1. AXLE

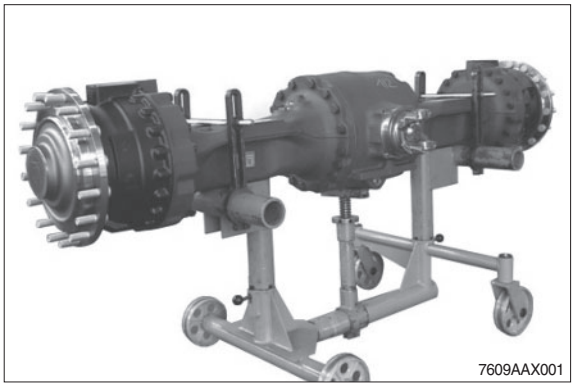
1) DISASSEMBLY

(1) Disassembly output and brake

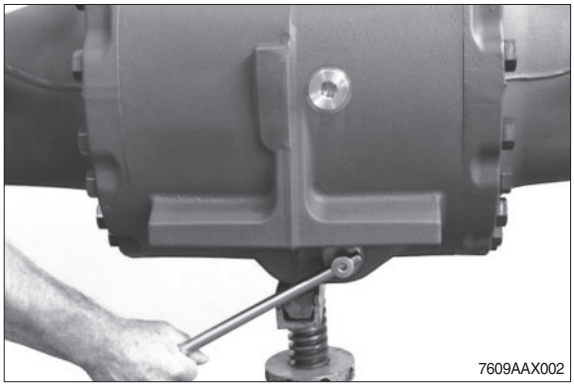
① Fix axle to assembly truck.

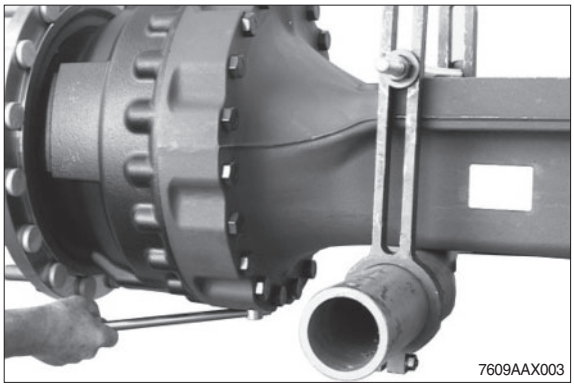
Assembly truck	5870 350 000
Fixtures	5870 350 077
Clamping brackets	5870 350 075
Support	5870 350 125

※ Before clamping the axle fully turn in the support. Position axle first onto the two fixtures, secure with clamping brackets and then unbolt the support until contact with the axle is obtained.



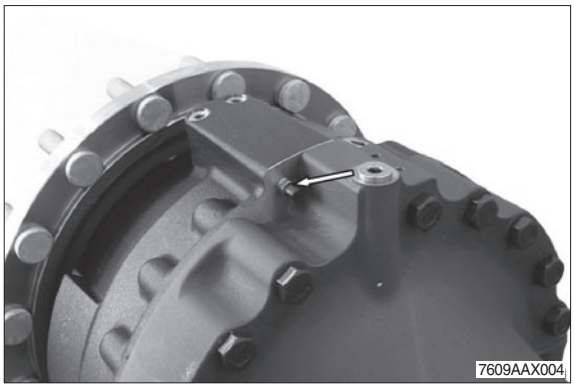
② Loosen screw plugs (3EA, see AX002 and AX003) and drain oil from the axle.





③ Remove the breather valve (see arrow).

※ To avoid any damage, the breather valve must be removed when separating the output.

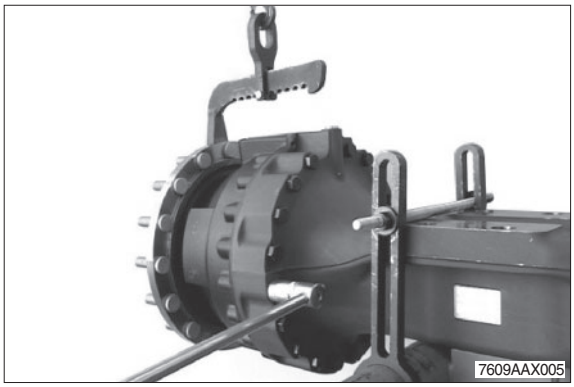


④ Secure the output with the lifting device and loosen hexagon screws.

Then separate the output assy from the axle housing.

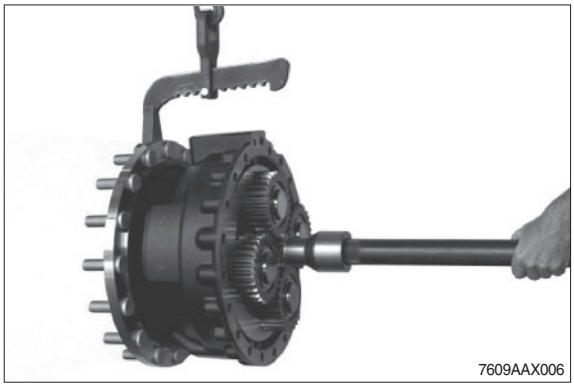
Load carrying device 5870 281 043

※ Fix the load carrying device with a wheel nut.



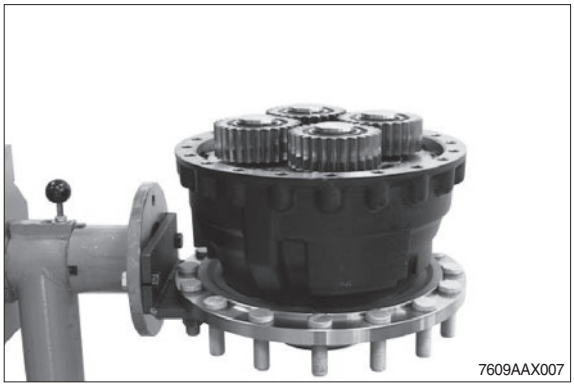
⑤ Pull stub shaft and sun gear shaft.

※ Pay attention to potentially releasing shim.

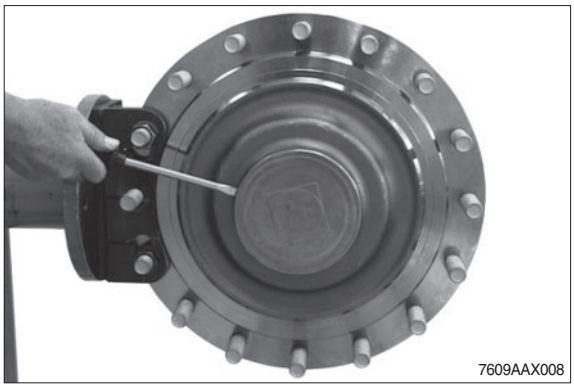


⑥ Fix output to assembly truck.

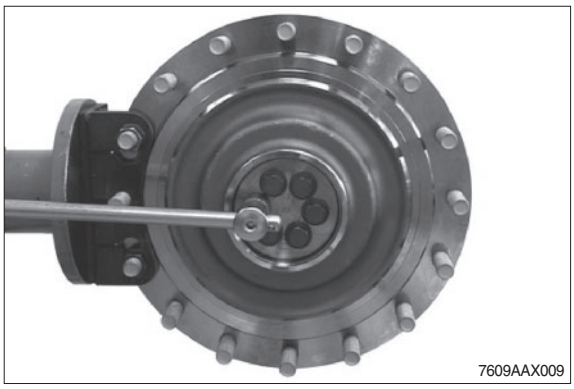
Assembly truck	5870 350 000
Fixture	5870 350 113



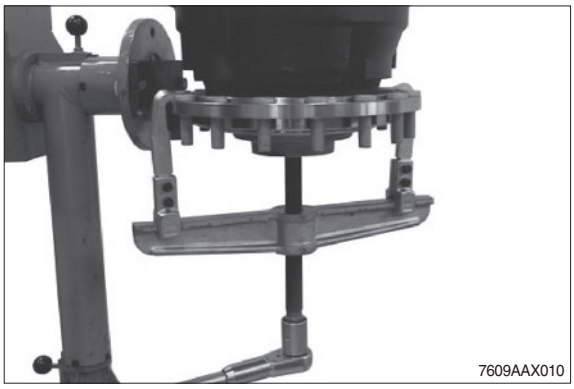
⑦ Use a lever to remove the cover from the output shaft.



⑧ Loosen locking screws and remove the releasing cover.

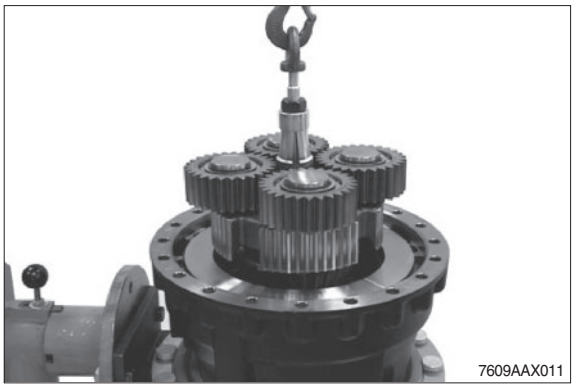


⑨ Press planetary carrier with a two-armed puller out of the profile of the output shaft.



⑩ Lift the planetary carrier out of the brake housing by means of the lifting device.

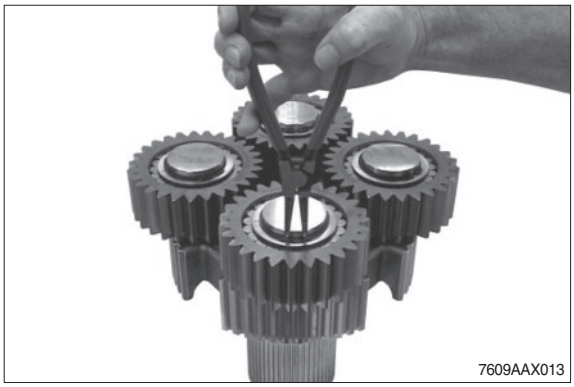
Inner extractor	5870 300 017
Eye nut	5870 204 076



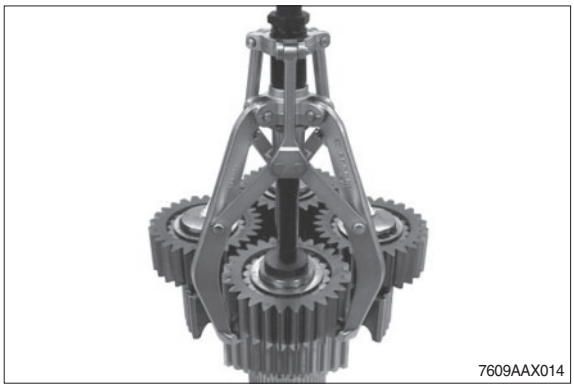
⑪ Pull the tapered roller bearing from the planetary carrier.

Rapid grip	5873 014 016
Basic tool	5873 004 001

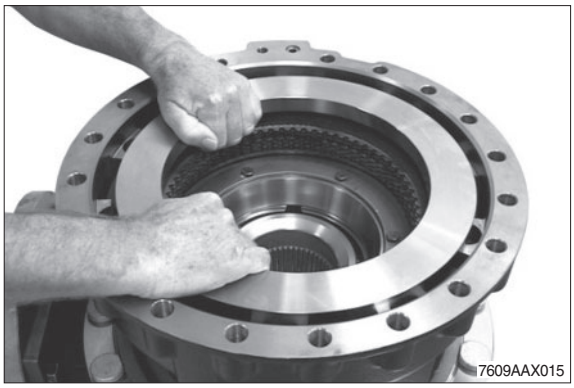
⑫ Disengage retaining ring.



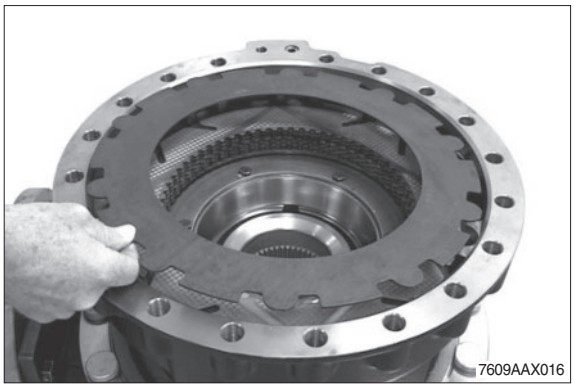
⑬ Pull off planetary gear.



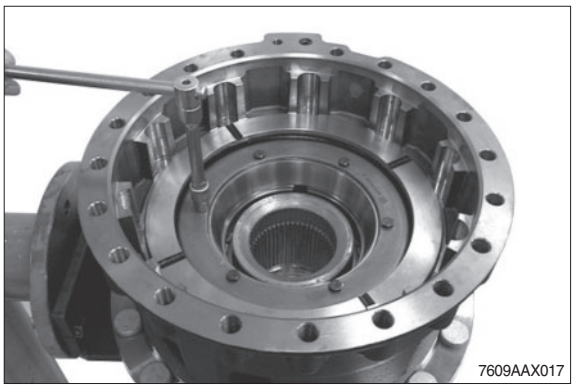
⑭ Lift the end plate out of the brake housing.



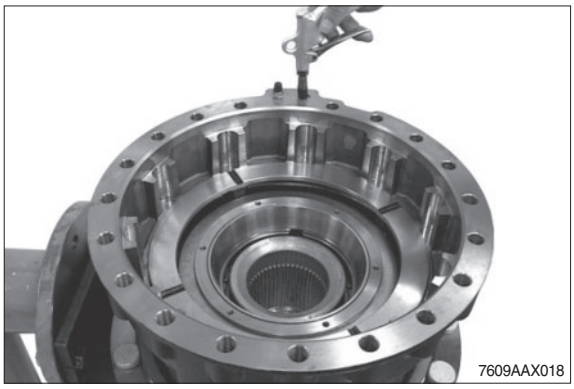
⑮ Lift the disk package out of the brake housing.



⑯ Loosen hexagon screws, remove releasing cover and cup spring.

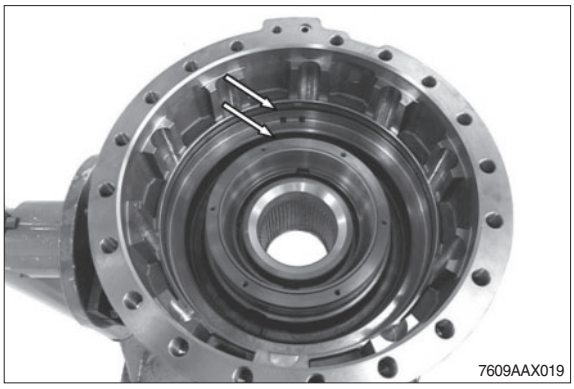


⑰ Mount breather valve and press piston out of the brake housing by means of compressed air.

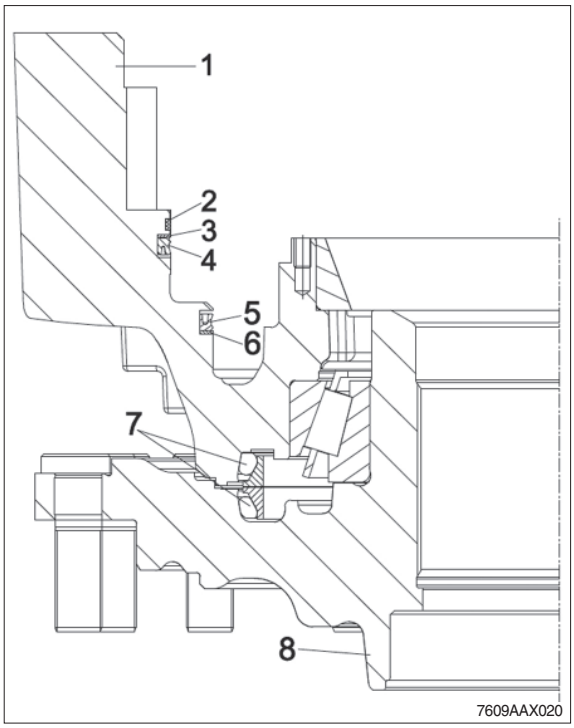


⑱ If necessary, remove guide ring, back-up rings and grooved rings out of the annular grooves of the brake housing (see arrows).

※ For the installation position of the single parts please also refer to the following sketch.

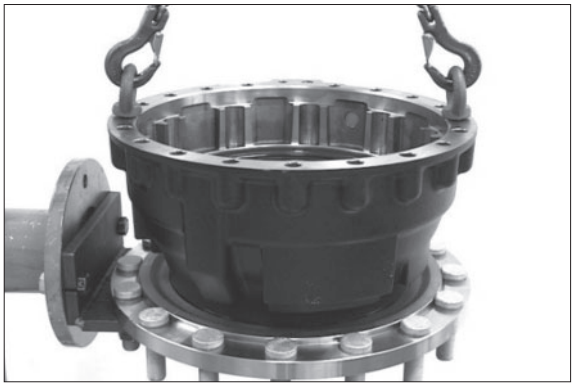


1 Brake housing
2 Guide ring
3 Back-up ring
4 Grooved ring
5 Grooved ring
6 Back-up ring
7 Slide ring seal
8 Output shaft



7609AAX020

⑲ Lift the brake housing from the output shaft by means of the lifting device.


7609AAX021

⑳ Use a lever to remove the slide ring seal from the brake housing.

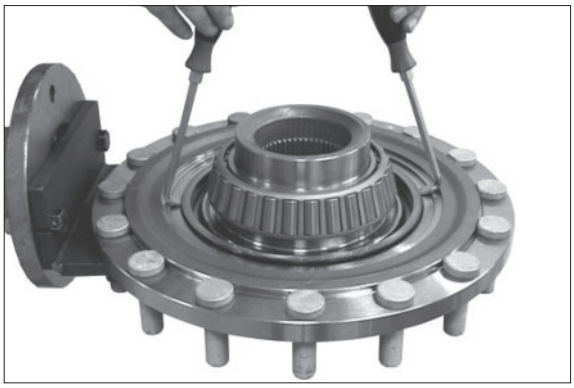
If necessary, force out both bearing outer rings.

Resetting device 5870 400 001


7609AAX022

㉑ Use a lever to remove the slide ring seal from the output shaft.

Resetting device 5870 400 001



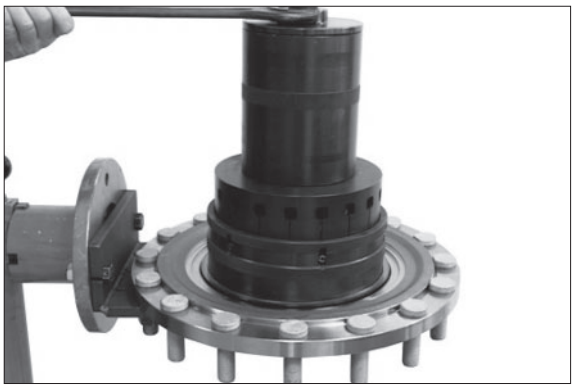
7609AAX023

㉒ Pull the tapered roller bearing from the output shaft.

Rapid grip
- Front axle AA00 693 459
- Rear axle 5873 014 013

Basic tool 5873 004 001

Pressure piece AA00 334 968



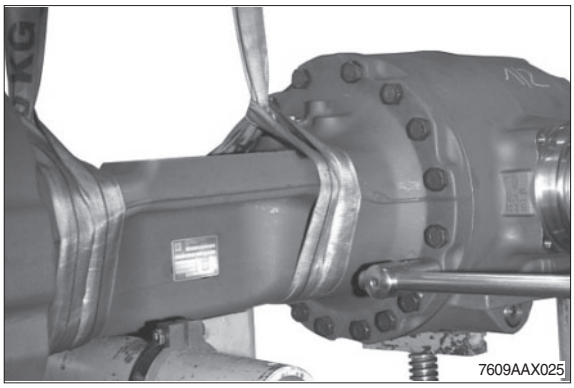
7609AAX024

(2) Disassembly axle housing

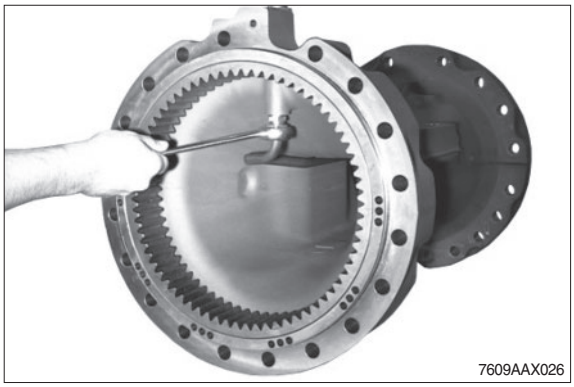
① Secure axle housing with the lifting device and loosen the hexagon screws.

Then separate the axle housing from the axle drive housing.

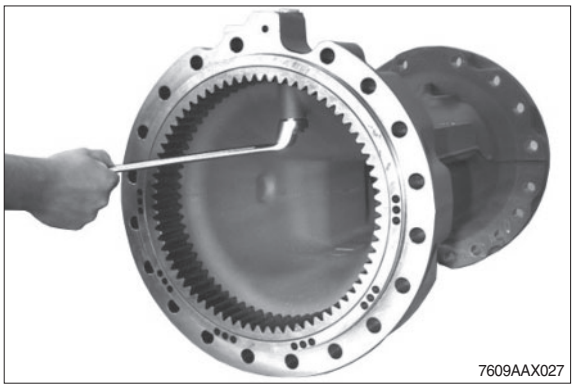
※ Pay attention to releasing differential.



② Loosen the threaded connections and remove the releasing brake tube.

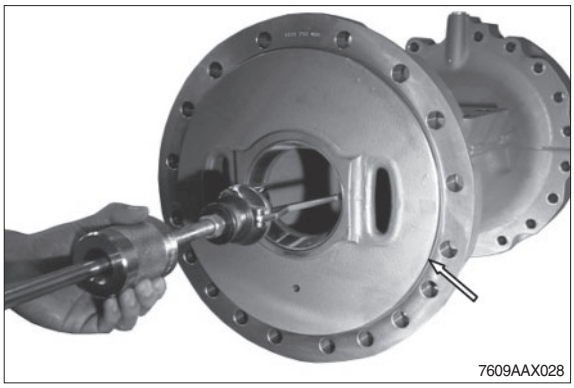


③ Loosen screw neck.



④ Pull the bearing outer ring out of the bearing hole and remove the shim behind.

Then remove the O-ring (see arrow).

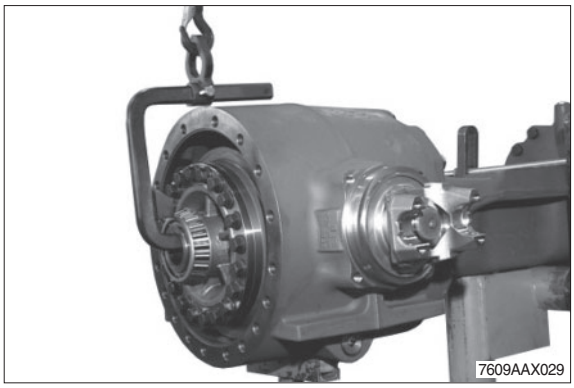


(3) Disassembly input

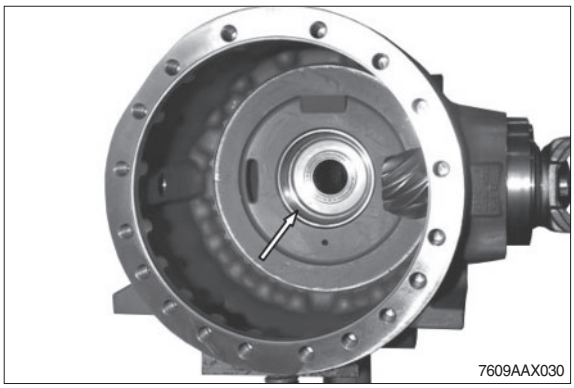
① Use the lifting device to lift the differential out of the axle drive housing.

Load carrying fixture 5870 281 083

※ Disassembly of the differential is described as of page 3-95.

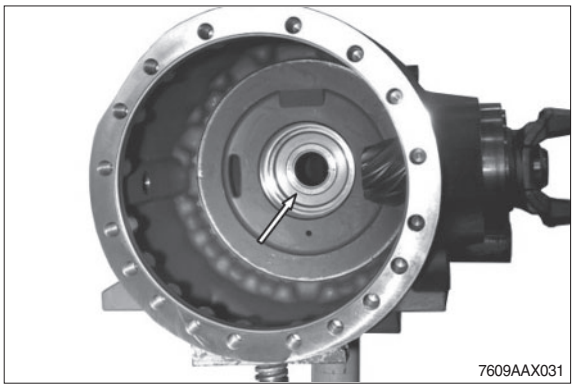


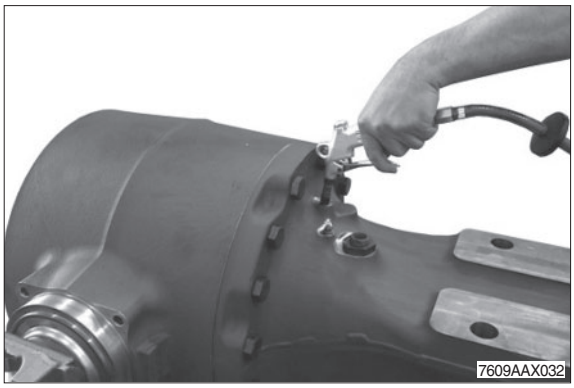
② Pull the bearing outer ring (see arrow) out of the housing hole and remove the shim behind.



③ Press piston (see arrow) out of the axle housing (see subsequent figure) by means of compressed air.

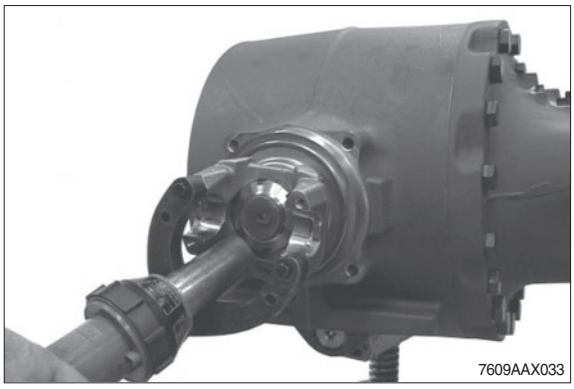
※ This operation is only necessary for the hydraulic lock differential (option).





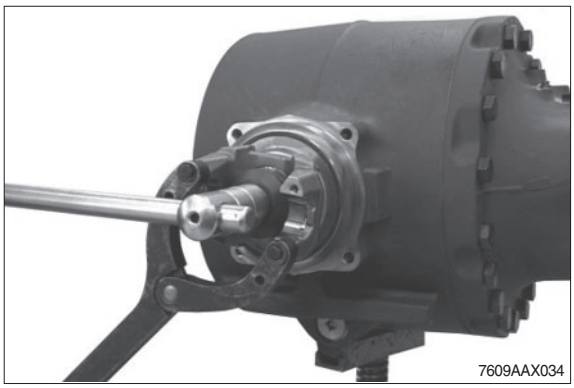
④ Heat slotted nut by means of hot air blower.

※ Slotted nut is secured with loctite (type No. : 262).

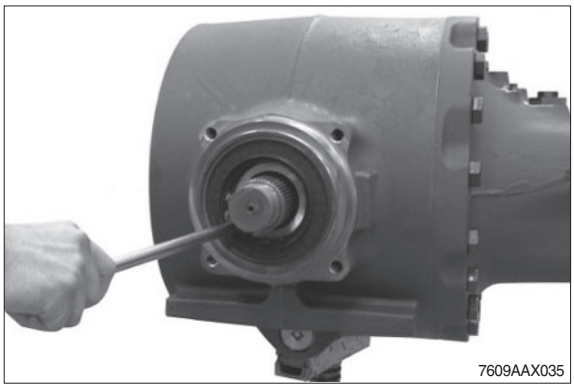


⑤ Loosen slotted nut and remove the shim behind.

Slotted nut wrench	5870 401 139
Clamping device	5870 240 002

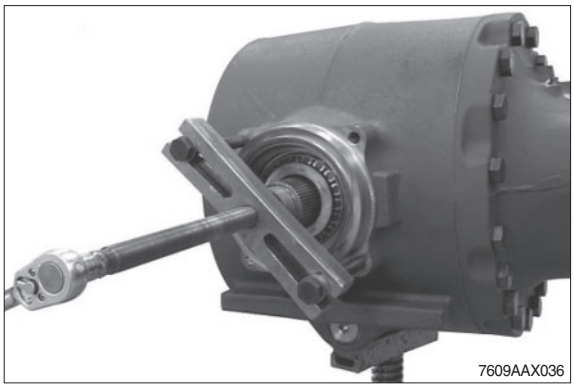


⑥ Pull the input flange from the input pinion and use a lever to remove the shaft seal behind from the axle drive housing.



⑦ Press input pinion from the axle drive housing and remove the releasing tapered roller bearing.

Front axle	
Clamp (2EA)	AA00 338 279
Rear axle	
Extractor	5870 000 065
Hexagon screw (2EA)	AA00 331 360

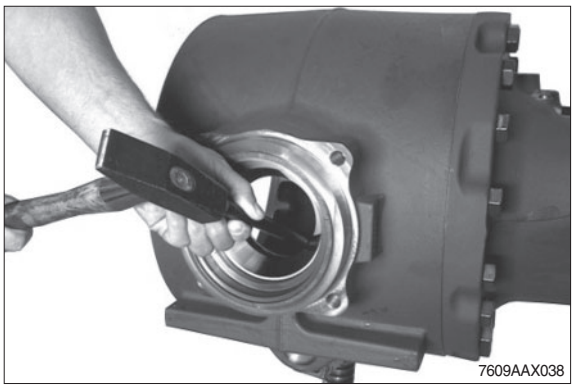


⑧ Remove spacer ring and pull the tapered roller bearing from the input pinion.

Gripping device

Front axle	5873 002 030
Rear axle	AA00 684 425
Basic tool	5873 002 000

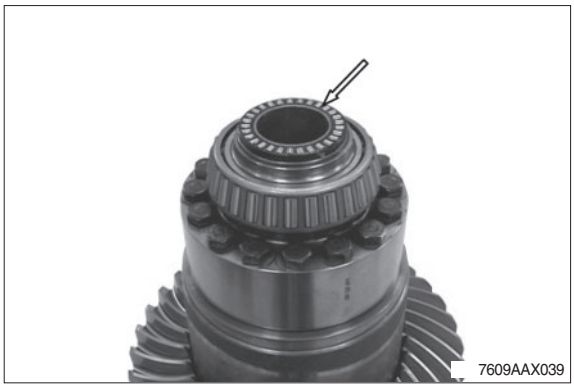
⑨ If necessary, force both bearing outer rings out of the axle drive housing.



(4) Disassembly differentials

Disassembly hydraulic lock differential (option)

① Remove axial roller cage (arrow).



② Pull both tapered roller bearings from the differential.

Crown wheel side

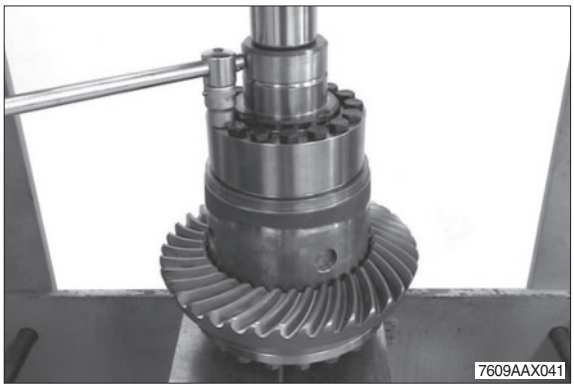
Grab sleeve	5873 012 016
Basic tool	5873 002 001

Opposite side

Grab sleeve	5873 003 029
Basic tool	5873 002 001
Reduction	5873 003 011
Pressure piece	5870 100 075

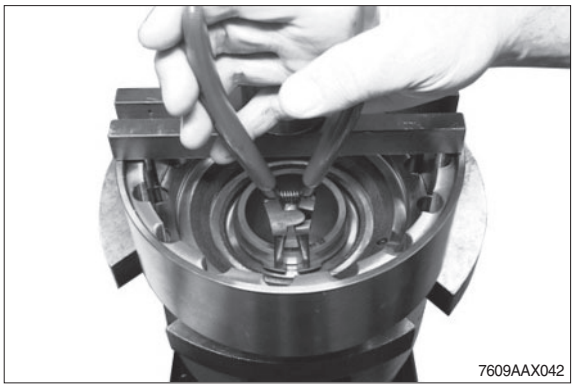
③ Preload the differential by means of the press, loosen the hexagon screws and remove the releasing housing cover.

Pressure piece	5870 100 075



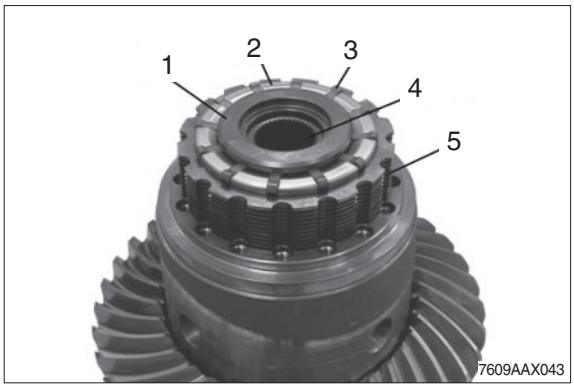
④ Preload the housing cover/compression spring by means of the press and disengage the retaining ring.

Then remove sliding sleeve and compression spring from the housing cover.

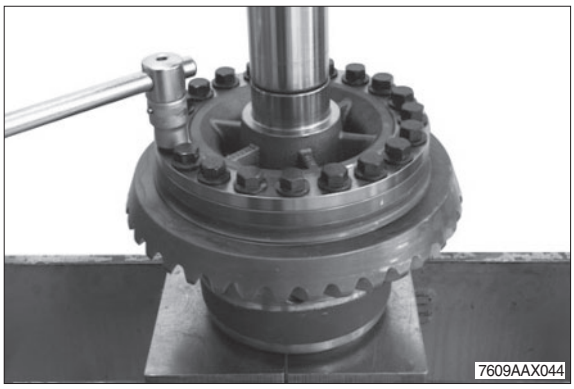


⑤ Remove single parts.

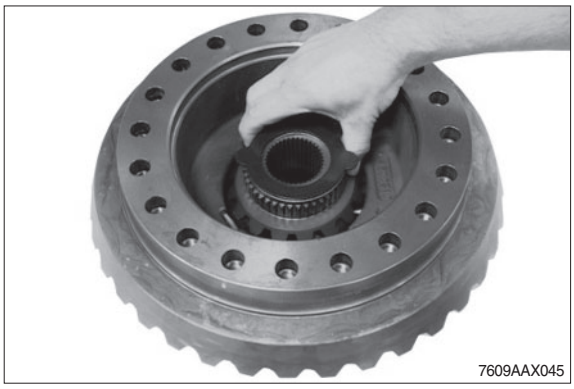
1 Pressure piece
2 Cage
3 Lever (12EA)
4 Disk carrier
5 Disk package



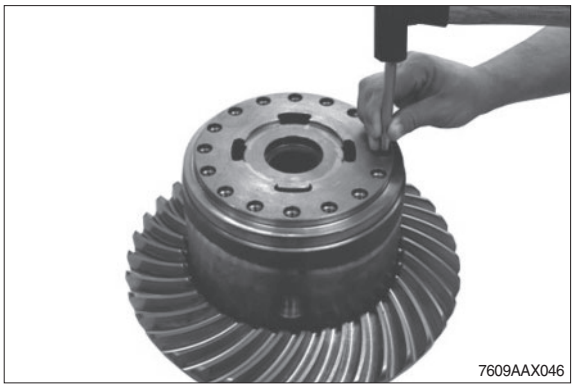
⑥ Preload differential by means of the press, loosen locking screws and housing cover.



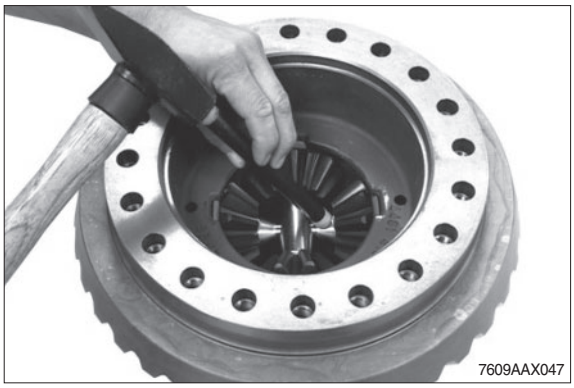
⑦ Remove axle bevel gear with thrust washers from the differential housing.



⑧ Force out both slotted pins.

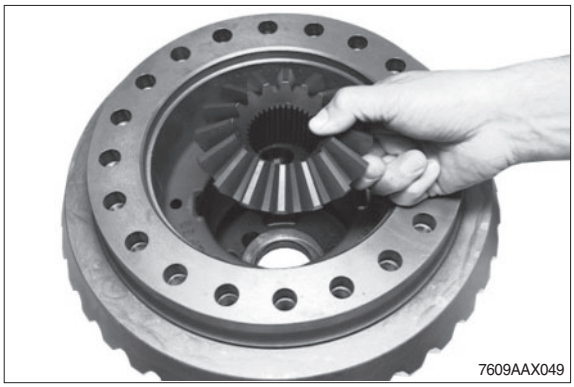


⑨ Force out both differential axles (short) and remove the releasing spider gears with thrust washers from the differential housing.

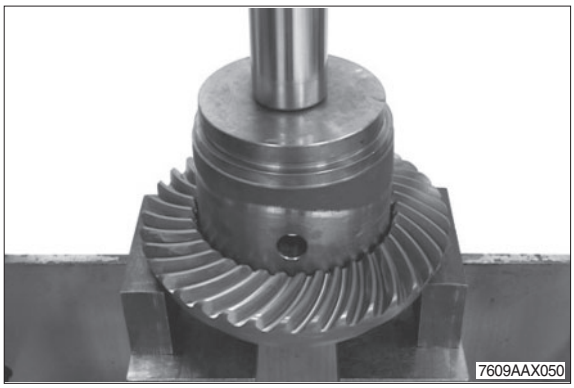


⑩ Pull the differential axle (long) and remove the releasing spider gears with thrust washers from the differential housing.

⑪ Remove the axle bevel gear and the shim behind.



⑫ Press crown wheel from the differential carrier.

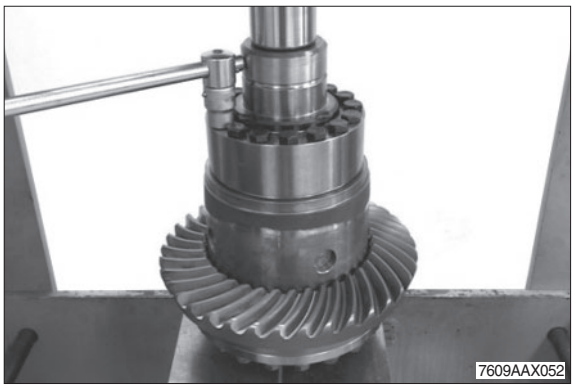


Disassembly conventional differential (standard)

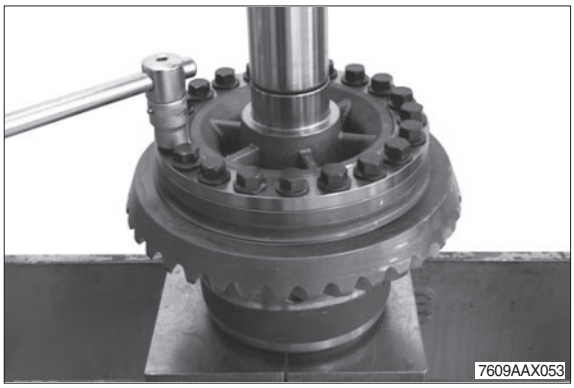
① Pull both tapered roller bearings from the differential.

Grab sleeve	5873 012 016
Basic tool	5873 002 001

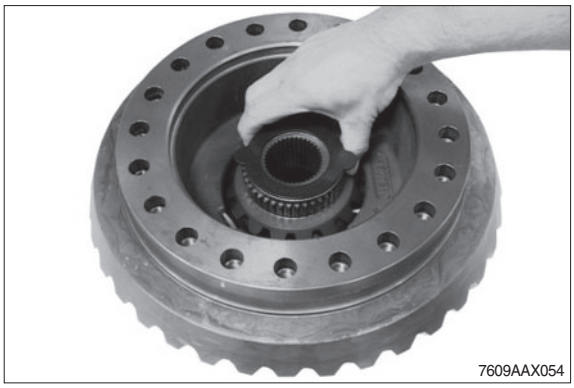
② Preload the differential by means of the press, loosen the hexagon screws and remove the releasing housing cover.



③ Preload the differential by means of the press, loosen locking screws and housing cover.

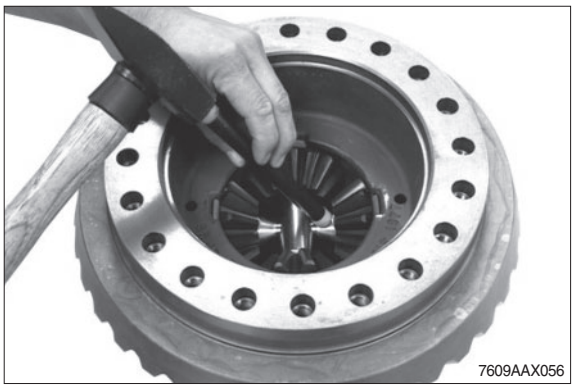


④ Remove axle bevel gear with thrust washers from the differential housing.

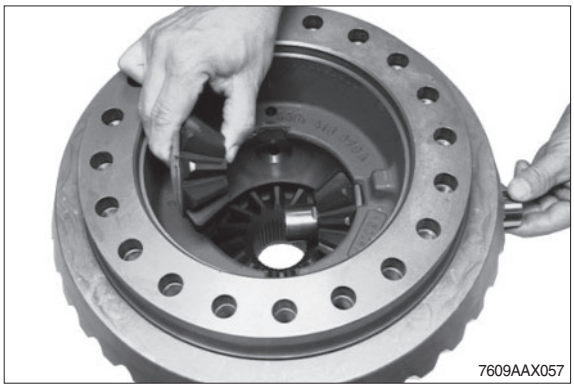


⑤ Force out both slotted pins.

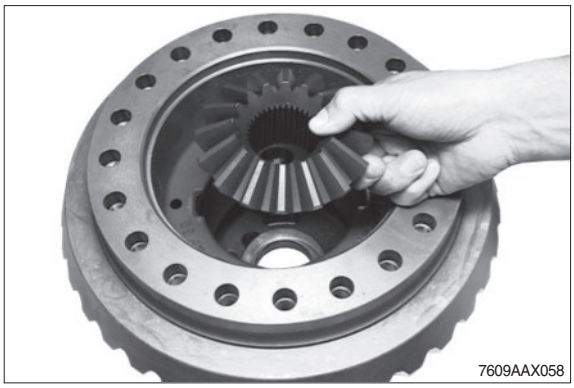
⑥ Force out both differential axles (short) and remove the releasing spider gears with thrust washers from the differential housing.



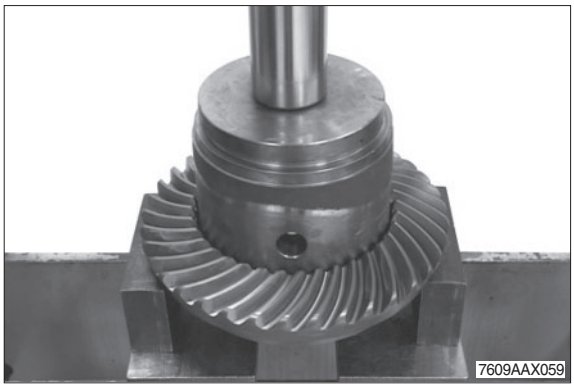
⑦ Pull the differential axle (long) and remove the releasing spider gears with thrust washers from the differential housing.



⑧ Remove the axle bevel gear and the shim behind.



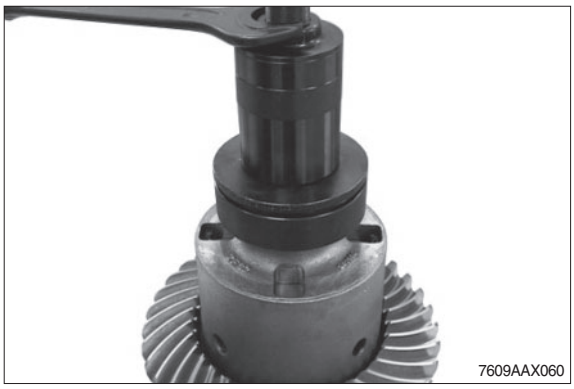
⑨ Press crown wheel from the differential carrier.



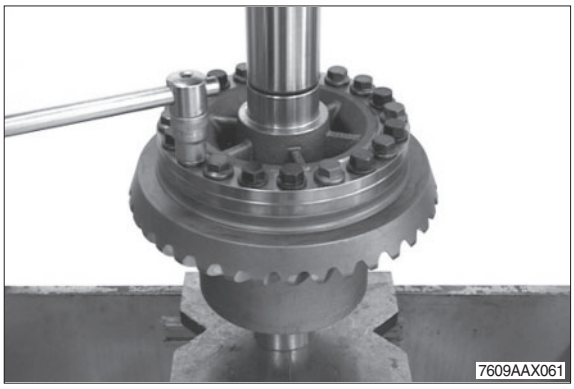
Disassembly limited slip differential (option)

① Pull both tapered roller bearings from the differential.

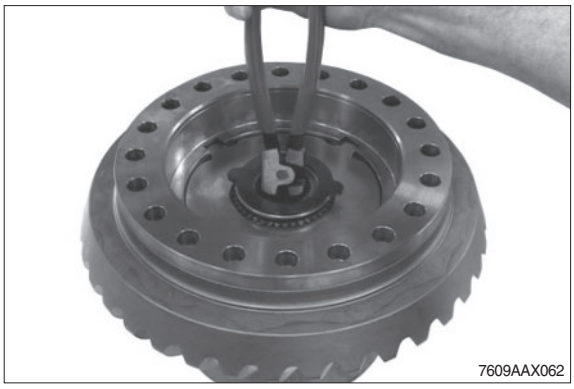
Grab sleeve	5873 012 016
Basic tool	5873 002 001



② Preload the differential by means of the press, loosen locking screws and housing cover.

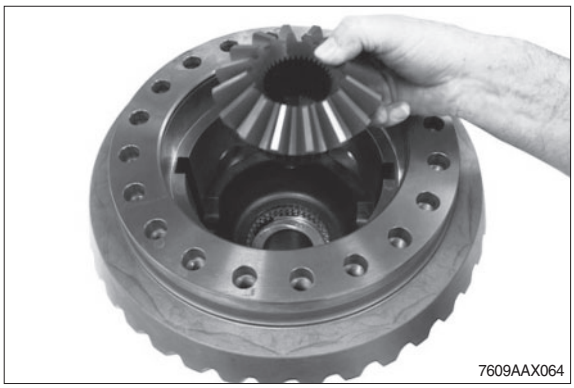


③ Lift the axle bevel gear with pressure ring, disk package and thrust washers out of the differential housing.



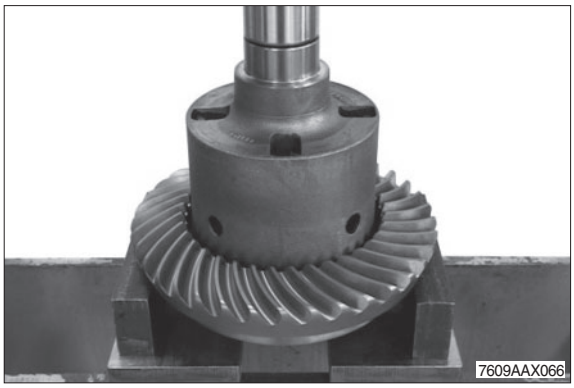
④ Remove spider shafts and axle bevel gears (see figure) out of the differential housing.

⑤ Remove the second axle bevel gear.



⑥ Lift the pressure ring out of the differential housing and remove the disk package and thrust washers behind.

⑦ Press crown wheel from the differential carrier.

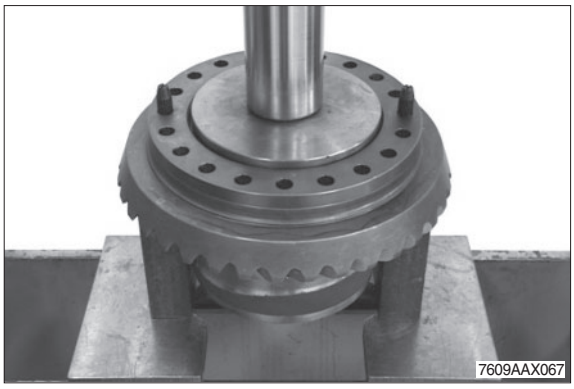


(5) Reassembly differentials

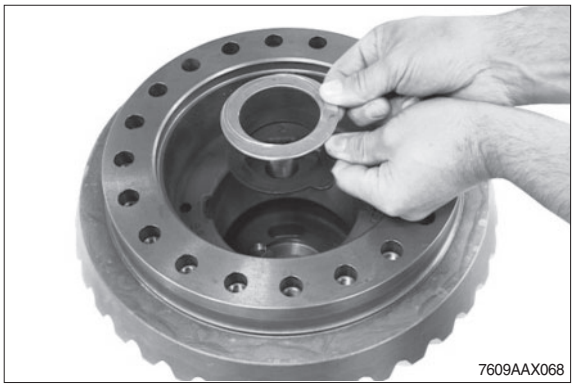
Reassembly hydraulic lock differential (option)

① Mount two locating pins and press the heated crown wheel onto the differential housing until contact is obtained.

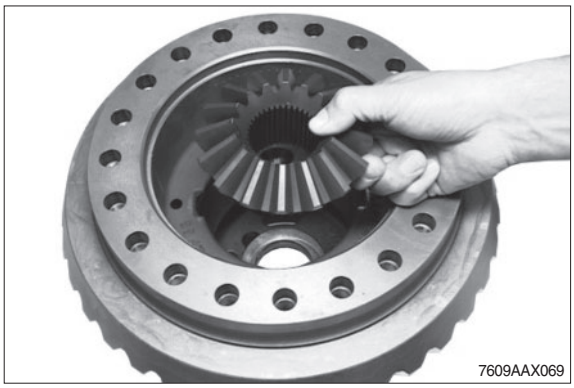
Locating pins 5870 204 040



② Insert thrust washer into the differential housing.

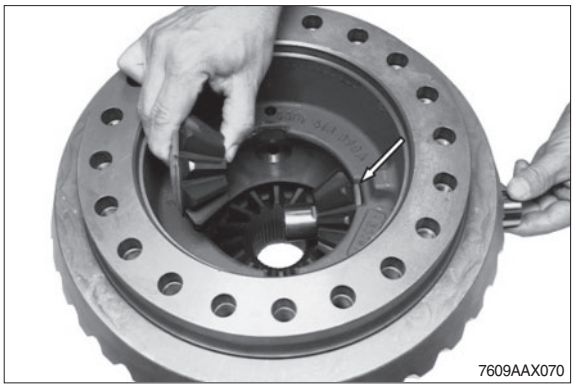


③ Insert axle bevel gear.



④ Insert spider gears with thrust washers into the differential housing and fix them with the spider shaft (long).

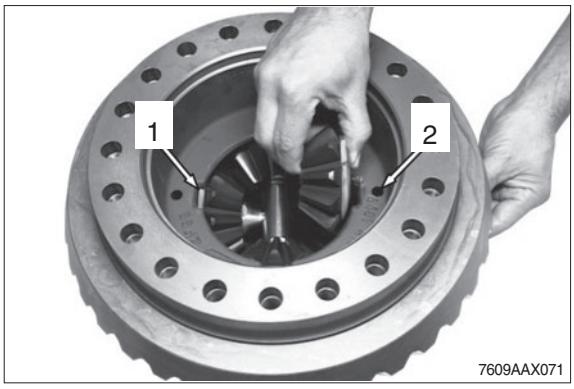
※ Thrust washers must be positioned with the tabs (see arrow) being located in the recesses of the differential housing.



⑤ Insert spider gears with thrust washers into the differential housing and fix them with the two spider shafts (short).

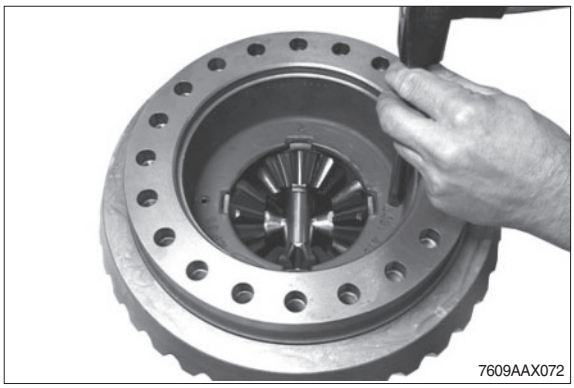
※ Thrust washers must be positioned with the tabs (see arrow 1) being located in the recesses of the differential housing.

※ Pay attention to radial installation position of the spider shafts (fixing holes, arrow 2).

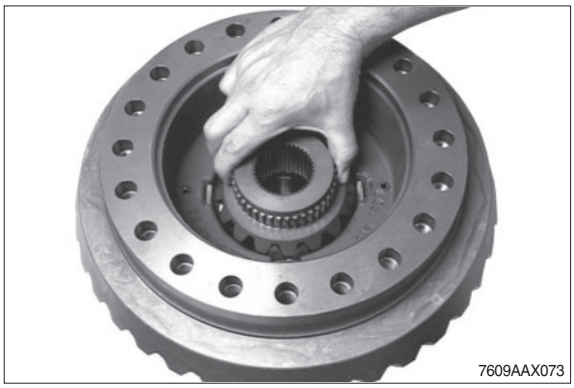


⑥ Fix spider shafts (short) with slotted pins.

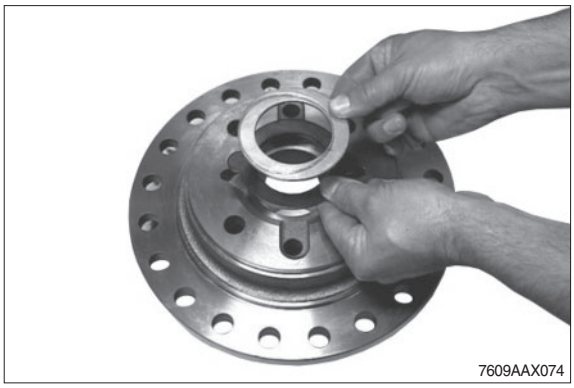
※ Flush mount slotted pins.



⑦ Mount second axle bevel gear.



⑧ Fix the thrust washers into the housing cover by means of grease.

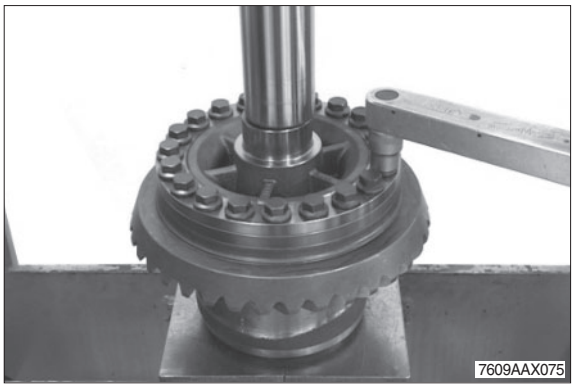


⑨ Mount two adjusting screws and insert the housing cover until contact with the differential housing is obtained.

Locating pins 5870 204 040

Preload the differential by means of the press and bolt with new locking screws.

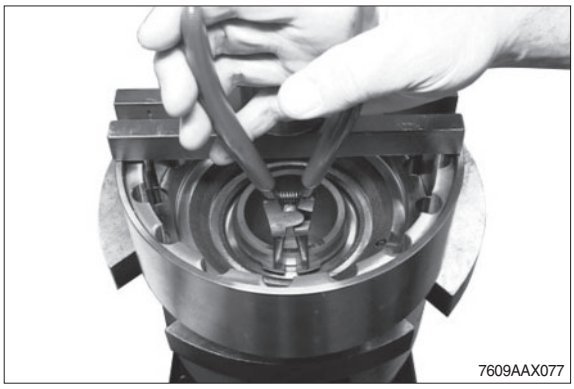
· Tightening torque (M16/12.9) :
40.8 kgf · m (295 lbf · ft)



⑩ Install compression spring onto the sliding sleeve.

⑪ Insert the premounted sliding sleeve into the housing cover.

Preload the compression spring by means of the press and engage the retaining ring into the annular groove of the sliding sleeve.

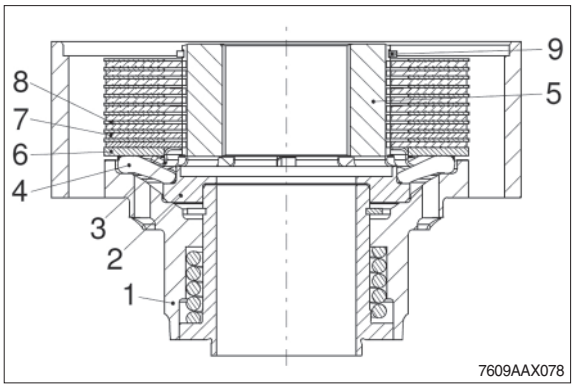


Setting of disk package

⑫ Premount single parts according to the adjacent sketch.

1 Housing cover
2 Pressure piece
3 Cage
4 Lever (12EA)
5 Disk carrier
6 Pressure ring
7 Inner disks
8 Outer disks (optional)
9 Snap ring

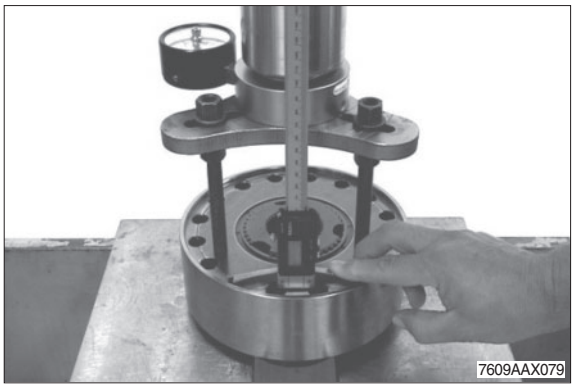
※ For the number of disks and the disk arrangement please refer to the relating parts manual.



⑬ Preload disk package with an axial force of F = 50^{+30} kN.
Then check the setting dimension "A" = 1.05±0.1 mm from the collar of the differential cover to the plane face of the outer disk (see also below sketch).

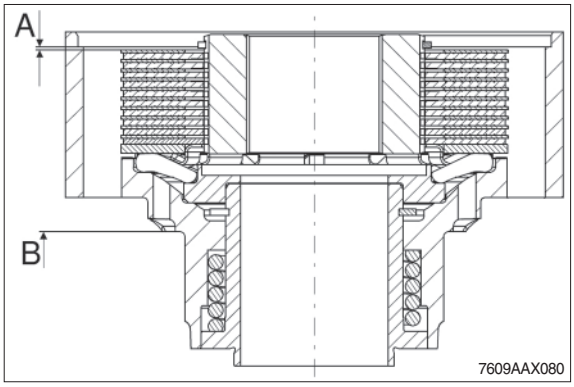
Pressure piece	5870 100 069
Load cell	5870 700 004

※ Any deviation from the specified setting dimension must be corrected with a corresponding outer disk.



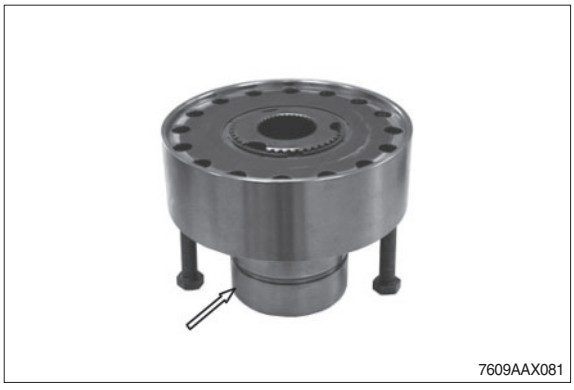
A = Setting dimension = 1.05±0.1 mm
B = Contact face

⑭ To obtain a correct measuring result :
The housing cover may only be supported on the contact face (B).
Ensure that the assembly fixture is only supported on the disk package and not on the disk carrier (5).



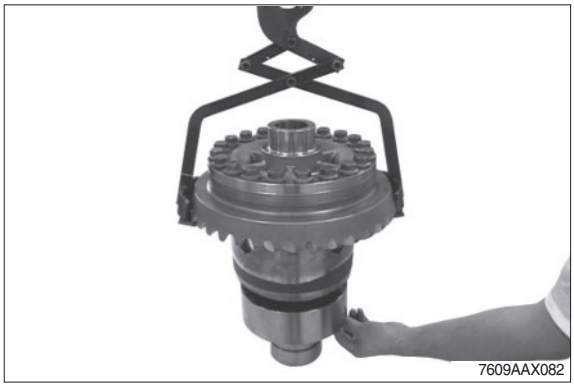
⑮ Position housing cover onto pressure piece (see arrow).
Insert two hexagon screws into the housing cover to radially fix the disk package.

Pressure piece	5870 100 075



⑯ Position the premounted differential with the lifting device onto the housing cover and preliminarily fix with hexagon screws.

Lifting device	AA00 331 446

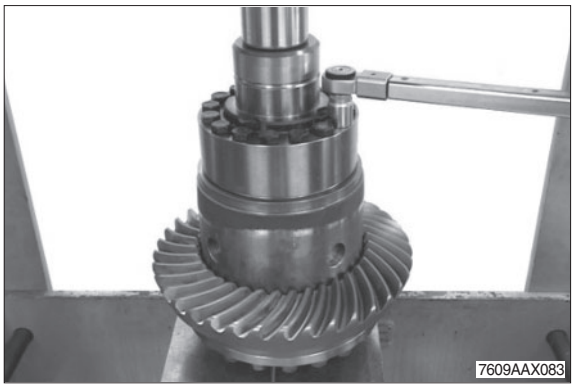


⑰ Preload the differential by means of the press and the pressure piece.

Then finally tighten the housing cover with hexagon screws.

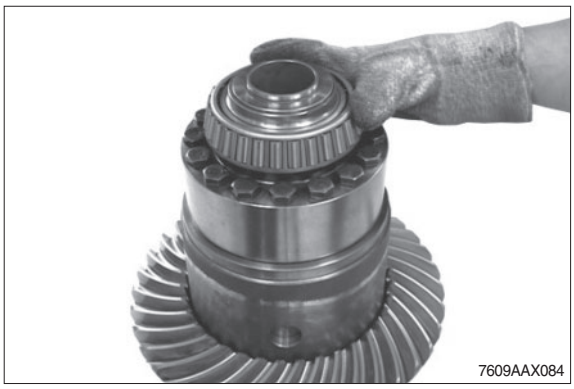
· Tightening torque (M14/10.9) :
18.9 kgf · m (136 lbf · ft)

Pressure piece 5870 100 075

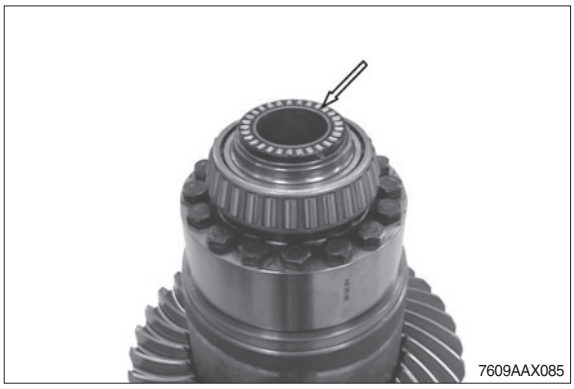


⑱ Heat both tapered roller bearings and insert until contact is obtained.

※ Adjust tapered roller bearing after cooling down.



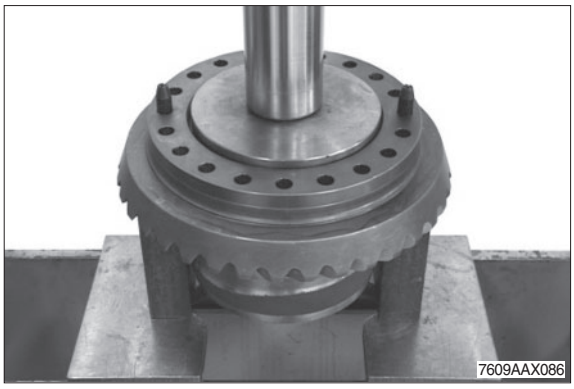
⑲ Fix axial roller cage (see arrow) to the sliding sleeve by means of grease.



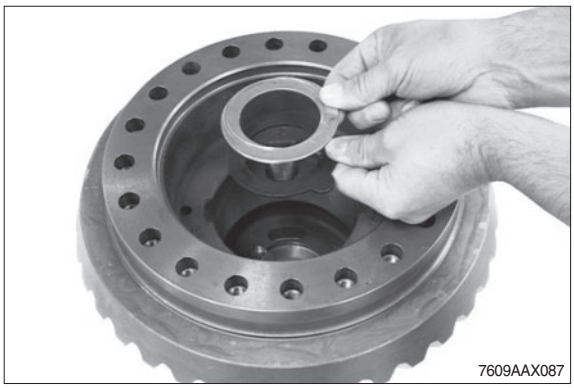
Reassembly conventional differential (standard)

① Mount two locating pins and press the heated crown wheel onto the differential housing until contact is obtained.

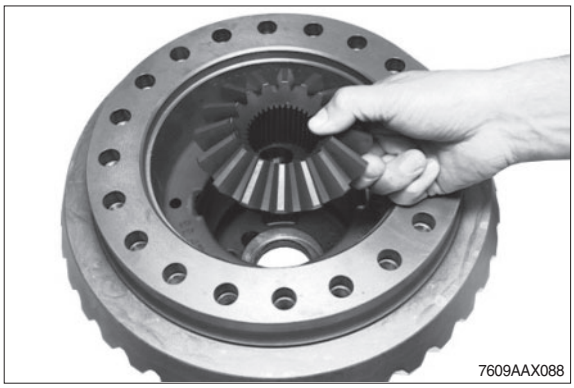
Locating pins 5870 204 040



② Insert thrust washer into the differential housing.

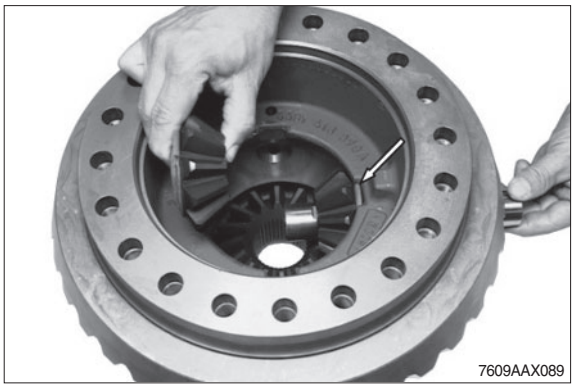


③ Insert axle bevel gear.



④ Insert spider gears with thrust washers into the differential housing and fix them with the spider shaft (long).

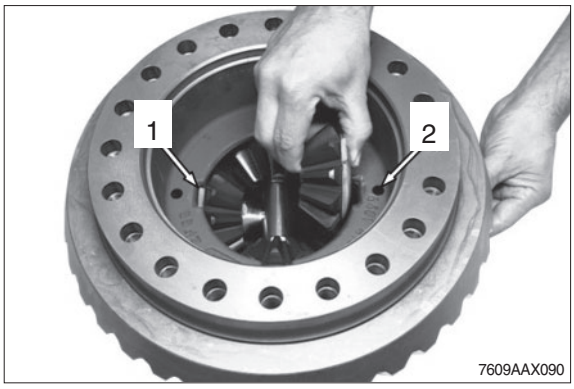
※ Thrust washers must be positioned with the tabs (see arrow) being located in the recesses of the differential housing.



⑤ Insert spider gears with thrust washers into the differential housing and fix them with the two spider shafts (short).

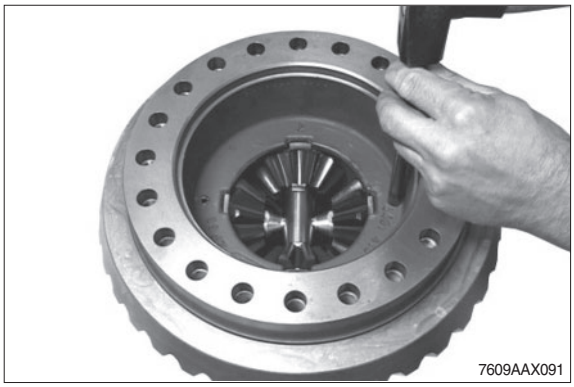
※ Thrust washers must be positioned with the tabs (see arrow 1) being located in the recesses of the differential housing.

※ Pay attention to radial installation position of the spider shafts (fixing holes, arrow 2).

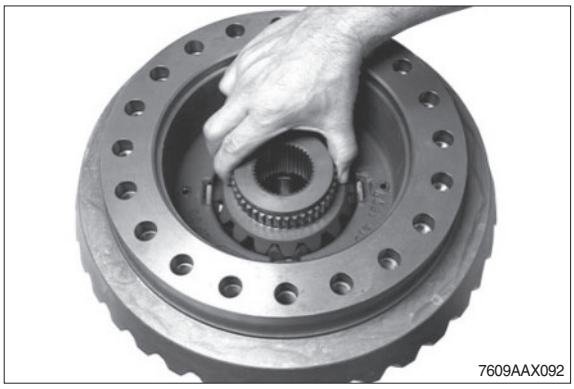


⑥ Fix spider shafts (short) with slotted pins.

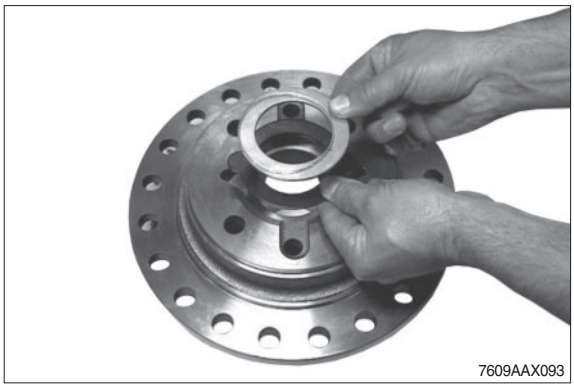
※ Flush mount slotted pins.



⑦ Mount second axle bevel gear.



⑧ Fix the thrust washers into the housing cover by means of grease.

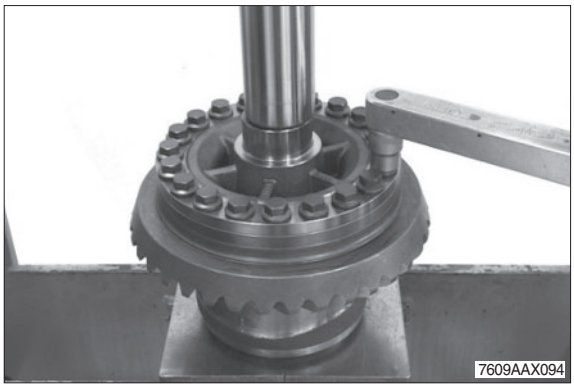


⑨ Mount two adjusting screws and insert the housing cover until contact with the differential housing is obtained.

Locating pins 5870 204 040

Preload the differential by means of the press and bolt with new locking screws.

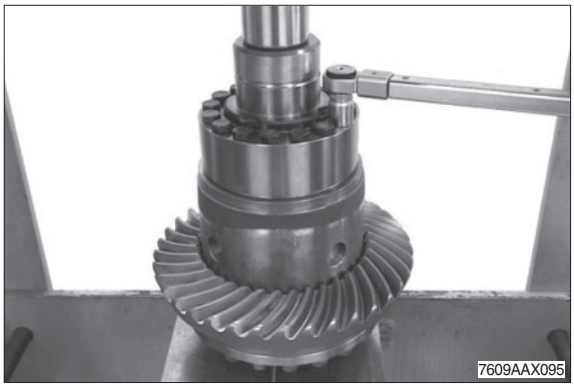
· Tightening torque (M16/12.9) :
40.8 kgf · m (295 lbf · ft)



⑩ Attach the housing cover and preload the differential with the press.

Then fix the housing cover with hexagon screws.

· Tightening torque (M14/10.9) :
18.9 kgf · m (136 lbf · ft)



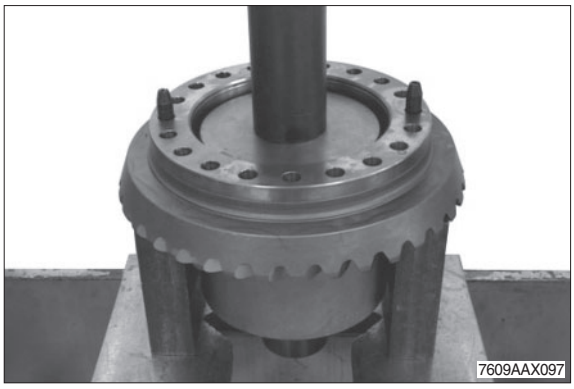
⑪ Heat both tapered roller bearings and insert until contact is obtained.

※ Adjust tapered roller bearing after cooling down.

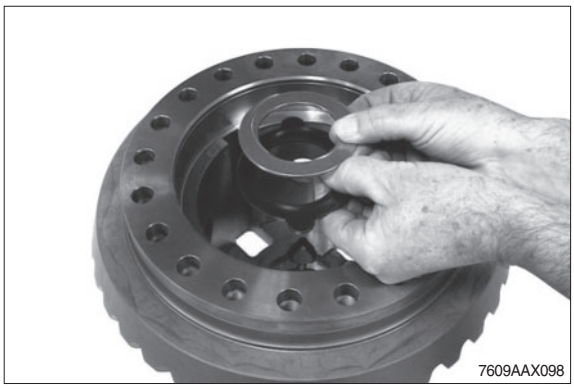
Reassembly limited slip differential (option)

① Mount two locating pins and press the heated crown wheel onto the differential housing until contact is obtained.

Locating pins 5870 204 040



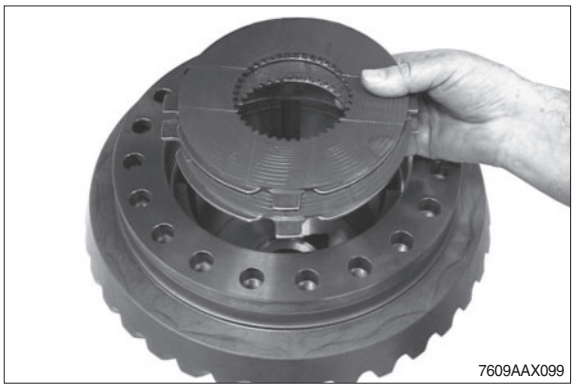
② Insert thrust washer into the differential housing.



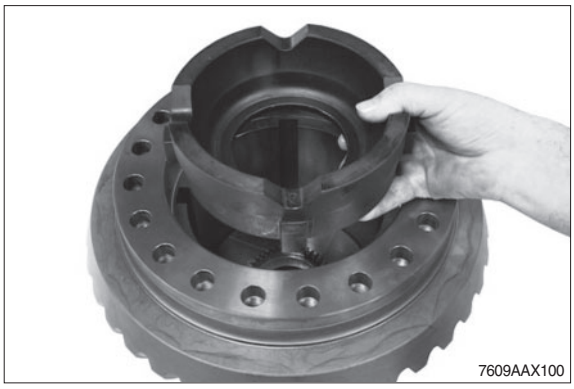
③ Mount outer and inner disks in alternating order, starting with an outer disk.

※ The installation clearance of the internal parts is corrected by mounting outer disks with different thicknesses.

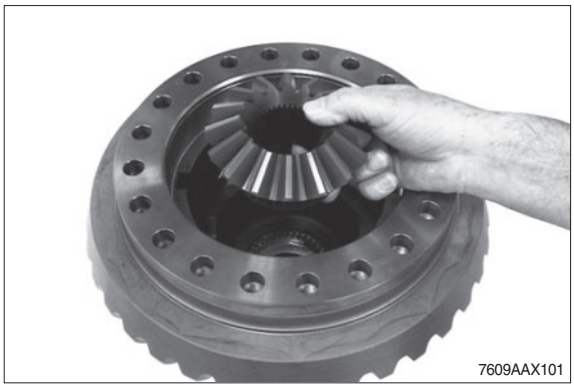
⚠ **The difference in thickness between the left and the right disk package must only be 0.1 mm at maximum.**



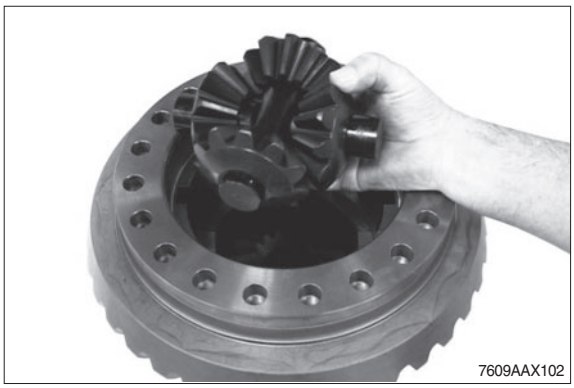
④ Place the pressure ring.



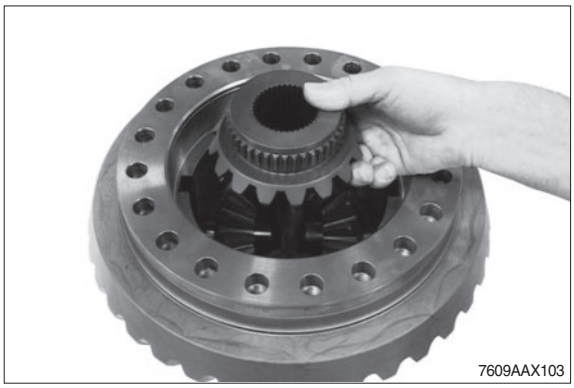
⑤ Insert the axle bevel gear until contact is obtained and install the inner disks with the teeth.



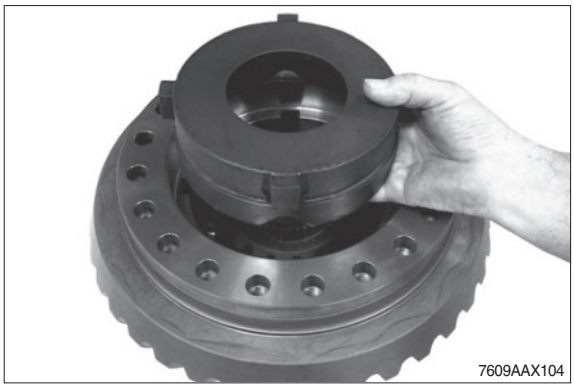
⑥ Preassemble the differential spider and insert it into the differential housing/into the pressure ring.



⑦ Mount second axle bevel gear.



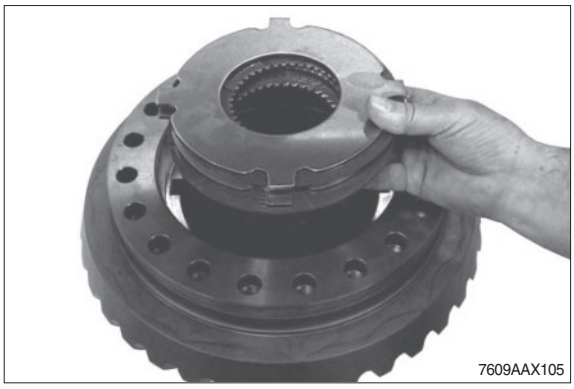
⑧ Insert the second pressure ring into the differential housing.



⑨ Mount outer and inner disks in alternating order, starting with an inner disk.

The installation clearance of the internal parts is corrected by mounting outer disks with different thicknesses.

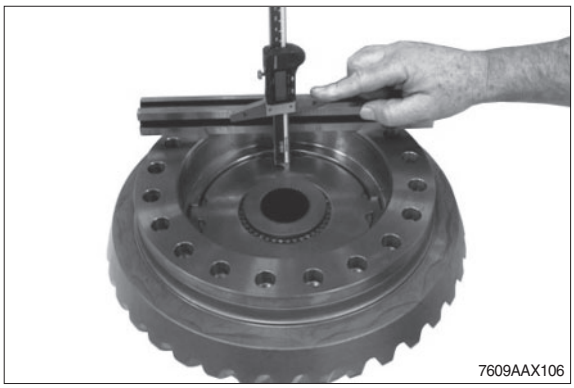
⚠ The difference in thickness between the left and the right disk package must only be 0.1 mm at maximum.


7609AAX105

Determine the installation clearance 0.2~0.7 mm

⑩ Measure dimension I, from the mounting face of the differential housing to the plane face of the outer disk.

Dimension I e.g. ..... 44.30 mm

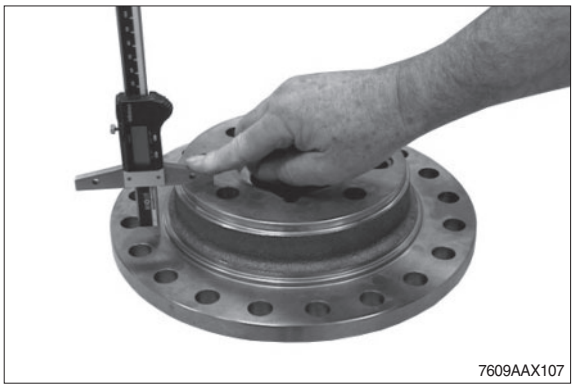

7609AAX106

⑪ Measure dimension II, from the contact face of the outer disk to the mounting face on the housing cover.

Dimension II e.g. ..... 43.95 mm

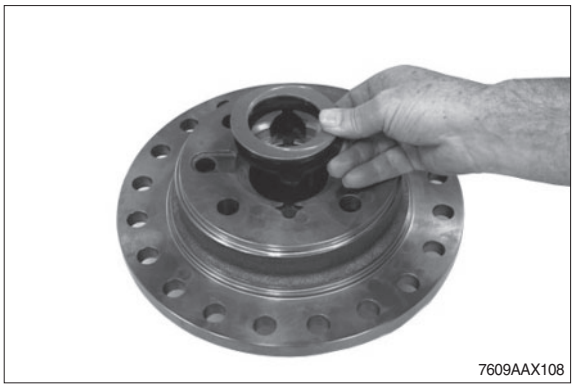
CALCULATION EXAMPLE :

Dimension I ..... 44.30 mm
Dimension II ..... - 43.95 mm
Difference = disk clearance = 0.35 mm


7609AAX107

※ Any deviation from the required installation clearance is to be corrected with corresponding outer disks (s = 2.7, s = 2.9, s = 3.0, s = 3.1, s = 3.2, s = 3.3 or s = 3.5 mm), taking care that the difference in thickness between the left and the right disk package must only be 0.1 mm at maximum.

⑫ Fix the thrust washers into the housing cover by means of grease.

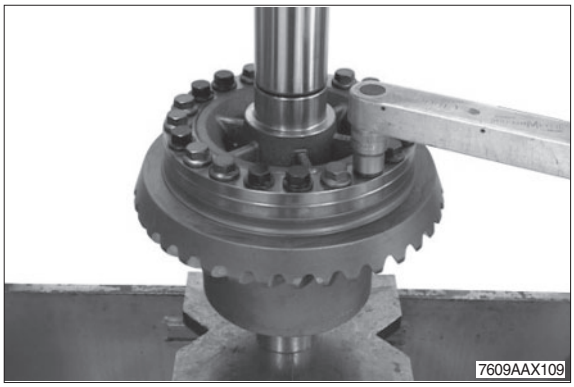


⑬ Mount two adjusting screws and insert the housing cover until contact with the differential housing is obtained.

Locating pins 5870 204 040

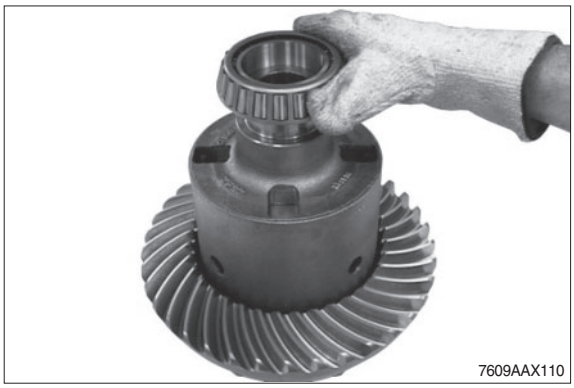
Preload the differential by means of the press and bolt with new locking screws.

· Tightening torque (M16/12.9) :
40.8 kgf · m (295 lbf · ft)



⑭ Heat both tapered roller bearings and insert until contact is obtained.

※ Adjust tapered roller bearing after cooling down.



(6) Reassembly input

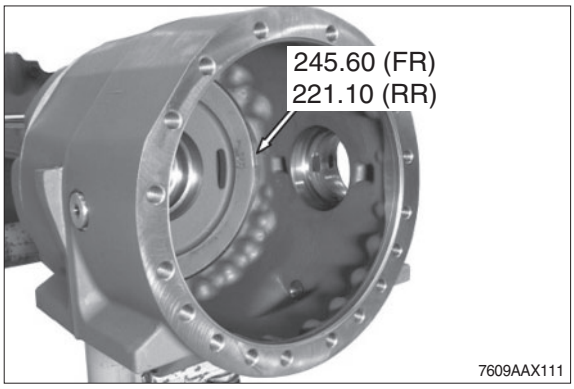
※ If crown wheel or input pinion are damaged, both parts must be jointly replaced.
In case of a new installation of a complete bevel gear set pay attention to an identical mating number of input pinion and crown wheel.

Determination of shim thickness to obtain a correct contact pattern

※ The following measuring procedures must be carried out with utmost accuracy.
Inaccurate measurements lead to an incorrect contact pattern requiring an additional disassembly and reassembly of input pinion and differential.

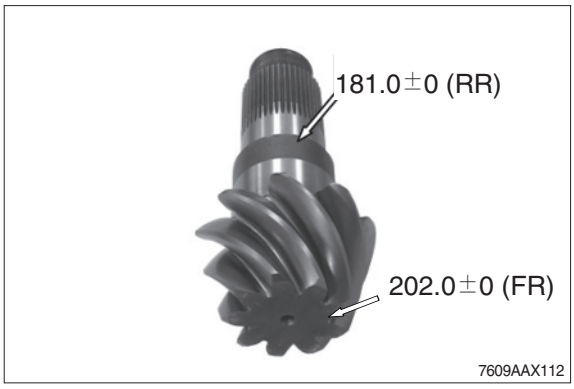
① Read dimension I from the axle drive housing.

Dimension I e.g.
Front axle ..... 245.60 mm
Rear axle ..... 221.10 mm



② Read dimension II (pinion dimension).

Dimension II e.g.
Front axle ..... 202.00 mm
Rear axle ..... 181.00 mm



③ Determine dimension III (bearing width).

Dimension III e.g.

Front axle	42.50 mm
Rear axle	39.10 mm

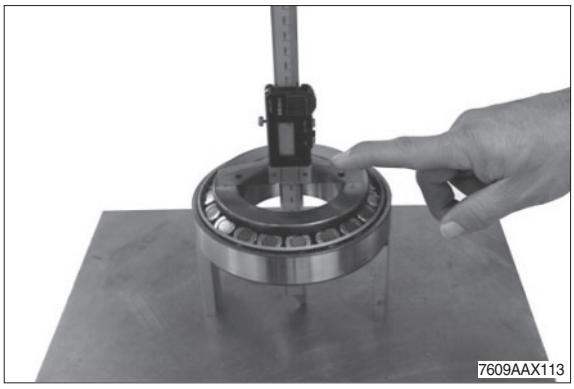
CALCULATION EXAMPLE "A„ :

Front axle

Dimension I	245.60 mm
Dimension II	- 202.00 mm
Dimension III	- 42.60 mm
Difference = shim	**s = 1.00 mm**

Rear axle

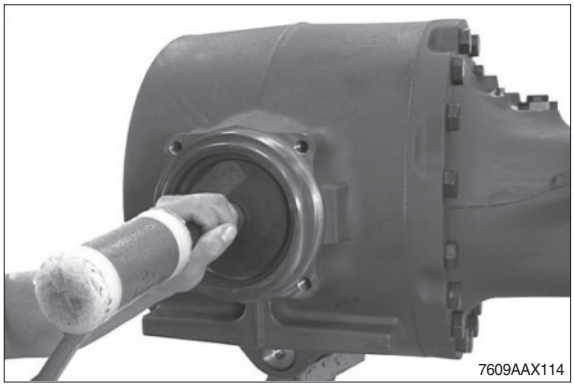
Dimension I	221.10 mm
Dimension II	- 181.00 mm
Dimension III	- 39.10 mm
Difference = shim	**s = 1.00 mm**



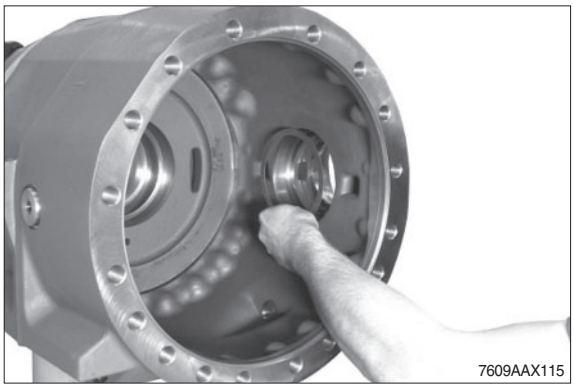
Reassembly of input pinion

④ Undercool the external bearing outer ring and insert it into the axle drive housing until contact is obtained.

