

# SERVICE BULLETIN

## CHECKING OR REPLACEMENT OF THE PROPELLER GEARBOX FOR ALL VERSIONS OF THE ROTAX<sup>®</sup> ENGINE TYPE 912 AND 914

**MANDATORY**

**SB-912-027**

**SB-914-010**

### Repeating symbols:

Please, pay attention to the following symbols throughout the Service Bulletin emphasizing particular information.

▲ **WARNING:** Identifies an instruction, which if not followed, may cause serious injury or even death.

■ **ATTENTION:** Denotes an instruction which if not followed, may severely damage the engine or could lead to suspension of warranty.

◆ **NOTE:** Information useful for better handling.

### 1) Planning information

#### 1.1) Engines affected

All versions of the engine type

- 912 A (Series) from S/N 4,410.330 to S/N 4,410.366
- 912 F (Series) from S/N 4,412.781 to S/N 4,412.791
- 914 F (Series) from S/N 4,420.128 to S/N 4,420.156;

◆ **NOTE:** The stated engines are only affected if the doghub, overload clutch or gearbox have never been replaced.

All gearboxes supplied as replacement part with the following serial numbers

15081, 15139, 15341, 15559, 15560, 15561, 15562;

◆ **NOTE:** The stated gearboxes are only affected if the doghub or overload clutch has never been replaced.

#### 1.2) Concurrent SB/SI and SL

none

#### 1.3) Reason

|| An unsuitable combination of a 7° tapered doghub and a 30° backlash doggear may have been installed in the gearbox of the engines affected.

#### 1.4) Subject

Checking or replacement of the propeller gearbox

#### 1.5) Compliance

|| Within the next 10 hours of operation check or replace the gearbox as per the following instructions.

#### 1.6) Approval

The technical content of this Service Bulletin is approved by ACG.

#### 1.7) Manpower

- estimated man hours for exchange of the gearbox (if necessary):  
For gearbox installed in the aircraft - - - 1,0 h per unit

#### 1.8) Mass data

- change of weight- - - none
- moment of inertia- - - unaffected

#### 1.9) Electric load

no change

000919

### 1.10) Software accomplishment summary

no change

### 1.11) References

In addition to this information refer to

- current issue of the Operator's Manual (OM)
- engine data sheet
- power , torque and fuel consumption curves
- Illustrated parts catalog
- Installation Manual (IM) and Check list
- all relevant Service Information
- all relevant Technical Bulletins
- Collective Manual (CM)
- Repair Manual (RM)
- Maintenance Manual (MM)

### 1.12) Other publications affected

none

### 1.13) Interchangeability of parts

- At exchange of the gearbox take care of the following
- If necessary, remove the gearbox as per the following instructions and send to a ROTAX<sub>a</sub> authorized Distributor or Service Center.

## 2) Material Information

### 2.1) Material - cost and availability

Cost and availability will be supplied on request by our ROTAX<sub>a</sub> authorized distributors.

### 2.2) Company support information

- || - The replacement program and cost sharing is valid until 31.03.2000. Up to this date application for limited reimbursement of costs can be made.
- Shipping cost, down time, loss of income, telephone costs etc. or cost of conversion to other engine versions or additional work, as for instance simultaneous engine overhaul is not covered in this scope and will not be born or reimbursed by ROTAX<sub>®</sub>.

### 2.3) Material requirement per engine

For the checking or replacement of the gearbox the following parts are required.

- ||| ◆ NOTE: This new parts requirement is only required if a doghub of 7° tapered surface in combination with a doggear of rectangular support face have been installed (see article 3.2).

item no.	New part no.	Qty.	Description	Old part no.	application
	XXX.XXX*	1	propeller gearbox assembly		engine
	842.575	1	hex. nut		drive gear
	825.701	1	oil filter		oil pump
	845.430	1	friction washer		drive gear
	899.784	as requ.	Loctite 574		sealing surface, crankcase
	XXX.XXX**	1	oil cooler		
	XXX.XXX**	2l	motor oil		

\* Please find the part number of the respective gearbox on the gearbox housing.

