 5870 281 047

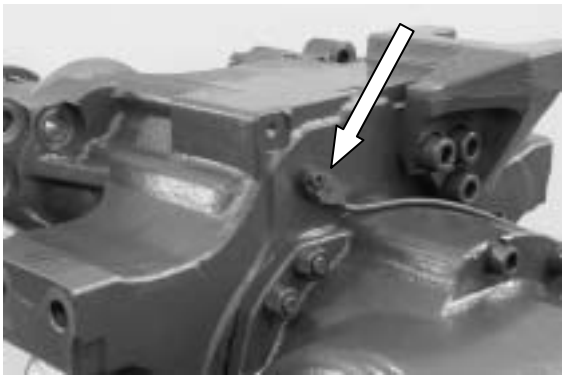


Figure 76

Assemble speed sensor (arrow).
Tightening torque M_A = 9,5 Nm

Left and right speed sensors of the individual versions can vary – pay attention to the individual specifications of the vehicle manufacturer!

Figure 77

2.3 OUTPUT

Assemble wheel bolt.

☞ **Pay attention to radial installation position!**

(S) Wheel stud puller basic tool	5870 610 010
(S) Insert 7/8 – 11	5870 610 008
(S) Insert M22x1.5	5870 610 002

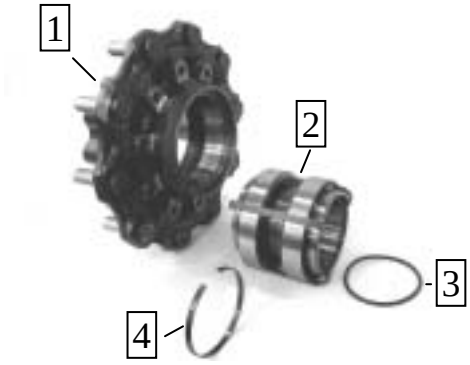


Figure 78

Mount compact bearing (figures 78 to 86)

☞ **When replacing the compact bearing or when changing grease as part of the maintenance interval, make sure that hub and compact bearing are cleaned thoroughly.**

Figures 78 and 79 show the individual components of the compact bearing and the installation position.

Legend to figure 78 and 79:

1 = Hub
2 = Compact bearing
3 = O-ring
4 = Retaining ring
} Complete component
5 = Hub carrier

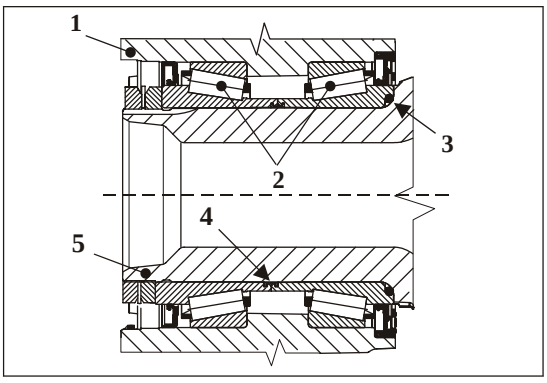


Figure 79

☞ **Position 3 and 4 are provided with the compact bearing as loose parts!**

Figure 80

Press in both bearing outer rings until contact is obtained.

(S) Driver	5870 050 007
(S) Handle	5870 260 004

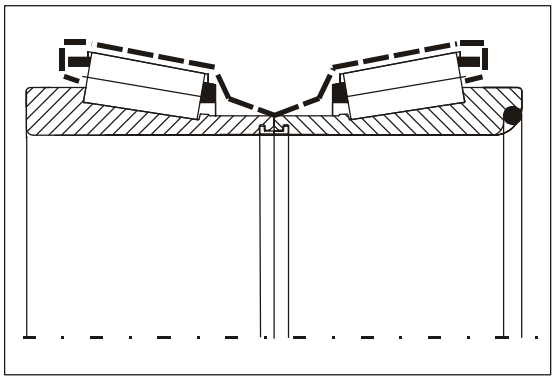


Figure 82

Grease compact bearing in the marked area - - - .

Total grease quantity of each output side: 130 gram (max. 150 g).

☞ **Apply richly grease onto the bearing rolls, inside, outside and on the front sides!**

⚠ **Only use grease types which have been released by ZF (e.g. Renolit LX-PEP 2, ZF order no.: 0671 190 122).**
ZF List of lubricants TE-ML 12 is binding!
The latest update of the List of Lubricants is available at internet site www.zf.com *Service/Techn. Information*!

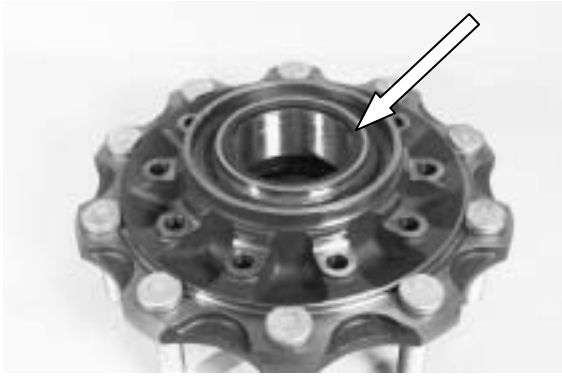


Figure 82

Mount bearing inner ring on brake disk side.

☞ **To ensure that the position of the bearing rollers in the bearing outer ring is precisely aligned, press bearing inner ring firmly and rotate it several times (roll in))!**
The bearing inner ring of the brake disk side is visible on the ring nut for the O-ring (arrow)!

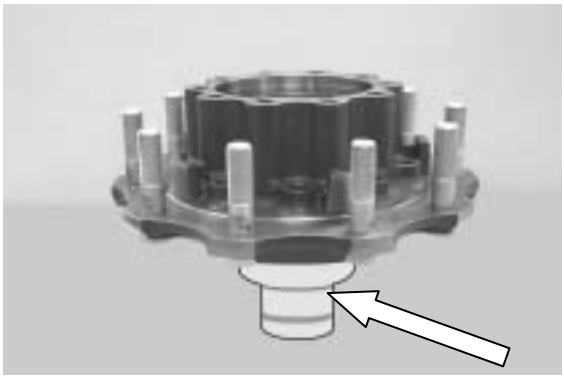


Figure 83

Turn hub.

☞ **Support the bearing inner ring on the brake disk side by means of an appropriate mandrel (arrow) to maintain the contact of the bearing inner ring!**

Figure 84

Mount outer bearing inner ring.

☞ **To ensure that the position of the bearing rollers in the bearing outer ring is precisely aligned, press bearing inner ring firmly and rotate it several times (roll in)!**
Clearance free contact of both bearing inner rings must be ensured!

Figure 85

Locate both bearing inner rings by means of retaining ring.

☞ **Pay attention that the installation position of the retaining ring is correct, see arrow/figure 86!**
In case of incorrect location the reference dimension is = 140 $^{+/- 0,4}$ mm , see figure 86 !
It is no more possible to lift the outer bearing inner ring.

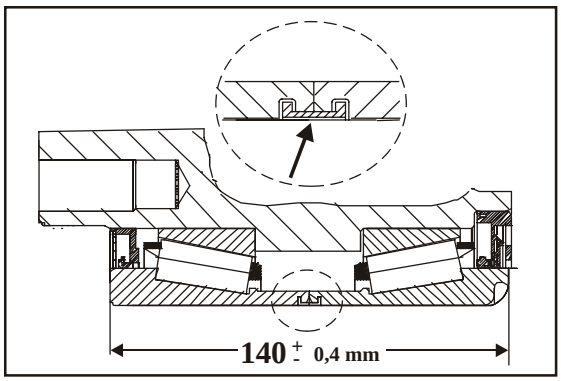


Figure 86

Figure 87

Mount shaft seal on the flange shaft side.

(S) Driver 5870 051 053

☞ **The use of the specified special tool (S) ensures that the installation depth is precise!**
Pay attention to the installation position, designation „OELSEITE /OILSIDE“ shows upwards!

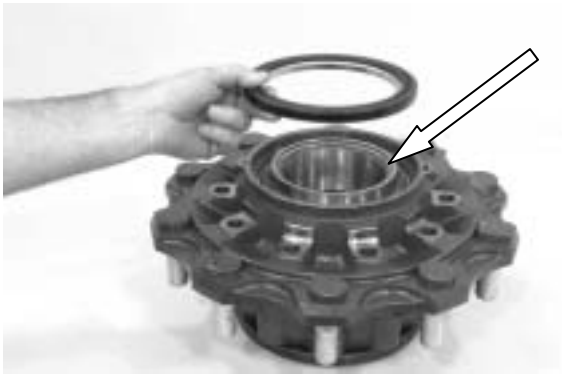


Figure 88

Mount shaft seal on the side of the brake disk.

(S) Driver 5870 051 053

☞ **The use of the specified special tool (S) ensures that the installation position is correct!**
Pay attention to the installation position – sensor ring or designation „AUSSENSEITE / OUTSIDE“ shows upwards (outside)!