Driver tool	5870 058 079
Handle	5870 260 004



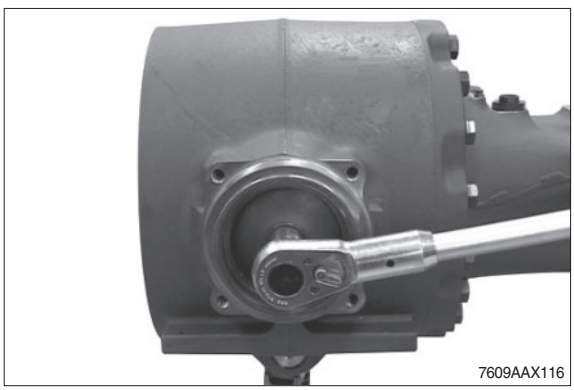
⑤ Insert the determined shim e.g. s = 1.00 mm into the housing hole.



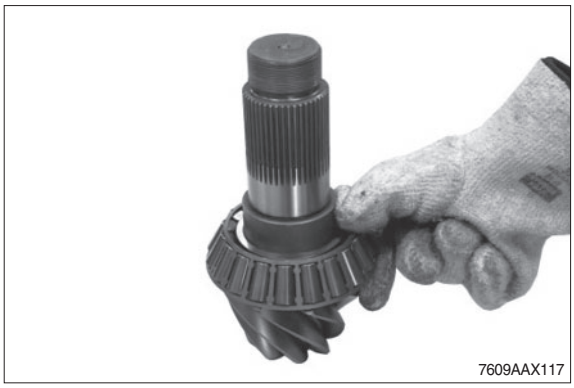
⑥ Undercool the internal bearing outer ring and bring it into contact position in the housing hole by using the assembly fixture.

Assembly fixture

Front axle	AA00 338 352
Rear axle	5870 345 080



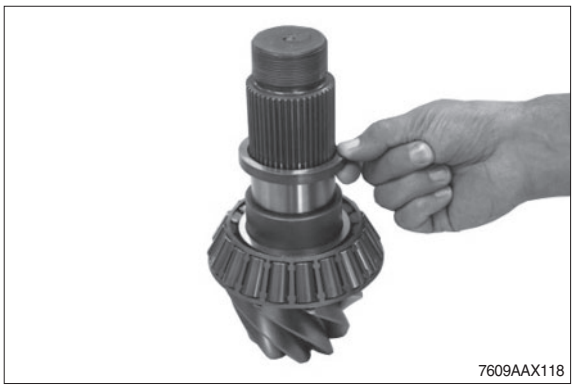
⑦ Heat the tapered roller bearing and insert it into the input pinion until contact is obtained.



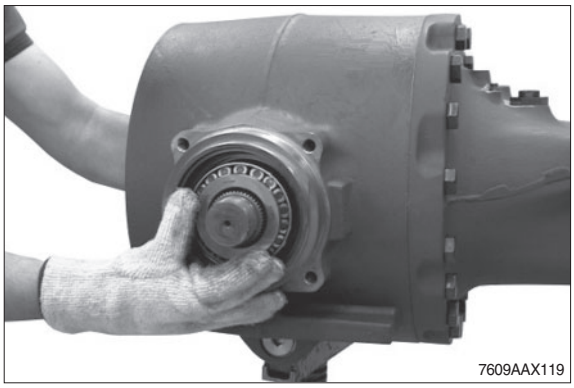
Setting of rolling torque of input pinion bearing 0.15~0.41 kgf · m (1.11~2.95 lbf · ft) (without shaft seal)

⑧ Insert spacer (e.g. s = 8.18 ㎜).

※ According to our experience the necessary rolling torque is obtained when reusing the spacer which has been removed during disassembly (e.g. s = 8.18 ㎜).
A later check of the rolling torque, however, is absolutely necessary.

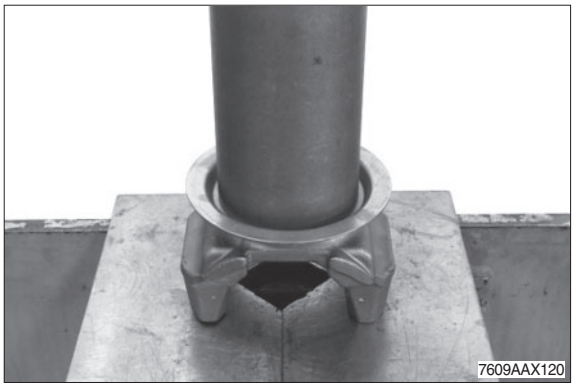


⑨ Insert the preassembled input pinion into the axle drive housing and insert the heated tapered roller bearing until contact is obtained.



⑩ Press the protection plate onto the input flange (see arrow) until contact is obtained.

※ Do not fit the shaft seal until the contact pattern has been checked.



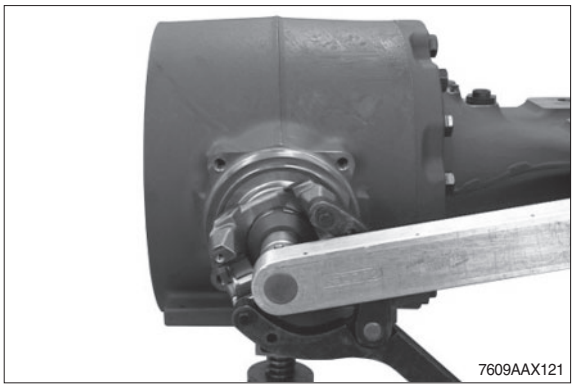
⑪ Insert input flange and fix it by means of disk and slotted nut.

· Tightening torque :
122 kgf · m (885 lbf · ft)

Slotted nut wrench	5870 401 139
Clamping device	5870 240 002

※ Preliminarily mount slotted nut without loctite.

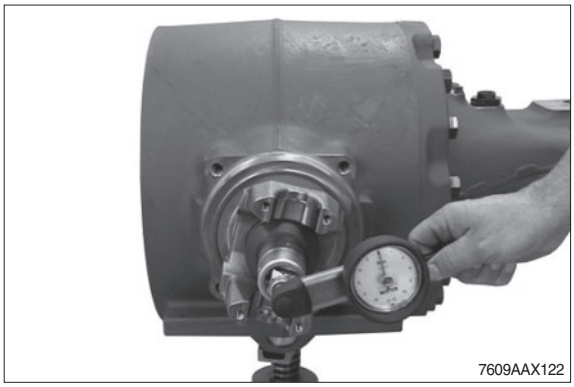
⚠ **While tightening rotate the input pinion several times in both directions.**


7609AAX121

⑫ Check rolling torque (0.15~0.41 kgf · m) without shaft seal).

※ When installing new bearings try to achieve the upper value of the rolling torque.

⚠ **In case of deviations from the necessary rolling torque correct with a corresponding spacer (AX118, page 3-116) as specified below.**
Insufficient rolling torque
install thinner spacer ring
Excessive rolling torque
install thicker spacer ring

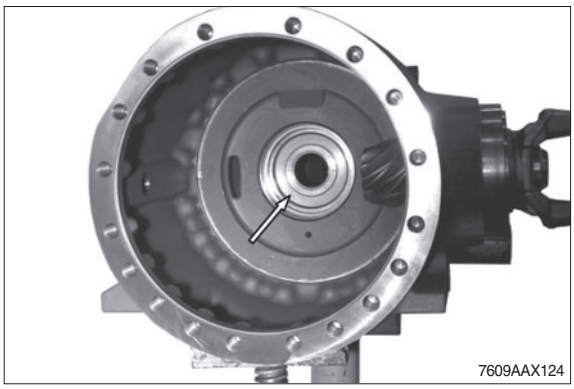

7609AAX122

⑬ Grease O-rings (2EA, see arrows) and insert them into the annular grooves of the piston.

※ Operation figure AX123 and AX124 is only necessary for hydraulic lock differential (option).


7609AAX123

⑭ Insert piston (see arrow) into the bearing housing until contact is obtained.

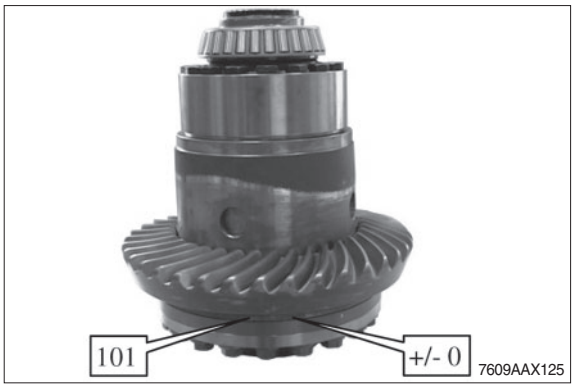

7609AAX124

Determination of shims for setting of bearing rolling torque (differential housing) and backlash (bevel gear set)

※ Determine the required shims on the basis of the read value (deviation/test dimension) and the corresponding specifications of the table below :

(KRS – SET – RIGHT)

(KRS = bevel gear set)



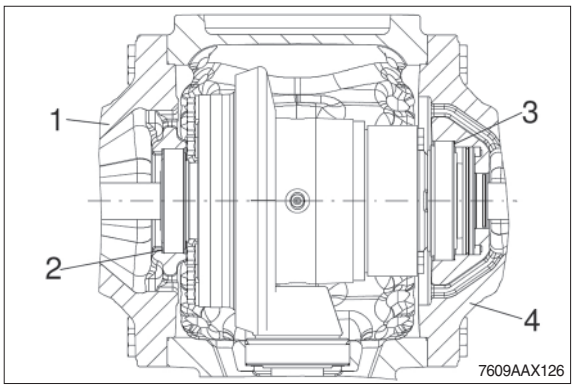
⑮ Deviation see crown wheel rear side.

※ The test dimension "101„ is stamped into the crown wheel rear side. If no + or – deviation is indicated, this value corresponds to the actual value "0" in the table below.

According to this value, the required shims are allocated in the table below.

Any + or – deviation of the test dimension caused by production is also marked on the crown wheel rear side (e.g. - 20 or - 10 or 10 or 20).

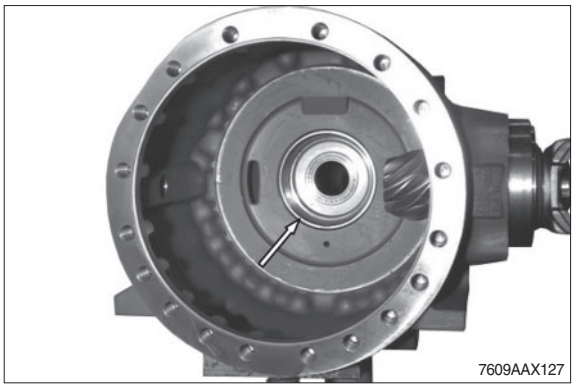
In accordance with this deviation, the required shims are allocated in the table below. (see parts manual for details)



1 Axle housing
2 Shim (crown wheel side)
3 Shim (differential carrier side)
4 Axle housing

Shims for differential					
Crown wheel marking		- 20	- 10	-	10
Deviation		- 0.2	- 0.1	0	0.1
Shim Differential cage side Shim thickness	Front axle	**0.8**	**0.9**	**1.0**	**1.1**
	Rear axle	**0.7**	**0.8**	**0.9**	**1.0**
Shim	Front axle	ZGAQ-04167	ZGAQ-04168	ZGAQ-04169	ZGAQ-04170
Shim Hydraulic lock differential	Rear axle	ZGAQ-04367	ZGAQ-04167	ZGAQ-04168	ZGAQ-04169
Shim Conventional, L/slip differential	Rear axle	ZGAQ-04368	ZGAQ-03896	ZGAQ-03897	ZGAQ-03898
Shim Crown wheel side Shim thickness	Front axle	**1.2**	**1.1**	**1.0**	**0.9**
	Rear axle	**1.3**	**1.2**	**1.1**	**1.0**
Shim	Front axle	ZGAQ-04171	ZGAQ-04170	ZGAQ-04169	ZGAQ-04168
	Rear axle	ZGAQ-04368	ZGAQ-03900	ZGAQ-03899	ZGAQ-03898

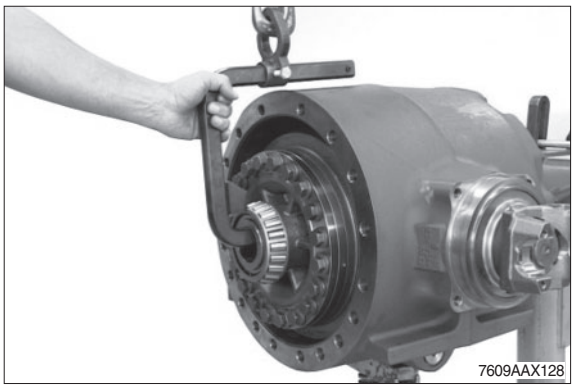
⑯ Insert the determined shim (e.g. s = 0.9 mm) into the hole of the axle housing and adjust the bearing outer ring (see arrow) until contact is obtained.


7609AAX127

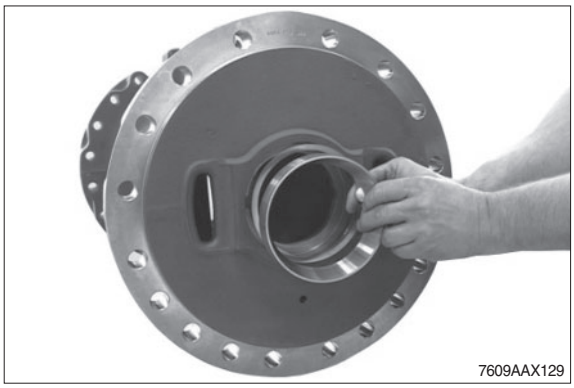
⑰ Cover some drive and coast flanks of the crown wheel with marking ink.

Then insert the premounted differential into the axle drive housing.

Load carrying device 5870 281 083


7609AAX128

⑱ Insert the determined shim (e.g. s = 1.1 mm) into the hole of the axle housing and adjust the bearing outer ring (see arrow) until contact is obtained.


7609AAX129

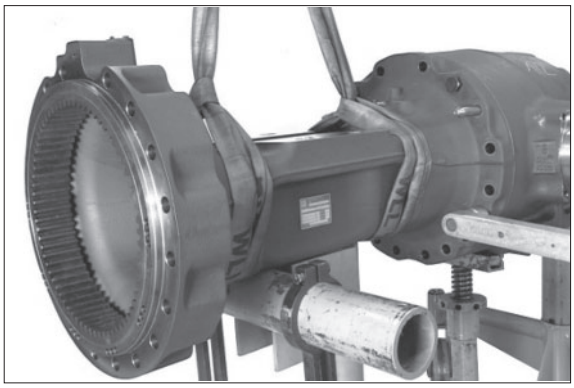
⑲ Mount two locating pins and bring the axle housing into contact position with the axle drive housing by means of the lifting device.

Locating pins 5870 204 024

Then preliminarily fix the axle housing with 4 hexagon screws.

· Tightening torque (M20/10.9) :
57.1 kgf · m (413 lbf · ft)

※ Preliminarily mount the axle housing without O-ring.

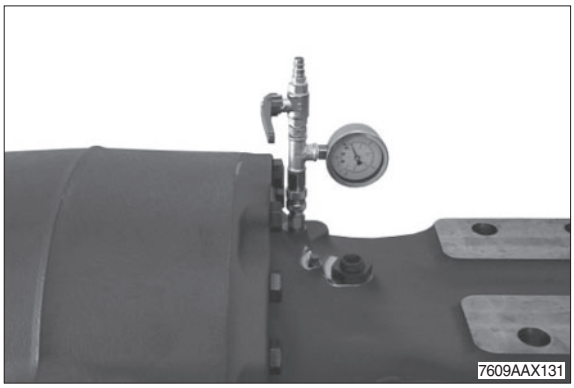

7609AAX130

Leakage test of lock

⑳ Pressurize the lock (p = 1 bar), close shut-off valve and remove air line.

⚠ **No noticeable pressure loss is allowed to occur within 10 sec.**

※ This operation is only necessary for hydraulic lock diferential (option).

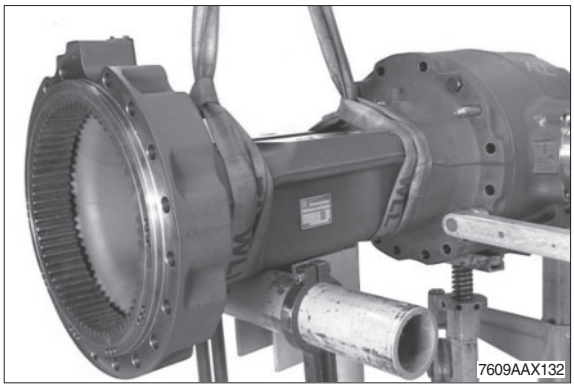


㉑ By rotating the input flange, roll crown wheel over the input pinion in both directions several times.

Then remove the axle housing again and lift the differential out of the axle drive housing.

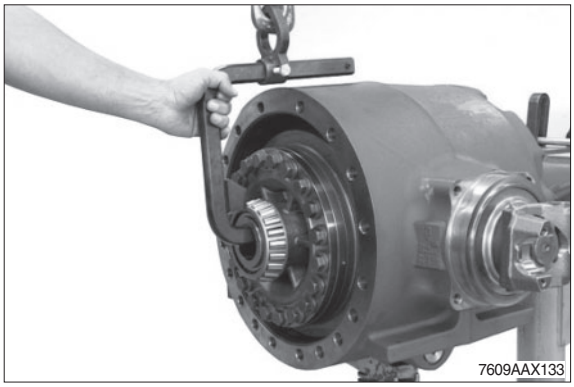
Compare the obtained contact pattern.

⚠ **In case of any contact pattern deviation, a measuring error was made when determining the shim (AX115), which must be corrected by all means.**



㉒ After the contact pattern check insert the differential again into the axle drive housing.

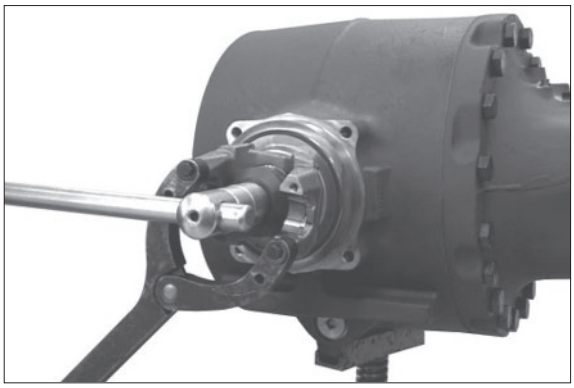
Load carrying device 5870 281 083



Reassembly of shaft seal (figure AX134~136)

㉓ Loosen the slotted nut and pull the input flange from the input pinion.

Slotted nut wrench	5870 401 139
Clamping device	5870 240 002



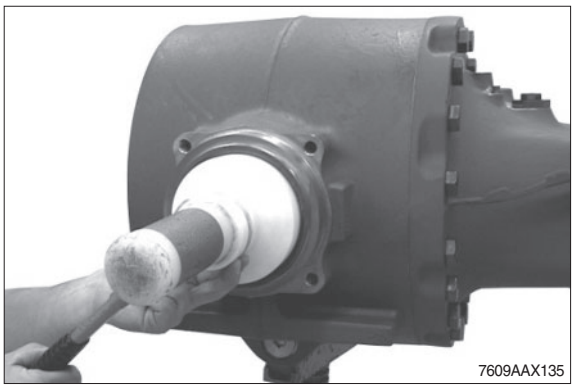
7609AAX134

㉔ Mount the shaft seal with the seal lip showing to the oil chamber.

Driver tool	5870 048 233

※ The exact installation position of the shaft seal is obtained when using the specified driver tool.

※ Wet the outer diameter of the shaft seal with spirit directly before installation and fill the space between seal and dust lip with grease.



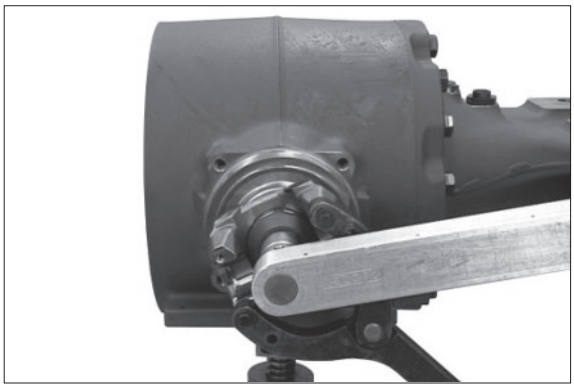
7609AAX135

㉕ Insert input flange and finally tighten by means of disk and slotted nut.

· Tightening torque :
122 kgf · m (885 lbf · ft)

Slotted nut wrench	5870 401 139
Clamping device	5870 240 002

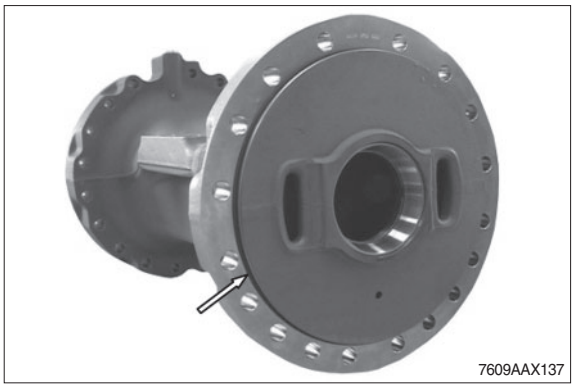
※ Cover the thread of the slotted nut with loctite (type no. : 262).



7609AAX136

(7) Reassembly axle housing

① Grease O-ring (see arrow) and insert it into the axle housing.



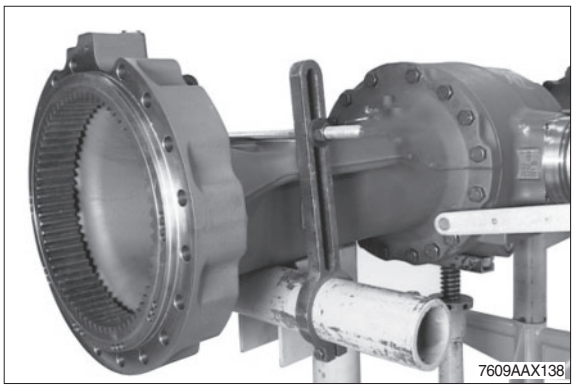
② Mount two locating pins and bring the axle housing into contact position with the axle drive housing by using the lifting device.

Then fix the axle housing by means of hexagon screws.

· Tightening torque (M20/10.9) :
57.1 kgf · m (413 lbf · ft)

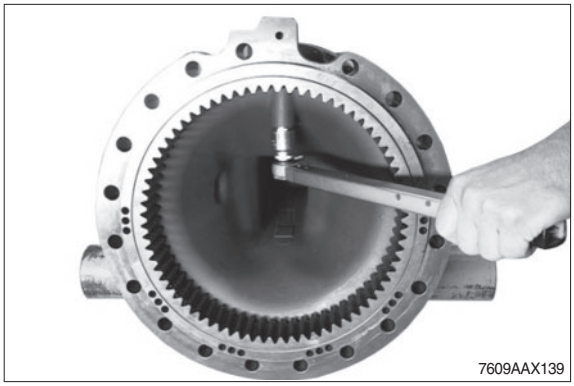
Locating pins 5870 204 024

※ After assembling the axle housing secure the axle with clamping brackets.

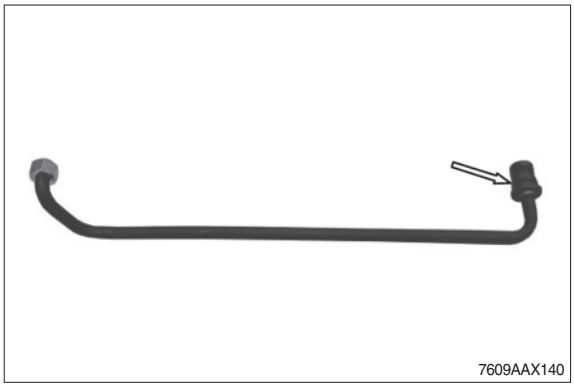


③ Mount fitting.

· Tightening torque :
3.67 kgf · m (26.6 lbf · ft)

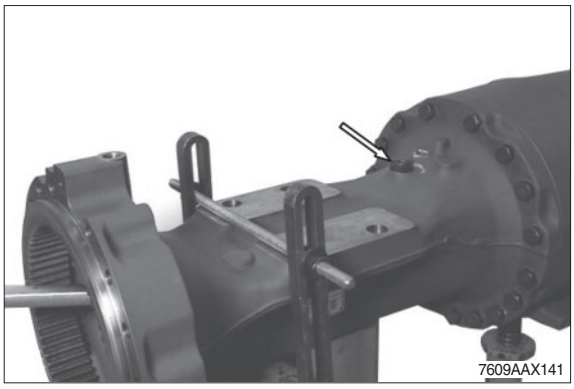


④ Grease O-ring and insert it into the annular groove of the brake tube (see arrow).



⑤ Mount brake tube with threaded connection and hexagon nut (see arrow).

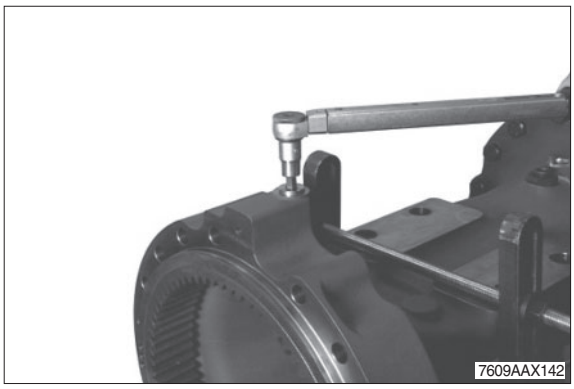
· Tightening torque :
10.2 kgf · m (73.8 lbf · ft)



⑥ Provide screw plug with a new O-ring and fit it.

Flush mount slotted pins.

· Tightening torque :
5.1 kgf · m (36.9 lbf · ft)



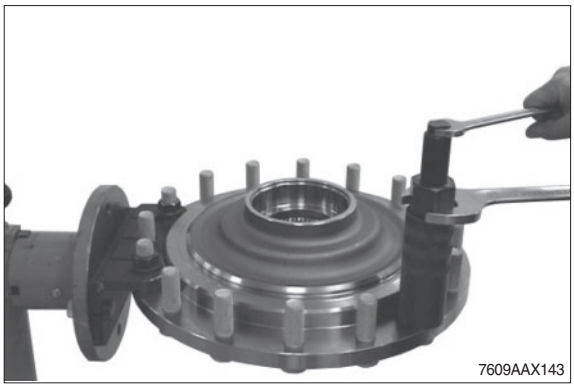
(8) Reassembly output and brake

① Pull in wheel stud into the output shaft until contact is obtained.

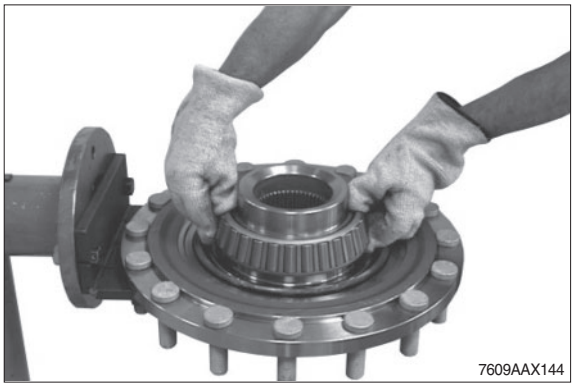
Wheel stud puller-basic tool 5870 610 001

Insert (M22×1.5) 5870 610 002

Special tool may only be used for repair solution when exchanging individual wheel studs with mounted output shaft. When using a new output shaft, mount the wheel studs with the press.



② Heat tapered roller bearing and insert it into the output shaft until contact is obtained.

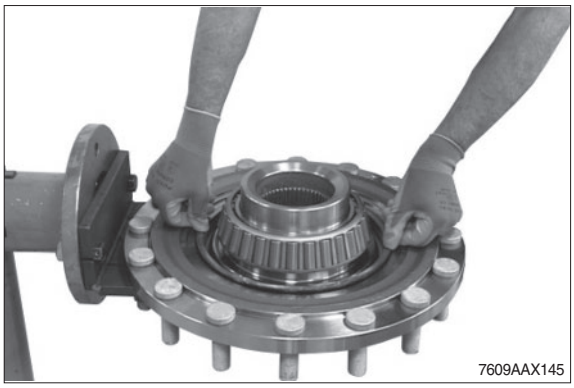


③ Wet O-ring of slide ring seal and locating hole with spirit.

Snap **new** slide ring seal (part 1) into the output shaft.

Then mount **new** slide ring seal (part 2) accordingly into the brake housing.

※ For the installation position of the seal please also refer to sketch, page 3-126.



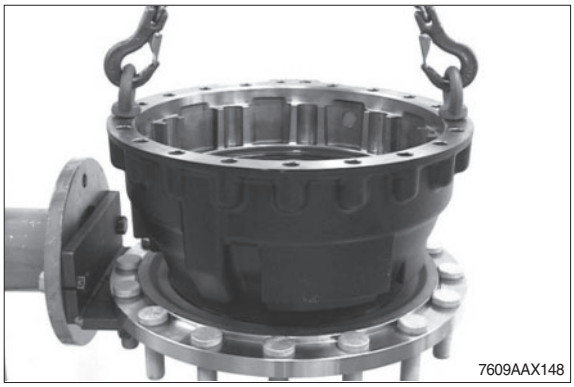
※ The surface of the slide ring seal may not have any grooves, scratches or other types of damage.
Take care that the sealing surface is parallel to the housing face.
The O-rings must be mounted evenly into the locating hole and must not bulge out of the hole.

⚠ **Risk of injury-Metal rings have extremely sharp edges.**
Wear protective gloves.

④ Insert both bearing outer rings (see arrows) into the brake housing until contact is obtained.

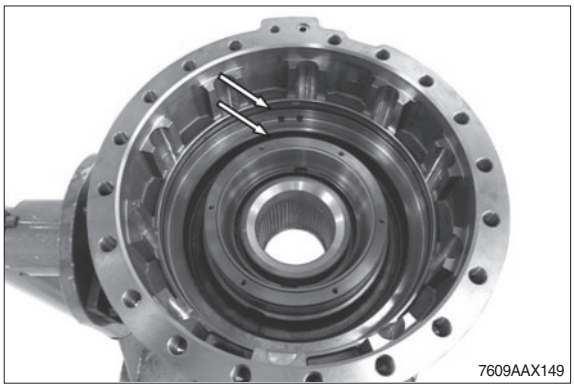
⑤ Insert the premounted brake housing by means of the lifting device over the output shaft until contact is obtained.

※ Before clamping the seal rings (slide ring seal) to installation dimension, clean the sliding surfaces and apply an oil film.
We recommend to use a leather cloth soaked with oil.



⑥ Insert back-up rings and grooved rings into the annular grooves of the brake housing (see arrows).

※ Pay attention to the installation position; please also refer to sketch, page 3-243.

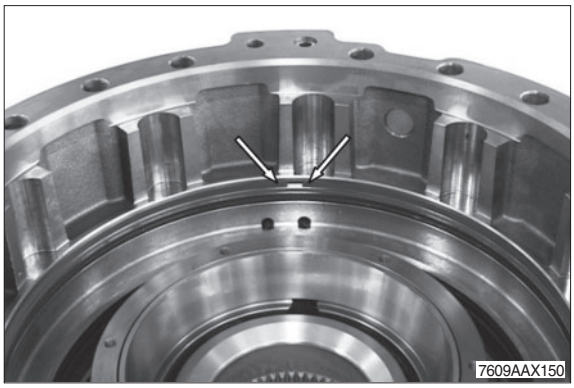


⑦ Clean the annular groove of the brake housing with spirit.

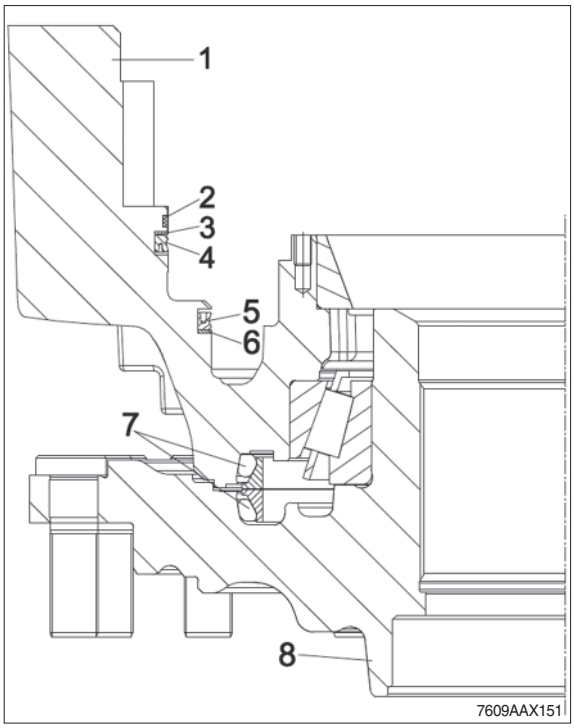
Then insert the guide ring into the annular groove (see also the following sketch) and fix it with loctite (type No. : 415) at its extremities (see arrows).

※ The full circumference of the guide ring must be in an exact contact position.

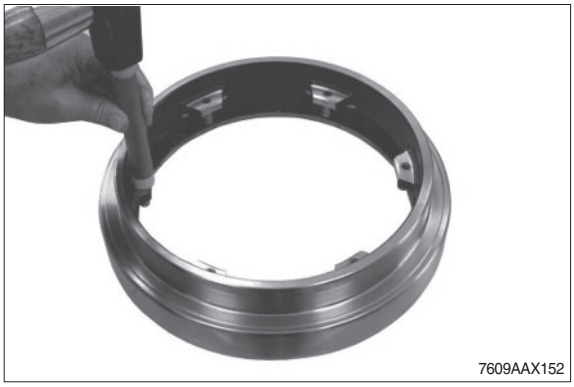
※ Upon installation the orifice of the guide ring must show upwards (12 o'clock).



1 Brake housing
2 Guide ring
3 Back-up ring
4 Grooved ring
5 Grooved ring
6 Back-up ring
7 Slide ring seal
8 Output shaft



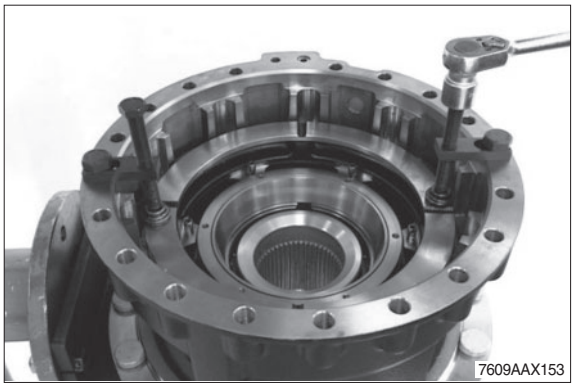
⑧ Flush-mount the slotted pins (6EA) into the holes of the piston.



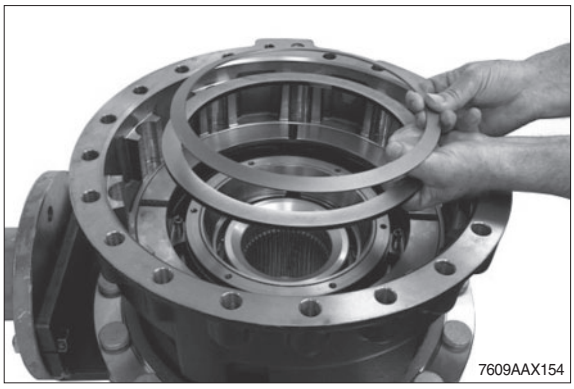
⑨ Insert the piston into the brake housing and carefully install with the fixing device until contact is obtained.

Fixing device AA00 680 530

※ Sufficiently oil seal surface of piston/ back-up rings, grooved rings and guide ring.

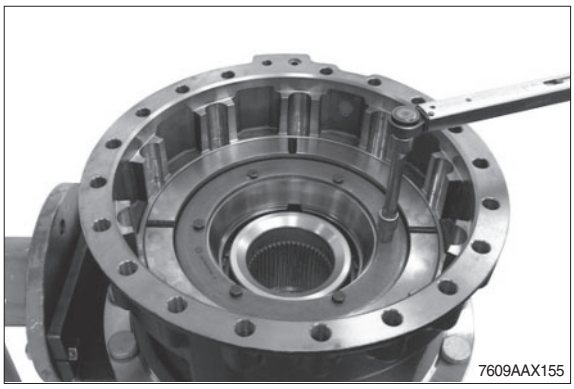


⑩ Insert disk and cup spring with the convex side showing upwards into the piston.



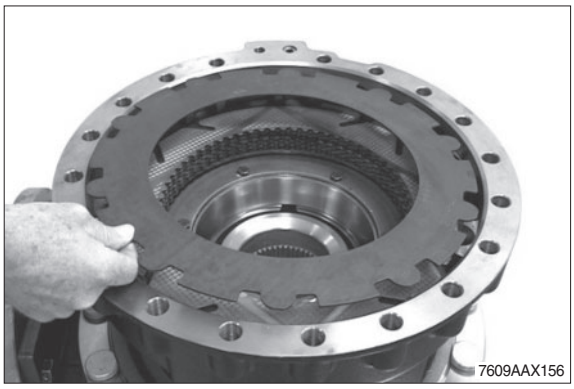
⑪ Insert cover and fix it by means of hexagon screws.

· Tightening torque (M8/10.9) :
3.47 kgf · m (25.1 lbf · ft)

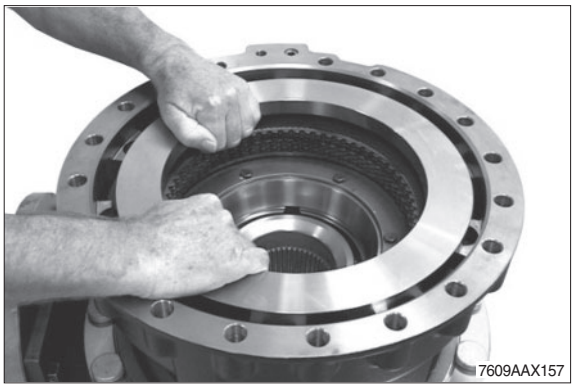


⑫ Mount outer and inner disks.

※ For the number of disks and the disk arrangement please refer to the relating parts manual.

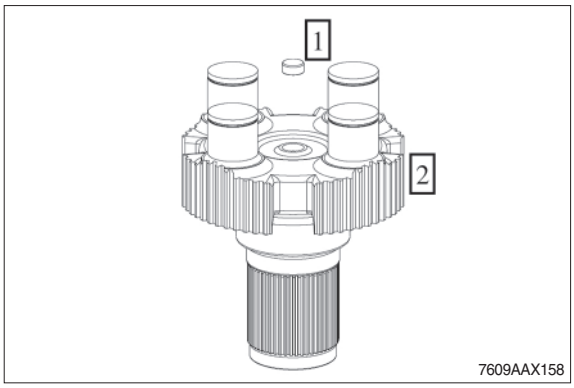


⑬ Insert end plate.



⑭ Press stop bolt into the planetary carrier until contact is obtained.

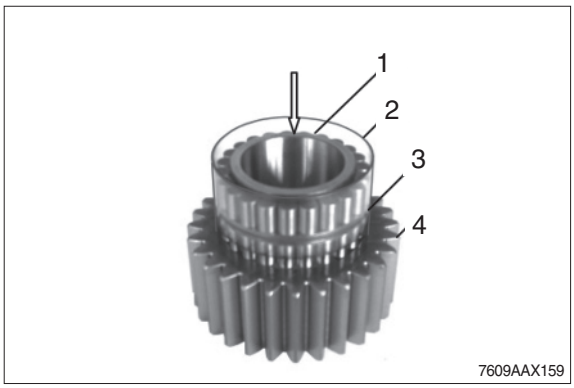
1 Stop bolt
2 Planetary carrier



⑮ Insert the cylindrical roller bearing into the planetary gear – for this purpose press the cylindrical roller bearing through the packaging sleeve until the snap ring engages into the annular groove of the planetary gear.

※ Use packaging sleeve to facilitate assembly.

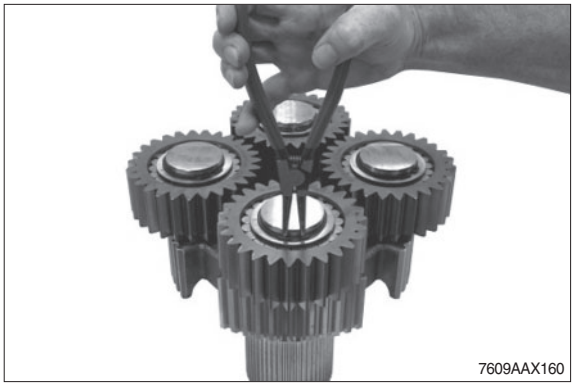
1 Cylindrical roller bearing
2 Packaging sleeve
3 Snap ring
4 Planetary gear



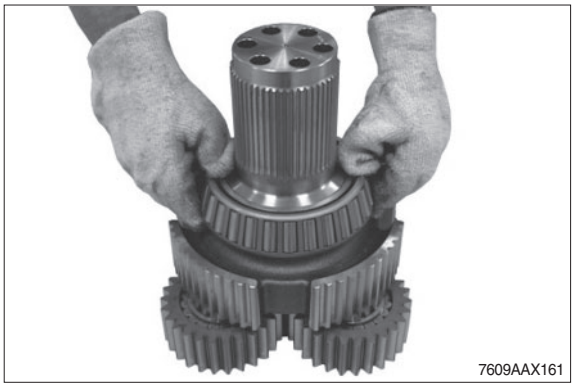
⑯ Heat bearing inner rings and insert the premounted planetary gears with large radius facing the planetary carrier (downwards) until contact is obtained.

※ Adjust bearing inner rings after cooling down.

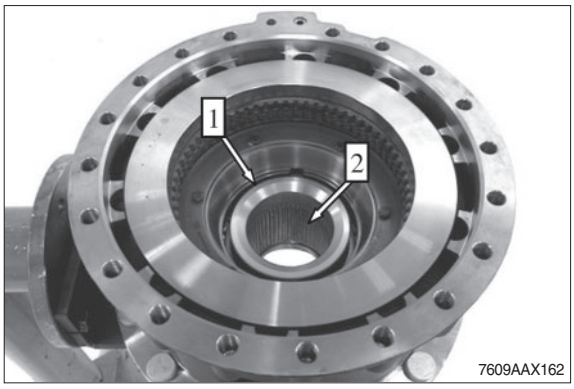
Then fix planetary gears by means of retaining rings.



⑰ Heat tapered roller bearing and install it to the planetary carrier until contact is obtained.



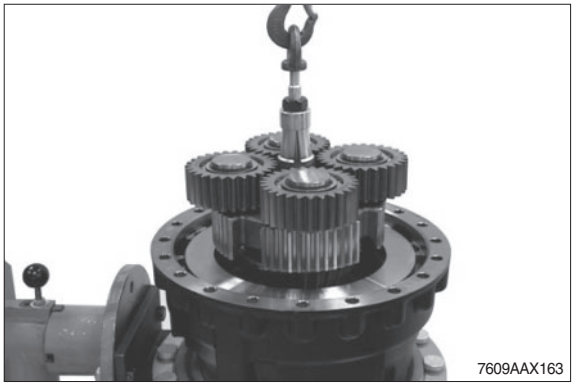
⑱ Wet front face (contact face bearing inner ring, arrow 1) and profile (teeth, arrow 2) in the output shaft with anti-corrosive agent.



⑲ Align disk package centrally and radially.

Then insert the planetary carrier by means of the lifting device into the teeth of the output shaft.

Inner extractor	5870 300 017
Eye nut	5870 204 076

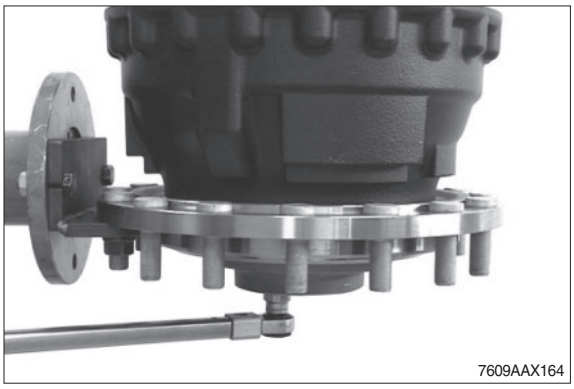


Setting of gap width output shaft / planetary carrier

⑳ Bring planetary carrier with measuring disk and three old locking screws, which were removed during disassembly, into contact position.

· Tightening torque :
20.4 kgf · m (148 lbf · ft)

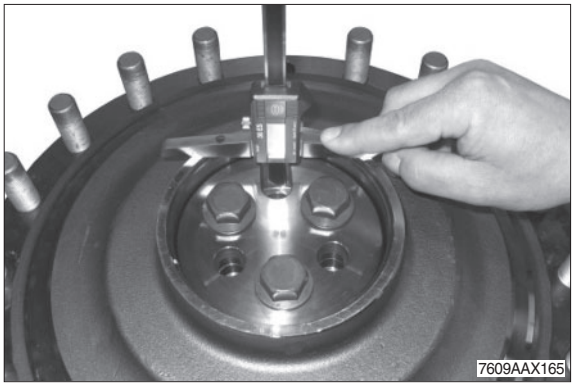
Measuring disk	AA00 360 730



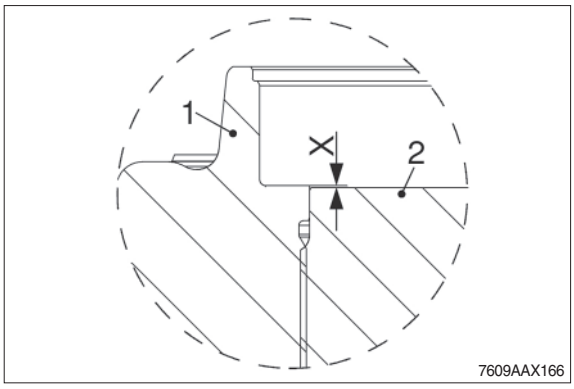
㉑ Pivot output 180˚ and measure gap width from the output shaft to the planetary carrier (see also subsequent sketch).

Gap width e.g. ..... 0.21 mm

Then remove the locking screws and the measuring disk again.



1 Planetary carrier
2 Output shaft
X Gap width

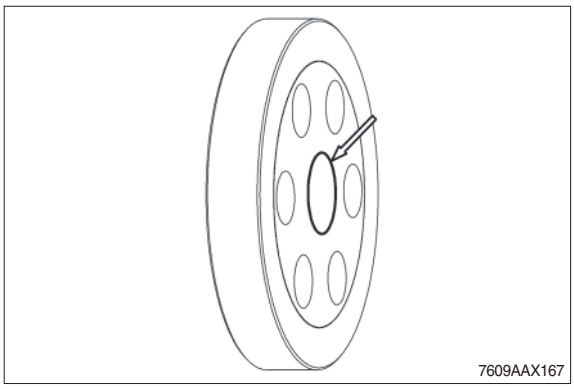


㉒ Select the cover (optional) on the basis of the following table.

Determined gap width (Delta)	Offset to be used on the cover	P/No.
0.30~0.24 mm	0.13±0.01 mm	ZGAQ-04137
0.239~0.18 mm	0.07±0.01 mm	ZGAQ-04370
0.179~0.10 mm	0.0 mm	ZGAQ-03909

※ Cover (ZGAQ-04370) has an offset of 0.07 mm on one side and an offset of 0.13 mm on the other side.

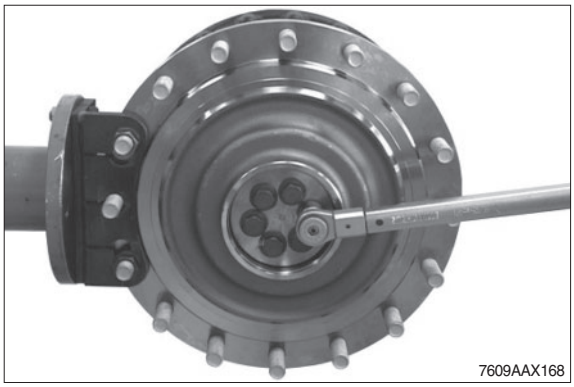
※ Offset 0.13 mm is visually marked with an annular groove (see arrow).



㉓ Insert the cover with the offset e.g. 0.07 mm showing to the planetary carrier and tighten with **new** locking screws.

※ When using the cover with offset 0.07 mm, the groove (figure AX167) must be visible when the cover is installed.

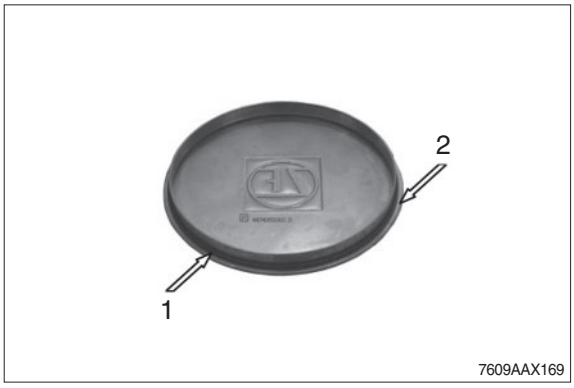
※ Tighten locking screws successively with a tightening torque of 20.4 kgf · m (148 lbf · ft).
Then retighten the locking screws successively with a tightening torque of 51 kgf · m (369 lbf · ft).



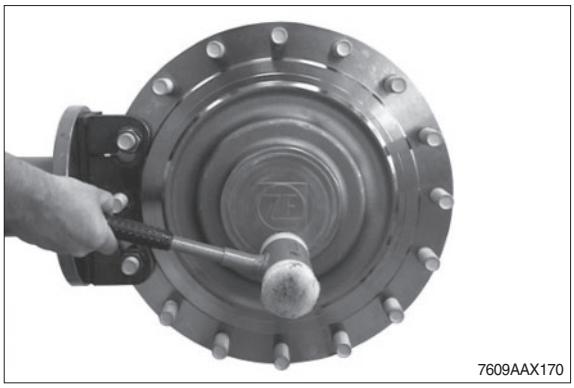
㉔ Install O-ring (see arrow 1) to the cover.

Then wet contact face (arrow 2).

※ Use new cover and O-ring.



㉕ Insert the cover into the output shaft until contact is obtained.

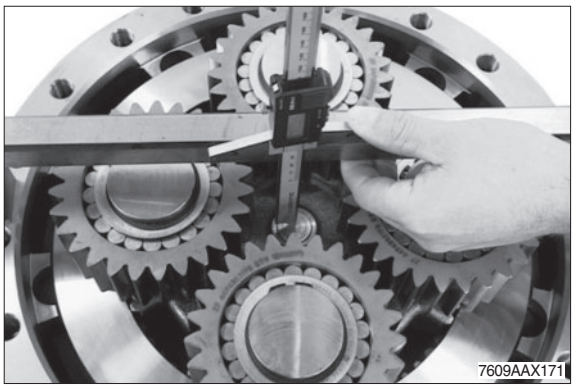


Set the axial play of the sun gear shaft 0.5~2.0 mm

㉖ Determine dimension I, from the mounting face of the brake housing to the front face of the stop bolt.

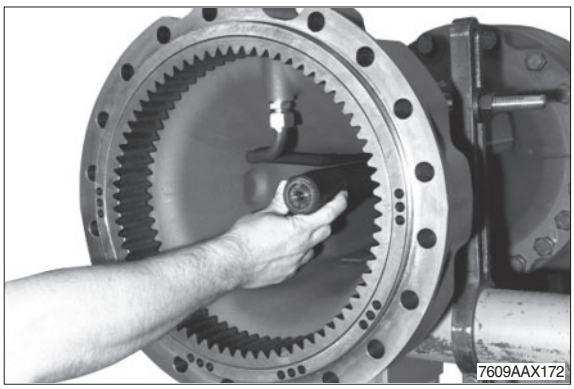
Dimension I e.g.
Front axle ..... 40.80 mm
Rear axle ..... 19.75 mm

Gauge blocks	5870 200 066
Straightedge	5870 200 022

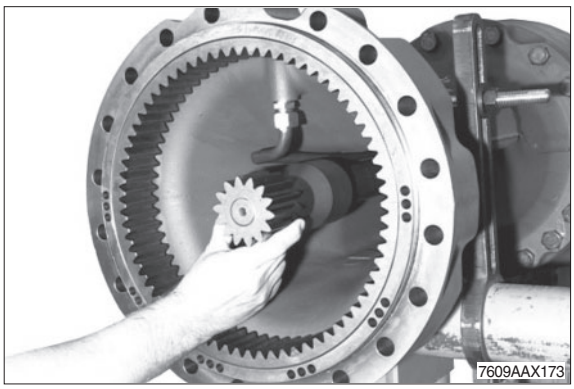


㉗ Insert stub shaft into the teeth of the axle bevel gear until contact is obtained.

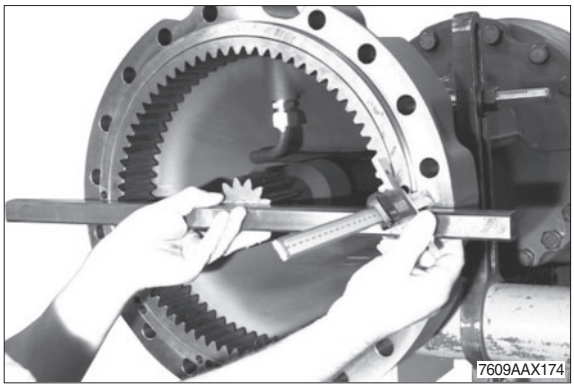
※ Pay attention to the installation position ; mount the stub shaft with the long teeth showing to the differential.



㉘ Insert the sun gear shaft until contact is obtained.



㉙ Measure dimension II, from the front face of the sun gear shaft to the mounting surface of the axle housing.



Dimension II e.g.

Front axle . . . . . 38.20 mm
Rear axle . . . . . 17.15 mm

Straightedge 5870 200 022

CALCULATION EXAMPLE :

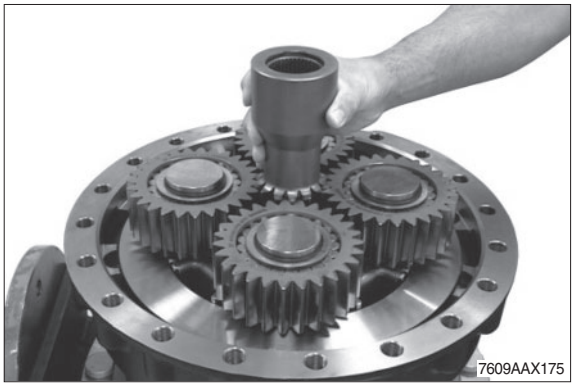
Front axle

Dimension I . . . . . 40.80 mm
Dimension II . . . . . - 38.20 mm
Difference . . . . . 2.60 mm
Required axial play e.g. . . . - 1.00 mm
Difference = shim e.g. s = 1.60 mm

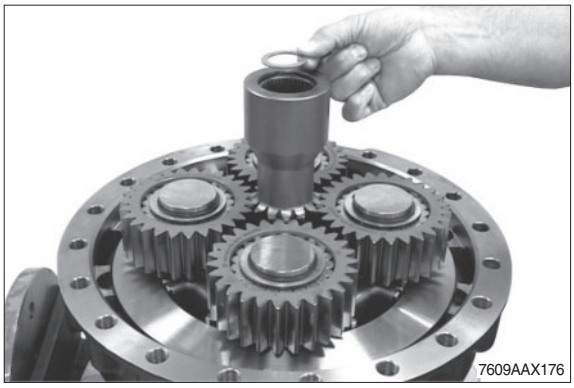
Rear axle

Dimension I . . . . . 19.75 mm
Dimension II . . . . . - 17.15 mm
Difference . . . . . 2.60 mm
Required axial play e.g. . . . - 1.00 mm
Difference = shim e.g. s = 1.60 mm

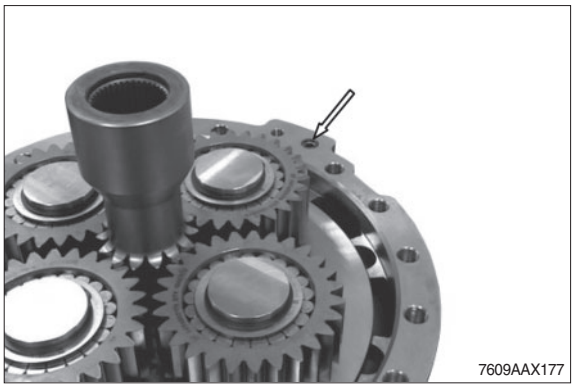
㉚ Insert sun gear shaft into the planetary carrier.



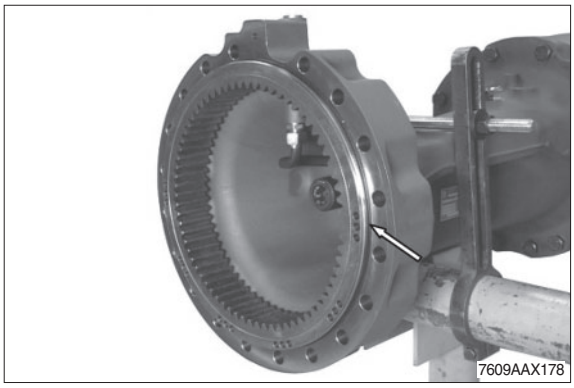
㉛ Fix determined shim (s) e.g. s = 1.60 mm with grease into the sun gear shaft.



㉜ Fix O-ring (see arrow) with grease into the countersink of the brake housing.



㉝ Grease O-ring (see arrow) and install it to the axle housing.



㉞ Mount two adjusting screws and use the lifting device to bring the output into contact position with the axle housing.

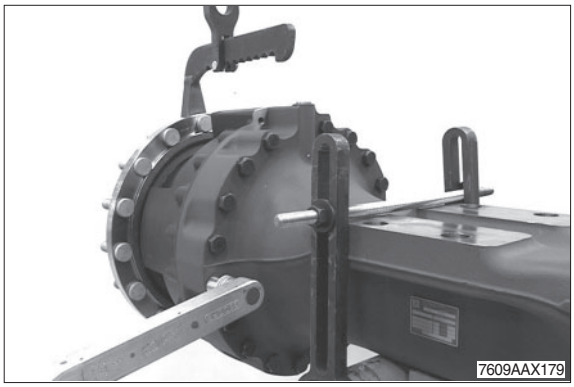
Then fix the output by means of hexagon screws.

· Tightening torque :
Front axle (M20/10.9)
57.1 kgf · m (413 lbf · ft)
Rear axle (M18/10.9)
39.8 kgf · m (288 lbf · ft)

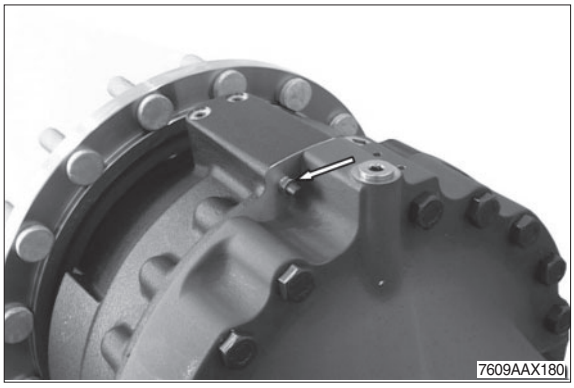
Adjusting screws

Front axle (M20)	5870 204 024
Rear axle (M18 × 15)	5870 204 029
Load carrying device	5870 281 043

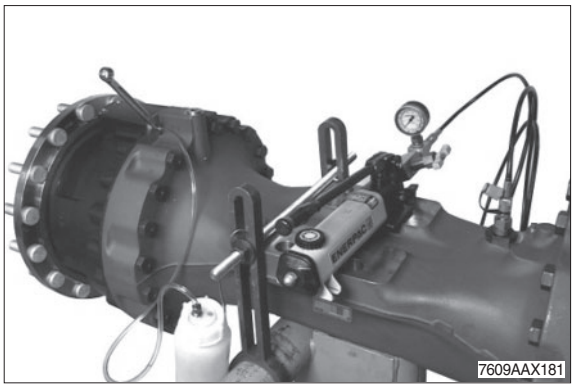
※ Fix load carrying device with wheel stud.



㉟ Mount breather (see arrow).



Check brake hydraulics for leakages



※ Before starting the test, completely breathe the brake hydraulics.

Then pressurize the brake temporarily (5EA) with p = 100 bar max.

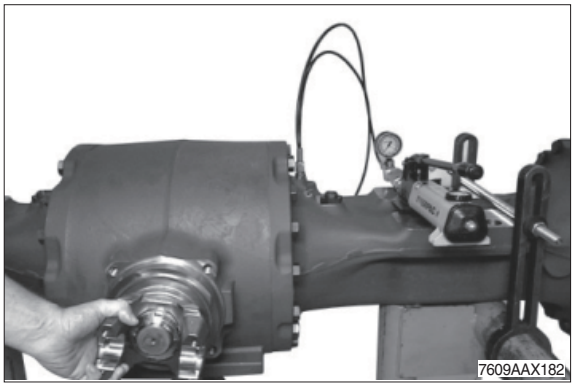
High-pressure test :
Build up test pressure p = 100-10 bar max and close connection to HP pump via shut-off valve.
A pressure drop of max 2 % (2 bar) is permissible during a 5-minute testing time.

Low-pressure test :
Reduce test pressure p = 5 bar and close shut-off valve.
No pressure drop is allowed during a 5-minute testing time.

Test media :
Engine oil SAE 10W

HP pump	5870 287 007
Clutch	0501 207 939
Reduction (M18 × 1.5)	5870 950 161
Oil collector bottle	5870 286 072

Check operability of hydraulic lock differential (opt)



Build up pressure p = 20 bar max and close connection to HP pump via shut-off valve.

Lock on :
When rotating the input flange, both outputs must have the same direction of rotation.

Lock off :
When rotating the input flange, one side has no movement or has the opposite direction of rotation.

Prior to putting the axle into operation, fill it with oil according to the related lubrication and maintenance instructions.

2.TRANSMISSION

Preparatory Activities

Mounting transmission on assembly truck

Special tools:

- 5870.350.071 Clamping bracket
- 5870.350.000 Assembly truck

1.

⚠ WARNING

Risk of injury due to uncontrolled motion of the load.
Death or serious injury possible.

- ⇨ Only use the suspension points intended for transportation purposes.
- ⇨ Only use secure, permitted, and tested means of transport, chain hoist, and lifting equipment with sufficient load capacity and suitable lifting technology.
- ⇨ Ensure that lifting equipment such as ropes and belts are not in contact with sharp edges and are not knotted or twisted.
- ⇨ Properly attach lifting appliances to load.
- ⇨ Observe the load's center of gravity! The crane hook must be located above the load's center of gravity.
- ⇨ Lift load slowly and observe whether the load tilts or swivels out laterally. If required, immediately put down load and modify attachment.
- ⇨ Keep distance.
- ⇨ Do not walk under suspended loads.
- ⇨ Only ever move load under supervision.

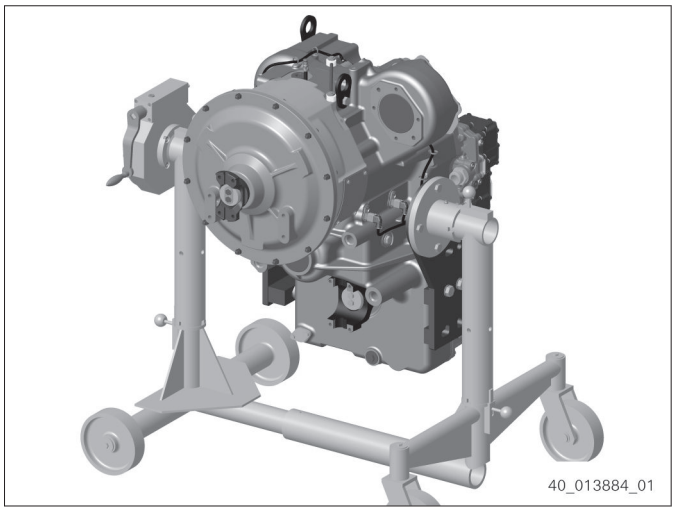


Fig. 21

Fix the transmission with
5870.350.071 [Clamping bracket] to
5870.350.000 [Assembly truck].

Draining oil

⚠ Observe the environmental regulations.

1. Loosen screw plug (1).

2. Loosen the screw plug (2) and drain oil.

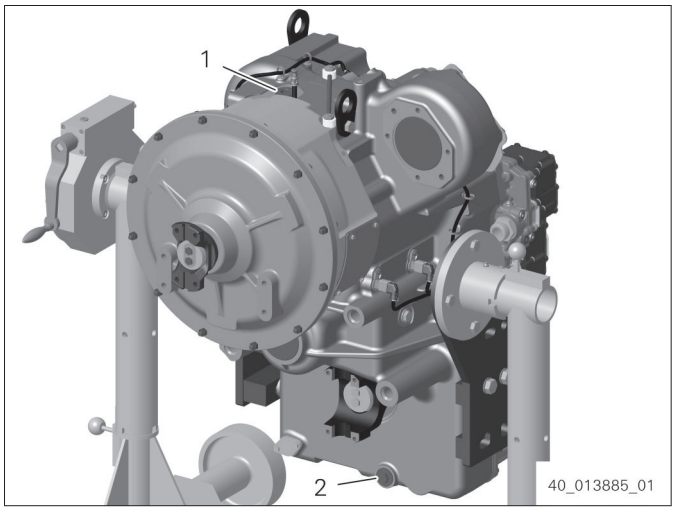


Fig. 22

Dismantling

Removing the pressure filters

1. Loosen the pressure filters (1)from the filter head.

2. Loosen the plunger switch (2).
   ※ The filter head is located near the transmission.

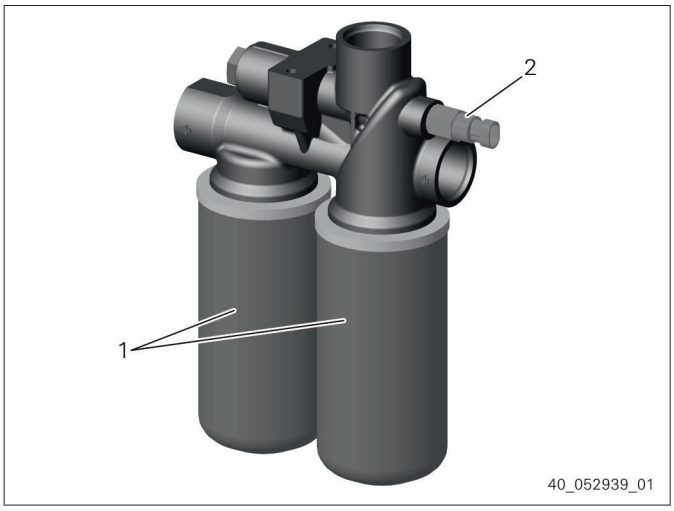


Fig. 23

Removing cover sheets (filler neck)

1. Loosen hexagon screws and remove cover sheet with seal (1).

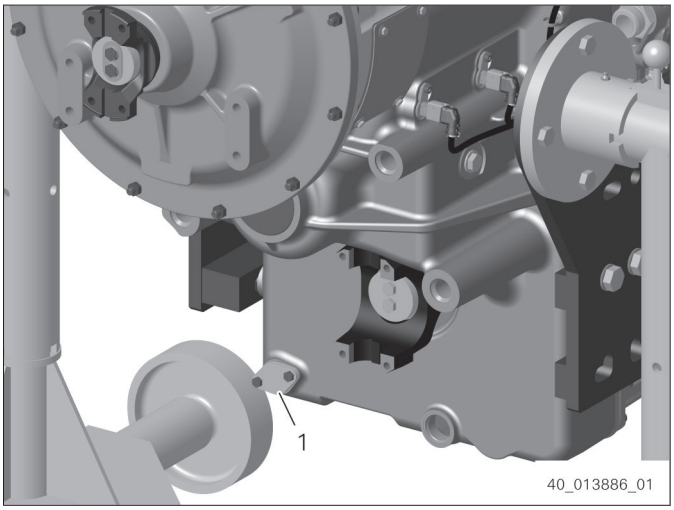


Fig. 24

2. Loosen hexagon screws and remove cover sheet with seal (1).

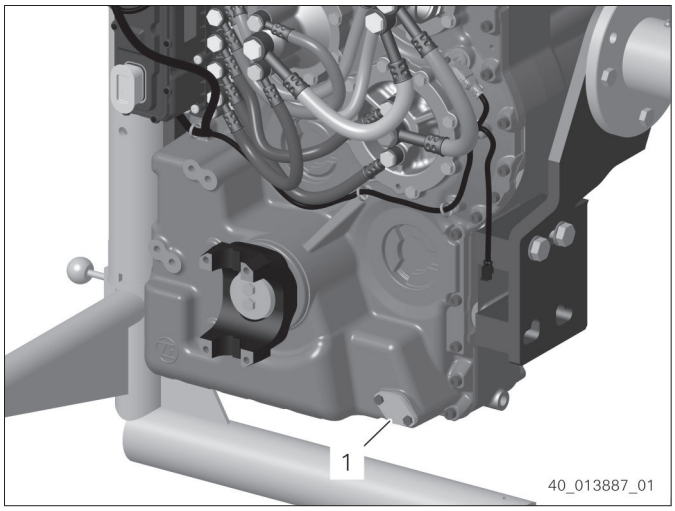


Fig. 25

Removing tube

1. Loosen hollow screws (1) and remove tube (2).

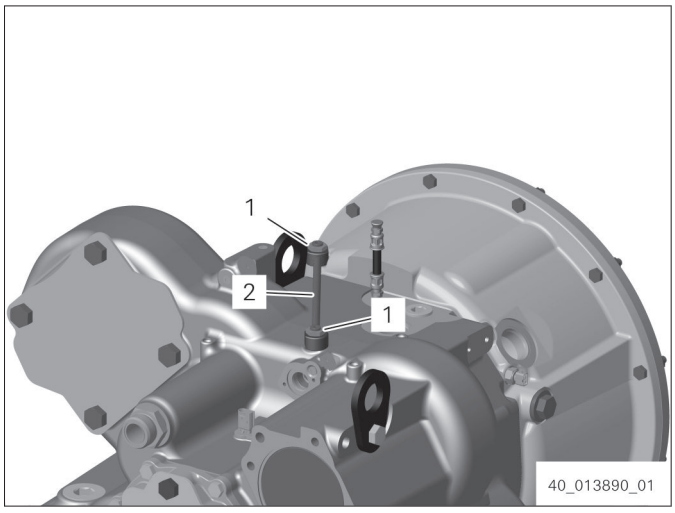


Fig. 28

Removing the hose assemblies

1. Loosen hollow screws and hose assemblies.

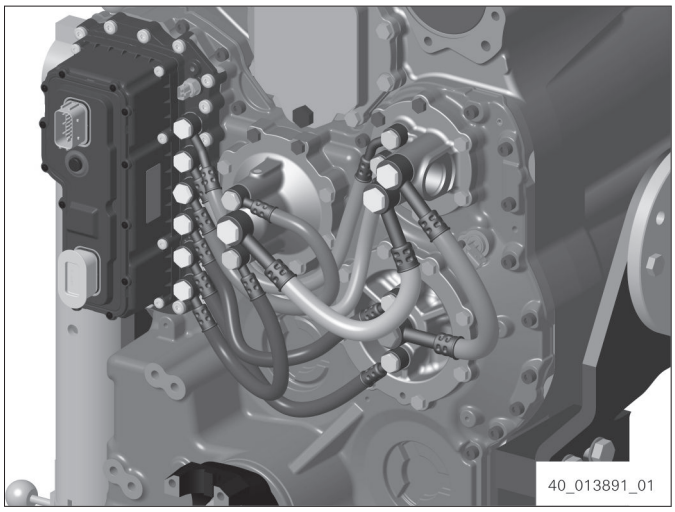


Fig. 29

Removing the speed sensors

1. Loosen the cap screw.
2. Pull the speed sensor (1) out of the cover.

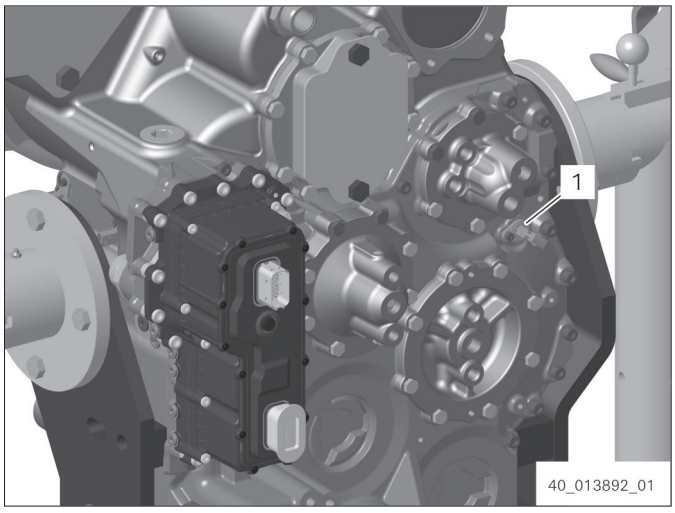


Fig. 30

3. Loosen cap screws.
4. Pull speed sensors (1) out of the housing.

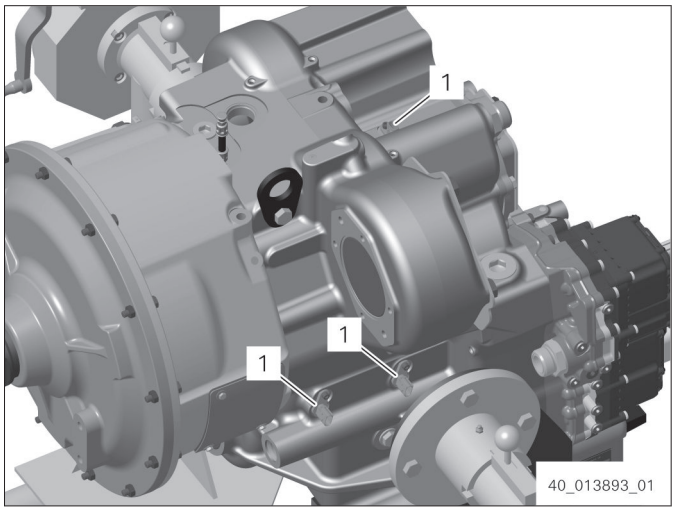


Fig. 31

Removing the temperature sensors and the breather

1. Loosen breather (1).
2. Loosen the temperature sensors (2).

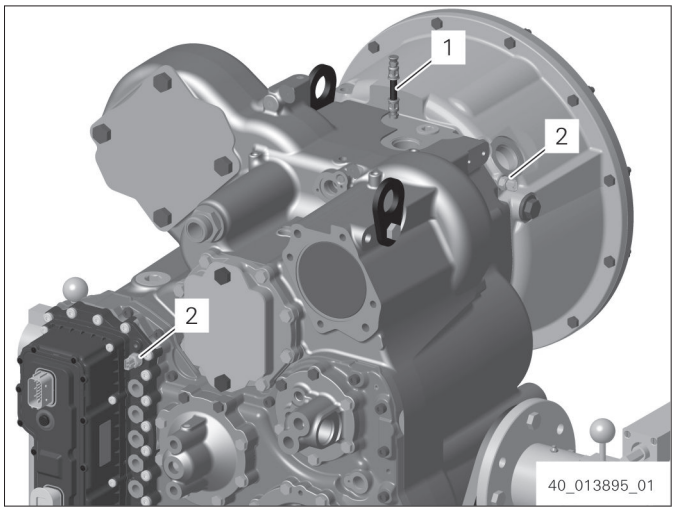


Fig. 32

Removing the converter pressure back-up valve

1. Loosen screw plug (1).

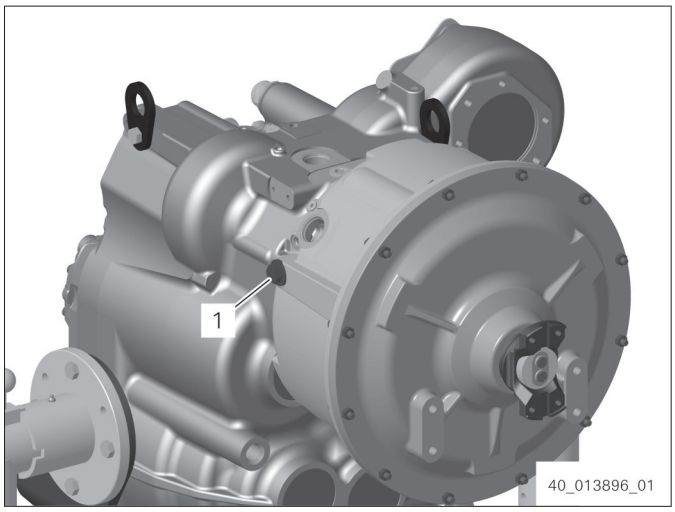


Fig. 33

2. Remove compression spring (1).

3. Pull the piston (2) from the torque converter bell housing.

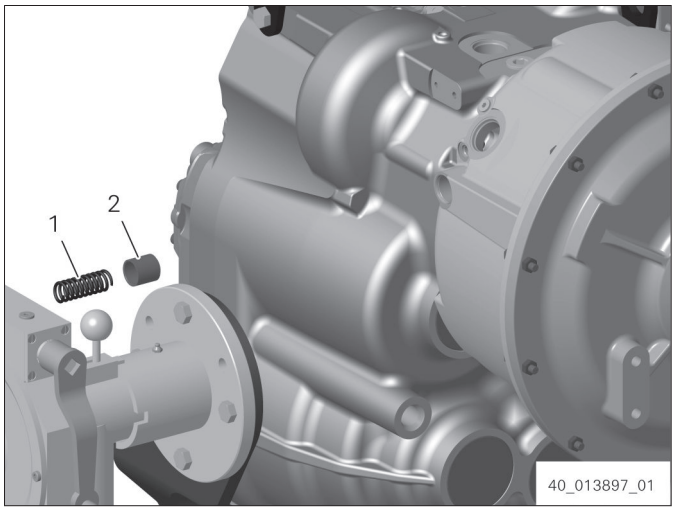


Fig. 34

Removing and dismantling shift system

Removing control unit (ECA4)

1. Loosen internal hexalobular bolts.

2. Remove control unit (1).

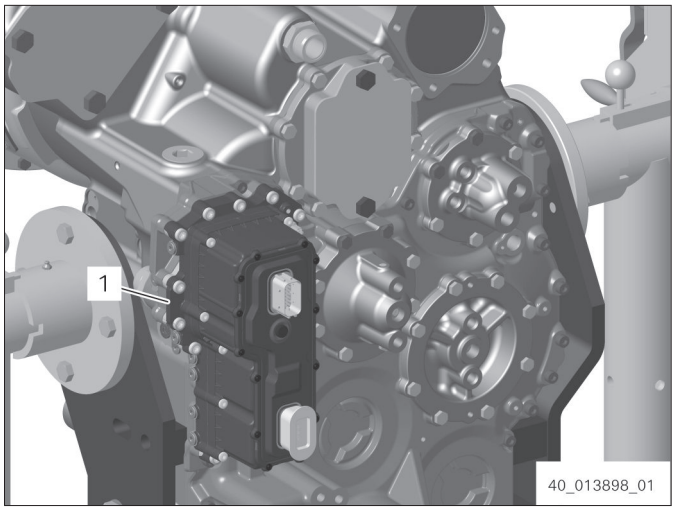


Fig. 35

Removing the pressure controllers

1. Separate plug connections (1) on the pressure controllers.
2. Loosen internal hexalobular bolts and remove fixing plate (3).
3. Remove cable (2).