- || \*\* only required if the lubrication circuit is contaminated.

### 2.4) Material requirement per spare part

none

### 2.5) Rework of parts

none

## 2.6) Special tools - price and availability

- Price and availability available at request from ROTAX<sub>a</sub> authorized Distributors and Service Centers.
- Tools required:

item no.	New part no.	Qty.	Description	Old part no.	application
	877.620	1	oil filter wrench		oil filter
	877.670	1	cutting tool		oilfilter
(3)	240.880	1	crankshaft locking pin		crankcase
(13)	877.660	1	puller assembly		gearbox
	877.445	1	socket wrench assy A/F 41		drive gear

## 3) Instructions / Accomplishment

All the measures must be taken and confirmed by the following persons or facilities:

- ROTAX<sub>®</sub>-Airworthiness representative
- ROTAX<sub>®</sub>-Distributors or their Service Center
- Persons with the respective Aviation Authority
- Persons with type-specific training (applicable only for non-certified engines)

▲ **WARNING:** Perform all this work away from open flames and in non-smoking areas only. Switch „OFF“ ignition and secure engine against unintentional operation.

- Secure aircraft against unauthorized operation
- Disconnect negative pole of aircraft battery.

### 3.1) General note:

The dog hub and dog gear create the effect of torsional shock absorption. The design of the torsional shock absorber allows a certain backlash before the dogs of the dog hub engage on the dogs of the dog gear. Within this 15° or 30° backlash, only the torque by friction of 15 ÷ 45 Nm is effective.

### 3.2) Checking of the backlash:

see fig. 1, 2, 3 and 11

◆ **NOTE:** The propeller can be turned by hand (15 Nm - 45 Nm/133 in lb - 400 in lb) along the complete range of the backlash.

|| - For exact verification of backlash the crankshaft has to be locked. Lock the crankshaft in accordance with the current Maintenance Manual or chapter 3.3.2.

|| - The distance or angle of propeller blade moving along the complete backlash can be checked with a suitable device as follows:

Measured at a radius of 0,75 m (29,5 in) the backlash is on:

- doghub of **15° backlash: L less than 315 mm (12.4 in)**

- doghub of **30° backlash: L more than 315 mm (12,4 in)**

|| **ATTENTION:** The reason for a backlash of more than 315 mm (12,4 in) could be an unsuitable combination of doghub and doggear. Replace the gearbox according to instructions.

|| If the measured backlash is less than 315 mm, the gearbox is unaffected and no further measures are necessary.

### || 3.3) Procedure on gearboxes with more than 315 mm backlash:

#### 3.3.1) Inspection of the lubrication system for chips:

see fig. 2 and 3

- Remove the magnetic drain plug (1) located in front left side of the crankcase and inspect plug for chips. Clean the magnetic plug and refit. Tightening torque 25 Nm (220 in.lb).
- **ATTENTION:** Steel chips in low numbers as depicted in fig. 3 can be tolerated if the size is below 3 mm (1/8").  
Also sliver-like chips can be tolerated as long as length does not exceed 10 mm (3/8") and the dia. is not above 0,05 mm (0,002").
- The oil filter must be cut open and inspected for chips according to the relevant Maintenance Manual. If in doubt contact an authorized ROTAX® distributor.
- **ATTENTION:** If the lubrication circuit is contaminated replace the oil cooler and flush the lubrication circuit as per the following instructions.
- Dismantle oil lines as per instructions of the aircraft builder and flush the lines.
- Clean the oil tank.
- Install provisional oil lines (used for flushing) without connecting the oil cooler into the circuit and without connecting the return oil line back to the oil tank but rather to a separate, clean and open container.
- ◆ **NOTE:** Otherwise chips could collect in the oil cooler or oil tank during the flushing procedure. Assure the oil cooler is removed.
- Fill the oil tank with approx. 2 l motor oil.
- ▲ **WARNING:** Make absolutely sure the ignition is switched "OFF" before cranking the engine.
- Crank the engine by hand on propeller to transfer the oil from the oil tank to the engine and back to the open container. This procedure is complete once the entire oil circuit including sump and oil tank are purged of oil.  
Carefully drain oil captured in clean open container and examine closely for chips as described previous. If unacceptable chips or slivers are found, repeat process until clear.
- Re-install clean oil lines according to instructions of the aircraft builder.
- Install oil filter and fill the system with oil in accordance with the relevant Maintenance Manual.

