

ROTAX®
AIRCRAFT ENGINES
SERVICE LETTER

**STANDARDIZATION OF
THE CRANKSHAFT/PISTON PIN AND OF THE GEARBOX
FOR ROTAX® ENGINE TYPE 912/914 (SERIES)**

**SL-912-002 R1
SL-914-002 R1**

Repeating symbols:

Please, pay attention to the following symbols throughout this document emphasizing particular information.

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

Group A

(Introduction of the crankshaft with concial interference fits part no. 888164 with bearing bushing in the small connecting rod eye)

- 912 A from S/N 4,410.401
- 912 F from S/N 4,412.803
- 912 S from S/N 4,922.501 (from series production)
- 912 UL from S/N 4,404.343
- 912 ULS from S/N 4,425.001 (from series production)
- 912 ULSFR from S/N 4,429.501 (from series production)
- 914 F from S/N 4,420.164
- 914 UL from S/N 4,417.791

(Introduction of the crankshaft part no. 996581 and/or part no. 966583 with bearing bushing in the small connecting rod eye) only as spare parts part no. 996581 from S/N 99.0023 and/or part no. 966583 from S/N 8105.

Group B

(Increasing of gear width/overload clutch and/or new dog hub):

- 912 S from S/N 4,922.501 (from series production)
- 912 ULS from S/N 4,425.001 (from series production)
- 912 ULSFR from S/N 4,429.501 (from series production)
- 914 F from S/N 4,420.164
- 914 UL from S/N 4,417.791

Group C

(Standardization of back lash in the propeller gear box to 30°)

- ◆ NOTE: UL-engines are only affected if to be used or equipped with an overload clutch.
- 912 A from S/N 4,410.367
 - 912 F from S/N 4,412.792
 - 912 S from S/N 4,922.503 (from series production)
 - 912 UL from S/N 4,403.283
 - 912 ULS from S/N 4,425.014
 - 912 ULSFR from S/N 4,429.501 (from series production)
 - 914 F from S/N 4,420.158
 - 914 UL from S/N 4,417.769
 - Gearbox from S/N 15.528

Group D

(Gearbox housing part no. 911746 with control processing for gear width)

- ◆ NOTE: UL-engines are only affected if to be used or equipped with an overload clutch.
- 912 A from S/N 4,410.380
 - 912 F from S/N 4,412.796
 - 912 S from S/N 4,922.505
 - 912 UL from S/N 4,403.413
 - 912 ULS from S/N 4,425.290
 - 912 ULSFR from S/N 4,429.501 (from series production)
 - 914 F from S/N 4,420.173
 - 914 UL from S/N 4,417.806
 - Gearbox from S/N 15.913

1.2) Concurrent ASB/SB/SI and SL

none

1.3) Reason

In the course of standardization and serial production of 912 S/ULS/ULSFR various standardization have been also carried out on engine and on gearbox for engine type 912 A/F/UL and 914 F/UL:

- Only for 912 S/ULS/ULSFR and 914 F/UL a dog gear of a width increased by 5 mm (0.2 in.) ((22 mm (0.87 in.) narrow, 27 mm (1.06 in.) wide)) was introduced.
- Standardizing to a modified crankshaft.
- Standardizing of the piston pin.

- ◆ NOTE: Generally the crankshaft with concial interference fits part no. 888164 and/or part no. 996583 and part no. 996581 with bearing bushing in the small connecting rod eye was introduced (see Group A).

Furthermore the following standardization for all serial engines of type 912 and 914, configuration with overload clutch, was carried out:

- Standardizing to back lash from 15° to 30° (see Group C).
- Standardizing of the slipping torque.
- Standardizing of the gearbox housing.
- Clutch hub part no. 958905 with 3 mm (.12 in) longer collar (configuration with overload clutch).

This information is intended to assist the aircraft manufacturer and operator in achieving the proper operating conditions, correct engine installation and consequently optimum performance and reliability.

1.4) Subject

Standardization of the crankshaft/piston pin and of the gearbox for ROTAX® engine type 912/914 (series).

1.5) Compliance

NONE - For Information Only

1.6) Approval

The technical content is approved under the authority of DOA Nr. EASA.21J.048.

1.7) Manpower

Estimated man-hours:

engine installed in the aircraft - - - manpower time will depend on installation and therefore no estimate is available from the engine manufacturer.