Insert O-ring into the ring nut of the bearing inner ring (arrow).

Figure 89

Bolt hub/brake disk.

Tightening torque (M16x1.5/10.9) …….. M_A = 300 Nm

Figure 90

Put lubricant „MOLYKOTE DX“ onto the bearing.

Figure 91

Insert inner installer into the hub carrier until contact is obtained.

(S) Inner installer 5870 651 085

Figure 92

Mount preassembled hub carefully by means of lifting device until contact is obtained.
Then remove inner installer again.

(S) Lifting bracket 5870 281 043

Mount internal slotted nut.

Figure 93

Pay attention to the installation position of the slotted nut – chamfer shows <u>outwards!</u>
While tightening rotate the hub several times in both directions!

Tightening torque (inner slotted nut) ….. M_A = 850 Nm

(S) Slotted nut wrench 5870 401 146

If no increase of the bearing rolling torque or axial play of the wheel bearing is noticeable (figure 94) while tightening the slotted nut (figure 93), it is possible that this is caused by the unsnapping of the retaining ring (figure 85 and 86).

If necessary, correct assembly fault!

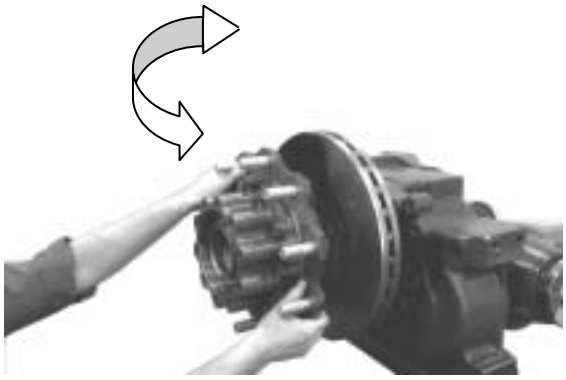


Figure 94

Insert locking plate and assemble outer slotted nut.

Figure 95

Pay attention to the installation position of the locking plate - – securing clip shows inside!
Pay attention to the installation position of the slotted nut – chamfer shows <u>inside!</u>

Tightening torque (outer slotted nut) …….. M_A = 1200 Nm

Figure 96

Secure slotted nut by fixing the locking plate to a nut of the outer slotted nut.

Figure 97

Insert O-ring into the ring nut of the flange shaft (arrow) and grease it.

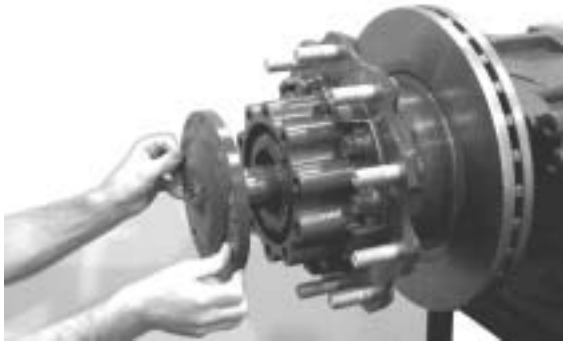


Figure 98

Insert flange shaft until contact is obtained and fix it with hexagon screws.

Tightening torque (M18x1.5/10.9) …….. M_A = 440 Nm

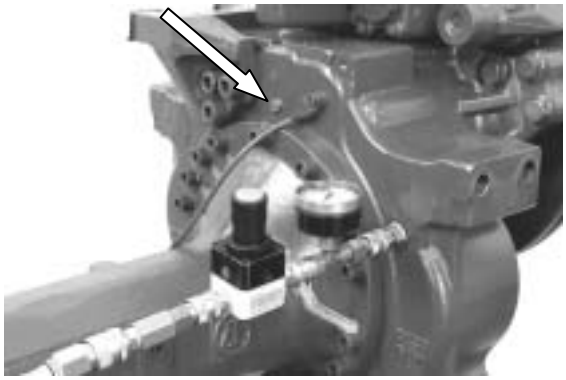


Figure 99

Check if the function of the sealing elements is correct!

Test medium : air
Test pressure : 0.5 bar
Test period: 10 minutes

☞ **Lock the mounting hole for the breather valve provisionally (arrow)!**
Lock the stop valve during the 10 minutes test period!

(S) Air connection 5870 286 079
(S) Reducer 5870 286 080

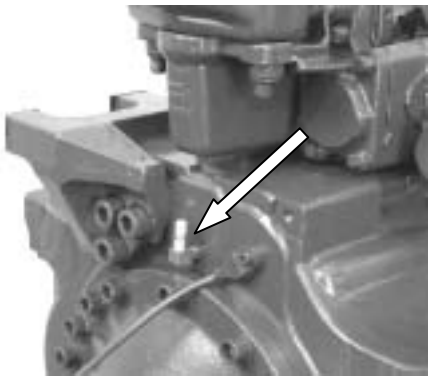


Figure 100

The following illustrations provide a description of the mounting of various peripherical parts and assemblies! Different versions may require different operating processes. In this context please also refer to the specifications of the relevant spare parts list and of the vehicle manufacturer!

Mount breather valve, see arrow (version: breather hose)!

Tightening torque …….. M_A = 6 Nm

Brake reassembly.

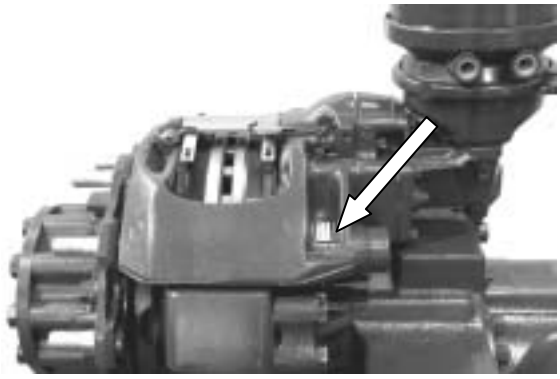


Figure 101

Tightening torque (M16x1,5 / 10.9) ……... M_A = 270 Nm
or (depending on individual version)
Tightening torque (M18x1,5 / 10.9)) …….. M_A = 440 Nm

When working on the brake system, the instructions and specifications of the respective brake manufacturer are binding!

The relevant information is included in the repair and maintenance instructions of the component manufacturer!

The latest updates of the individual instructions can be ordered by the brake manufacturer or looked up at the available internet site!

Brake manufacturer and brake type can be taken from the identification plate of the brake caliper!

Figure 102

Figure 101 shows the position of the identification plate (arrow) with the example of a KNORR – brake!
With this version it is necessary to pay attention to the installation position of the fitting screw (arrow / figure 102)!
The fitting screw must always be mounted on the left and right output side <u>in driving direction (front side)</u>!

Figure 103

Fix the spring carriers (4x) with screws and washers to the axle housing.

Tightening torque (M20x1.5/10.9) …….. M_A = 620 Nm

Pay attention to the installation position – see the markings which have been applied during the disassembly process!

Before commissioning the unit, carry out oil filling according to the specifications provided in the lubrication and maintenance instructions
(ZF-order no.: 5871 214 902)!

2. ASSEMBLY

2.1 INPUT - DIFFERENTIAL

General: **If crown wheel or drive pinion are damaged, both parts (bevel gear set) must be replaced!**

☞ **Make sure that mating numbers are identical!**

The following pages describe the setting of the assemblies being listed below.

- **A - Contact pattern - bevel gear set**
- **B - Backlash - bevel gear set**
- **C - Rolling torque – drive pinion bearing**
- **D - Rolling torque – differential bearing**