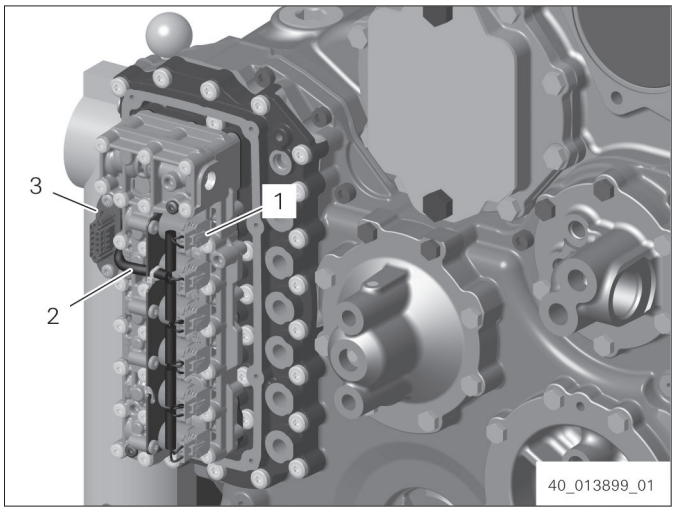


Fig. 36

4. Loosen internal hexalobular bolts and remove clamping plate (2).
5. Pull out the pressure controllers (1).

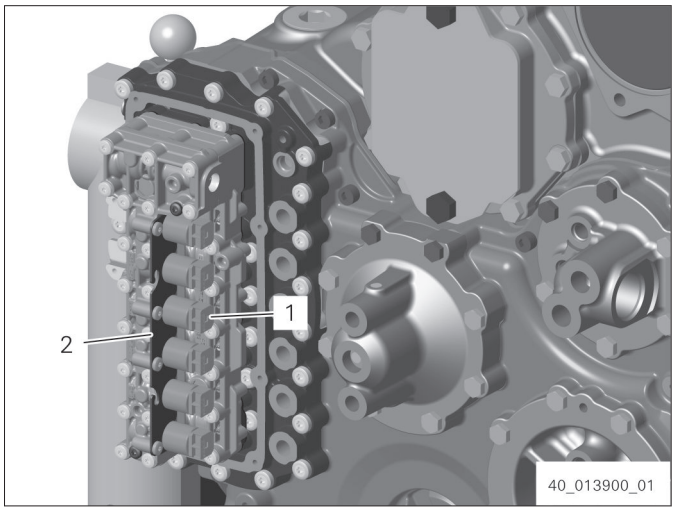


Fig. 37

Removing and dismantling valve blocks

Special tools:

- AA02.414.200 Driver tool
- AA02.416.754 Driver tool
- AA02.416.230 Driver tool

1. Loosen internal hexalobular bolts. Remove valve block (1) and intermediate plate.

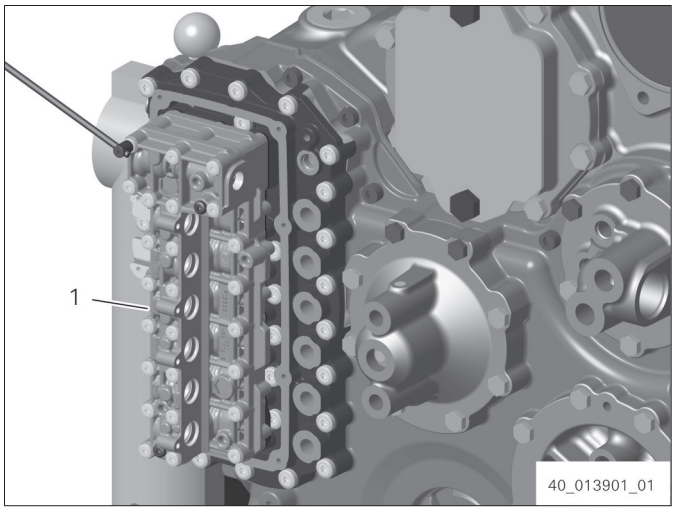


Fig. 38

2. Press the piston inwards with AA02.414.200 [Driver tool] and remove the fixing plate (1).

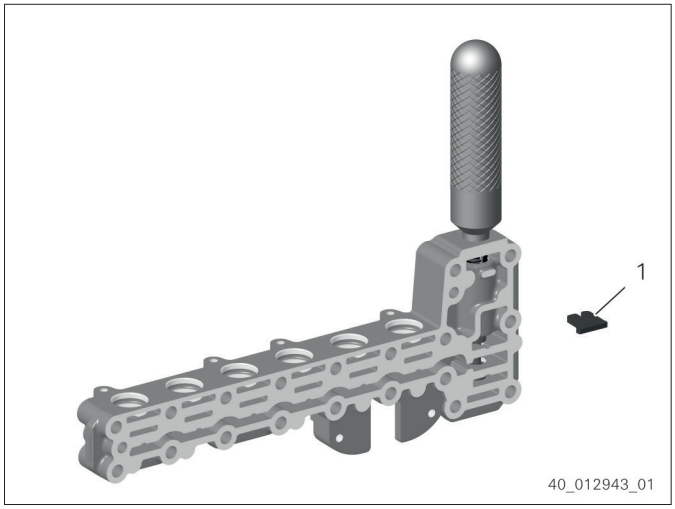


Fig. 39

3. Remove compression spring (2) and piston (1) from the hole.

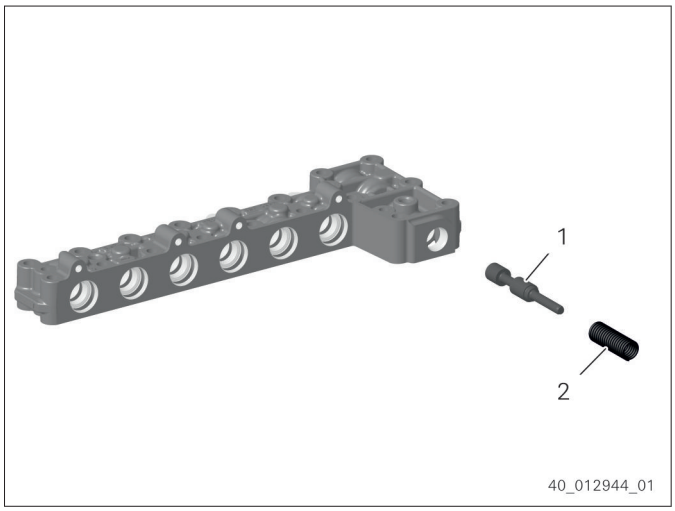


Fig. 40

4. Loosen internal hexalobular bolts. Remove valve block (1) and intermediate plate.

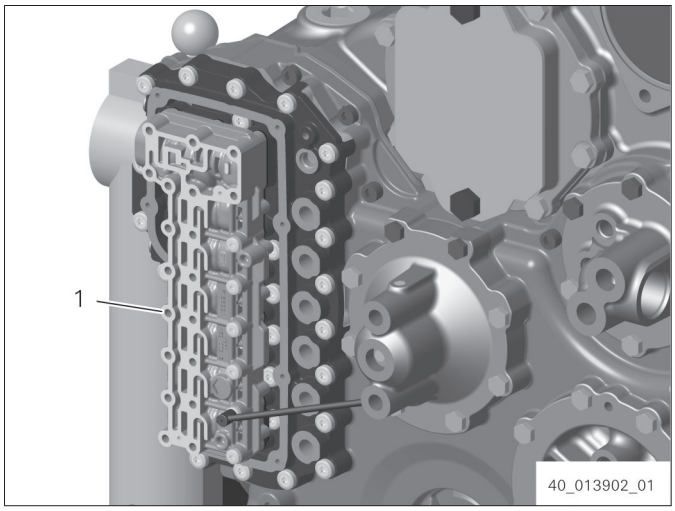


Fig. 41

5. Press the plug inwards with AA02.416.754 [Driver tool] and remove the spring clip (1).

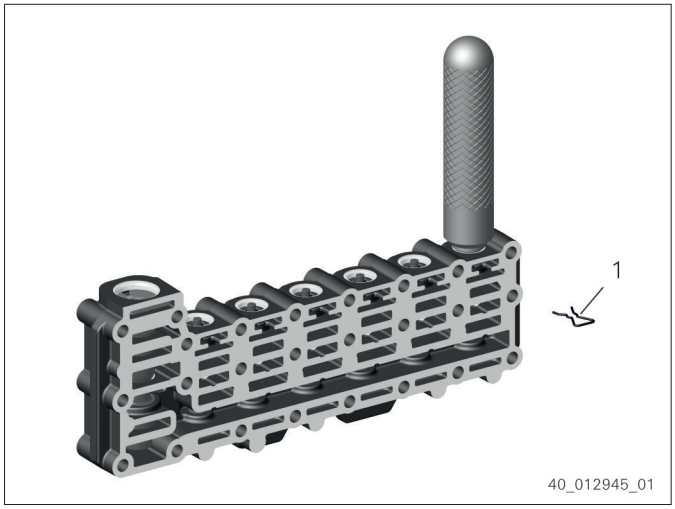


Fig. 42

6. Pull the plug (3) out of the hole.

7. Remove control piston (2) and compression spring (1) from the hole.

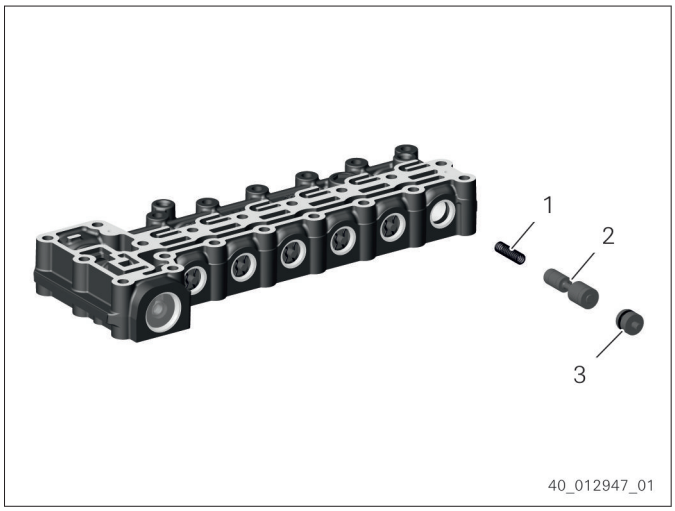


Fig. 43

8. Press the plug inwards using AA02.416.230 [Driver tool] and remove fixing plate (1).

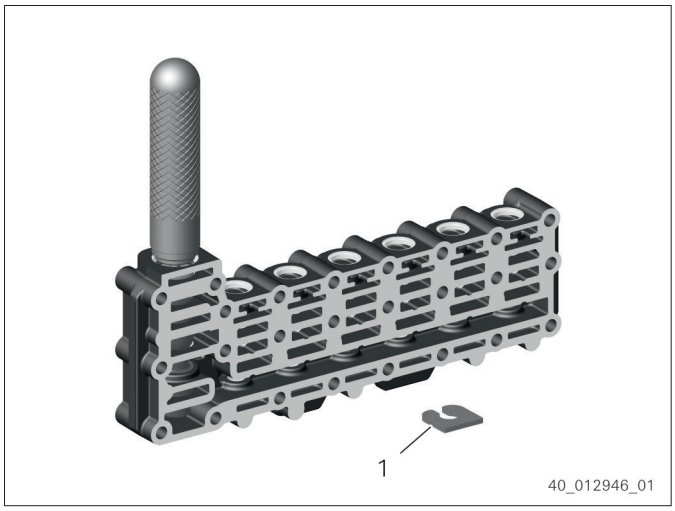


Fig. 44

9. Pull the plug (3) out of the hole.

10. Remove compression spring (2) and control piston (1) from the hole.

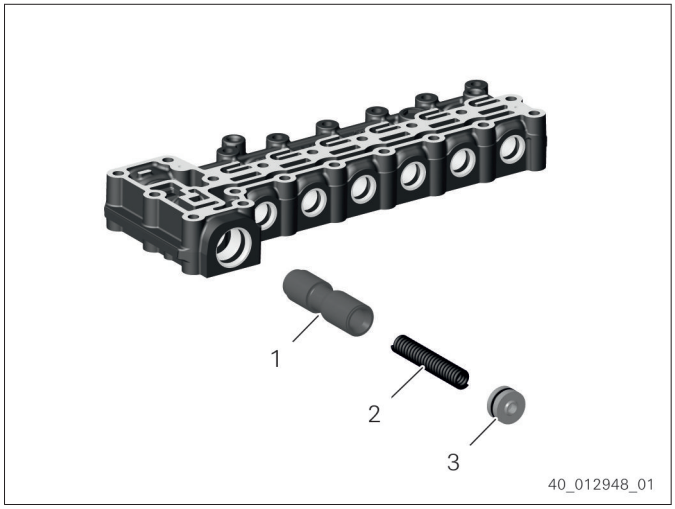


Fig. 45

Removing duct plate

1. Remove valves (1) from duct plate.

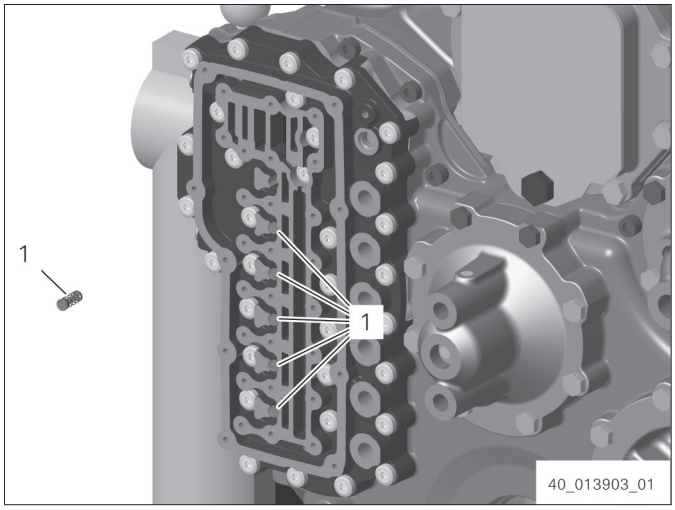


Fig. 46

2. Loosen internal hexalobular bolts. Remove duct plate (1) and seal.

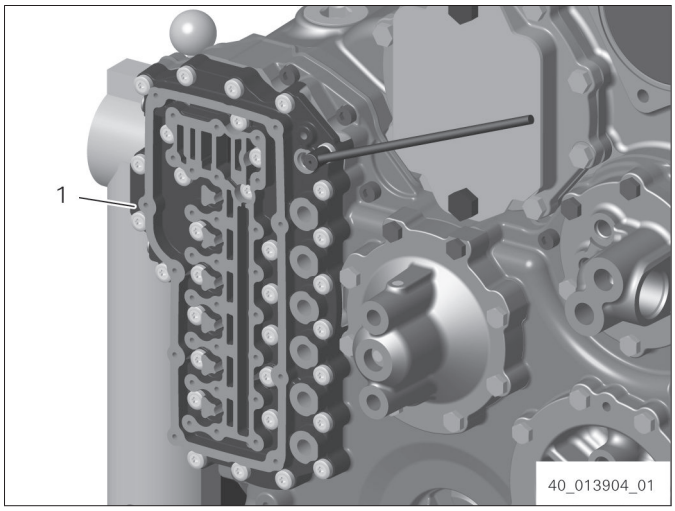


Fig. 47

3. Remove screw plugs (1) from duct plate.

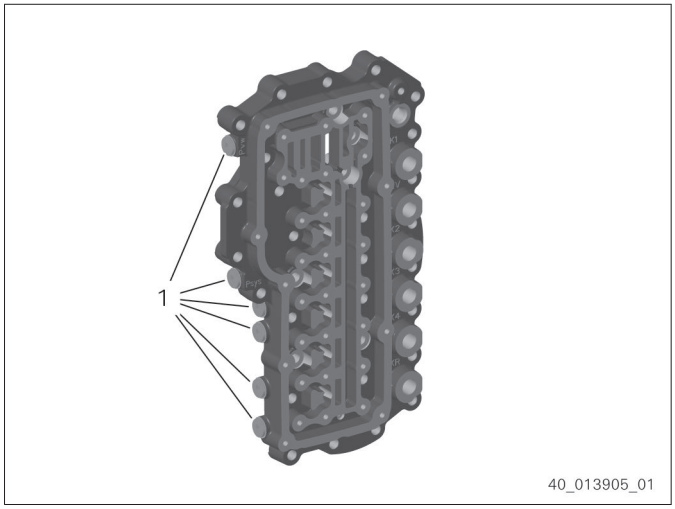


Fig. 48

Removing fixing plates

1. Loosen hexagon screws and remove fixing plates (1).

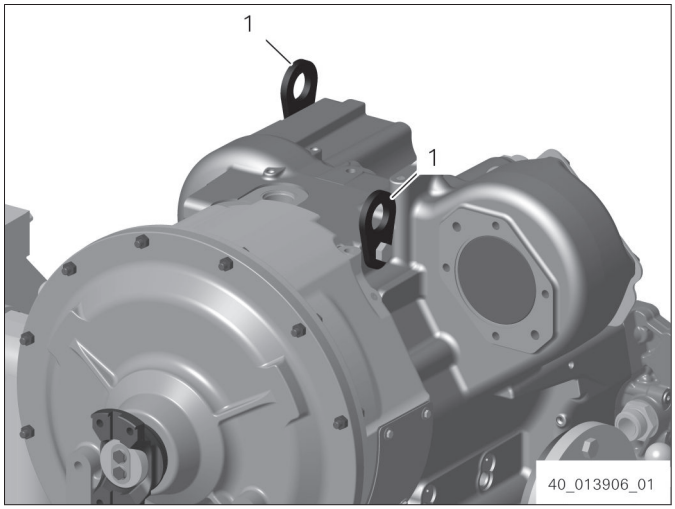


Fig. 49

Removing engine connection and converter

Special tools:

- AA02.676.915 Load ring

1. Mark installation position of the cover towards the torque converter bell housing.

2. Loosen hexagon nuts (1) and remove hexagon screws (2).

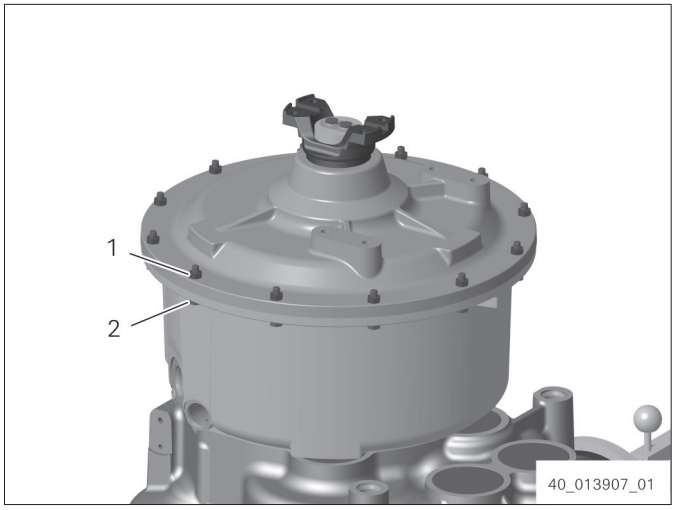


Fig. 50

3. **⚠ CAUTION**

   Risk of crushing due to moving parts.
   Slight or moderate injury possible.
   ⇨ Do not reach into danger area!

   Lift off the cover and the converter using two AA02.676.915 [Load ring] and the crane.

Fig. 51

4. Remove locking plate (1).

5. Loosen hexagon screws (2).

6. Remove washer (3).

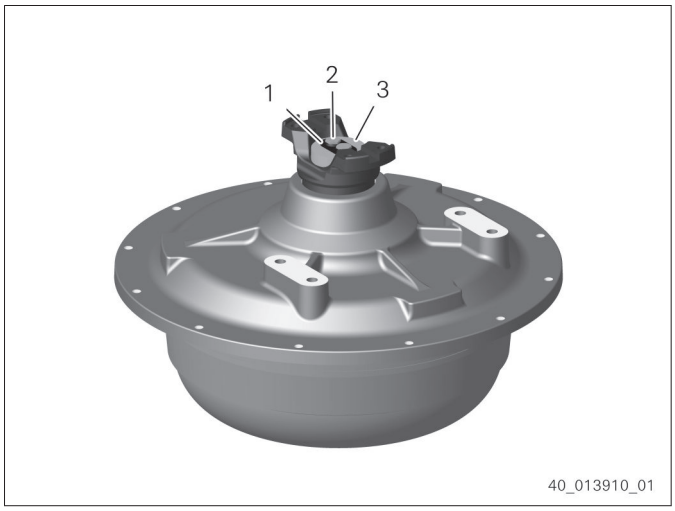


Fig. 52

7. Use two-armed extractor to pull output flange from flange shaft.

Fig. 53

8. **⚠ CAUTION**

Risk of crushing due to hydraulic tool.
Slight to moderate injury possible.
⇨ Do not reach into danger area.

Force flange shaft and converter out of the cover.

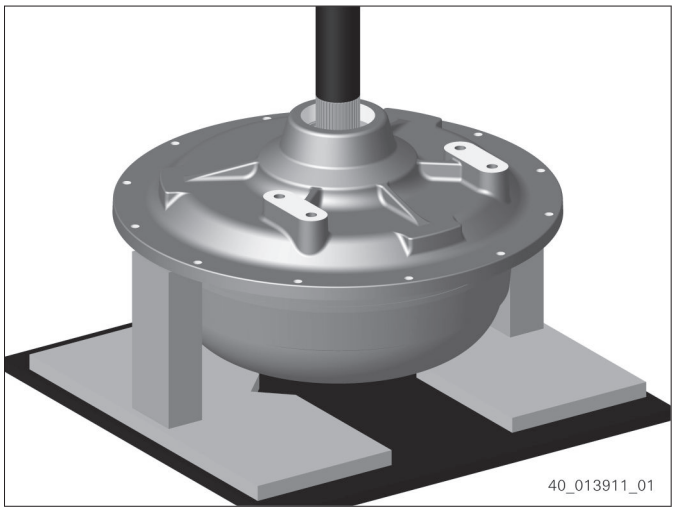


Fig. 54

9. Remove V-ring (1).

10. Pull the ball bearing (2) out of the cover.

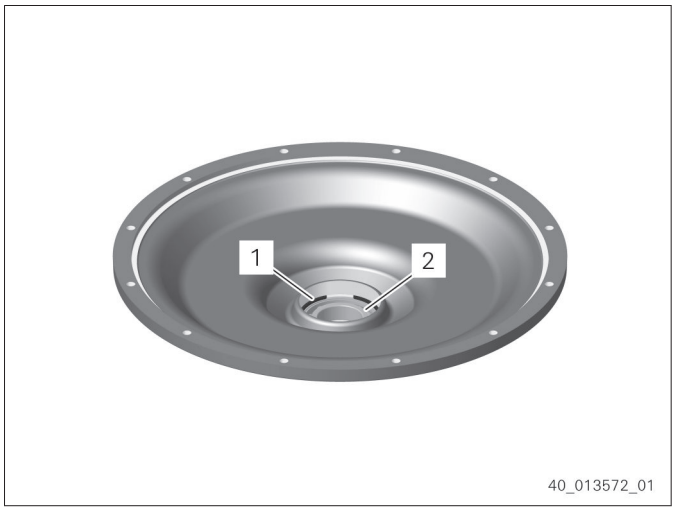


Fig. 55

11. Remove R-ring (1).

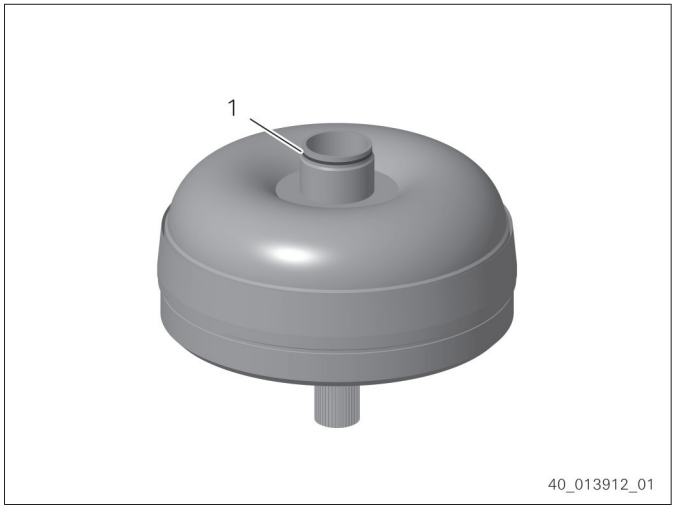


Fig. 56

12. Loosen hexagon screws (1).

13. Remove flange shaft (2).

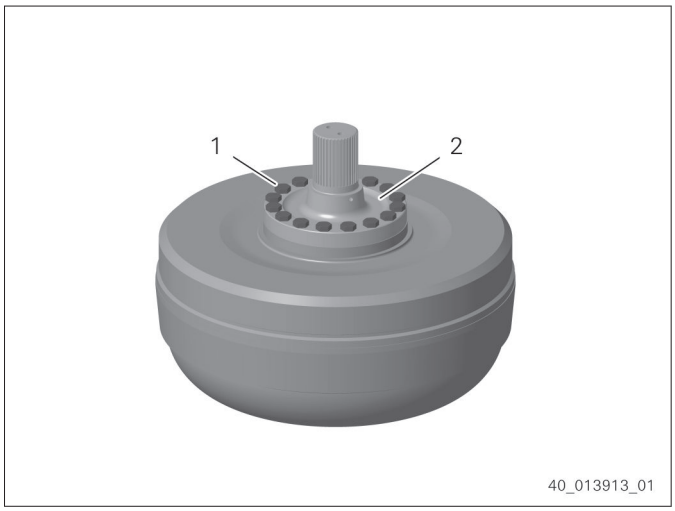


Fig. 57

Dismantling drive

Special tools:

- 5870.204.005 Hexagon screw
- 5870.000.089 Press-out device
- 5870.345.036 Pry bar
- AA02.247.426 Eyebolt

1. Loosen hollow screws (2).

2. Remove oil tube (1).

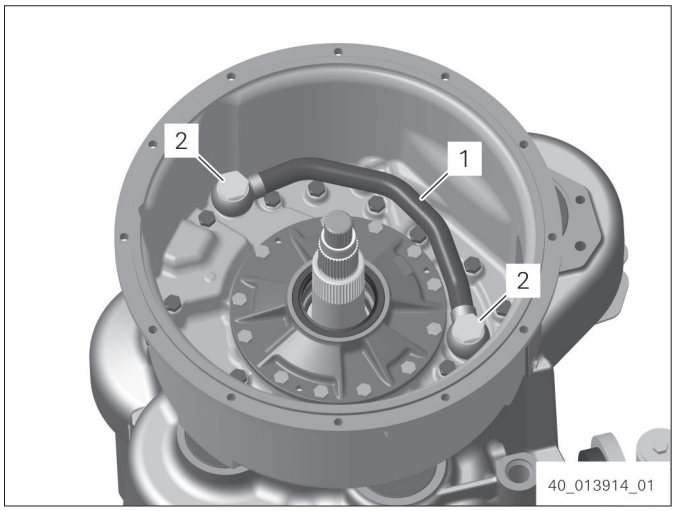


Fig. 58

3. Loosen hexagon screws.

4. Evenly pull off bearing cover with three 5870.204.005 [Hexagon screw].

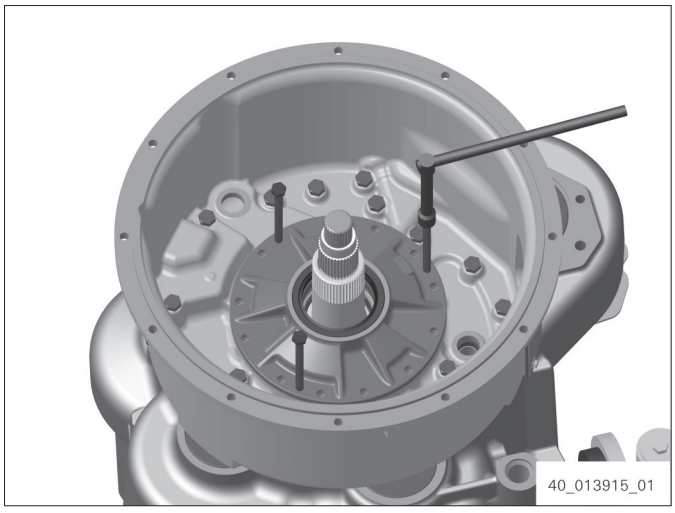


Fig. 59

5. Remove shaft sealing ring (1) from bearing cover.

6. Remove needle sleeve (2).

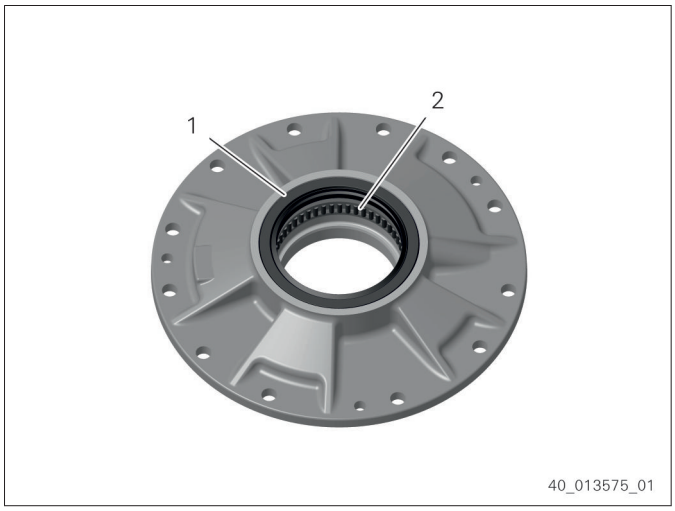


Fig. 60

7. Fasten 5870.000.089 [Press-out device] to the oil feed flange with two cap screws M12 x 50.

8. Pull oil feed flange evenly out of torque converter bell housing by means of 5870.000.089 [Press-out device].

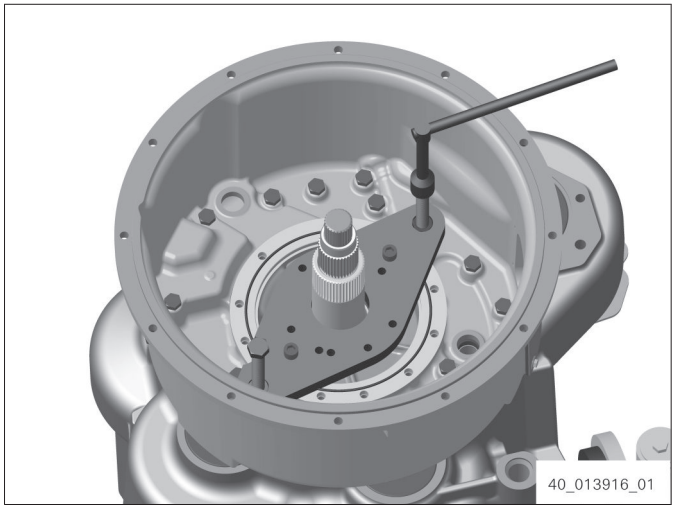


Fig. 61

9. Remove slotted pin (1).

10. Remove converter safety valve (2).

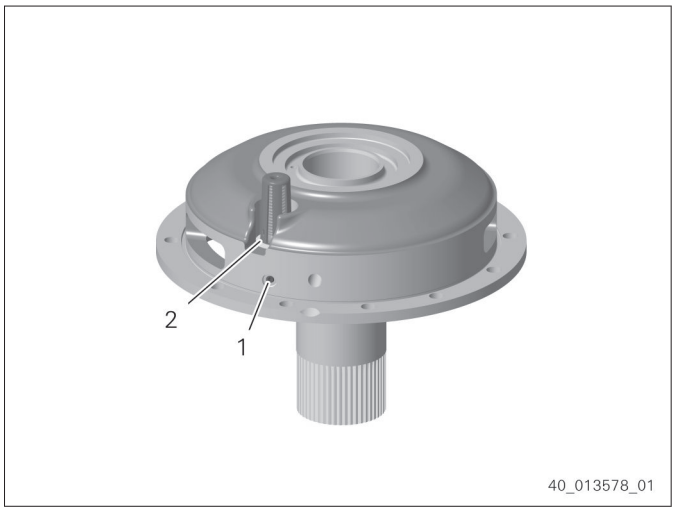


Fig. 62

11. Loosen hexagon screws.

12. Remove torque converter bell housing using 5870.345.036 [Pry bar], two AA02.247.426 [Eyebolt] and a crane.

13. Remove seal.

Fig. 63

14. Remove R-rings (1) from input shaft.

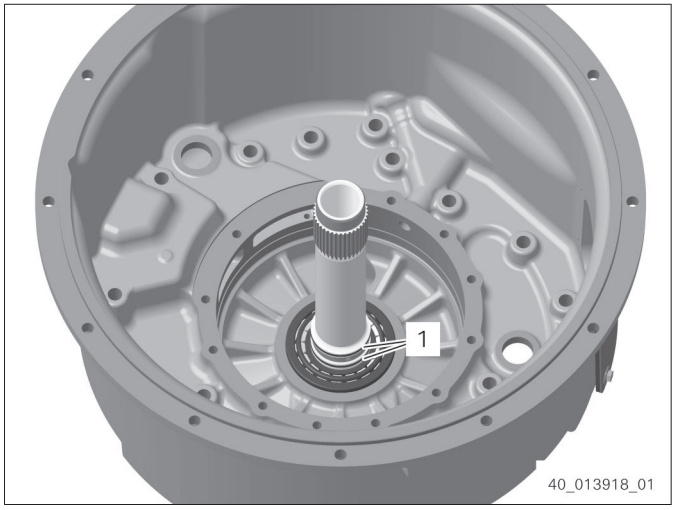


Fig. 64

15. **⚠ CAUTION**

Risk of crushing due to hydraulic tool.
Slight to moderate injury possible.
⇨ Do not reach into danger area.

Press out the input shaft.

16. Remove bearing inner ring (1).

17. Remove helical gear (2).

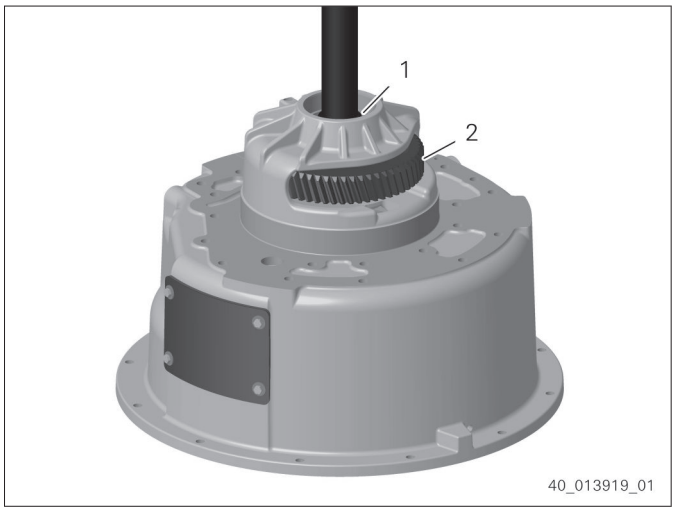


Fig. 65

18. Force bearing inner ring from input shaft.

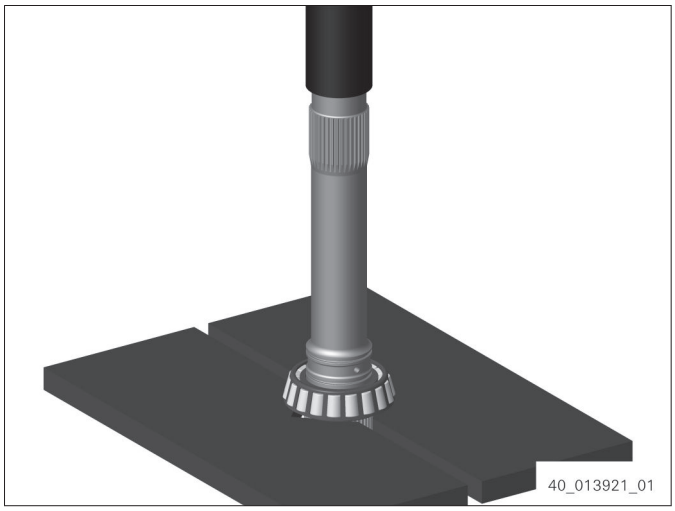


Fig. 66

19. Remove bearing outer rings (1).

20. Loosen the hexagon screws and remove the cover sheet (2) and the cover plate (3).

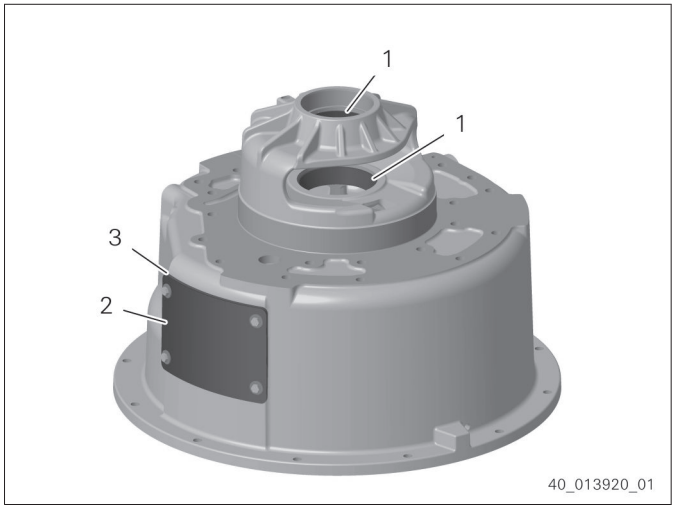


Fig. 67

21. Remove protection caps (1).

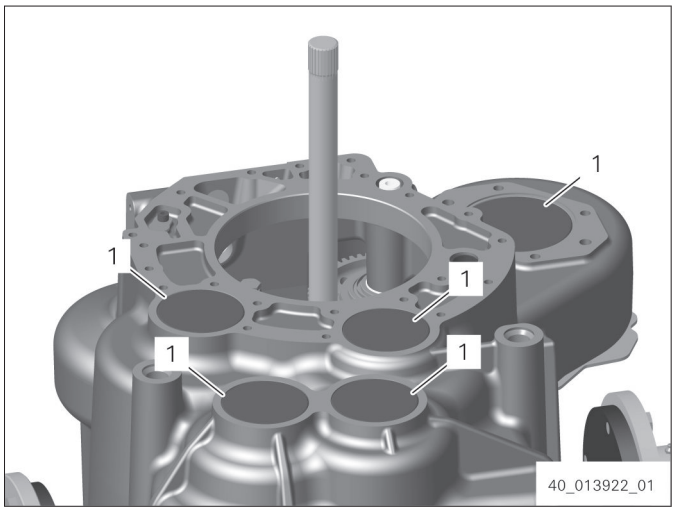


Fig. 68

Removing and dismantling the power take-offs (variant with PTO) 1, 3 and 4)

Removing shaft

Special tools:

- 5873.001.020 Gripping device
- 5873.001.000 Basic tool

1. Loosen hexagon screws and remove the cover (1).

2. Remove O-ring.

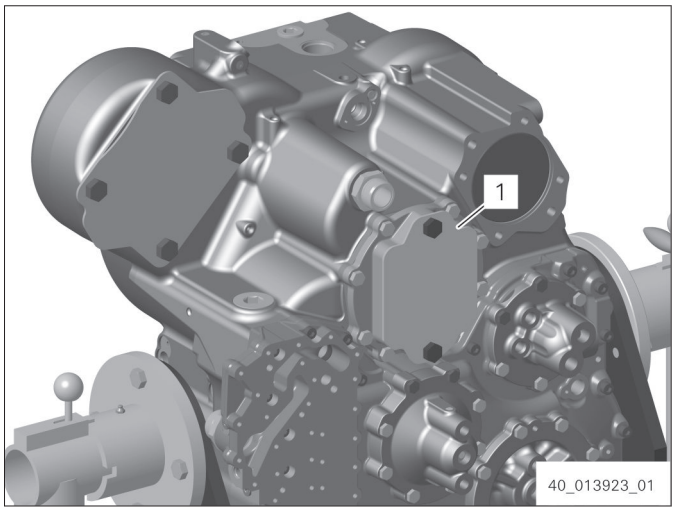


Fig. 69

3. Remove shaft with gear (1) from the transmission.

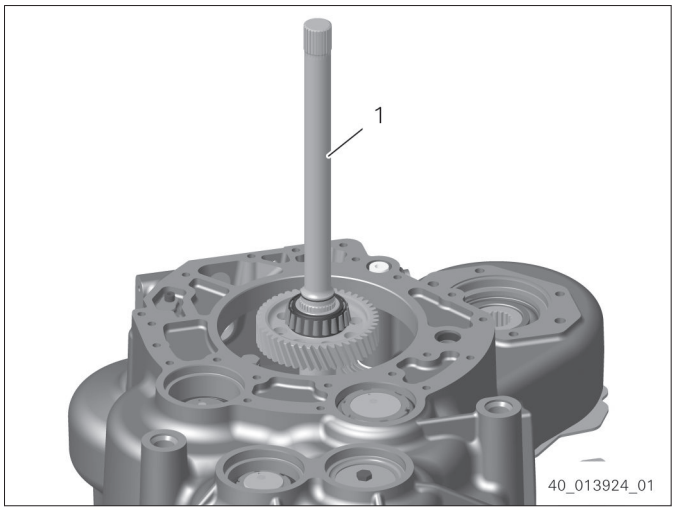


Fig. 70

4. Remove R-ring (1) from annular groove of the shaft.

5. Remove parallel key (2).

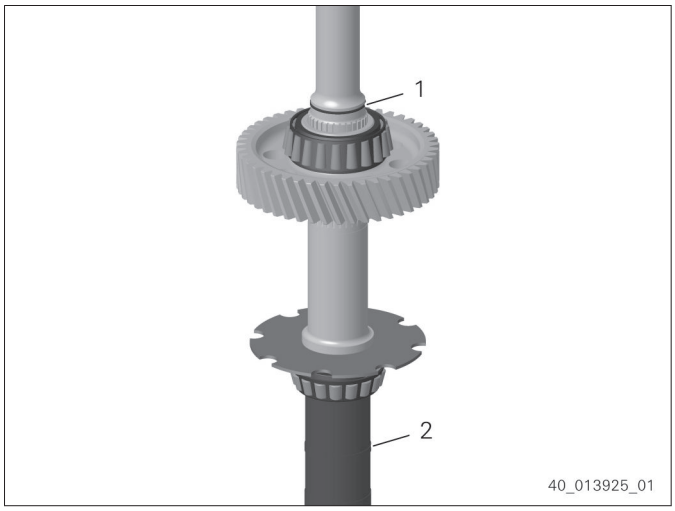


Fig. 71

6. Pull off gear (1).

7. Remove retaining ring (2).

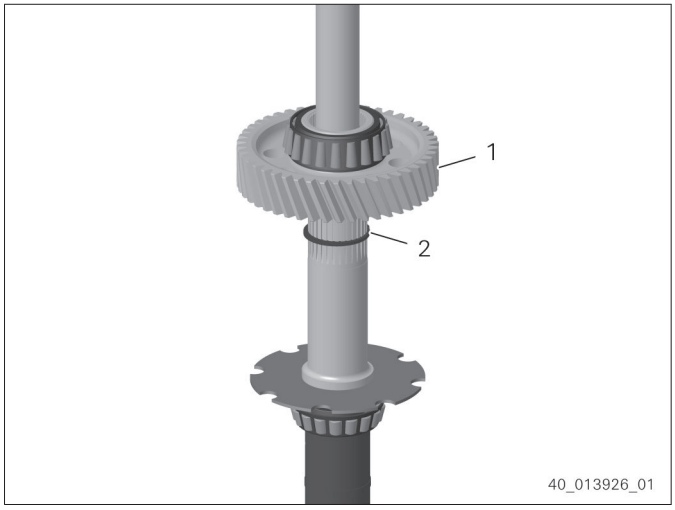


Fig. 72

8. Pull off bearing inner ring with 5873.001.020 [Gripping device] and 5873.001.000 [Basic tool] from gear.

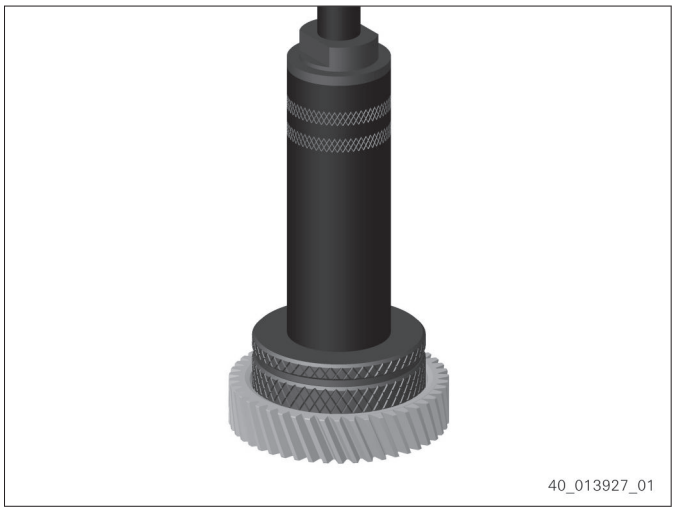


Fig. 73

9. Use protective chucks made from aluminum.

   Fix shaft in the vise.

10. Loosen the cap screw.

11. Remove spring washer.

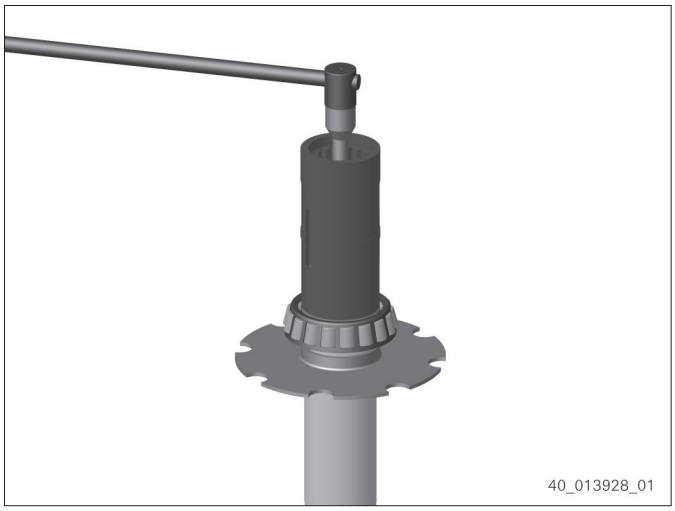


Fig. 74

12. Pull off bearing inner ring and driver with three-armed extractor from the shaft.

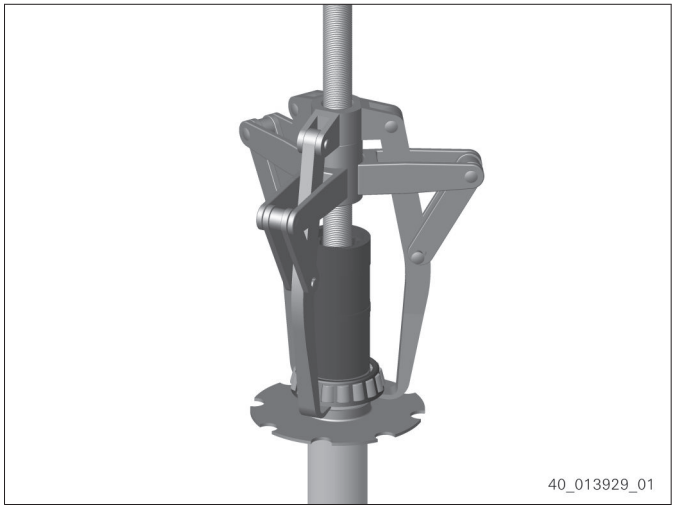


Fig. 75

13. Pull off the bearing inner ring and discs from the driver.

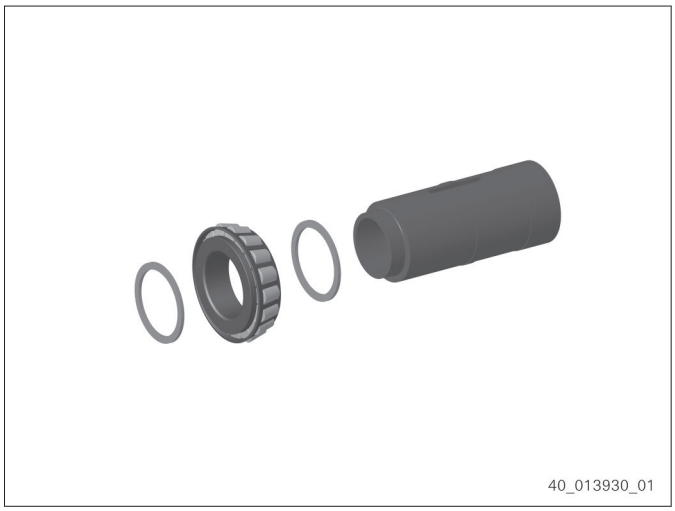


Fig. 76

Removing pressure oil pump

Special tools:

- AA02.813.910 Puller

1. Loosen hexagon screws.
2. Remove pump flange (1).
3. Remove O-ring.

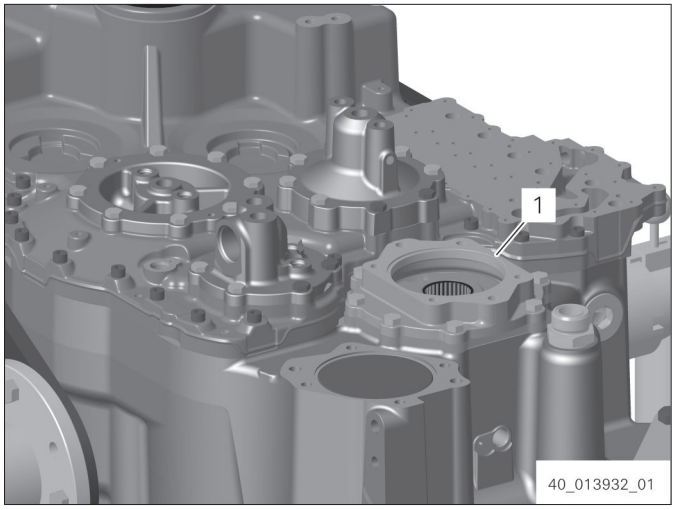


Fig. 77

4. Loosen cap screws (1).

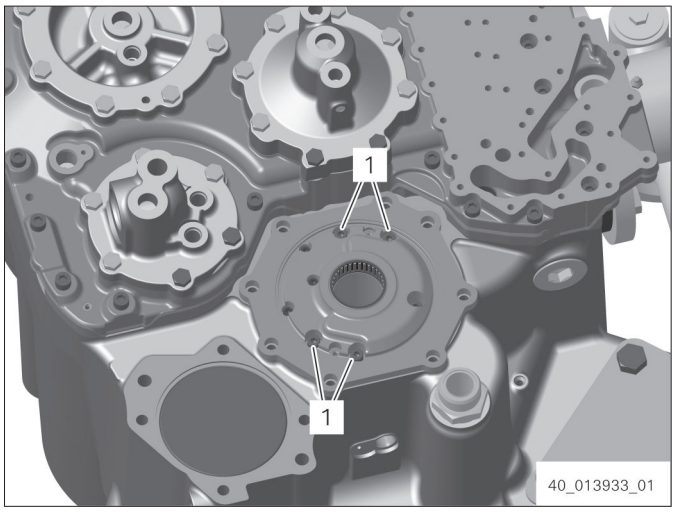


Fig. 78

5. Fasten AA02.813.910 [Puller] to gear pump with four cap screws M8 x 65.

6. Pull gear pump evenly out of housing hole by means of AA02.813.910 [Puller].

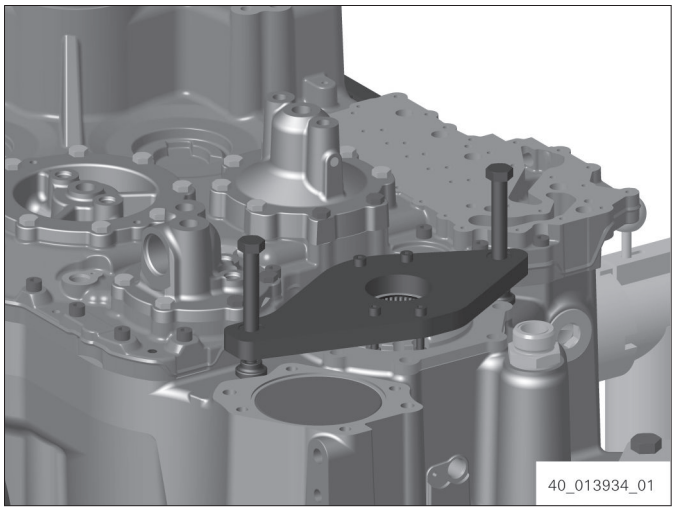


Fig. 79

7. Pull bearing outer ring (1) out of the gear pump.

8. Remove O-ring (2).

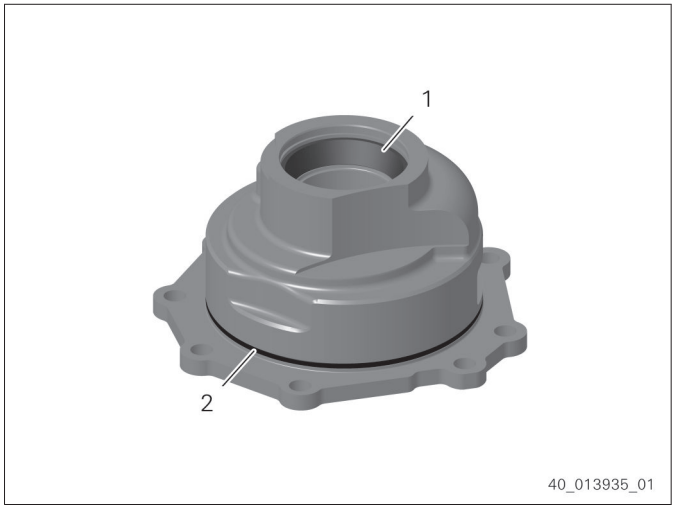


Fig. 80

Checking gear pump

9. Check individual parts of the gear pump for wear marks before assembling the transmission.

   The gear pump is only available as a complete unit.

   Loosen cap screws.

10. Remove cover (1).

11. Check the cover, outer rotor, inner rotor and the pump housing for wear marks.
    In case of any damage, install **new** gear pump.

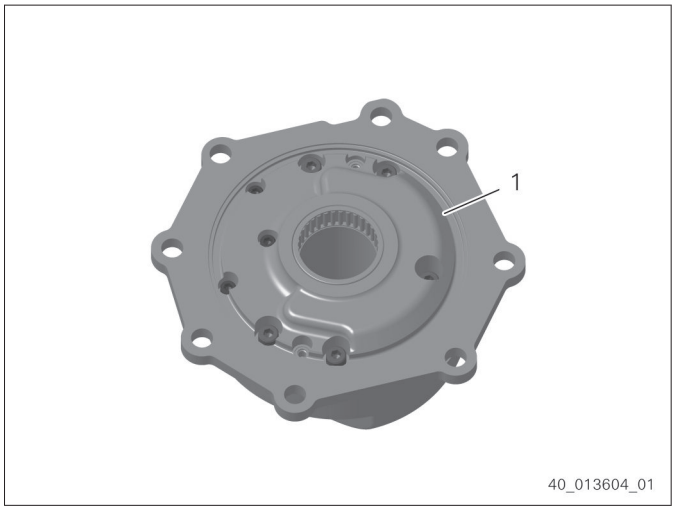


Fig. 81

12. Insert outer rotor and inner rotor, with the chamfered tooth side facing the pump housing.

13. Insert cylindrical pins until contact is obtained.

14. Place the cover.

15. Bolt in and tighten cap screws.
Tightening torque: 23 Nm
Tightening torque: 9.5 Nm

Removing PTOs 3 and 4

Special tools:
- AA02.242.247 Extracting device
- AA02.571.771 Adapter

1. Loosen hexagon screws and remove cover (1).

2. Remove O-ring.

3. Remove sealing cap (2) from the housing hole.

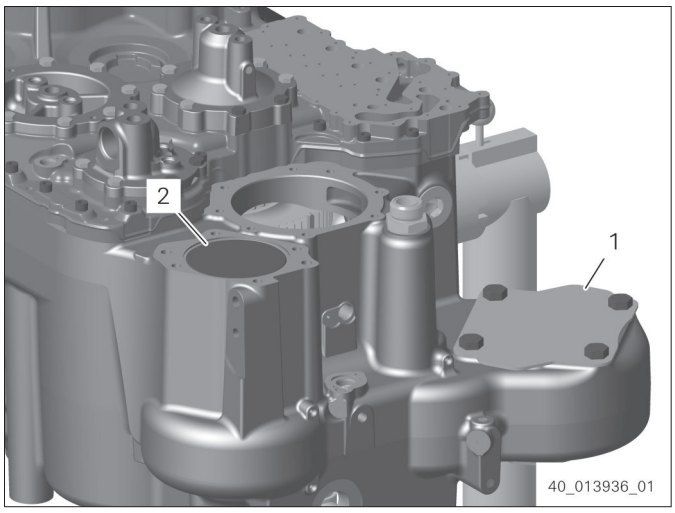


Fig. 82

4. Pull pin (1) with AA02.242.247 [Extracting device] and AA02.571.771 [Adapter] out of the housing hole.
Remove gear (2), bearing inner rings and shim.

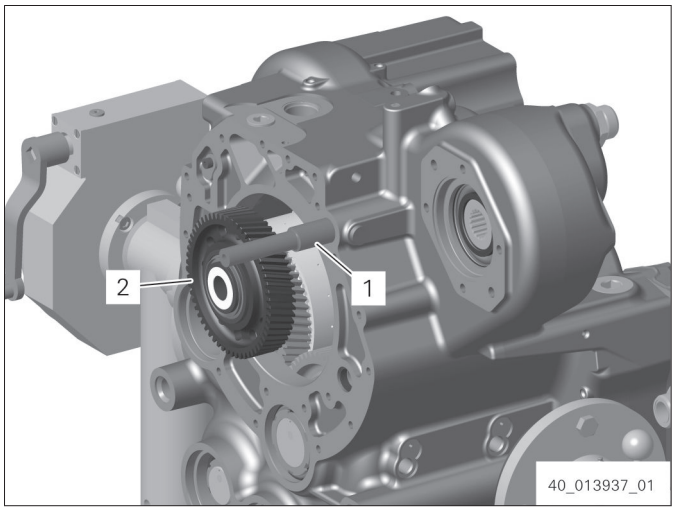


Fig. 83

5. Remove retaining ring (1).

6. Remove shim.

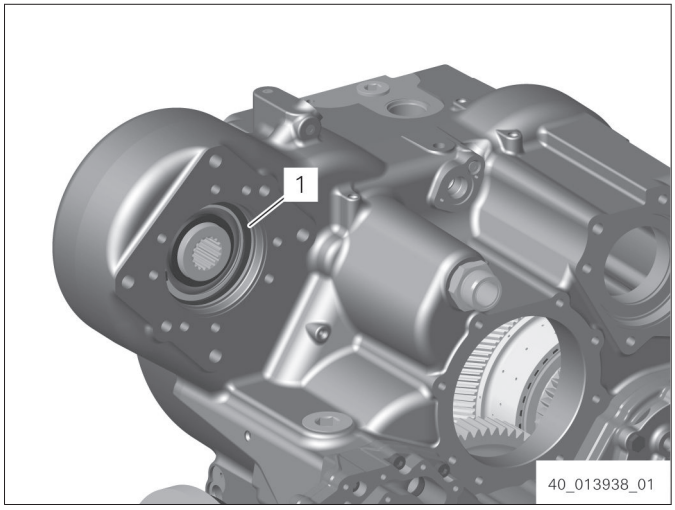


Fig. 84

7. Force out driver (1) and remove gear.

8. Remove both ball bearings.

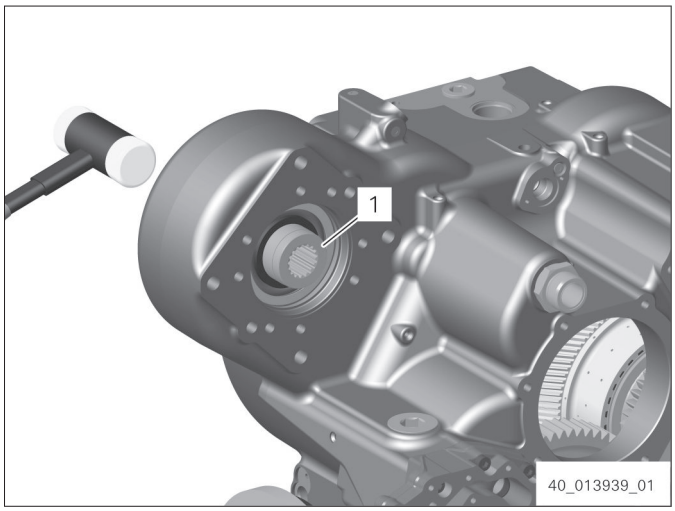


Fig. 85

Removing countershaft

Special tools:

- AA02.242.247 Extracting device
- AA02.242.584 Adapter

1. Remove cover.

2. Loosen hexagon screw (1).

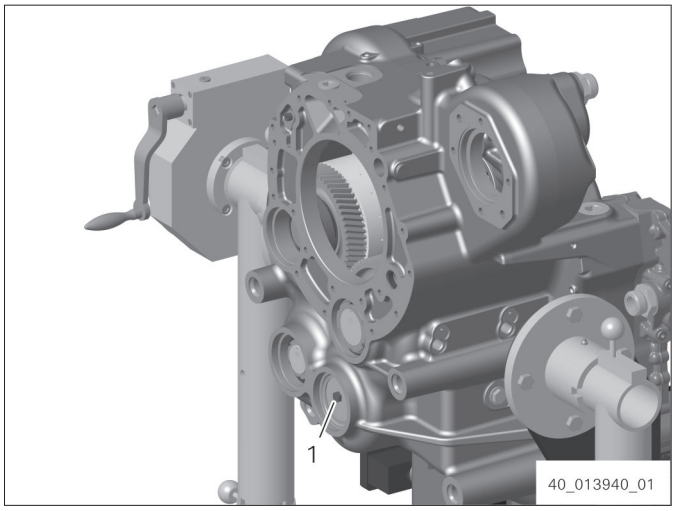


Fig. 86

3. Use AA02.242.247 [Extracting device] and AA02.242.584 [Adapter] to pull axle out of housing.

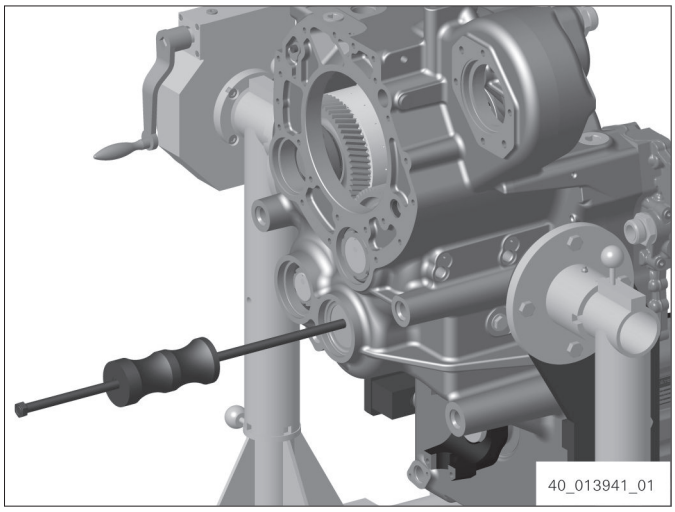


Fig. 87

Removing yokes

Removing yoke on converter side

1. Remove locking plate (1).
2. Loosen hexagon screws (2).
3. Remove washer (3).

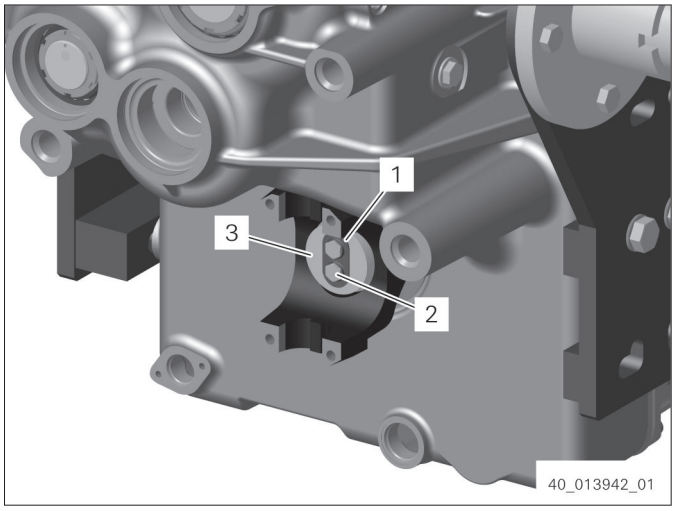


Fig. 88

4. Remove washer (1).
5. Remove O-ring (2).

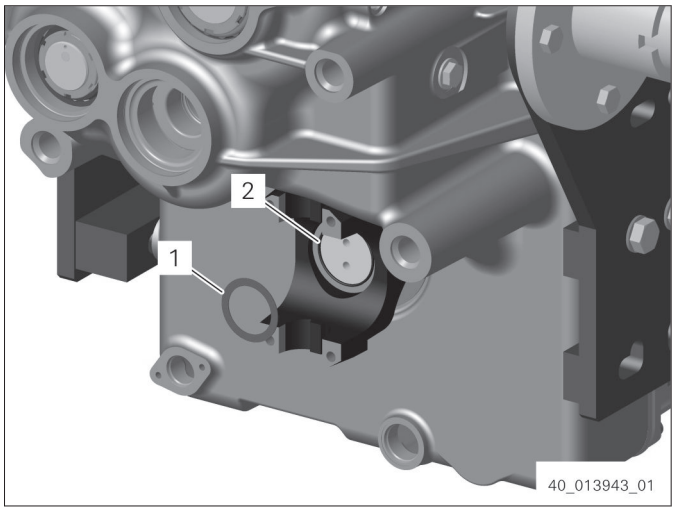


Fig. 89

6. Pull off yoke (1).

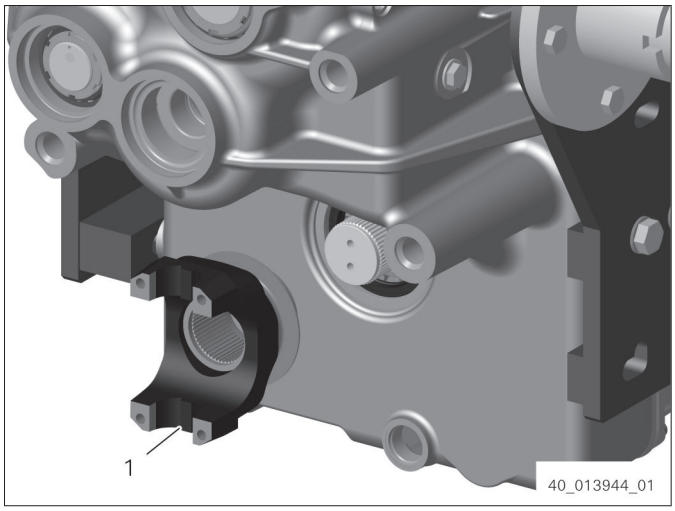


Fig. 90

7. Remove shaft sealing ring (1) from housing hole.

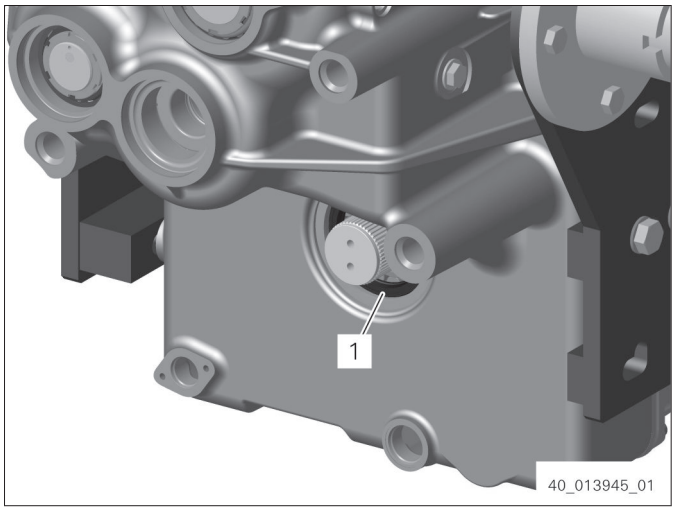


Fig. 91

Installing the yoke on the output side

8. Remove locking plate (1).

9. Loosen hexagon screws (2).

10. Remove washer (3).

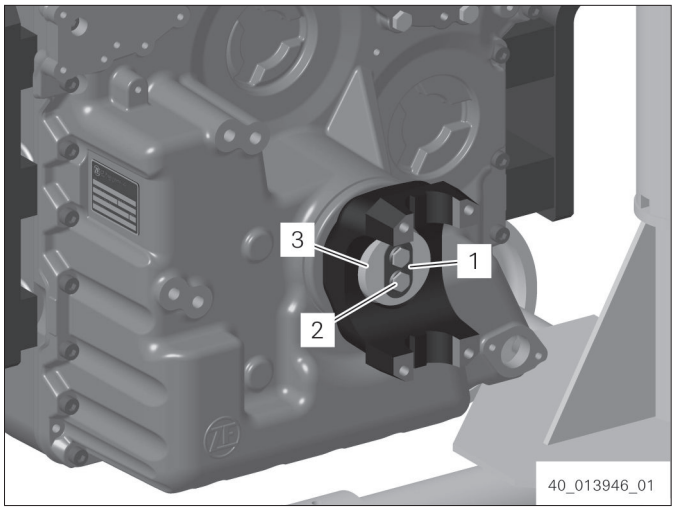


Fig. 92

11. Remove washer (2).

12. Remove O-ring (1).

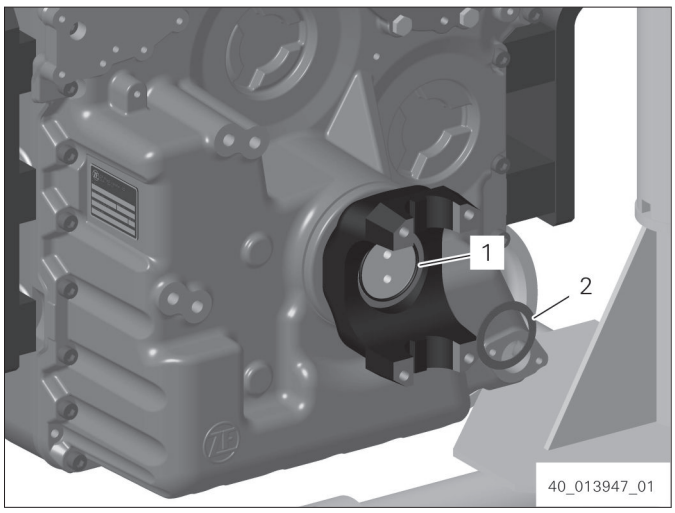


Fig. 93

13. Pull off yoke (1).

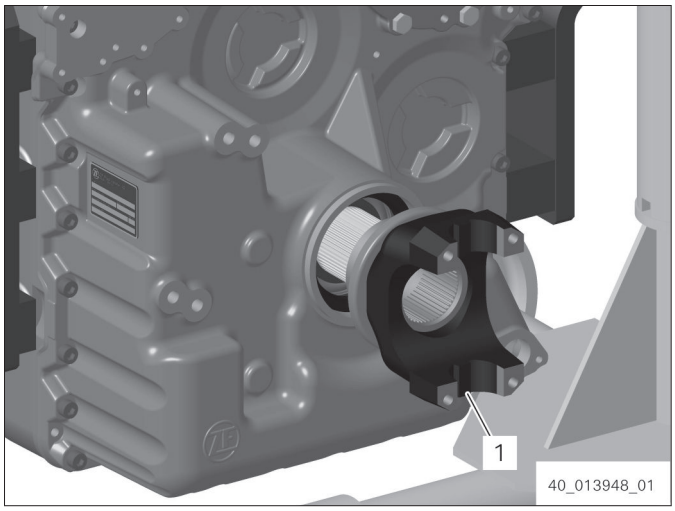


Fig. 94

14. Remove shaft sealing ring (1) from housing hole.

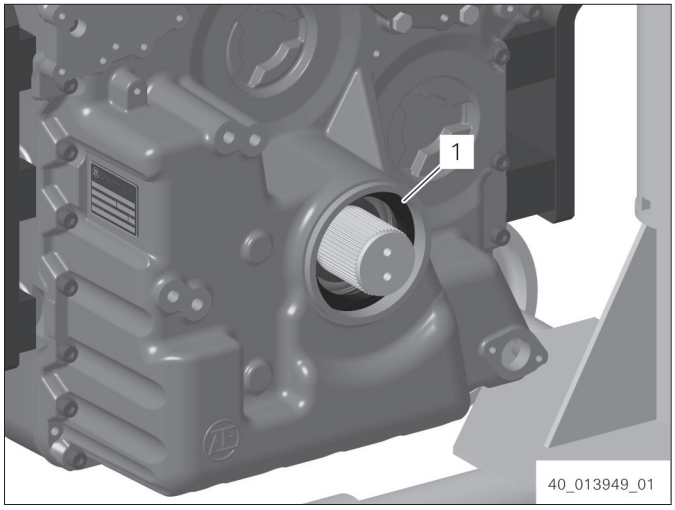


Fig. 95

Removing and dismantling clutches and output

Removing bearing cover and the covers

Special tools:

- 5870.204.069 Thread insert
- 5870.650.014 Extracting device
- 5870.204.005 Hexagon screw

1. Loosen hexagon screws.

2. Pull bearing cover K1/KV (1) with 5870.204.069 [Thread insert] and 5870.650.014 [Extracting device] out of cover hole.

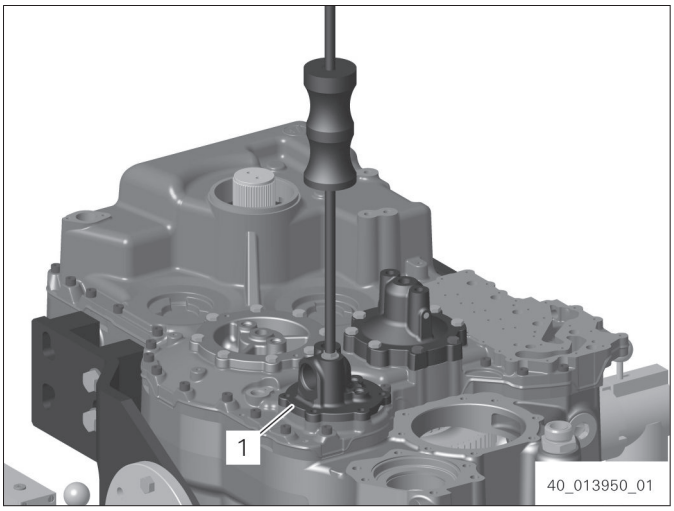


Fig. 96

3. Pull bearing outer ring (1) out of bearing cover.

4. Remove shim and ring.

Fig. 97

5. Loosen hexagon screws.

6. Pull off cover K2/KR (1) using 5870.204.069 [Thread insert] and 5870.650.014 [Extracting device].

7. Remove shim and O-ring.

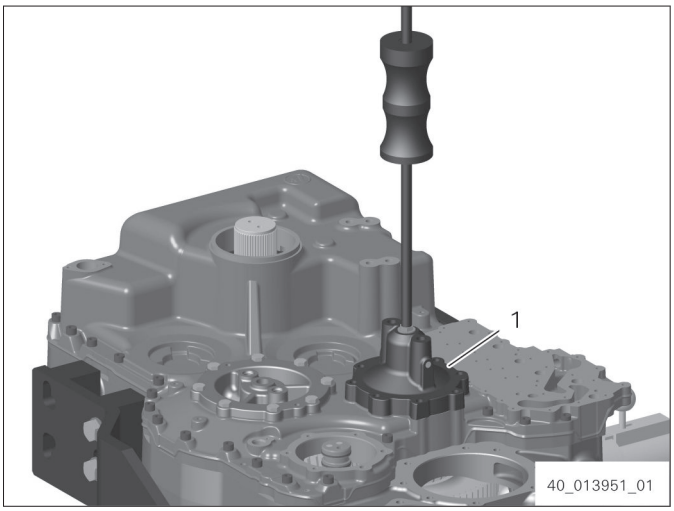


Fig. 98

8. Loosen hexagon screws.

9. Evenly pull cover K3/K4 (1) out of cover hole with two 5870.204.005 [Hexagon screw].

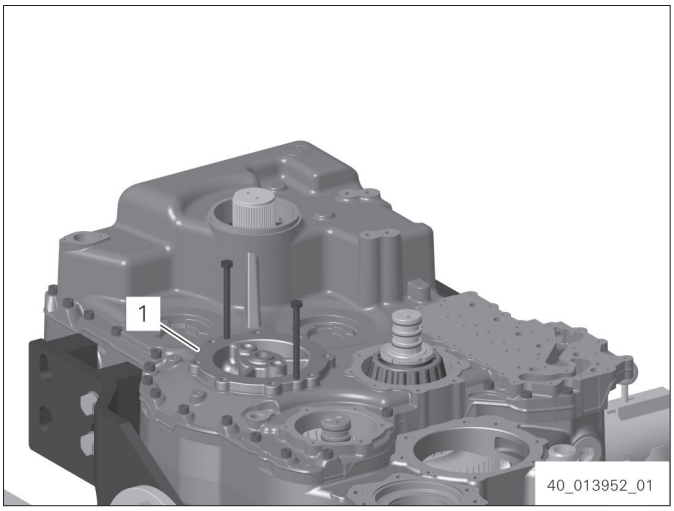


Fig. 99

10. Pull off bearing inner ring from cover using three-armed extractor.

11. Remove spacer washer.

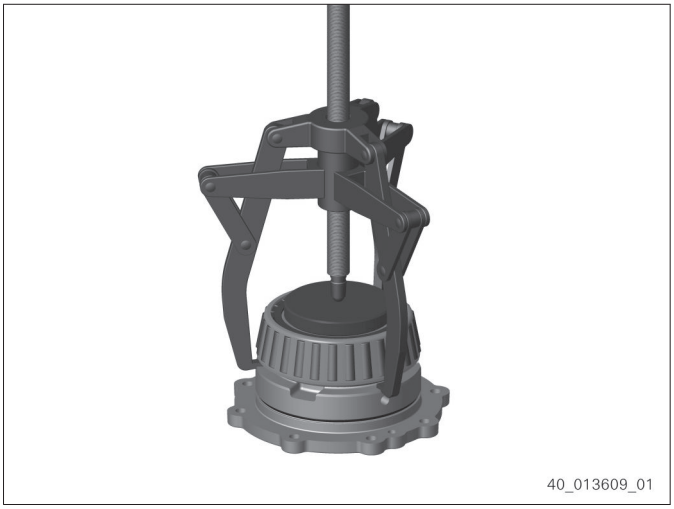


Fig. 100

Removing and dismantling the cover

Special tools:

- 5870.281.061 Load-lifting equipment
- 5870.204.005 Hexagon screw

1. Loosen cap screws.

2. Mount 5870.281.061 [Load-lifting equipment] (3) to cover (1).
Turn hexagon screw (4) into output shaft until contact is obtained.

3. Turn two 5870.204.005 [Hexagon screw] (2) into the cover until contact is obtained.

4. Separate the cover evenly from the housing by means of two 5870.204.005 [Hexagon screw] and 5870.281.061 [Load-lifting equipment].

5. Lift off cover using 5870.281.061 [Load-lifting equipment] and a crane.

6. Loosen the adapter (1).

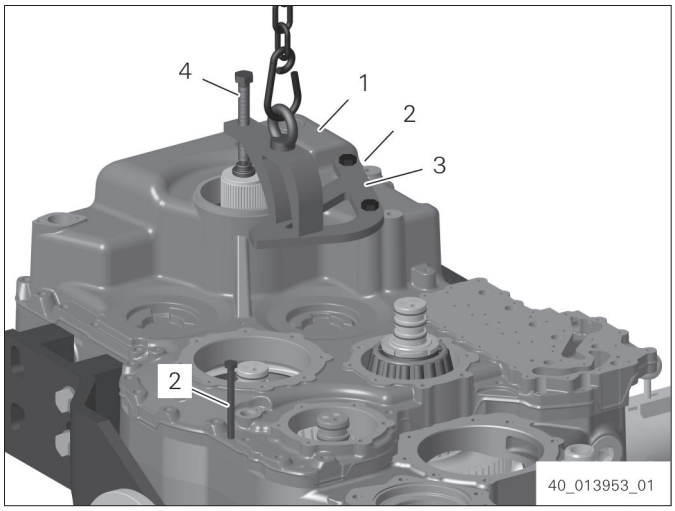


Fig. 101

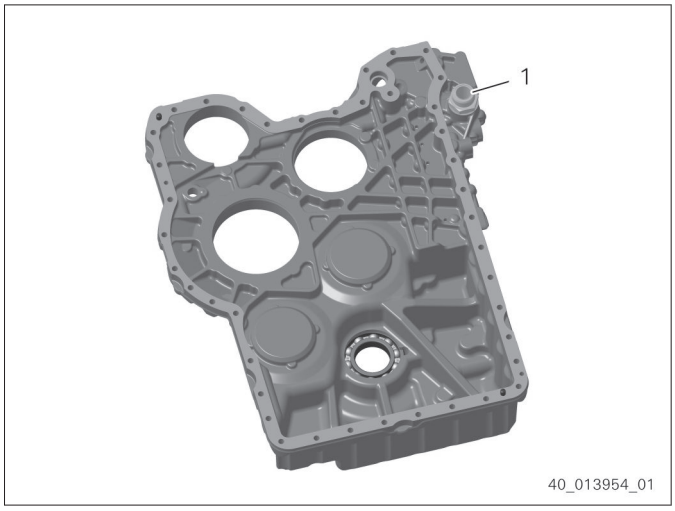


Fig. 102

7. Remove retaining ring (1).

8. Pull ball bearing (2) out of the cover hole.

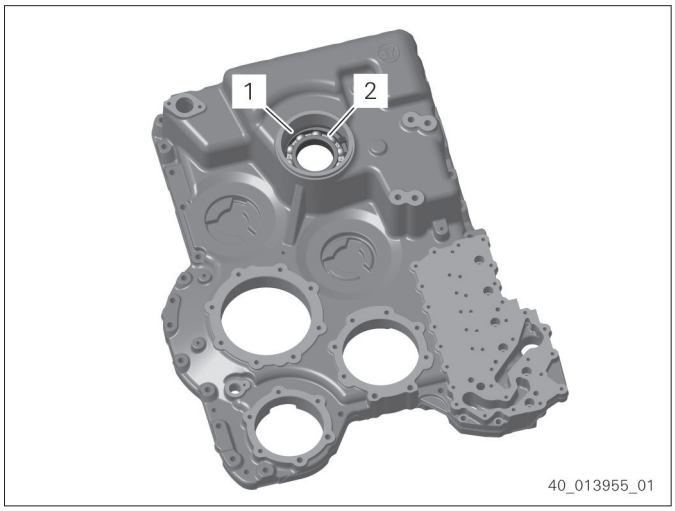


Fig. 103

Removing suction tube

1. Loosen cap screws (2).

2. Remove suction tube (1).

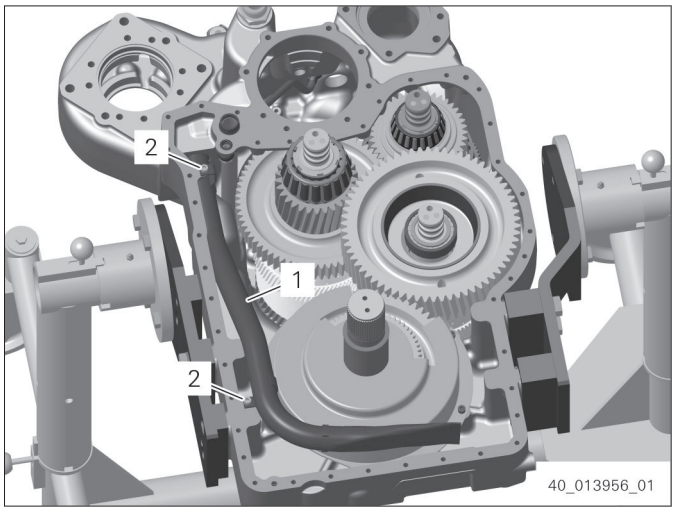


Fig. 104

Removing output shaft and output gear

Special tools:

- 5870.100.054 Stop washer
- 5870.204.002 Eyebolt

1. Remove shim (1).

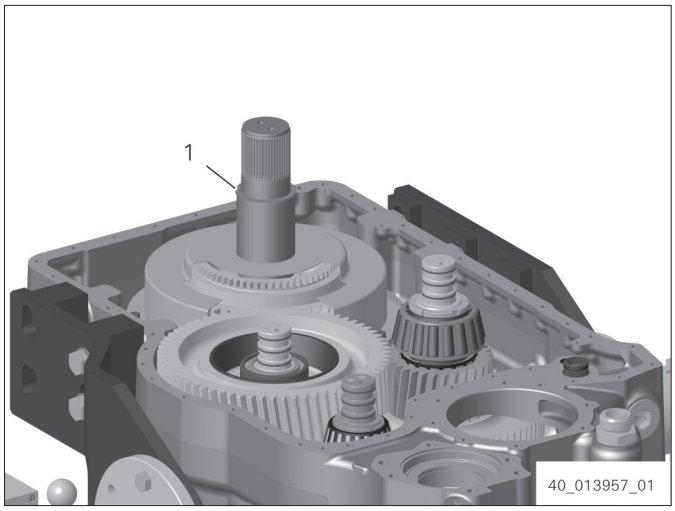


Fig. 105

2. Force output shaft (1) out of gear by means of a plastic hammer.

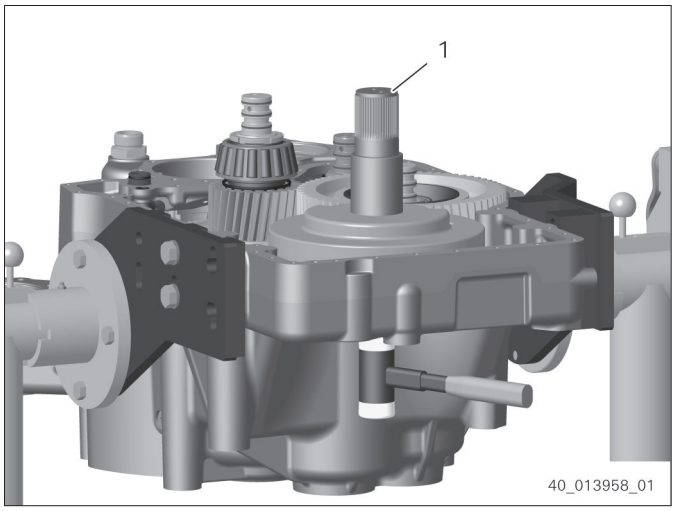


Fig. 106

3. Loosen cap screws.

4. Remove cover sheet (1).

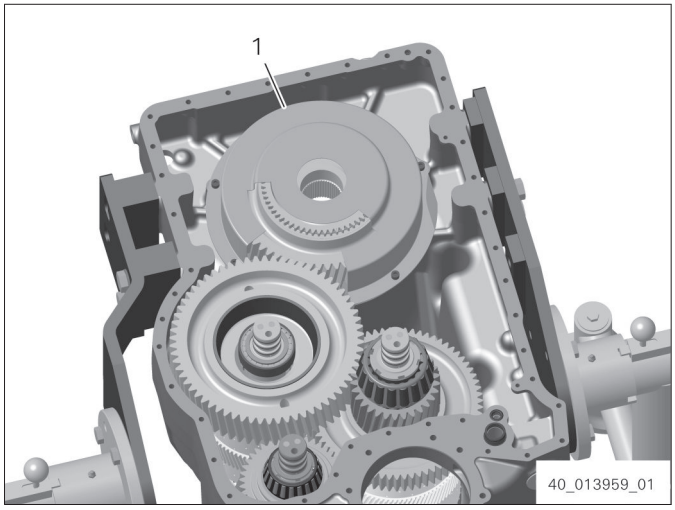


Fig. 107

5. **⚠ CAUTION**

Risk of crushing due to moving load.
Slight to moderate injury possible.

⇨ Move load slowly and carefully.

⇨ Do not reach into danger area.

Use 5870.100.054 [Stop washer], 5870.204.002 [Eyebolt] and crane to lift gear out of housing.

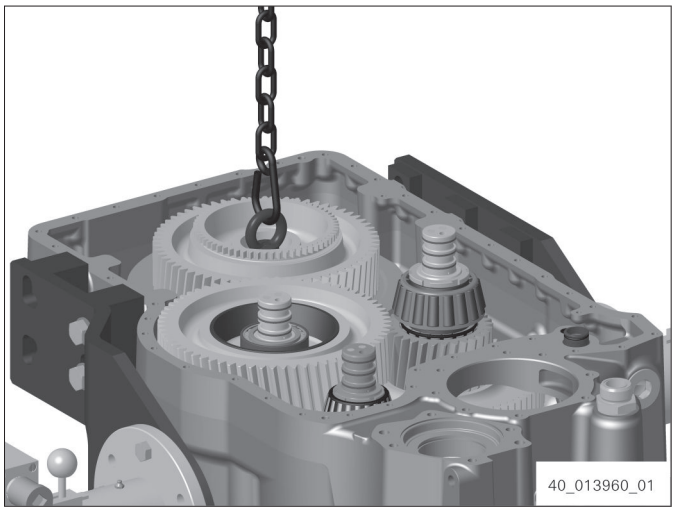


Fig. 108

6. Pull bearing inner ring from gear using a three-armed extractor and 5870.100.054 [Stop washer].

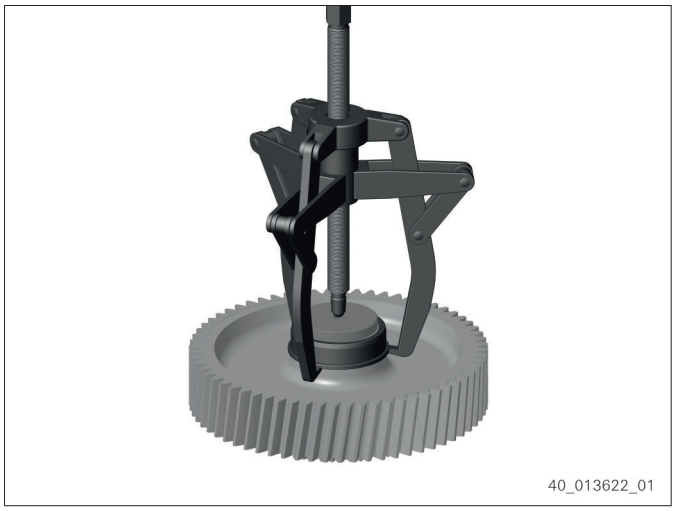


Fig. 109

7. Remove cover sheet (1).

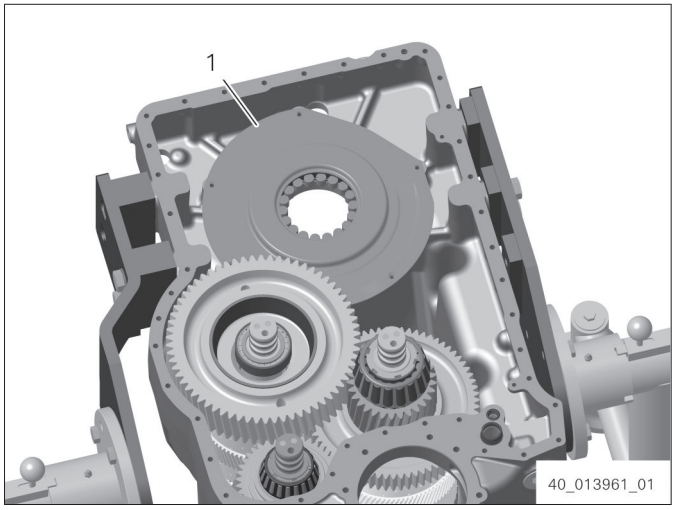


Fig. 110

8. Remove cylindrical roller bearing (1) from housing hole.

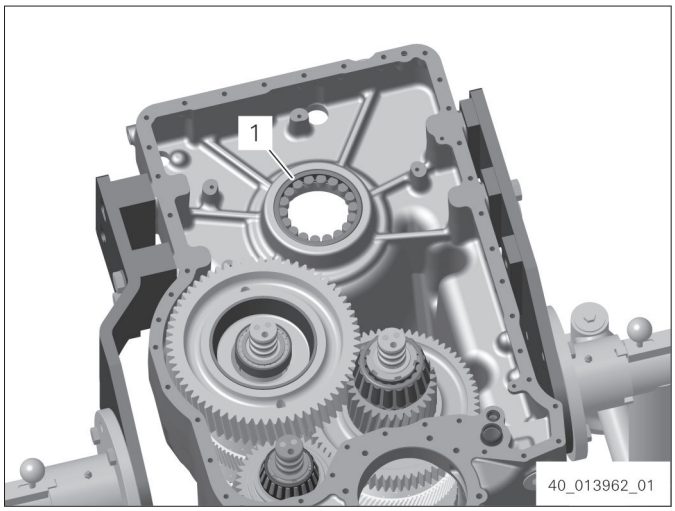


Fig. 111

Removing clutches

Special tools:

- 5870.204.002 Eyebolt

1. **⚠ CAUTION**

   Risk of crushing due to moving load.
   Slight to moderate injury possible.

   ⇨ Move load slowly and carefully.

   ⇨ Do not reach into danger area.

   Slightly lift clutch KR/K2 (2) and move in direction of arrow.