#### 3.3.2) Locking of the crankshaft

see fig. 4 and 5.

- To lock the crankshaft remove the plug screw M8x20 and sealing ring from the crankcase half cyl. 2/4 (2). Turn crankshaft until the pistons of cyl. no 1 and no. 2 are in T.D.C. and lock crankshaft in this position with the crankshaft locking screw (3) (part no. 240.880).
- ◆ **NOTE:** The crankshaft locking screw is part of the standard tool kit supplied with each engine.
- For easy location of the correct crankshaft position, turn crankshaft so that the impressed 4-digit number (4) on the flywheel hub(5) aligns with the edge (6) of the ignition housing.  
For this verification, the ignition cover has to be removed as follows (if fitted):
  - remove the 3 hex. screws M6 x 16 (24)
  - take off ignition cover (25)
- The required crankshaft recess position (7) can be additionally verified with a flashlight through the hole in the crankcase.
- Turn-in crankshaft locking screw and rotate crankshaft slightly to and fro until the screw engages noticeably in the recess (7) of the crankshaft and tighten the locking screw to 10 Nm (90 in.lb).
- Unlocking according article 3.3.4.

#### 3.3.3) Removal of the propeller gearbox

see fig. 6, 7, 8 and 9

Remove 8 Allen screws (8) M6 and 2 Allen screws (9) M8 crosswise from gear cover (10). The gear cover is kept in position by 2 dowels. Screw puller (11), (part no. 877.660) onto M8 tapping (12) of gear cover (10). Now the complete gearbox can be pulled off with the impact puller (13) without damaging the ball bearing and the propeller shaft.

- **ATTENTION:** When removing the gearbox, take care not to damage the bearing seat and the oil ring contact surface of propeller shaft.

Remove hex.nut M30x1,5 (16) with wrench 41 A/F, part no. 877.445, and the drive gear with friction washer (17) from crankshaft. If required, lever off the drive gear gently with 2 screw drivers.

◆ NOTE: The hex nut is with left hand thread!

Make sure that both dowels remain with crankcase and not with gear cover.

■ ATTENTION: The gear set has a continuous 6-digit serial number which is shown on the drive gear front side (18) and on the dog gear. The gears are paired as a set and must not be exchanged individually.

■ ATTENTION: Before reinstallation of the gearbox and the drive gear remove all the remains of LOCTITE and sealing compound.

Send the gearbox and drive gear to an ROTAX<sup>®</sup> authorized distributor for repair.

### 3.3.4) Reinstallation of the propeller gearbox

see fig. 10

◆ NOTE: The repaired or replaced gearbox is also with a backlash of 30°, but is equipped with a dog hub of rectangular surface (see fig.11).

Slide drive gear (19) onto crankshaft (20). Fit hex. nut (21) M30x1,5 secured with LOCTITE 221 and friction washer (22) VS 30 on crankshaft. Torque to 200 Nm (1770 in).

■ ATTENTION: Dog gear and drive gear are paired and are marked with a consecutive serial number (23). Use only parts of the same serial number!

Clean sealing surface of gear cover and crankcase. Insert both dowels 6x20 into crankcase. Grease oil seal 30x52x7 for propeller shaft in crankcase. Lubricate bearing bore for propeller shaft.