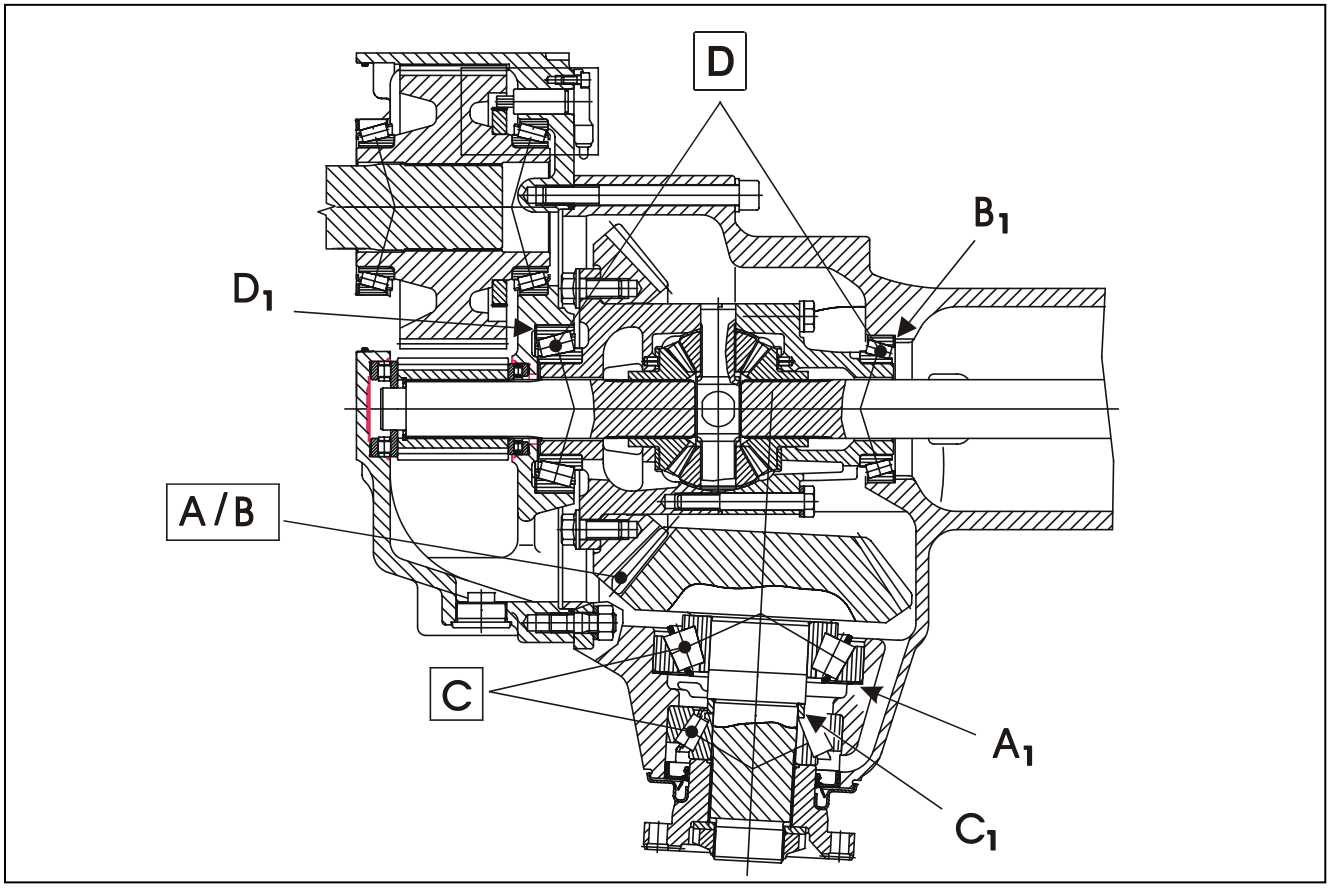


Figure 1

Legend:

- **A_1 - Shim-contact pattern**
- **B_1 - Shim-backlash**
- **C_1 - Adjusting ring-drive pinion bearing**
- **D_1 - Shim-differential bearing**

☞ **When reusing the shims being removed during disassembly, we know from experience that the required setting values are obtained!**
However, it is indispensable to check the values!

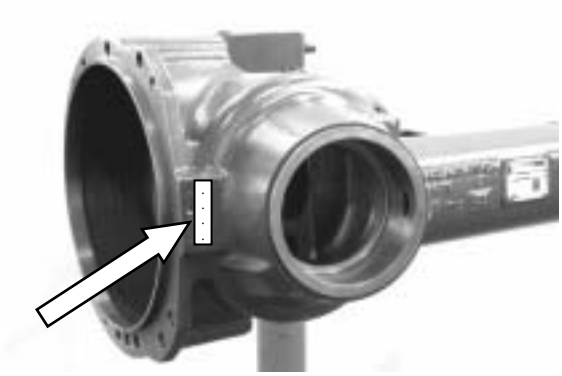


Figure 2

Contact pattern – adjustment of bevel gear set (fig. 1 to 6):

Read the installation dimension A on the axle housing (arrow).

Dimension A e.g. …….. 195.42 mm

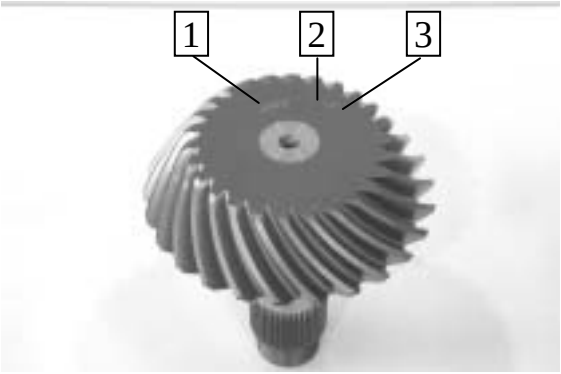


Figure 3

The figure left shows the drive pinion.

The following information is stamped or marked manually into the pinion head:

1 = Mating number (marked manually)
2 = Pinion basic dimension (stamped)
3 = Pinion distance deviation + or – (marked manually)

NOTE:
Distance deviation is indicated in $^{1}/_{100}$ mm.

Pinion dimension „X“ e.g.:

Dimension X 153 $_{-5}$ ($^{5}/_{100}$ = 0.05) = 152.95 mm

If no distance deviation is indicated, pinion basic dimension equals pinion dimension „X“!

Figure 4

Determine bearing height.

Dimension Y e.g. …….. 41.25 mm

(S) Straightedge	5870 200 022
(S) Gauge block	5870 200 066
(S) Digital depth gauge	5870 200 072

Calculation example A_1:

Dimension X (pinion dimension) e.g. ..... 152.95 mm
Dimension Y (bearing height) e.g. ..... + 41.25 mm
Equals dimension Z = 194.20 mm

Calculation example A_2:

Dimension A e.g. ..... 195.42 mm
Dimension Z e.g. ..... - 194.20 mm
Difference = shim s = 1.22 mm

☞ **The individual shims are available in 0.03 mm size intervals. Use the next available shim size e.g. s = 1.23!**

Supercool outer bearing outer ring and insert it until contact is obtained.

Figure 5

Mount shim (according to calculation example s = 1.23 mm). Supercool bearing outer ring and insert it with the fixture into the bearing hole until contact is obtained. (Figure 6 and 7).

Figure 6

(S) Assembly fixture 5870 345 080

Figure 7

Figure 8

Press bearing inner ring until contact is obtained.

Figure 9

<u>Adjust rolling torque of the input pinion bearing 1.5 to 4.5 Nm (figures 9 to 13):</u>

☞ **As per experience the required rolling moment is obtained by use of the adjusting ring available at disassembly!**
However, a later checking of the rolling moment is imperative!

Mount adjusting ring e.g. s = 10.32 mm.

Figure 10

Position drive pinion and mount the heated bearing inner ring until contact is obtained.

☞ **Before mounting the input flange and tightening the slotted nut (figures 11 and 12), let bearing inner ring cool down to ambient temperature.**

Figure 11

Mount input flange.

Figure 12

Mount shim and tighten slotted nut.

While tightening rotate the drive pinion several times in both directions.

Tightening torque …… M_A = 1000 Nm

(S) Slotted nut wrench	Ø 86 mm	5870 401 093
(S) Slotted nut wrench	Ø 81 mm	5870 401 139
(S) Centering disk		5870 912 015
(S) Clamping yoke		5870 240 002

Figure 13

Check bearing rolling torque between 1.5 and 4.5 Nm!

Bearing rolling torque e.g. …….. 3.5 Nm.

In case of deviations from the necessary rolling torque, corrections have to be carried out with the relevant adjusting ring (figure 9) as specified below:

Insufficient rolling torque – install thinner ring
Excessive rolling torque – install thicker ring

(S) Slotted nut wrench	5870 203 031
(S) Reducer ½“ – ¼““	5870 656 056

Secure the slotted nut (Loctite) and assemble the shaft seal after the contact pattern has been accepted (figure 41 ff)!

Figure 14

Differential (figures 14 to 23)

☞ **The following illustrations provide a description of the differential assembly: Version I, type "C" Version II / type "D" (new differential), is only available as complete component.**

Heat crown wheel and install it at the mounting face of the differential until contact is obtained.

⚠ **Pay attention to radial installation position!**
Use protective gloves!

Figure 15

Fix differential carrier by means of press.
Bolt crown wheel and differential carrier.

☞ **Permitted temperature for crown wheel and differential carrier when bolting max. + 30° C!**

Only new locking screws may be used!

Tightening torque …….. M_A = 250 Nm

Insert thrust washer.

Figure 16

☞ **Pay attention to installation position – lubricating groove showing upwards (to the axle bevel gear).**

Figure 17

Radial fixation of thrust washer by means of grooved pins (2 x).

☞ **Pay attention to the installation depth of the grooved pins! The front face of the grooved pins must be slightly below the contact face/thrust washer (approx. 1.0 mm).**

Pre-assemble differential carrier halve 2 accordingly!

Figure 18

Install axle bevel gear.