1.8) Mass data

change of weight - - - none.

moment of inertia - - - unaffected.

1.9) Electrical load data

no change

1.10) Software accomplishment summary

no change

1.11) References

In addition to this technical information refer to current issue of

- Illustrated Parts Catalog (IPC)

◆ NOTE: Due to additional modified the part number in this Service Letter can be out of date.

◆ NOTE: The status of Manuals can be determined by checking the table of amendments of the Manual. The 1st column of this table is the revision status. Compare this number to that listed on the ROTAX WebSite: www.rotax-aircraft-engines.com. Updates and current revisions can be downloaded for free.

1.12) Other publications affected

none

1.13) Interchangeability of parts

- at exchange take care of the following:

■ CAUTION: Proceed according to text and table in this Service Letter because not all parts are compatible with one another.

2) Material Information

2.1) Material - cost and availability

Price and availability will be supplied on request by ROTAX® Authorized Distributors or their Service Center.

2.2) Company support information

none

2.3) Material requirement per engine

■ CAUTION: For retro-install proceed according to text and table in this Service Letter, because not all parts are compatible with one another.

2.4) Material requirement per spare part

none

2.5) Rework of parts

none

2.6) Special tooling/lubricant-/adhesives-/sealing compound - Price and availability

Price and availability will be supplied on request by ROTAX® Authorized Distributors or their Service Centers.

■ CAUTION: In using these special tools observe the manufacturers specifications.

3) Accomplishment/Instructions

Accomplishment

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

- ROTAX® -Airworthiness representative
- ROTAX® -Distributors or their Service Centers
- Persons approved by the respective Aviation Authority
- *Persons with type-specific training (applicable only for non-certified engines)*

▲ WARNING: Proceed with this work only in a non-smoking area and not close to sparks or open flames. Switch off ignition and secure engine against unintentional operation. Secure aircraft against unauthorized operation. Disconnect negative terminal of aircraft battery.

▲ WARNING: Risk of scalds and burns! Allow engine to cool sufficiently and use appropriate safety gear while performing work.

▲ WARNING: Should removal of a locking device (e.g. lock tabs, self-locking fasteners, etc.) be required when undergoing disassembly/assembly, always replace with a new one.

◆ NOTE: All work has to be performed in accordance with the relevant Maintenance Manual.

|| 3.1) Increasing of the dog gear width (affected engines "group B"):

On ROTAX® 912 ULS, 912 S, 914 UL, 914 F a dog gear of a width increased by 5 mm (0,2 in) was introduced (see fig. 3). This dog gear is part of the gear set 886518.

◆ NOTE: The gear set of increased width is available only for gear reduction ratio 1:2,43.

Increasing of the dog gear width made the following additional modifications necessary:

- Modification of the dog support face (see section 3.1.1)
- Change of the axial design of the crankshaft (see section 3.1.2)
- Additional clearance in the gearbox housing (see section 3.1.3)
- Interim gear set part no. 888680 (see section 3.1.4)

3.1.1) Modification of dog hub and of overload clutch (affected engines "group B"):

The increase in dog gear width made modification of the dog support surface necessary. The dog support surface is now machined 7° tapered (see fig. 4).

▲ WARNING: A gear set of the increased width must be only paired with the **7° tapered dog hub** part no. 958892 (without overload clutch) and is allowed to be fitted only together with the overload clutch of new design part no. 996887.

This new dog hub and new dog gear of the overload clutch must never be used in connection with a gear set of narrow width as the contact surfaces do not match correctly.

◆ NOTE: The new dog hub and dog gear of the overload clutch and the dog gear of increased width can be identified by a groove (see fig. 4).

3.1.2) Standardizing of the crankshafts (affected engines "group A"):

Because of the wider dog gear, it became necessary to change the axial position of the drive gear. Therefore the crankshaft part no. 888164 is furnished with a longer ending (see fig. 5).

▲ WARNING: If the modified crankshaft part no. 888164 will be installed instead of the previous one (part no. 996583) take care of the following:

- If the narrow gear set is going to continue to be used, then it will be necessary to inspect the gear set for traces of wear due to axial staggering between drive gear and dog gear. If traces of wear are obvious, exchange the gear set for one of increased width. In this case the overload clutch or dog hub has to be exchanged for use with a 7° dog support face.