◆ NOTE: On engine versions 3 and 4 this oil seal is not fitted.

Keep the rollers of the roller bearing in position with grease to facilitate assembly of propeller shaft.

Position gear cover with completely pre-assembled gear unit, previously coated with sealing compound LOCTITE 574. Turn propeller shaft slightly to allow the dog gear and drive gear for governor to engage. By gently tapping on the gear cover with a plastic mallet (not on propeller shaft) the gearbox is fitted on crankcase.

◆ NOTE: Rigid resistance at a gap of approx. 10 mm (0,4 in.) could mean the rollers of the bearing are not in correct position. Reposition the rollers, keep them in position with grease and / or turn the vacuum pump gear to allow engagement.

■ ATTENTION: If excessive force is applied at assembly, the roller bearing or the vacuum pump drive can be damaged. If sealing face becomes oily during assembly process, clean it and apply again sealing compound LOCTITE 574.

Tighten gearbox evenly with 2 Allen screws M8x45 and 8 Allen screws M6x45 and lockwashers crosswise. Torque for M8 = 25 Nm (220 in.lb), for M6 = 10 Nm (90 in.lb).

Remove crankshaft locking screw and fit crankshaft plug screw with sealing ring and tighten to 22 Nm (195 in.lb). For verification turn crankshaft with wrench 24 A/F on hex. screw on magneto side.

- fit the ignition cover with 3 hex. hd. collar screws M6 x 16 (24). Secure screws with LOCTITE 221 and tighten to 5 Nm (44 in. lb.)

- Reconnect the aircraft battery

### 3.4) Test run

Start the engine. Conduct test run inclusive ignition check and leakage test in accordance with the current Maintenance Manual of the engine type.

### 3.5) Summary

▲ WARNING: Non-compliance with these recommendations could result in engine damage, personal injury or death!

Approval of translation to best knowledge and judgement - in any case the original text in German language and the metric units (SI-system) are authoritative.

#### 4) Appendix

Following drawings should convey additional information.