☞ **Oil all internal components of the differential according to ZF –List of lubricants TE ML 12!**

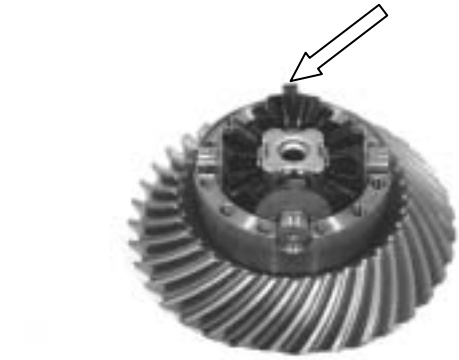


Figure 19

Mount complete differential spider.

☞ **Pay attention to radial installation position of the thrust washers – torsional stop in vertical position, see arrow!**

Figure 20

Mount second side gear.

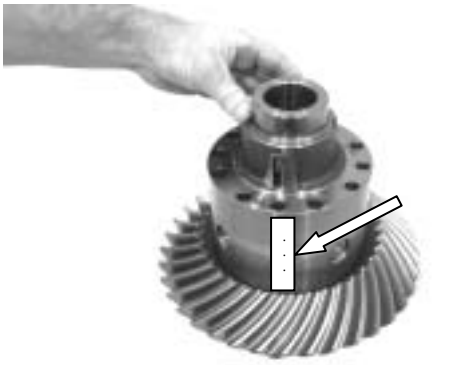


Figure 21

Mount pre-assembled differential carrier half II.

☞ Pay attention to radial installation position, see ZF-No .... (arrow)!

Figure 22

Fix differential carrier halves by means of hexagon screws and washers (s = 3.0 mm).

Tightening torque (M12x1.5/10.9) …… M_A = 120 Nm

Figure 23

Press both bearing outer rings until contact is obtained.

Figure 24

Adjust backlash– bevel gear set
and
bearing rolling torque – differential 2.5 to 5..5 Nm (figures 24 to 40):

☞ **Necessary backlash, see crown wheel (arrow)!**

Figure 25

Insert adjusting shim and bearing outer ring into the bearing hole until contact is obtained.

☞ **When reusing the shims being removed during disassembly, we know from experience that the required setting values are obtained.**
However, it is indispensable to check the values afterwards!

(S) Driver	5870 058 078
(S) Handle	5870 260 002

Insert pre-assembled differential into the axle housing.
Then pivot axle housing into vertical position.

Figure 26

Install bearing outer ring.

Figure 27

Insert measuring cover evenly until contact is obtained by means of hexagon screws (4 x).

(S) Measuring cover 5870 200 121

Figure 28

To ensure that the individual components are centered precisely, rotate bevel gear set several times in both directions.

Figure 29

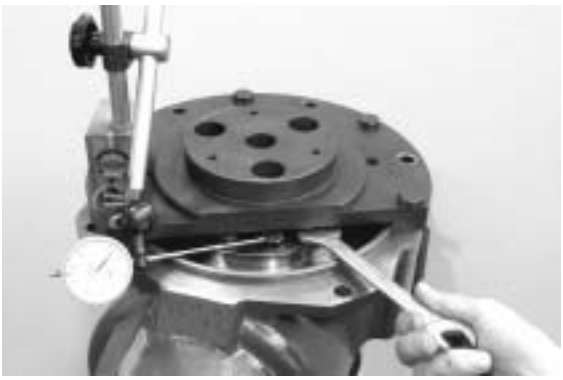


Figure 30

Check backlash!

☞ **Due to the installation situation, the acceptance of the backlash is not possible on the outer diameter of the crown wheel!**
When accepting on the crown wheel threaded connection (screw head), the necessary backlash (see manually marked value on the crown wheel) must be reduced by 30%.

In case of a necessary backlash of e.g. 0.2 mm the relevant calculation example reads as follows:

$$^{0.2\ mm}/_{100\ \%} \cdot 70\% = 0.14\ mm$$

Permitted tolerance deviation ± 0.02 mm

If backlash corrections are necessary, the following information must be taken into account:

1. **Insufficient backlash ⇒ mount thicker adjusting shim (figure 25).**

2. **Excessive backlash ⇒ mount thinner adjusting shim (figure 25).**

Figure 31

Position dial indicator to the crown wheel back and check max. axial runout 0.06 mm!

☞ **In case of deviations from the permitted axial runout, check the accurate contact between crown wheel and differential carrier and correct, if necessary.**

(S) Magnetic stand 5870 200 055
(S) Dial indicator 5870 200 057

Figure 32

Adjust rolling torque of the differential bearing between 2.5 and 5.5 Nm (figures 32 to 35):

Calculate dimension I, between the front face of the bearing outer ring and the mounting face of the axle housing (figures 32 and 33).

Dimension I is based on the measuring processes of figure 32 and figure 33 !

Measurement I (figure 32):
Insert digital caliper gauge until bearing outer ring and balance to 0.00 mm.
Then separate measuring cover from the axle housing.

Figure 33

Measurement II (figure 33):

Insert caliper gauge until straightedge and read dimension I.

Dimension I e.g.…… 26.68 mm

(S) Straightedge	5870 200 022
(S) Digital depth gauge	5870 200 072

Figure 34

Calculate dimension II, between the mounting face of the drop center housing and the locating face/bearing outer ring (figure 34).

Measurement I:
Position digital caliper gauge between straightedge and mounting face and balance to 0.00 mm.

Measurement II:
Now insert caliper gauge to the mounting face/bearing outer ring and read dimension II.

Dimension II e.g. ……27.69 mm

Calculation example B:

Dimension II……	27.69 mm
Dimension I……. ……	- 26.68 mm
Difference	= 1.21 mm

Difference ≙ installation dimension of the adjusting shim!
The individual shims are available in 0.05 mm size intervals.
When using the next available shim size, e.g.
s = 1.20 mm, the necessary rolling torque of the differential bearing is between 2.5 and 5.5 Nm!

Figure 35

Insert the calculated adjusting shim (e.g. s = 1.20 mm) and install the bearing outer ring until contact is obtained.

Figure 36

Contact pattern – check bevel gear set (figures 36 to 40):

Cover some drive and coast flanks of the crown wheel with marking ink.

Figure 37

Insert differential into the axle housing.

Position the drop center housing on the axle housing and locate it provisionally with hexagon nuts as well as with cylindrical screws.

Tightening torque …….. M_A = 200 Nm

(S) Lifting chain 5870 281 047

Figure 38

Figure 39

Roll drive pinion several times in both directions over the crown gear.

Figure 40

<u>Check total rolling torque (pinion and differential bearing)!</u>

☞ **Total rolling torque must be approx. 2 – 3 Nm above the previously measured rolling torque of the pinion bearing (figure 13)!**
If a completely preassembled drop center drive is mounted, it is necessary to increase the rolling torque by 3-4 Nm.

(S) Torque spanner	5870 203 031
(S) Reducer $^1/_2$ " - $^1/_4$ "	5870 656 056

Now disassemble differential again and compare the contact pattern result with the contact pattern examples of page 0/4 and 0/5.

☞ **In case of a contact pattern deviation, it is imperative to correct the measuring fault which has occurred during the calculation of the adjusting shim (figure 6)!**

Figure 41

Pivot axle housing into horizontal position.
Loosen slotted nut and remove input flange.

Assemble shaft seal with the seal lip showing to the oil chamber (figure 41).

☞ **Wet outer diameter with spirit!**
The use of the specified special tool (S) ensures the precise installation position!

(S) Driver 5870 048 216

Figure 42

Press the protective shield over the collar of the input flange until contact is obtained.

(S) Driver 5870 056 008
(S) Handle 5870 260 002

Figure 43

Insert input flange.
Final fixation of input flange by means of disk and slotted nut.

☞ **Wet thread of the slotted nut sporadically with Loctite, type no. 262!**

Tightening torque ……. M_A = 1000 Nm

(S) Slotted nut wrench Ø 86 mm 5870 401 093
(S) Slotted nut wrench Ø 81 mm 5870 401 139
(S) Centering shim 5870 912 015
(S) Clamping yoke 5870 240 002

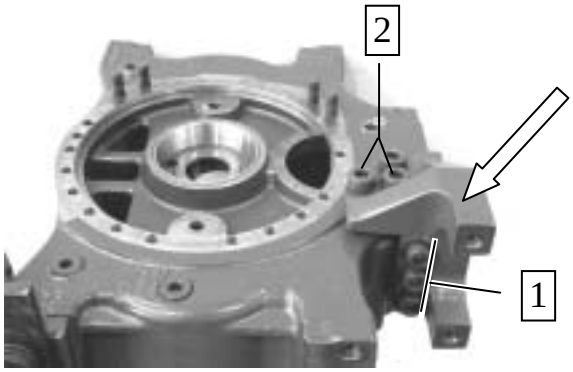


Figure 44

2.2 DROP CENTER DRIVE

Fix the longitudinal rod bracket (arrow) by means of cylindrical screws and washers on the drop center housing as specified below:

☞ **Secure screws with Loctite 243!**

1. Position the bracket on the housing.
   Provisionally tighten the cylindrical screws (pos. 1) on the side of the rod connection finger-tight (3 … 5 Nm)!