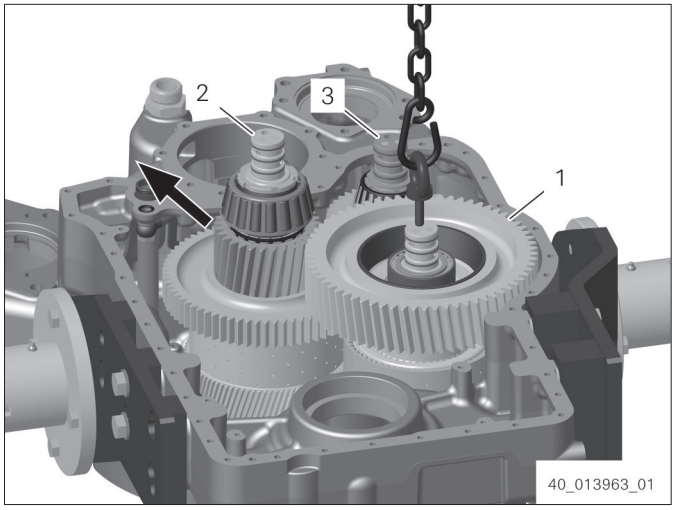


Fig. 112

2. Remove clutch K3/K4 (1) out of housing using 5870.204.002 [Eyebolt] and a crane.

3. Remove clutch KR/K2 (2) out of housing using 5870.204.002 [Eyebolt] and a crane.

4. Remove clutch KV/K1 (3) out of housing using 5870.204.002 [Eyebolt] and a crane.

5. Figure shows the disassembled clutches.
   - 1 = Clutch K1
   - 2 = Clutch KV
   - 3 = Clutch K2
   - 4 = Clutch KR
   - 5 = Clutch K3
   - 6 = Clutch K4

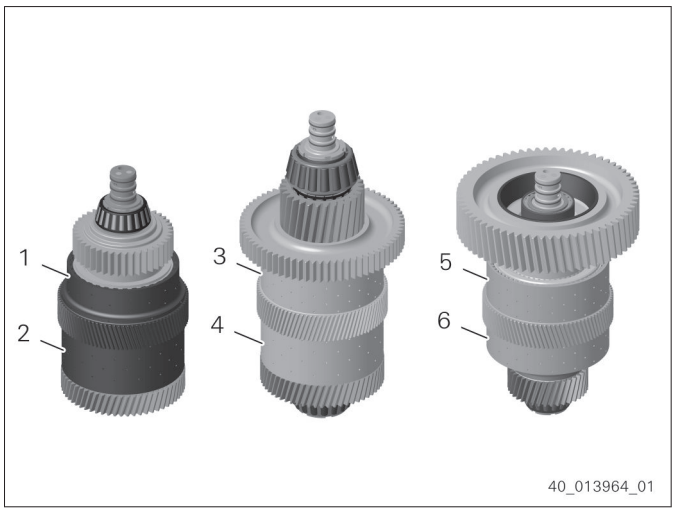


Fig. 113

Dismantling clutch K3/K4

Special tools:

- 5870.350.000 Assembly truck
- 5870.654.033 Assembly fixture
- AA02.778.672 Rapid grip
- 5873.002.001 Basic tool
- 5870.401.118 Groove nut wrench

- 5870.401.115 Groove nut wrench
- 5873.002.033 Gripping device
- 5870.345.072 Assembly fixture

1. Fasten clutch K3/K4 to 5870.350.000 [Assembly truck] by means of 5870.654.033 [Assembly fixture].

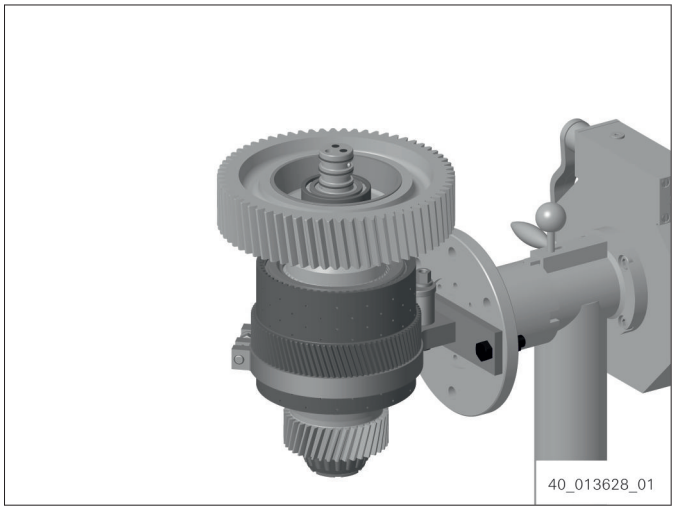


Fig. 114

2. Remove R-rings (1).

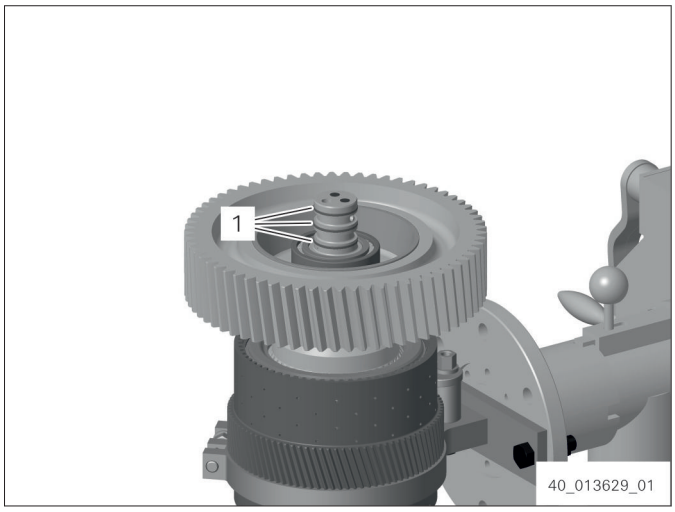


Fig. 115

Dismantling clutch K3

3. Pull roller bearing from disk carrier using a three-armed extractor.

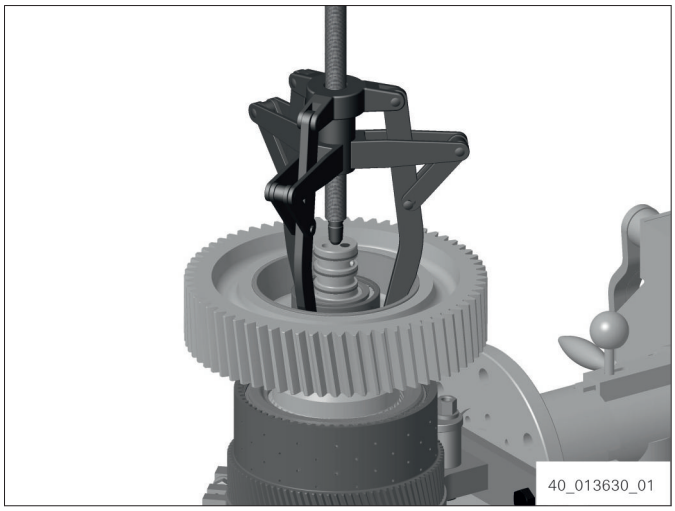


Fig. 116

4. Remove spur gear (1).

5. Remove bearing outer ring (2) from spur gear.

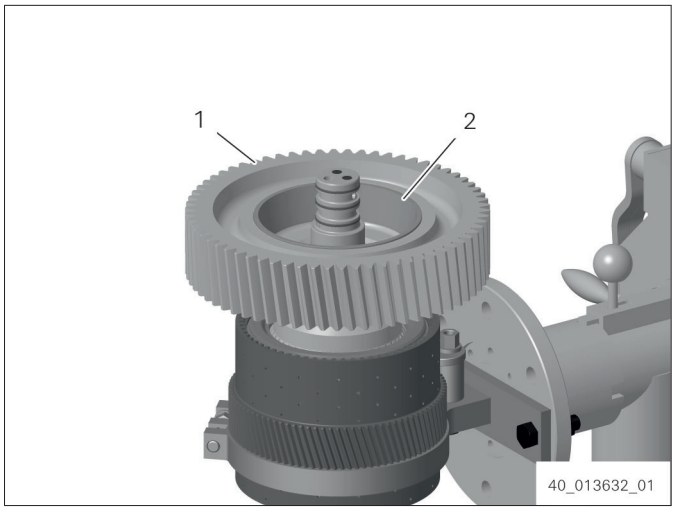


Fig. 117

6. Pull off bearing inner ring with AA02.778.672 [Rapid grip] and 5873.002.001 [Basic tool].

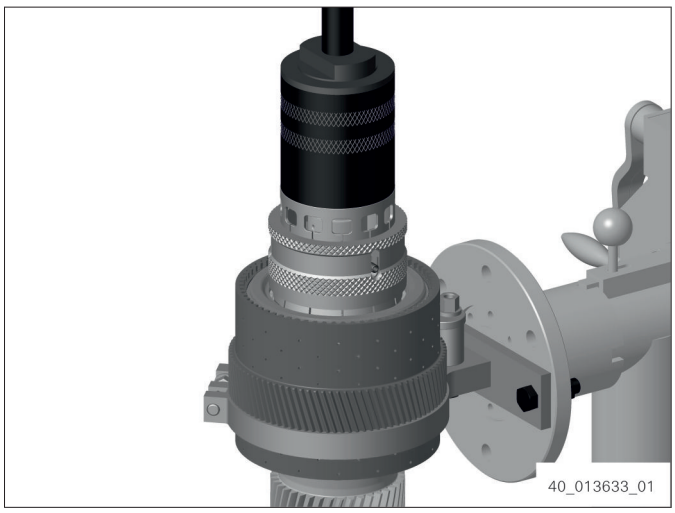


Fig. 118

7. Remove snap ring (1).

8. Remove end shim (2) from disk carrier.

9. Remove disk package (3).

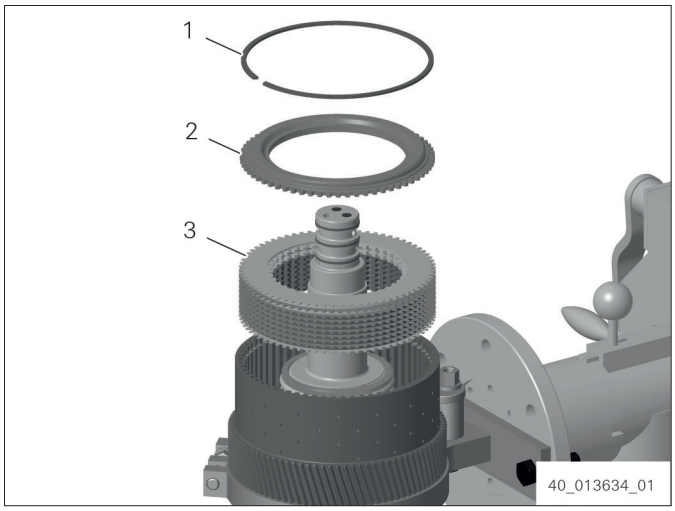


Fig. 119

Dismantling clutch K4

10. Turn disk carrier by 90°.

11. Loosen slotted nut with 5870.401.118 [Groove nut wrench] and 5870.401.115 [Groove nut wrench].

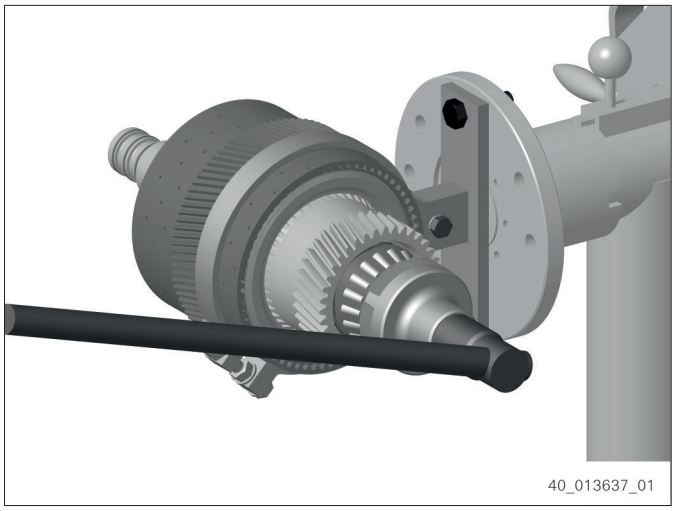


Fig. 120

12. Turn disk carrier by 90°.

13. Pull helical gear, bearing inner ring and taper roller bearing from disk carrier using the three-armed extractor.

14. Remove bearing outer rings from helical gear.

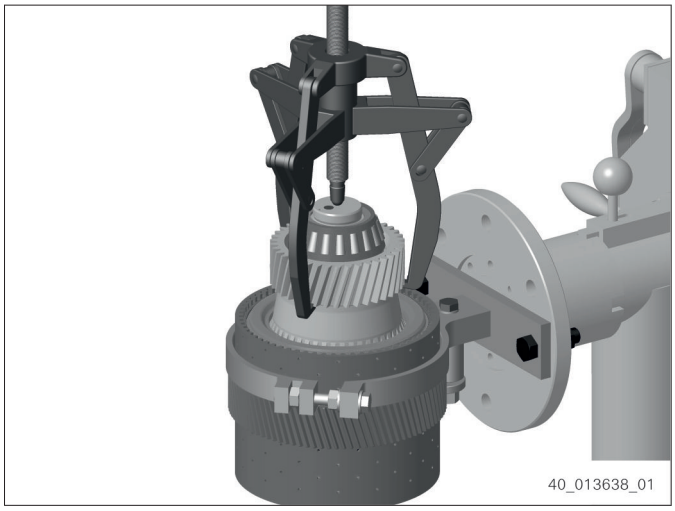


Fig. 121

15. Remove washer.

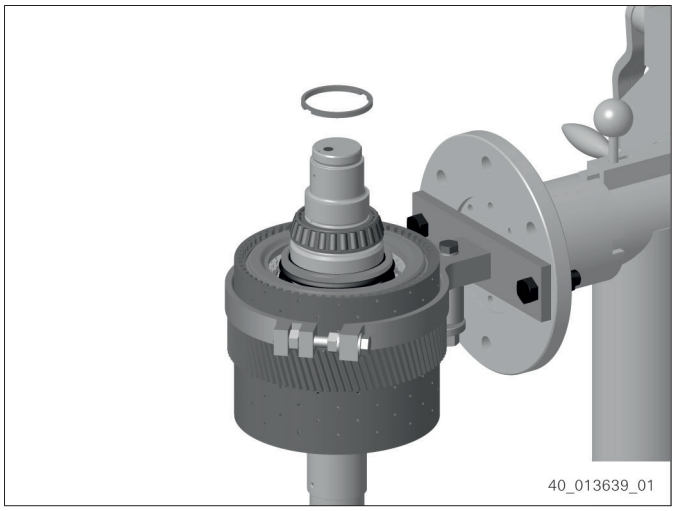


Fig. 122

16. Pull off bearing inner ring with 5873.002.033 [Gripping device] and 5873.002.001 [Basic tool].

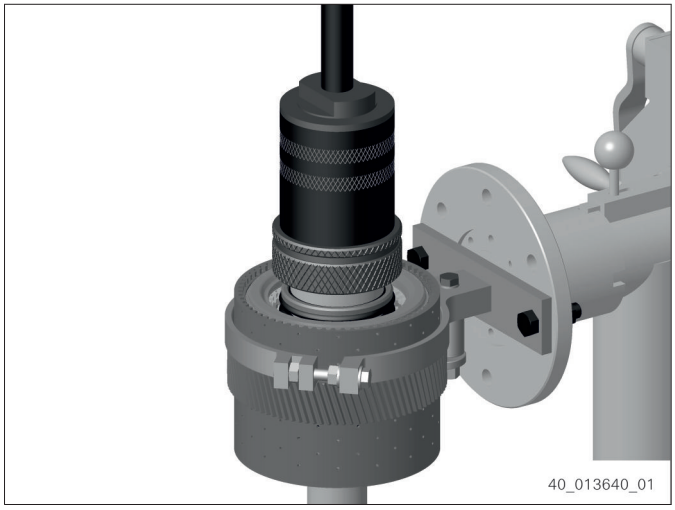


Fig. 123

17. Remove snap ring (1).

18. Remove end shim (2) from disk carrier.

19. Remove disk package (3).

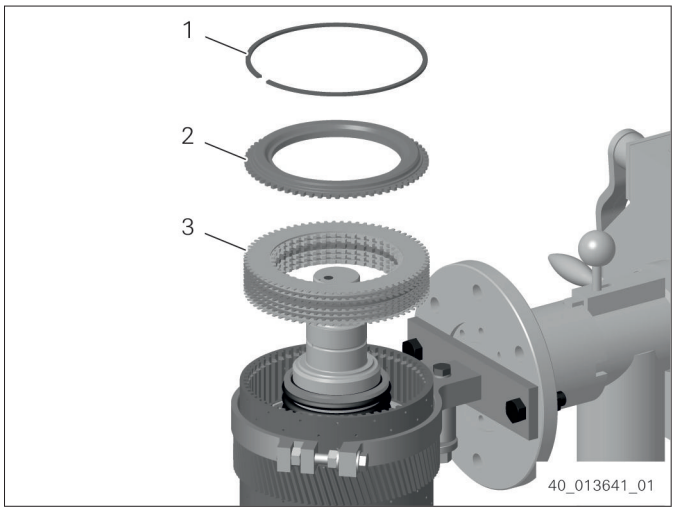


Fig. 124

20. Press guide ring downwards with 5870.345.072 [Assembly fixture] and hand-operated press and hold it there.

21. Remove snap ring.

22. Release hand-operated press.

23. Remove guide ring, compression spring and intermediate washer.

24. Turn disk carrier by 180°.

25. Press guide ring downwards with 5870.345.072 [Assembly fixture] and hand-operated press and hold it there.

26. Remove snap ring.

27. Release hand-operated press.

28. Remove guide ring, compression spring and intermediate washer.

29. Press both pistons out of disk carrier using compressed air.

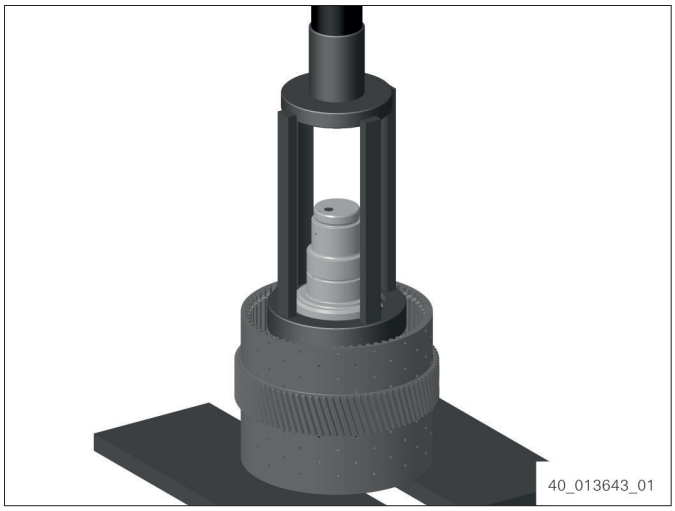


Fig. 125

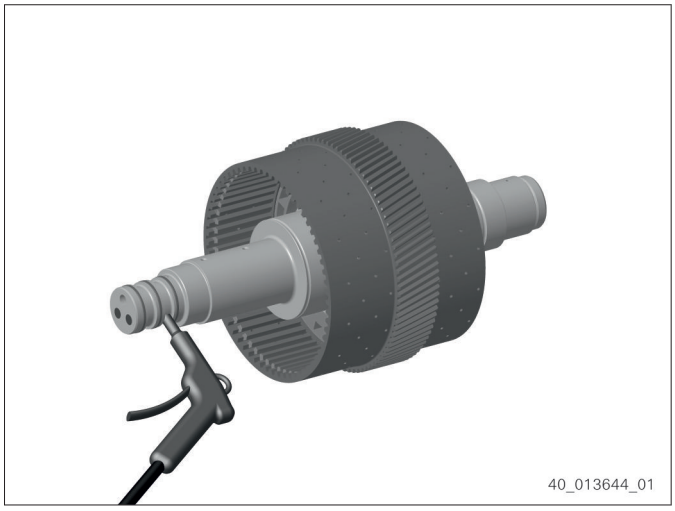


Fig. 126

Dismantling clutch KR/K2

Special tools:

- 5870.350.000 Assembly truck
- 5870.654.033 Assembly fixture
- AA02.769.745 Slotted nut wrench
- 5873.012.018 Rapid grip
- 5873.002.001 Basic tool

- 5873.012.019 Rapid grip
- 5873.002.000 Basic tool
- 5870.401.099 Groove nut wrench
- 5873.002.044 Gripping device
- 5870.654.045 Assembly fixture
- 5873.012.013 Rapid grip
- 5870.345.072 Assembly fixture

1. Fasten clutch KR/K2 to

   5870.350.000 [Assembly truck] using 5870.654.033 [Assembly fixture].

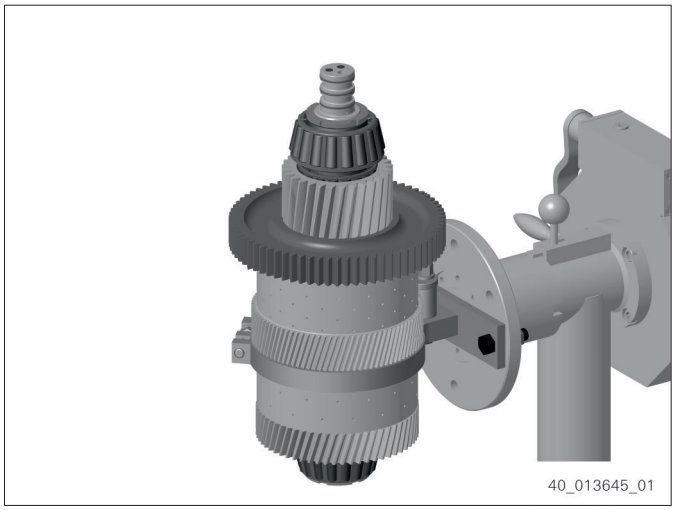


Fig. 127

2. Remove R-rings (1).

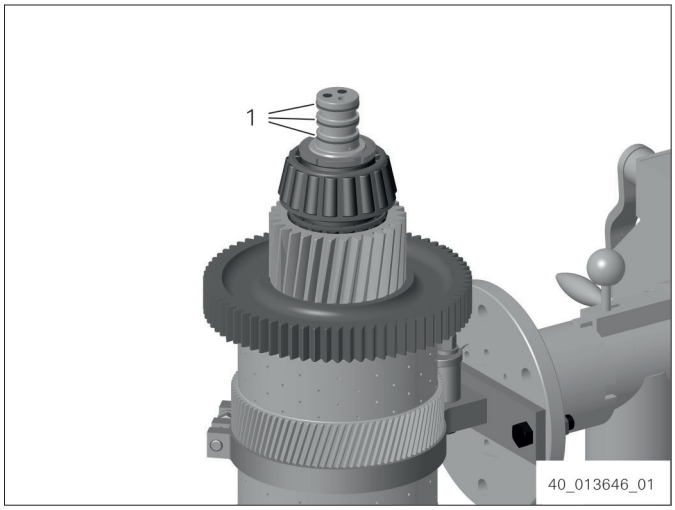


Fig. 128

Dismantling clutch K2

3. Turn disk carrier by 90°.

4. Loosen slotted nut with AA02.769.745 [Slotted nut wrench].

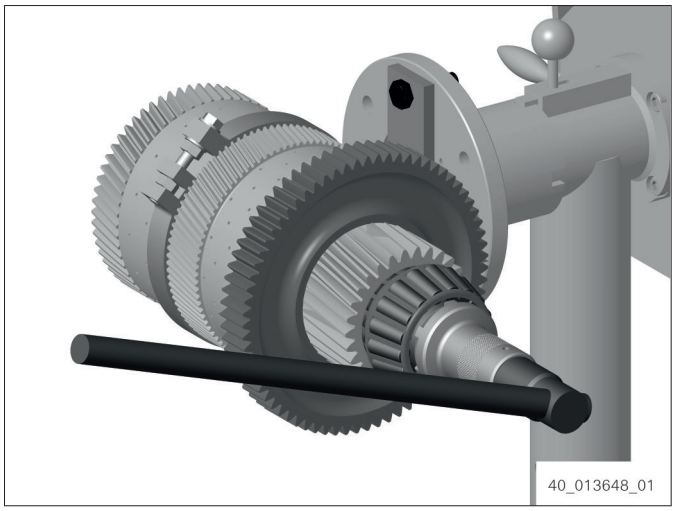


Fig. 129

5. Turn disk carrier by 90°.

6. Pull off bearing inner ring with 5873.012.018 [Rapid grip] and 5873.002.001 [Basic tool].

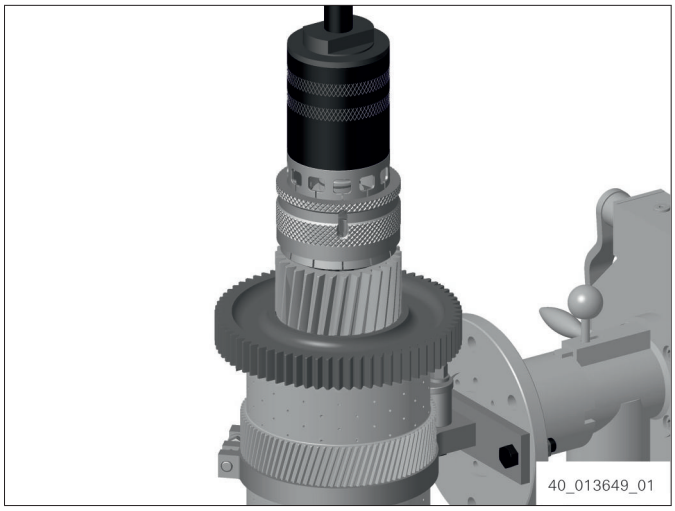


Fig. 130

7. Pull both gears and bearing inner ring from disk carrier using two-armed extractor.

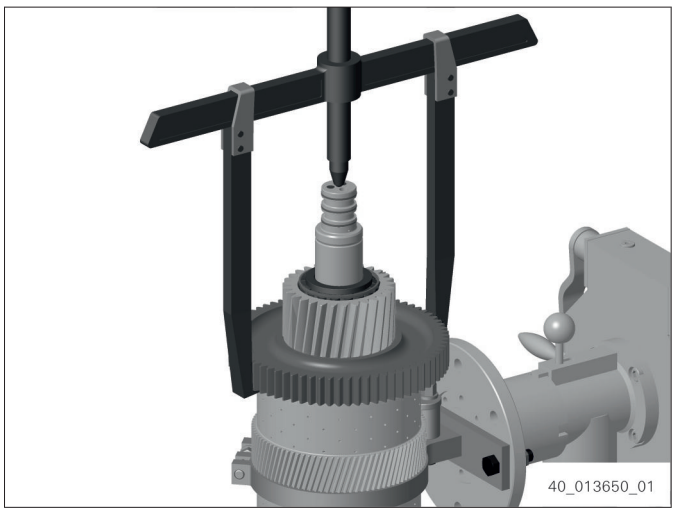


Fig. 131

8. Pull off bearing inner ring with 5873.012.019 [Rapid grip] and 5873.002.000 [Basic tool].

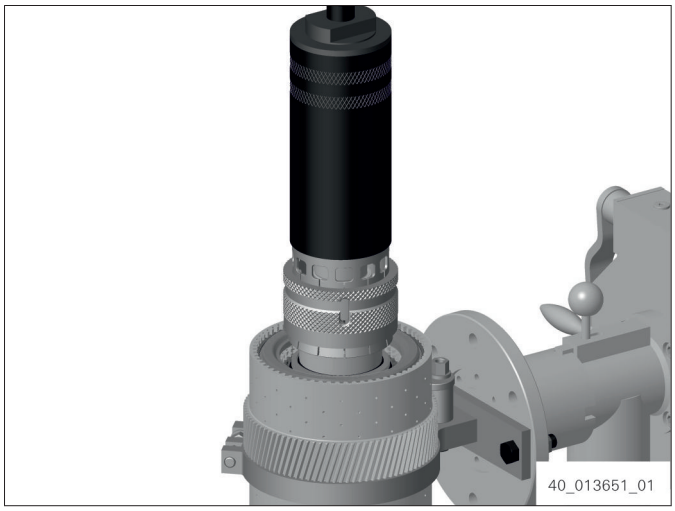


Fig. 132

9. Remove snap ring (1).

10. Remove end shim (2) from disk carrier.

11. Remove disk package (3).

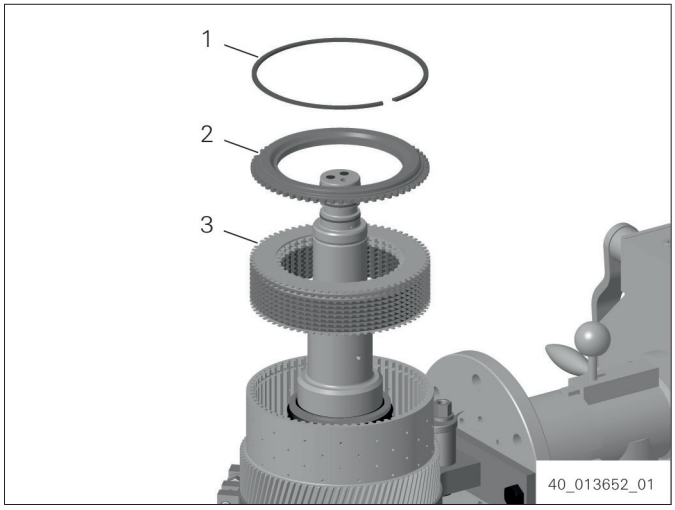


Fig. 133

Dismantling KR clutch

12. Turn disk carrier by 90°.

13. Loosen slotted nut with 5870.401.099 [Groove nut wrench].

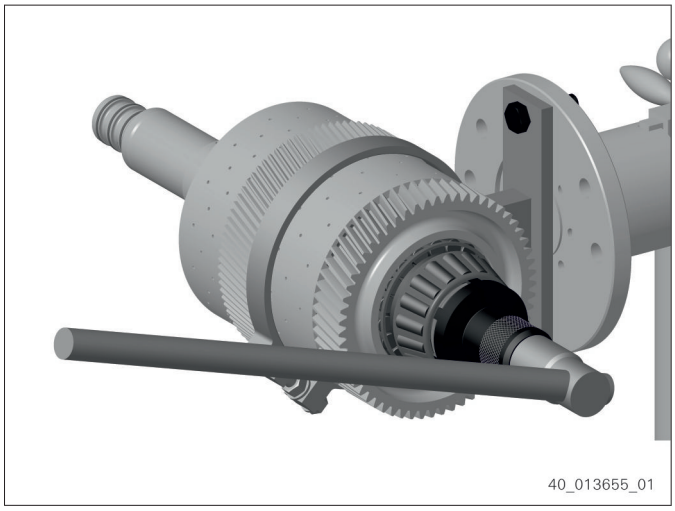


Fig. 134

14. Turn disk carrier by 90°.

15. Pull off bearing inner ring with 5873.002.044 [Gripping device] and 5873.002.001 [Basic tool].

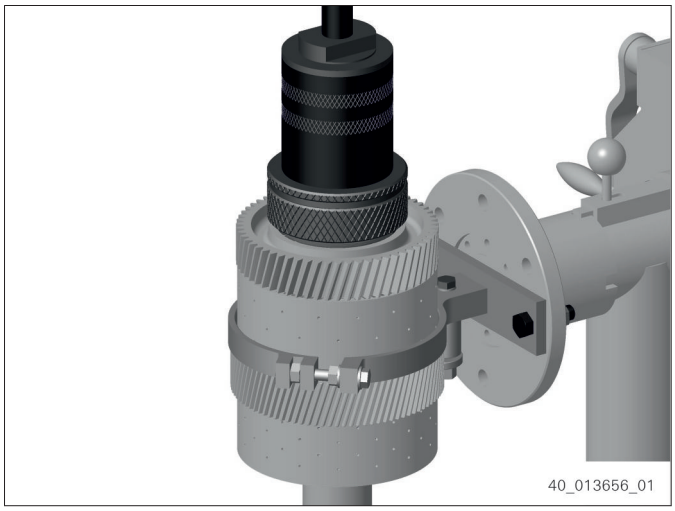


Fig. 135

16. Pull spur gear and bearing inner ring from disk carrier using 5870.654.045 [Assembly fixture] and three-armed puller.

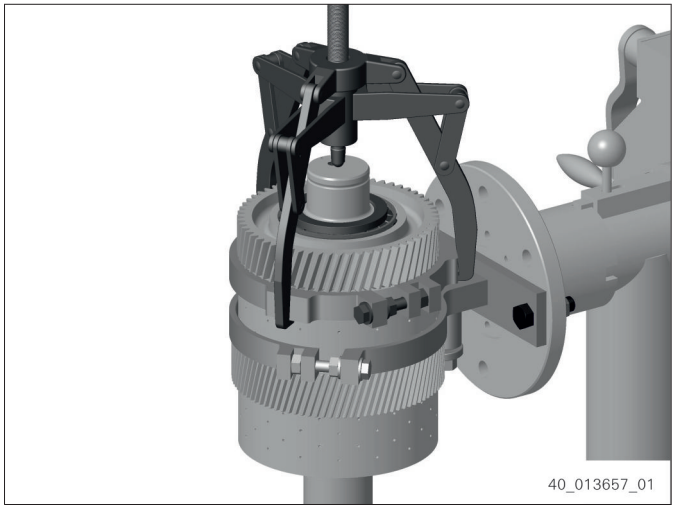


Fig. 136

17. Remove ring.

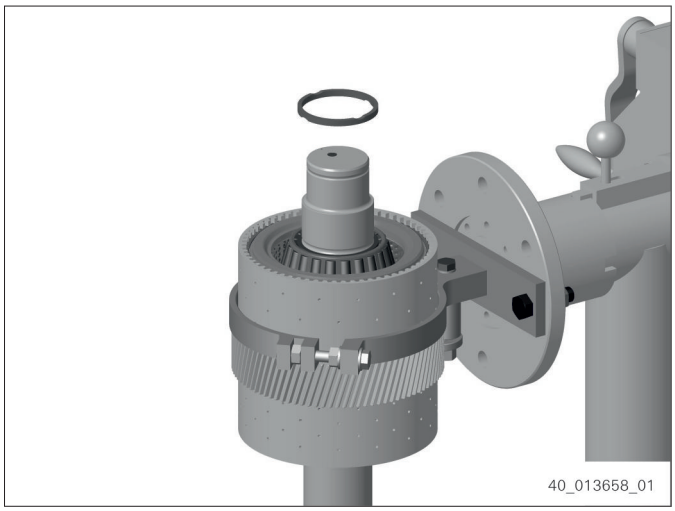


Fig. 137

18. Remove snap ring (1).

19. Remove end shim (2) from disk carrier.

20. Remove disk package (3).

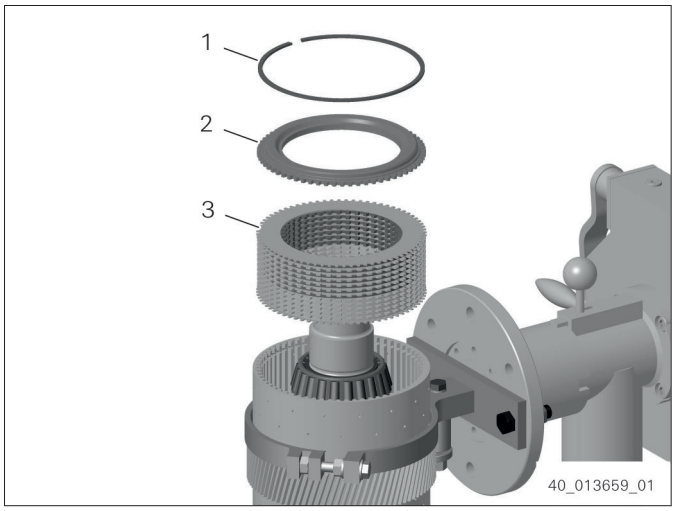


Fig. 138

21. Pull off bearing inner ring with 5873.012.013 [Rapid grip] and 5873.002.001 [Basic tool].

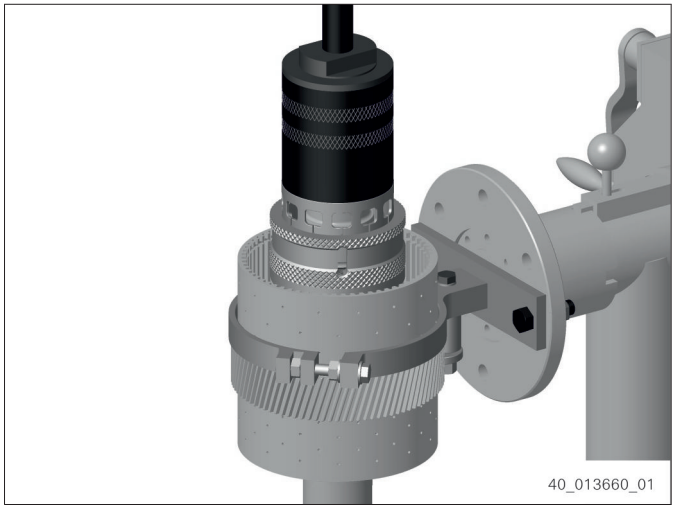


Fig. 139

22. Press guide ring downwards with 5870.345.072 [Assembly fixture] and hand-operated press and hold it there.

23. Remove snap ring.

24. Release hand-operated press.

25. Remove guide ring, compression spring and intermediate washer.

26. Turn disk carrier by 180°.

27. Press guide ring downwards with 5870.345.072 [Assembly fixture] and hand-operated press and hold it there.

28. Remove snap ring.

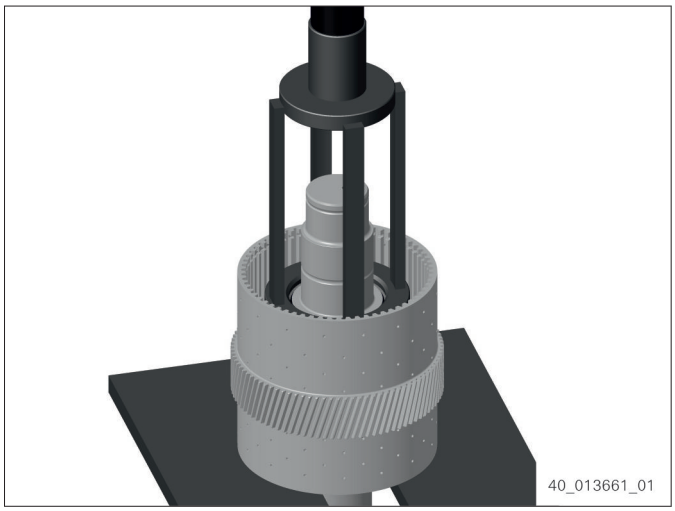


Fig. 140

29. Release hand-operated press.

30. Remove guide ring, compression spring and intermediate washer.

31. Press both pistons out of disk carrier using compressed air.

Fig. 141

Dismantling clutch KV/K1

Special tools:

- 5870.350.000 Assembly truck
- 5870.654.033 Assembly fixture
- 5870.401.118 Groove nut wrench
- 5870.401.115 Groove nut wrench
- 5873.001.023 Gripping device
- 5873.001.000 Basic tool
- 5870.345.036 Pry bar
- 5873.001.034 Gripping device
- 5870.654.045 Assembly fixture
- 5870.345.072 Assembly fixture

1. Fasten clutch KV/K1 to 5870.350.000 [Assembly truck] using 5870.654.033 [Assembly fixture].

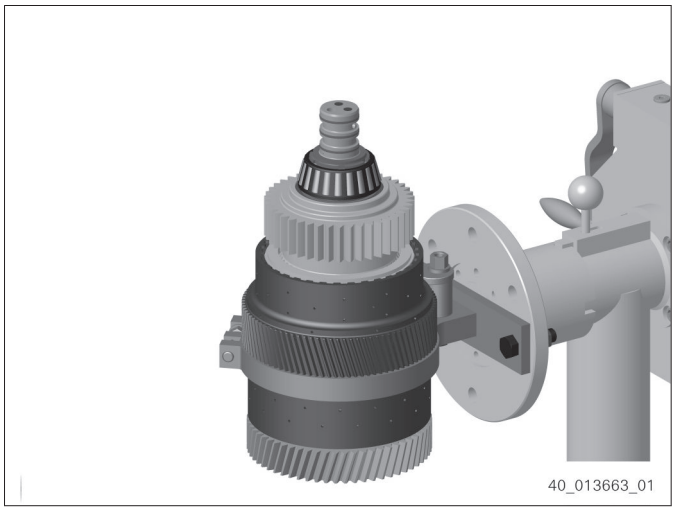


Fig. 142

2. Remove R-rings (1).

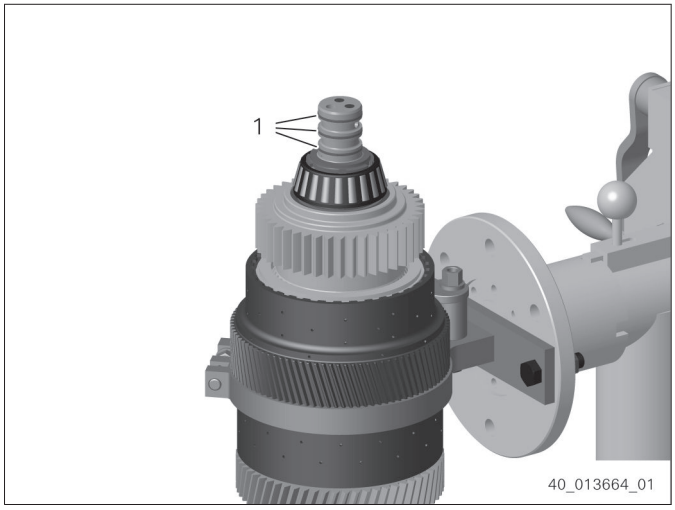


Fig. 143

Dismantling clutch K1

3. Turn disk carrier by 90°.

4. Loosen slotted nut with 5870.401.118 [Groove nut wrench] and 5870.401.115 [Groove nut wrench].

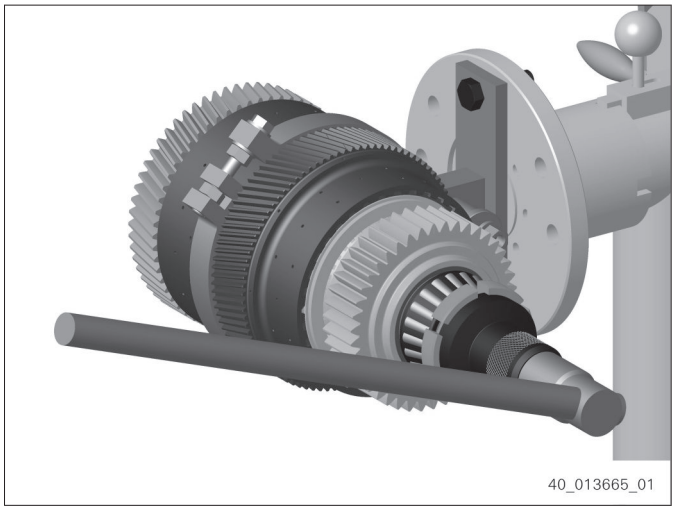


Fig. 144

5. Turn disk carrier by 90°.

6. Pull off bearing inner ring with 5873.001.023 [Gripping device] and 5873.001.000 [Basic tool].

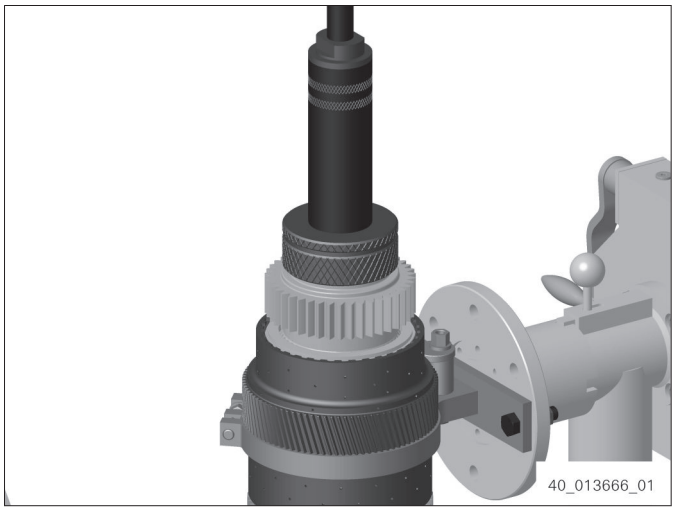


Fig. 145

7. Remove washer.

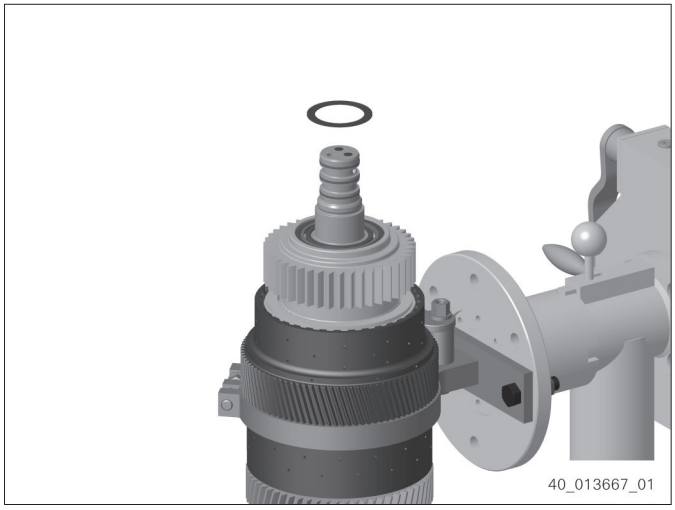


Fig. 146

8. Pull gear and parts of the angular ball bearing from disk carrier using the three-armed extractor.

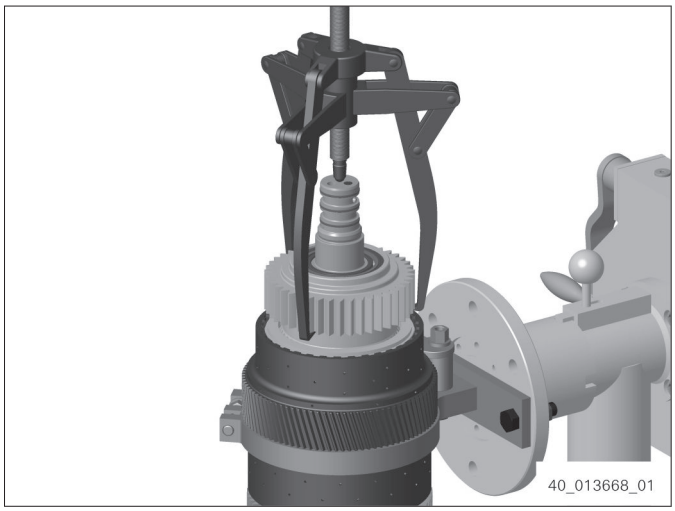


Fig. 147

9. Figure shows single parts of gear bearing.
   - 1 = angular ball bearing
   - 2 = Snap ring
   - 3 = gear

   The angular ball bearing is only available as complete unit.

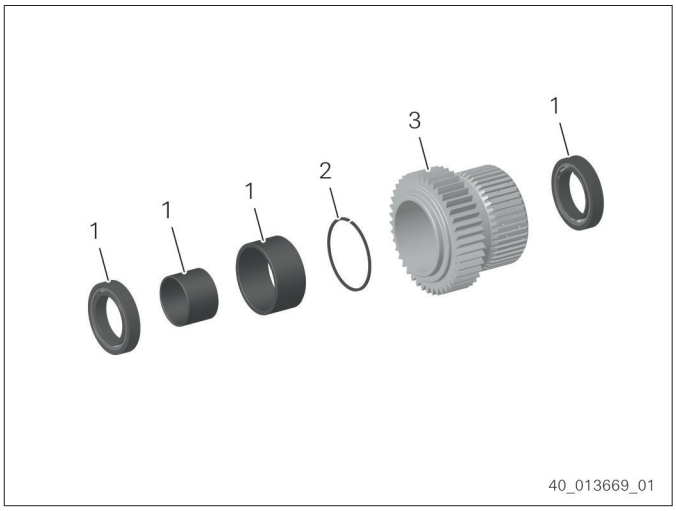


Fig. 148

10. Remove intermediate ring of angular ball bearing.

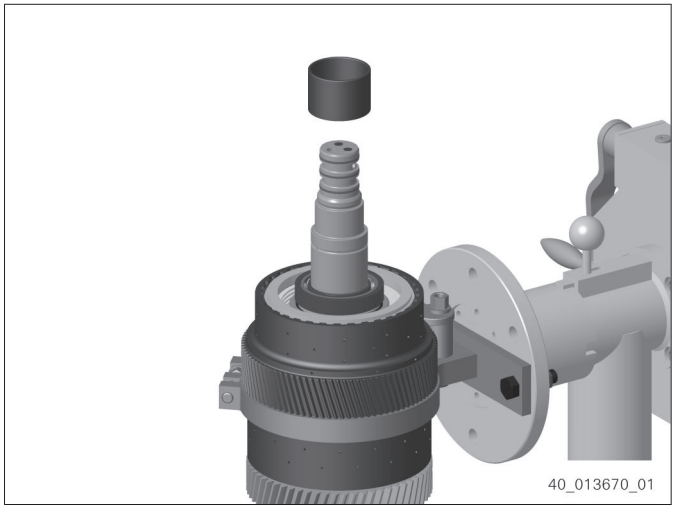


Fig. 149

11. Remove snap ring (1).

12. Remove end shim (2) from disk carrier.

13. Remove disk package (3).

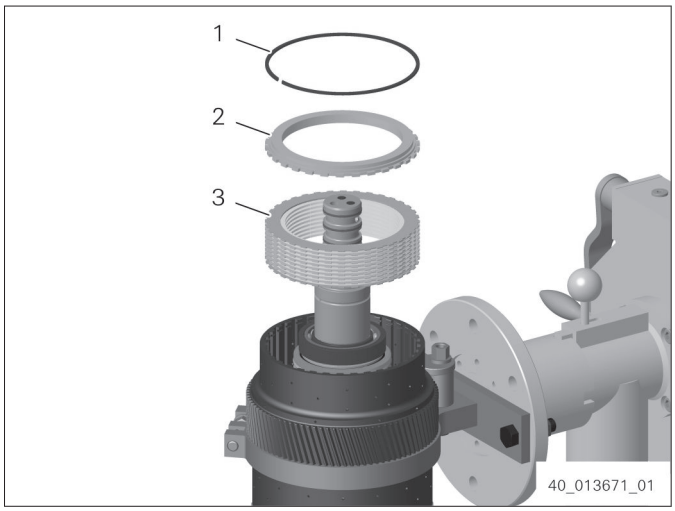


Fig. 150

14. Use 5870.345.036 [Pry bar] to pull the lower ball bearing of the angular ball bearing from the disk carrier and remove releasing balls.

    → The ball bearing is destroyed.

    The angular ball bearing is only available as complete unit.

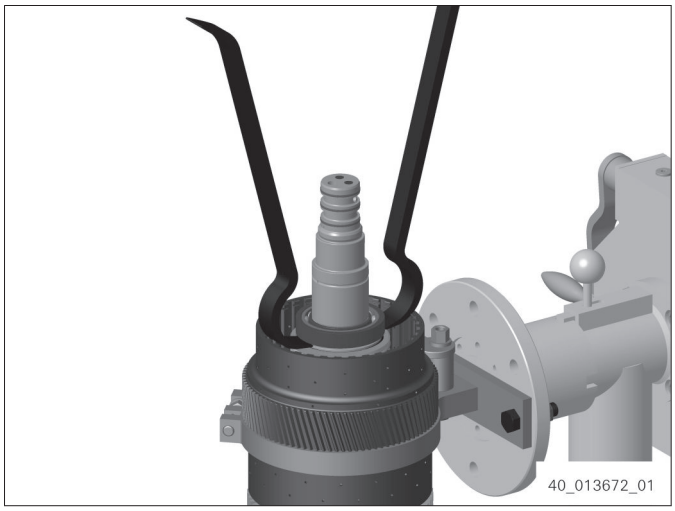


Fig. 151

Dismantling clutch KV

15. Turn disk carrier by 90°.

16. Loosen slotted nut with 5870.401.118 [Groove nut wrench] and 5870.401.115 [Groove nut wrench].

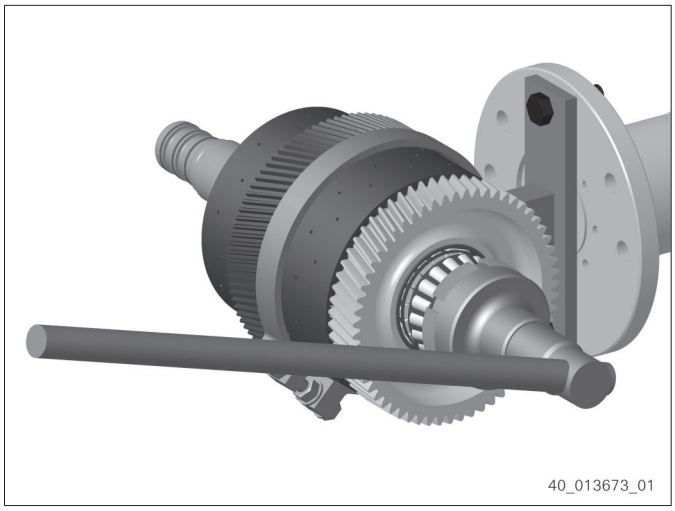


Fig. 152

17. Turn disk carrier by 90°.

18. Pull off bearing inner ring with 5873.001.034 [Gripping device] and 5873.001.000 [Basic tool].

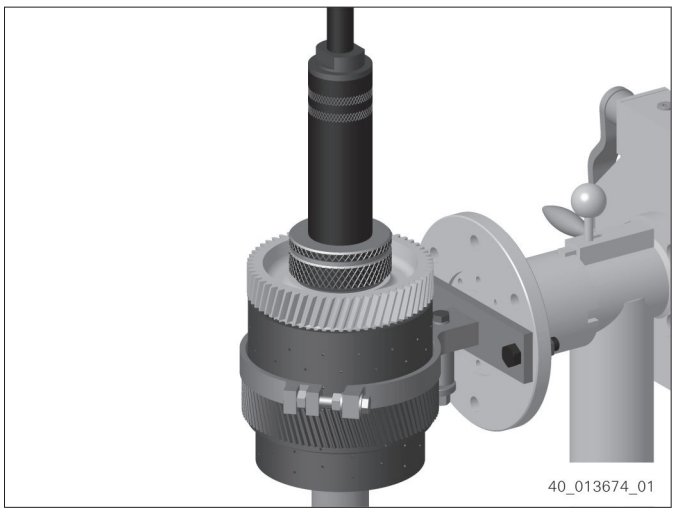


Fig. 153

19. Pull spur gear and bearing inner ring from disk carrier using 5870.654.045 [Assembly fixture] and three-armed puller.

20. Remove bearing outer rings from spur gear.

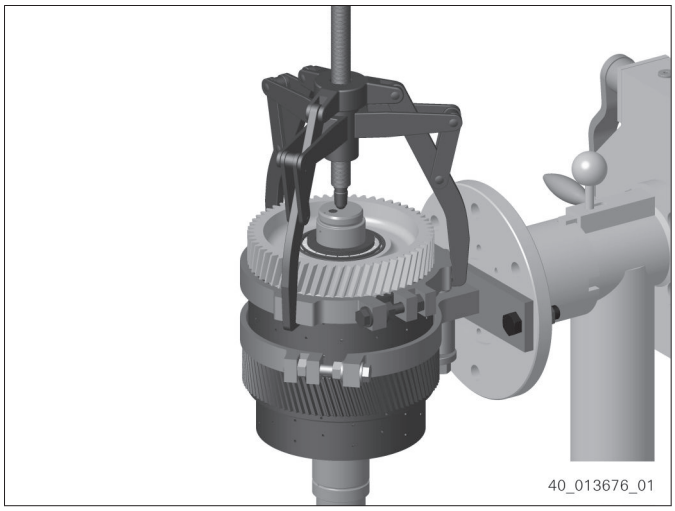


Fig. 154

21. Remove ring.

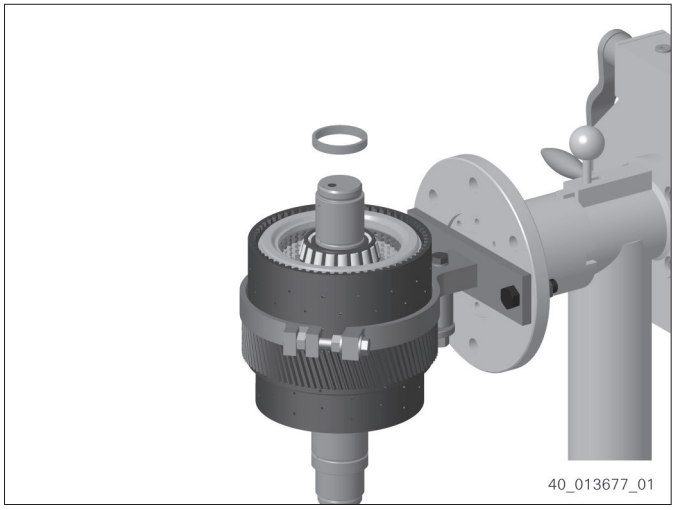


Fig. 155

22. Remove snap ring (1).

23. Remove end shim (2) from disk carrier.

24. Remove disk package (3).

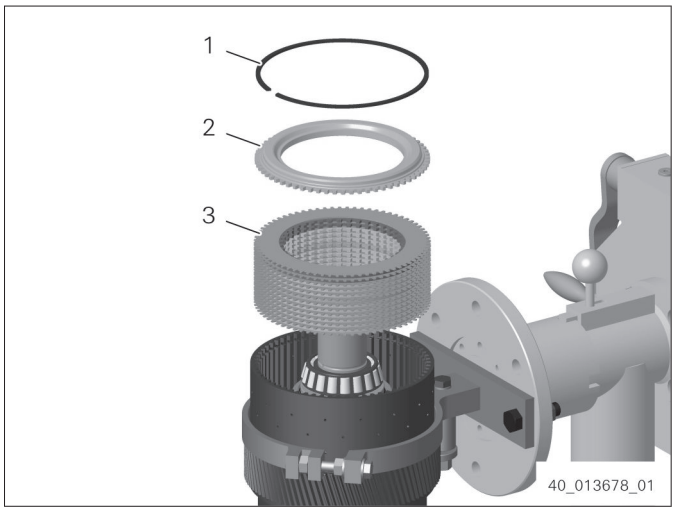


Fig. 156

25. Pull off bearing inner ring with 5873.001.034 [Gripping device] and 5873.001.000 [Basic tool].

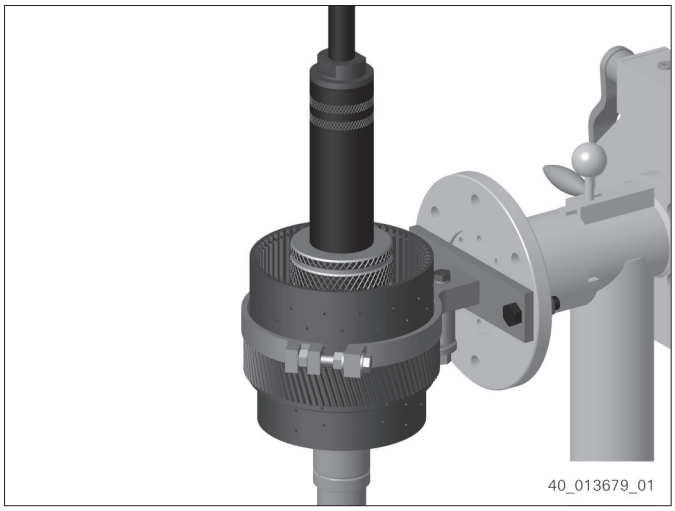


Fig. 157

26. Press guide ring downwards with 5870.345.072 [Assembly fixture] and hand-operated press and hold it there.

27. Remove snap ring.

28. Release hand-operated press.

29. Remove guide ring, compression spring and intermediate washer.

30. Turn disk carrier by 180°.

31. Press guide ring downwards with 5870.345.072 [Assembly fixture] and hand-operated press and hold it there.

32. Remove snap ring.

33. Release hand-operated press.

34. Remove guide ring, compression spring and intermediate washer.

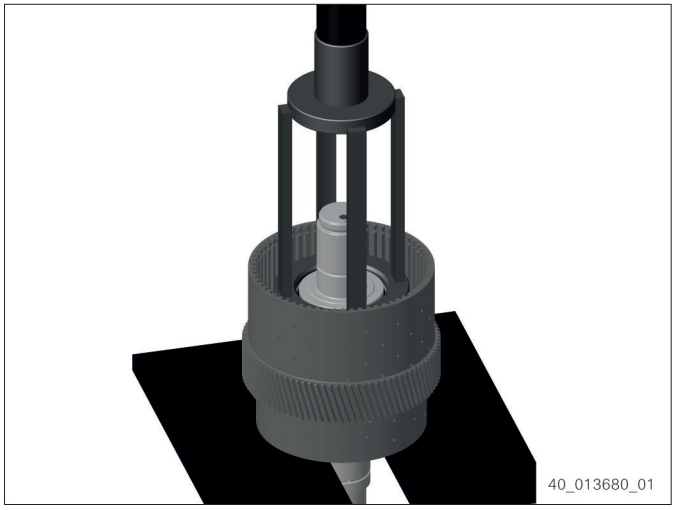


Fig. 158

35. Press both pistons out of disk carrier using compressed air.

Fig. 159

Disassembling the housing

1. Pull bearing outer rings out of housing holes. Figure shows the positions of the bearing outer rings.
   - 1 = clutch KV/K1
   - 2 = clutch K3/K4
   - 3 = clutch KR/K2

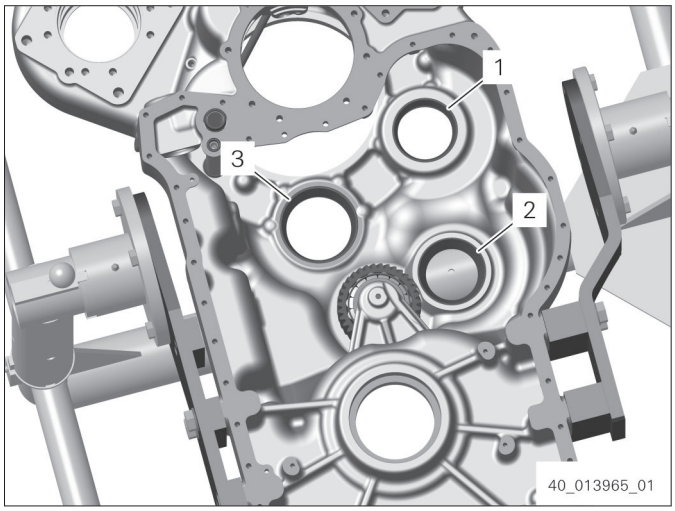


Fig. 160

2. Remove gear (1) with both tapered roller bearings (layshaft gear).

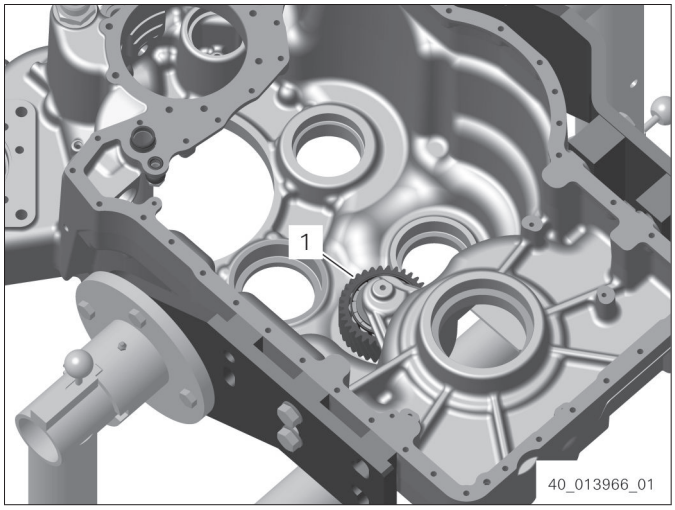


Fig. 161

3. Loosen the adapter (1).

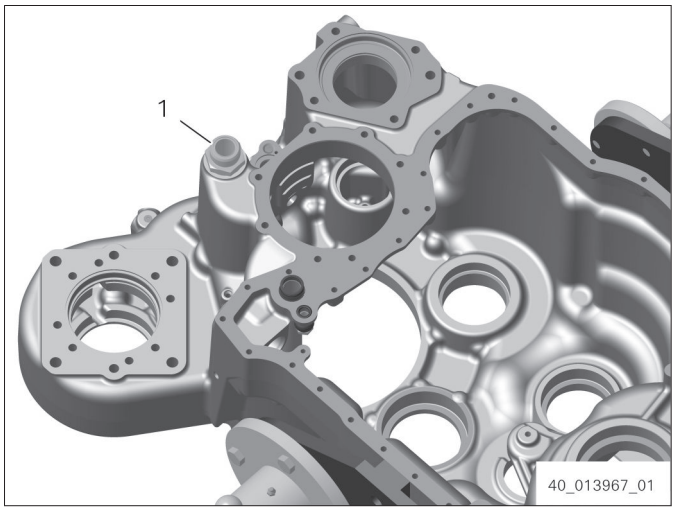


Fig. 162

4. Remove tube (1).

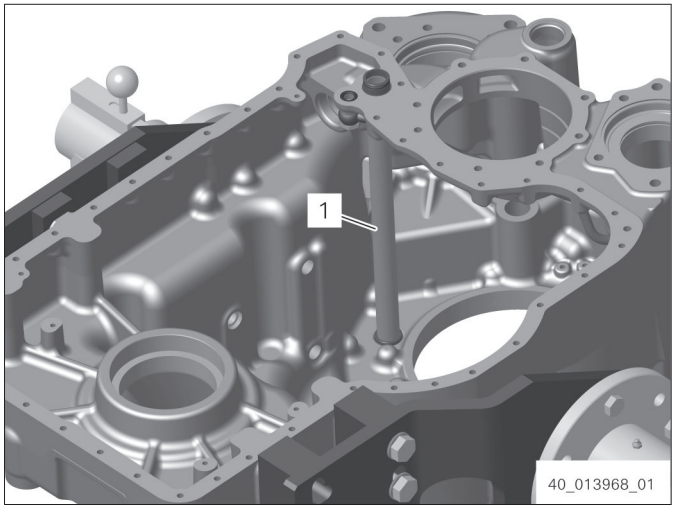


Fig. 163

5. Loosen hollow screws and tube.

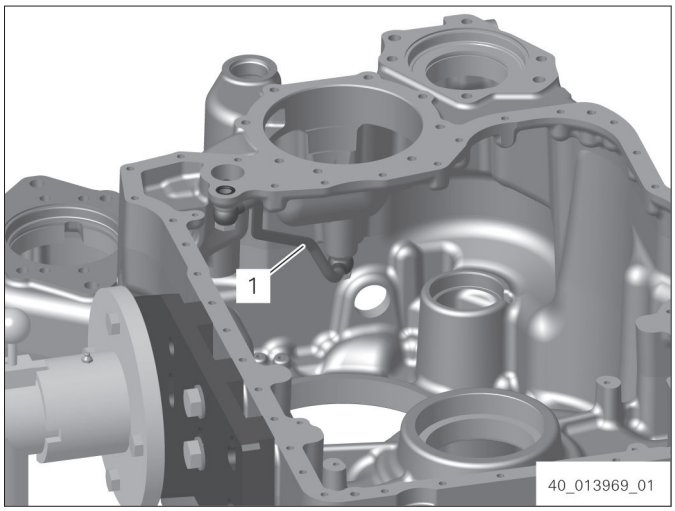


Fig. 164

Assembly

Assembling housing

1. Insert sealing rings between tube (2) and housing.

2. Push sealing rings onto the hollow screws.

3. Screw in the hollow screws with sealing ring (1) and tighten them.
   Tightening torque: **45 Nm**

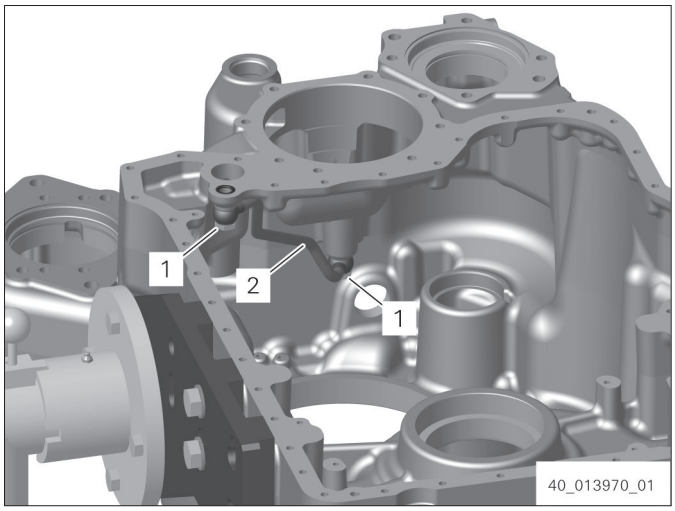


Fig. 165

4. Grease O-rings.

5. Insert O-rings (1) into annular grooves of the tube.

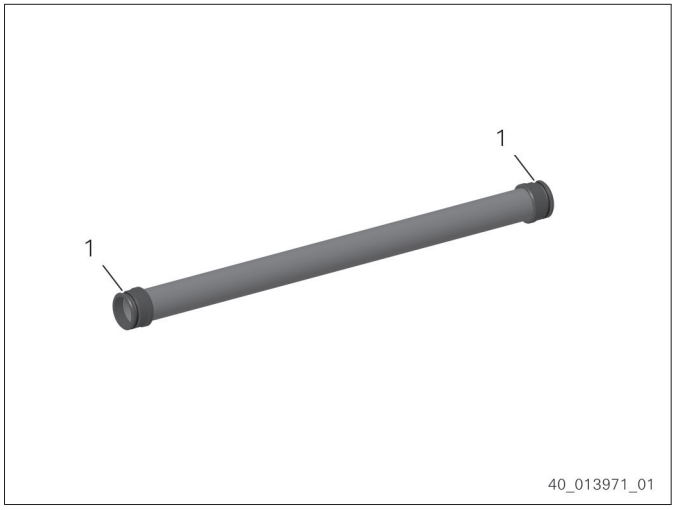


Fig. 166

6. Insert tube (1) into the housing.

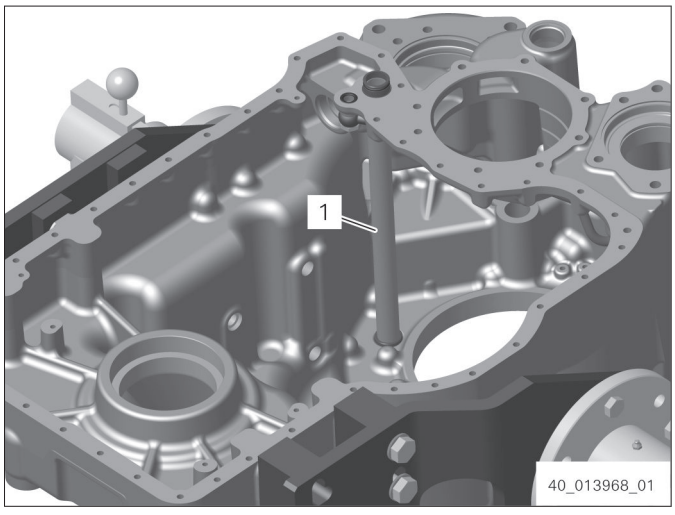


Fig. 167

7. Screw in the adapter with O-ring (1) and tighten.
   Tightening torque: **117 Nm**

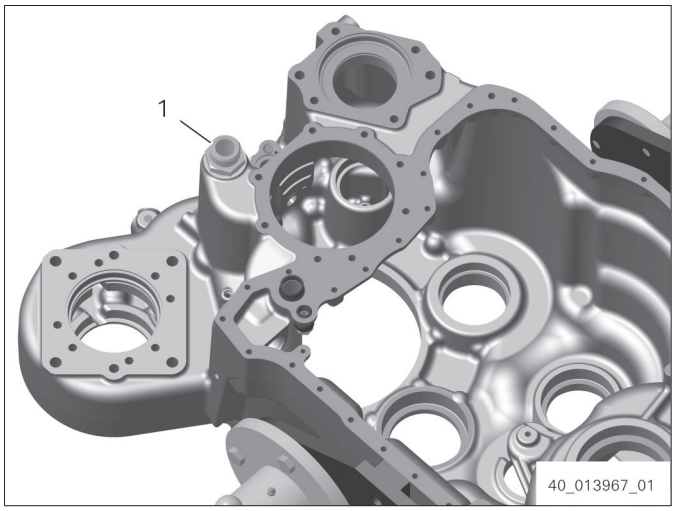


Fig. 168

8. Insert ring and both tapered roller bearings into gear (layshaft gear).

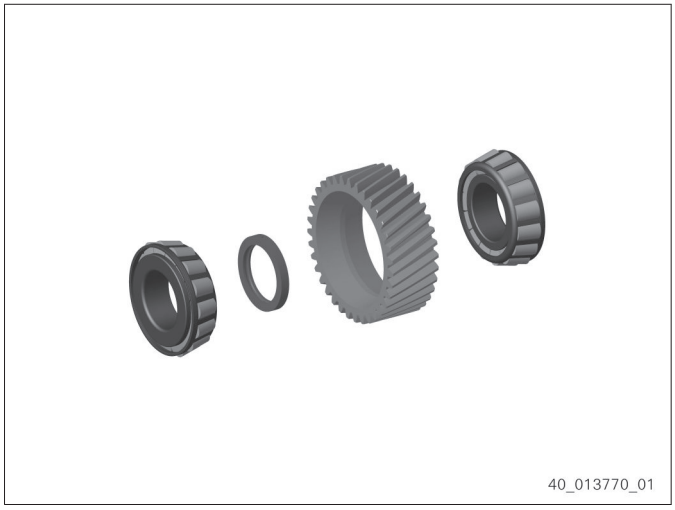


Fig. 169

9. Insert gear (1) into the housing.
   Countershaft cannot be inserted before installation of the clutches.

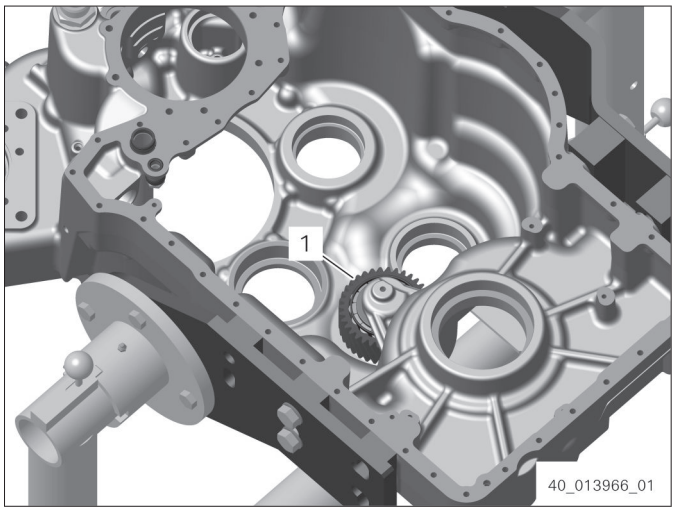


Fig. 170

10. Insert bearing outer rings in housing holes until contact is obtained.
Figure shows the positions of the bearing outer rings.
    - 1 = clutch KV/K1
    - 2 = clutch K3/K4
    - 3 = clutch KR/K2

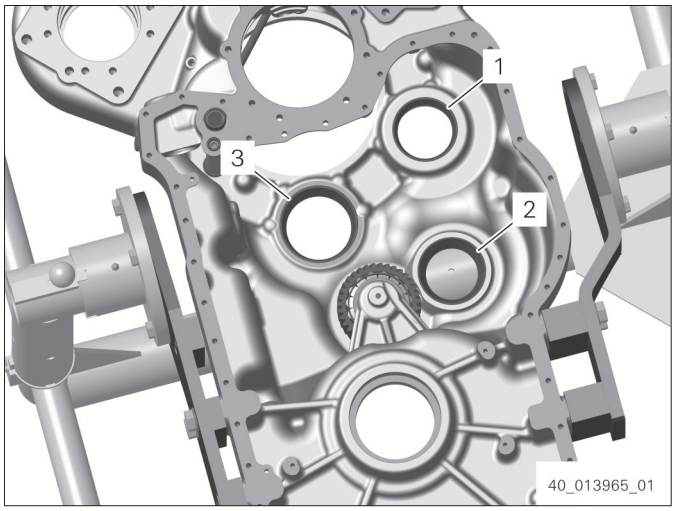


Fig. 171

Assembling and installing clutches and output

Assembling clutch KV/K1

Special tools:

- 5870.350.000 Assembly truck
- 5870.654.033 Assembly fixture
- 5870.320.014 Assembly fixture
- 5870.320.018 Inserting tool
- 5870.320.019 Press-in mandrel
- 5870.345.072 Assembly fixture
- 5870.401.118 Groove nut wrench
- 5870.401.115 Groove nut wrench

1. Fasten disk carrier to 5870.350.000 [Assembly truck] using 5870.654.033 [Assembly fixture].

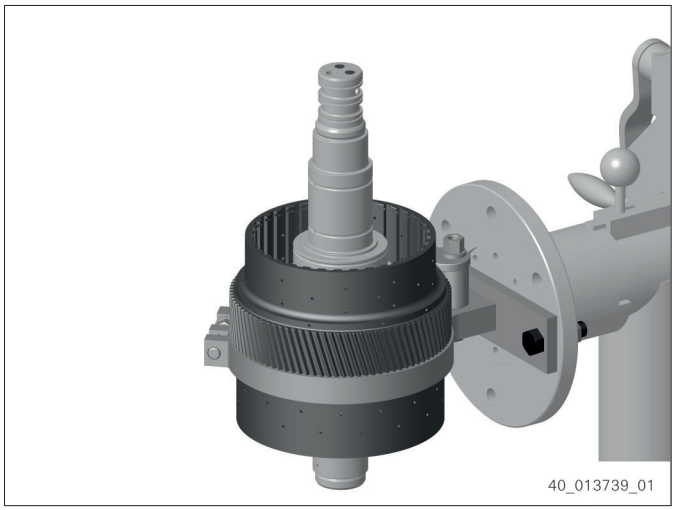


Fig. 172

Assembling disk carrier

2. Turn disk carrier by 180.

3. Insert sealing plug (1) into hole with 5870.320.014 [Assembly fixture] and 5870.320.018 [Inserting tool].

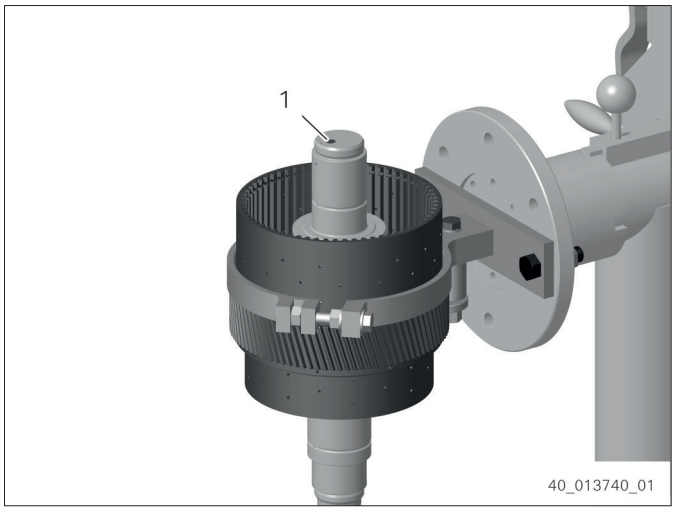


Fig. 173

4. Flush-mount valve (1) using 5870.320.019 [Press-in mandrel]. Insert valve with the chamfered side facing downwards.

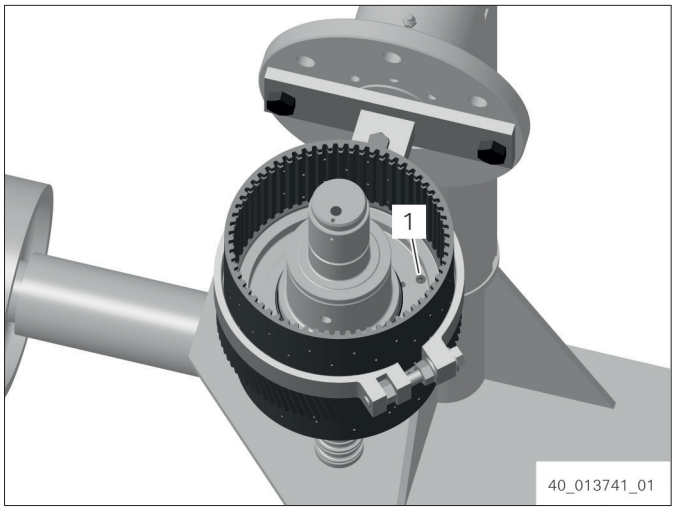


Fig. 174

5. Turn disk carrier by 180.

6. Insert sealing plugs (1) into holes using 5870.320.014 [Assembly fixture] and 5870.320.018 [Inserting tool].

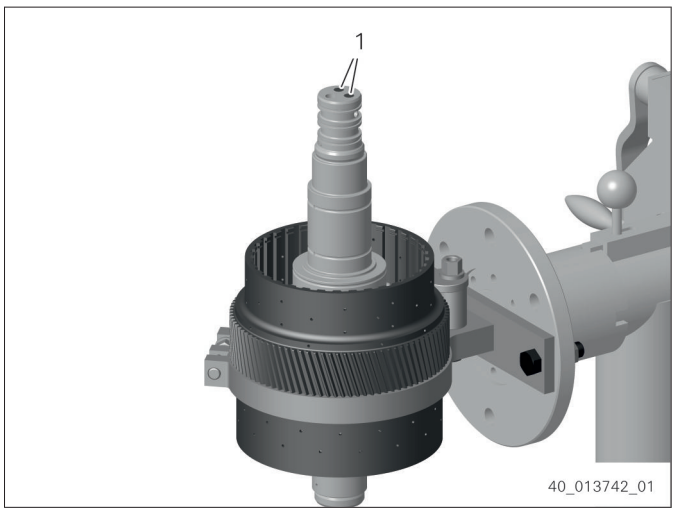


Fig. 175

7. Flush-mount valve (1) using 5870.320.019 [Press-in mandrel]. Insert valve with the chamfered side facing downwards.

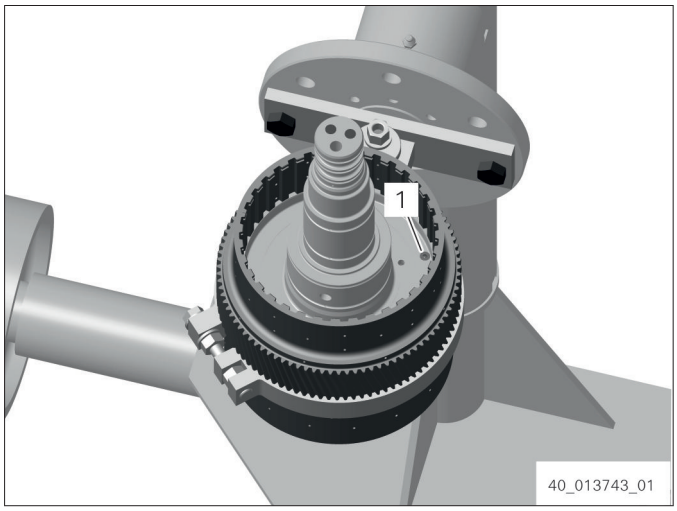


Fig. 176

8. Apply oil to O-rings (1) and insert them twist-free into annular grooves of the piston.

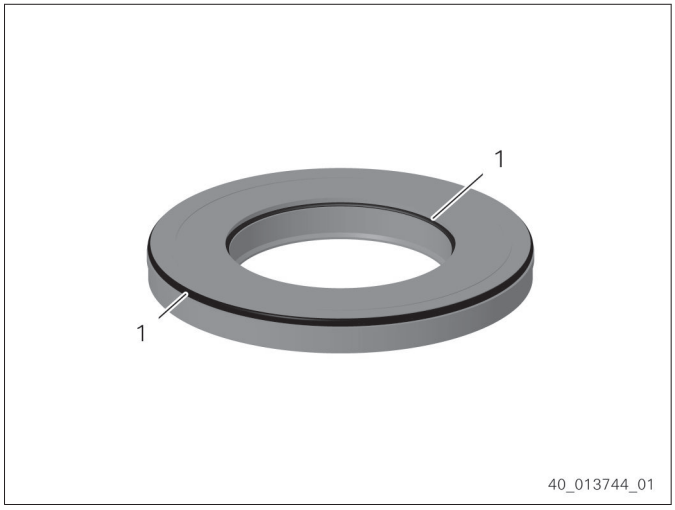


Fig. 177

9. Oil O-rings and piston bearing surfaces.

10. Insert piston (1) into the disk carrier until contact is obtained.

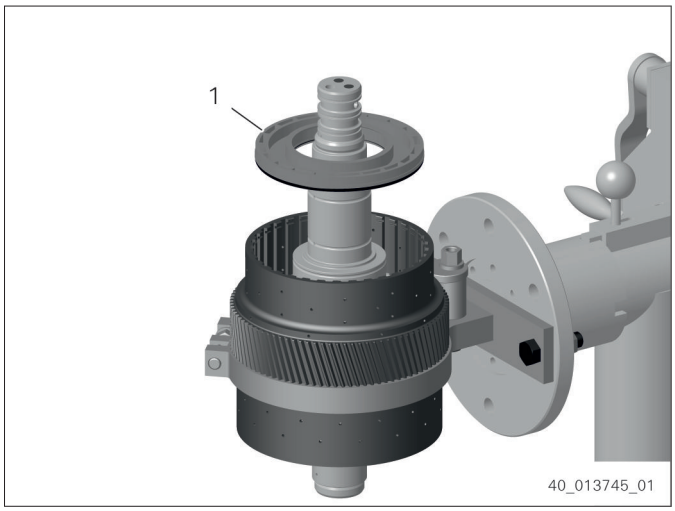


Fig. 178

11. Slide on intermediate washer (2) and compression spring (1).

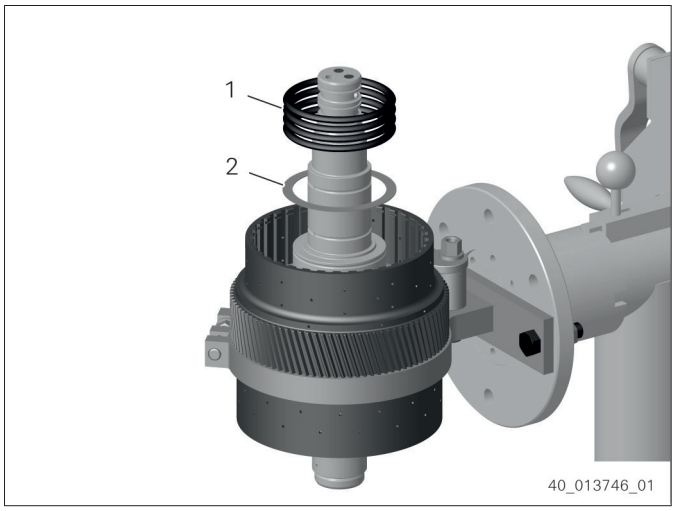


Fig. 179

12. Place guide ring (2) onto compression spring with chamfer facing upwards.

13. Slide on snap ring (1).

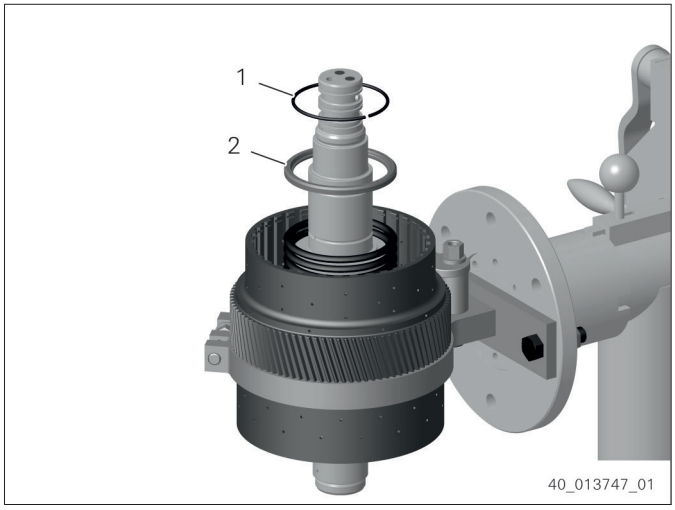


Fig. 180

14. Press guide ring downwards with 5870.345.072 [Assembly fixture] and hand-operated press and hold it there.

15. Insert snap ring into annular groove of disk carrier.

16. Release hand-operated press.

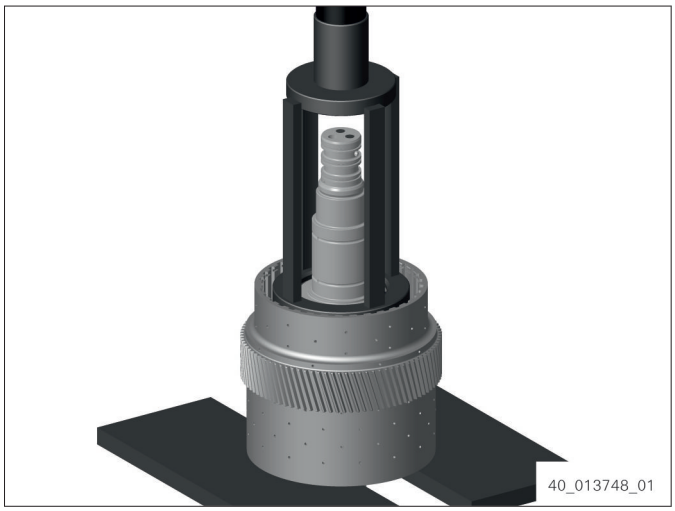


Fig. 181

17. Turn disk carrier by 180.

18. Apply oil to O-rings and insert them twist-free into annular grooves of the piston.

19. Oil O-rings and piston bearing surfaces.

20. Insert piston into the disk carrier until contact is obtained.

21. Slide on intermediate washer and compression spring.

22. Place guide ring onto compression spring with chamfer facing upwards.

23. Slide on snap ring.

24. Press guide ring downwards with 5870.345.072 [Assembly fixture] and hand-operated press and hold it there.

25. Insert snap ring into annular groove of disk carrier.

26. Release hand-operated press.

27. Fasten disk carrier to 5870.350.000 [Assembly truck] using 5870.654.033 [Assembly fixture].

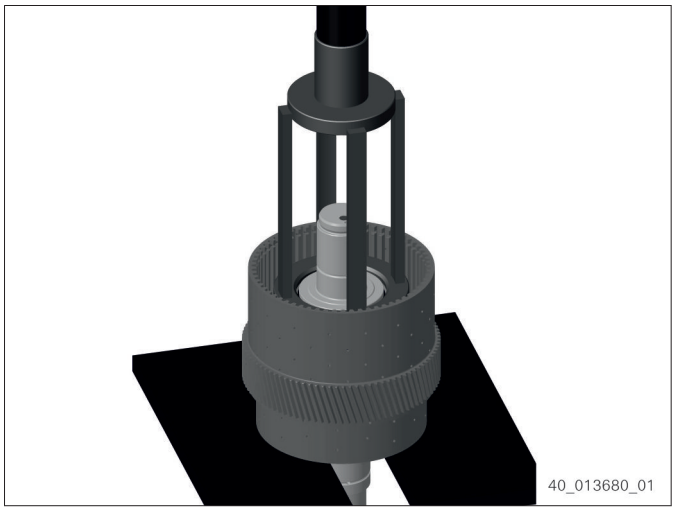


Fig. 182

Assembling clutch KV

28. To ensure a correct measuring result, install single parts without oil for the time being.

Insert outer disks and inner disks.
Insert first outer disk with the uncoated side facing the piston.
Insert last outer disk with the uncoated side facing the end shim.