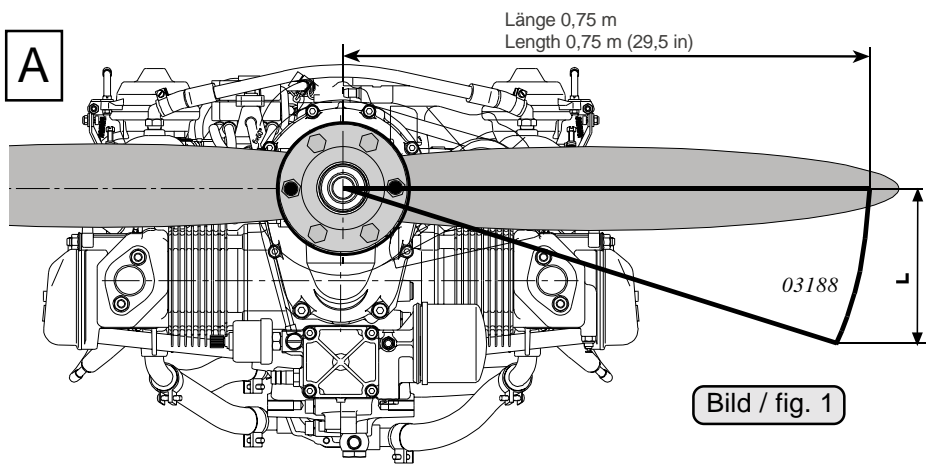


Bild / fig. 1

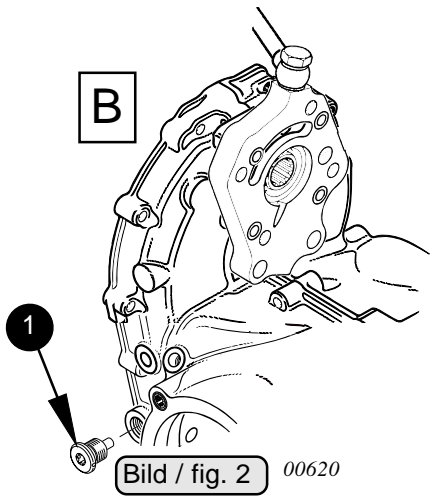
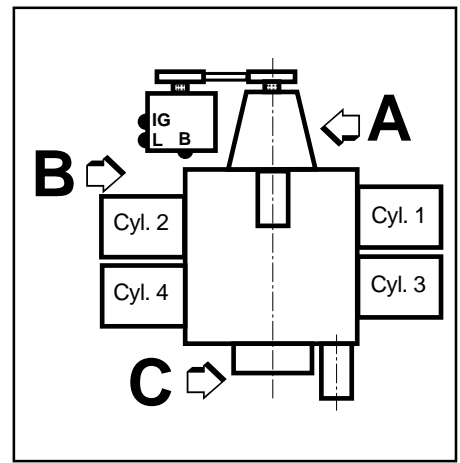


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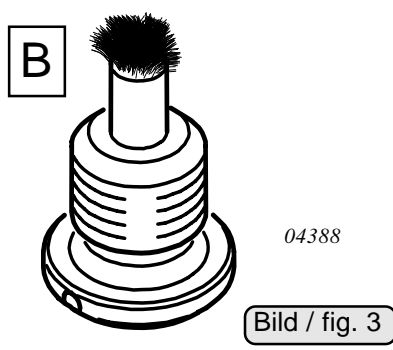


