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LuK repair solution for dry double clutches



Disassembly and assembly
Special tools/diagnostics

Ford, DPS6 6-speed transmission



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1 Diagnostics for the double clutch system

1.1 General notes on testing the system

Before repairing the double clutch, a few key questions must first be clarified with the customer in order to pinpoint the error as much as possible.

If the vehicle is still drivable, we recommend carrying out a test drive. The customer should be the driver in order to demonstrate any possible malfunctions.

Specific questions for the customer:

- Exactly what is not working or what is the exact problem?
- When did the problem first occur?
- Did the problem occur suddenly or did it develop gradually (slowly)?
- When does the problem occur?
Sporadically, often, always?
- What driving condition is the vehicle in when the problem occurs?
E.g. when starting, accelerating, decelerating, when the engine is cold or warm?
- What is the vehicle mileage?
- Is the vehicle subjected to extraordinary loads?
E.g. towed trailer, high load capacity, frequent hill climbs, operated as a taxi, fleet vehicle, rental vehicle, driving school?
- What is the driving profile like?
Urban vehicle, short journeys, intercity, motorway?
- Have repairs already been carried out on the clutch system/transmission system?
If so, at what mileage? What were the symptoms of that complaint? What repairs were carried out?

General checks on the vehicle

Before starting a repair on the vehicle, the following items must be checked:

- Error code entries in the ECU (engine, transmission, clutch, amenities, CAN-BUS, etc.)
- Battery power

Double clutch on the engine side



Double clutch on the transmission side



1.2 Checking for wear

Clutch wear cannot be checked with a test drive. The transmission and clutch electronics continuously monitor the system. If the wear limit has been reached, this will be displayed in the instrument cluster.

1.3 Visual inspection

Prior to each repair, the clutch system area must be checked for leaks and damage as a matter of course. Damage caused by parts that have broken off or oil leaks due to defective seals or sealing rings must be rectified before the clutch is replaced. If the clutch is oily, it must be replaced.

1.4 Noise

For the noise rating of the double clutch area, it must generally be ensured during a test drive that no noise is emanating from surrounding components such as the emission system, heat shields, engine suspension damping blocks, auxiliary equipment etc. The radio, air conditioning and ventilation must be switched off during the noise investigation. Tools such as a stethoscope can also be used in the garage to locate the source of the noise.

1.5 Diagnostics

The transmission electronics and clutch electronics can be diagnosed. Prior to each repair, the contents of the error memory must be read using a suitable diagnostic tool and, if possible, retained as a print-out. The error memory report provides an initial overview of the system errors and forms the basis for further repair measures. The report provides the data required to assess the error pattern (important when contacting the Service Centre or in the event of warranty claim).

Finally, a basic adjustment of the clutch system must be carried out using a suitable diagnostic tool once all work on the double clutch is complete.

Note:

If you have any questions about diagnostics and repairs, please call our Service Centre on:
Phone: +49 6103 753-333.

2 Description and content of the LuK RepSet 2CT

The LuK RepSet 2CT (twin-clutch technology) includes all the necessary components to replace the double clutch system. It is advisable to replace not only the double clutch, but the engaging system as well.

Thanks to the LuK RepSet 2CT, Schaeffler Automotive Aftermarket is able to offer a complete and practical solution. The components included in the set are precisely co-ordinated ex works, meaning malfunctions such as those caused by composite installations are eliminated from the outset.



- | | |
|--|--|
| 1 Double clutch | 8 Washers for clutches K1 and K2 |
| 2 Lever actuator for clutch 1 (K1) | 9 Retaining ring |
| 3 Return springs for lever actuator K1 | 10 Mounting screws for lever actuators |
| 4 Lever actuator for clutch 2 (K2) | 11 Mounting screws for guiding sleeve |
| 5 Return springs for lever actuator K2 | 12 Mounting screws for servo motors |
| 6 Guiding sleeve | 13 Nuts for attachment to the flywheel |
| 7 Engagement bearings for clutches K1 and K2 | |

3 Description and content of the LuK special tools

The LuK special tool is essential for the correct disassembly/assembly of the Ford double clutch. The double clutch must be disconnected during disassembly of the transmission input shaft and fitted again on assembly. In addition, the return springs must be correctly adjusted and the transport locks on clutches K1 and K2 released following mounting.