For the arrangement refer to the current spare parts list.

Thickness of the two optional inner disks must not differ by more than 0.7 mm.

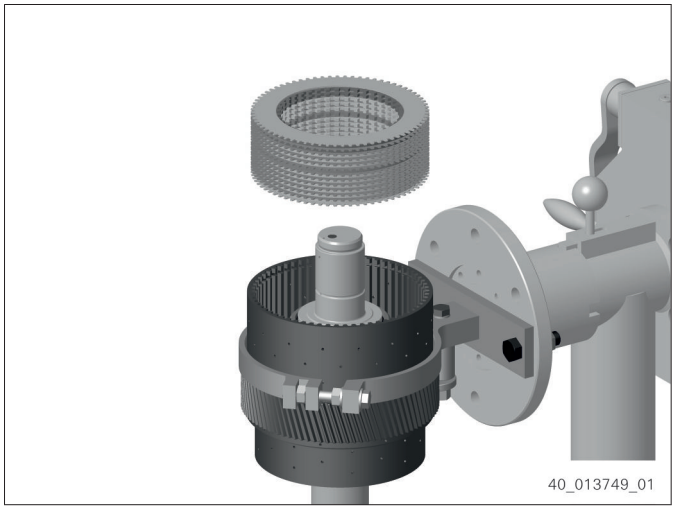


Fig. 183

29. Insert end shim (2).

30. Insert snap ring e. g. 2.60 mm (1).

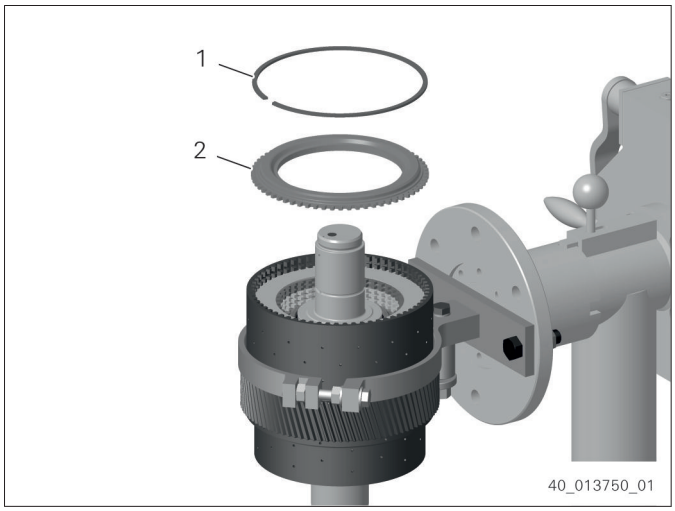


Fig. 184

31. Position dial gauge on the end shim.

32. Push end shim downwards with 100 N and set dial gauge to zero.

33. Lift end shim until contact with snap ring is obtained and check the necessary Disk clearance 2.8 mm to 3.0 mm.
If the disk clearance is too small, insert thinner inner disks or (and) a thinner snap ring.
If disk clearance is too big, install thicker inner disks or (and) and a thicker snap ring.

Thickness of the two optional inner disks must not differ by more than 0.7 mm.

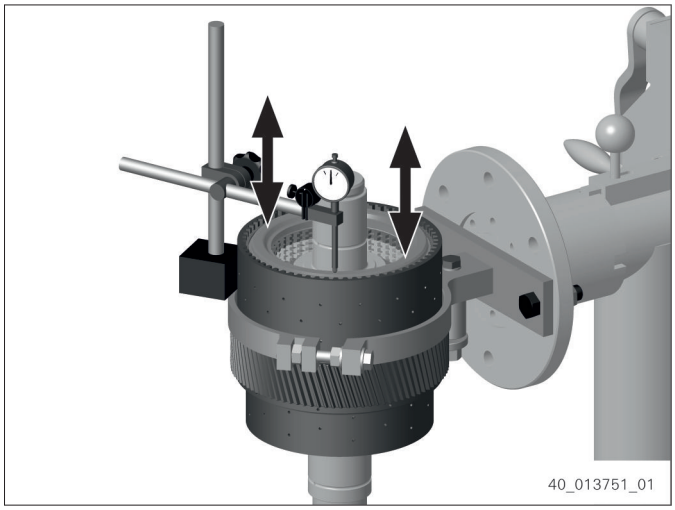


Fig. 185

34. Carry out the following two work steps immediately one after the other.

⚠ CAUTION

Risk of burn injuries due to contact with hot surfaces.
Slight or moderate injury possible.
⇨ Wear protective gloves.

Heat bearing inner ring.

35. Slide on bearing inner ring until contact is obtained.

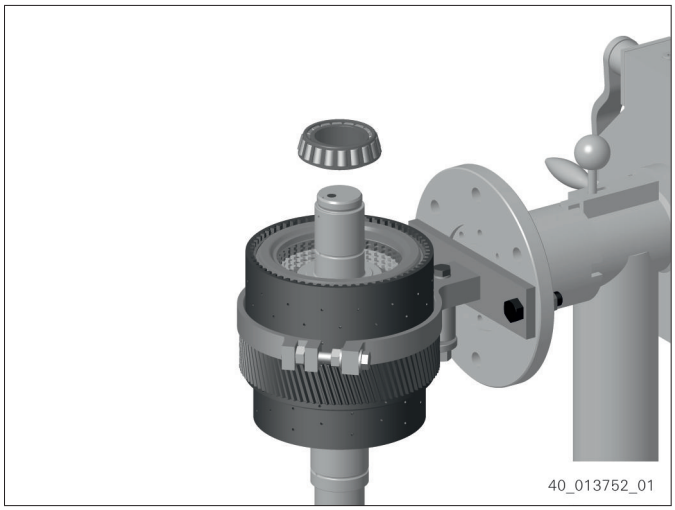


Fig. 186

36. Let bearing inner ring cool down.

37. Adjust bearing inner ring.

38. Slide on ring.

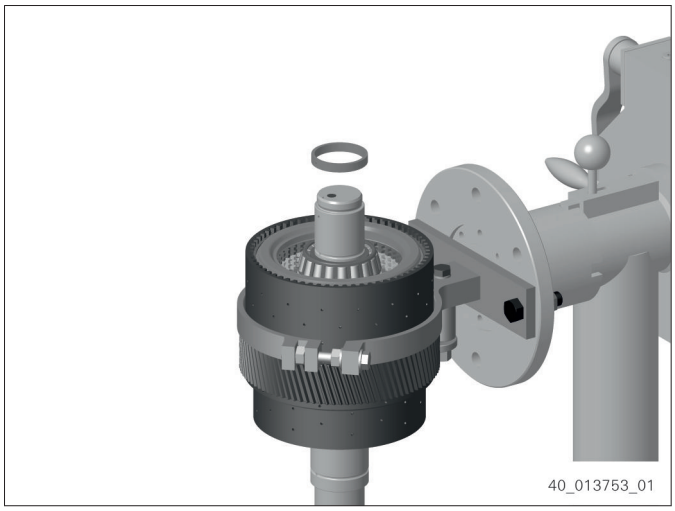


Fig. 187

39. Insert bearing outer rings into spur gear until contact is obtained.

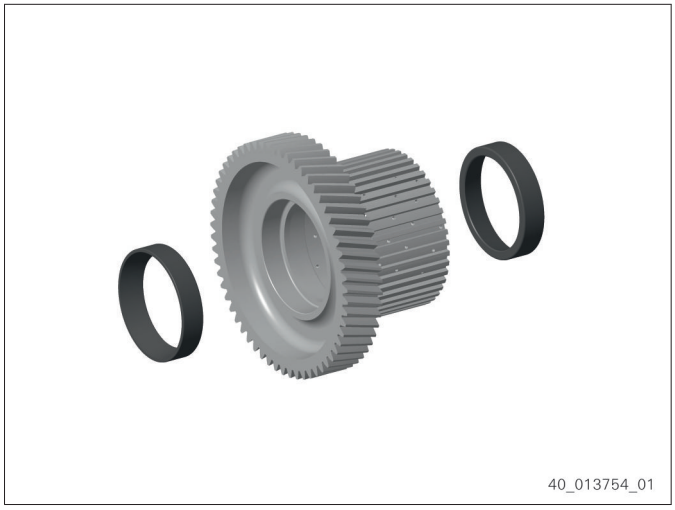


Fig. 188

40. Slide spur gear (1) onto shaft until contact is obtained. Insert spur gear into disk package by short mutual rotary motions.

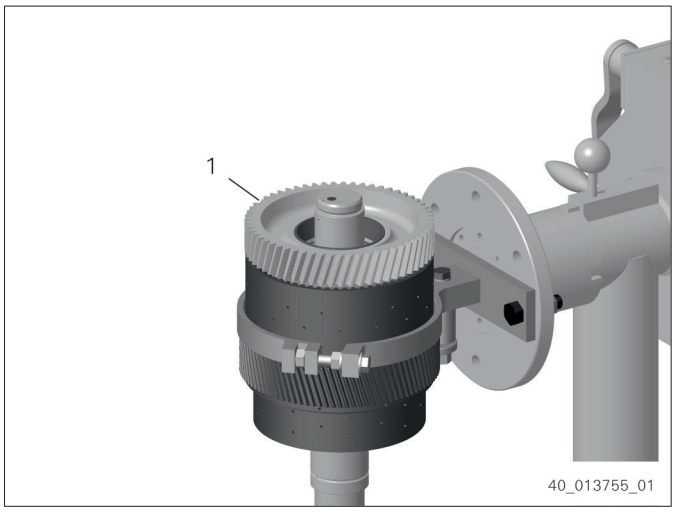


Fig. 189

41. Carry out the following two work steps immediately one after the other.

⚠ CAUTION

Risk of burn injuries due to contact with hot surfaces.
Slight or moderate injury possible.
⇨ Wear protective gloves.

Heat bearing inner ring.

42. Slide on bearing inner ring until contact is obtained.

43. Let bearing inner ring cool down.

44. Adjust bearing inner ring.

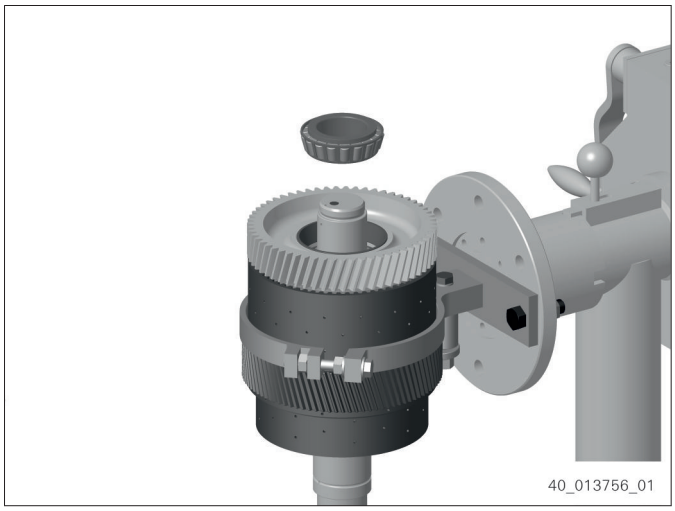


Fig. 190

45. Carry out the following two work steps immediately one after the other.

⚠ CAUTION

Risk of burn injuries due to contact with hot surfaces.
Slight or moderate injury possible.
⇨ Wear protective gloves.

Heat bearing inner ring.

46. Slide on bearing inner ring until contact is obtained.

47. Let bearing inner ring cool down.

48. Adjust bearing inner ring.

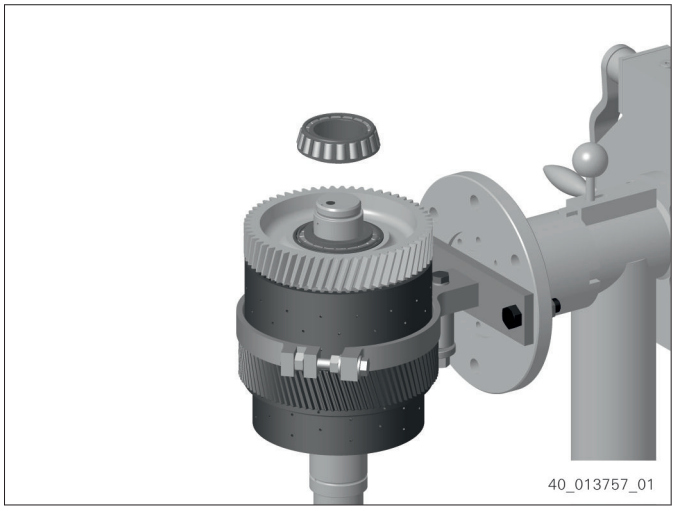


Fig. 191

49. Turn disk carrier by 90.

50. Use 5870.401.118 [Groove nut wrench] and 5870.401.115 [Groove nut wrench] to tighten the slotted nut.
Tightening torque: 550 Nm

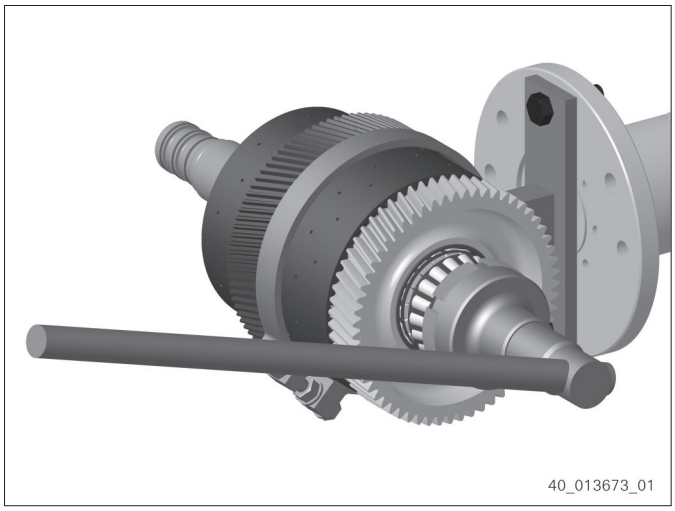


Fig. 192

Assembling clutch K1

51. Turn disk carrier by 90.

52. To ensure a correct measuring result, install single parts without oil for the time being.

Insert outer disks and inner disks.
Insert first outer disk with the uncoated side facing the piston.
Insert last outer disk with the uncoated side facing the end shim.

For the arrangement refer to the current spare parts list.

Thickness of the two optional inner disks must not differ by more than 0.7 mm.

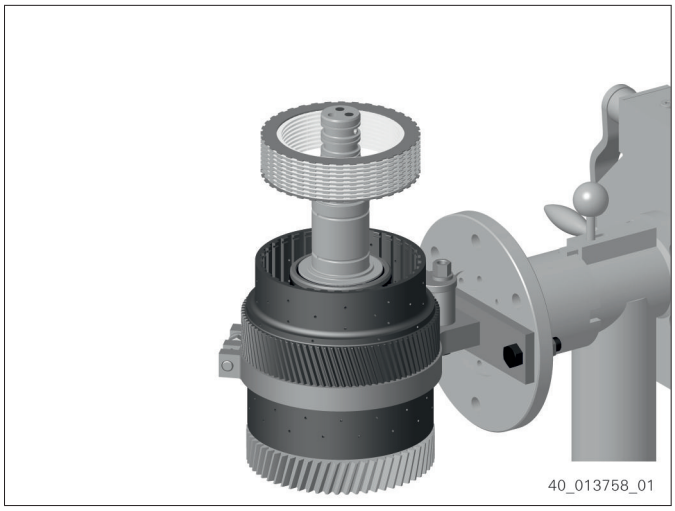


Fig. 193

53. Insert end shim (2).

54. Insert snap ring e. g. 2.30 mm (1).

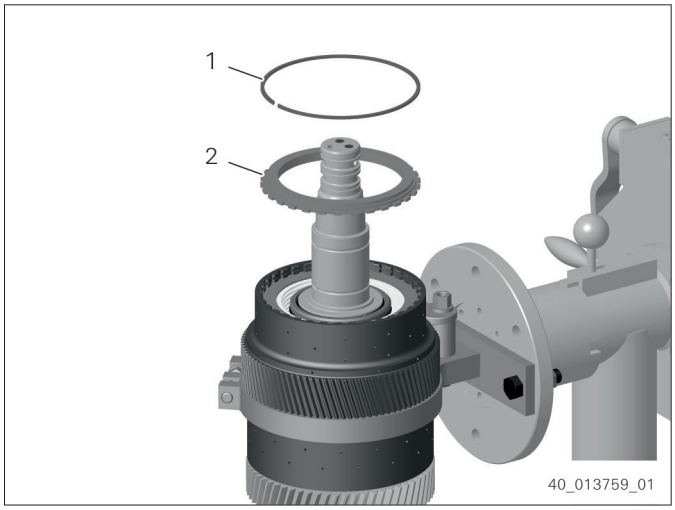


Fig. 194

55. Position dial gauge on the end shim.

56. Push end shim downwards with 100 N and set dial gauge to zero.

57. Lift end shim until contact with snap ring is obtained and check the necessary Disk clearance 2.2 mm to 2.4 mm.
If the disk clearance is too small, insert thinner inner disks or (and) a thinner snap ring.
If disk clearance is too big, install thicker inner disks or (and) and a thicker snap ring.

Thickness of the two optional inner disks must not differ by more than 0.7 mm.

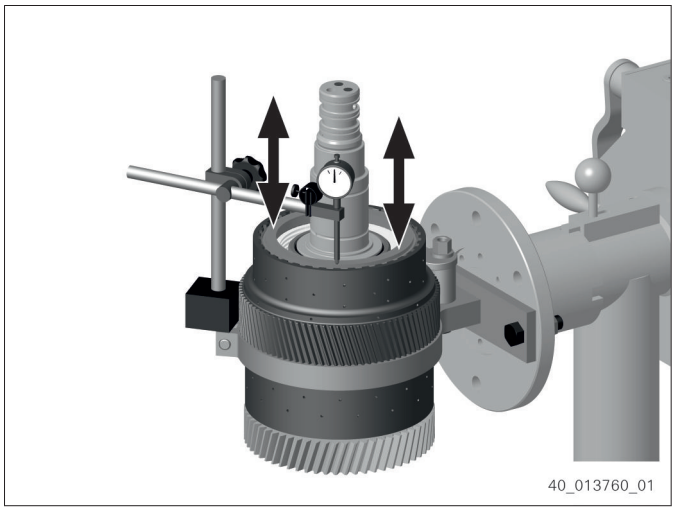


Fig. 195

58. The angular ball bearing has not yet been installed in the gear.

Align disk package with the gear (1). Insert gear into the disk package by short mutual rotary motions.

59. Remove gear.

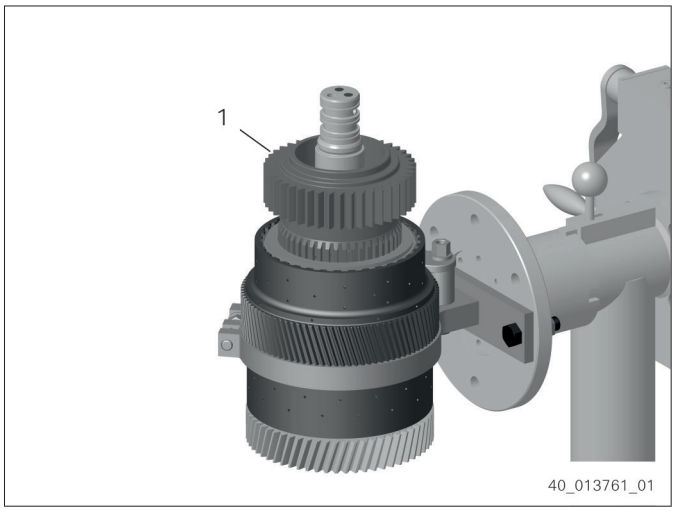


Fig. 196

60. Figure shows single parts of gear bearing.
- 1 = Angular ball bearing
- 2 = Snap ring
- 3 = Gear

The angular ball bearing is only available as complete unit.

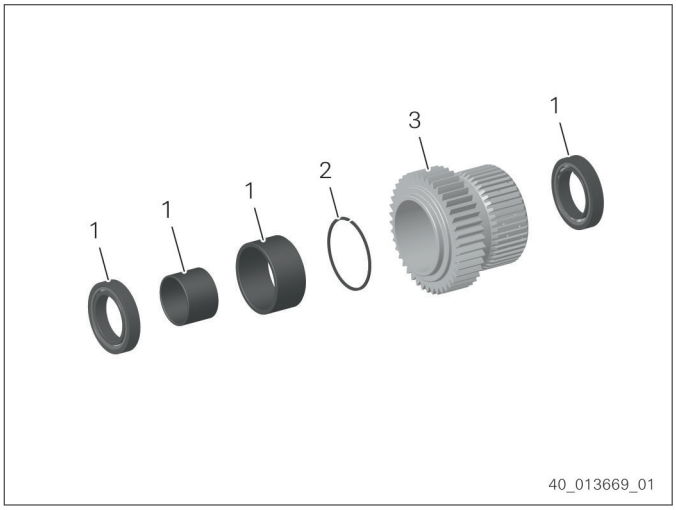


Fig. 197

61. Carry out the following two work steps immediately one after the other.

⚠ CAUTION

Risk of burn injuries due to contact with hot surfaces.
Slight or moderate injury possible.
⇨ Wear protective gloves.

Heat the ball bearing inner ring.

62. Slide on the ball bearing with the lubricating groove facing upwards until contact is obtained.

63. Allow the ball bearing to cool down.

64. Adjust bearing inner ring.

65. Slide on intermediate ring.

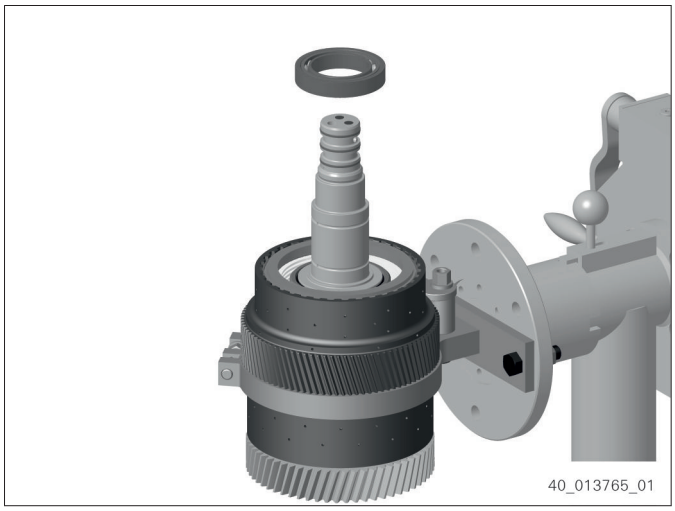


Fig. 198

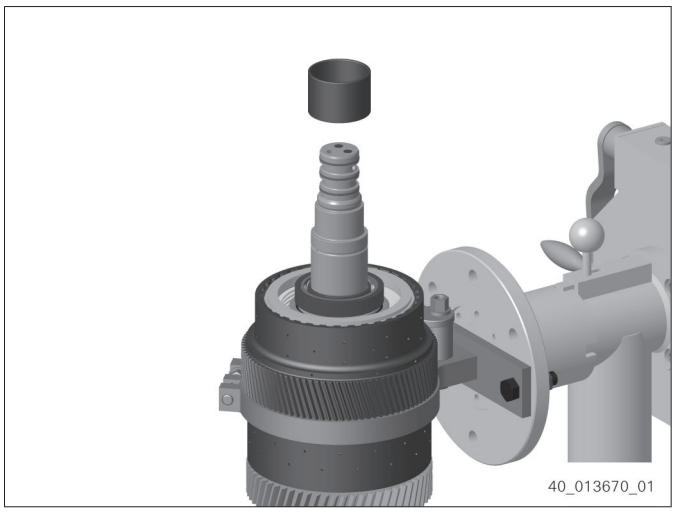


Fig. 199

66. Insert snap ring into annular groove of the gear.

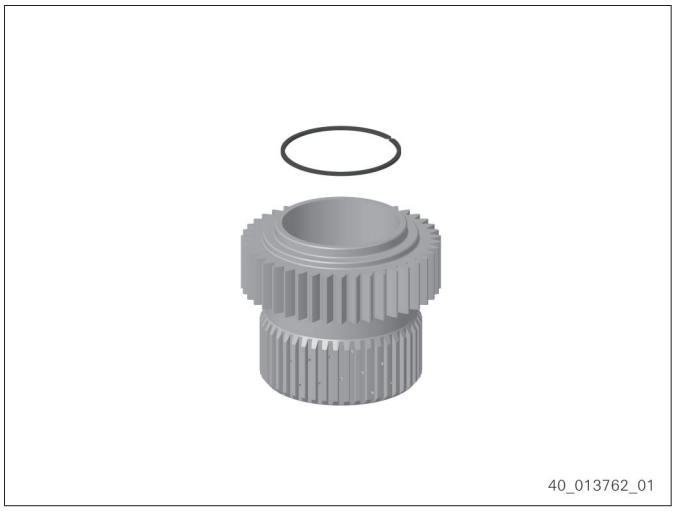


Fig. 200

67. Insert intermediate ring with the offset front face facing the snap ring.

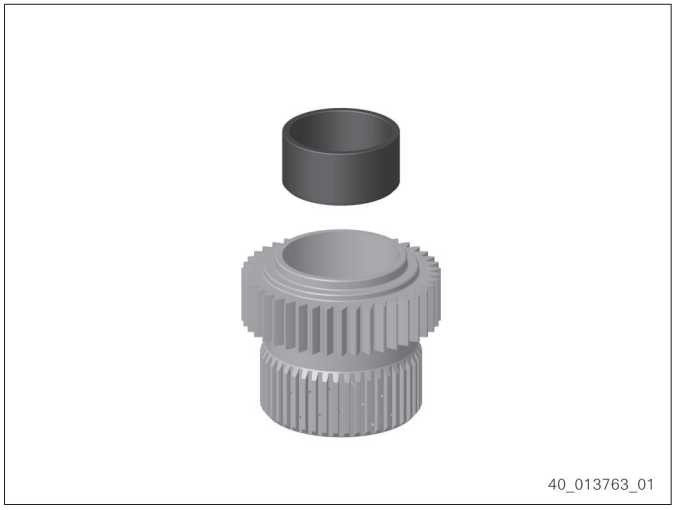


Fig. 201

68. Insert ball bearing with the lubricating groove facing downwards until contact is obtained.

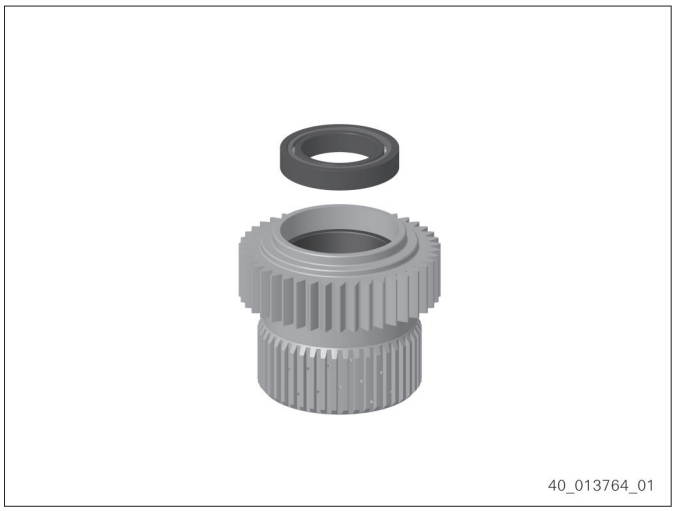


Fig. 202

69. Carry out the following two work steps immediately one after the other.

⚠ CAUTION

Risk of burn injuries due to contact with hot surfaces.
Slight or moderate injury possible.
⇨ Wear protective gloves.

Heat gear and ball bearing.

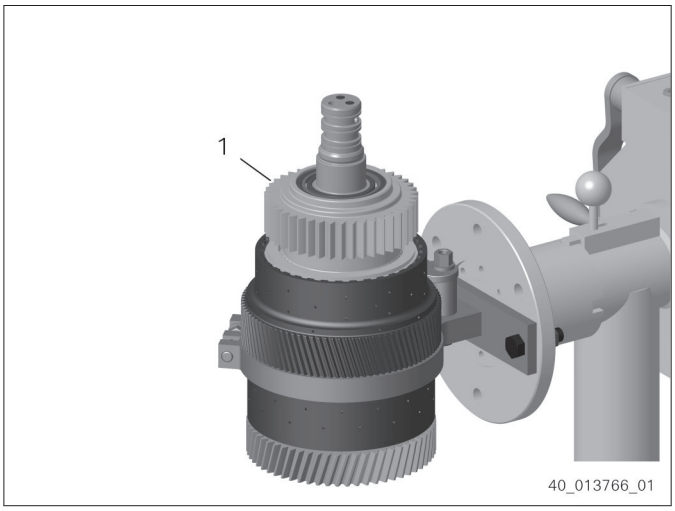


Fig. 203

70. Slide gear (1) onto shaft until contact is obtained. Insert gear into disk package.

71. Allow the ball bearing to cool down.

72. Adjust bearing inner ring.

73. Slide on shim.

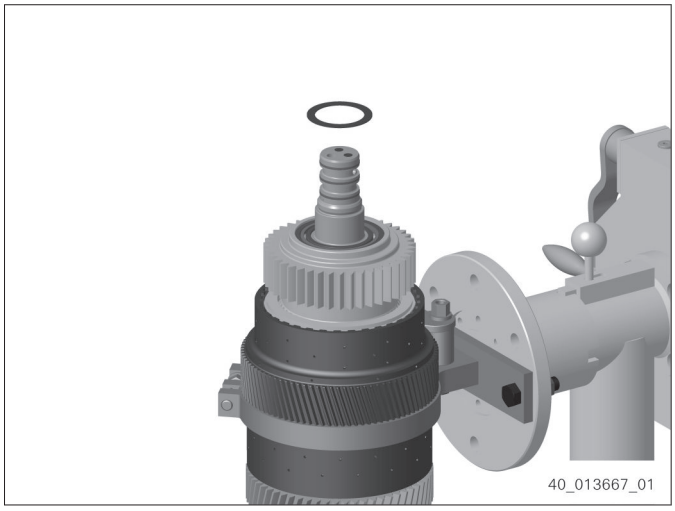


Fig. 204

74. Carry out the following two work steps immediately one after the other.

⚠ CAUTION

Risk of burn injuries due to contact with hot surfaces.
Slight or moderate injury possible.
⇨ Wear protective gloves.

Heat bearing inner ring.

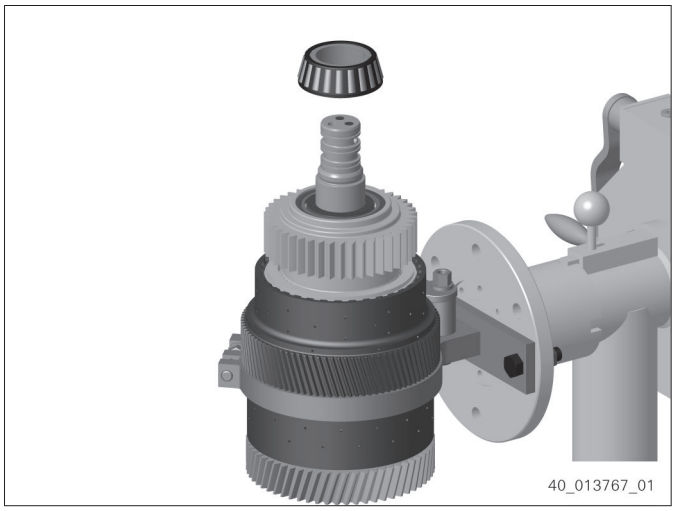


Fig. 205

75. Slide on bearing inner ring until contact is obtained.

76. Let bearing inner ring cool down.

77. Adjust bearing inner ring.

78. Turn disk carrier by 90.

79. Use 5870.401.118 [Groove nut wrench] and 5870.401.115 [Groove nut wrench] to tighten the slotted nut.
Tightening torque: 550 Nm

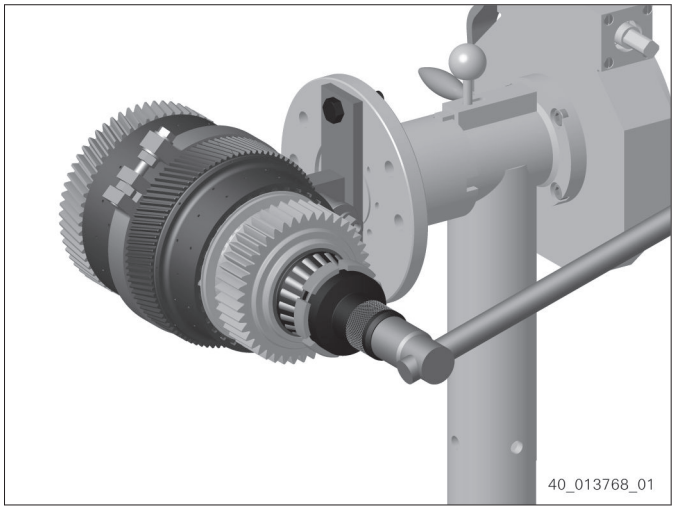


Fig. 206

80. Check function of the clutches by applying compressed air.

→ Closing and opening of the clutch is clearly audible.

If closing and opening is not audible, disassemble and check clutch.

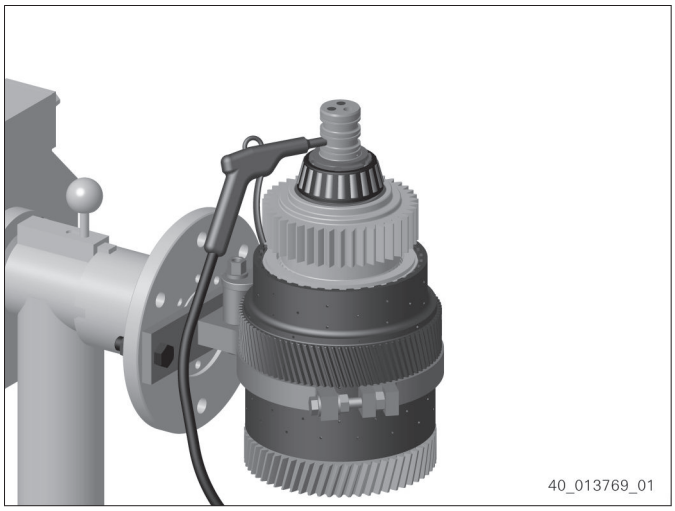


Fig. 207

81. Grease annular grooves of shaft.

82. Insert R-rings (1).

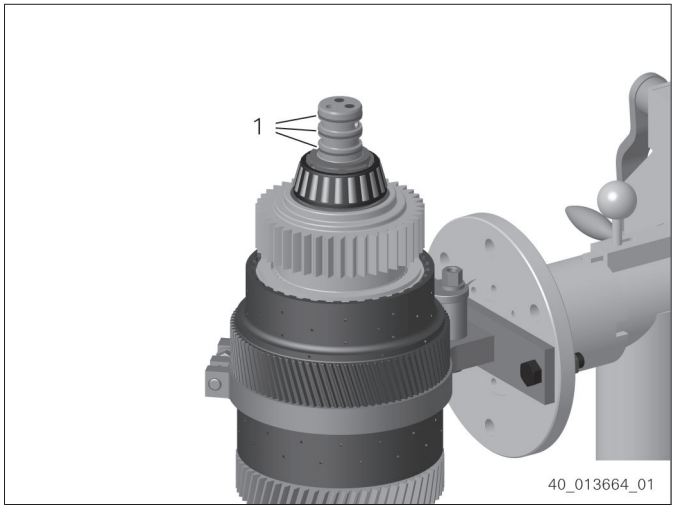


Fig. 208

Assembling clutch KR/K2

Special tools:

- 5870.350.000 Assembly truck
- 5870.654.033 Assembly fixture
- 5870.320.014 Assembly fixture
- 5870.320.018 Inserting tool
- 5870.320.019 Press-in mandrel
- 5870.345.072 Assembly fixture
- 5870.401.099 Groove nut wrench
- AA02.769.745 Slotted nut wrench

1. Fasten disk carrier to 5870.350.000 [Assembly truck] using 5870.654.033 [Assembly fixture].

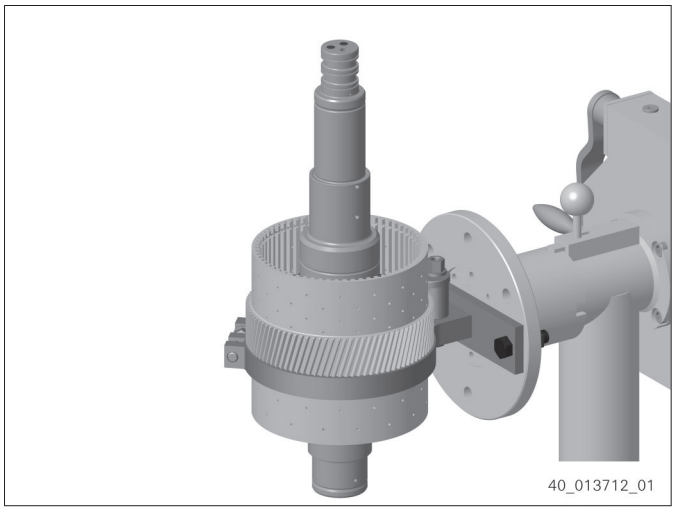


Fig. 209

Assembling disk carrier

2. Turn disk carrier by 180.

3. Insert sealing plug (1) into hole with 5870.320.014 [Assembly fixture] and 5870.320.018 [Inserting tool].

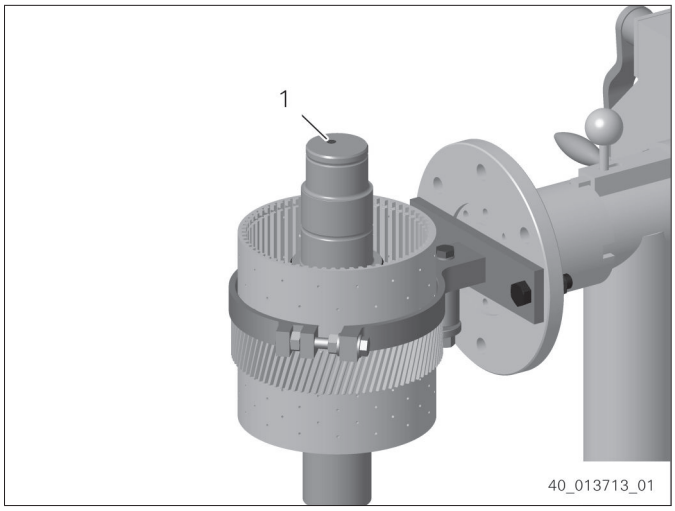


Fig. 210

4. Flush-mount valve (1) using 5870.320.019 [Press-in mandrel]. Insert valve with the chamfered side facing downwards.

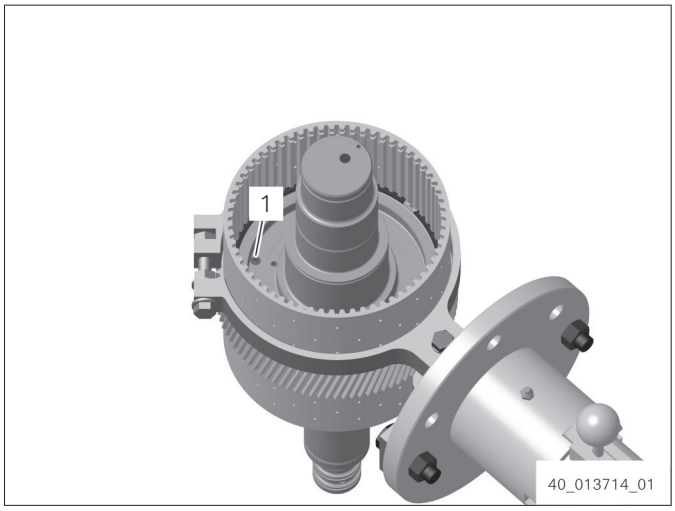


Fig. 211

5. Turn disk carrier by 180.

6. Insert sealing plugs (1) into holes using 5870.320.014 [Assembly fixture] and 5870.320.018 [Inserting tool].

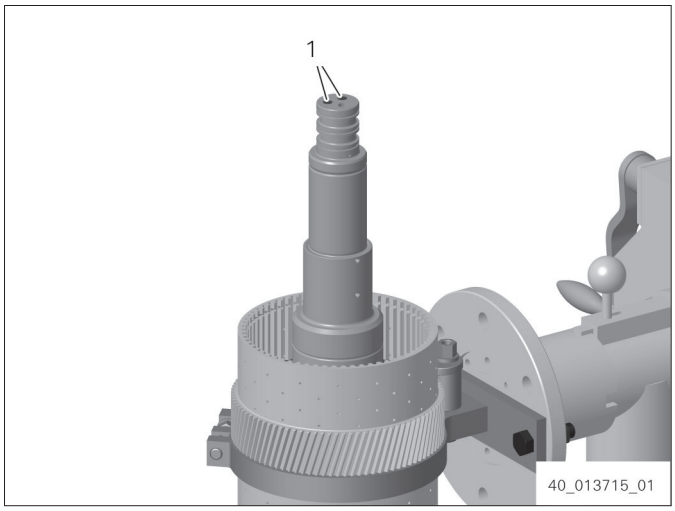


Fig. 212

7. Flush-mount valve (1) using 5870.320.019 [Press-in mandrel]. Insert valve with the chamfered side facing downwards.

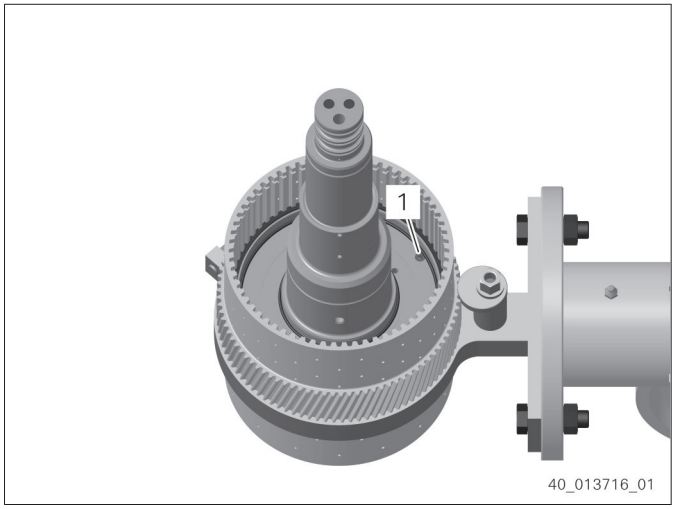


Fig. 213

8. Apply oil to O-rings (1) and insert them twist-free into annular grooves of the piston.

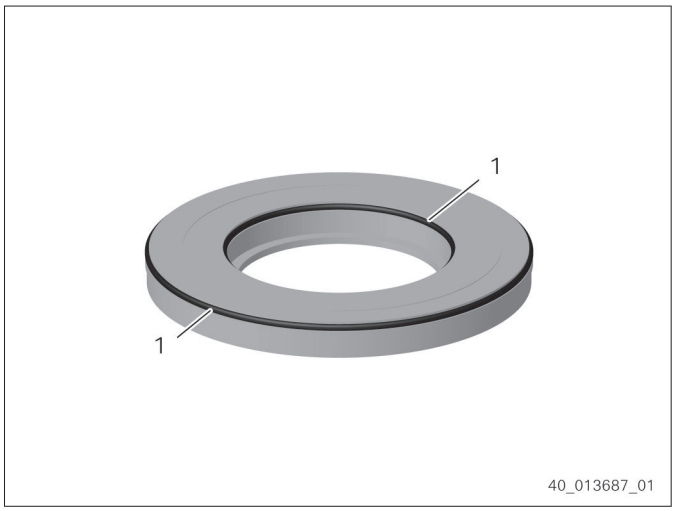


Fig. 214

9. Oil O-rings and piston bearing surfaces.

10. Insert piston (1) into the disk carrier until contact is obtained.

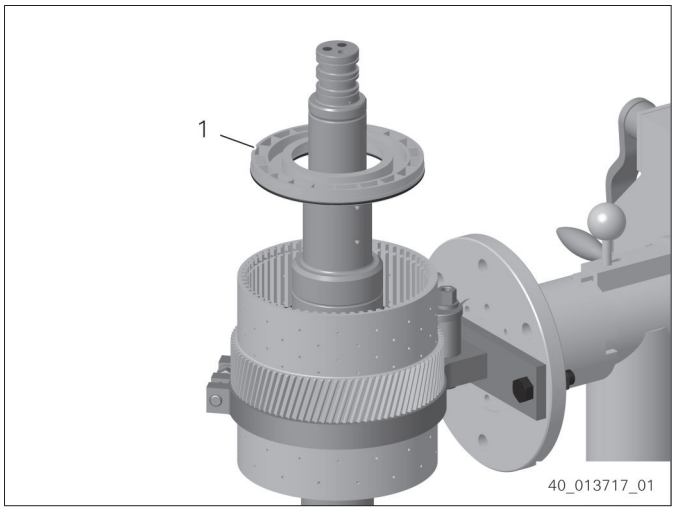


Fig. 215

11. Slide on intermediate washer (2) and compression spring (1).

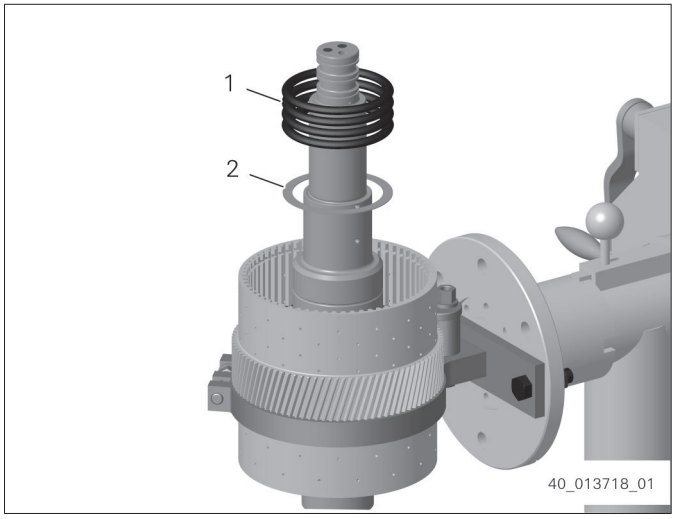


Fig. 216

12. Place guide ring (2) onto compression spring with chamfer facing upwards.

13. Slide on snap ring (1).

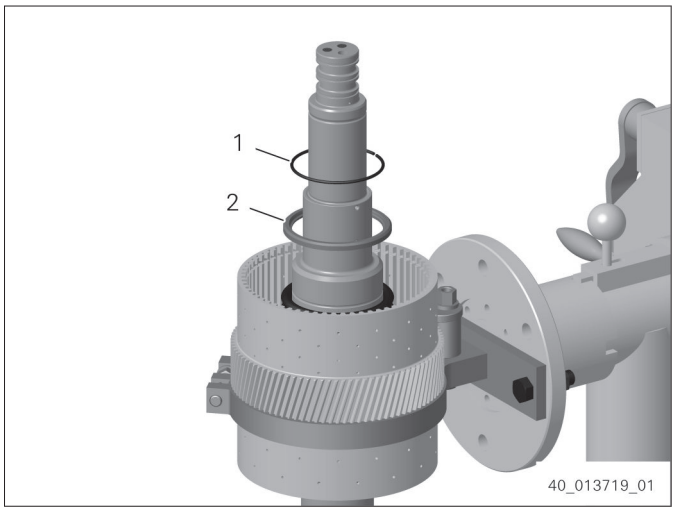


Fig. 217

14. Press guide ring downwards with 5870.345.072 [Assembly fixture] and hand-operated press and hold it there.

15. Insert snap ring into annular groove of disk carrier.

16. Release hand-operated press.

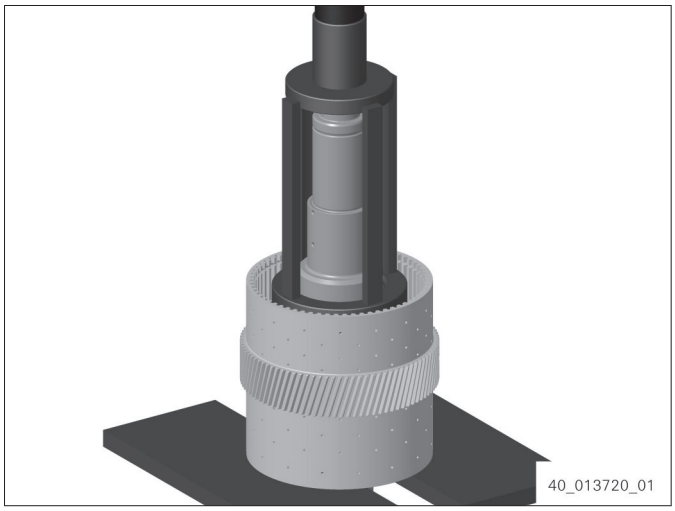


Fig. 218

17. Turn disk carrier by 180.

18. Apply oil to O-rings and insert them twist-free into annular grooves of the piston.

19. Oil O-rings and piston bearing surfaces.

20. Insert piston into the disk carrier until contact is obtained.

21. Slide on intermediate washer and compression spring.

22. Place guide ring onto compression spring with chamfer facing upwards.

23. Slide on snap ring.

24. Press guide ring downwards with 5870.345.072 [Assembly fixture] and hand-operated press and hold it there.

25. Insert snap ring into annular groove of disk carrier.

26. Release hand-operated press.

27. Fasten disk carrier to 5870.350.000 [Assembly truck] using 5870.654.033 [Assembly fixture].

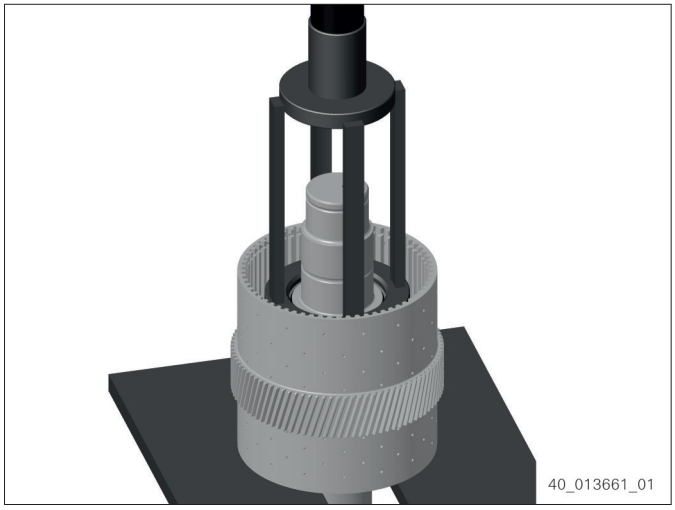


Fig. 219

Assembling clutch KR

28. To ensure a correct measuring result, install single parts without oil for the time being.

Insert outer disks and inner disks.
Insert first outer disk with the uncoated side facing the piston.
Insert last outer disk with the uncoated side facing the end shim.
For the arrangement refer to the current spare parts list.

Thickness of the two optional inner disks must not differ by more than 0.7 mm.

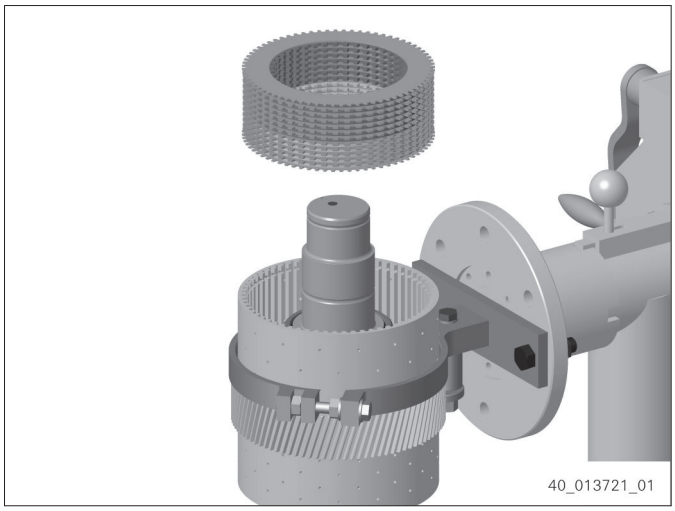


Fig. 220

29. Insert end shim (2).

30. Insert snap ring e. g. 2.60 mm (1).

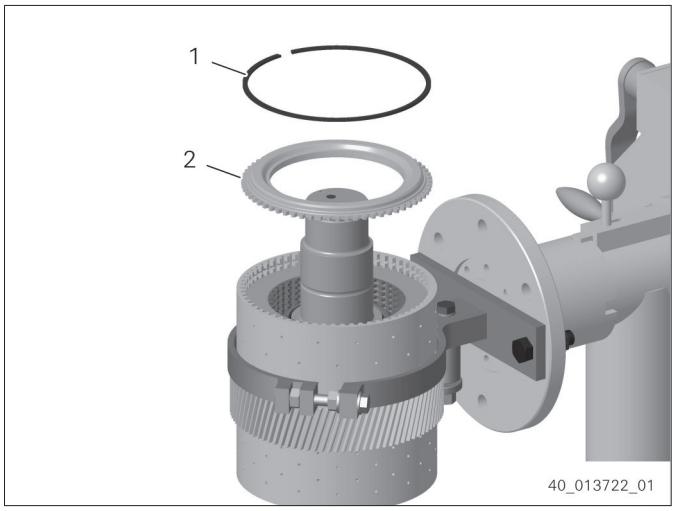


Fig. 221

31. Position dial gauge on the end shim.

32. Push end shim downwards with 100 N and set dial gauge to zero.

33. Lift end shim until contact with snap ring is obtained and check the necessary Disk clearance 2.8 mm to 3.0 mm.
If the disk clearance is too small, insert thinner inner disks or (and) a thinner snap ring.
If disk clearance is too big, install thicker inner disks or (and) and a thicker snap ring.

Thickness of the two optional inner disks must not differ by more than 0.7 mm.

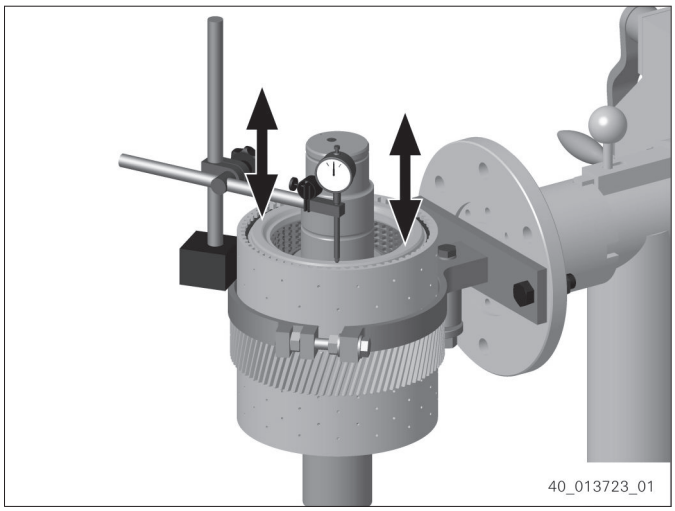


Fig. 222

34. Carry out the following two work steps immediately one after the other.

⚠ CAUTION

Risk of burn injuries due to contact with hot surfaces.
Slight or moderate injury possible.
⇨ Wear protective gloves.

Heat bearing inner ring.

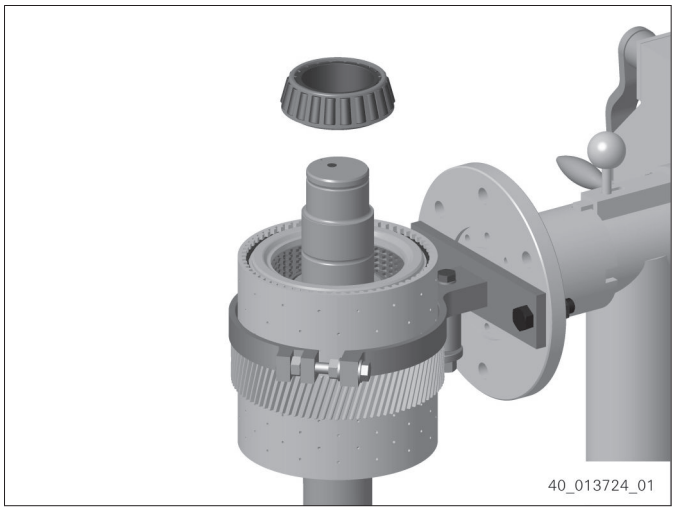


Fig. 223

35. Slide on bearing inner ring until contact is obtained.

36. Let bearing inner ring cool down.

37. Adjust bearing inner ring.

38. Slide spur gear (1) onto shaft until contact is obtained. Insert spur gear into disk package by short mutual rotary motions.

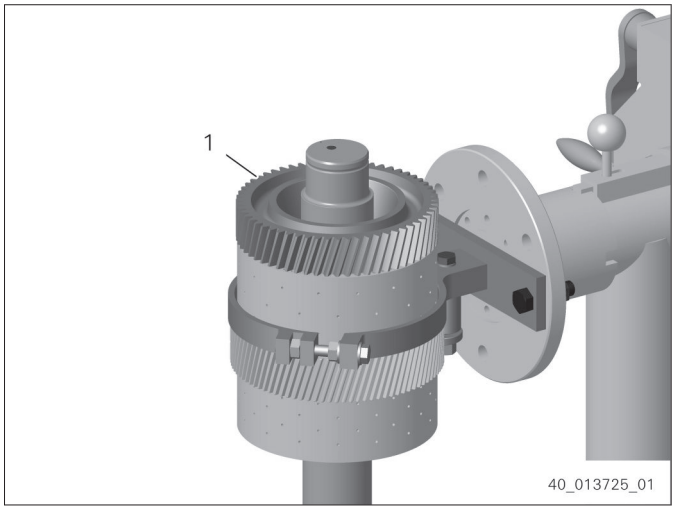


Fig. 224

39. Slide on ring with the recesses facing downwards.

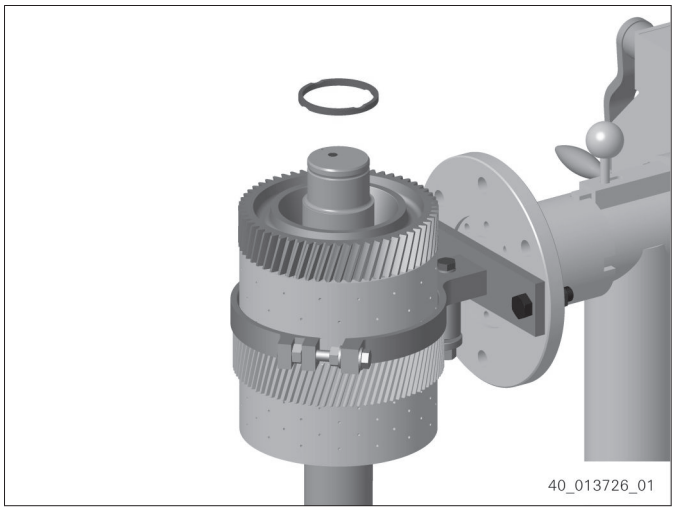


Fig. 225

40. Carry out the following two work steps immediately one after the other.

⚠ CAUTION

Risk of burn injuries due to contact with hot surfaces.
Slight or moderate injury possible.
⇨ Wear protective gloves.

Heat bearing inner ring.

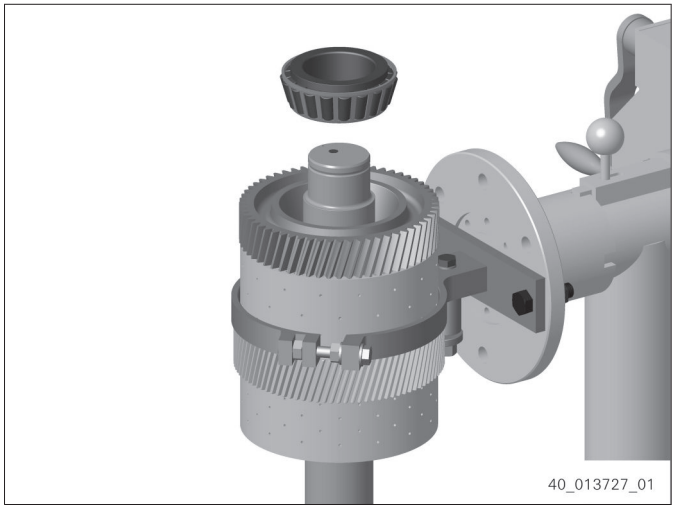


Fig. 226

41. Slide on bearing inner ring until contact is obtained.

42. Let bearing inner ring cool down.

43. Adjust bearing inner ring.

44. Carry out the following two work steps immediately one after the other.

⚠ CAUTION

Risk of burn injuries due to contact with hot surfaces.
Slight or moderate injury possible.
⇨ Wear protective gloves.

Heat bearing inner ring.

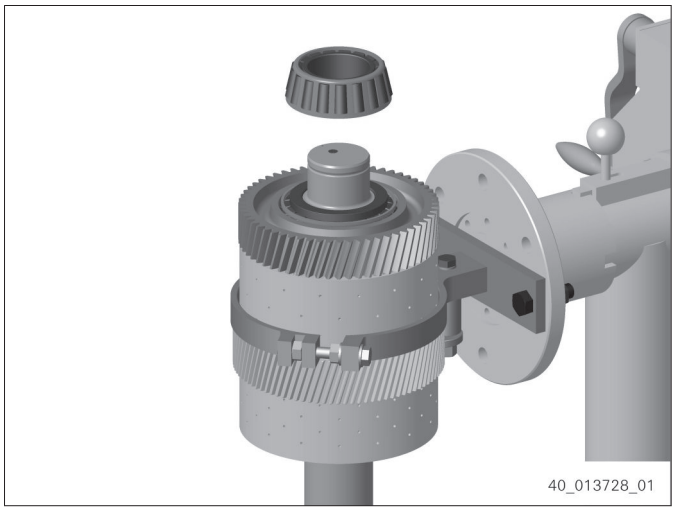


Fig. 227

45. Slide on bearing inner ring until contact is obtained.

46. Let bearing inner ring cool down.

47. Adjust bearing inner ring.

48. Turn disk carrier by 90.

49. Tighten slotted nut with 5870.401.099 [Groove nut wrench].
Tightening torque: 800 Nm

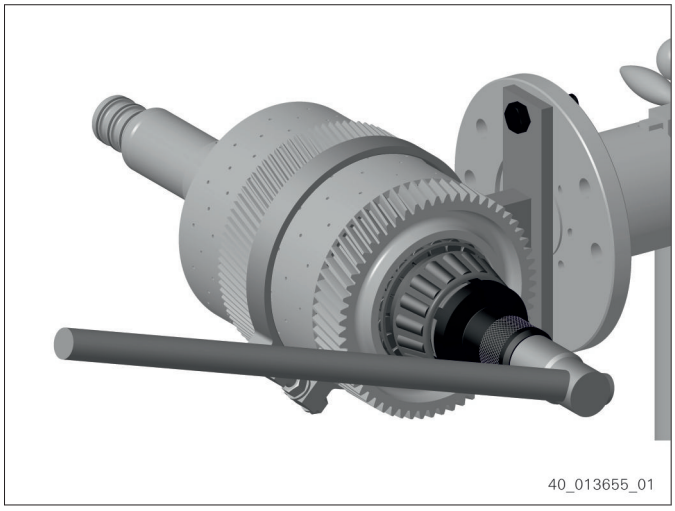


Fig. 228

Assembling clutch K2

50. Turn disk carrier by 90.

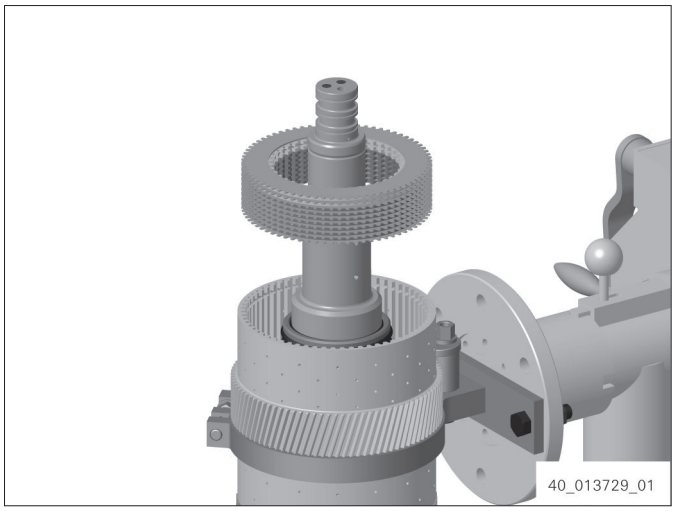


Fig. 229

51. To ensure a correct measuring result, install single parts without oil for the time being.

    Insert outer disks and inner disks.
    Insert first outer disk with the uncoated side facing the piston.
    Insert last outer disk with the uncoated side facing the end shim.

    For the arrangement refer to the current spare parts list.

    Thickness of the two optional inner disks must not differ by more than 0.7 mm.

52. Insert end shim (2).

53. Insert snap ring e. g. 2.60 mm (1).

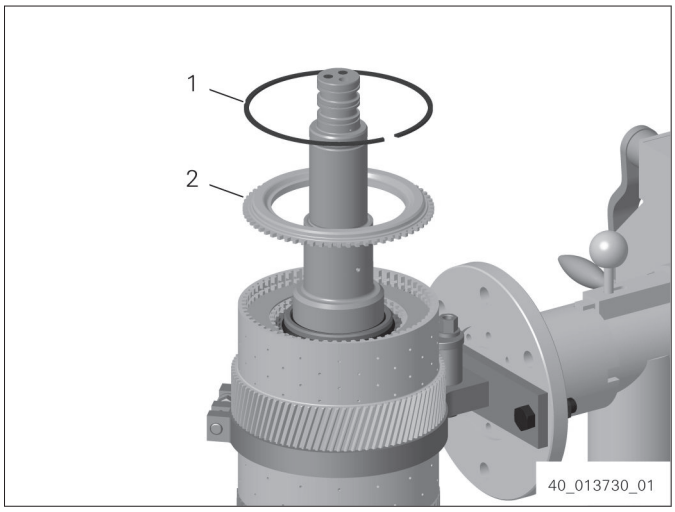


Fig. 230

54. Position dial gauge on the end shim.

55. Push end shim downwards with 100 N and set dial gauge to zero.

56. Lift end shim until contact with snap ring is obtained and check the necessary Disk clearance 2.2 mm to 2.4 mm.
    If the disk clearance is too small, insert thinner inner disks or (and) a thinner snap ring.
    If disk clearance is too big, install thicker inner disks or (and) and a thicker snap ring.

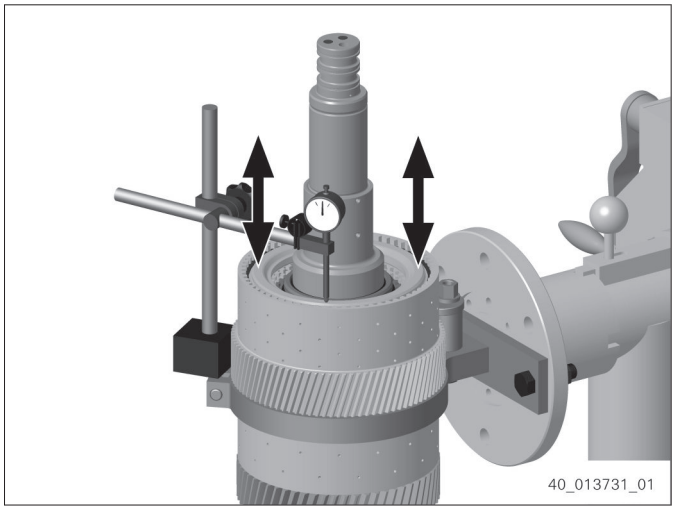


Fig. 231

Thickness of the two optional inner disks must not differ by more than 0.7 mm.

57. Carry out the following two work steps immediately one after the other.

⚠ CAUTION

Risk of burn injuries due to contact with hot surfaces.
Slight or moderate injury possible.
⇨ Wear protective gloves.

Heat bearing inner ring.

58. Slide on bearing inner ring (1) until contact is obtained.

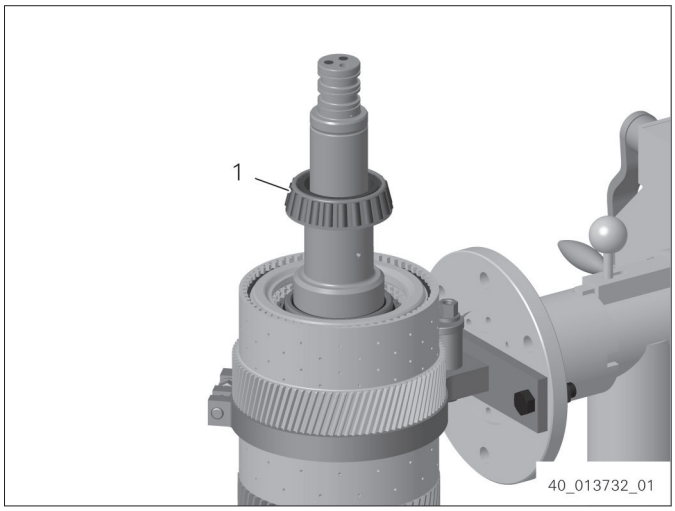


Fig. 232

59. Let bearing inner ring cool down.

60. Adjust bearing inner ring.

61. **⚠ CAUTION**

Risk of burn injuries due to contact with cold surface.
Slight to moderate injury possible.
⇨ Wear protective gloves.

Undercool gear (1).

62. **⚠ CAUTION**

Risk of burn injuries due to contact with hot surfaces.
Slight or moderate injury possible.
⇨ Wear protective gloves.

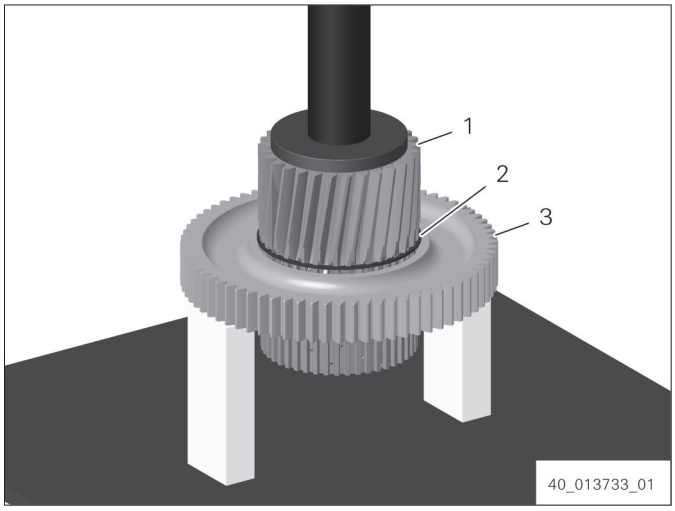


Fig. 233

Heat up the gear (3).

63. Carry out the following three work steps immediately one after the other.

Insert snap ring (2) into annular groove of the gear (1).

64. Insert gear (1) into gear (3).

65. **⚠ CAUTION**

Risk of crushing due to hydraulic tool.
Slight to moderate injury possible.
⇨ Do not reach into danger area.

Push snap ring (2) into annular groove and force gear (1) into gear (3), until snap ring engages audibly.

66. Slide gear (1) onto shaft until contact is obtained. Insert gear into the disk package by short mutual rotary motions.

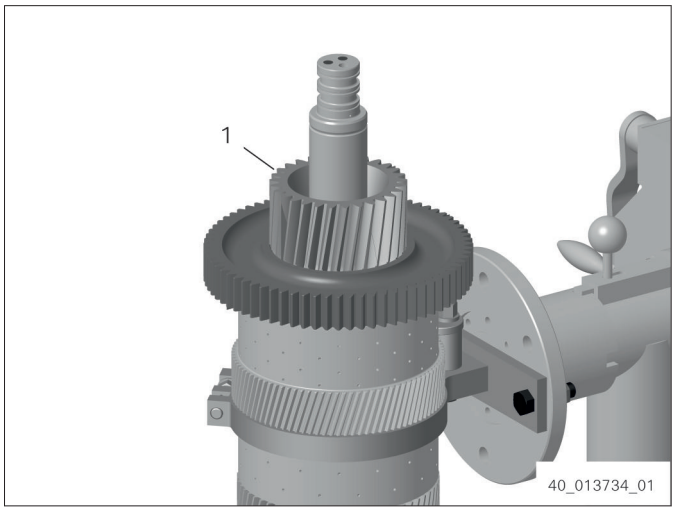


Fig. 234

67. Carry out the following two work steps immediately one after the other.

⚠ CAUTION

Risk of burn injuries due to contact with hot surfaces.
Slight or moderate injury possible.
⇨ Wear protective gloves.

Heat bearing inner ring.

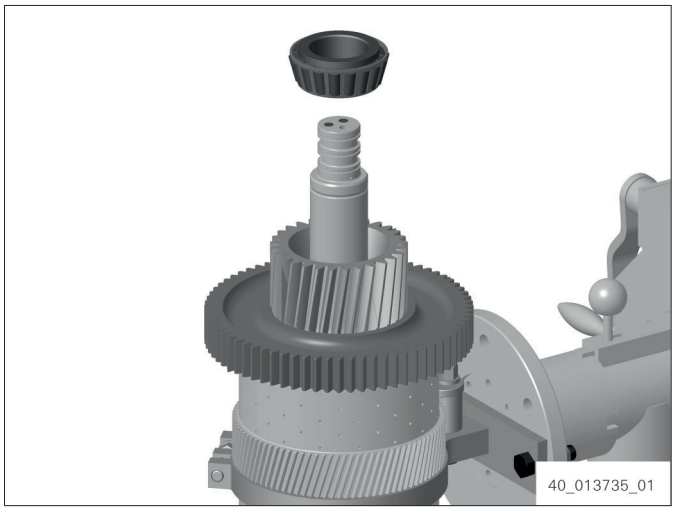


Fig. 235

68. Slide on bearing inner ring until contact is obtained.

69. Let bearing inner ring cool down.

70. Adjust bearing inner ring.

71. Carry out the following two work steps immediately one after the other.

⚠ CAUTION

Risk of burn injuries due to contact with hot surfaces.
Slight or moderate injury possible.
⇨ Wear protective gloves.

Heat bearing inner ring.

72. Slide on bearing inner ring until contact is obtained.

73. Let bearing inner ring cool down.

74. Adjust bearing inner ring.

75. Turn disk carrier by 90.

76. Tighten slotted nut with AA02.769.745 [Slotted nut wrench].
Tightening torque: 800 Nm

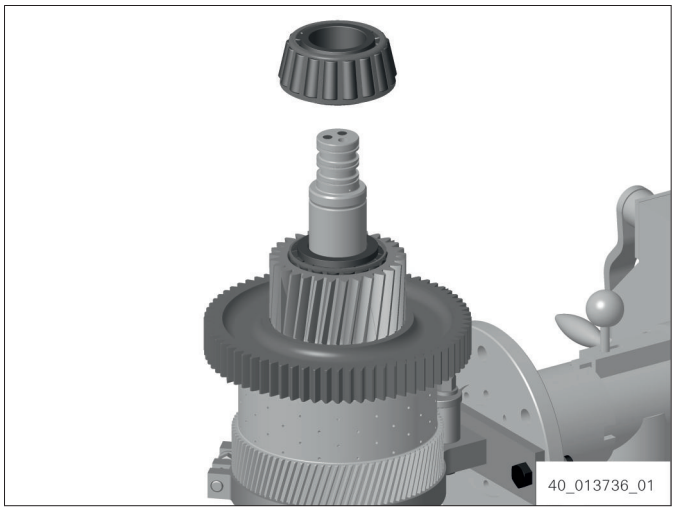


Fig. 236

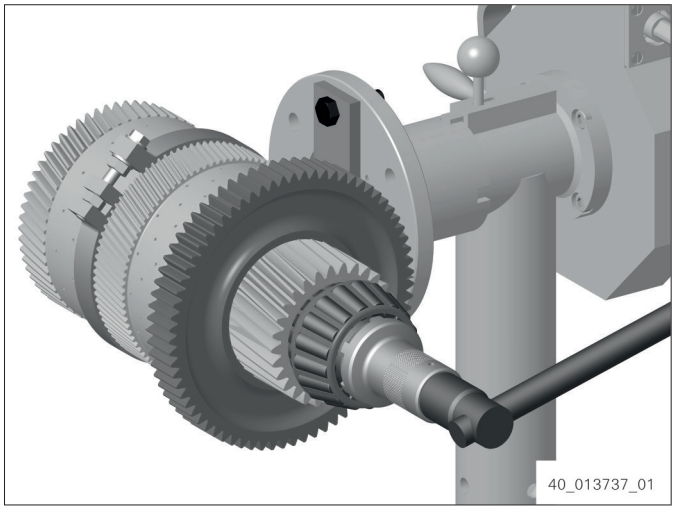


Fig. 237

77. Check function of the clutches by applying compressed air.

    → Closing and opening of the clutch is clearly audible.

    If closing and opening is not audible, disassemble and check clutch.

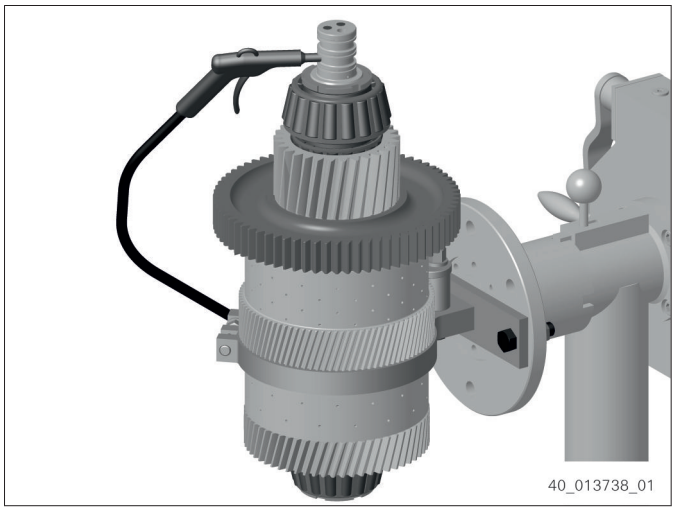


Fig. 238

78. Grease annular grooves of shaft.

79. Insert R-rings (1).

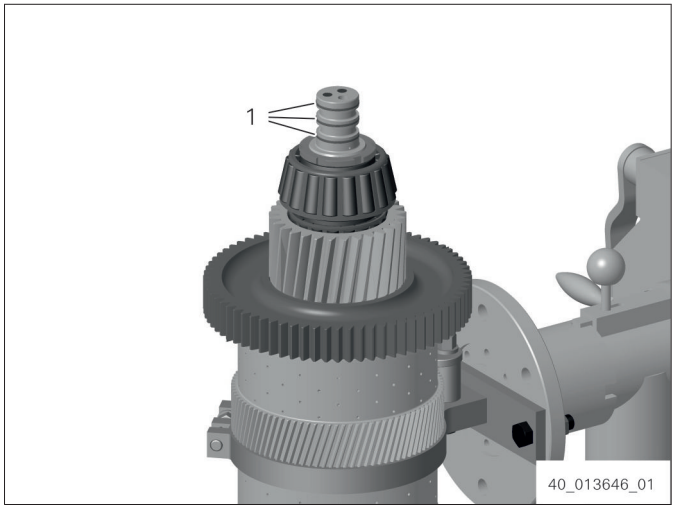


Fig. 239

Assembling clutch K3/K4

Special tools:

- 5870.350.000 Assembly truck
- 5870.654.033 Assembly fixture
- 5870.320.014 Assembly fixture
- 5870.320.018 Inserting tool
- 5870.320.019 Press-in mandrel
- 5870.345.072 Assembly fixture
- 5870.401.118 Groove nut wrench
- 5870.401.115 Groove nut wrench
- 5870.345.033 Assembly fixture
- AA00.317.255 Load ring

1. Fasten disk carrier to 5870.350.000 [Assembly truck] using 5870.654.033 [Assembly fixture].

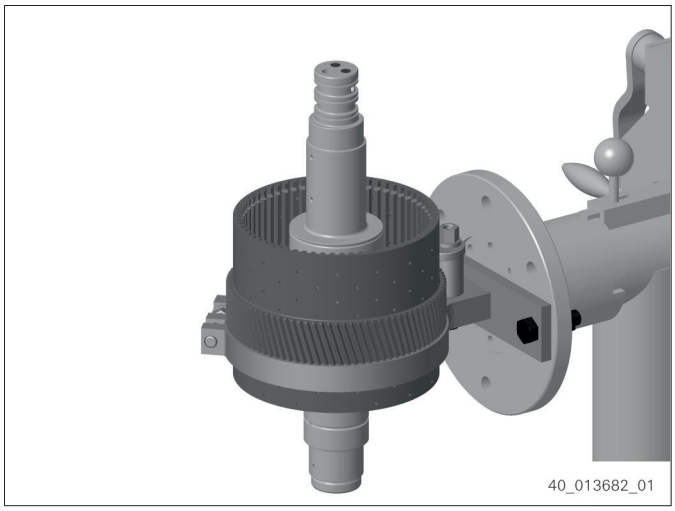


Fig. 240

Assembling disk carrier

2. Turn disk carrier by 180.

3. Insert sealing plug (1) into hole with 5870.320.014 [Assembly fixture] and 5870.320.018 [Inserting tool].

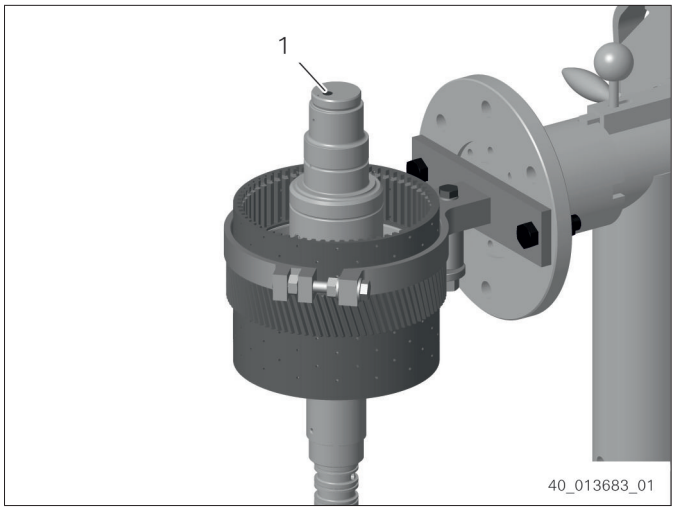


Fig. 241

4. Flush-mount valve (1) using 5870.320.019 [Press-in mandrel]. Insert valve with the chamfered side facing downwards.

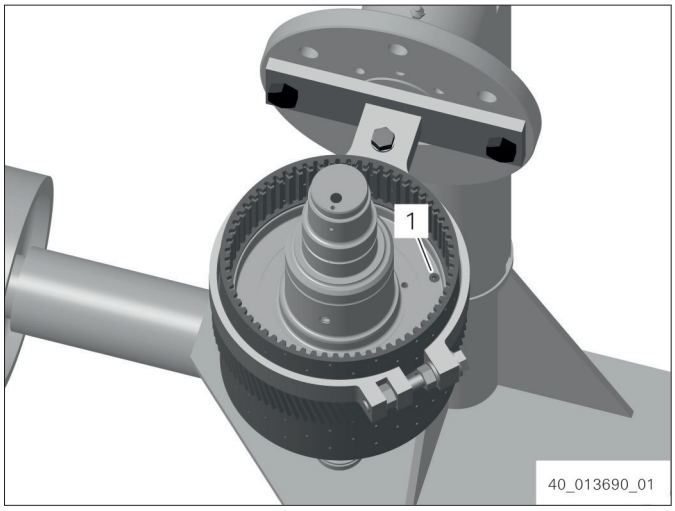


Fig. 242

5. Turn disk carrier by 180.

6. Insert sealing plugs (1) into holes using 5870.320.014 [Assembly fixture] and 5870.320.018 [Inserting tool].

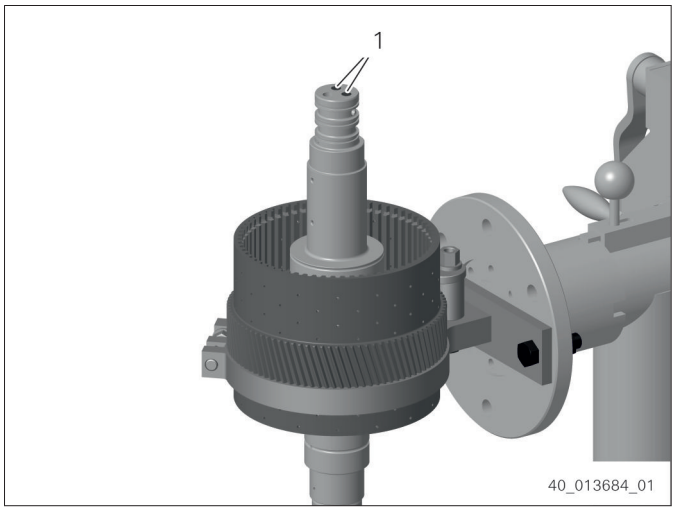


Fig. 243

7. Flush-mount valve (1) using 5870.320.019 [Press-in mandrel]. Insert valve with the chamfered side facing downwards.

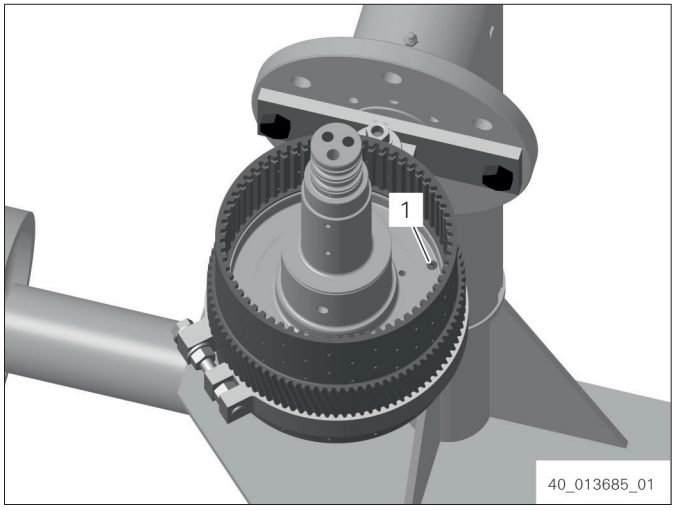


Fig. 244

8. Apply oil to O-rings (1) and insert them twist-free into annular grooves of the piston.

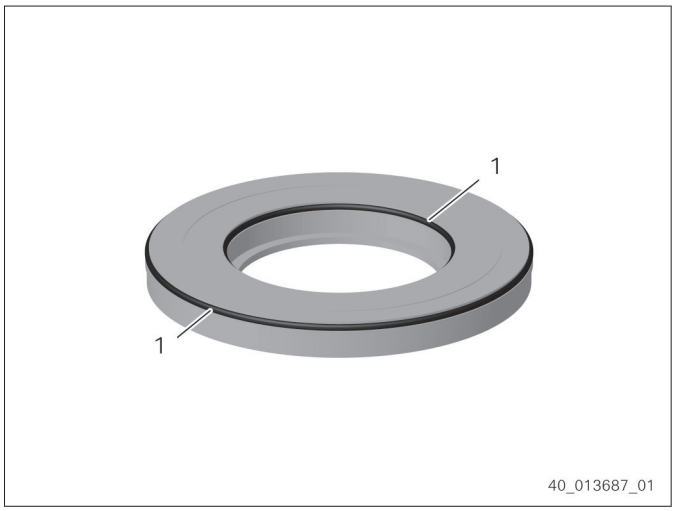


Fig. 245

9. Oil O-rings and piston bearing surfaces.

10. Insert piston (1) into the disk carrier until contact is obtained.

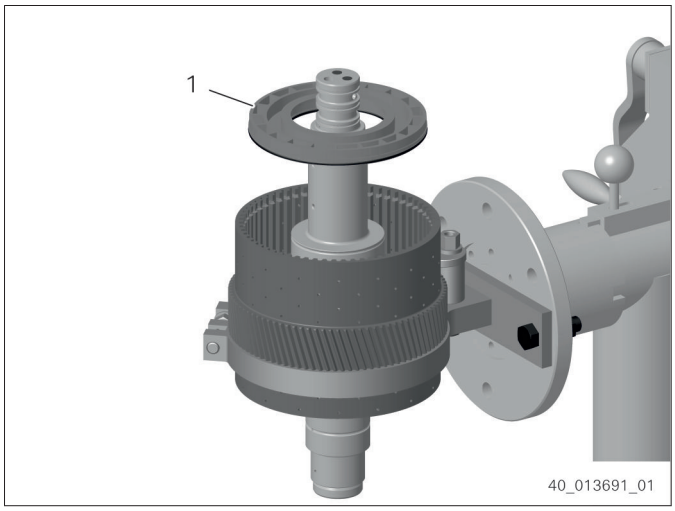


Fig. 246

11. Slide on intermediate washer (2) and compression spring (1).

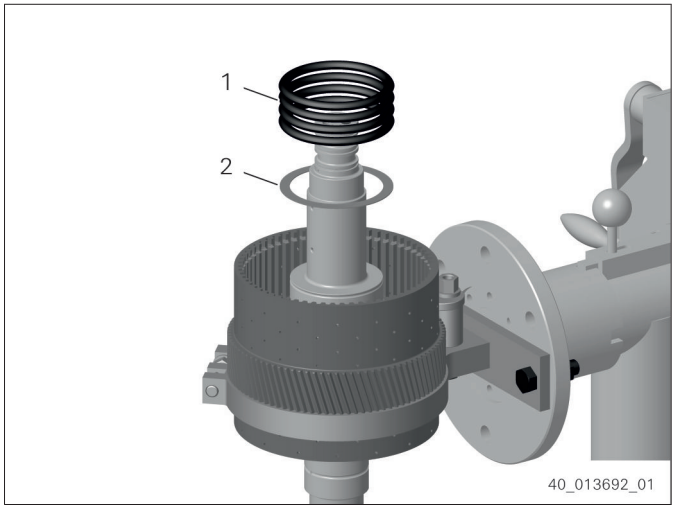


Fig. 247

12. Place guide ring (2) onto compression spring with chamfer facing upwards.

13. Slide on snap ring (1).

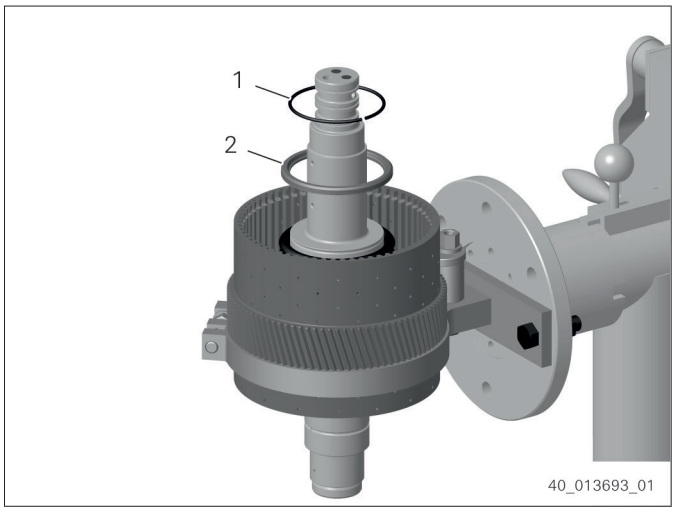


Fig. 248

14. Press guide ring downwards with 5870.345.072 [Assembly fixture] and hand-operated press and hold it there.

15. Insert snap ring into annular groove of disk carrier.

16. Release hand-operated press.

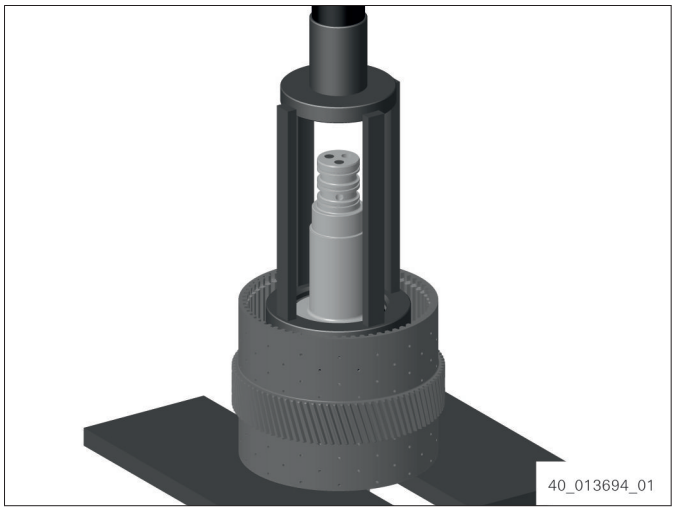


Fig. 249

17. Turn disk carrier by 180.

18. Apply oil to O-rings and insert them twist-free into annular grooves of the piston.

19. Oil O-rings and piston bearing surfaces.

20. Insert piston into the disk carrier until contact is obtained.

21. Slide on intermediate washer and compression spring.

22. Place guide ring onto compression spring with chamfer facing upwards.

23. Slide on snap ring.

24. Press guide ring downwards with 5870.345.072 [Assembly fixture] and hand-operated press and hold it there.

25. Insert snap ring into annular groove of disk carrier.

26. Release hand-operated press.

27. Fasten disk carrier to 5870.350.000 [Assembly truck] using 5870.654.033 [Assembly fixture].

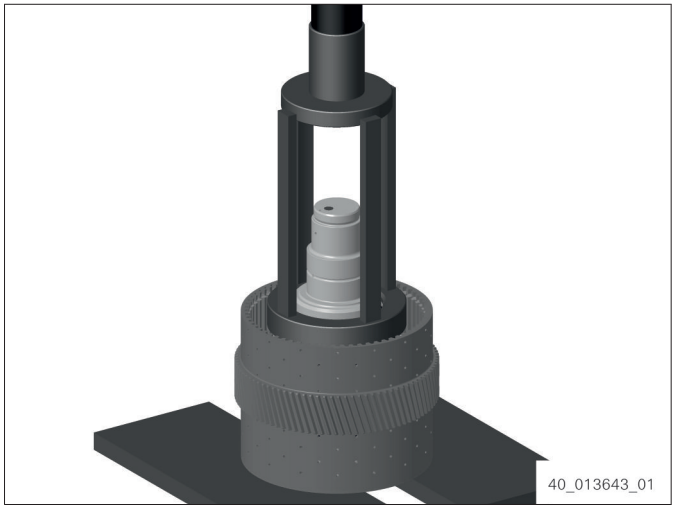


Fig. 250

Assembling clutch K4

28. To ensure a correct measuring result, install single parts without oil for the time being.

Insert outer disks and inner disks.
Insert first outer disk with the uncoated side facing the piston.
Insert last outer disk with the uncoated side facing the end shim.