- The crankshaft part no. 888164 is only allowed to be installed into the gearbox housing part no. 911746 (see chapter 3.1.3)

Furthermore the crankshaft (part no. 888164) is furnished with bearing bushing in the small end bearing (see chapter. 3.3)

■ CAUTION: The crankshaft part no. 996583 with S/N 8105 and/or part no. 996581 with S/N 8105, which only available for spare part service, with bearing bushing in the small end bearing was introduced. Observe this conditions for using the correct piston pin (see chapter. 3.3.1).

3.1.3) Gearbox housing assy. part no. 911746 (affected engines, "group D")

The changed axial position of the drive gear and the dog gear of increased width require extra space in the gearbox housing (see fig. 2).

■ CAUTION: The crankshaft part no. 888164 is allowed to be installed only in the gearbox housing part no. 911746, where the space between gear set and housing wall will be ensured.

3.1.4) Interim gear set

(see fig. 6)

This gear set is necessary if a gearbox with a narrow gear set has to be converted into a gearbox with an increased gear set width and for a crankshaft part no. 996583 or older.

◆ NOTE: This gear set is with a drive gear of increased width which compensates for the axial staggering between crankshaft part no. 996583 and dog gear of increased width.

◆ NOTE: The interim gear set is only available with reduction ratio 2,43.

▲ WARNING: This gear set is allowed to be installed only together with a crankshaft part no. 996583 or of earlier date and in gearbox housing part no. 911746.

3.2) In the course of standardization further modifications of the gearbox were carried out:

Standardization of the backlash on the gear dogs to 30° (affected engines "group C"):

All gearboxes with overload clutch from serial production will be with a backlash of 30°.

◆ NOTE: The backlash of 30° is between dog hub and dog gear.

◆ NOTE: In the future, gearboxes without an overload clutch will have no backlash.

3.3) Standardizing of the piston pin (affected engines „group A“)

With the introduction of the crankshaft part no 888164 (see chapter. 3.1.2) the top (small) connecting rod eye was equipped with bearing socket, to be improved coupling of material with piston pin.

▲ WARNING: At the crankshaft part no. 888164 must only be used the piston pin part no. 916356. (see fig. 7-10)

3.3.1) Repair of the engine type 914 series:

At repair- and/or overhaul following recommendations must be observe:

- In using of the crankshaft part no. **996583 without conrod bushing** (engines previous „group A“), there must be only 4 nitride piston pin part no. 916420 (black surface) installed. (see fig. 10)
- In using of the crankshaft part no. **996583 with conrod bushing** there must be only 4 piston pin part no. 916356 installed.
- In using of the crankshaft part no. **888164** (engines previous „group A“) there must be only 4 piston pin part no. 916356 installed.

3.3.2) Repair/Overhaul of the engine type 912 series:

All these engines the piston pin part no. 916356 can be install without considering the serial number.

■ CAUTION: For reason of weight limits there must be only 4 same piston pin installed in one engine.

To prevent any mix-up, see the illustration fig. 7 to 10.

3.4) Summary

▲ WARNING: Non-compliance with these instructions 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.

3.5) Overview

The following table shows which components are together compatible:

Conduct test run including ignition check and leakage test.