If a previously removed double clutch is reused (for instance, due to work being carried out on the gearbox gasket), the transport lock must be re-enabled.

A modular tool system has been developed by Schaeffler Automotive Aftermarket for current and future dry LuK double clutch systems. All module units can be used in combination with each other.



Note:

If you have any questions about the special tools, please call our Service Centre on:
Phone: +49 6103 753-333.

3.1 Basic tool kit

The basic tool kit (part no. 400 0418 10) forms the basis of the modular tool system. It contains those tools that are generally required for all repairs to double clutches.

Together with a vehicle-specific tool kit, they form a complete kit for professional repairs. This is based on all dry double clutch systems currently available from LuK.



- 1 Puller with spindle and pressure piece
- 2 3 thumb screws
- 3 3 M10 threaded bolts, 100 mm long
- 4 3 M10 threaded bolts, 160 mm long
- 5 Circlip pliers, angled
- 6 Magnet
- 7 Transmission support with height adjustment

- 8 2 plugs for differential openings
- 9 DMF reset tool
- 10 Unlocking key
- 11 Special open-end wrench
- 12 DVD with assembly/disassembly instructions and training video

3.2 Ford tool kit

This tool kit (part no. 400 0427 10) contains all tools that are required to carry out professional repairs on a dry double clutch on Ford vehicles with 1.6-litre and 2.0-litre naturally aspirated engines (DPS6 6-speed transmission).

It must be used together with the basic tool kit.



- | | | | |
|---|--------------------------------|---|---|
| 1 | 3 hooks | 5 | Template for vehicles with 1.6-litre petrol engines |
| 2 | 3 thrust pieces | 6 | Template for vehicles with 2.0-litre petrol engines |
| 3 | Pressure sleeve for assembly | 7 | 2 handles |
| 4 | Support sleeve for disassembly | 8 | DVD with assembly/disassembly instructions and training video |

3.3 Reset tool kit

New double clutches for Ford vehicles with a DPS6 transmission are in principle fitted with a transport fastener. This means that no additional work is necessary prior to assembly.

The transport fastener must be put back in place if the double clutch is used again after disassembly, e.g. because work has been carried out on the transmission seals. The reset tool kit (part no. 400 0425 10) must be used for this type of work.



- 1 Base plate with spindle
- 2 Pressure nut
- 3 Adapter
- 4 2 fixing pins
- 5 2 knurled nuts
- 6 K2 pressure piece, Ø 115 mm
- 7 K2 pressure piece, Ø 131 mm

- 8 K1 pressure ring, Ø 85 mm
- 9 K1 pressure ring, Ø 105 mm
- 10 K1 return ring
- 11 K2 return ring
- 12 3 K1 fixing pieces
- 13 DVD with assembly/disassembly instructions and training video

4 Disassembly and assembly of the double clutch

LuK RepSet 2CT training videos and brochures on DVD



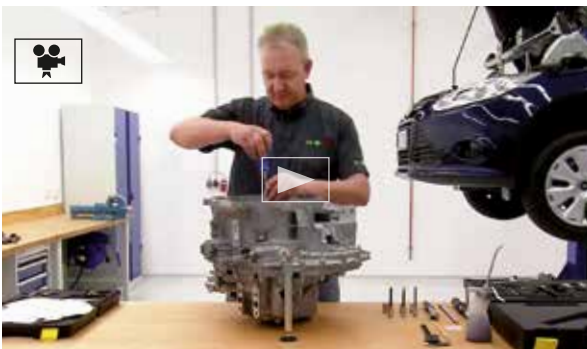
The training videos show and explain all the steps in the removal and installation process for the double clutch using LuK special tools.

The informative footage and brochures are included in our special tool cases as a DVD. The DVD is also available separately on request.

Note:

If you have any questions about the DVD, please call our Service Centre on: Phone: +49 6103 753-333.

In addition, the latest version of the training video and brochure is always available to download from www.rexpert.com and www.schaeffler-aftermarket.com.