For the arrangement refer to the current spare parts list.

Thickness of the two optional inner disks must not differ by more than 0.7 mm.

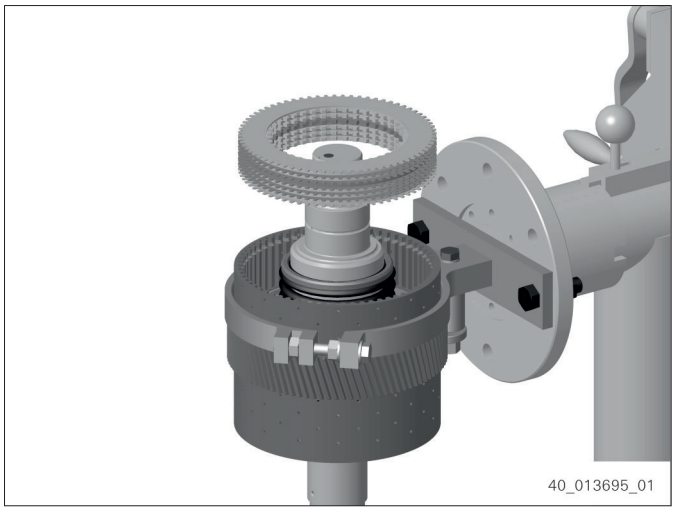


Fig. 251

29. Insert end shim (2).

30. Insert snap ring e. g. 2.60 mm (1).

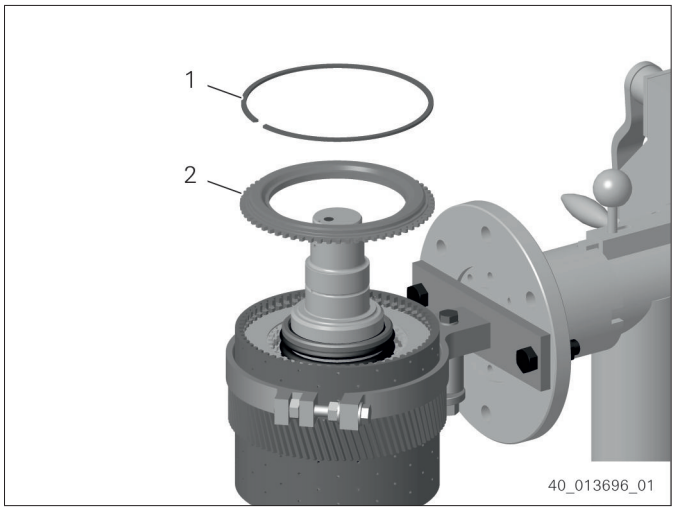


Fig. 252

31. Position dial gauge on the end shim.

32. Push end shim downwards with 100 N and set dial gauge to zero.

33. Lift end shim until contact with snap ring is obtained and check the necessary Disk clearance 2.2 mm to 2.4 mm.
If the disk clearance is too small, insert thinner inner disks or (and) a thinner snap ring.
If disk clearance is too big, install thicker inner disks or (and) and a thicker snap ring.

Thickness of the two optional inner disks must not differ by more than 0.7 mm.

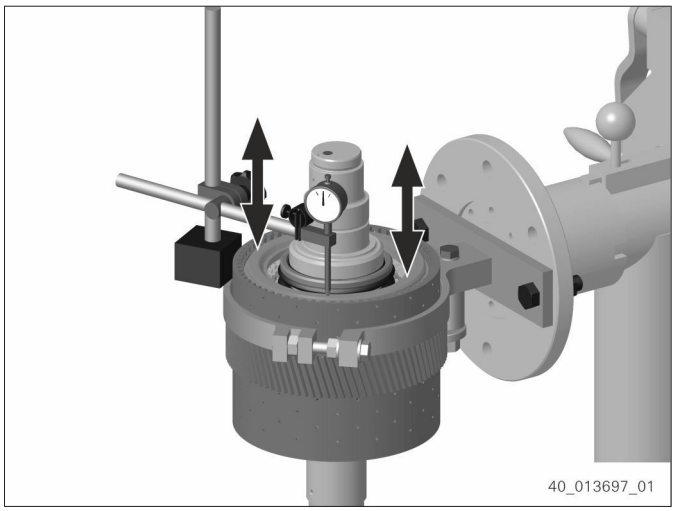


Fig. 253

34. Carry out the following two work steps immediately one after the other.

⚠ CAUTION

Risk of burn injuries due to contact with hot surfaces.
Slight or moderate injury possible.
⇨ Wear protective gloves.

Heat bearing inner ring.

35. Slide on bearing inner ring until contact is obtained.

36. Let bearing inner ring cool down.

37. Adjust bearing inner ring.

38. Slide on washer with recesses facing downwards.

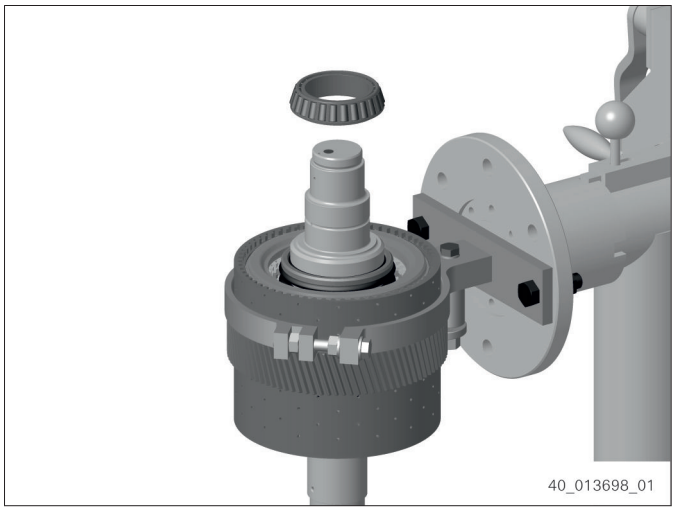


Fig. 254

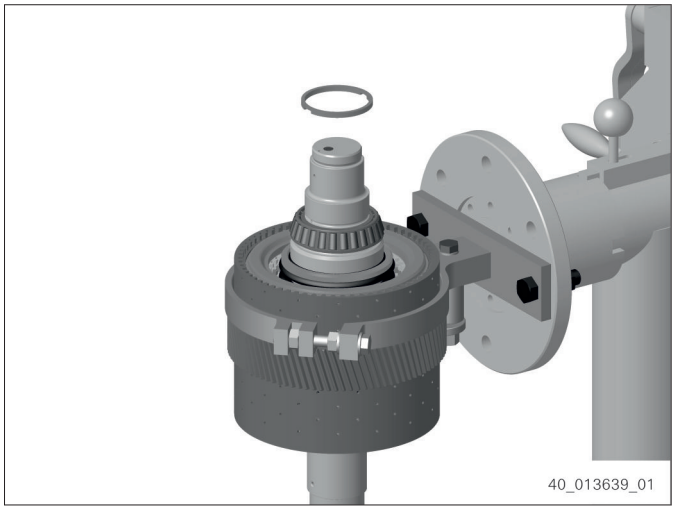


Fig. 255

39. Insert bearing outer rings into helical gear until contact is obtained.

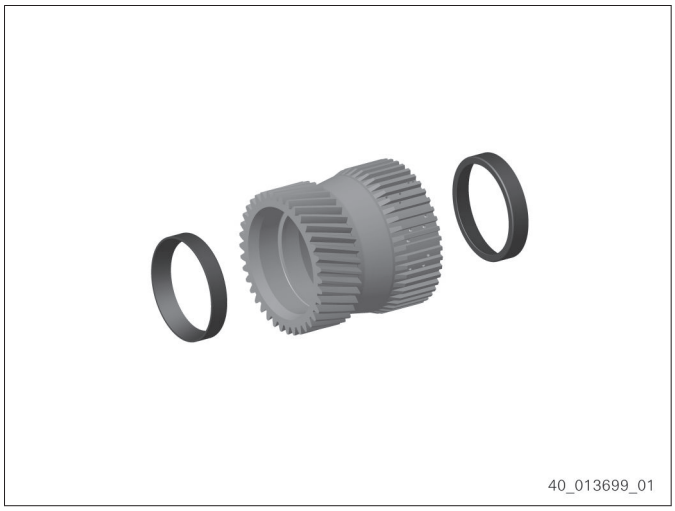


Fig. 256

40. Slide helical gear (1) onto shaft until contact is obtained. Insert helical gear into the disk package by short mutual rotary motions.

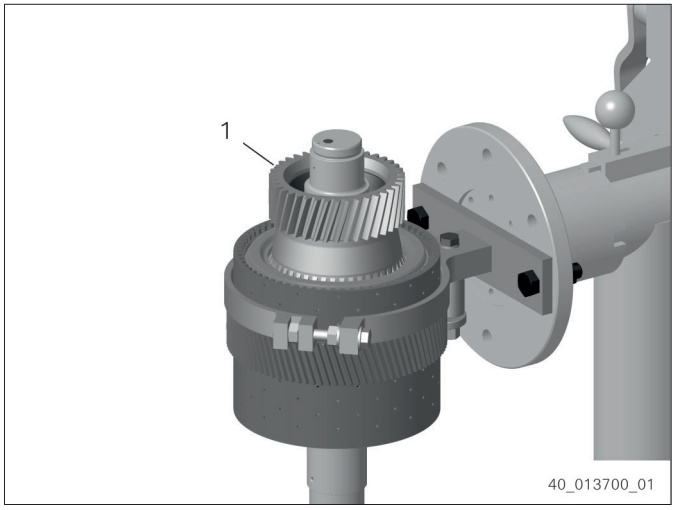


Fig. 257

41. Carry out the following two work steps immediately one after the other.

⚠ CAUTION

Risk of burn injuries due to contact with hot surfaces.
Slight or moderate injury possible.
⇨ Wear protective gloves.

Heat bearing inner ring.

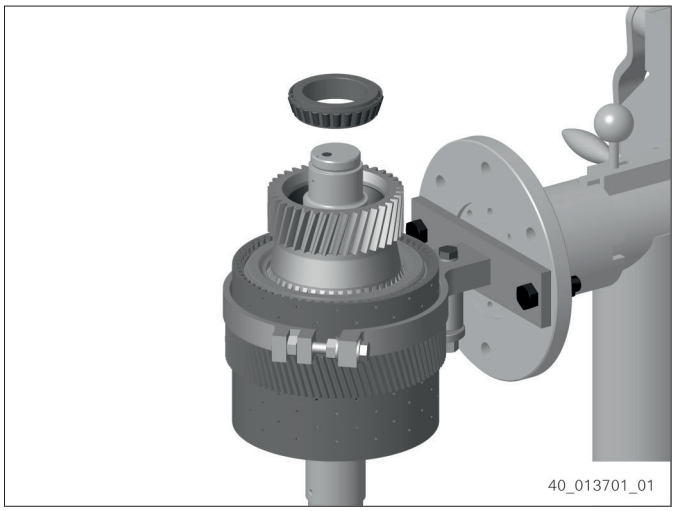


Fig. 258

42. Slide on bearing inner ring until contact is obtained.

43. Let bearing inner ring cool down.

44. Adjust bearing inner ring.

45. Carry out the following two work steps immediately one after the other.

⚠ CAUTION

Risk of burn injuries due to contact with hot surfaces.
Slight or moderate injury possible.
⇨ Wear protective gloves.

Heat bearing inner ring.

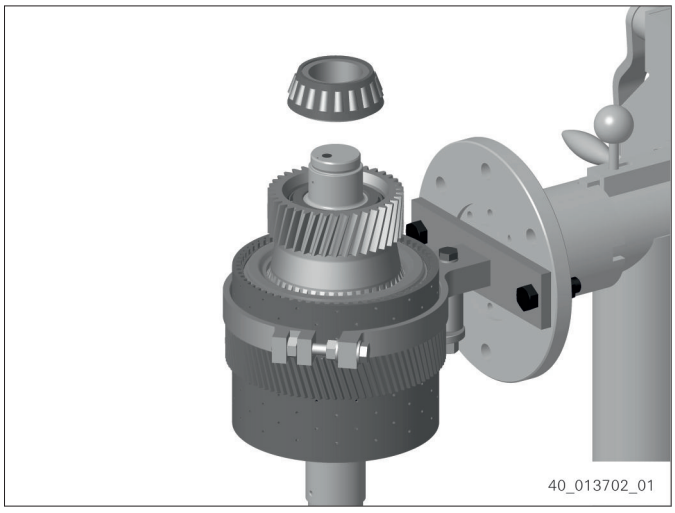


Fig. 259

46. Slide on bearing inner ring until contact is obtained.

47. Let bearing inner ring cool down.

48. Adjust bearing inner ring.

49. Turn disk carrier by 90.

50. Use 5870.401.118 [Groove nut wrench] and 5870.401.115 [Groove nut wrench] to tighten the slotted nut.
Tightening torque: 550 Nm

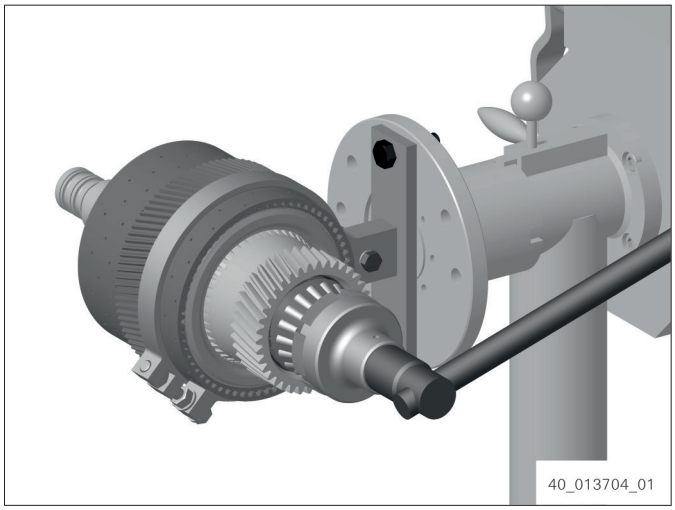


Fig. 260

Assembling clutch K3

51. Turn disk carrier by 90.

52. To ensure a correct measuring result, install single parts without oil for the time being.

Insert outer disks and inner disks.
Insert first outer disk with the uncoated side facing the piston.
Insert last outer disk with the uncoated side facing the end shim.

For the arrangement refer to the current spare parts list.

Thickness of the two optional inner disks must not differ by more than 0.7 mm.

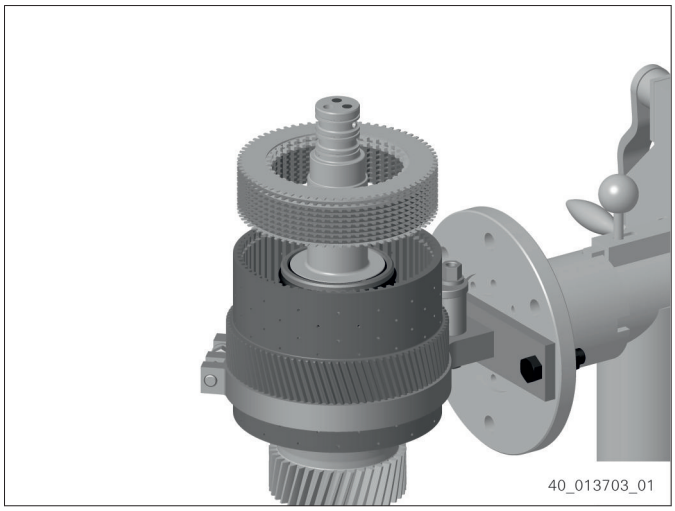


Fig. 261

53. Insert end shim (2).

54. Insert snap ring e. g. 2.60 mm (1).

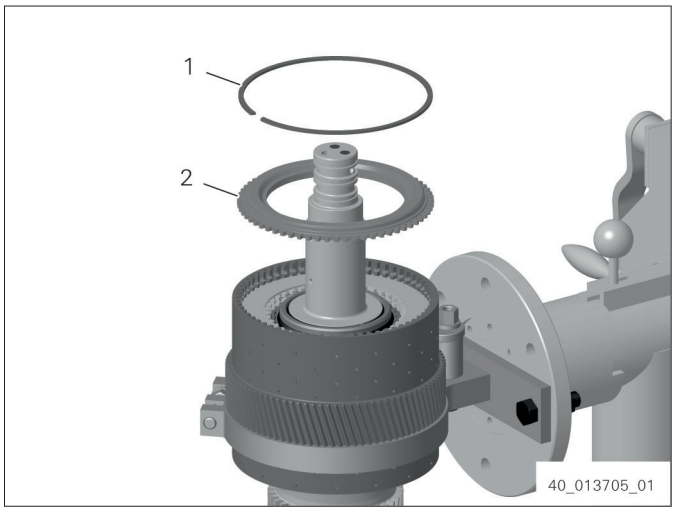


Fig. 262

55. Position dial gauge on the end shim.

56. Push end shim downwards with 100 N and set dial gauge to zero.

57. Lift end shim until contact with snap ring is obtained and check the necessary Disk clearance 2.2 mm to 2.4 mm.
If the disk clearance is too small, insert thinner inner disks or (and) a thinner snap ring.
If disk clearance is too big, install thicker inner disks or (and) and a thicker snap ring.

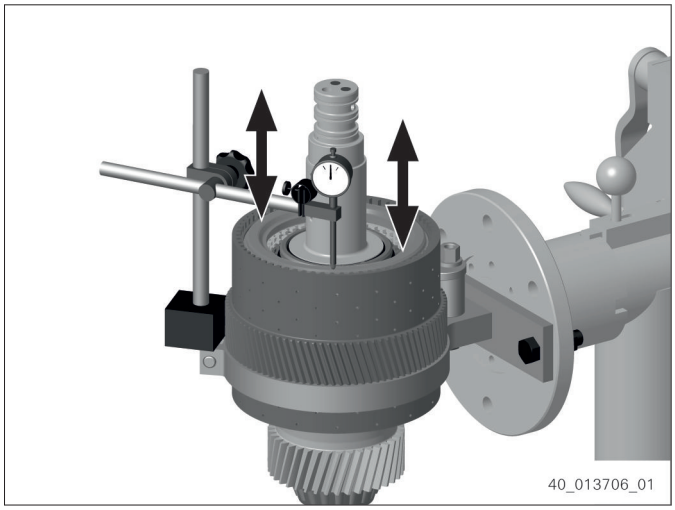


Fig. 263

Thickness of the two optional inner disks must not differ by more than 0.7 mm.

58. Carry out the following two work steps immediately one after the other.

⚠ CAUTION

Risk of burn injuries due to contact with hot surfaces.
Slight or moderate injury possible.
⇨ Wear protective gloves.

Heat bearing inner ring.

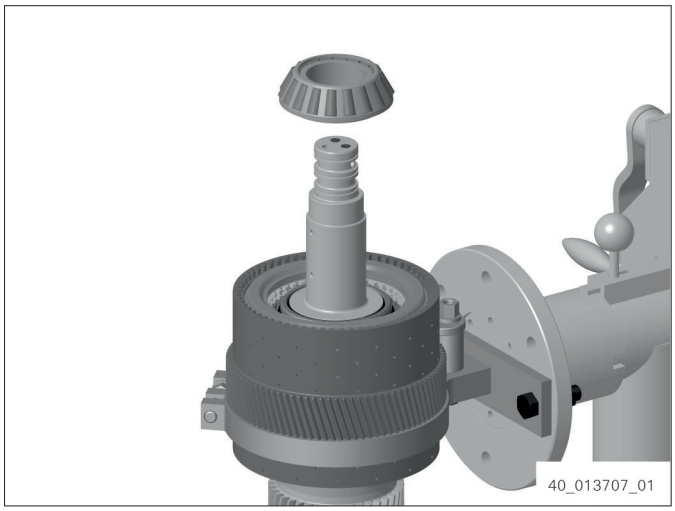


Fig. 264

59. Slide on bearing inner ring until contact is obtained.

60. Let bearing inner ring cool down.

61. Adjust bearing inner ring.

62. Insert bearing outer ring into spur gear until contact is obtained.

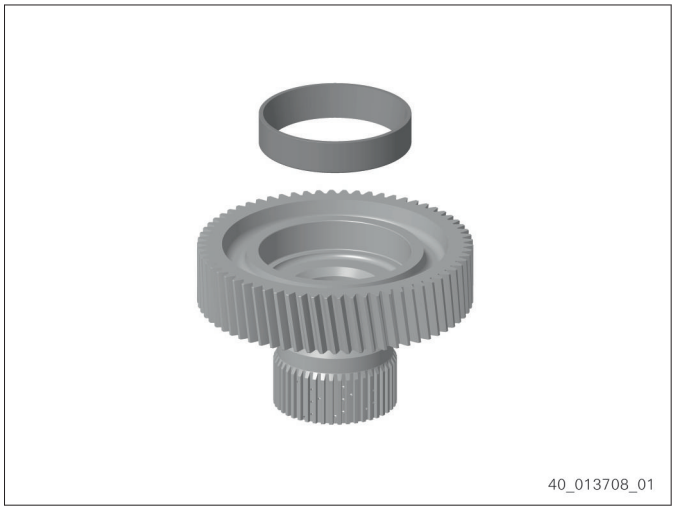


Fig. 265

63. Slide spur gear (1) onto shaft until contact is obtained. Insert spur gear into disk package by short mutual rotary motions.

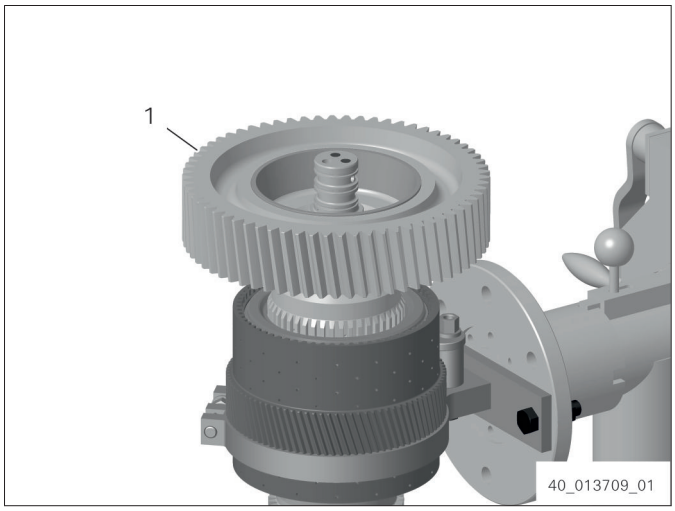


Fig. 266

64. Carry out the following two work steps immediately one after the other.

⚠ CAUTION

Risk of burn injuries due to contact with hot surfaces.
Slight or moderate injury possible.
⇨ Wear protective gloves.

Heat up roller bearing.

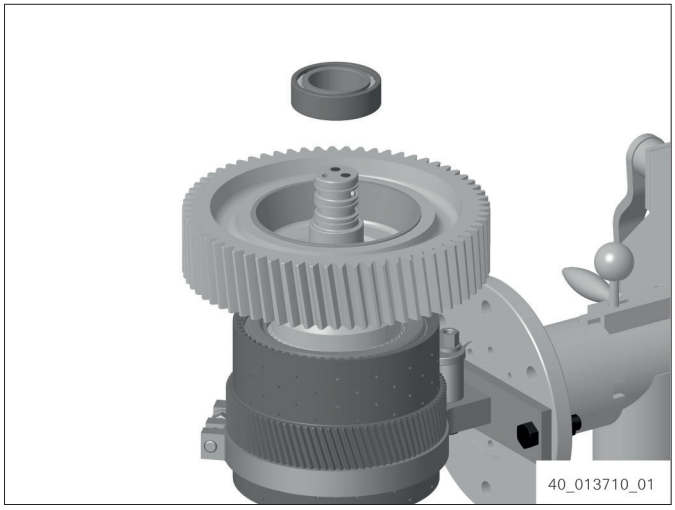


Fig. 267

65. Slide on roller bearing until contact is obtained.

66. Let the roller bearing cool down.

67. Adjust bearing inner ring.

68. Check function of the clutches by applying compressed air.

→ Closing and opening of the clutch is clearly audible.

If closing and opening is not audible, disassemble and check clutch.

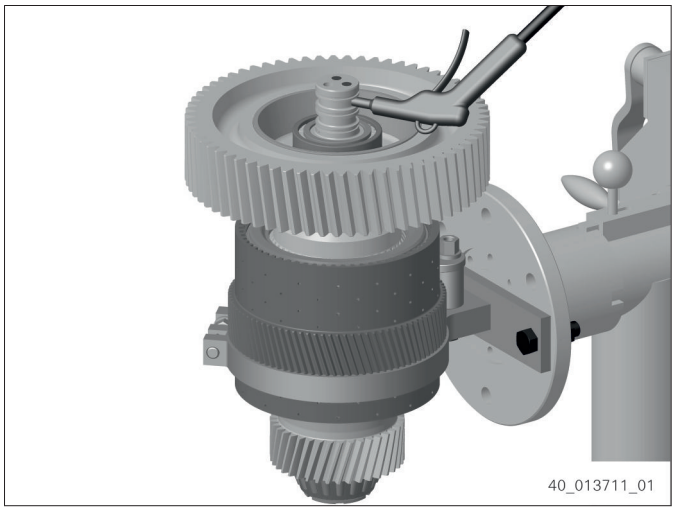


Fig. 268

69. Grease annular grooves of shaft.

70. Insert R-rings (1).

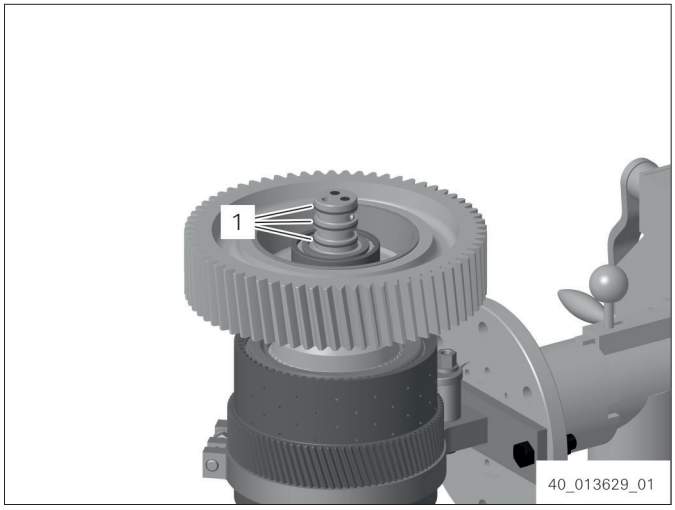


Fig. 269

71. Fix spur gear axially by means of 5870.345.033 [Assembly fixture] and AA00.317.255 [Load ring].

→ Spur gear has been fixed and cannot be pulled out of the disk package.

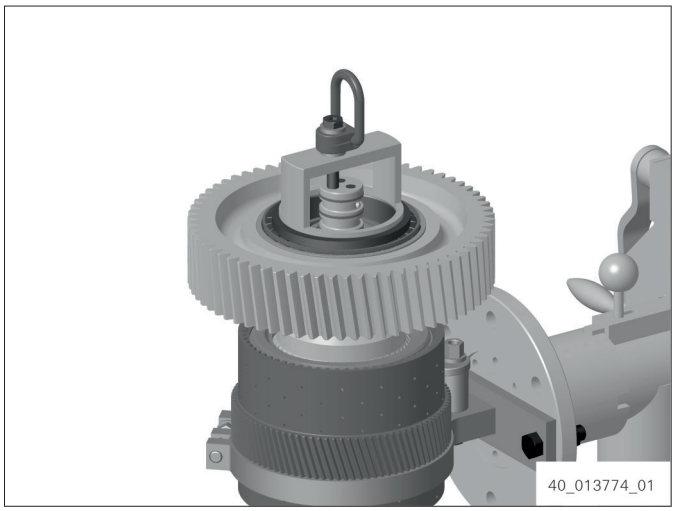


Fig. 270

Installing clutches

Special tools:

- 5870.204.002 Eyebolt
- 5870.345.033 Assembly fixture
- AA00.317.255 Load ring

1.

⚠ CAUTION

Risk of crushing due to moving load.
Slight to moderate injury possible.

⇨ Move load slowly and carefully.

⇨ Do not reach into danger area.

Insert clutch KV/K1 into housing by means of 5870.204.002 [Eyebolt] and crane.

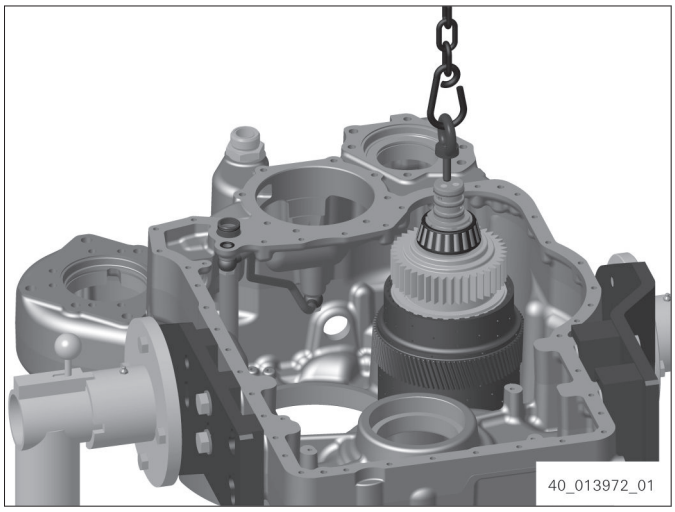


Fig. 271

2.

⚠ CAUTION

Risk of crushing due to moving load.
Slight to moderate injury possible.

⇨ Move load slowly and carefully.

⇨ Do not reach into danger area.

Insert clutch KR/K2 by means of 5870.204.002 [Eyebolt] and crane.

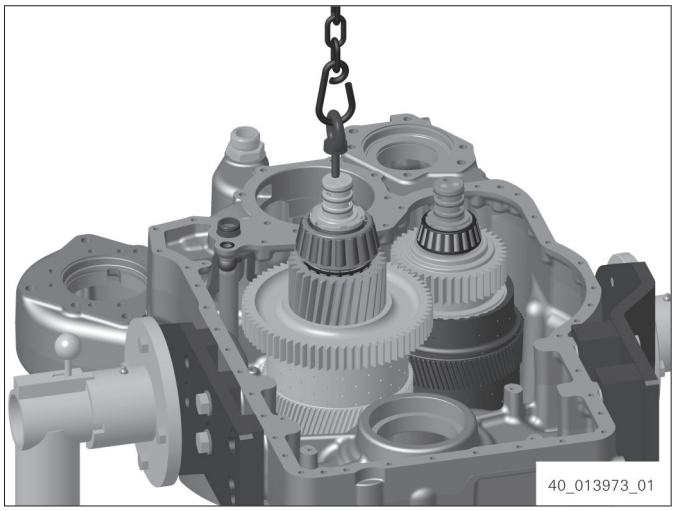


Fig. 272

3. Check position of gear (1). Flush-align tapered roller bearings and housing hole.

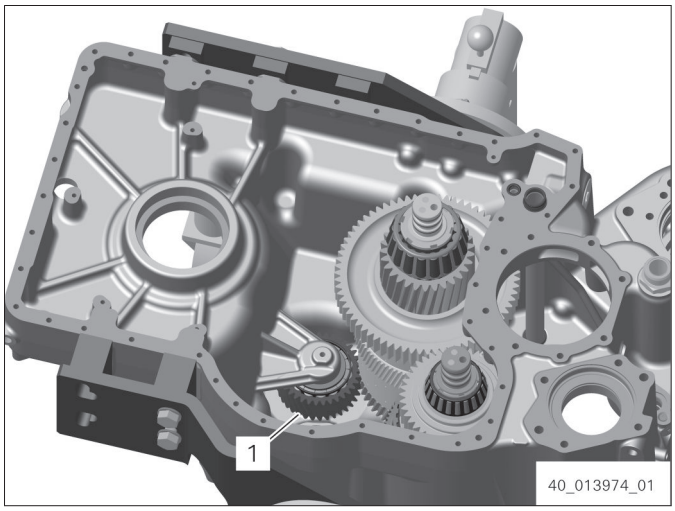


Fig. 273

4. **⚠ CAUTION**

Risk of crushing due to moving load.
Slight to moderate injury possible.

⇨ Move load slowly and carefully.

⇨ Do not reach into danger area.

Slightly lift clutch KR/K2 (1) and move in direction of arrow.

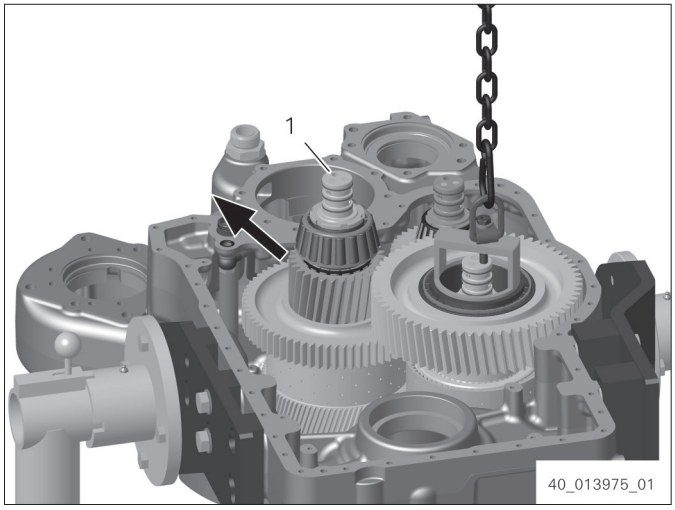


Fig. 274

5. Insert clutch K3/K4 into housing by means of 5870.345.033 [Assembly fixture], AA00.317.255 [Load ring] and crane.

6. Remove AA00.317.255 [Load ring] and 5870.345.033 [Assembly fixture].

Installing output gear

Special tools:

- 5870.100.054 Stop washer
- 5870.204.002 Eyebolt

1. Insert cylindrical roller bearing (1) into housing hole until contact is obtained.

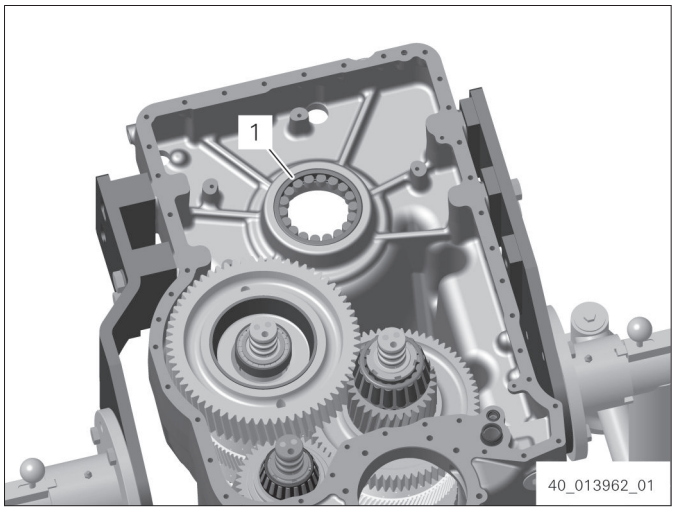


Fig. 275

2. Place cover sheet (1) into position.

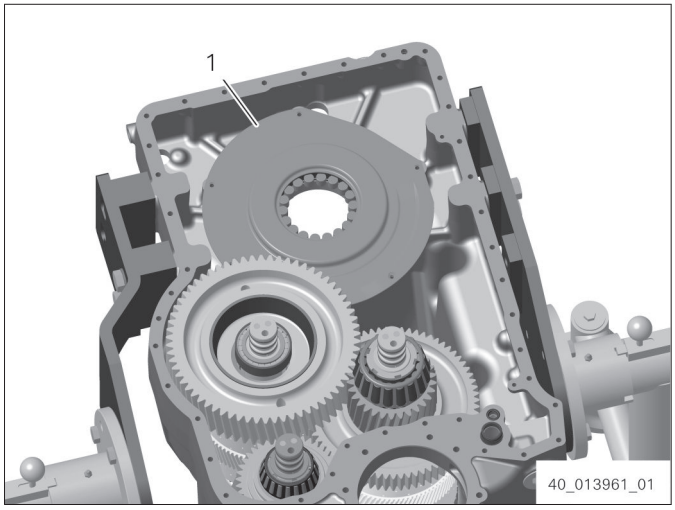


Fig. 276

3. Carry out the following two work steps immediately one after the other.

⚠ CAUTION

Risk of burn injuries due to contact with hot surfaces.
Slight or moderate injury possible.
⇨ Wear protective gloves.

Heat bearing inner ring.

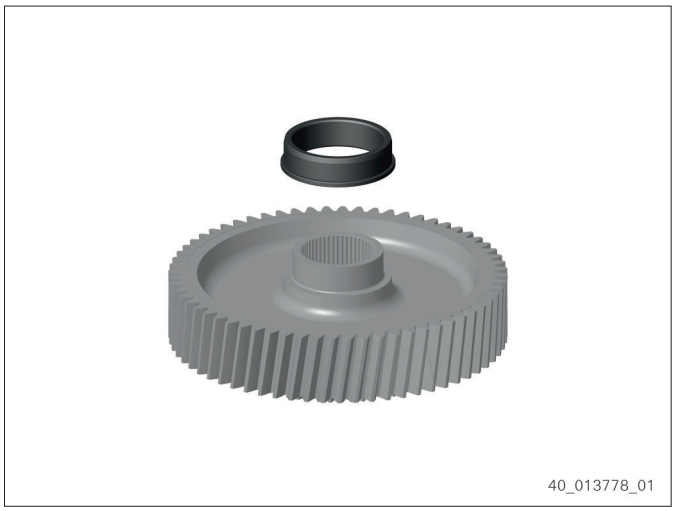


Fig. 277

4. Slide bearing inner ring onto gear until contact is obtained.

5. Let bearing inner ring cool down.

6. Adjust bearing inner ring.

7. **⚠ CAUTION**

   Risk of crushing due to moving load.
   Slight to moderate injury possible.
   ⇨ Move load slowly and carefully.
   ⇨ Do not reach into danger area.

   Use 5870.100.054 [Stop washer], 5870.204.002 [Eyebolt] and crane to insert gear into the housing. Insert gear into the cylindrical roller bearing until contact is obtained.

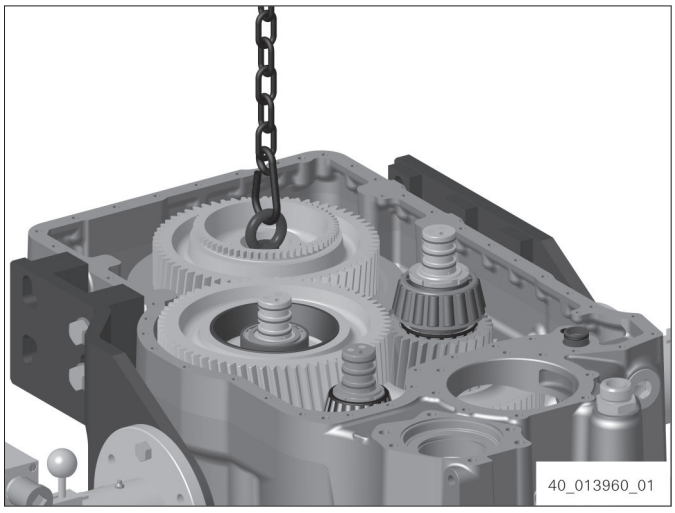


Fig. 278

8. Place cover sheet (1) into position.

9. Bolt in and tighten cap screws.
   Tightening torque: 23 Nm

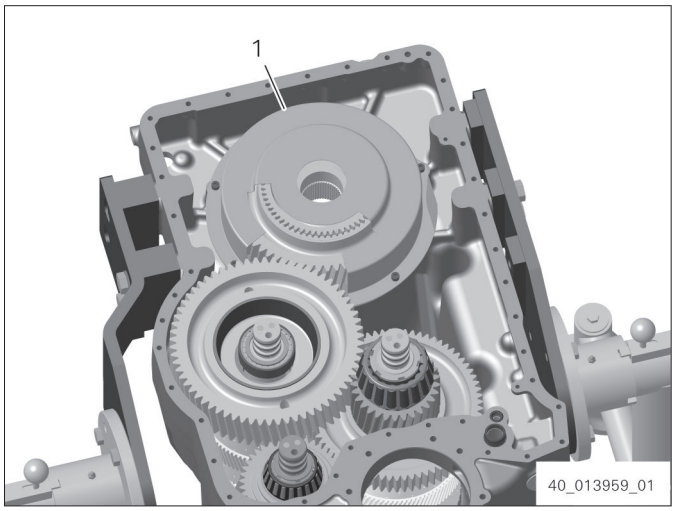


Fig. 279

Installing suction tube

1. Insert suction tube (1).

2. Bolt in and tighten cap screws (2).
   Tightening torque: **23 Nm**

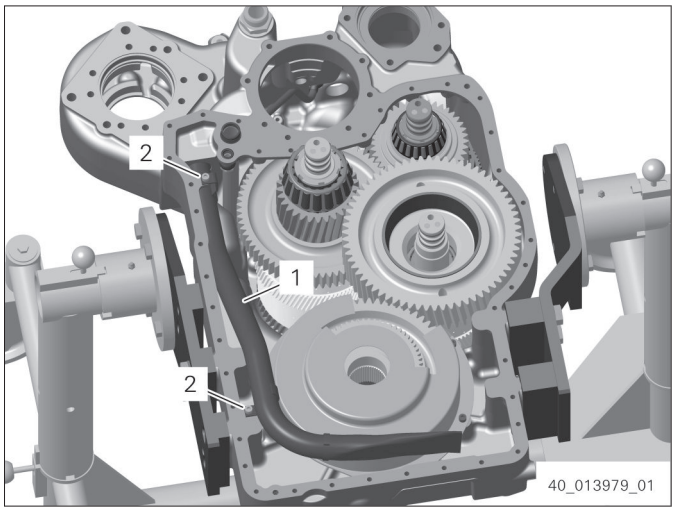


Fig. 280

Fitting the cover to the housing

Special tools:
- 5870.281.061 Load-lifting equipment

Operating supplies and auxiliary materials:
- 0666.790.033 LOCTITE 574

1. Screw in the adapter with O-ring (1) and tighten.
   Tightening torque: **117 Nm**

2. Bolt in screw plugs with O-ring (2) and tighten.
   Tightening torque: **35 Nm**

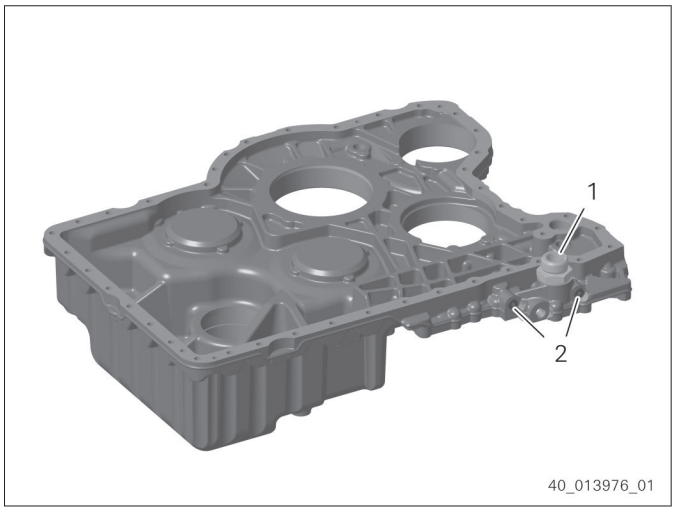


Fig. 281

3. Apply 0666.790.033 [LOCTITE 574] onto the mounting face (1).

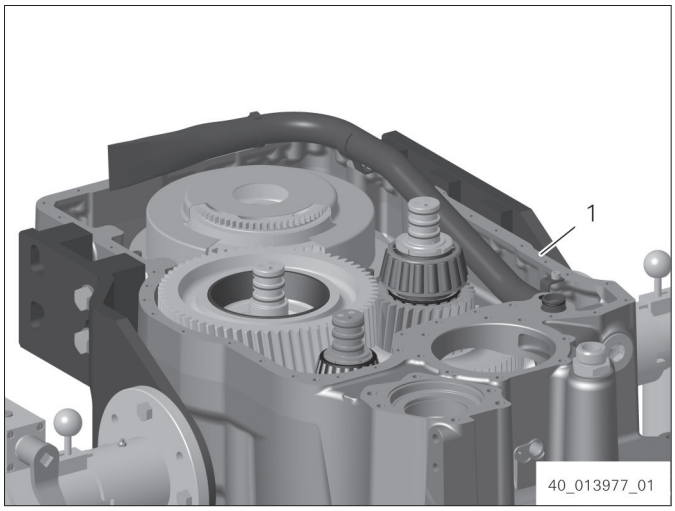


Fig. 282

4. Fit 5870.281.061 [Load-lifting equipment] to the cover.

5. **⚠ CAUTION**

Risk of crushing due to moving load.
Slight to moderate injury possible.
⇨ Move load slowly and carefully.
⇨ Do not reach into danger area.

Mount cover using a crane.

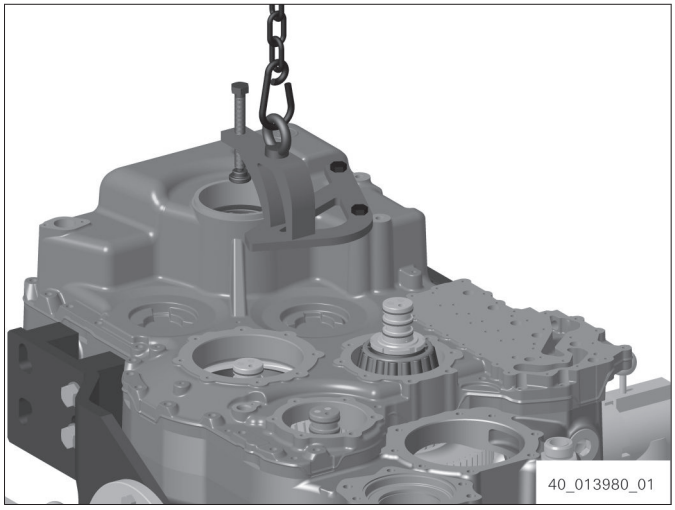


Fig. 283

6. **⚠ CAUTION**

Risk of injury due to parts flying away.
Slight or moderate injury possible.
⇨ Wear protective goggles.

Flush-mount both pins (1).

7. Bolt in and tighten cap screws.
Tightening torque: 46 Nm

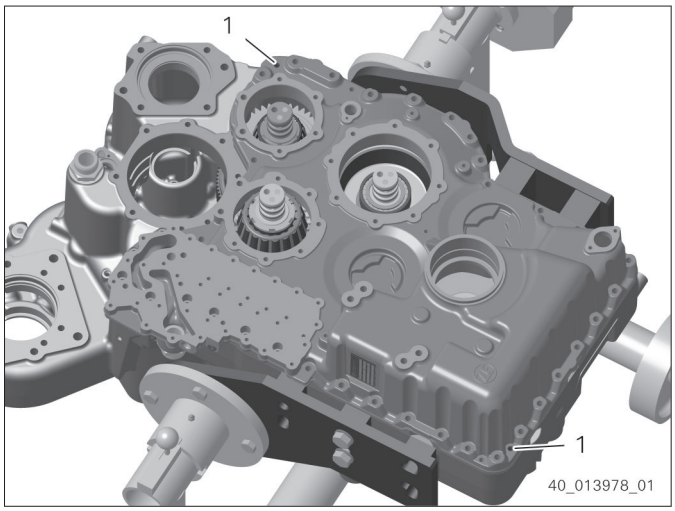


Fig. 284

Setting bearing preload of clutches

Special tools:

- 5870.320.014 Assembly fixture
- 5870.320.018 Inserting tool
- 5870.200.022 Straightedge
- 5870.204.007 Locating pin

Setting bearing preload of clutches K3/K4

1. Insert sealing plug (1) into hole of cover by means of 5870.320.014 [Assembly fixture] and 5870.320.018 [Inserting tool].

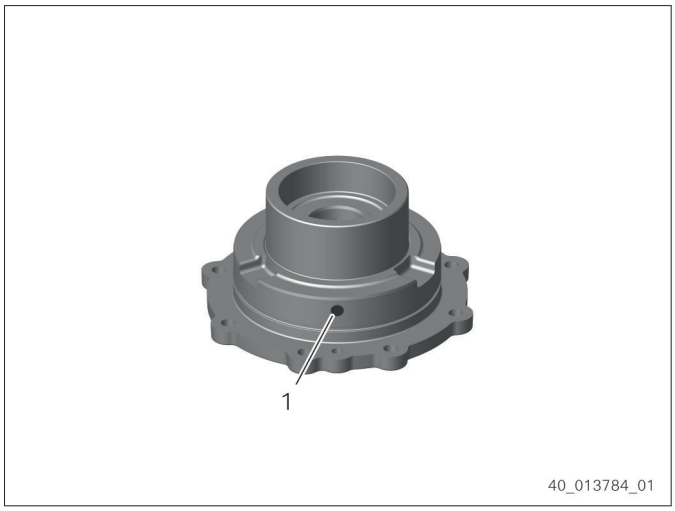


Fig. 285

2. Insert sealing plug (1) into hole with 5870.320.014 [Assembly fixture] and 5870.320.018 [Inserting tool].

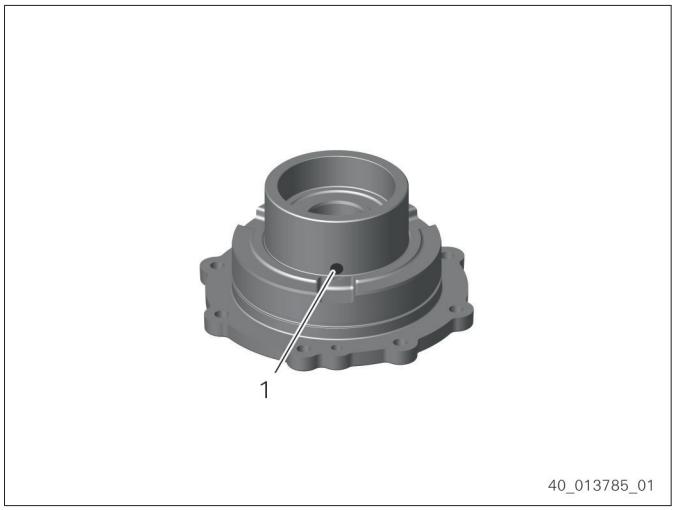


Fig. 286

3. Insert bearing inner ring (1) into bearing outer ring.

4. Rotate bearing inner ring in both directions several times.

5. Use depth gauge and 5870.200.022 [Straightedge] to measure the distance from mounting face to front face of the bearing inner ring.
Distance A = e. g. 43.70 mm

   Measure at several points and calculate the average.

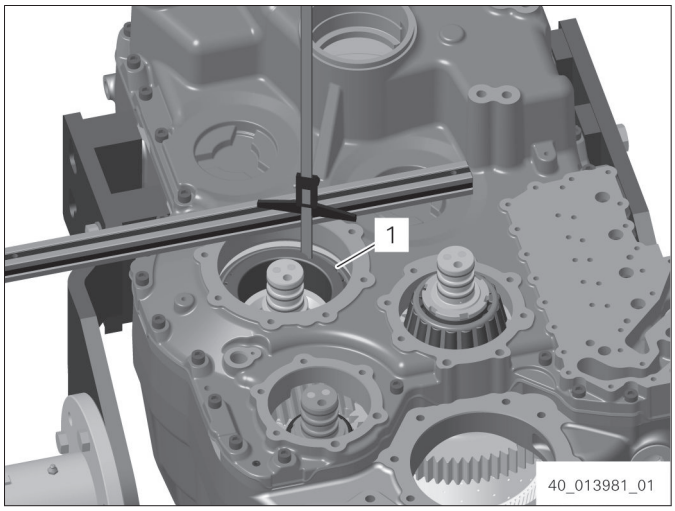


Fig. 287

6. Use depth gage, parallel gage blocks and 5870.200.022 [Straightedge] to measure distance from mounting face to contact face of bearing inner ring.
Distance B = e.g. 42.20 mm

7. Calculate thickness of spacer washer for Bearing preload 0.12 mm to 0.18 mm.

   Calculation example:
   s = distance A − distance B + mean value of required bearing preload
   s = 43.70 mm − 42.20 mm + 0.15 mm
   s = 1.65 mm

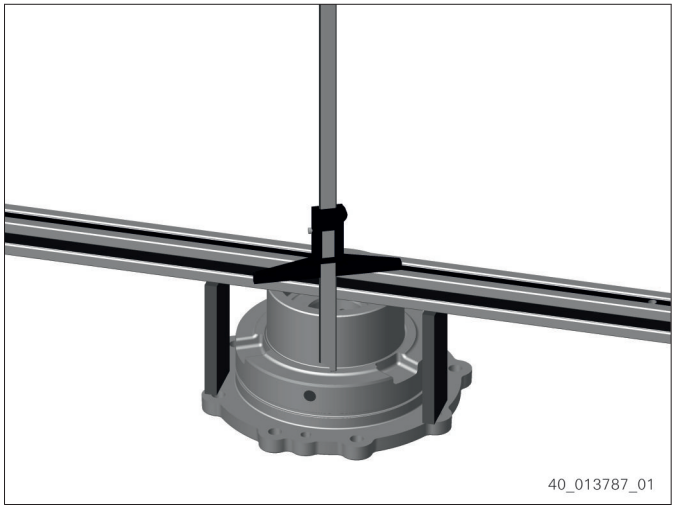


Fig. 288

8. Slide spacer washer with the calculated thickness, e. g. s = 1.65 mm onto the cover.

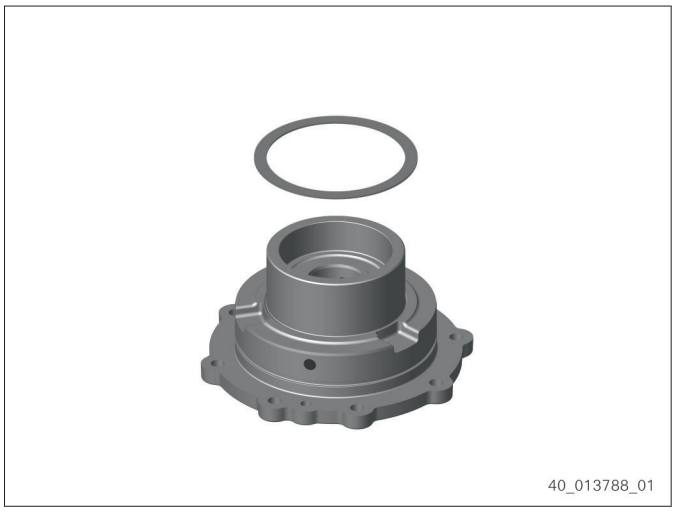


Fig. 289

9. Carry out the following two work steps immediately one after the other.

⚠ CAUTION

Risk of burn injuries due to contact with hot surfaces.
Slight or moderate injury possible.
⇨ Wear protective gloves.

Heat bearing inner ring.

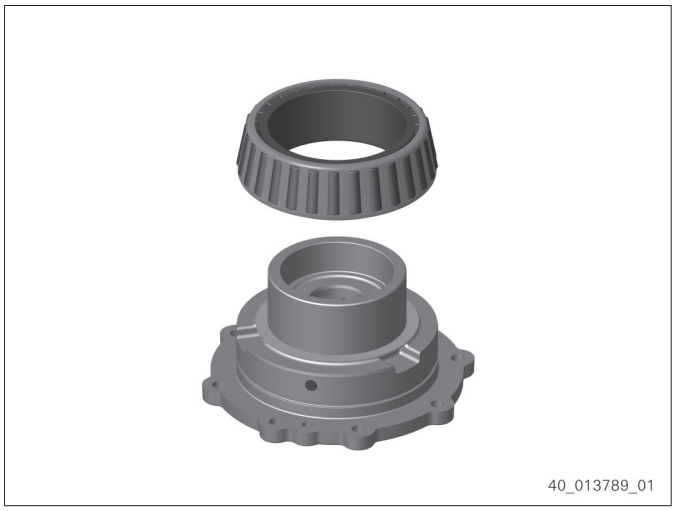


Fig. 290

10. Slide on bearing inner ring until contact is obtained.

11. Let bearing inner ring cool down.

12. Adjust bearing inner ring.

13. Turn two 5870.204.007 [Locating pin] into cover.

14. Center R-rings (1).

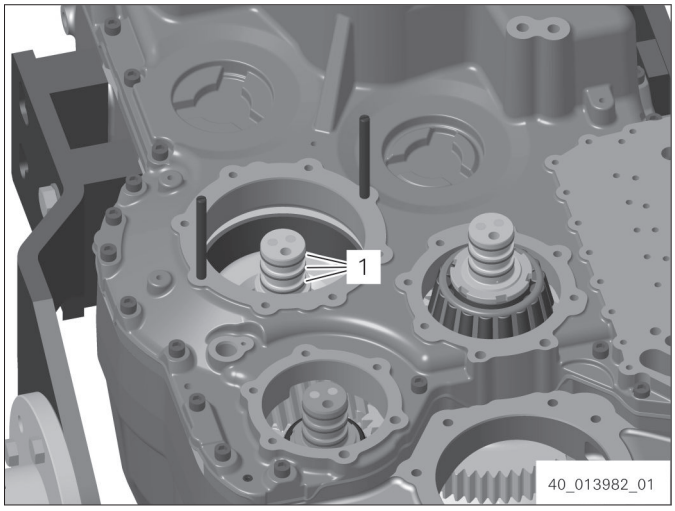


Fig. 291

15. Grease O-ring.

16. Insert O-ring (1) into annular groove.

17. Carry out the following three work steps immediately one after the other.

⚠ CAUTION

Risk of burn injuries due to contact with hot surfaces.
Slight or moderate injury possible.
⇨ Wear protective gloves.

Heat bearing hole.

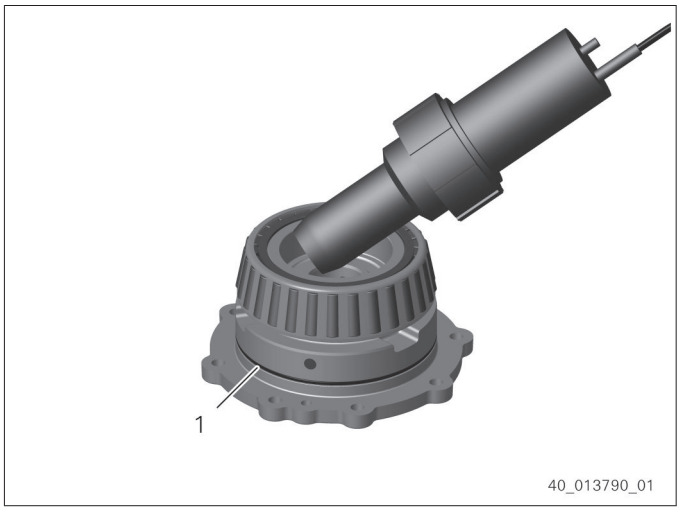


Fig. 292

18. Slide on cover (1).

19. Turn in and tighten hexagon screws evenly.
Tightening torque: 46 Nm

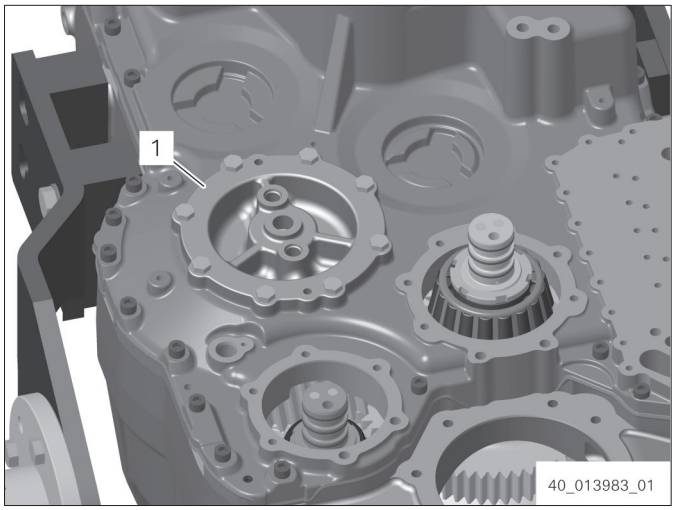


Fig. 293

20. Check function of the clutches by applying compressed air.

→ Closing and opening of the clutch is clearly audible.

If closing and opening is not audible, remove cover and check R-rings.

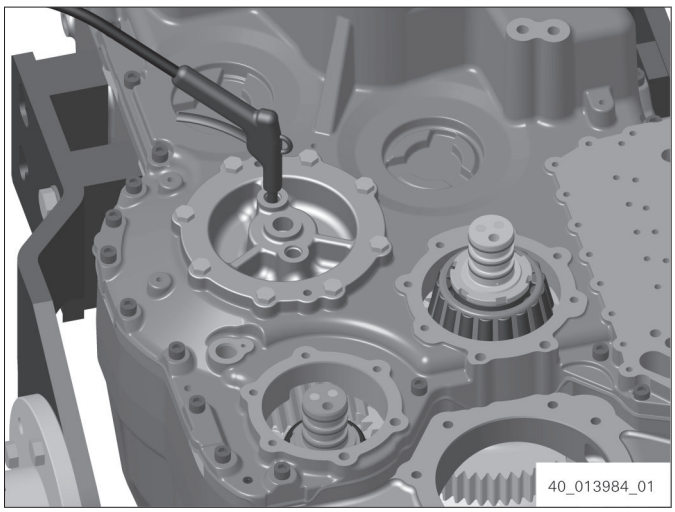


Fig. 294

Setting bearing preload of clutch KR/K2

21. Insert sealing plug (1) into hole of cover by means of 5870.320.014 [Assembly fixture] and 5870.320.018 [Inserting tool].

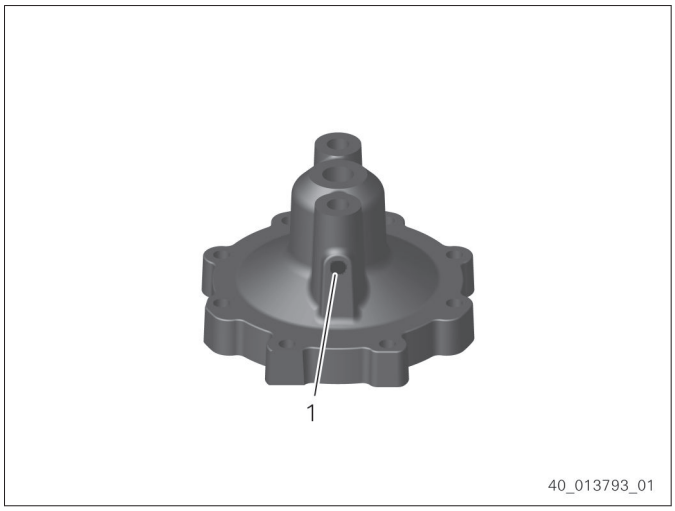


Fig. 295

22. Insert sealing plug (1) into hole with 5870.320.014 [Assembly fixture] and 5870.320.018 [Inserting tool].

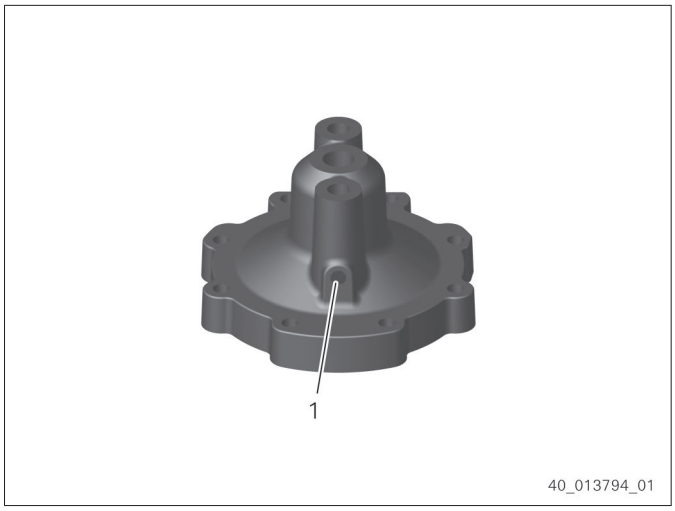


Fig. 296

23. Insert bearing outer ring (1) until contact is obtained.

24. Use depth gage to measure distance from front face of bearing outer ring to mounting face.
Distance A = e. g. 16.20 mm

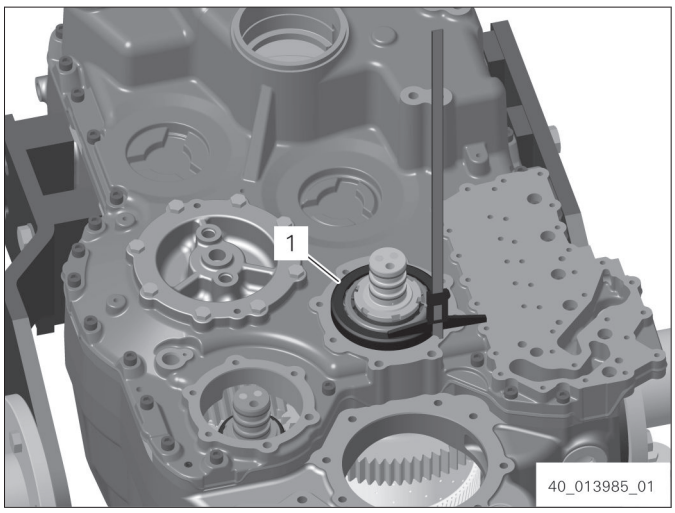


Fig. 297

25. Use depth gage to measure distance from mounting face to contact face of bearing inner ring.
Distance B = e.g. 17.75 mm

26. Calculate thickness of shim for Bearing preload 0.12 mm to 0.18 mm.

Calculation example:
s = distance B − distance A + mean value of the required bearing preload
s = 17.75 mm − 16.20 mm + 0.15 mm
s = 1.70 mm

Fig. 298

27. Use grease to insert shim (1) with the calculated thickness, e. g. s = 1.70 mm into the cover.

28. Grease O-ring.

29. Insert O-ring (2) into annular groove.

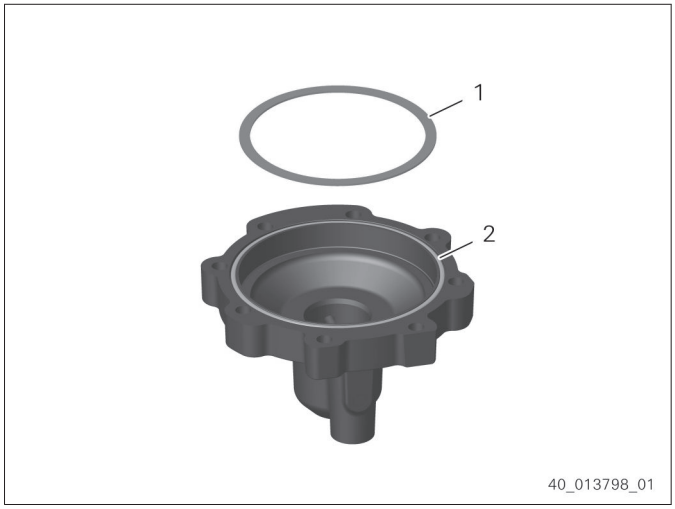


Fig. 299

30. Turn two 5870.204.007 [Locating pin] into cover.

31. Center R-rings (1).

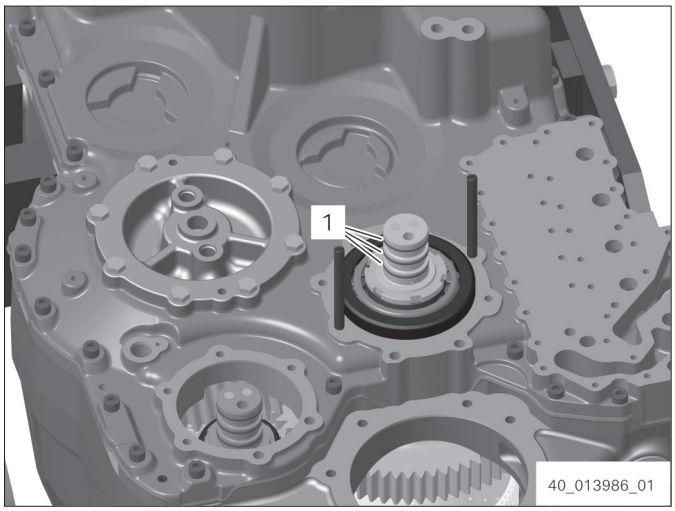


Fig. 300

32. Slide on cover (1).

33. Turn in and tighten hexagon screws evenly.
Tightening torque: 46 Nm

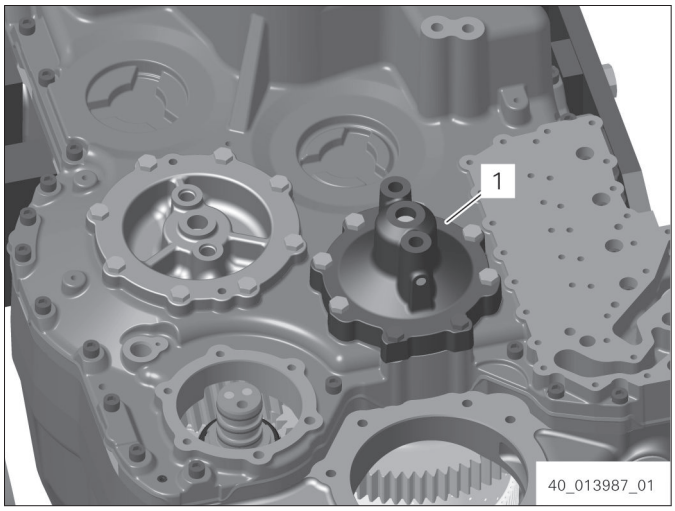


Fig. 301

34. Check function of the clutches by applying compressed air.

→ Closing and opening of the clutch is clearly audible.

If closing and opening is not audible, remove cover and check R-rings.

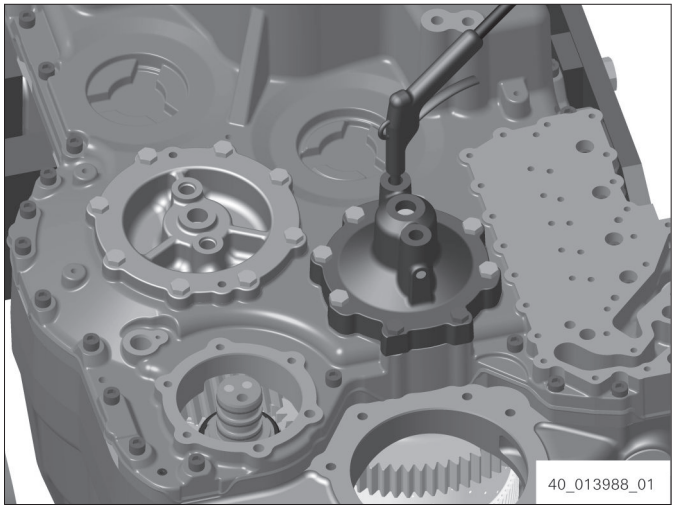


Fig. 302

Setting bearing preload of clutch KV/K1

35. Insert sealing plugs (1) into holes of the bearing cover using 5870.320.014 [Assembly fixture] and 5870.320.018 [Inserting tool].

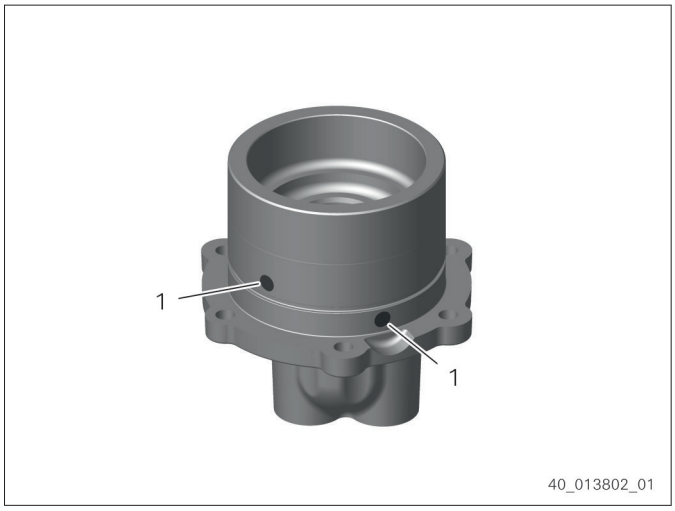


Fig. 303

36. Put on bearing outer ring (1).

37. Rotate bearing outer ring in both directions several times.

38. Use depth gage to measure distance from mounting face to front face of bearing outer ring.
Distance A = e. g. 52.60 mm

    Measure at several points and calculate the average.

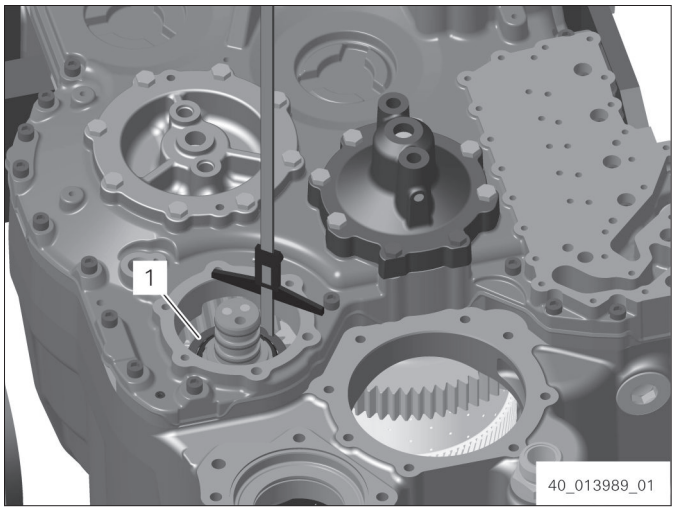


Fig. 304

39. Insert ring with chamfered side facing downwards into the bearing cover.

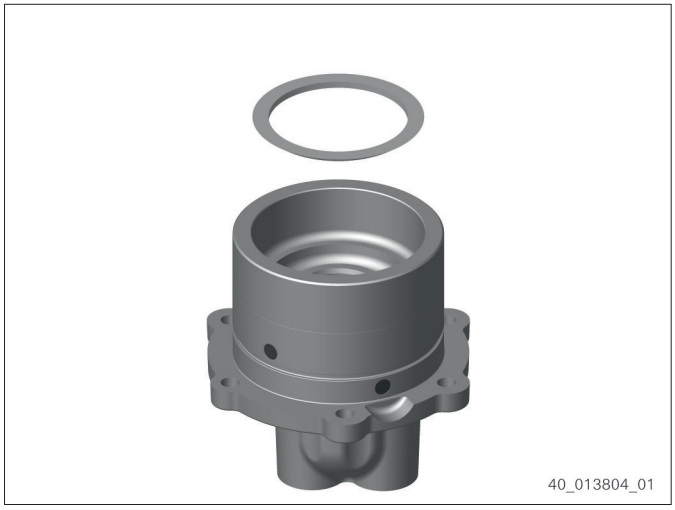


Fig. 305

40. Use depth gage to measure distance from mounting face to plane face of the ring.
Distance B = e.g. 50.75 mm

41. Calculate thickness of shim for Bearing preload 0.12 mm to 0.18 mm.

    Calculation example:
    s = distance A − distance B + mean value of required bearing preload
    s = 52.60 mm − 50.75 mm + 0.15 mm
    s = 2.00 mm

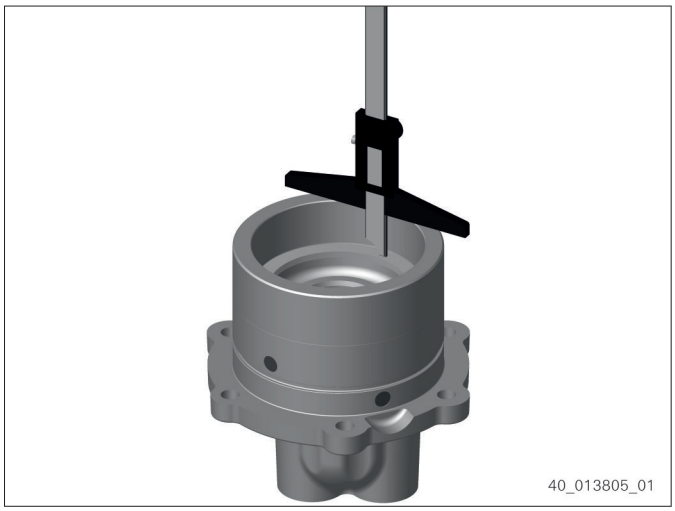


Fig. 306

42. Insert shim with the calculated thickness, e. g. s = 2.00 mm into the bearing cover.

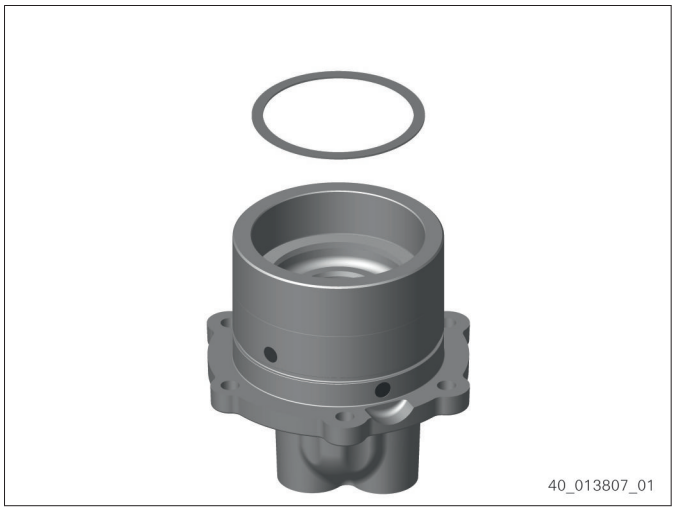


Fig. 307

43. Insert bearing outer ring (1) until contact is obtained.

44. Grease O-ring.

45. Insert O-ring (2) into annular groove.

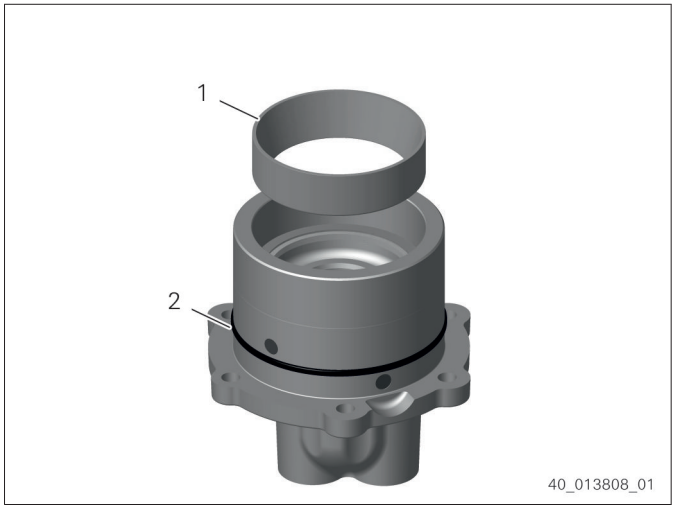


Fig. 308

46. Center R-rings (1).

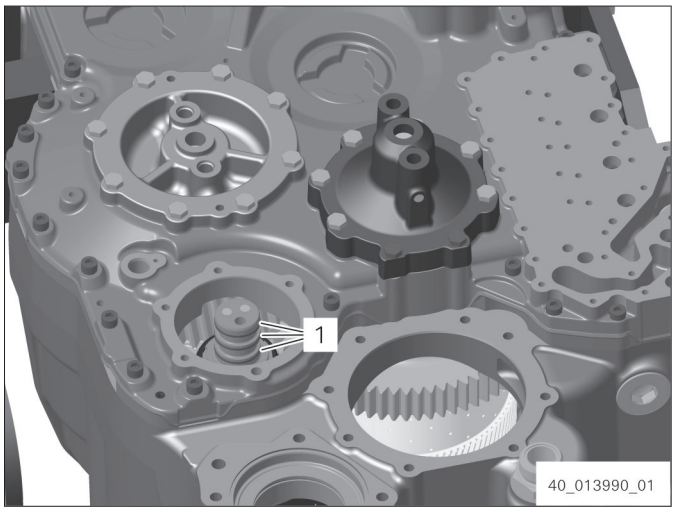


Fig. 309

47. Turn two 5870.204.007 [Locating pin] into cover.

48. Carry out the following three work steps immediately one after the other.

⚠ CAUTION

Risk of burn injuries due to contact with hot surfaces.
Slight or moderate injury possible.
⇨ Wear protective gloves.

Heat up hole.