		Kombinationsmöglichkeit / combination								
Ausgangsbasis / starting base	Gemeinsame Verwendbarkeit der Verschiedenen Zahnradsets, Klauehnen, Rutschkupplungen, Getriebedeckel und Kurbelwellen: common use of the different gear sets, dog hubs, slipper clutches, gear box housings and crankshafts:	Überlastkupplung (TNR. 966883), rechtwinkelige Klauehnenab overload clutch (part no. 966883), rectangular dog hub				Klauehne rechtwinkelig (TNR. 958920) dog hub rectangular (part no. 958920)				
		Überlastkupplung 7° (TNR. 996887) overload clutch 7° (part no. 996887)	Überlastkupplung 7° (TNR. 996887) overload clutch 7° (part no. 996887)	Klauehne 7° (TNR. 958892) dog hub 7° (part no. 958892)	Zahnradsetz 1:2,27 (Klauehrad schmal, 22 mm) (5) gear set 1:2,27 (dog gear narrow, 22mm) (5)	Zahnradsetz 1:2,43 (Klauehrad schmal, 22 mm) (5) gear set 1:2,43 (dog gear narrow, 22mm) (5)	Zahnradsetz 1:2,43 (Klauehrad breit, 27mm) (6) gear set 1:2,43 (dog gear wide, 27mm) (6)	Zahnradsetz 1:2,43 (Interim, Klauehrad breit, 27 mm) (5) gear set 1:2,43 (interim, dog gear wide, 27 mm) (5)	Zahnradsetz 1:2,43 (Interim, Klauehrad schmal, 22 mm) (5) gear set 1:2,43 (interim, dog gear narrow, 22mm) (5)	
		yes	yes	no	no	yes	no	yes	yes	
		yes	yes	no	no	yes	no	yes	yes	
		no	no	yes	yes	no	yes	yes	yes	
		no	no	yes	yes	no	yes	yes	yes	
		yes	yes	no	no	yes	no	yes	yes	
		yes	yes	yes	yes	yes	yes	yes	yes	
		yes	yes	no	yes	yes	yes	yes	yes	
		yes	yes	yes	yes	yes	yes	yes	yes	
1) nur mit Kurbelwelle TNr. 996583 oder älter 1) only with crankshaft part no. 996583 or older		7) nur bei Motortype 912 A/ F (Motoren vor Gruppe A) und 912 UL 7) only at engien type 912 A/ F (engines before group A) and 912 UL								
2) nur mit Getriebegehäuse ab S/N 15.913 (TNR. 911746) 2) only with gearbox housing from S/N 15.913 (part no. 911746)		8) nur bei Motortype 914 F/ UL (Motoren vor Gruppe A) 8) only at engien type 914 F/ UL (engines before group A)								
3) nur mit Kurbelwelle TNr. 888164 3) only with crankshaft partno. 888164		9) Der Kolbenbolzen TNr. 916356 kann für alle Motoren der Type 912 UL/ A/ F/ S/ ULS/ ULSFR verwendet werden. 9) The piston pin part. no. 916356 can be used at engine type 912UL/ A/ F/ S/ ULS/ ULSFR.								
4) nur mit schmalen Zahnradsets 4) only with narrow gear sets		10) zulässig, sofern Kurbelwelle mit Buchse in kleinem Pleuelauge versehen ist 10) permissible if crankshaft has bushing in small end bearing								
5) nicht erlaubt bei Motoren Gruppe B 5) not allowed on engines group B		11) nicht zulässig, sofern Kurbelwelle mit Buchse in kleinem Pleuelauge versehen ist 11) not permissible if crankshaft has bushing in small end bearing								
6) nicht erlaubt bei 912 UL 6) not allowed on engines 912 UL		SL-912-002 R1 SL-914-002 R1 page 7 of 11								

4) Appendix

the following drawings should convey additional information:

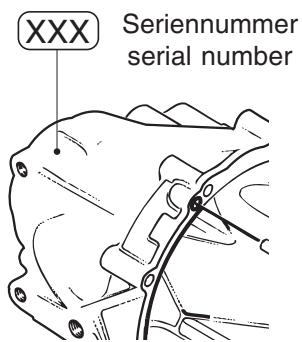


Bild / Fig. 1
02879

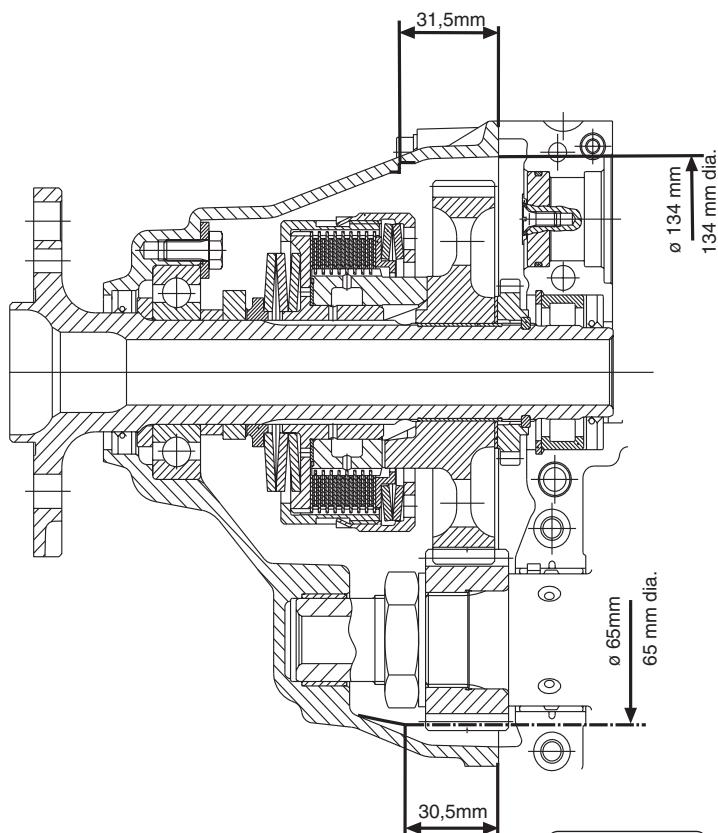


Bild / Fig. 2
03225

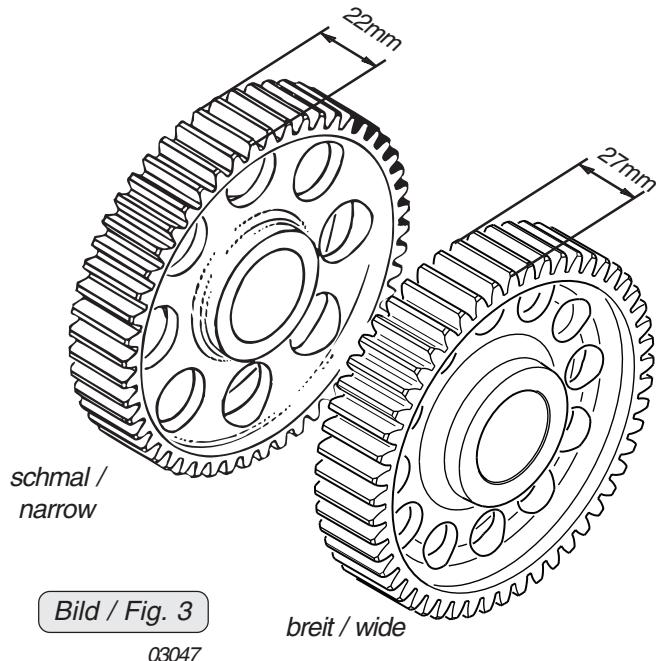
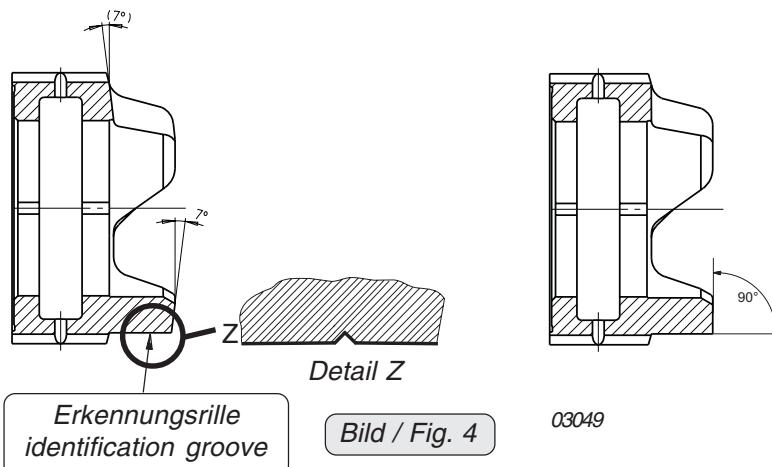


Bild / Fig. 3
03047

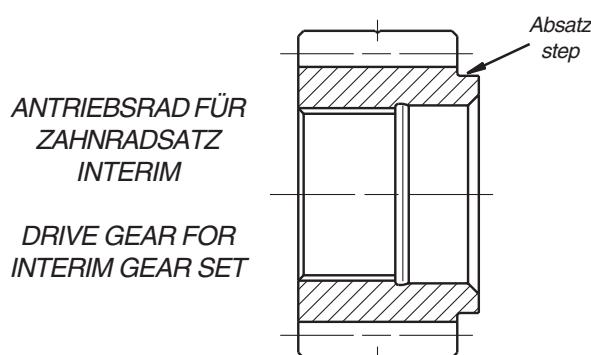
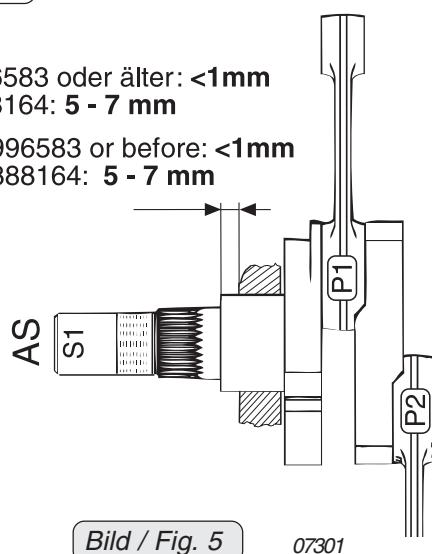
für breiten Zahnradsetz
for wide gear set