2. Now mount cylindrical screws (pos.2) and tighten them with the necessary tightening torque M_A = 440 Nm.

3. Finally tighten cylindrical screws (pos. 1) with the necessary tightening torque M_A = 440 Nm!

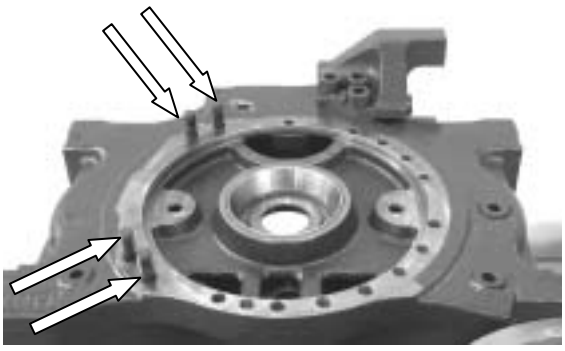


Figure 45

Mount stud bolts, see arrows!

Tightening torque …….. M_A = 33 Nm

☞ **Wet thread with Loctite 262!**
Mount stud bolts only on the drop center housing of the differential.

Mount drive gear (figures 46 to 50)

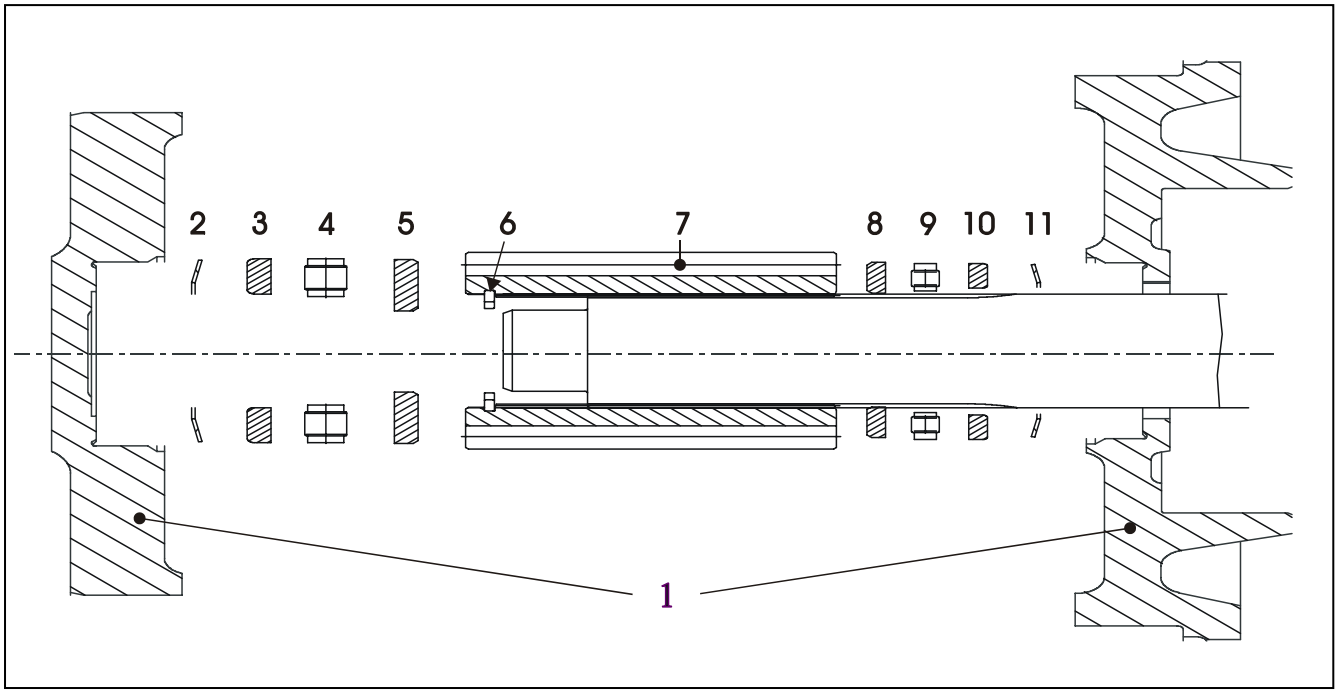


Figure 46

Legend to figure 46 :

1 = housing
2 = cup spring (67.5 x 50.5 x 0.7)
3 = housing shim (68 x 42 x 5)
4 = axial bearing (68 x 40 x 9)
5 = plate (68 x 30 x 5)
6 = retaining ring
7 = drive gear
8 = plate (42 x 65 x 4)
9 = axial bearing (65 x 45 x 6)
10 = housing disk (47 x 65 x 4)
11 = cup spring (63.8 x 50.5 x 0.7)

☞ **Pay attention to the installation position of the cup springs (pos. 2 and pos. 11), refer to sketch!**

Mount plates (pos. 5 and pos. 8) with the larger chamfer or radius showing to the drive gear!

Mount housing disks (pos. 3 and pos. 10) with the larger chamfer or radius showing to the housing!

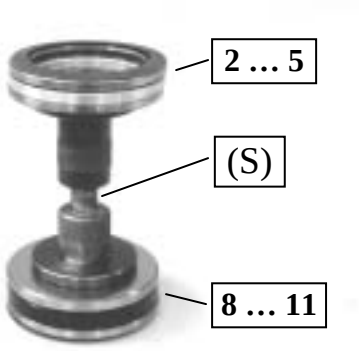


Figure 47

Position individual components pos. 2 to 5 and pos. 8 to 11 by means of assembly fixture (figure 47) in the drop center housing (arrow/figure 48).

(S) Assembly fixture 5870 345 103

☞ **The cup springs are pre-stressed with the fixture, until the drive gear can be assembled (figure 50)!**
Pay attention to the installation position of the individual components, refer to figure 46!

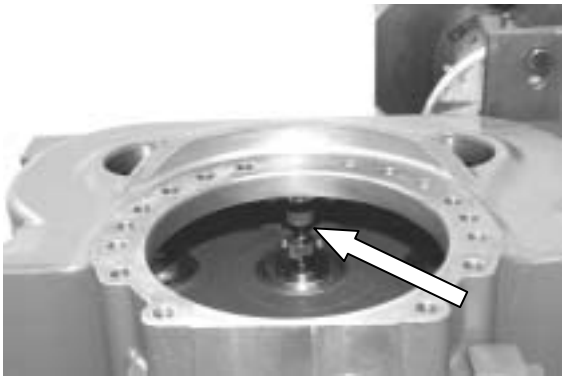


Figure 48

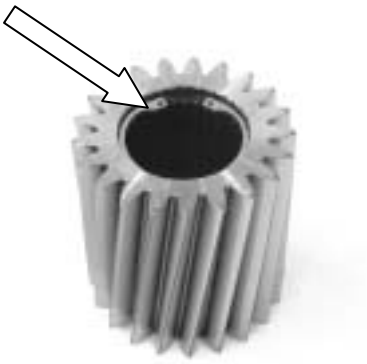


Figure 49

Engage retaining ring (arrow) into the groove of the drive gear.

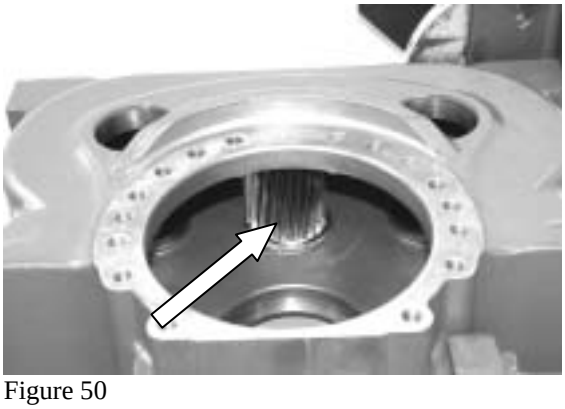


Figure 50

Position the drive gear in the housing (arrow) and thereby remove the assembly fixture again.

☞ **Pay attention to installation position - retaining ring shows upwards, see also figure 46 !**

Preassemble intermediate gears and check axial play 0.01 to 0.05 mm (figures 51 and 52):

☞ **When reusing already run intermediate gears, pay attention to allocation and installation position of the individual components!**
When reusing the shims being removed during disassembly, we know from experience that the required axial play of the intermediate gear bearing is obtained.
However, it is indispensable to check the values afterwards!!

Assemble individual components and insert adjusting shim.