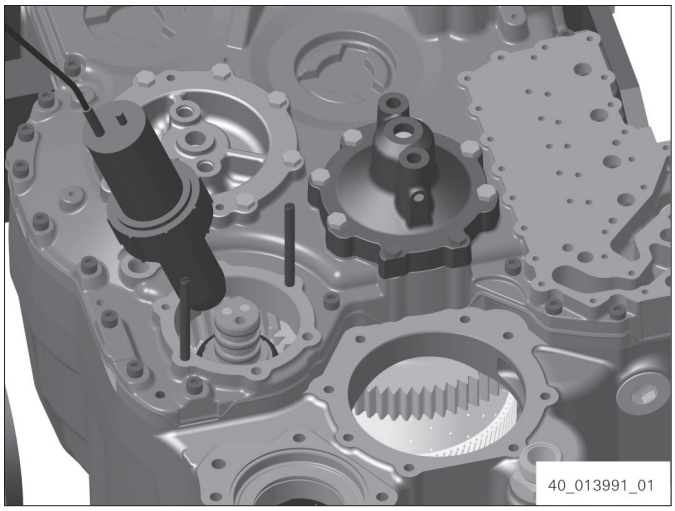


Fig. 310

49. Insert bearing cover (1).

50. Turn in and tighten hexagon screws evenly.
Tightening torque: 46 Nm

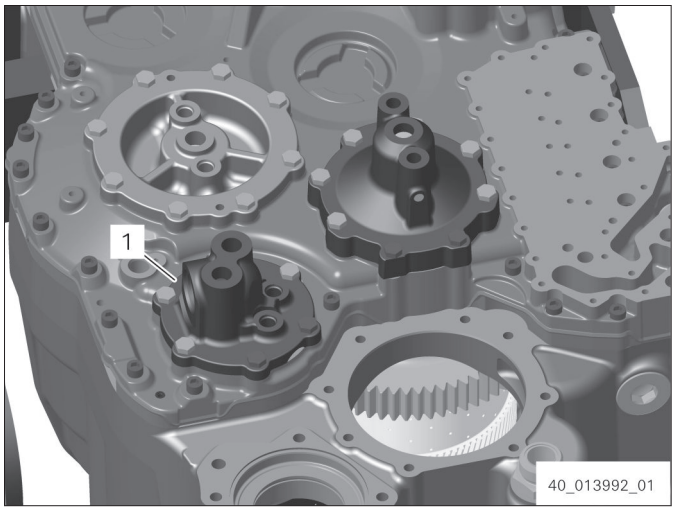


Fig. 311

51. Check function of the clutches by applying compressed air.

→ Closing and opening of the clutch is clearly audible.

If closing and opening is not audible, remove bearing cover and check R-rings.

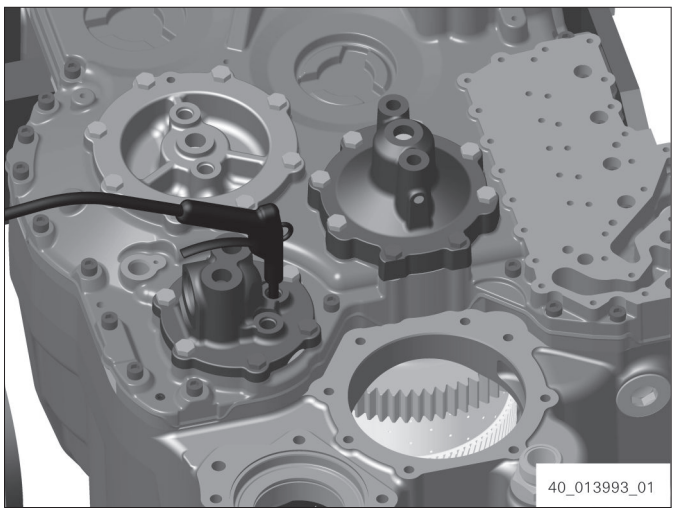


Fig. 312

10.3 Installing the output shaft

1. Carry out the following two work steps immediately one after the other.

⚠ CAUTION

Risk of burn injuries due to contact with hot surfaces.
Slight or moderate injury possible.
⇨ Wear protective gloves.

Heat up hole in gear.

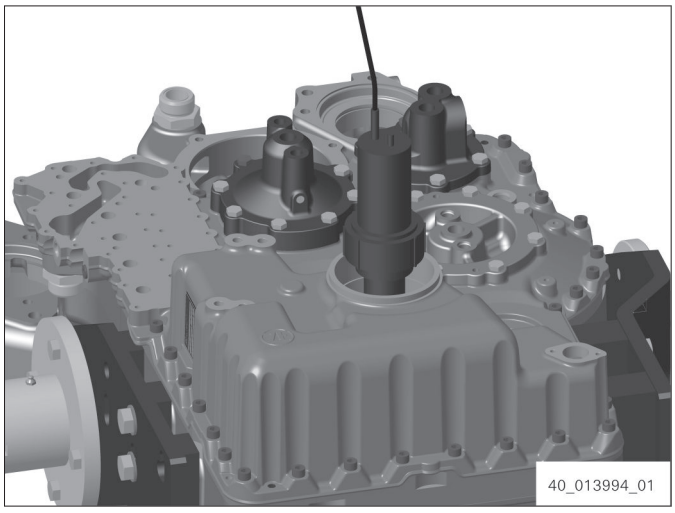


Fig. 313

2. Insert output shaft (1) with long toothing into gear until contact is obtained.
3. Let gear cool down.
4. Adjust output shaft.

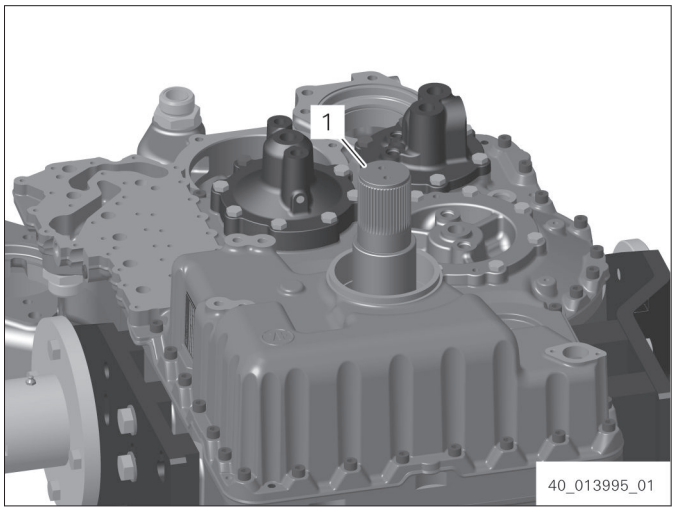


Fig. 314

Setting axial clearance of output shaft

5. Use depth gage to measure distance from front face of the cover to contact face of the shim.
Distance A = e. g. 66.90 mm

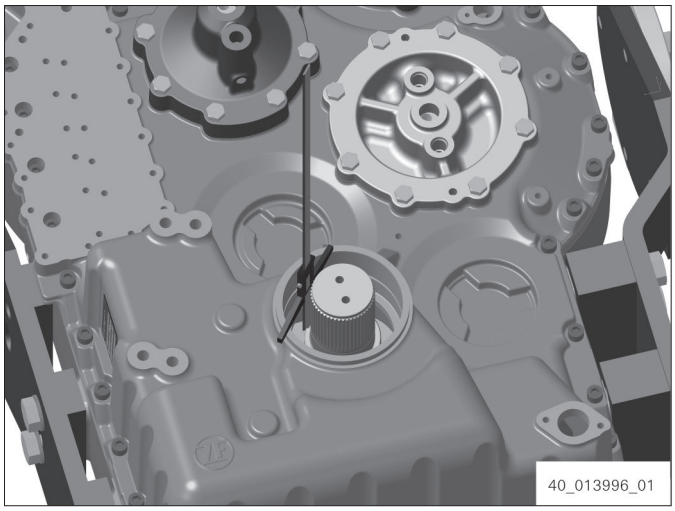


Fig. 315

6. Use depth gage to measure distance from front face of cover to contact face of ball bearing.
Distance B = e.g. 64.20 mm

7. Calculate thickness of shim for Axial clearance of output shaft 0.30 mm to 0.50 mm.

Calculation example:
s = distance A − distance B − mean value of axial clearance
s = 66.90 mm − 64.20 mm − 0.40 mm
s = 2.30 mm

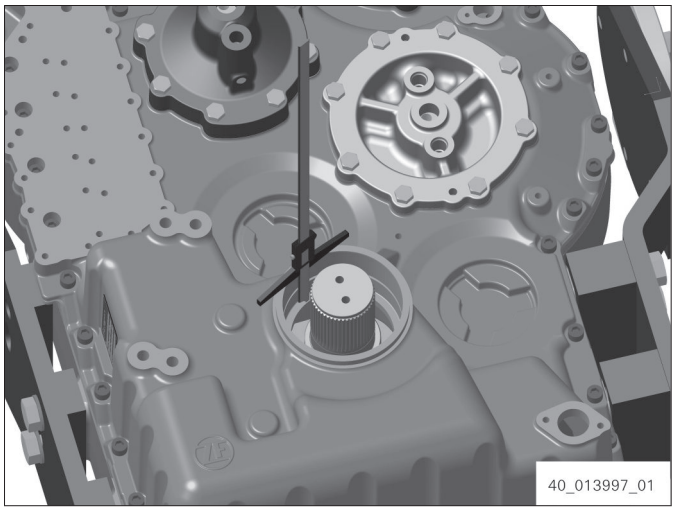


Fig. 316

8. Slide on shim (1) with the calculated thickness, e. g. s = 2.30 mm.

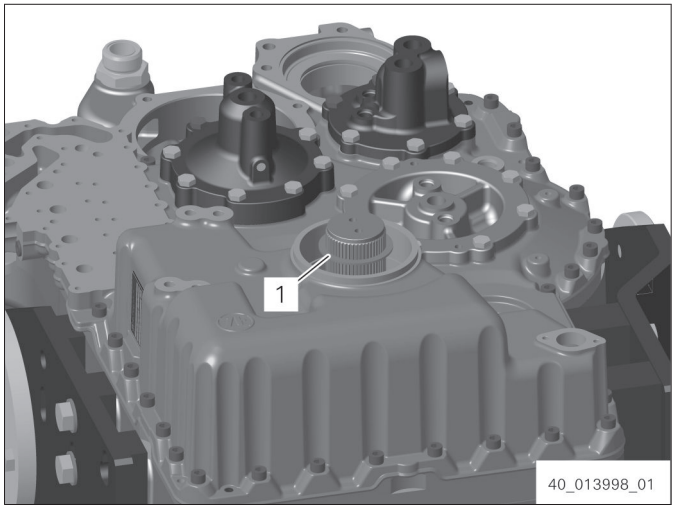


Fig. 317

9. Insert ball bearing (1) until contact is obtained.

10. Insert retaining ring (2) into annular groove.

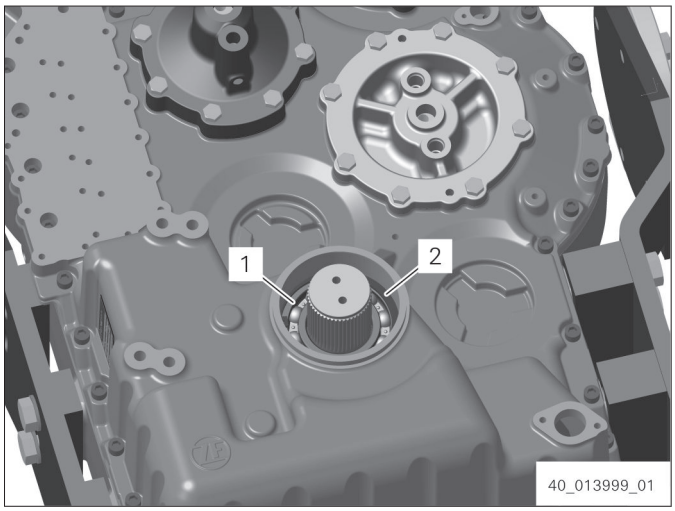


Fig. 318

Installing yokes

Special tools:

- 5870.048.290 Driver tool
- AA01.368.722 Press-in bush
- 5870.057.009 Driver tool
- 5870.260.002 Handle
- 5870.048.265 Driver tool

Operating supplies and auxiliary materials:

- 0666.690.191 PHÖNIX SPIRITUS

Installing yoke on output side

1. Carry out the following two work steps immediately one after the other.

   Apply 0666.690.191 [PHÖNIX SPIRITUS] to outer diameter of the shaft sealing ring.

2. Use 5870.048.290 [Driver tool] to insert shaft sealing ring (1) with seal lip facing the oil chamber.

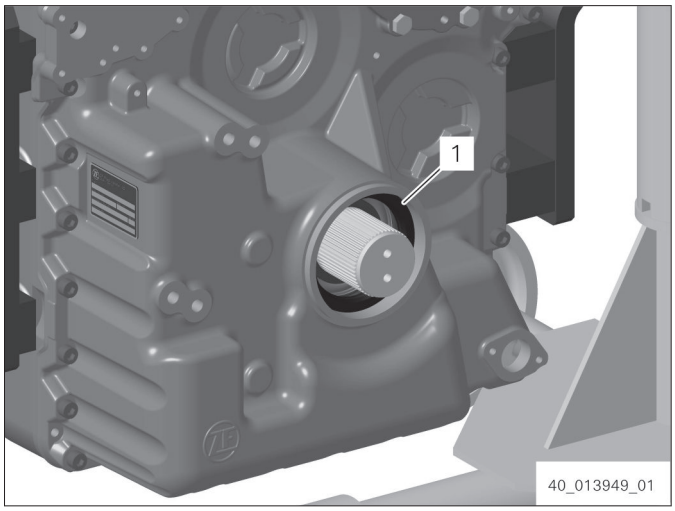


Fig. 319

3. Use AA01.368.722 [Press-in bush] to force screen sheet onto yoke until contact is obtained.

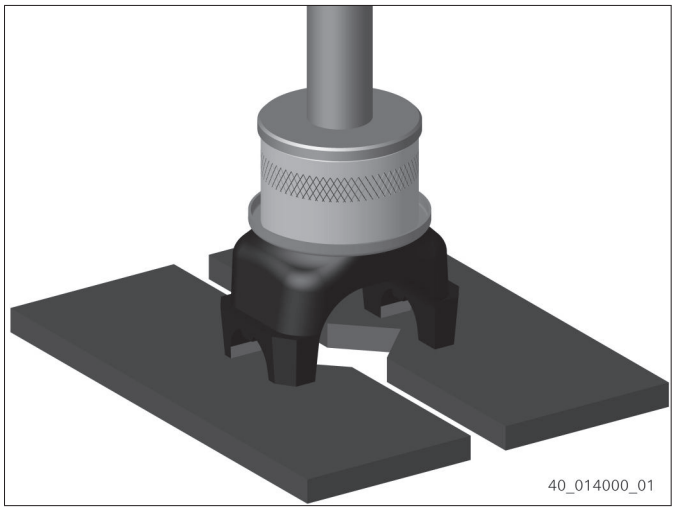


Fig. 320

4. Slide yoke (1) onto output shaft until contact is obtained.

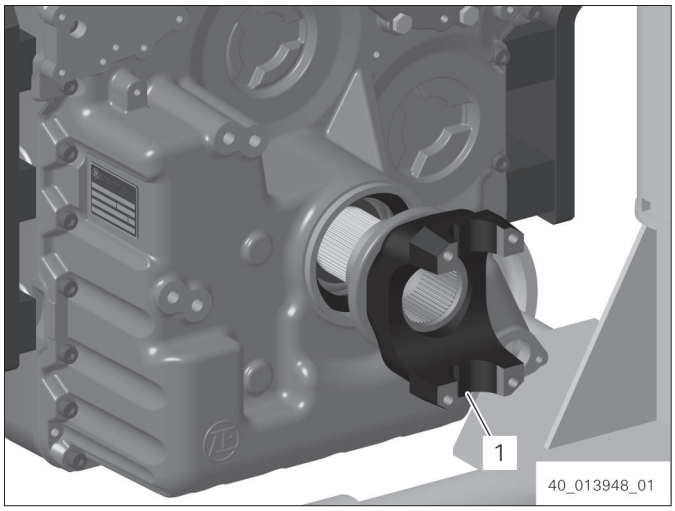


Fig. 321

5. Adjust the gap width (distance X).
   - 1 = Yoke
   - 2 = Washer
   - 3 = Output shaft
   - 4 = Washer
   - 5 = O-ring

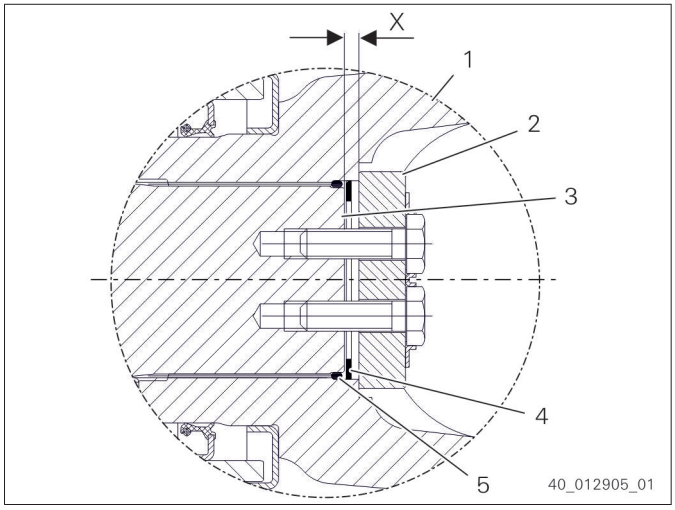


Fig. 322

6. Use depth gage to measure distance from front face of the yoke to front face of the output shaft.
   Distance A = e. g. 79.50 mm

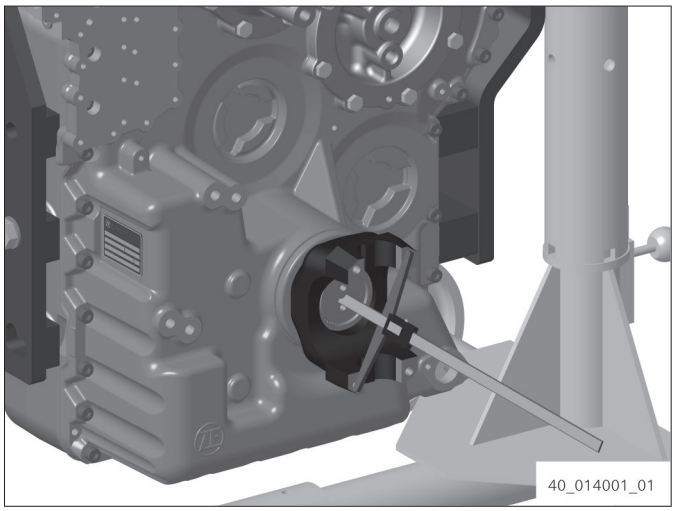


Fig. 323

7. Use depth gage to measure distance from front face to contact face of the washer on the yoke.
Distance B = e.g. 78.00 mm

8. Calculate thickness s of shim for setting Gap width of the output flange 0.30 mm to 0.80 mm to the output shaft.

Calculation example:
s = distance A – distance B – mean value of the required distance
s = 79.50 mm – 78.00 mm – 0.50 mm
s = 1.00 mm

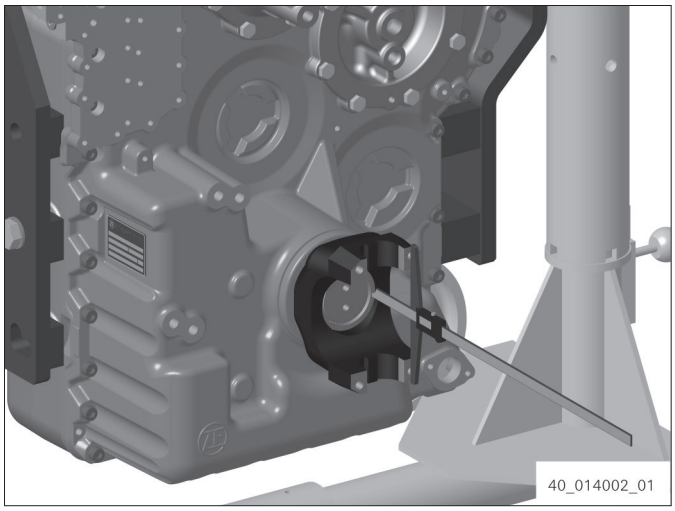


Fig. 324

9. Insert O-ring (1) in the space between output shaft and yoke.

10. Insert washer (2) with the calculated thickness, e. g. s = 1.00 mm.

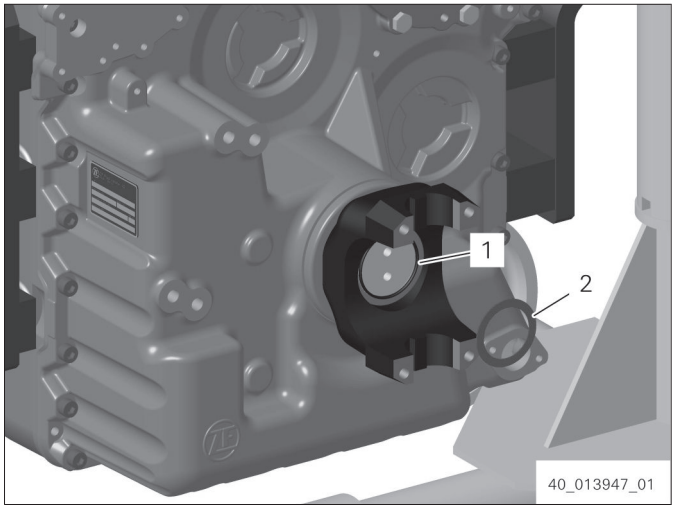


Fig. 325

11. Fix yoke with washer (3) and hexagon screws (2).
Tightening torque: **46 Nm**

12. **⚠ CAUTION**

Risk of injury due to parts flying away.
Slight or moderate injury possible.
⇨ Wear protective goggles.

Mount locking plate (1) using the 5870.057.009 [Driver tool] and 5870.260.002 [Handle] until contact is obtained.

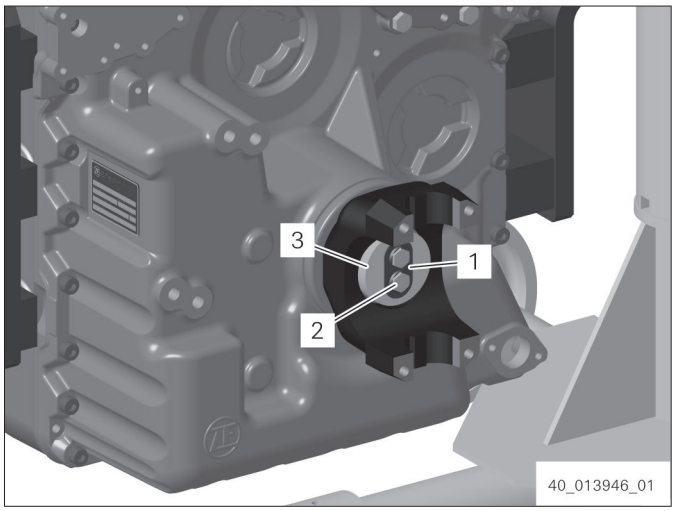


Fig. 326

Installing yoke on converter side

13. Carry out the following two work steps immediately one after the other.

    Apply 0666.690.191 [PHÖNIX SPIRITUS] to outer diameter of the shaft sealing ring.

14. Use 5870.048.265 [Driver tool] to insert shaft sealing ring (1) with seal lip facing the oil chamber.

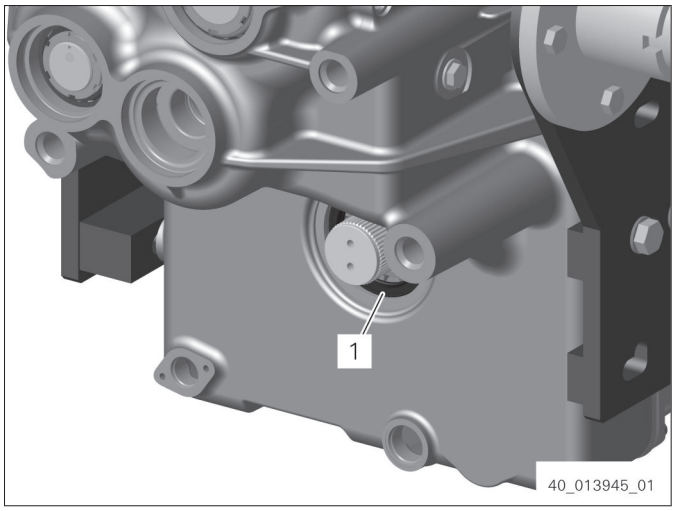


Fig. 327

15. Use AA01.368.722 [Press-in bush] to press protecting plate onto the yoke until contact is obtained.

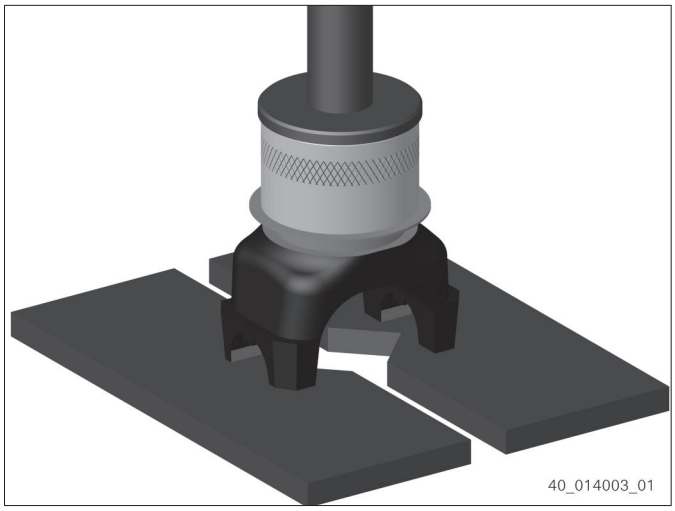


Fig. 328

16. Slide yoke (1) onto output shaft until contact is obtained.

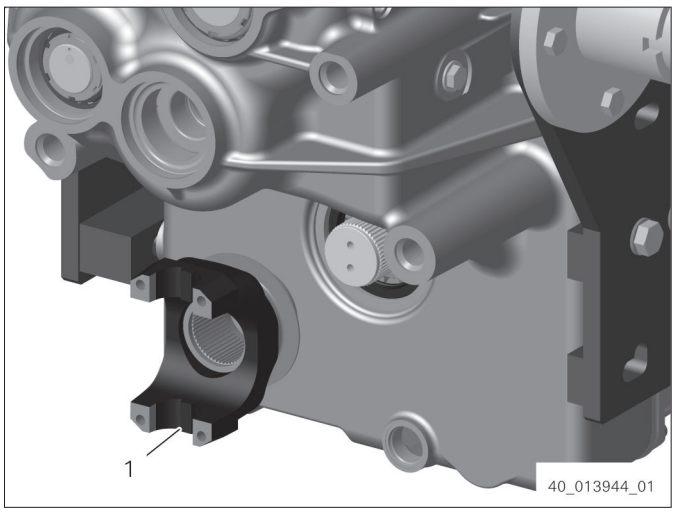


Fig. 329

17. Adjust the gap width (distance X).
    - 1 = Yoke
    - 2 = Washer
    - 3 = Output shaft
    - 4 = Washer
    - 5 = O-ring

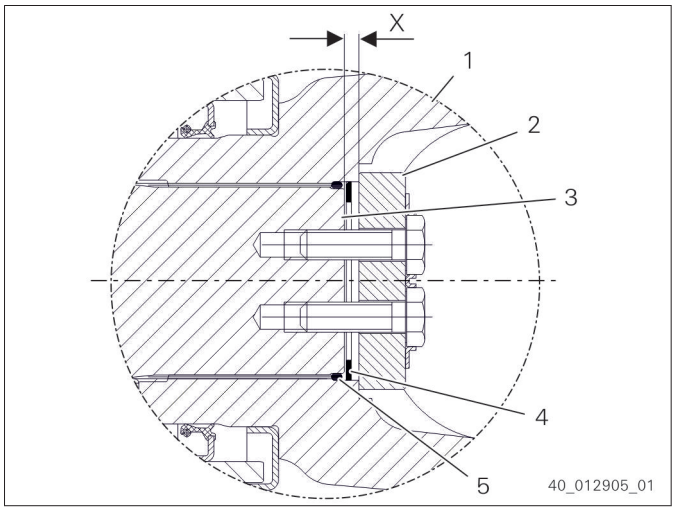


Fig. 330

18. Use depth gage to measure distance from front face of the yoke to front face of the output shaft.
    Distance A = e. g. 79.50 mm

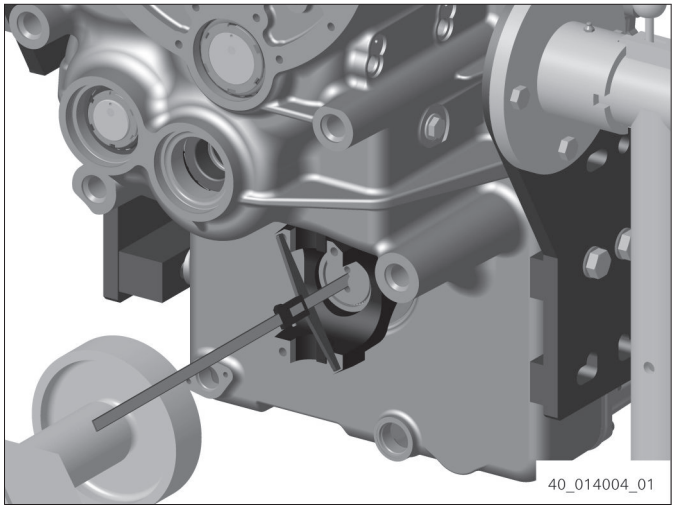


Fig. 331

19. Use depth gage to measure distance from front face to contact face of the washer on the yoke.
    Distance B = e.g. 78.00 mm

20. Calculate thickness s of shim for setting Gap width of the output flange 0.30 mm to 0.80 mm to the output shaft.

    Calculation example:
    s = distance A − distance B − mean value of the required distance
    s = 79.50 mm − 78.00 mm − 0.50 mm
    s = 1.00 mm

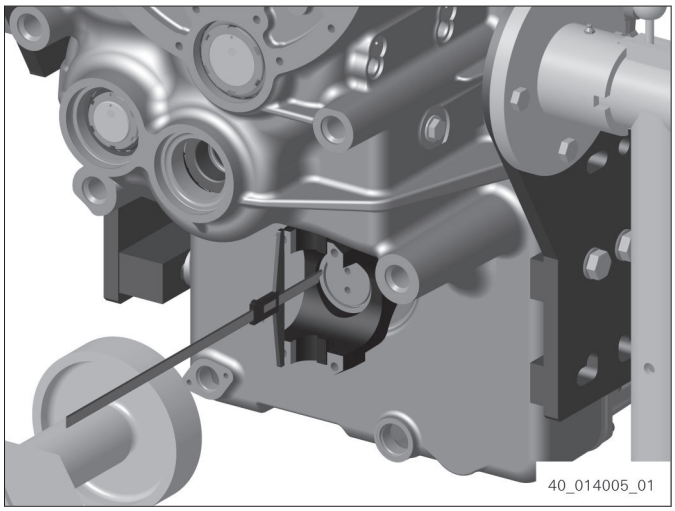


Fig. 332

21. Insert O-ring (2) in the space between output shaft and yoke.

22. Insert washer (1) with the calculated thickness, e. g. s = 1.00 mm.

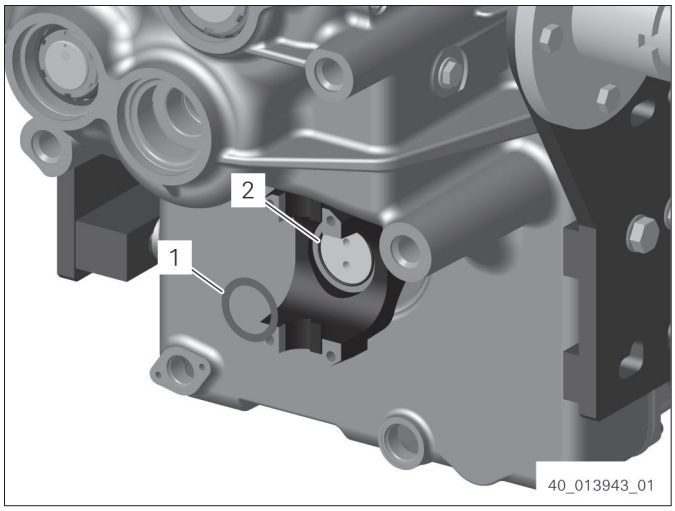


Fig. 333

23. Fix yoke with washer (3) and hexagon screws (2).
Tightening torque: **46 Nm**

24. **⚠ CAUTION**

Risk of injury due to parts flying away.
Slight or moderate injury possible.
⇨ Wear protective goggles.

Mount locking plate (1) using the 5870.057.009 [Driver tool] and 5870.260.002 [Handle] until contact is obtained.

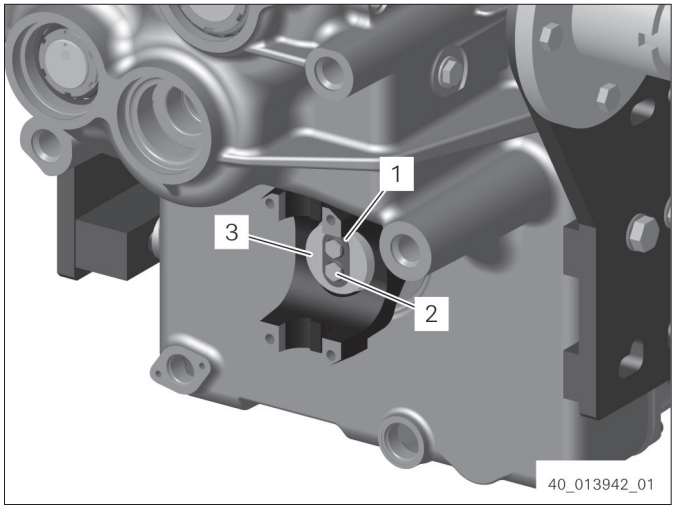


Fig. 334

Installing countershaft

Special tools:
- 5870.204.007 Locating pin

Operating supplies and auxiliary materials:
- 0666.690.248 LOCTITE 243
- 0666.690.191 PHÖNIX SPIRITUS

1. Center gear, bearing inner rings and ring.

2. Carry out the following three work steps immediately one after the other.

⚠ CAUTION

Risk of burn injuries due to contact with hot surfaces.
Slight or moderate injury possible.
⇨ Wear protective gloves.

Heat up bearing inner rings.

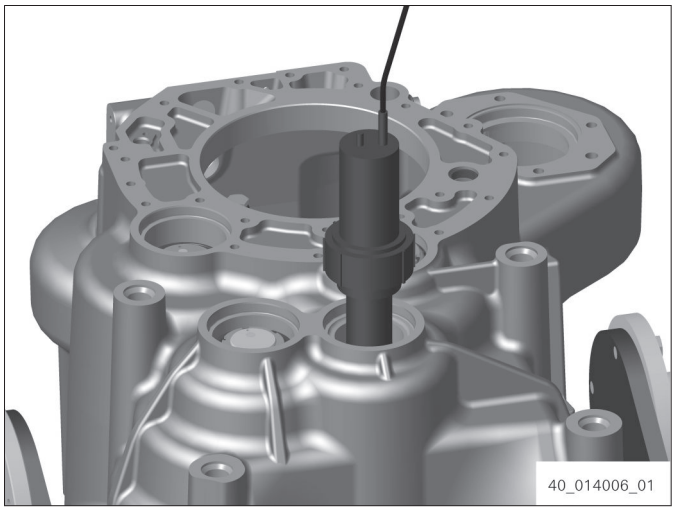


Fig. 335

3. Bolt one 5870.204.007 [Locating pin] (1) into housing.

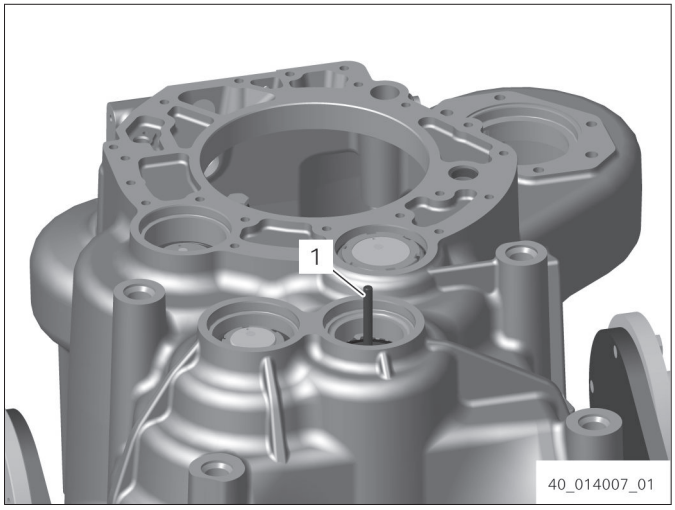


Fig. 336

4. Insert axle (1) until contact is obtained.

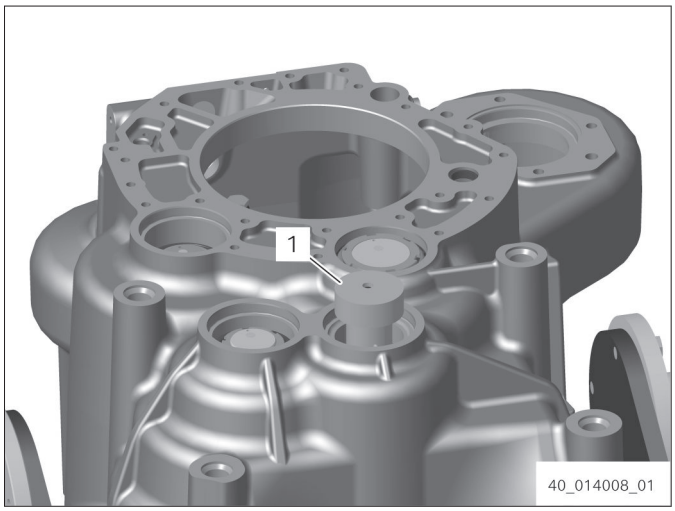


Fig. 337

5. Remove 5870.204.007 [Locating pin].

6. Apply 0666.690.248 [LOCTITE 243] to the thread of the hexagon screw.

7. Turn in and tighten hexagon screw (1).
Tightening torque: 46 Nm

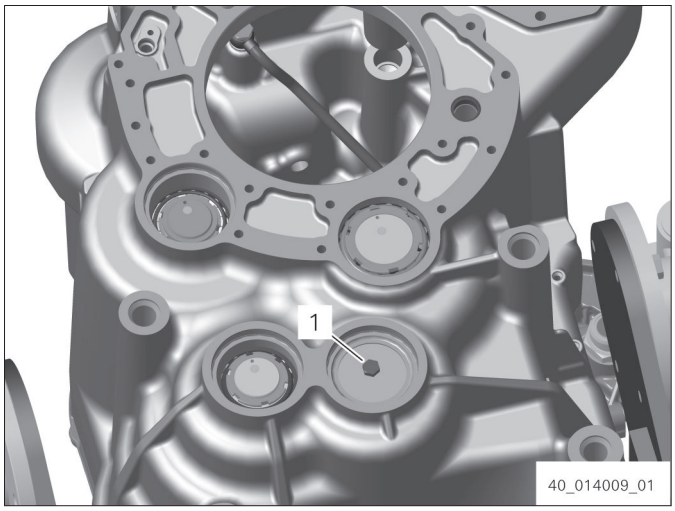


Fig. 338

8. Carry out the following two work steps immediately one after the other.

Apply 0666.690.191 [PHÖNIX SPIRITUS] to the outer diameter of the protection cap.

9. Flush-mount protection cap (1) with the open side facing inwards into the housing hole.

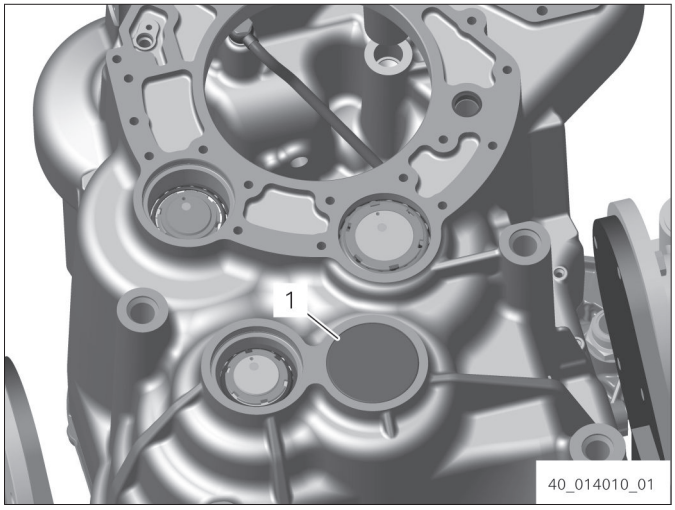


Fig. 339

Assembling and installing the power take-offs (variant with PTO) 1, 3 and 4

Installing PTOs 3 and 4

Special tools:
- 5870.200.113 Feeler gauge

Operating supplies and auxiliary materials:
- 0666.690.191 PHÖNIX SPIRITUS

1. Insert plug with O-ring (1) into housing hole.

2. Fasten plug with cap screw.
Tightening torque: 23 Nm

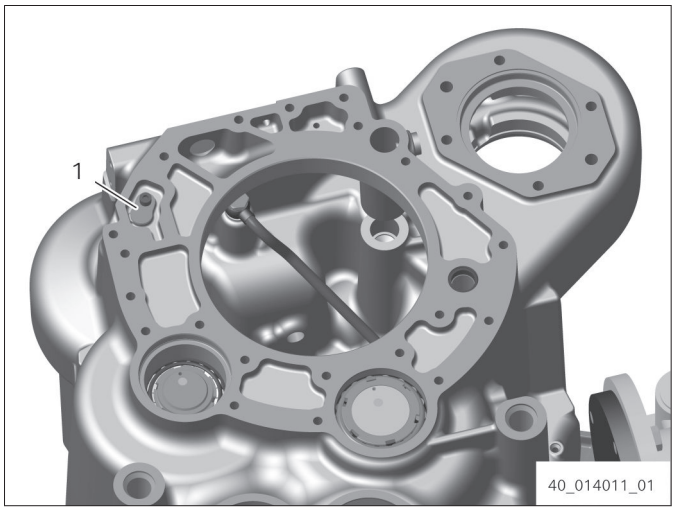


Fig. 340

3. Carry out the following two work steps immediately one after the other.

Apply 0666.690.191 [PHÖNIX SPIRITUS] to the outer diameter of the protection cap.

4. Flush-mount protection cap (2) with the open side facing inwards into the housing hole.

5. Insert the ball bearing (1) into the housing hole until contact is obtained.

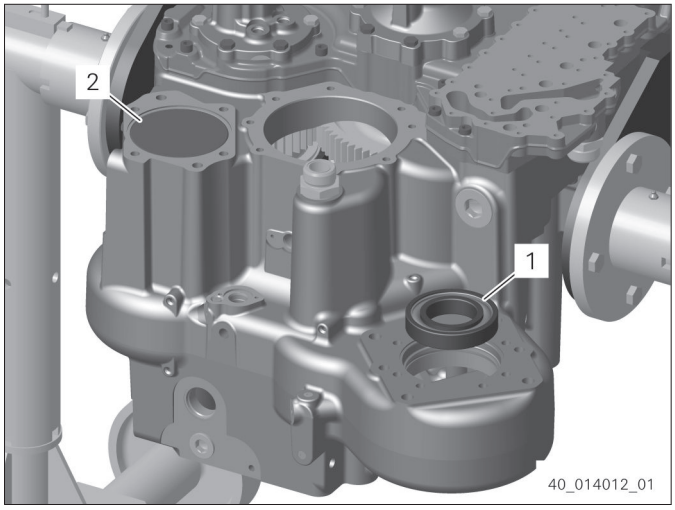


Fig. 341

6. Insert gear (1) with the short collar facing downwards into the housing.

7. Center gear.

8. Carry out the following two work steps immediately one after the other.

⚠ CAUTION

Risk of burn injuries due to contact with hot surfaces.
Slight or moderate injury possible.
⇨ Wear protective gloves.

Heat hole in the gear and bearing inner ring of the ball bearing.

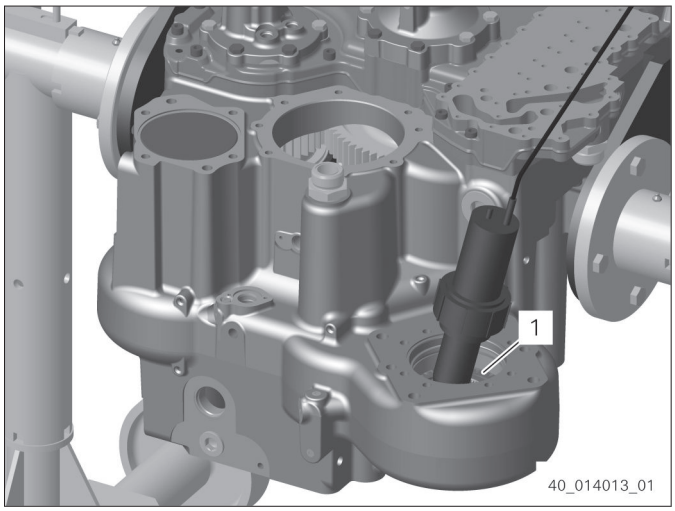


Fig. 342

9. Insert driver (1) with the short collar facing downwards until contact is obtained.

10. Let gear cool down.

11. Adjust the driver.

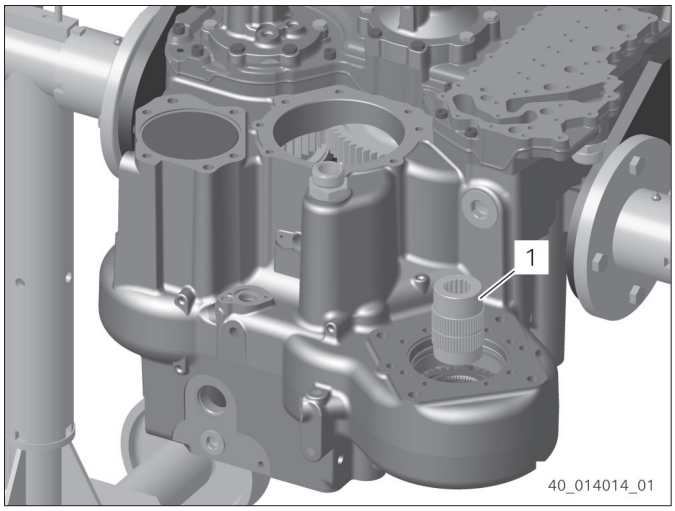


Fig. 343

Setting axial play of the gear bearing

12. Insert the ball bearing (3) into the housing hole until contact is obtained.

13. Insert shim (2) e. g. s = 1.40 mm.

14. Insert retaining ring (1) into annular groove.

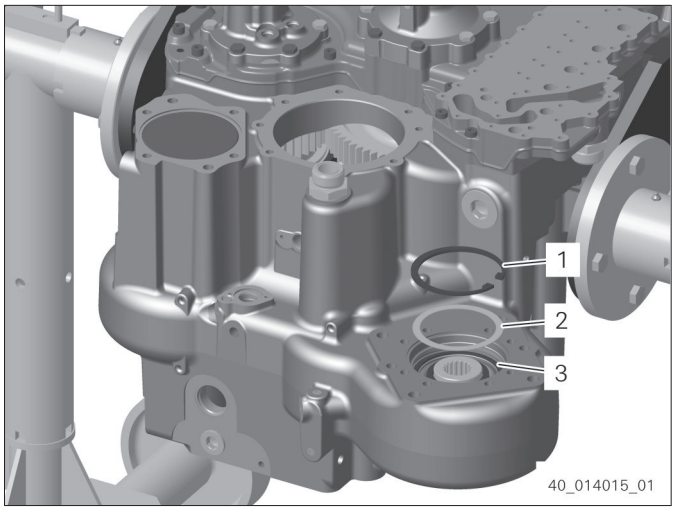


Fig. 344

15. Check Axial play gear bearing 0.20 mm to 0.30 mm with 5870.200.113 [Feeler gauge].
If the axial clearance is too small, install a thinner shim.
If the axial clearance is too large, install a thicker shim.

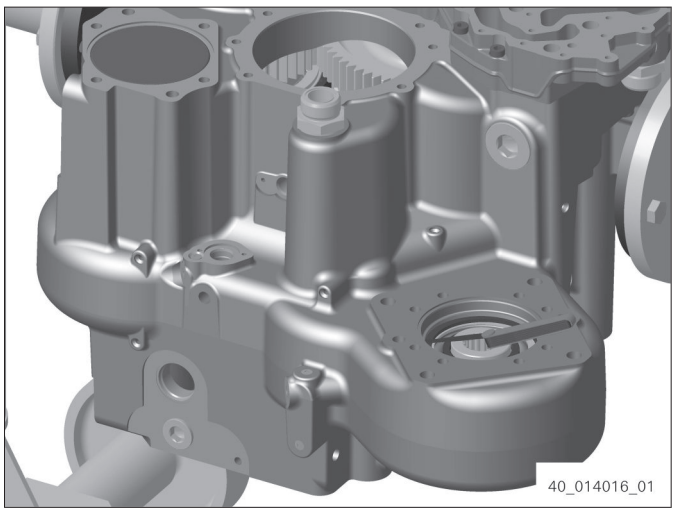


Fig. 345

16. Grease O-ring.

17. Insert the O-ring (1) into the countersink of the housing.

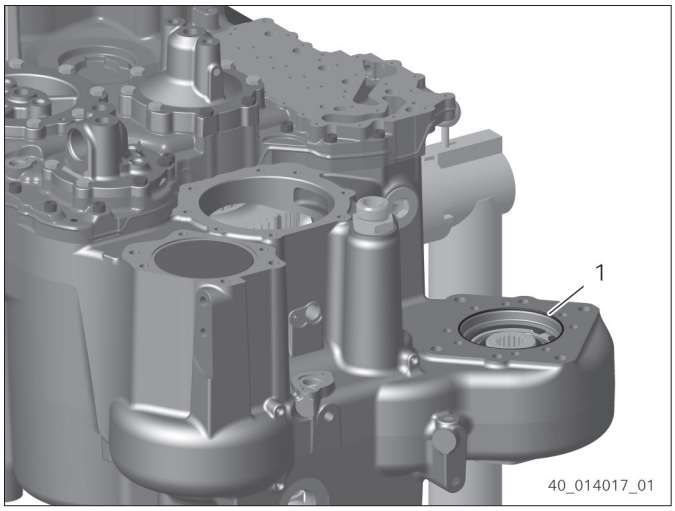


Fig. 346

18. Fix cover (1) with hexagon screws.
Tightening torque: 46 Nm

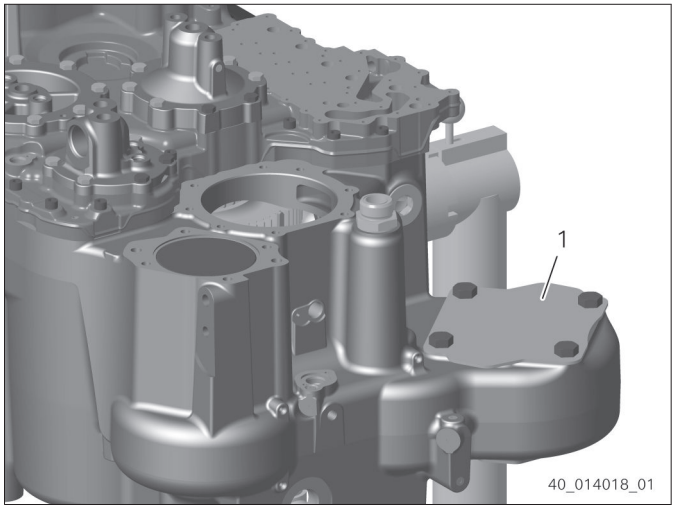


Fig. 347

19. Rotate transmission by 180.

20. Carry out the following two work steps immediately one after the other.

Apply 0666.690.191 [PHÖNIX SPIRITUS] to the outer diameter of the protection cap.

21. Flush-mount protection cap (1) with the open side facing inwards into the housing hole.

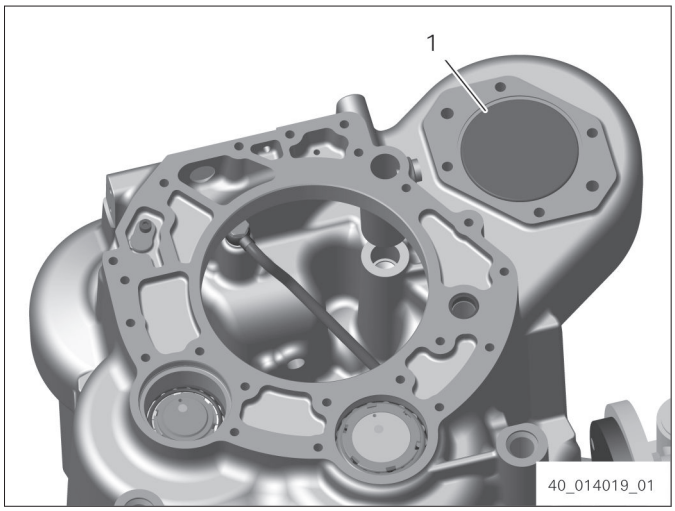


Fig. 348

22. Insert bearing outer rings into the gear until contact it obtained.

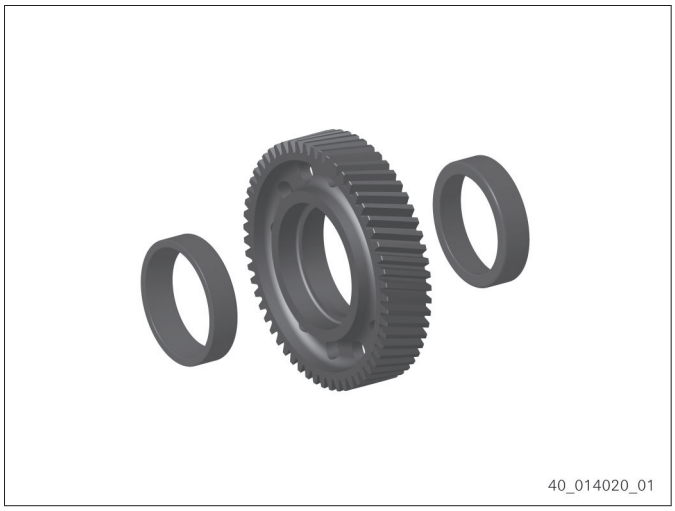


Fig. 349

23. Insert bearing inner rings into bearing outer rings.

24. Insert gear (1) into the housing.

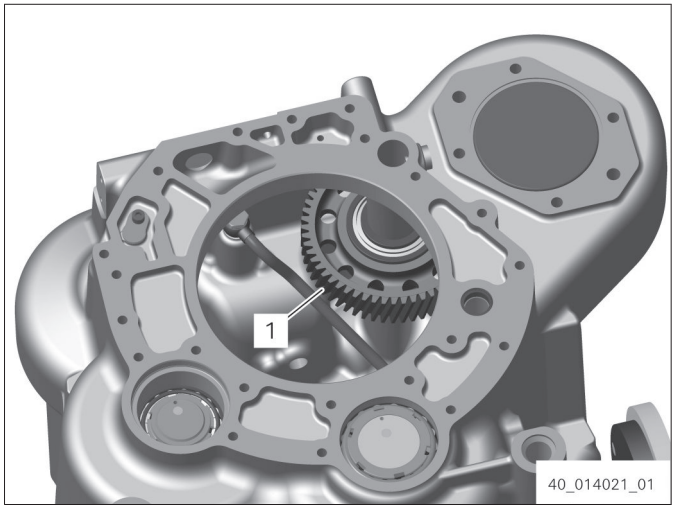


Fig. 350

Adjusting axial clearance of the gear bearing (intermediate gear)

25. Measure distance between housing and front side bearing inner ring with 5870.200.113 [Feeler gauge].
Distance = e. g. 1.45 mm

26. Calculate thickness of the shim for Axial clearance gear bearing (intermediate gear) 0.01 mm to 0.10 mm.

Calculation example:
s = distance − mean value of axial clearance
s = 1.45 mm − 0.05 mm
s = 1.40 mm

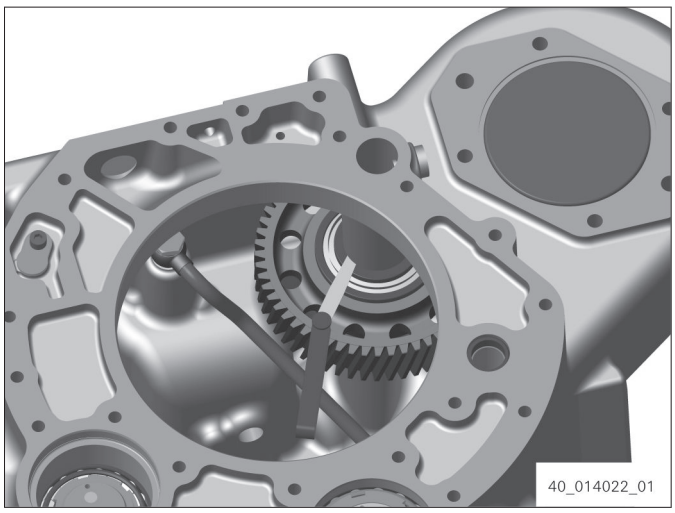


Fig. 351

27. Insert shim (1) with the calculated thickness e. g. s = 1.40 mm.

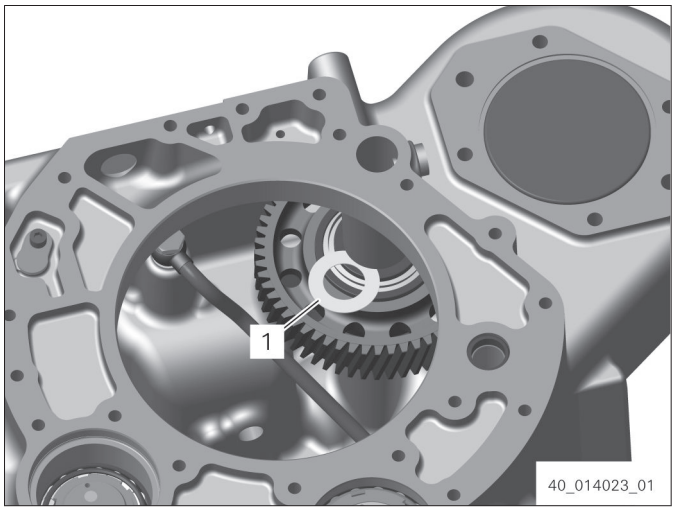


Fig. 352

28. Center gear and shim.

29. Carry out the following two work steps immediately one after the other.

⚠ CAUTION

Risk of burn injuries due to contact with cold surface.
Slight to moderate injury possible.
⇨ Wear protective gloves.

Undercool pin.

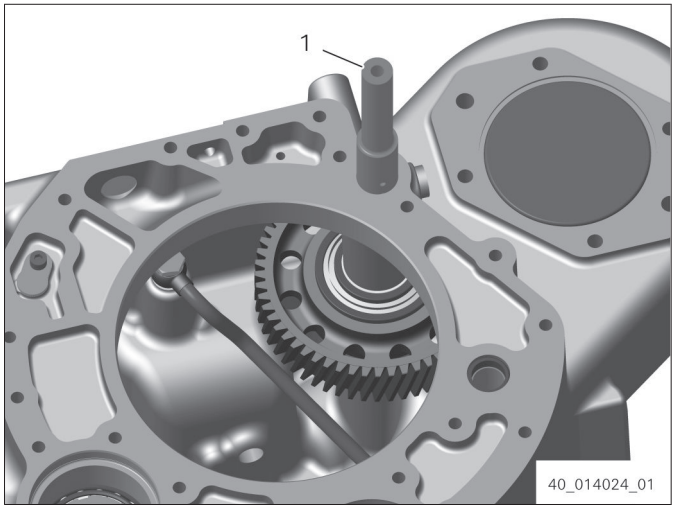


Fig. 353

30. Insert pin (1) into housing hole until contact is obtained.

Installing pressure oil pump

Special tools:

- 5870.801.006 Hot air pot
- 5870.204.021 Fixing pin

Checking gear pump

1. Check individual parts of the gear pump for wear marks before assembling the transmission.

   The gear pump is only available as a complete unit.

   Loosen cap screws.

2. Remove cover (1).

3. Check the cover, outer rotor, inner rotor and the pump housing for wear marks.
   In case of any damage, install **new** gear pump.

4. Insert outer rotor and inner rotor, with the chamfered tooth side facing the pump housing.

5. Insert cylindrical pins until contact is obtained.

6. Place the cover.

7. Bolt in and tighten cap screws.
   Tightening torque: **23 Nm**
   Tightening torque: **9.5 Nm**

8. Insert bearing outer ring (1) until contact is obtained.

9. Grease O-ring.

10. Insert O-ring (2) into annular groove.

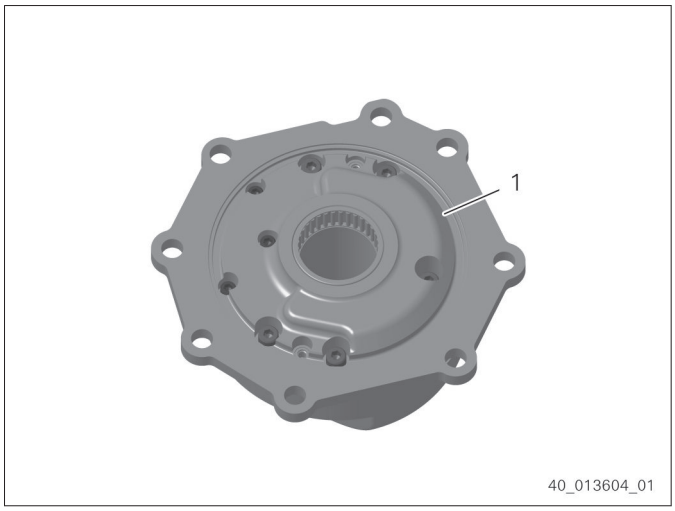


Fig. 354

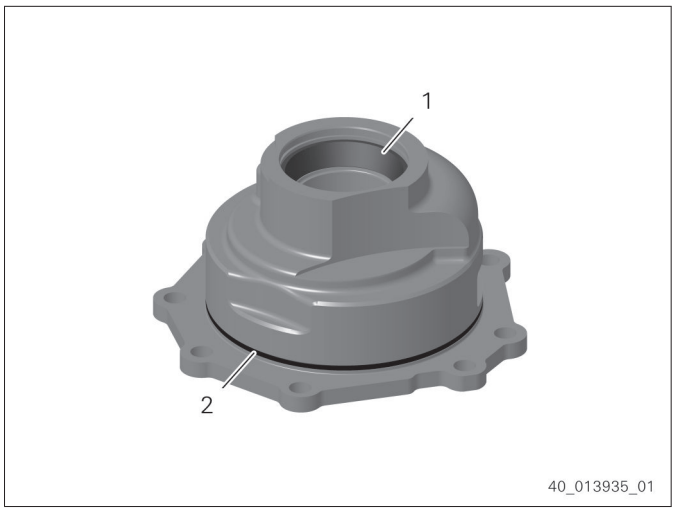


Fig. 355

11. Carry out the following three work steps immediately one after the other.

⚠ CAUTION

Risk of burn injuries due to contact with hot surfaces.
Slight or moderate injury possible.
⇨ Wear protective gloves.

Heat up housing hole by means of hot air blower and 5870.801.006 [Hot air pot].

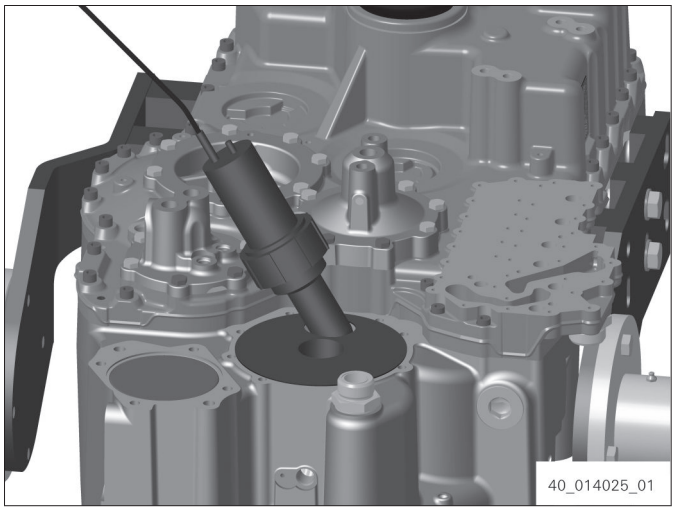


Fig. 356

12. Screw two 5870.204.021 [Fixing pin] into the housing.

13. Insert gear pump (1) into housing hole until contact is obtained.

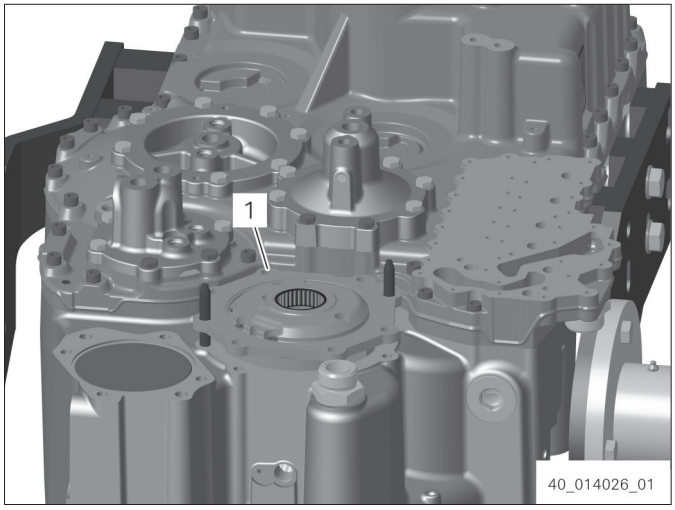


Fig. 357

14. Grease O-ring.

15. Slide O-ring (1) onto pump flange.

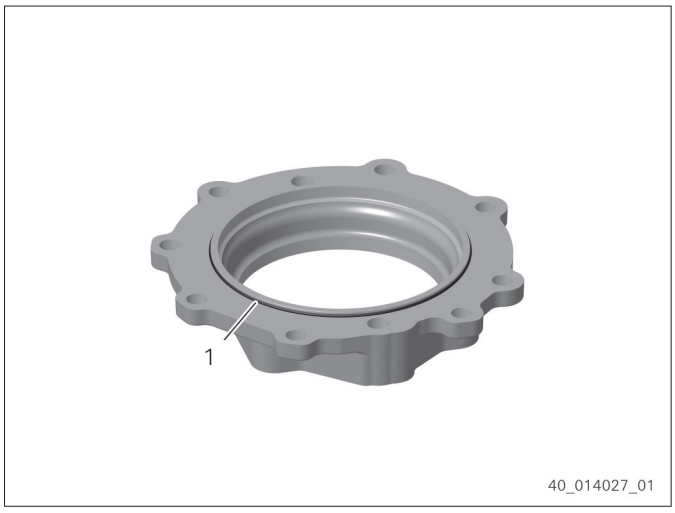


Fig. 358

16. Fit pump flange (1).

17. Fix pump flange and gear pump with hexagon screws.
Tightening torque: **79 Nm**

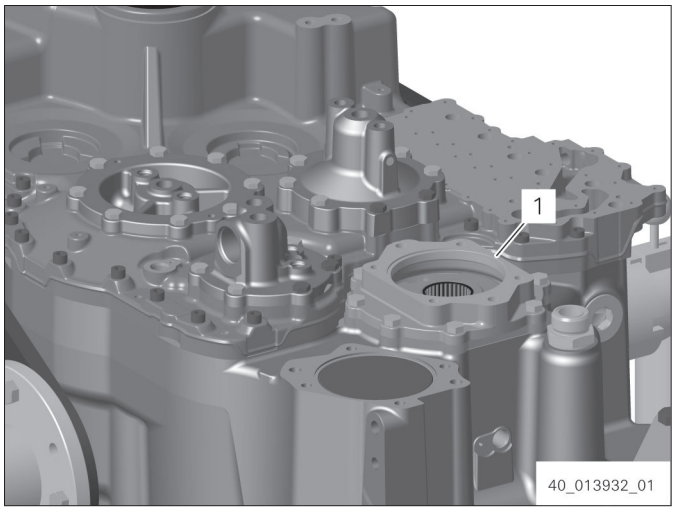


Fig. 359

Installing shaft

Operating supplies and auxiliary materials:
- 0666.690.248 LOCTITE 243

1. Slide shim (2) onto driver.

2. Carry out the following two work steps immediately one after the other.

⚠ CAUTION

Risk of burn injuries due to contact with hot surfaces.
Slight or moderate injury possible.
⇨ Wear protective gloves.

Heat bearing inner ring.

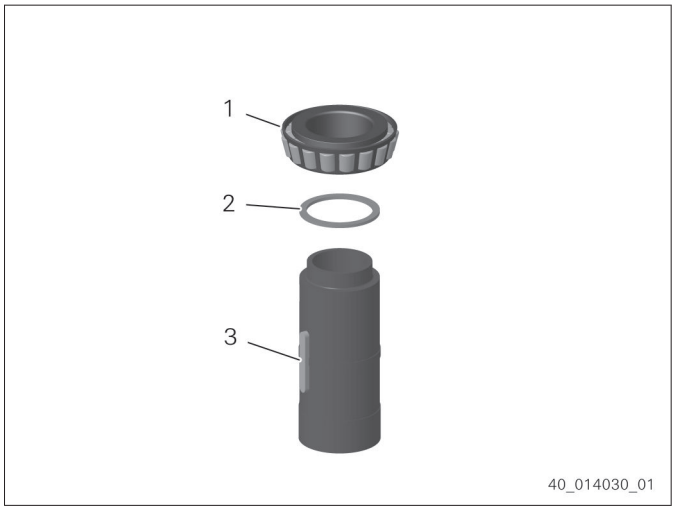


Fig. 360

3. Slide on bearing inner ring (1) until contact is obtained.

4. Let bearing inner ring cool down.

5. Adjust bearing inner ring.

6. Insert fitting key (3).

7. Slide washer onto shaft.

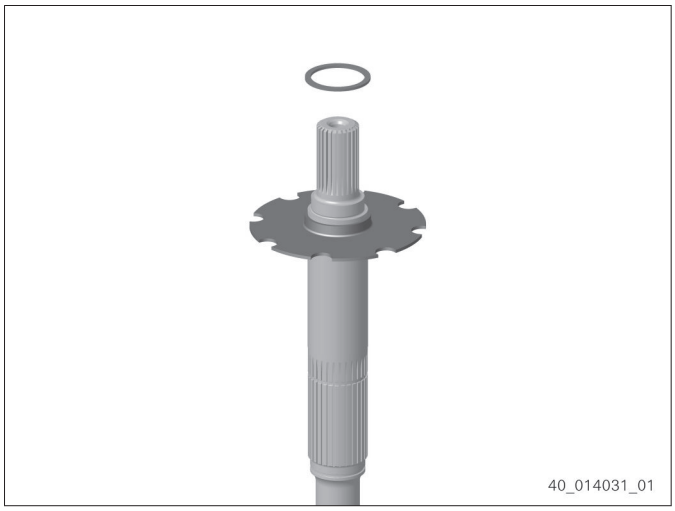


Fig. 361

8. Slide the driver (3) onto the shaft.

9. Insert spring washer (2) with the larger inner diameter facing upwards.

10. Apply 0666.690.248 [LOCTITE 243] to thread of cap screw.

11. Bolt in cap screw (1) and tighten.
Tightening torque: **46 Nm**

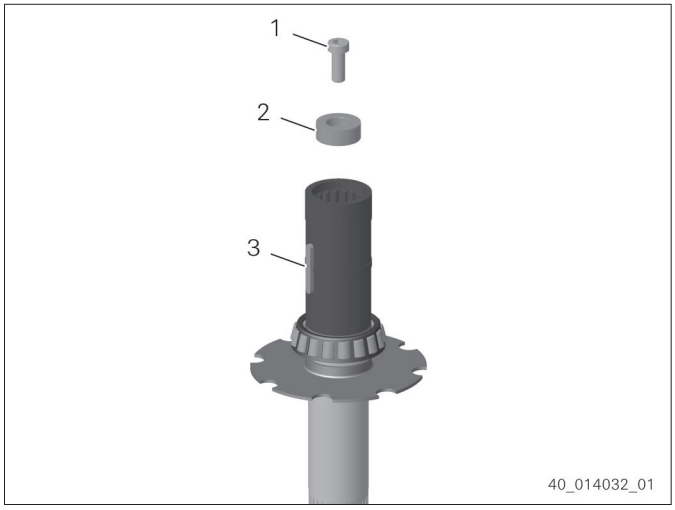


Fig. 362

12. Carry out the following two work steps immediately one after the other.

⚠ CAUTION

Risk of burn injuries due to contact with hot surfaces.
Slight or moderate injury possible.
⇨ Wear protective gloves.

Heat bearing inner ring.

13. Slide on bearing inner ring (1) onto the gear until contact is obtained.

14. Let bearing inner ring cool down.

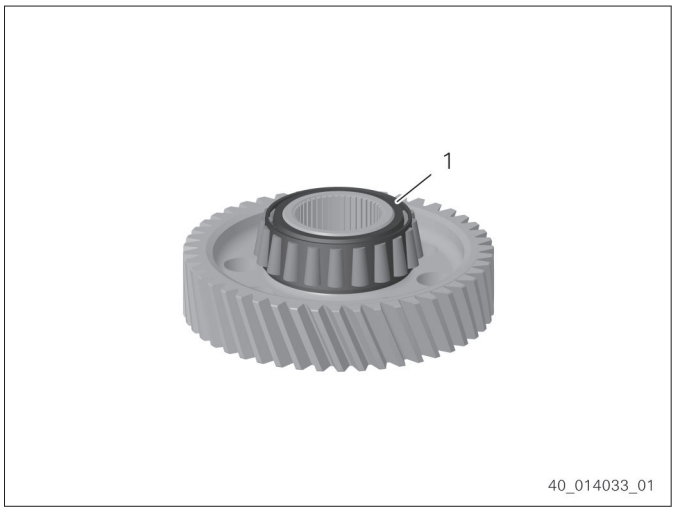


Fig. 363

15. Adjust bearing inner ring.

16. Insert retaining ring (2).

17. Slide on gear (1) until contact is obtained.

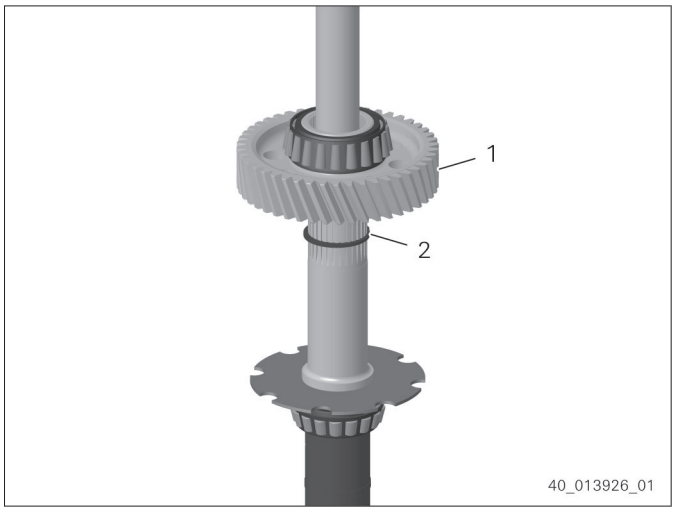


Fig. 364

18. Grease the annular groove on the shaft.

19. Insert and center R-ring (1).

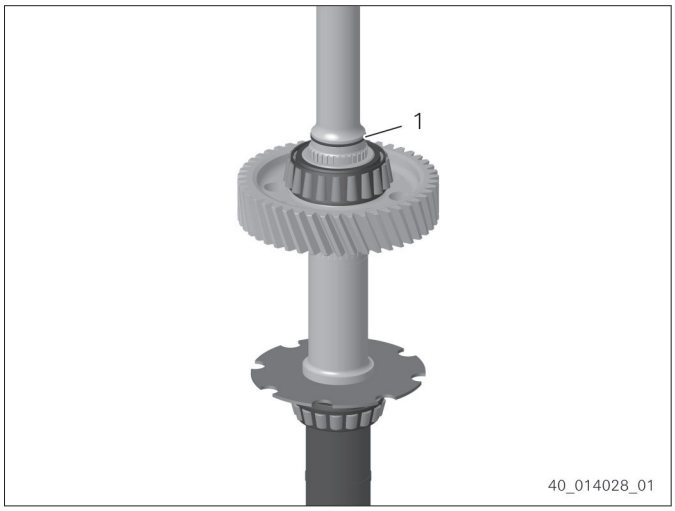


Fig. 365

20. Flush-align fitting key and fitting key groove.

21. Insert shaft (1) into the gear pump until contact is obtained.

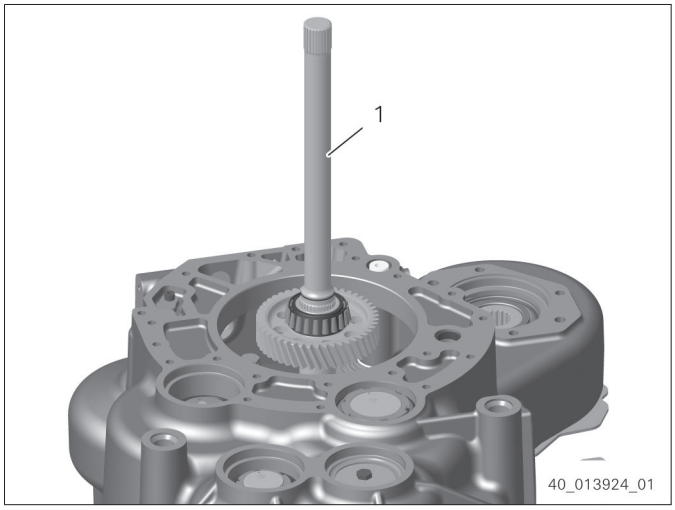


Fig. 366

22. Grease O-ring.

23. Insert the O-ring (1) into the countersink of the pump flange.

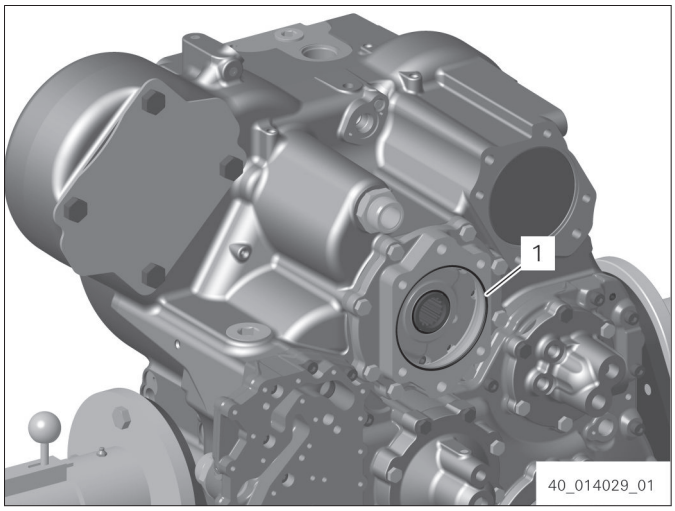


Fig. 367

24. Secure the cover (1) with hexagon screws. Tightening torque: 46 Nm

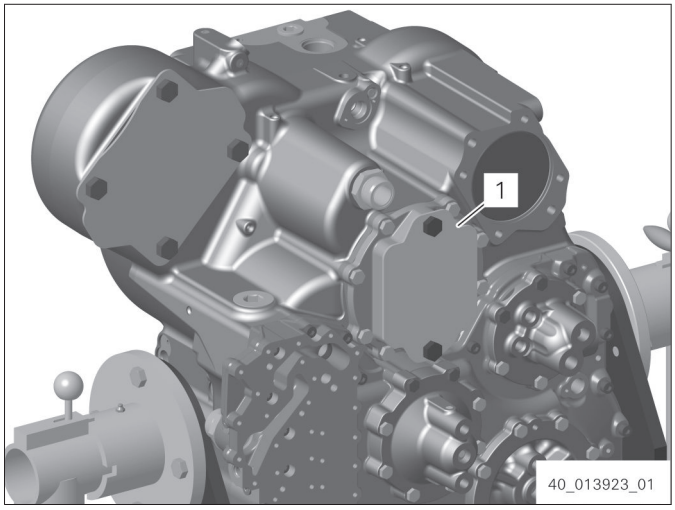


Fig. 368

Assembling drive

Special tools:

- 5870.320.016 Lever riveter
- 5870.801.006 Hot air pot
- 5870.204.007 Locating pin
- 5870.058.051 Driver tool
- 5870.260.002 Handle
- 5870.048.030 Driver tool
- 5870.204.021 Fixing pin
- AA02.247.426 Eyebolt

Operating supplies and auxiliary materials:

- 0666.690.191 PHÖNIX SPIRITUS

1. Insert sealing plugs (1) into holes using 5870.320.016 [Lever riveter].

2. Screw in and tighten screw plug with O-ring (2).
   Tightening torque: 35 Nm

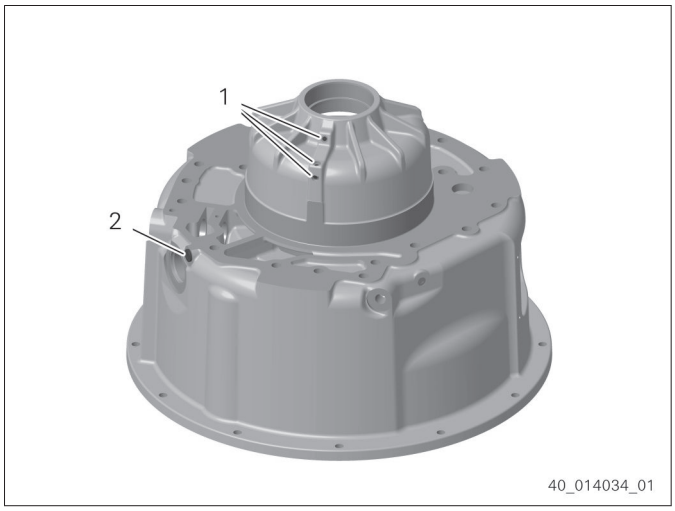


Fig. 369

3. Insert bearing outer ring (1) into bearing hole until contact is obtained.

4. Insert bearing inner ring (2).

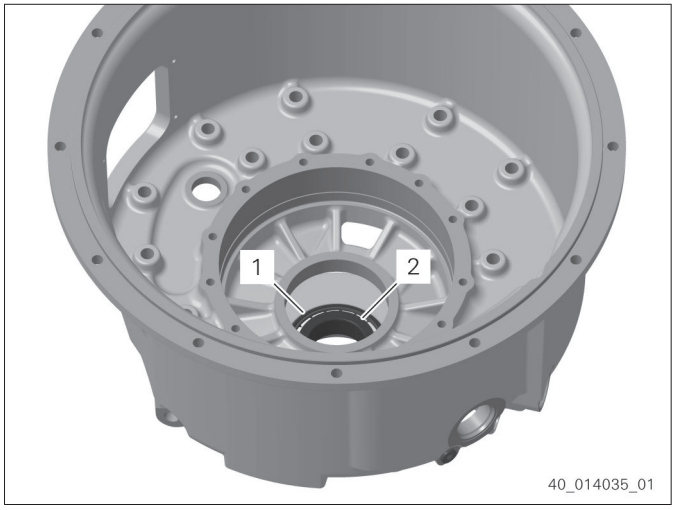


Fig. 370

5. Insert helical gear (1) with long collar facing upwards into torque converter bell housing.

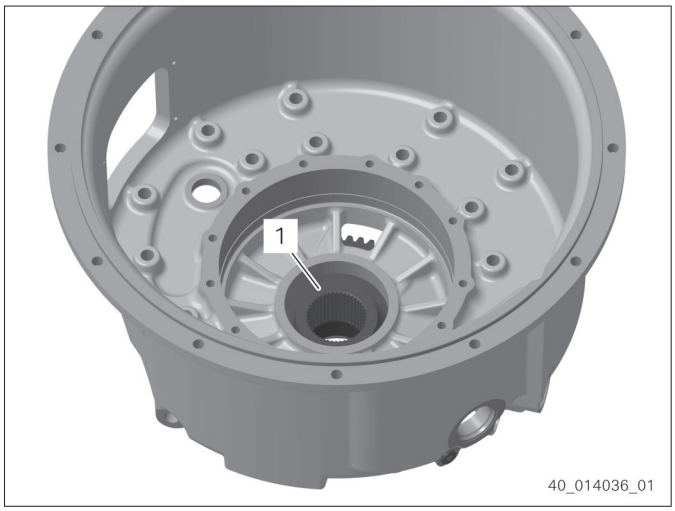


Fig. 371

6. Carry out the following two work steps immediately one after the other.

⚠ CAUTION

Risk of burn injuries due to contact with hot surfaces.
Slight or moderate injury possible.
⇨ Wear protective gloves.

Heat up hole in helical gear and bearing inner ring.

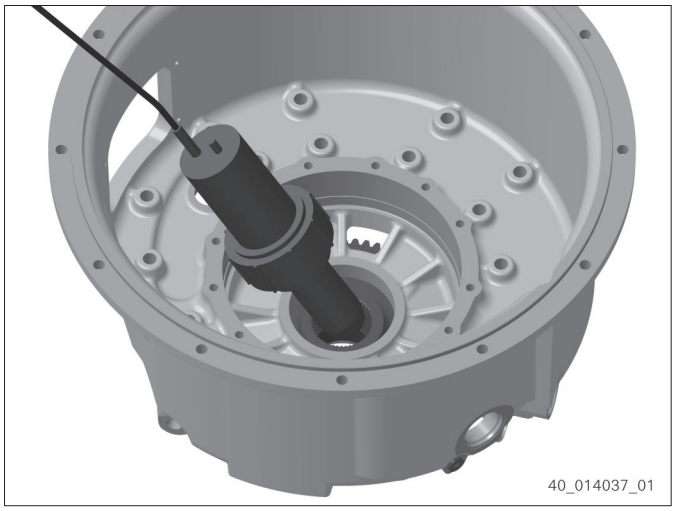


Fig. 372

7. Insert input shaft (1) until contact is obtained.

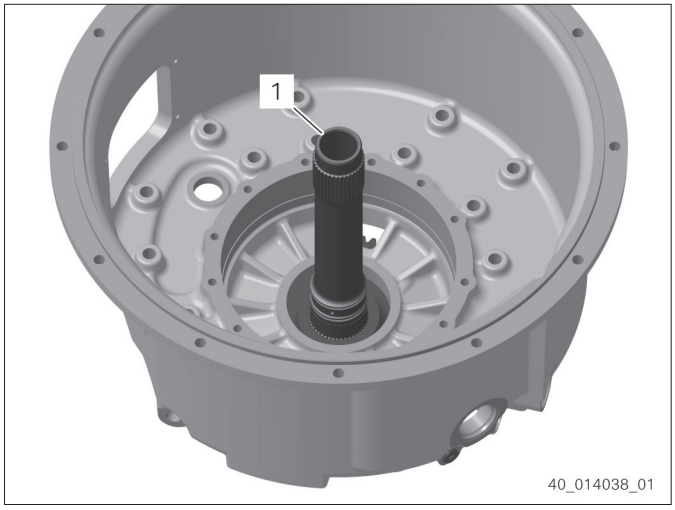


Fig. 373

8. Carry out the following two work steps immediately one after the other.

⚠ CAUTION

Risk of burn injuries due to contact with hot surfaces.
Slight or moderate injury possible.
⇨ Wear protective gloves.

Heat bearing inner ring.