für schmalen Zahnradsetz
for narrow gear set



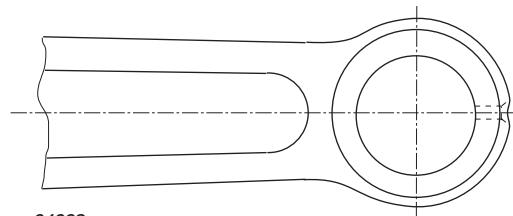
Kurbelwelle TNr. 996583 oder älter: <1mm
Kurbelwelle TNr. 888164: 5 - 7 mm

crankshaft, part no.996583 or before: <1mm
crankshaft, part no.888164: 5 - 7 mm



Type 912 Serie

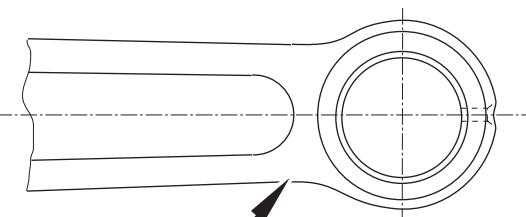
Kurbelwelle TNr. 996583 bis S/N 8104
crankshaft part no. 996583 to S/N 8104



04068

Bild / Fig. 7

Kurbelwelle TNr. 888164 ab Serie
crankshaft part no. 888164 with start of
serial production
und/and
Kurbelwelle TNr. 996583 ab S/N 8105
crankshaft part no. 996583 from S/N 8105



04069

Lagerbuchse
bushing

Kolbenbolzen
piston pin



04065

TNr. / part no. 916355
Gewicht / weight ~ 75g



ersetzt durch/ replaced by



04066

TNr. / part no. 916356
Gewicht / weight ~ 85g

Bild / Fig. 8

TNr./ part no. 916356
Gewicht/ weight ~ 85g

04066

■ CAUTION: Observe the combination options of the piston pin in accordance chapter 3.3.

Type 914 Serie

Kurbelwelle TNr. 996583 bis S/N 8104
crankshaft part no. 996583 to S/N 8104

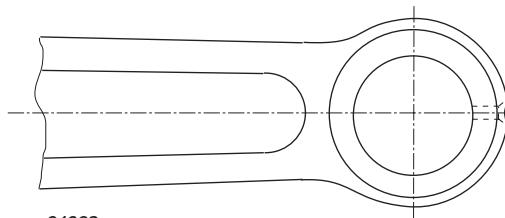
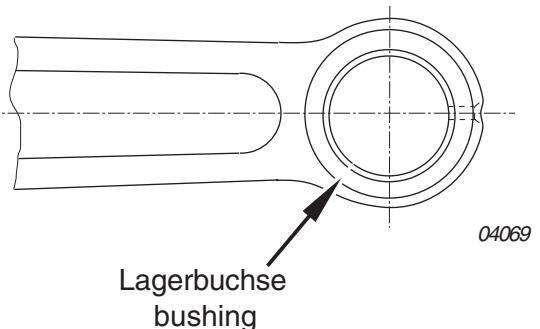


Bild / Fig. 9

Kurbelwelle TNr. 888164
crankshaft part no. 888164
und/and
Kurbelwelle TNr. 996583 ab S/N 8105
crankshaft part no. 996583 from S/N 8105



Kolbenbolzen
piston pin

nitrierte Oberfläche
nitrated surface



Bild / Fig. 10

TNr./ part no. 916420
Gewicht/ weight ~ 87g

04067



TNr./ part no. 916356
Gewicht/ weight ~ 85g

04066

- ◆ NOTE: The illustrations in this document show the typical construction. They may not represent full detail or the exact shape of the parts which have the same or similar function. Exploded views are **no technical** drawings and are for reference only. For specific detail, refer to the current documents of the respective engine type.