Bild / fig. 3

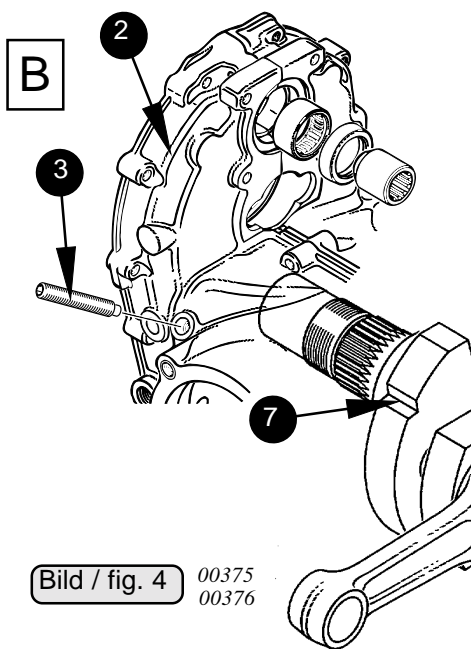


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00376

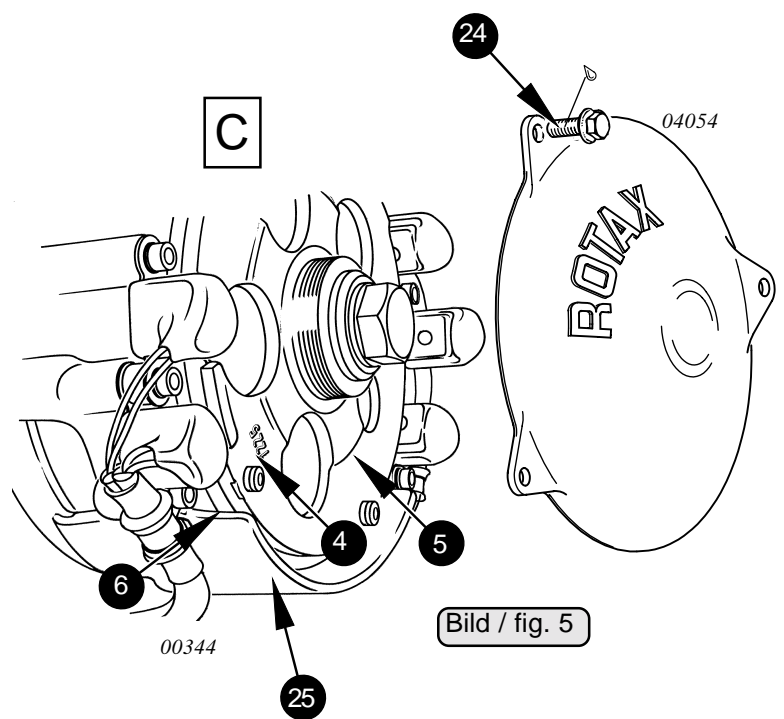
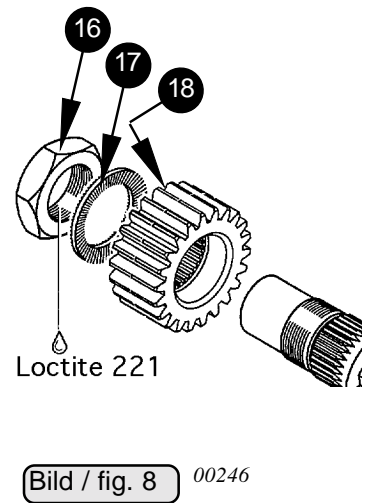
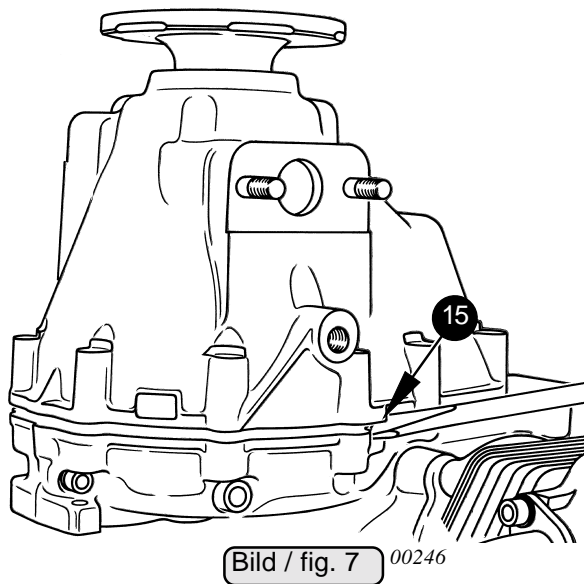
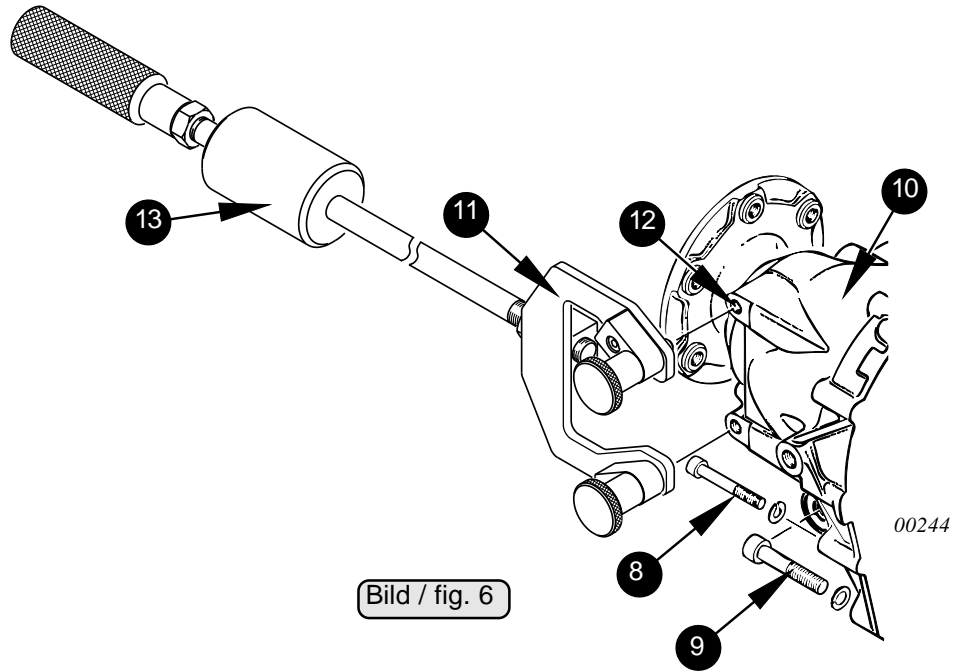
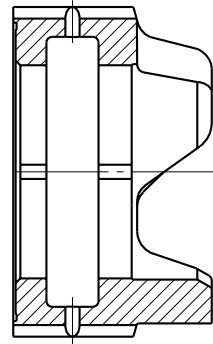
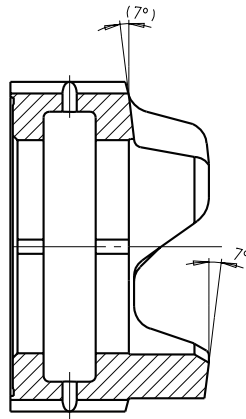