9. Slide on bearing inner ring (2) until contact is obtained.

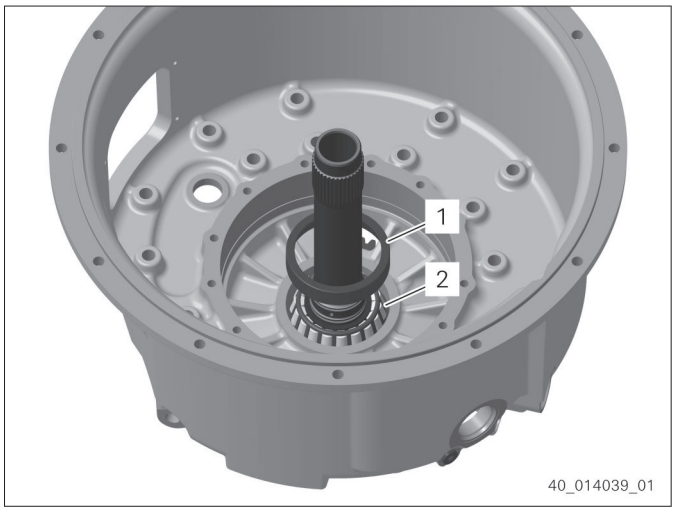


Fig. 374

10. Let bearing inner ring cool down.

11. Adjust bearing inner ring.

12. Insert bearing outer ring (1) until contact is obtained.

13. Grease annular grooves of input shaft.

14. Insert and center R-rings (1).

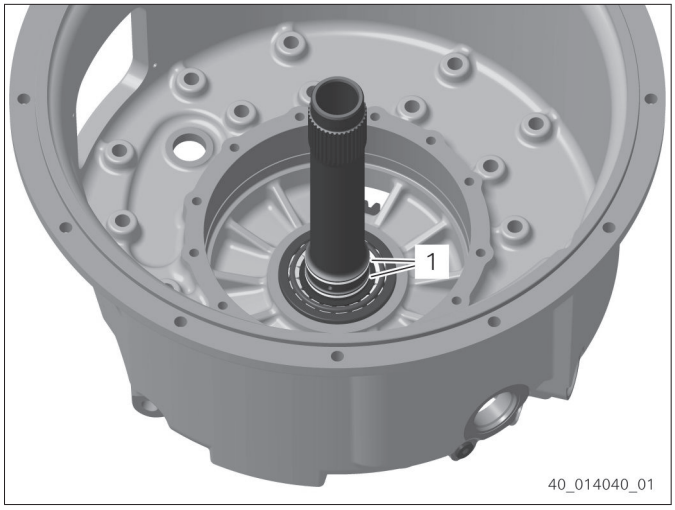


Fig. 375

15. Insert converter safety valve (2) into oil feed flange until contact is obtained.

16. **⚠ CAUTION**

    Risk of injury due to parts flying away.
    Slight or moderate injury possible.
    ⇨ Wear protective goggles.

    Flush-mount slotted pin (1).

17. Grease O-ring.

18. Slide on O-ring (3).

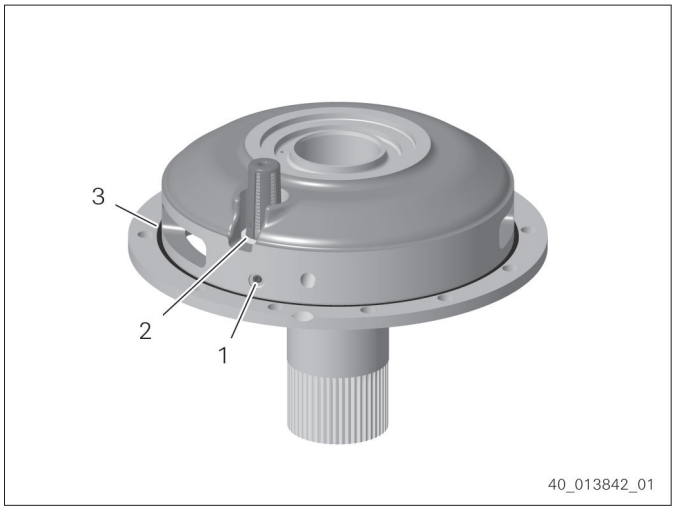


Fig. 376

19. Carry out the following three work steps immediately one after the other.

⚠ CAUTION

Risk of burn injuries due to contact with hot surfaces.
Slight or moderate injury possible.
⇨ Wear protective gloves.

Heat up hole with hot air blower and 5870.801.006 [Hot air pot].

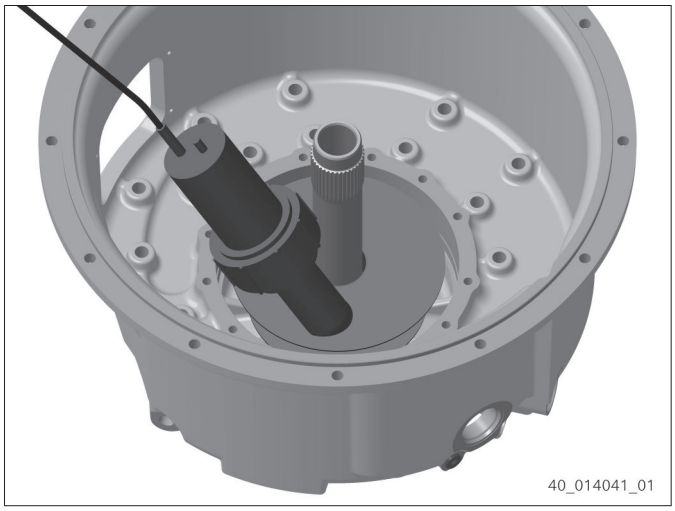


Fig. 377

20. Turn two 5870.204.007 [Locating pin] into torque converter bell housing.

21. Insert oil feed flange (1) into hole until contact is obtained.

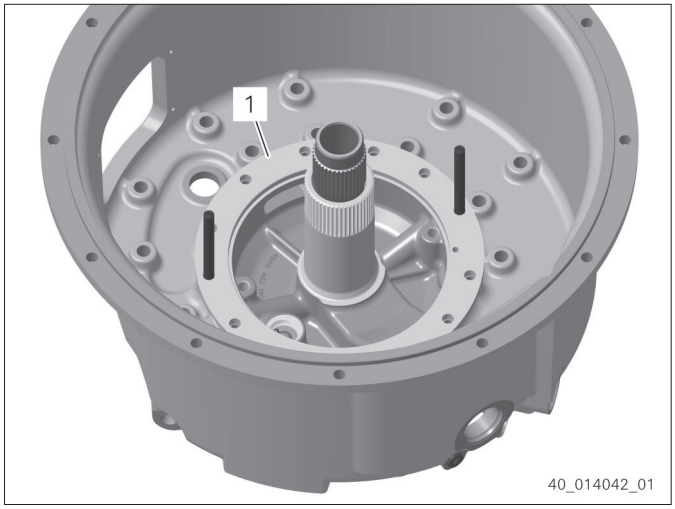


Fig. 378

22. Insert needle sleeve (1) into bearing cover using 5870.058.051 [Driver tool] and 5870.260.002 [Handle] until contact is obtained. Insert needle sleeve with marked front face showing upwards.

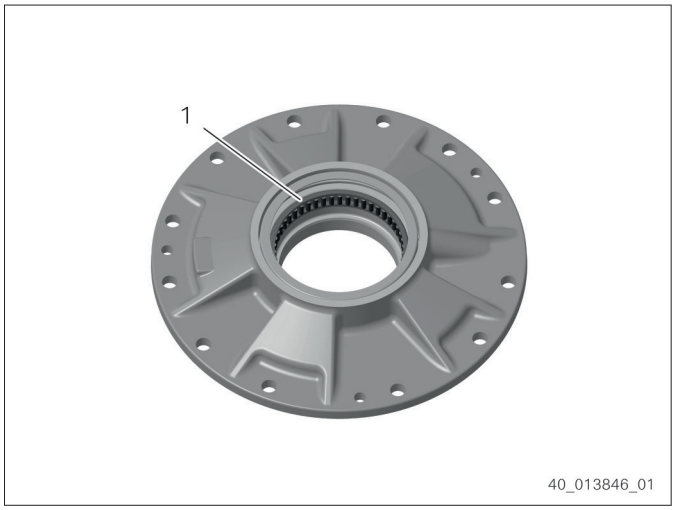


Fig. 379

23. Carry out the following two work steps immediately one after the other.

Apply 0666.690.191 [PHÖNIX SPIRITUS] to outer diameter of shaft sealing ring.

24. Insert shaft sealing ring (1) with 5870.048.030 [Driver tool].

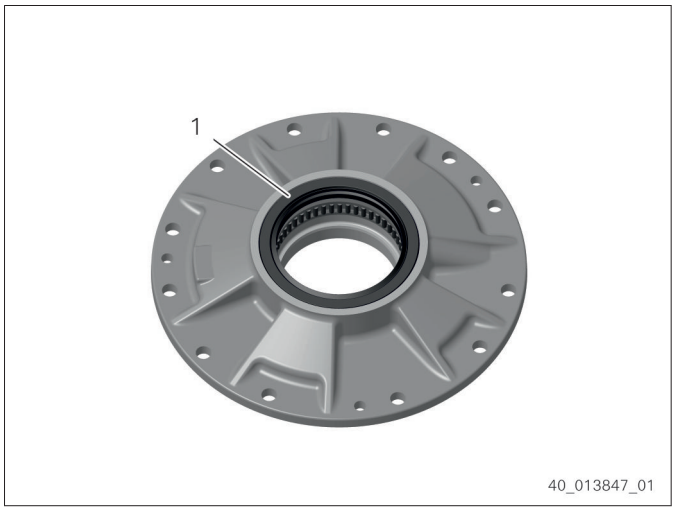


Fig. 380

25. Grease O-ring.

26. Fit O-ring (1).

Fig. 381

27. Fit bearing cover (1).

28. Turn in and tighten hexagon screws.
Tightening torque: 46 Nm

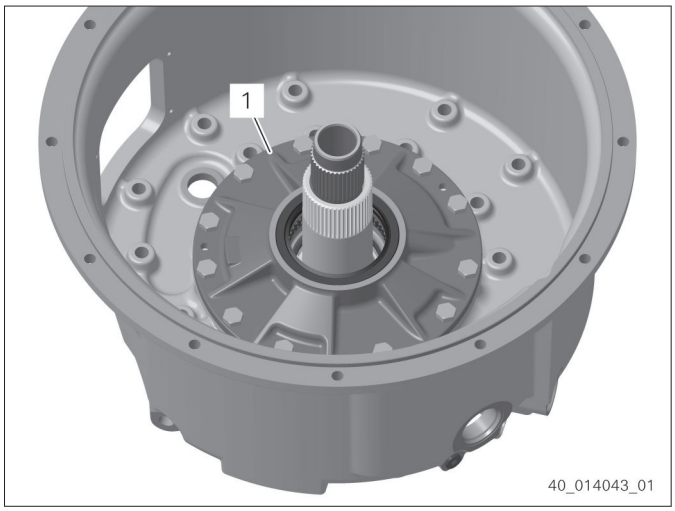


Fig. 382

29. Push washers onto hexagon screws.

30. Fix cover plate (1) and cover sheet (2) with hexagon screws.
Tightening torque: **2 Nm (±1 Nm)**

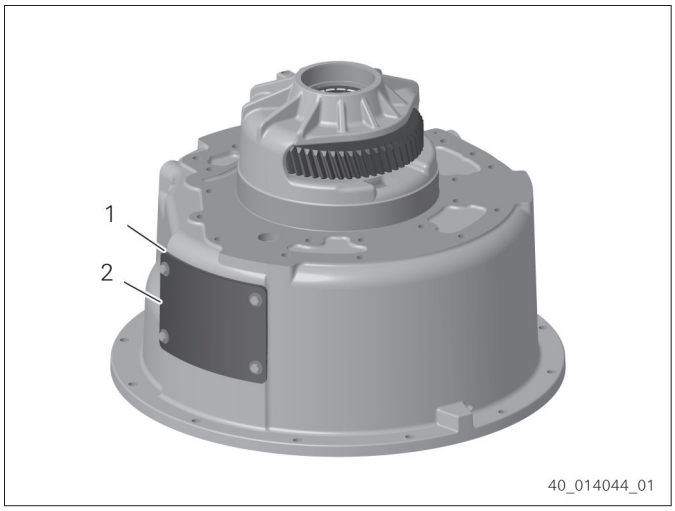


Fig. 383

31.

⚠ CAUTION

Risk of injury due to parts flying away.
Slight or moderate injury possible.
⇨ Wear protective goggles.

Force in slotted pin until contact is obtained.

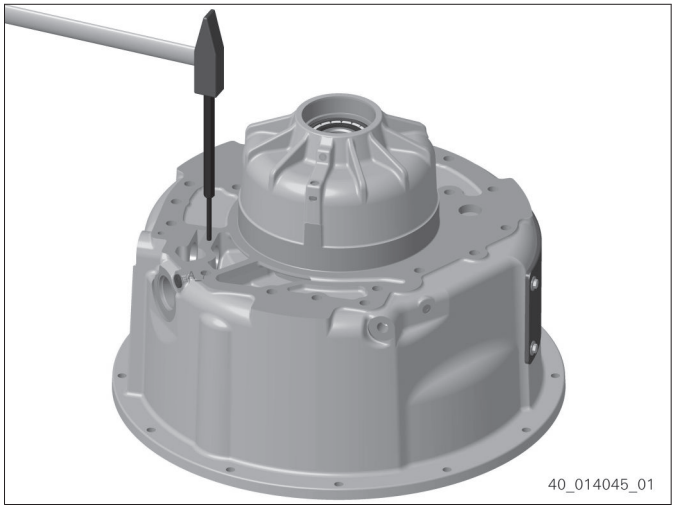


Fig. 384

32. Carry out the following two work steps immediately one after the other.

Apply 0666.690.191 [PHÖNIX SPIRITUS] to the outer diameter of the protection caps.

33. Flush-mount protection caps (1) with the open side facing inwards into housing holes.

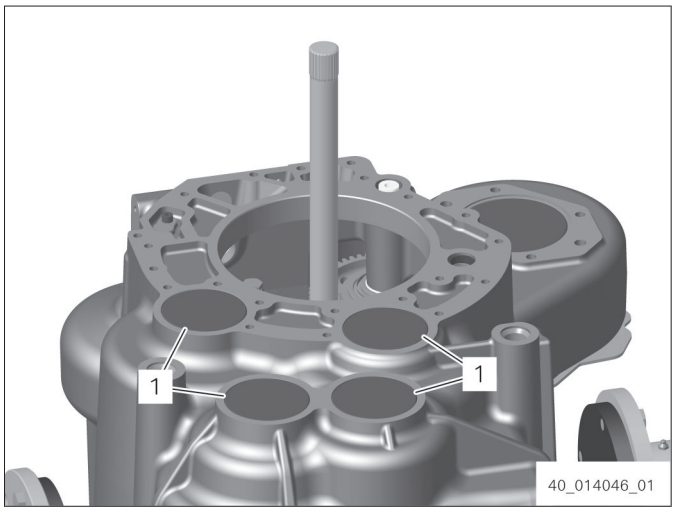


Fig. 385

34. Screw two 5870.204.021 [Fixing pin] into the housing.

35. Put on seal (1).

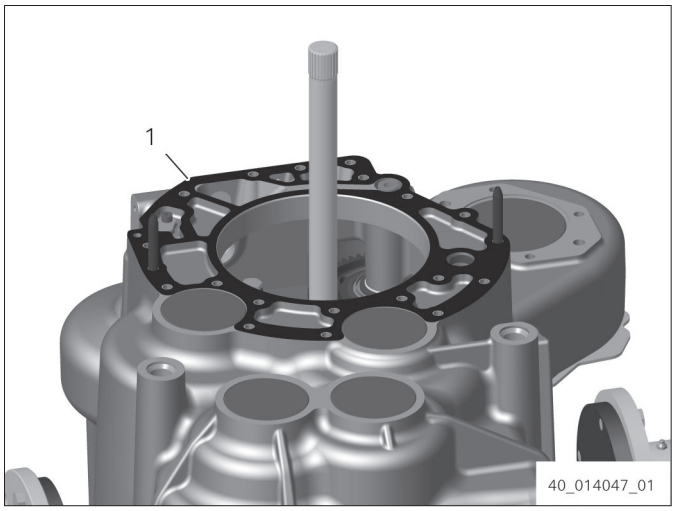


Fig. 386

36. **⚠ CAUTION**

Risk of crushing due to moving load.
Slight to moderate injury possible.

⇨ Move load slowly and carefully.

⇨ Do not reach into danger area.

Mount torque converter bell housing with two AA02.247.426 [Eyebolt] and a crane.

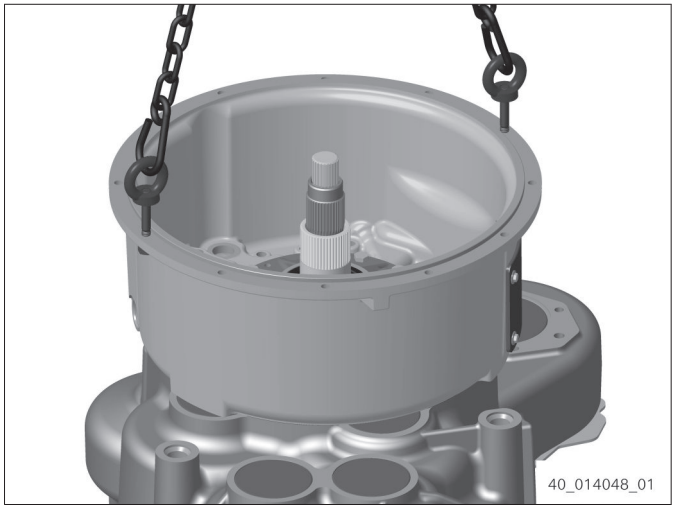


Fig. 387

37. Turn in and tighten hexagon screws.
Tightening torque: 115 Nm

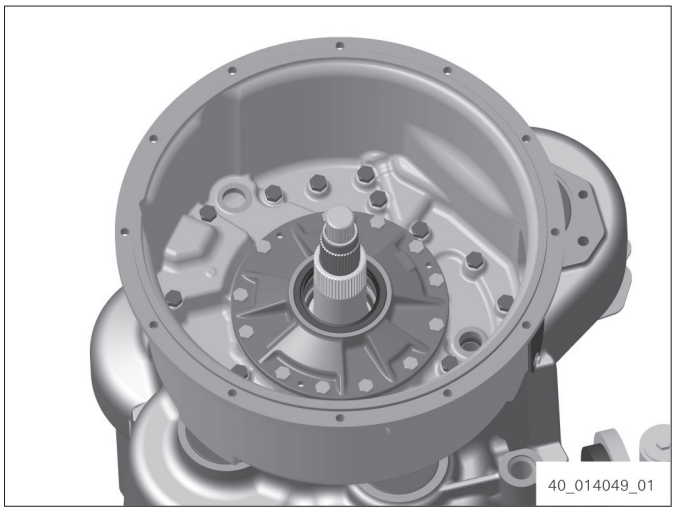


Fig. 388

38. Insert sealing rings between oil tube (1) and torque converter bell housing.

39. Slide sealing ring onto hollow screws (2).

40. Screw in the hollow screws with sealing ring (2) and tighten them.
Tightening torque: 130 Nm

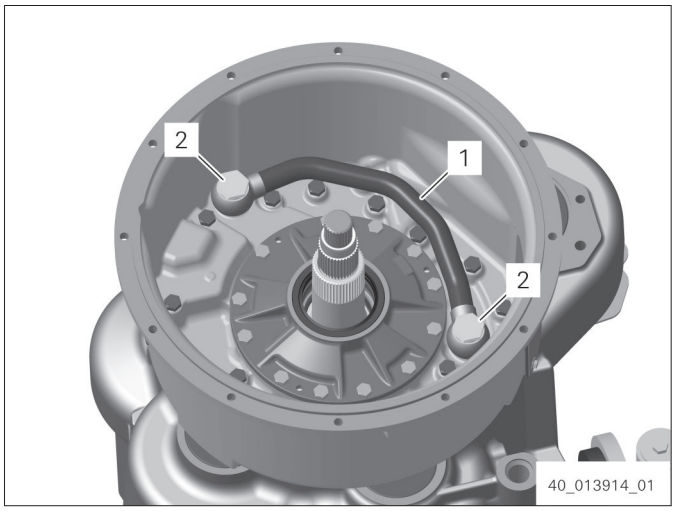


Fig. 389

Mounting engine connection and converter

Special tools:
- 5870.057.009 Driver tool
- 5870.260.002 Handle
- AA02.676.915 Load ring

Operating supplies and auxiliary materials:
- 0666.690.248 LOCTITE 243

1. Position flange shaft (2) onto converter.

2. Apply 0666.690.248 [LOCTITE 243] to thread of hexagon screws.

3. Screw in and tighten hexagon screws (1).
Tightening torque: 68 Nm

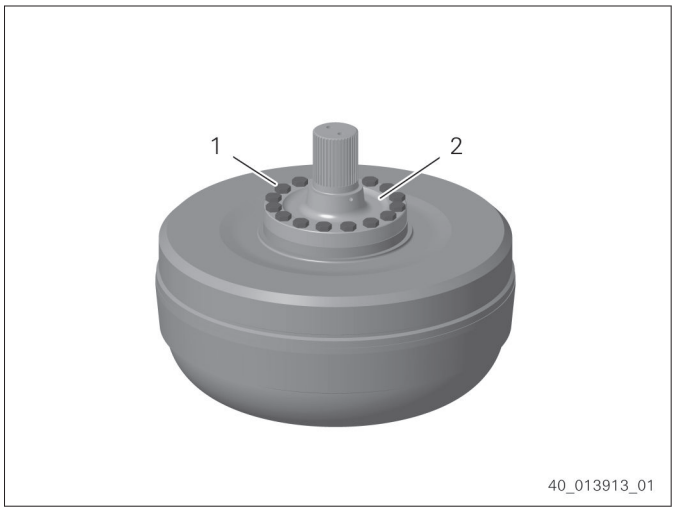


Fig. 390

4. Grease annular groove.

5. Insert and center R-ring (1).

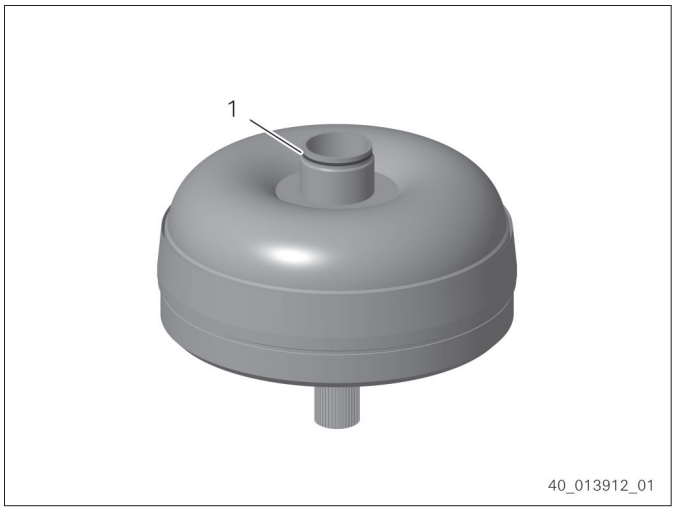


Fig. 391

6. Insert the ball bearing (2) in the cover until contact is obtained.

7. Insert V-ring (1).

Fig. 392

8. **⚠ CAUTION**

Risk of crushing due to hydraulic tool.
Slight to moderate injury possible.
⇨ Do not reach into danger area.

Use suitable tools to press cover onto flange shaft until contact is obtained.

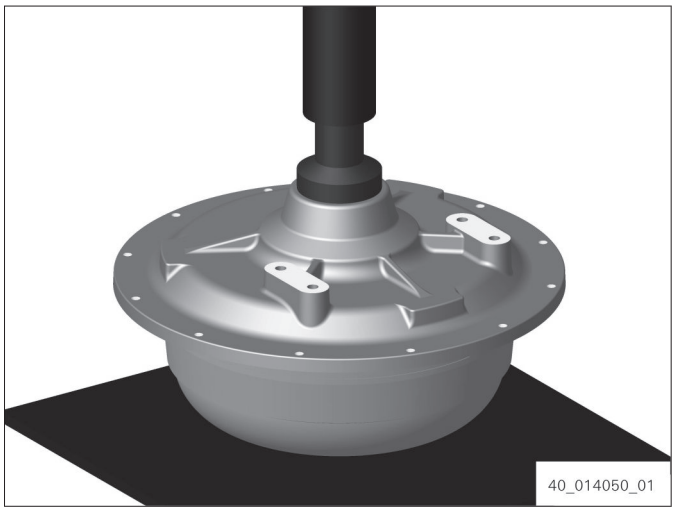


Fig. 393

9. Carry out the following two work steps immediately one after the other.

⚠ CAUTION

Risk of burn injuries due to contact with hot surfaces.
Slight or moderate injury possible.
⇨ Wear protective gloves.

Heat up internal spline.

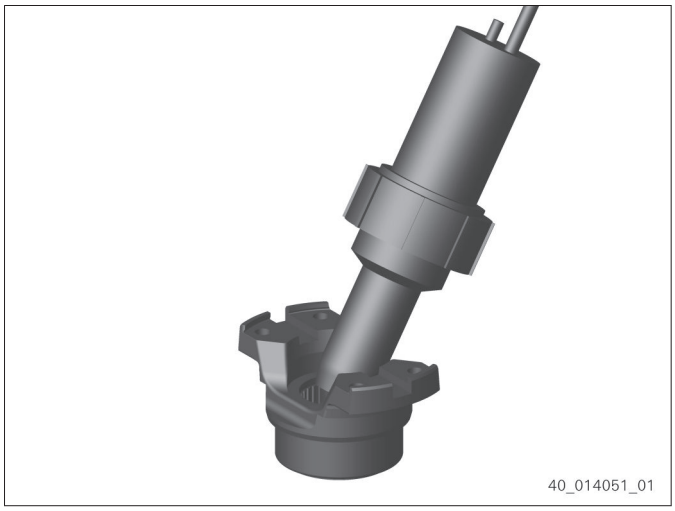


Fig. 394

10. Slide output flange (1) onto flange shaft until contact is obtained.

Fig. 395

11. Fix output flange with washer (3) and hexagon screws (2).
Tightening torque: **46 Nm**

12. **⚠ CAUTION**

Risk of injury due to parts flying away.
Slight or moderate injury possible.
⇨ Wear protective goggles.

Mount locking plate (1) using the 5870.057.009 [Driver tool] and 5870.260.002 [Handle] until contact is obtained.

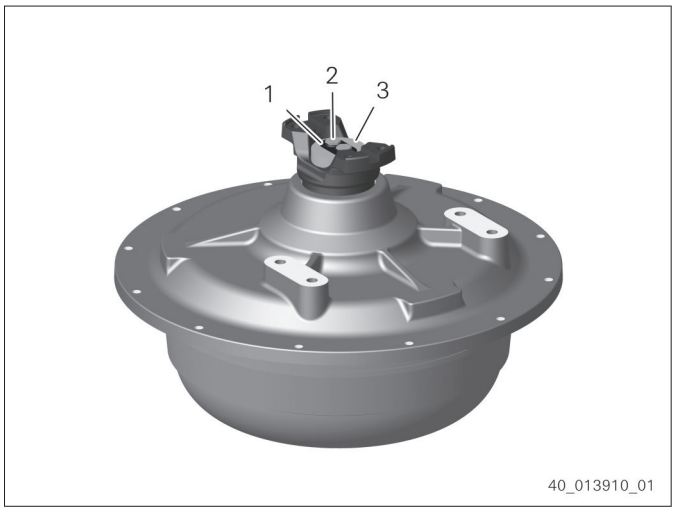


Fig. 396

13. **⚠ CAUTION**

Risk of crushing due to moving parts.
Slight or moderate injury possible.
⇨ Do not reach into danger area!

Use two AA02.676.915 [Load ring] and crane to slide on cover and converter until contact is obtained. Mount the cover according to the marking.

Fig. 397

14. Insert hexagon screws (2) into holes and tighten nuts (1).
Tightening torque: 46 Nm

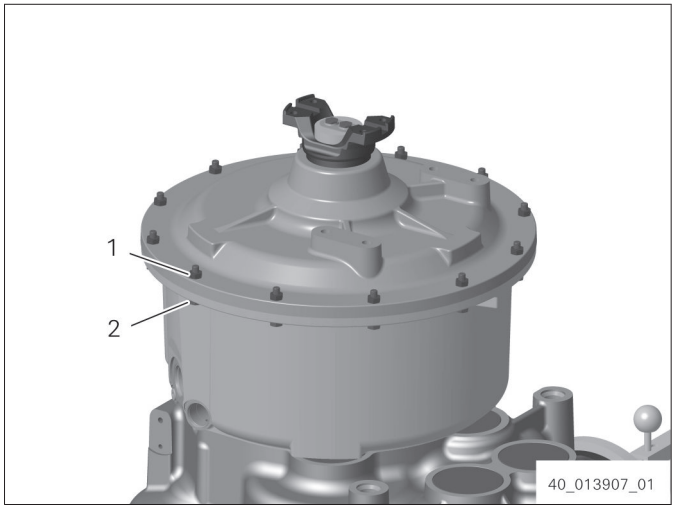


Fig. 398

Mounting the fixing plates

1. Fix the fixing plates (1) with hexagon screws.
Tightening torque: 195 Nm

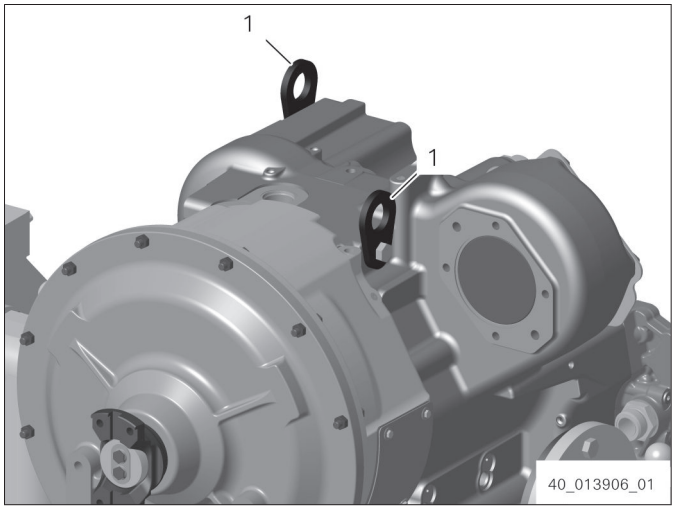


Fig. 399

Installing the torque converter pressure retaining valve

1. Insert the piston (2) into the torque converter bell housing.

2. Insert compression spring (1).

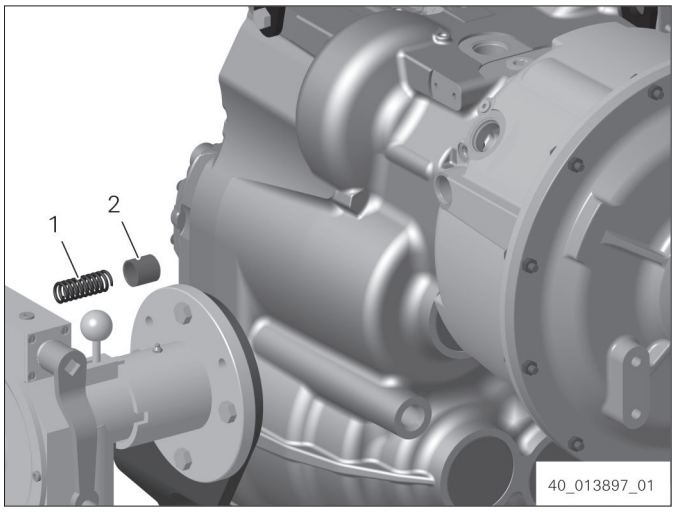


Fig. 400

3. Insert screw plug with O-ring (1) and tighten. Tightening torque: 130 Nm

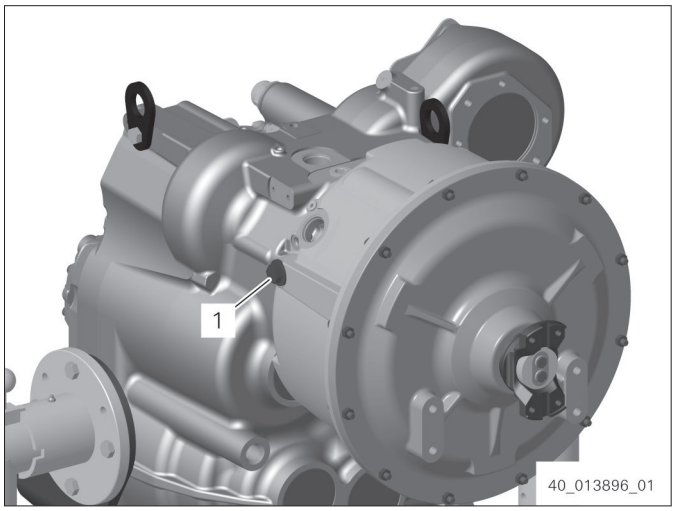


Fig. 401

Assembling and installing shift system

Installing duct plate

Special tools:

- 5870.204.037 Fixing pin

1. Turn two 5870.204.037 [Fixing pin] into cover.

2. Slide on seal (1).

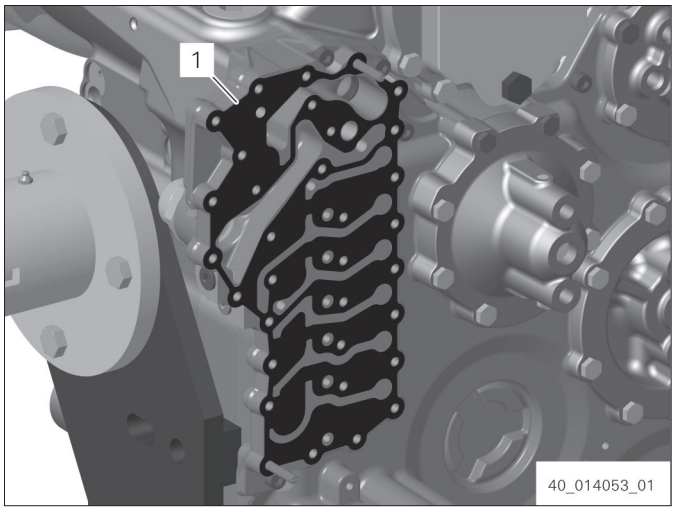


Fig. 402

3. Bolt in screw plugs (1) into duct plate and tighten.
Tightening torque: 9.5 Nm

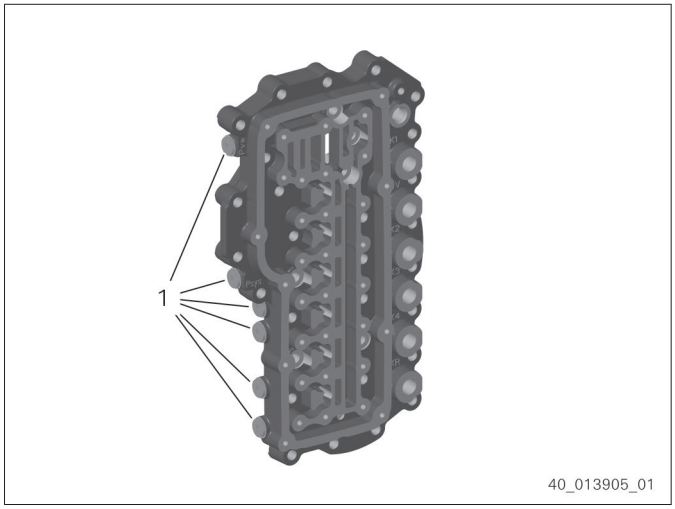


Fig. 403

4. Slide on duct plate (1).

5. Fix duct plate with internal hexalobular bolts in the specified order.
Tightening torque: **23 Nm**

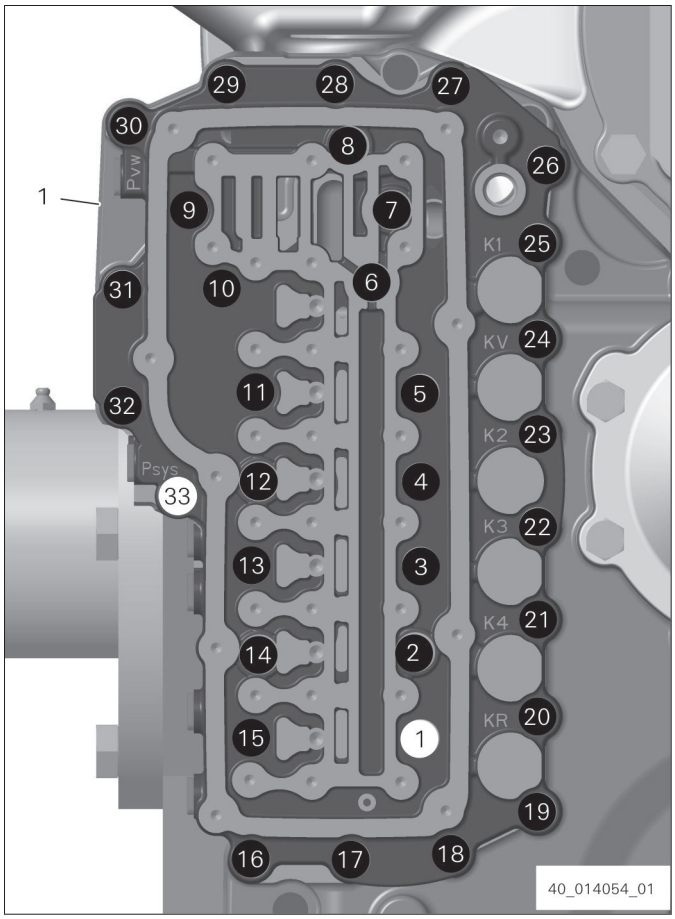


Fig. 404

6. Insert valves (1) in duct plate.

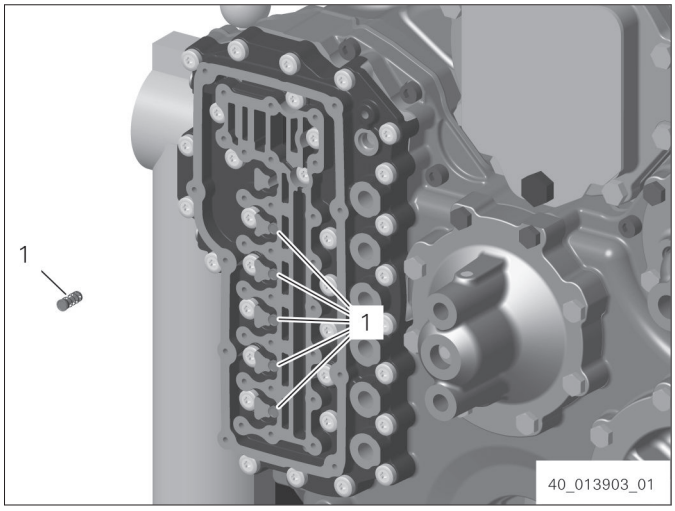


Fig. 405

Assembling and mounting valve blocks

Special tools:

- 5870.204.063 Fixing pin
- AA02.416.230 Driver tool
- AA02.416.754 Driver tool

- AA02.414.200 Driver tool
- AA02.788.633 Torque wrench

1. Bolt two 5870.204.063 [Fixing pin] into the duct plate.

2. Slide on **new** intermediate plate (1).

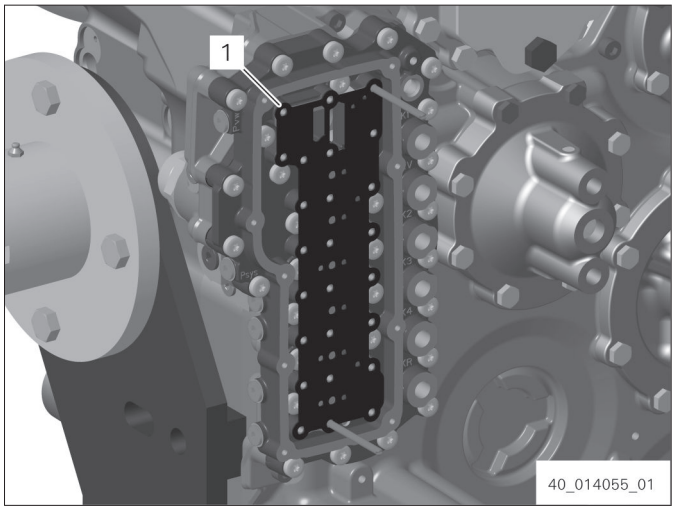


Fig. 406

3. Insert the control piston (1) in the hole.

4. Insert compression spring (2).

5. Oil O-ring.

6. Insert O-ring in the annular groove of the plug (3).

7. Insert the plug (3) in the hole.

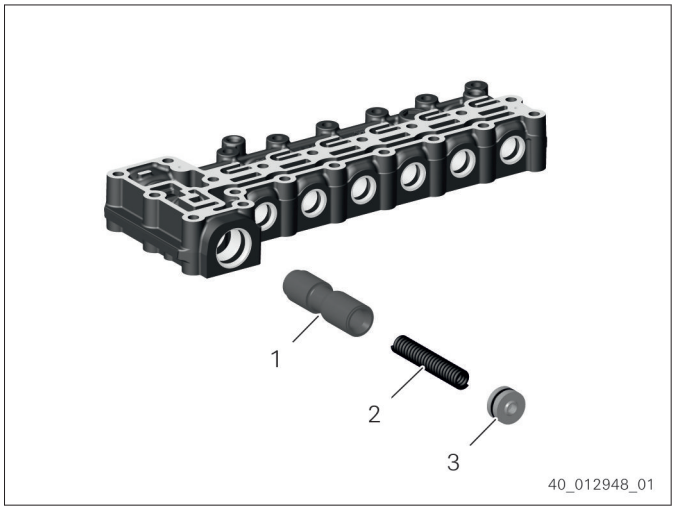


Fig. 407

8. Press the plug inwards with AA02.416.230 [Driver tool] until contact is obtained and insert fixing plate (1).

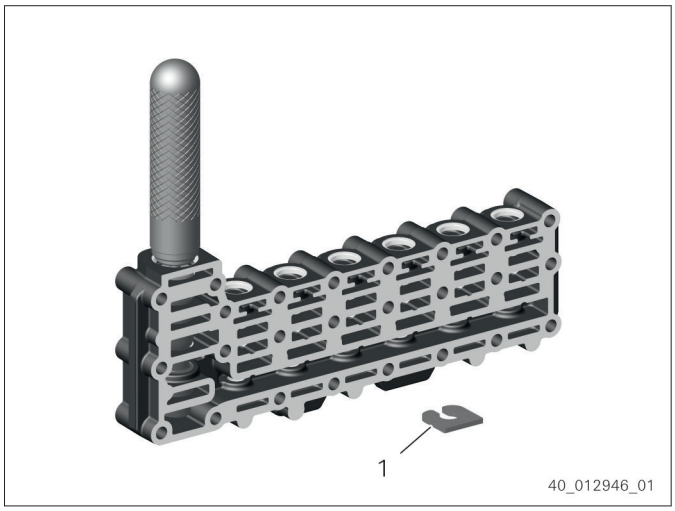


Fig. 408

9. Insert the compression spring (1) into the bore.

10. Insert the control piston (2).

11. Oil O-ring.

12. Insert O-ring in the annular groove of the plug (3).

13. Insert the plug (3) in the hole.

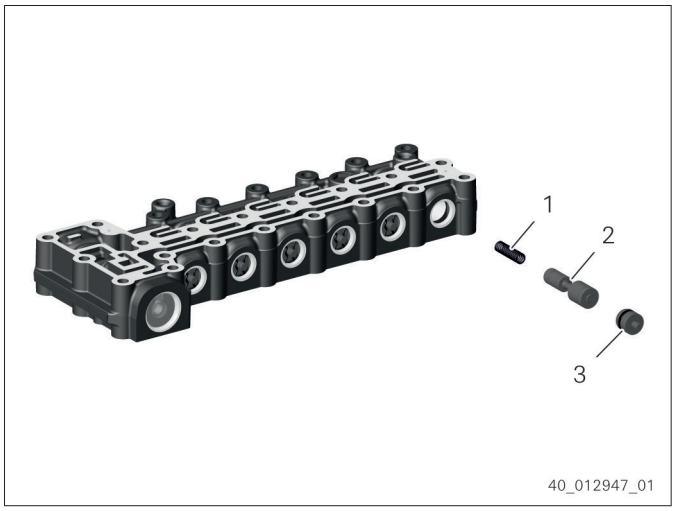


Fig. 409

14. Push the plug inwards with the AA02.416.754 [Driver tool] until contact is obtained and insert the spring clip (1).

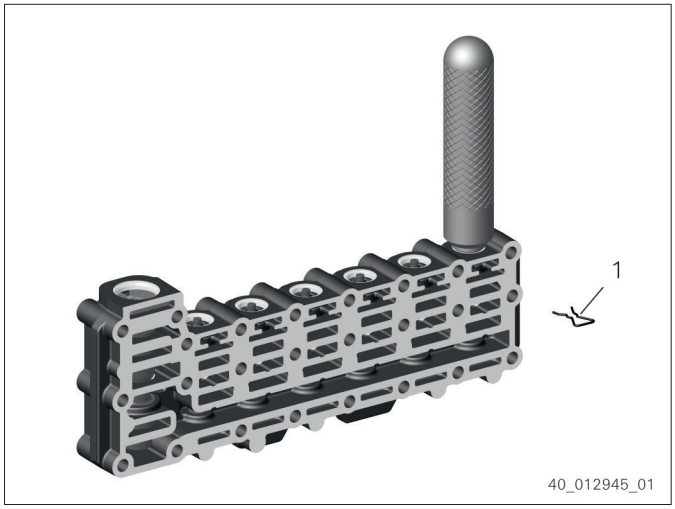


Fig. 410

15. Push on valve block (1).

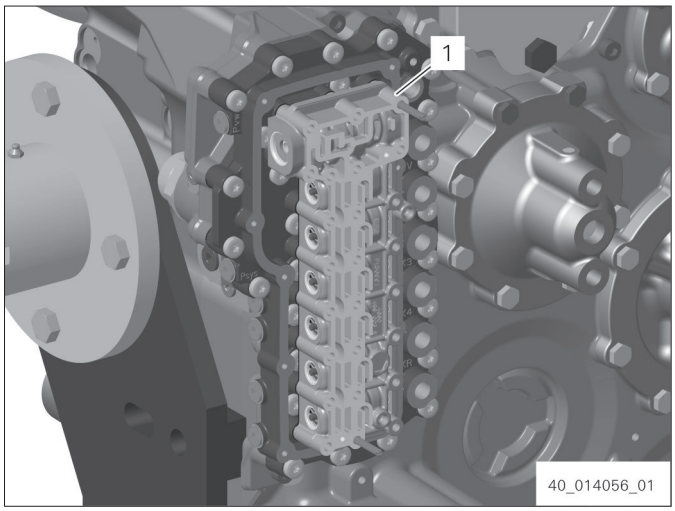


Fig. 411

16. Push on intermediate plate (1).

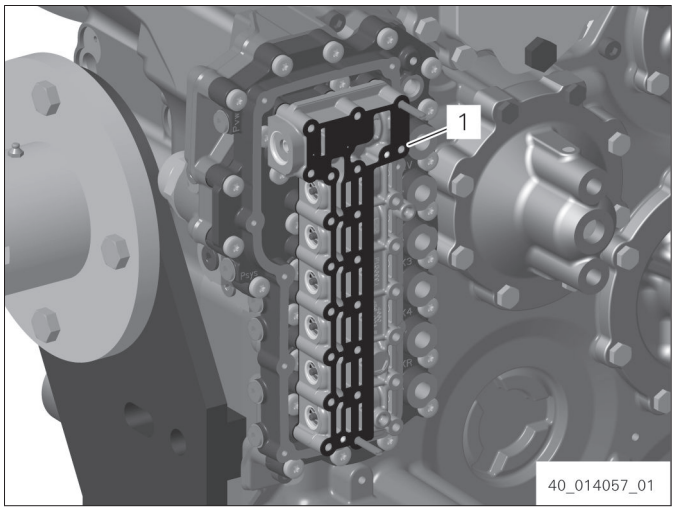


Fig. 412

17. Insert piston (1) in the hole.

18. Insert compression spring (2).

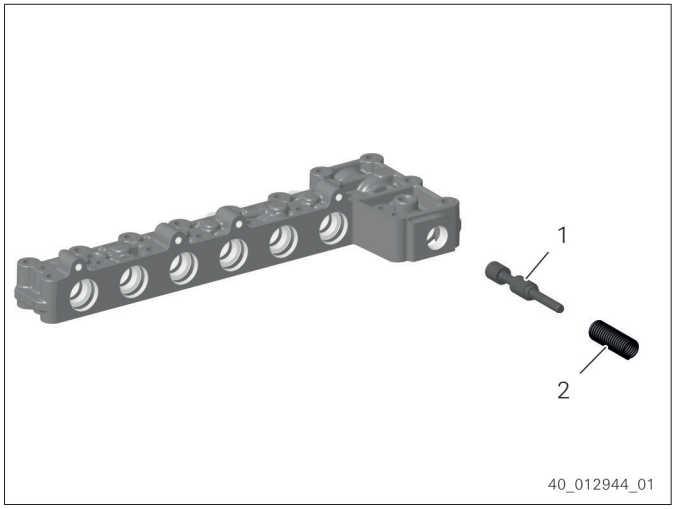


Fig. 413

19. Push the compression spring inwards with AA02.414.200 [Driver tool] until contact is obtained and insert the fixing plate (1).

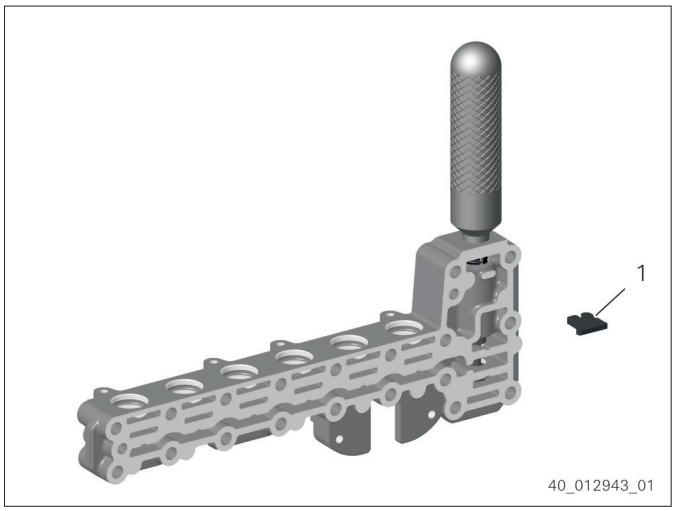


Fig. 414

20. Push on valve block (1).

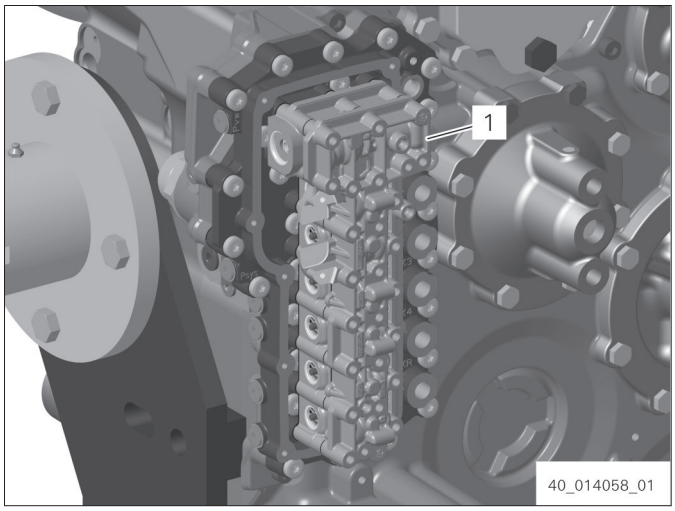


Fig. 415

21. Screw in and tighten the hexalobular driving screws (1).
Tightening torque: 3 Nm

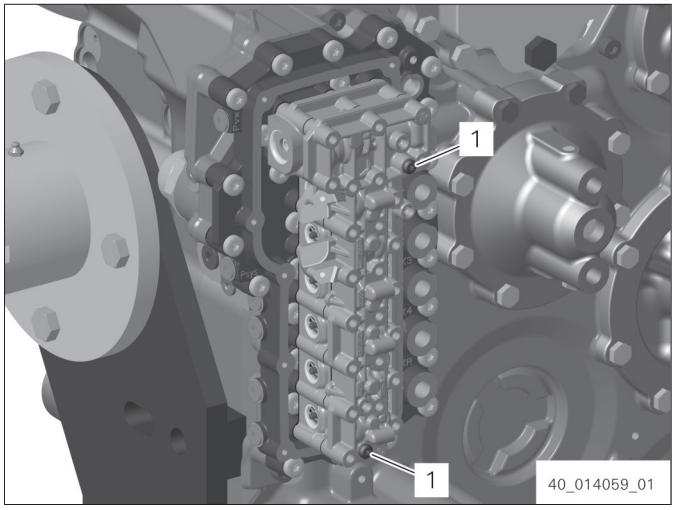


Fig. 416

Fixing valve blocks (Variant using the duct plate removed during disassembly)

22. Apply oil to the threads of the internal hexalobular bolts M 6x 85.

23. Bolt in internal hexalobular bolts M6 x 85 (1 bis 19) and tighten with AA02.788.633 [Torque wrench] in the specified order.
Tightening torque: 2 Nm and 35° Additional tightening angle

24. Apply oil to the threads of the internal hexalobular bolts M 6x 50.

25. Bolt in internal hexalobular bolts M6 x 50 (20 bis 25) and tighten with AA02.788.633 [Torque wrench] in the specified order.
Tightening torque: 2 Nm and 17° Additional tightening angle

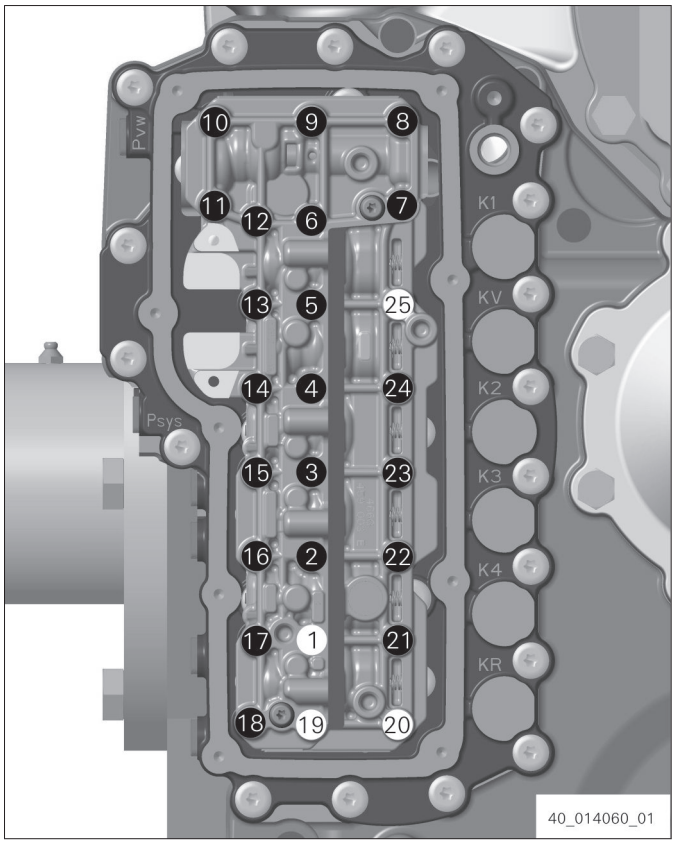


Fig. 417

Fixing valve blocks (Variant with new oil-free duct plate)

26. Bolt in **new** non-lubricated internal hexalobular bolts M6 x 85 (1 bis 19) and tighten with AA02.788.633 [Torque wrench] in the specified order.
Tightening torque: **3 Nm** and **60°** Additional tightening angle

27. Bolt in **new** non-lubricated internal hexalobular bolts M6 x 50 (20 bis 25) and tighten with AA02.788.633 [Torque wrench] in the specified order.
Tightening torque: **3 Nm** and **45°** Additional tightening angle

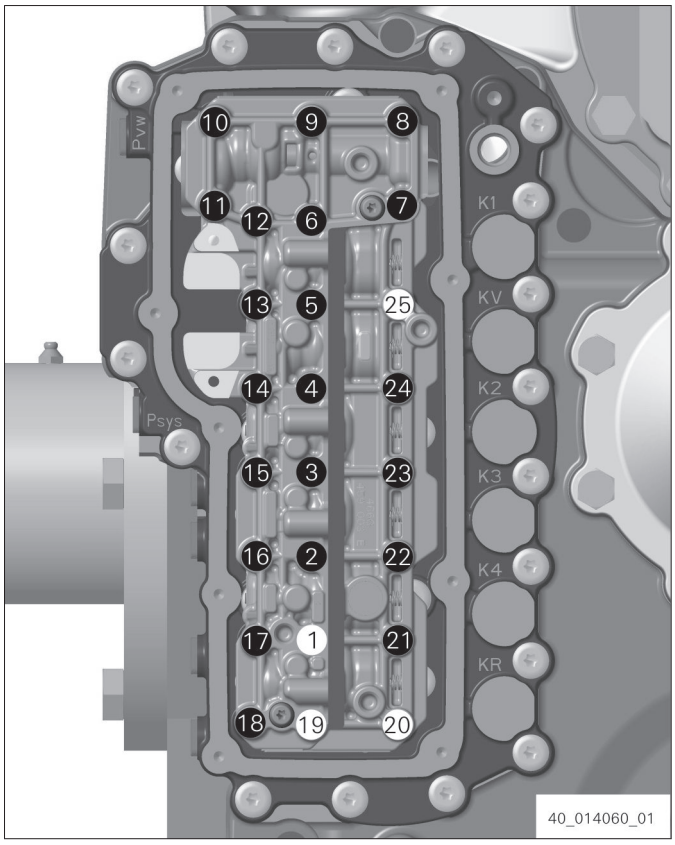


Fig. 418

Installing the pressure controllers

1. Pay attention to radial installation position of the pressure controllers.

   Insert pressure controllers with O-rings (2) in valve block.

2. Fix pressure controllers with clamping plate (1) and internal hexalobular bolts.
Tightening torque: **9.5 Nm**

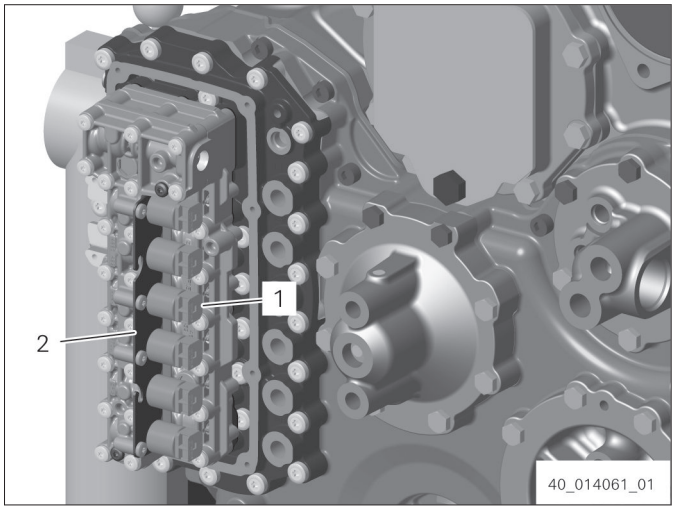


Fig. 419

3. Insert plugs (1) on the pressure controllers.

4. Fix plug (3) with fixing plate (4) and internal hexalobular bolts.
   Tightening torque: 9.5 Nm

5. Insert cable (2) in cable routing on the clamping plate.

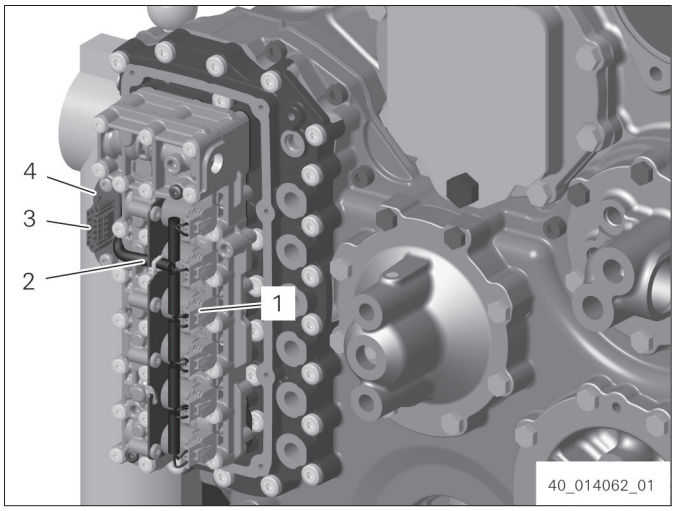


Fig. 420

Installing control unit (EC4A)

Special tools:

- 5870.204.063 Fixing pin

1. Insert seal (1) in control unit (2).

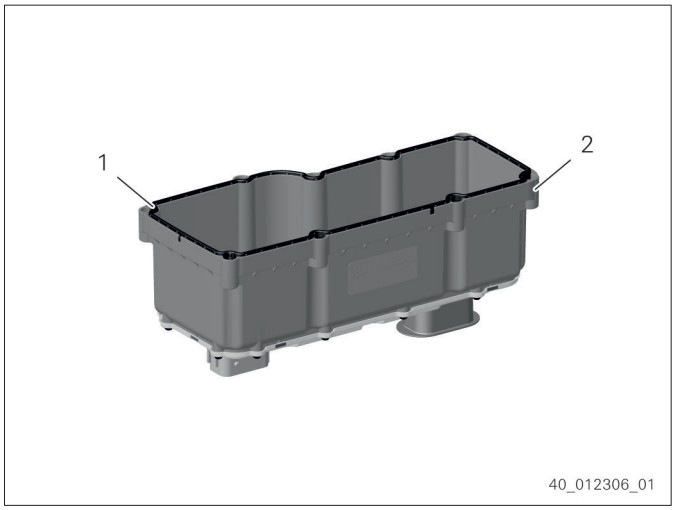


Fig. 421

2. Bolt two 5870.204.063 [Fixing pin] into the duct plate.

3. Slide on control unit.

4. Bolt in internal hexalobular bolts and tighten in the specified order.
Tightening torque: **9.5 Nm**

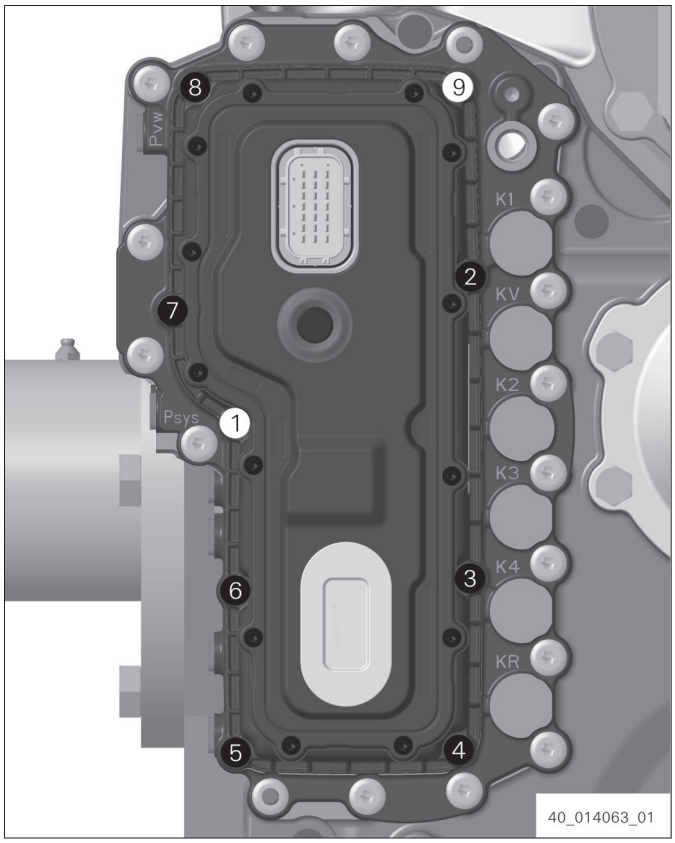


Fig. 422

Installing the temperature sensors and the breather

1. Bolt in breather (1) and tighten.
Tightening torque: **12 Nm**

2. Screw in and tighten temperature sensors with O-ring (2).
Tightening torque: **25 Nm**

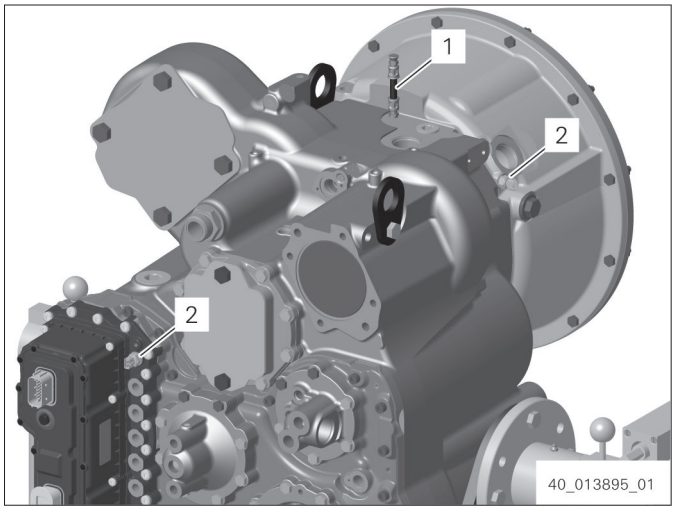


Fig. 423

Installing the speed sensors

1. Insert speed sensors with O-ring (1) in housing holes.

2. Fix speed sensors with cap screws.
Tightening torque: 9.5 Nm

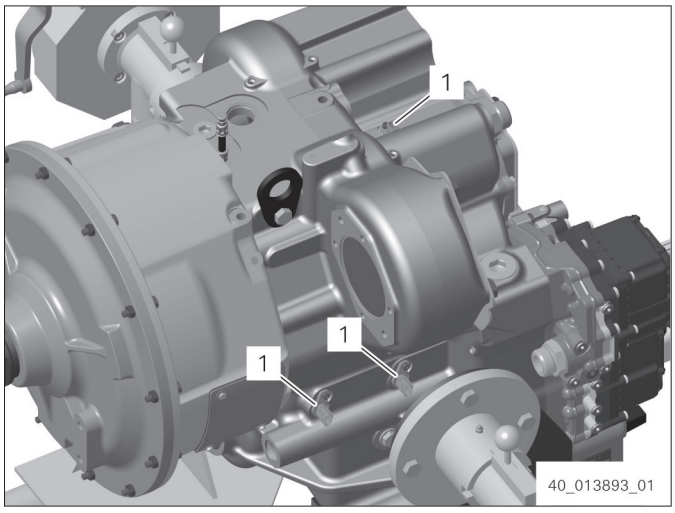


Fig. 424

3. Insert speed sensor with sealing element (1) into the housing hole.

4. Fasten speed sensor with cap screw.
Tightening torque: 9.5 Nm

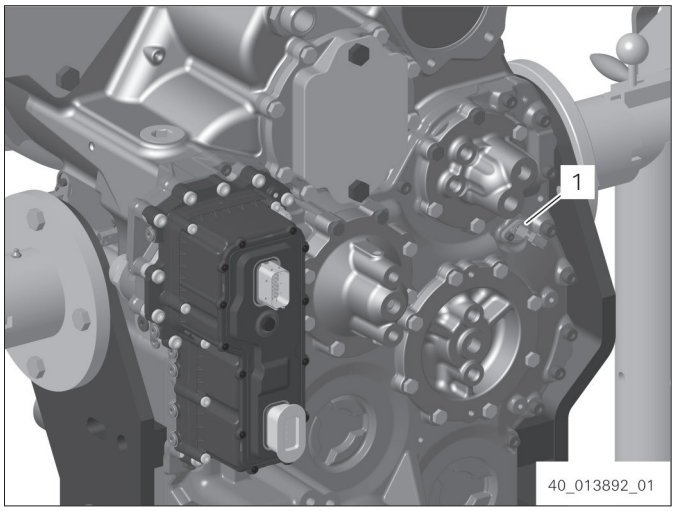


Fig. 425

Attaching the hose assemblies

Attaching the hose assembly K1

1. Insert the O-ring between the hose assembly (3) and the bearing cover (2).

2. Turn in hollow screw with O-ring (1) and tighten.
   Tightening torque: **45 Nm**

3. Insert O-ring between hose assembly (3) and duct plate (5).

4. Turn in hollow screw with O-ring (4) and tighten.
   Tightening torque: **45 Nm**

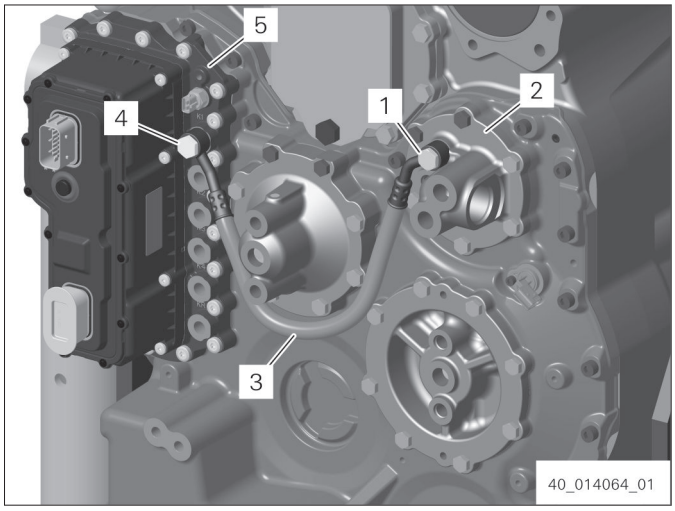


Fig. 426

Attaching the hose assembly KV

5. Insert the O-ring between the hose assembly (3) and the bearing cover (2).

6. Turn in hollow screw with O-ring (1) and tighten.
   Tightening torque: **45 Nm**

7. Insert O-ring between hose assembly (3) and duct plate (5).

8. Turn in hollow screw with O-ring (4) and tighten.
   Tightening torque: **45 Nm**

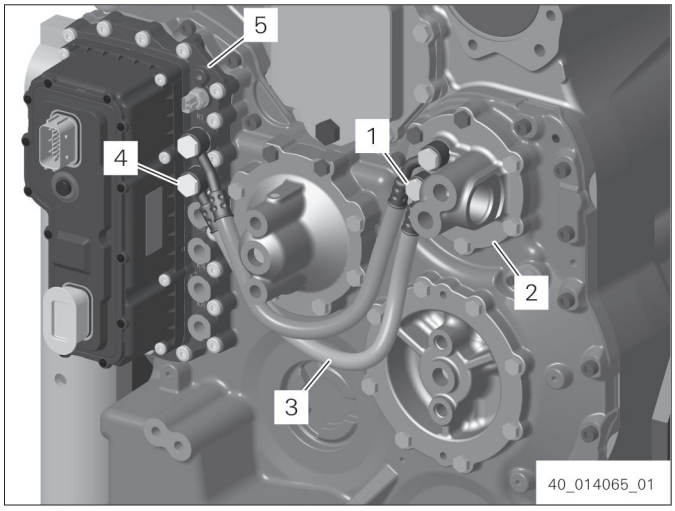


Fig. 427

Attaching the hose assembly K2

9. Insert O-ring between hose assembly (3) and the cover (2).

10. Turn in hollow screw with O-ring (1) and tighten.
Tightening torque: **45 Nm**

11. Insert O-ring between hose assembly (3) and duct plate (5).

12. Turn in hollow screw with O-ring (4) and tighten.
Tightening torque: **45 Nm**

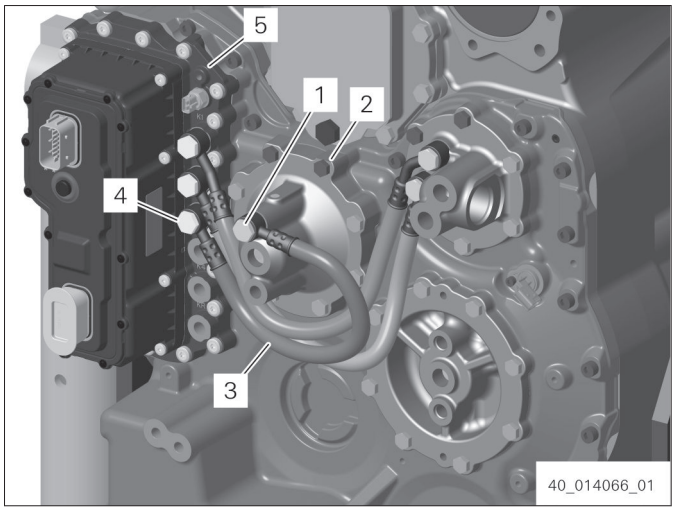


Fig. 428

Attaching the hose assembly K3

13. Insert O-ring between hose assembly (3) and the cover (2).

14. Turn in hollow screw with O-ring (1) and tighten.
Tightening torque: **45 Nm**

15. Insert O-ring between hose assembly (3) and duct plate (5).

16. Turn in hollow screw with O-ring (4) and tighten.
Tightening torque: **45 Nm**

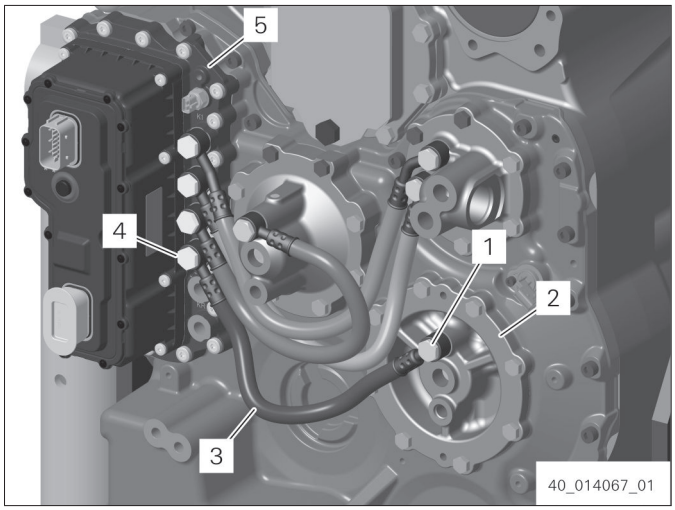


Fig. 429

Attaching the hose assembly K4

17. Insert O-ring between hose assembly (3) and the cover (2).

18. Turn in hollow screw with O-ring (1) and tighten.
Tightening torque: **45 Nm**

19. Insert O-ring between hose assembly (3) and duct plate (5).

20. Turn in hollow screw with O-ring (4) and tighten.
Tightening torque: **45 Nm**

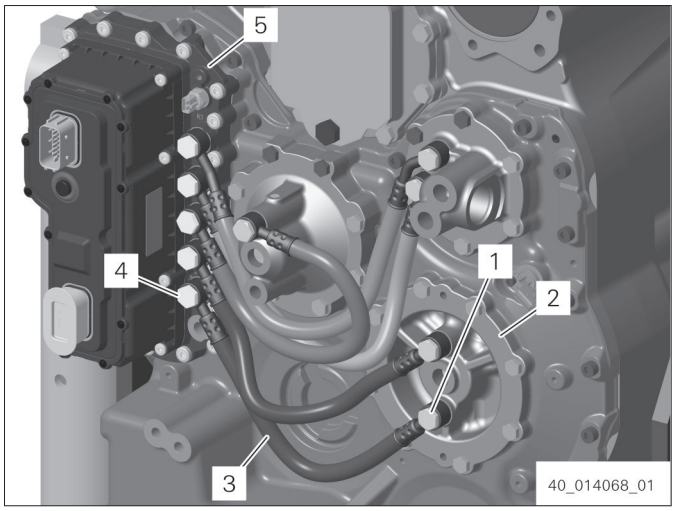


Fig. 430

Attaching the hose assembly KR

21. Insert O-ring between hose assembly (3) and the cover (2).

22. Turn in hollow screw with O-ring (1) and tighten.
Tightening torque: **45 Nm**

23. Insert O-ring between hose assembly (3) and duct plate (5).

24. Turn in hollow screw with O-ring (4) and tighten.
Tightening torque: **45 Nm**

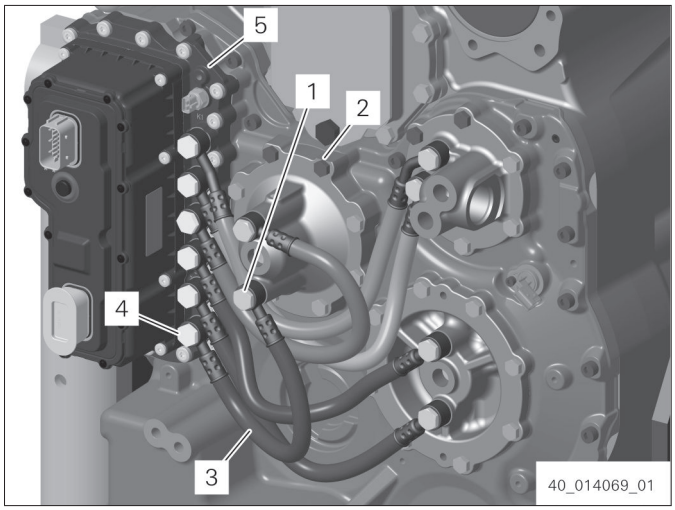


Fig. 431

Attaching the hose assembly S2

25. Insert the O-ring between the hose assembly (3) and the bearing cover (2).

26. Turn in hollow screw with O-ring (1) and tighten.
Tightening torque: **60 Nm**

27. Insert O-ring between hose assembly (3) and the cover (5).

28. Turn in hollow screw with O-ring (4) and tighten.
Tightening torque: **60 Nm**

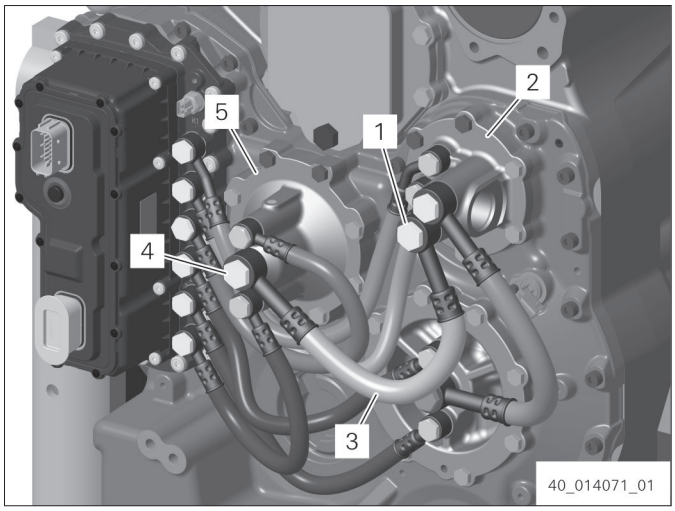


Fig. 432

Installing the tube

1. Insert sealing ring between tube (3) and housing.

2. Insert sealing ring between tube (3) and torque converter bell housing.

3. Bolt in hollow screws with O-ring (1) and tighten.
Tightening torque: **45 Nm**

4. Bolt in screw plugs with O-ring (2) and tighten.
Tightening torque: **20 Nm**

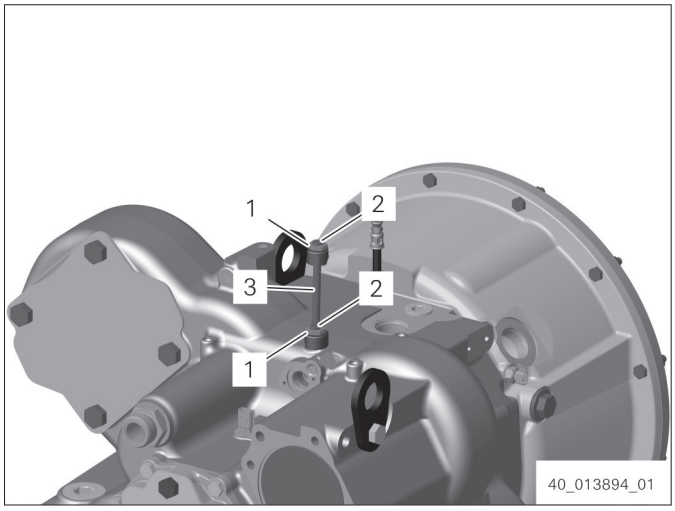


Fig. 433

Installing pressure controller (converter clutch valve)

1. Insert pressure controller with O-rings (1) into the housing hole.

2. Fix pressure controller with two cap screws. Tightening torque: **9.5 Nm**

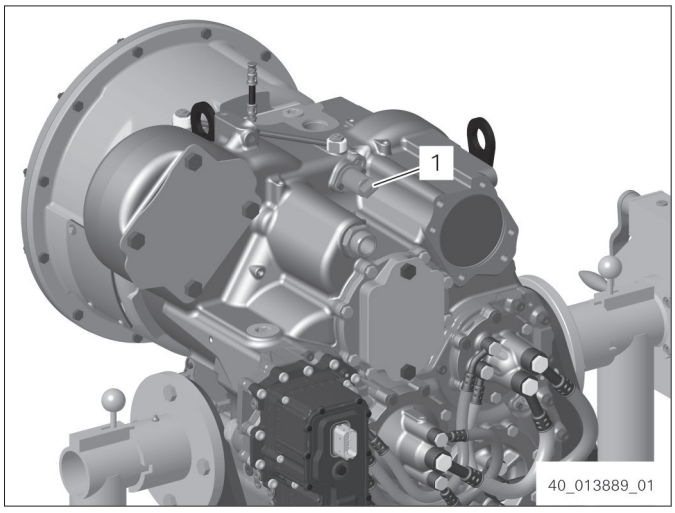


Fig. 434

3. Route cable (1) and insert plugs.

4. Fasten cable to the transmission with cable ties.

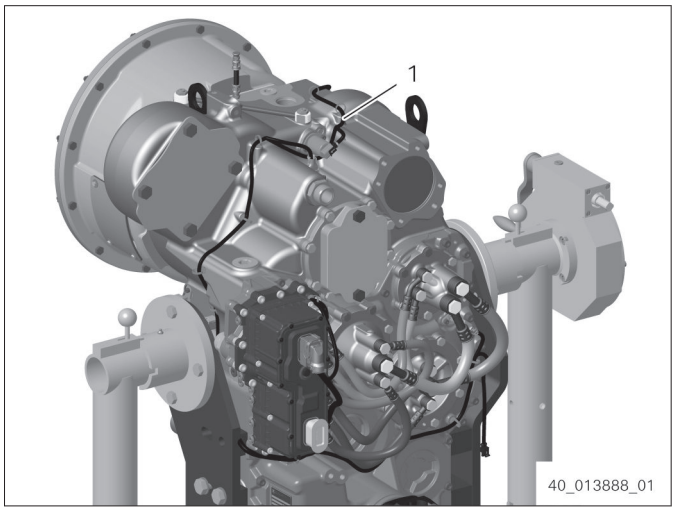


Fig. 435

Installing cover sheets (filler neck)

1. Put on seal and cover sheet (1).

2. Turn in and tighten hexagon screws.
   Tightening torque: 23 Nm

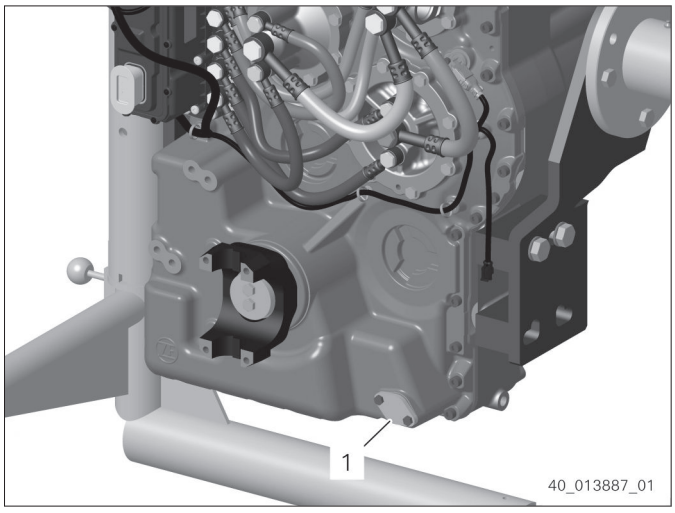


Fig. 436

3. Put on seal and cover sheet (1).

4. Turn in and tighten hexagon screws.
   Tightening torque: 23 Nm

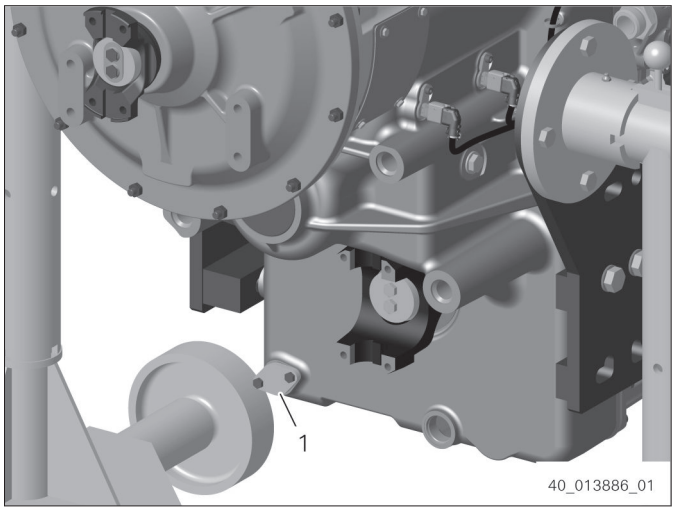


Fig. 437

Installing pressure filters

1. Apply a thin film of oil to the seal of the pressure filters.

2. Bolt in the pressure filters (1) until contact between the sealing face to the filter head is obtained.

3. Tighten the pressure filters (1).
   Tightening torque: Contact sealing surface +90°to 180°
   As an alternative, use a tool with torque display to tighten the pressure filters.
   Tightening torque: 40 Nm

4. Screw in the plunger switch including the O-ring (2) and tighten it.
   Tightening torque: 25 Nm (±5 Nm).
   The filter head is located near the transmission.

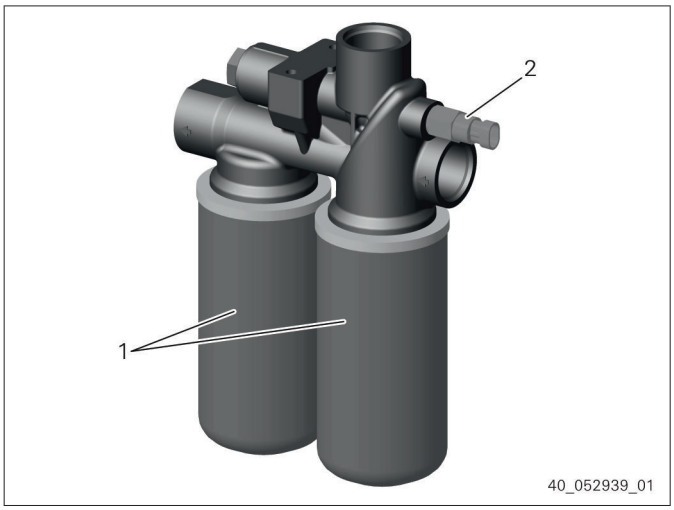


Fig. 438

Adding oil

1. Turn in screw plug with O-ring (2) and tighten.
   Tightening torque: 80 Nm

2. Before starting the transmission, fill up with oil according to the Operating Instructions.

3. Screw in and tighten screw plug with O-ring (1).
   Tightening torque: 145 Nm

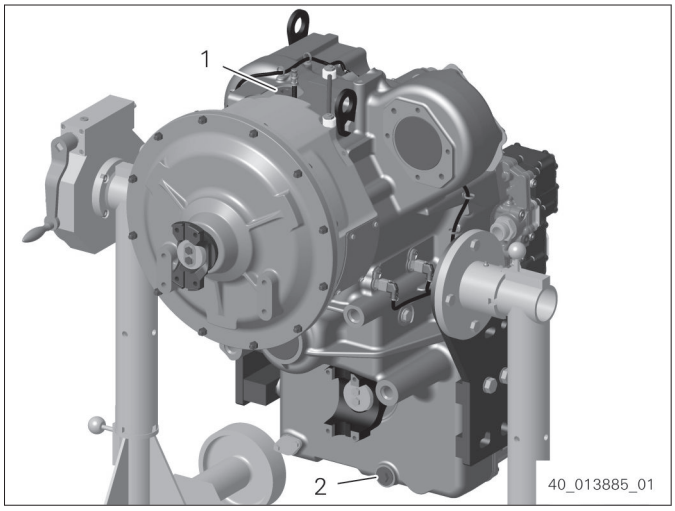


Fig. 439