Figure 51

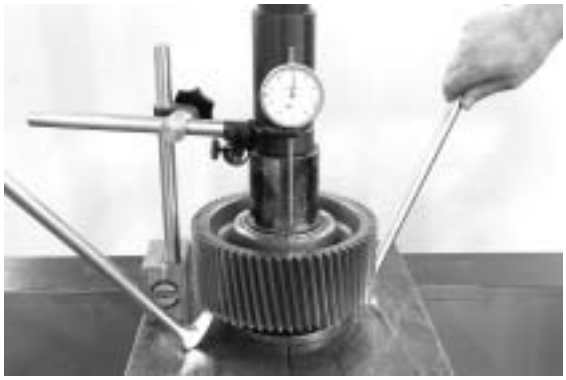


Figure 52

Insert plug gauge (S) and fix intermediate gear bearing by means of press. Contact pressure approx. 10 000 N (1 to.).

Check axial play!

☞ **In case of deviations from the necessary axial play, correct with the relevant adjusting shim (figure 51).**

(S) Plug gauge	5870 200 094
(S) Magnetic stand	5870 200 055
(S) Dial indicator	5870 200 057
(S) Pry bar	5870 345 071

Then disassemble bearing bolt again.

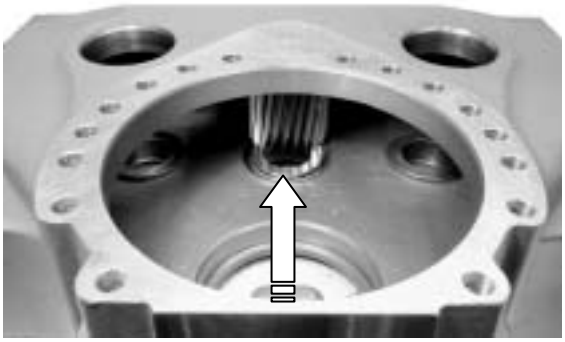


Figure 53

Install intermediate gears (figures 53 to 58):

In order to enable the assembly of both intermediate gears, move drive gear preliminarily in direction of arrow.

☞ **When putting back the drive gear, make sure that the installation position of the components is maintained!**

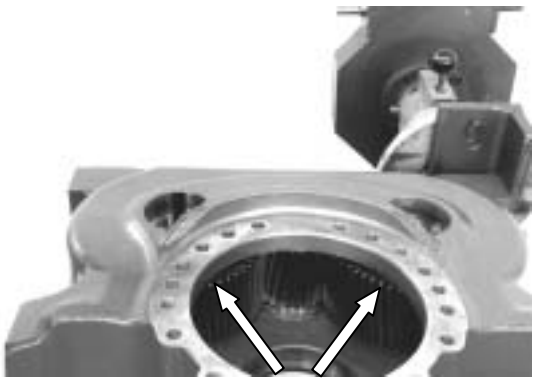


Figure 54

Position both intermediate gears (arrows) in the drop center housing.
Then align intermediate gears and side gear centrally to the bearing holes.

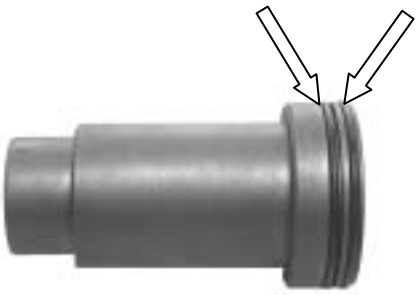


Figure 55

Insert O-rings (arrows) in both annular grooves of the bearing bolt and grease them.

Figure 56

Use assembly grease to glue the calculated adjusting shim and mount the adjusting screw.

(S) Adjusting screws 5870 204 022

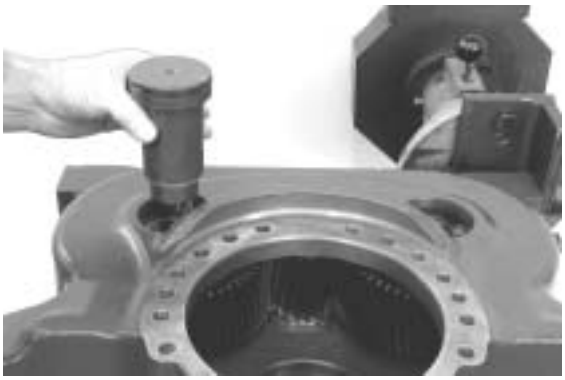


Figure 57

Locate both intermediate gears by means of bolts.


Figure 58

Pivot drop center housing 180°.

Locate both bearing bolts by means of hexagon screws.

Tightening torque (M14/10.9) …… M_A = 185 Nm


Figure 59

<u>Pre-assemble and install output gear (figures 59 to 71)</u>

Heat impulse disk and press it until contact is obtained.


Figure 60

Press both bearing inner rings until contact is obtained.

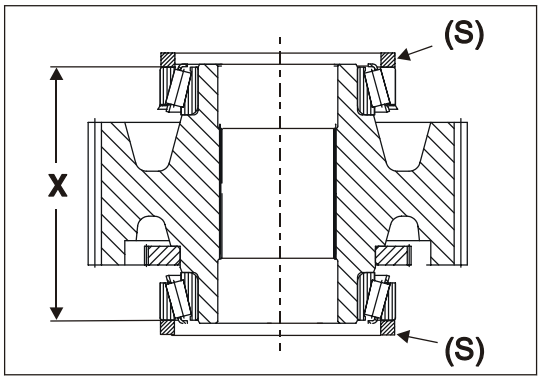


Figure 61

Adjust axial play – output bearing 0.00 to 0.03 mm (figures 61 to 65):

Determine the total height of the output gear bearing, figure 61 and 62!

(S) Measuring ring (2x)	0730 161 832
(S) Digital depth gauge	5870 200 072
(S) Measuring bar	5870 200 127
(S) Straightedge	5870 200 022


Figure 62

Dimension X e.g. ……. 135.12 mm

☞ **Roll bearing several times in both directions in order to ensure that the individual components are centered precisely!**


Figure 63

Drop center housing:

Measure dimension I between the mounting face/flange and the locating face of the bearing outer ring.

Dimension I e.g. …….. 136.48 mm

(S) Digital depth gauge	5870 200 072
(S) Measuring bar	5870 200 127


Figure 64

Hub carrier:

Measure dimension II, between the mounting face of the flange and the locating face of the bearing outer ring.

Dimension II e.g. ……... + 0.02 mm

☞ **Dimension II, can be + or – !**

(S) Digital depth gauge	5870 200 072
(S) Measuring bar	5870 200 022
(S) Gauge blocks	5870 200 066

Calculation example C:

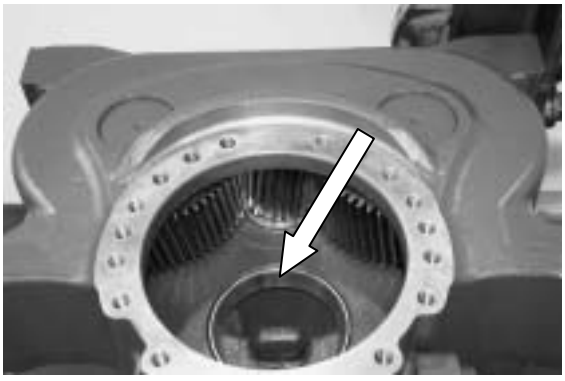
Dimension I ……		136.48 mm
Dimension II ……..	+	0.02 mm
Equals dimensionY	=	136.50 mm

Dimension Y……		136.50 mm
Dimension X……..	-	135.12 mm
Difference	s =	1.38 mm

☞ **The individual shims are available in 0.03 mm size intervals. When using the next available thinner adjusting shim, e.g. 1.37 mm, the axial play is 0.01 mm!**

Figure 65

Insert the calculated adjusting shim and mount bearing outer ring until contact is obtained.



Figure

Insert bearing outer ring (arrow) into the bearing hole until contact is obtained.

Figure 67

Insert output gear.

☞ **Pay attention to installation position – impulse disk shows downwards!**

Figure 68

Mount protective shield.

(S) Press device 5870 506 162

☞ **Wet the contact surface hub/screen shield with Loctite (type-no. 574)!**
Pay attention to installation dimension 4^{+1} mm , refer to figure 69!
The use of the specified special tool ensures that the installation position is precise!

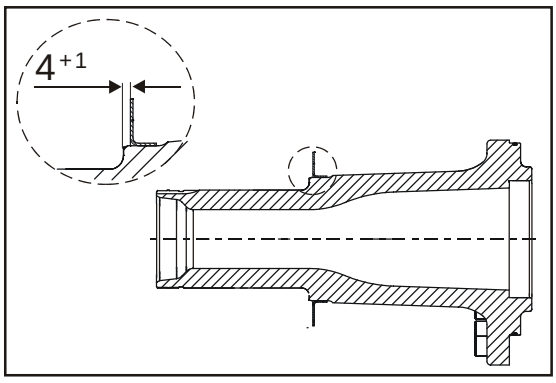


Figure 69

Figure 70

Assemble and grease O-ring (arrow).

Figure 71

Fix hub carrier on the drop center housing.

☞ **Assemble washers s = 3.0 mm!**
For the Torx screw version the assembly of washers is not applicable!
Secure screws with Loctite 243!