Bild / fig. 5

A



A



03049

■ ATTENTION: dog hub with 7° tapered surface (use only for gear set with dog gear of 27 mm width)

■ ATTENTION: dog hub rectangular surface (use only for gear set with dog gear of 22 mm width)

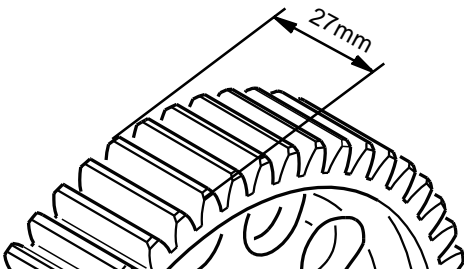
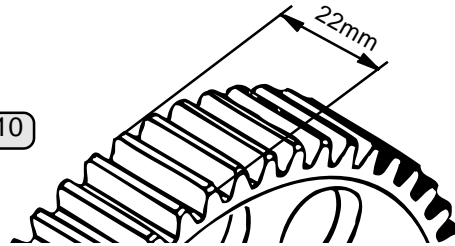


Bild / fig. 10



03501

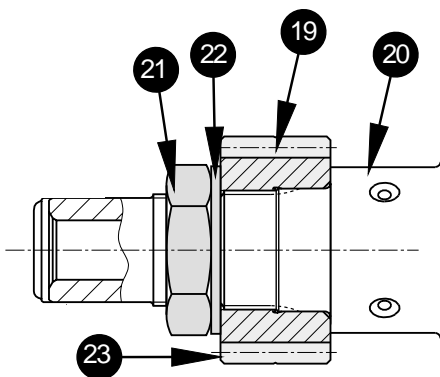


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FALSCH KOMBINATION /  
WRONG COMBINATION

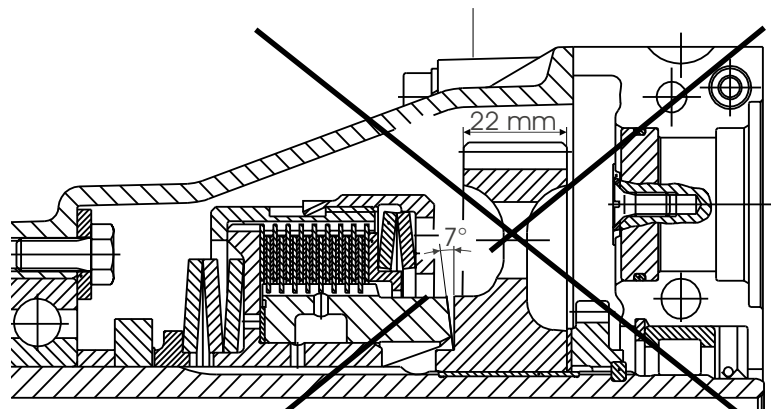


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