4.1 Repair information

Valid for:

Ford 1.6 and 2.0-litre petrol engines with a DPS6 6-speed transmission and dry double clutch

In combination with:

LuK RepSet 2CT, part no. 602 0008 00

Using the special tools:

LuK basic tool kit, part no. 400 0418 10

LuK Ford tool kit, part no. 400 0427 10

LuK reset tool kit, part no. 400 0425 10

Important information for proper repairs:

- Repairs may only be performed by qualified personnel using the appropriate garage equipment
- Due to on-going technical developments in the series by the vehicle manufacturer, the repair process and the special tools required are subject to change
- Repair work may essentially be carried out only using the latest repair instructions and corresponding special tools

The latest data and information can be found at:

www.schaeffler-aftermarket.com or www.rexpert.com

- If transmission oil leaks out during the repair, the oil level must be checked and filled up once the transmission is installed
- Before installing the double clutch, it is necessary to clean the transmission input shafts thoroughly and to check for damage. Once this has been done, a suitable lubricant must be applied to the gearings. The vehicle manufacturer's specifications must be observed as a priority for this step. If the vehicle manufacturer does not give any indication regarding the use of lubricants, a high-melting point grease containing MoS₂ that is temperature-resistant and resistant to ageing (e.g. Castrol Olista Longtime 2 or 3) can be used as an alternative
- The components of the engaging system and the clutch system must not be greased or oiled, unless specified in this brochure
- Once the clutch and transmission have been installed, a basic adjustment of the system must be carried out using a suitable diagnostic system

- Oily and/or dirty transmission parts must be cleaned before using the new components. Cleanliness must be ensured throughout the entire repair process
- If a double clutch that has already been removed is to be used again following, for example, work on the transmission seal, the transport fasteners for the double clutch must be reset
- The double clutch and flywheel are balanced and must be positioned correctly in relation to each other when installed. If this is not the case, a loss of comfort may result and malfunctions may occur

Attention:

- Dropped double clutches must no longer be used
- Cleaning in a part washing machine is not permitted
- The disassembly of components is not permitted

4.2 Removal of the double clutch

- The transmission must be removed according to the vehicle manufacturer's specifications

Note:

The double clutch is attached to the flywheel by six nuts. These nuts must first be removed via the starter opening. Otherwise, it is not possible to disconnect the transmission from the engine.

The double clutch and flywheel are balanced and must be positioned correctly in relation to each other when installed.

If the clutch is not being replaced, the installation position of the flywheel and the double clutch must be marked.



- During the removal process, insert the plugs (KL-0500-8012) into the openings of the differential



- Mount the transmission onto a suitable fixture or place on a workbench and secure with the transmission support (KL-0500-802) so that the transmission is stable and the clutch bell housing is positioned horizontally



- Disassemble the retaining ring of the upper clutch disc hub (K1) using a screwdriver



- Remove the retaining ring and clutch disc hub (K1)



- Using the snap ring pliers (KL-0192-12), remove the retaining ring from the hollow shaft; the ring is usually damaged in the process and must be replaced

Note:

If the retaining ring in the groove of the hollow shaft cannot be loosened, the clutch must be pressed down slightly using the special tool kit, as shown on page 29.



- Select template

Note:

To remove the clutch from the hollow shaft, it must be positioned correctly in the transmission bell housing.

The transmission design variants of the two engine variants (1.6-litre and 2.0-litre variants) are different from each other. For this reason, there are two different templates.

Template number KL-0500-8341 must be used for vehicles with a 1.6-litre engine. For vehicles with a 2.0-litre engine, template number KL-0500-8342 is required.



- Insert the template such that the bores on the clutch (arrow) are visible through the three large openings



- Turn the clutch until the template is positioned as shown in the transmission bell housing



- Repeat the process with the remaining two hooks

Note:

The extractor hook marked with the number 2 is magnetic and automatically engages on the bottom of the clutch when swivelled into another position. This extractor hook is therefore different to the two other hooks.