Tightening torque (cylindrical screws)	M_A = 200 Nm
or (depending on individual version)	
Tightening torque (Torx screws)	M_A = 185 Nm

Figure 72

Insert plug shaft until contact is obtained (figure 72 and 73).

☞ **An installation dimension between 109 and 112 mm (see figure 73) ensures that all individual components of the drive gear bearing are being assembled and centered!**

Figure 73

(S) Digital depth gauge 5870 200 072

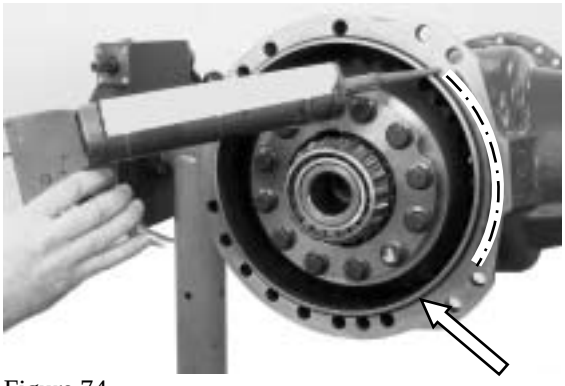


Figure 74

Put sealing agent DREI-BOND SILIKON 1207 onto the mounting face of the section without holes.

Mount and grease O-ring (arrow).

Figure 75

Mount drop center housing by means of lifting device onto the axle housing until contact is obtained and fix it.

Assemble washers s = 3.0 mm!
For the Torx screw version the assembly of washers is not applicable!
Secure screws with Loctite 243!

Tightening torque

Hexagon screws	M_A = 200 Nm
Cylindrical screws	M_A = 200 Nm
or	
Torx screws	M_A = 185 Nm

(S) Lifting chain 5870 281 047

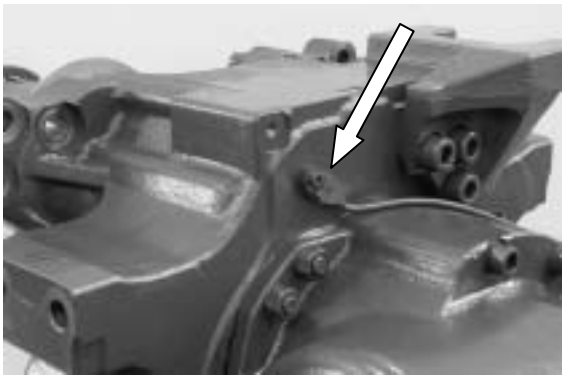


Figure 76

Assemble speed sensor (arrow).
Tightening torque M_A = 9,5 Nm

Left and right speed sensors of the individual versions can vary – pay attention to the individual specifications of the vehicle manufacturer!

Figure 77

2.3 OUTPUT

Assemble wheel bolt.

☞ **Pay attention to radial installation position!**

(S) Wheel stud puller basic tool	5870 610 010
(S) Insert 7/8 – 11	5870 610 008
(S) Insert M22x1.5	5870 610 002

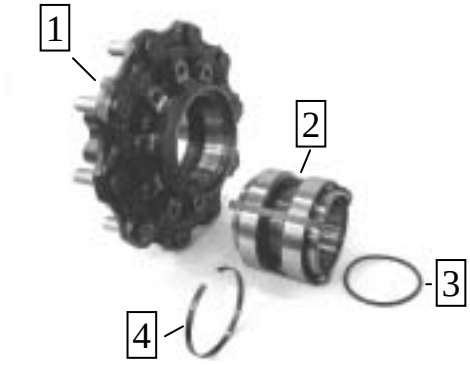


Figure 78

Mount compact bearing (figures 78 to 86)

☞ **When replacing the compact bearing or when changing grease as part of the maintenance interval, make sure that hub and compact bearing are cleaned thoroughly.**

Figures 78 and 79 show the individual components of the compact bearing and the installation position.

Legend to figure 78 and 79:

1 = Hub
2 = Compact bearing
3 = O-ring
4 = Retaining ring
} Complete component
5 = Hub carrier

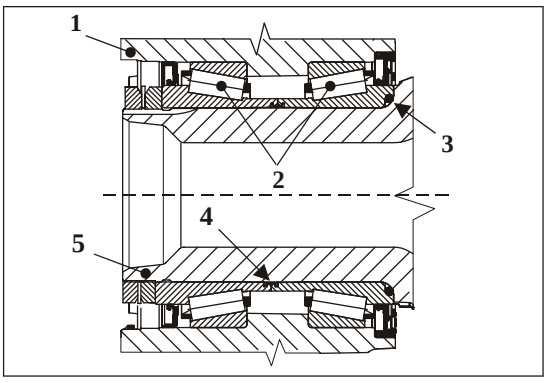


Figure 79

☞ **Position 3 and 4 are provided with the compact bearing as loose parts!**

Figure 80

Press in both bearing outer rings until contact is obtained.

(S) Driver	5870 050 007
(S) Handle	5870 260 004

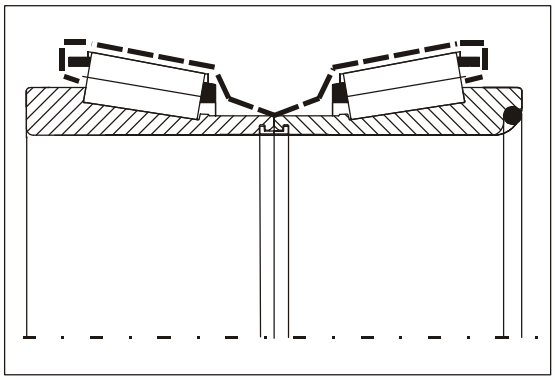


Figure 82

Grease compact bearing in the marked area - - - .

Total grease quantity of each output side: 130 gram (max. 150 g).

☞ **Apply richly grease onto the bearing rolls, inside, outside and on the front sides!**

⚠ **Only use grease types which have been released by ZF (e.g. Renolit LX-PEP 2, ZF order no.: 0671 190 122).**
ZF List of lubricants TE-ML 12 is binding!
The latest update of the List of Lubricants is available at internet site www.zf.com *Service/Techn. Information*!

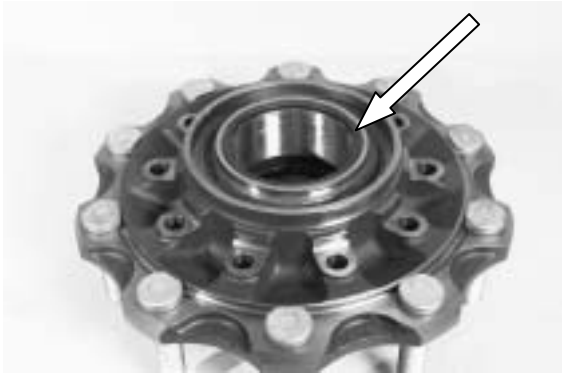


Figure 82

Mount bearing inner ring on brake disk side.

☞ **To ensure that the position of the bearing rollers in the bearing outer ring is precisely aligned, press bearing inner ring firmly and rotate it several times (roll in))!**
The bearing inner ring of the brake disk side is visible on the ring nut for the O-ring (arrow)!

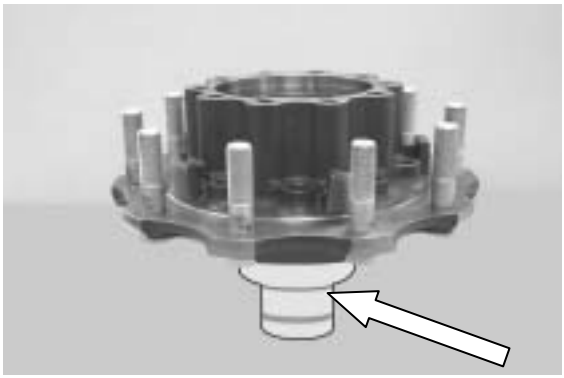


Figure 83

Turn hub.

☞ **Support the bearing inner ring on the brake disk side by means of an appropriate mandrel (arrow) to maintain the contact of the bearing inner ring!**

Figure 84

Mount outer bearing inner ring.

☞ **To ensure that the position of the bearing rollers in the bearing outer ring is precisely aligned, press bearing inner ring firmly and rotate it several times (roll in)!**
Clearance free contact of both bearing inner rings must be ensured!

Figure 85

Locate both bearing inner rings by means of retaining ring.

☞ **Pay attention that the installation position of the retaining ring is correct, see arrow/figure 86!**
In case of incorrect location the reference dimension is = 140 $^{+/- 0,4}$ mm , see figure 86 !
It is no more possible to lift the outer bearing inner ring.

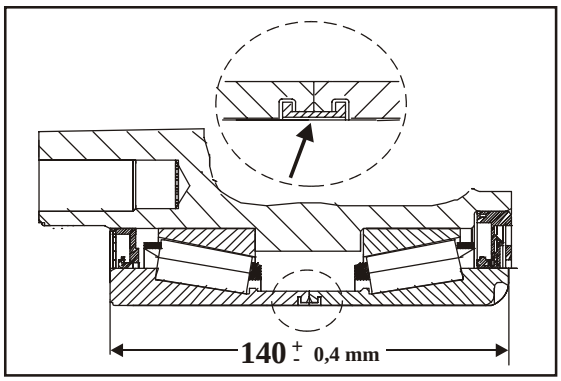


Figure 86

Figure 87

Mount shaft seal on the flange shaft side.

(S) Driver 5870 051 053

☞ **The use of the specified special tool (S) ensures that the installation depth is precise!**
Pay attention to the installation position, designation „OELSEITE /OILSIDE“ shows upwards!

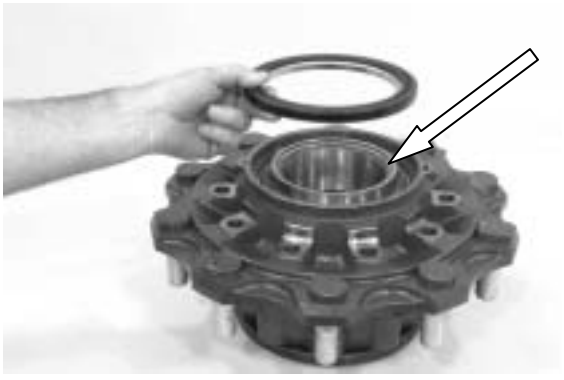


Figure 88

Mount shaft seal on the side of the brake disk.

(S) Driver 5870 051 053

☞ **The use of the specified special tool (S) ensures that the installation position is correct!**
Pay attention to the installation position – sensor ring or designation „AUSSENSEITE / OUTSIDE“ shows upwards (outside)!

Insert O-ring into the ring nut of the bearing inner ring (arrow).

Figure 89

Bolt hub/brake disk.

Tightening torque (M16x1.5/10.9) …….. M_A = 300 Nm

Figure 90

Put lubricant „MOLYKOTE DX“ onto the bearing.

Figure 91

Insert inner installer into the hub carrier until contact is obtained.

(S) Inner installer 5870 651 085

Figure 92

Mount preassembled hub carefully by means of lifting device until contact is obtained.
Then remove inner installer again.

(S) Lifting bracket 5870 281 043

Mount internal slotted nut.

Figure 93

Pay attention to the installation position of the slotted nut – chamfer shows <u>outwards!</u>
While tightening rotate the hub several times in both directions!

Tightening torque (inner slotted nut) ….. M_A = 850 Nm

(S) Slotted nut wrench 5870 401 146

If no increase of the bearing rolling torque or axial play of the wheel bearing is noticeable (figure 94) while tightening the slotted nut (figure 93), it is possible that this is caused by the unsnapping of the retaining ring (figure 85 and 86).

If necessary, correct assembly fault!

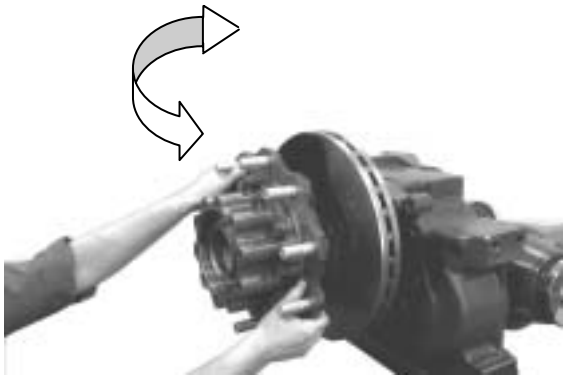


Figure 94

Insert locking plate and assemble outer slotted nut.

Figure 95

Pay attention to the installation position of the locking plate - – securing clip shows inside!
Pay attention to the installation position of the slotted nut – chamfer shows <u>inside!</u>

Tightening torque (outer slotted nut) …….. M_A = 1200 Nm

Figure 96

Secure slotted nut by fixing the locking plate to a nut of the outer slotted nut.

Figure 97

Insert O-ring into the ring nut of the flange shaft (arrow) and grease it.

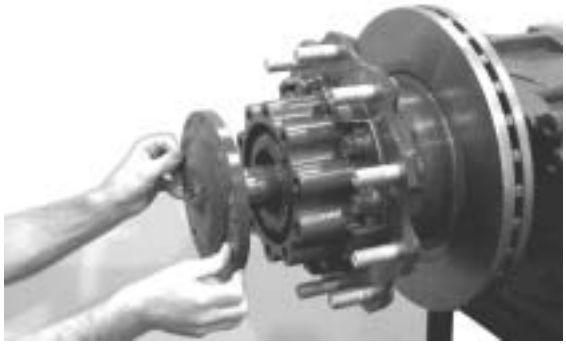


Figure 98

Insert flange shaft until contact is obtained and fix it with hexagon screws.

Tightening torque (M18x1.5/10.9) …….. M_A = 440 Nm

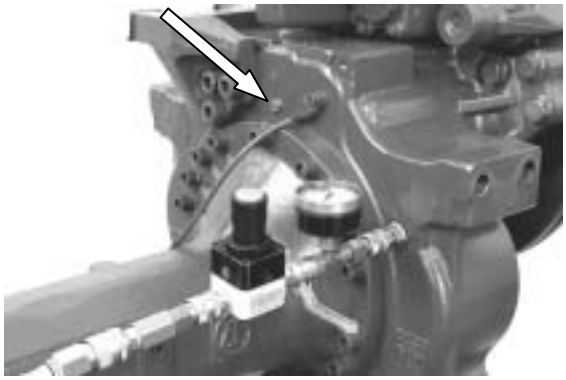


Figure 99

Check if the function of the sealing elements is correct!

Test medium : air
Test pressure : 0.5 bar
Test period: 10 minutes

☞ **Lock the mounting hole for the breather valve provisionally (arrow)!**
Lock the stop valve during the 10 minutes test period!

(S) Air connection 5870 286 079
(S) Reducer 5870 286 080

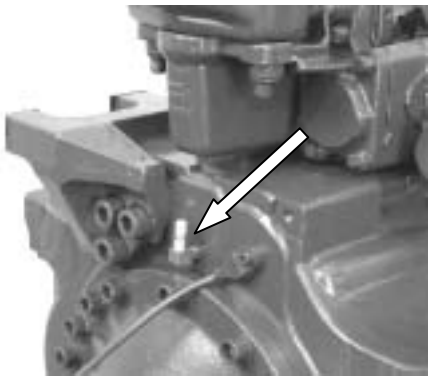


Figure 100

The following illustrations provide a description of the mounting of various peripherical parts and assemblies! Different versions may require different operating processes. In this context please also refer to the specifications of the relevant spare parts list and of the vehicle manufacturer!

Mount breather valve, see arrow (version: breather hose)!

Tightening torque …….. M_A = 6 Nm

Brake reassembly.

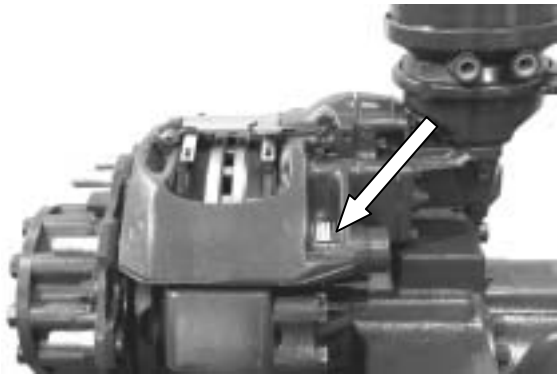


Figure 101

Tightening torque (M16x1,5 / 10.9) ……... M_A = 270 Nm
or (depending on individual version)
Tightening torque (M18x1,5 / 10.9)) …….. M_A = 440 Nm

When working on the brake system, the instructions and specifications of the respective brake manufacturer are binding!

The relevant information is included in the repair and maintenance instructions of the component manufacturer!

The latest updates of the individual instructions can be ordered by the brake manufacturer or looked up at the available internet site!

Brake manufacturer and brake type can be taken from the identification plate of the brake caliper!

Figure 102

Figure 101 shows the position of the identification plate (arrow) with the example of a KNORR – brake!
With this version it is necessary to pay attention to the installation position of the fitting screw (arrow / figure 102)!
The fitting screw must always be mounted on the left and right output side <u>in driving direction (front side)</u>!

Figure 103

Fix the spring carriers (4x) with screws and washers to the axle housing.

Tightening torque (M20x1.5/10.9) …….. M_A = 620 Nm

Pay attention to the installation position – see the markings which have been applied during the disassembly process!

Before commissioning the unit, carry out oil filling according to the specifications provided in the lubrication and maintenance instructions
(ZF-order no.: 5871 214 902)!