- Remove template
- Place the support sleeve (KL-0500-8212) on the hollow shaft



- Mount the puller (KL-0500-60A) on the support sleeve and hooks
- Using the thumb screws, position the spindle so that the hooks can be mounted stress-free on the puller



- Screw the thumb screws into the hooks by hand



- Tighten three hexagon-socket head screws on the puller



- Disconnect the clutch package by turning the spindle onto the hollow shaft



- Disassemble the puller, extractor hooks and support sleeve. Loosen the hexagon-socket head screws on the puller
- Attach the handles and use these to lift out the clutch

Attention:

If the clutch is to be reused, it must be placed carefully on a soft surface. Otherwise, there is a risk of the lever spring being damaged.



4.3 Removal of the engaging system

- Remove washers



- Remove K1 and K2 engagement bearings



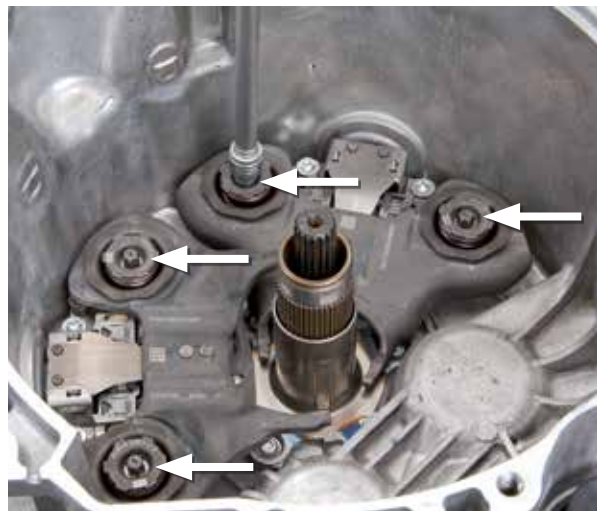
- Remove the screws from the two servo motors (for K1 and K2)



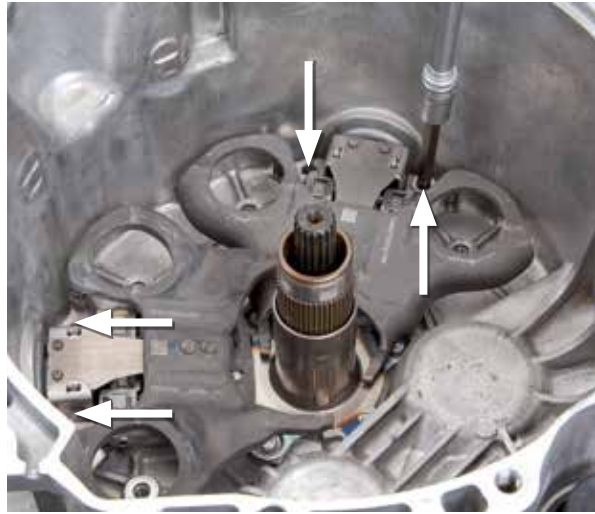
- Remove servo motors



- Loosen and remove return springs



- Unscrew the mounting screws of the lever actuators



- Remove both lever actuators

Note:

If the lever actuators are to be reused, remove them at the base plate and place them on a soft surface.



- Remove the three screws from the guiding sleeve



- Remove the guiding sleeve



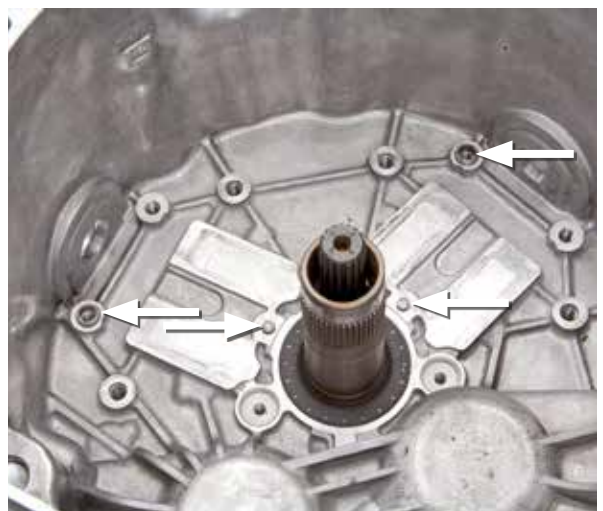
- Check the radial shaft sealing rings on the transmission input shafts for leaks
- Clean the transmission input shafts

Attention:

The bearing seat of the hollow shaft must be cleaned and must be in faultless condition. When the bearing seat is oxidised or damaged, the force when pushing on the clutch will increase to an inadmissible level and consequently damage the bearing arrangement of the hollow shaft in the transmission.



- Check that the adapter sleeves and dowel pins are securely in place



4.4 Installation of the engaging system

- Install a new guiding sleeve; this fits in only one position
- Ensure that the guiding sleeve is in the correct position



- Tighten the new screws to 8 Nm



- Insert the lever actuator for K2 (narrow fork opening)
- The correct position is determined by the adapter sleeve and the dowel pin

Note:

During assembly, the lever actuators for K1 and K2 must generally be left on the base plate. Failure to do so will cause the engaging system to malfunction.



- Insert the lever actuator for K1 (wide fork opening)
- The correct position is determined by the adapter sleeve and the dowel pin



- Insert the two servo motors and fix in position with a screw as required
- If the gear teeth don't match up right away, the motor shaft must be rotated slightly



- Tighten new screws on the base plate of the lever actuators to 19 Nm



- Remove the transport fasteners from the two lever actuators

Attention:

If these are not removed, damage and/or malfunctions may occur!



- The return spring and the lever actuator are coordinated and must therefore be assigned correctly



- The middle four digits on the return spring and the last four digits on the lever actuator must be identical



Note:

There are always four return springs and two lever actuators in the LuK RepSet 2CT. Each pair of return springs has its own single four-digit number and is used in the respective lever actuator.



- Tighten the return springs to 26 Nm



Note:

After tightening the return spring, it is possible that the markings on the housing of the return spring are not aligned with the markings on the lever actuator. If this is the case, the return spring must re-aligned.



- Place the special open-ended spanner (KL-0500-8010) on the housing of the return spring and turn it until the markings are aligned



- Insert engagement bearings for K1 and K2

Attention:

The two engagement bearings are connected with each other and must not be disassembled. When inserting the engagement bearings, hold by the outer ring and carefully slide onto the guiding sleeve. Assembly is only possible in one position.



- Insert the two washers



4.5 Installation of the double clutch

If a double clutch that has already been used and removed is to be re-installed following, for example, work on the transmission seal, the transport fasteners of the double clutch must be reset (see chapter 5). If a new double clutch is to be used, this step is omitted.

- Prepare two pea-sized portions (0.2 grams each) of lubricant on a piece of cardboard

Note:

Take the vehicle manufacturer's specifications into account when choosing the lubricant. If no information is available, a high-melting point grease containing MoS_2 that is temperature-resistant and resistant to ageing (e.g. Castrol Olista Longtime 2 or 3) can be used.

- Using a brush, apply a portion of lubricant to the splines of the hollow shaft
- Use the brush to apply the other portion to the splines of the solid shaft

Attention:

If too much lubricant is used, a malfunction of the double clutch may occur.

- Wet the bearing seat of the transmission input shaft with a drop of transmission oil around the entire circumference

Attention:

If too much lubricant is used, a loss of comfort may result and/or a malfunction of the double clutch may occur.



- Attach the handles and place the clutch onto the hollow shaft. Turning slightly ensures that the gear teeth of clutch plate K2 and the hollow shaft mesh with each other

Note:

The support bearing on this double clutch has been designed such that it can move in the central plate. This movement occurs as a result of the design and is used to compensate for the radial offset. Therefore, noises that may occur during handling should not be regarded as a defect. More information on the different kinds of offset can be found in the brochure entitled "The dry double clutch".

Attention:

There is a risk of injury if you insert the clutch without using the special tool!

- Check that the clutch is sitting correctly on the shaft; measure the distance between the upper edge of the bearing inner ring and the face of the hollow shaft; it must not exceed 7 mm
- If the distance is greater, the splines are not engaged correctly
- Remove the handles



- Place the pressure sleeve (KL-0500-8211) on the bearing inner ring of the clutch package

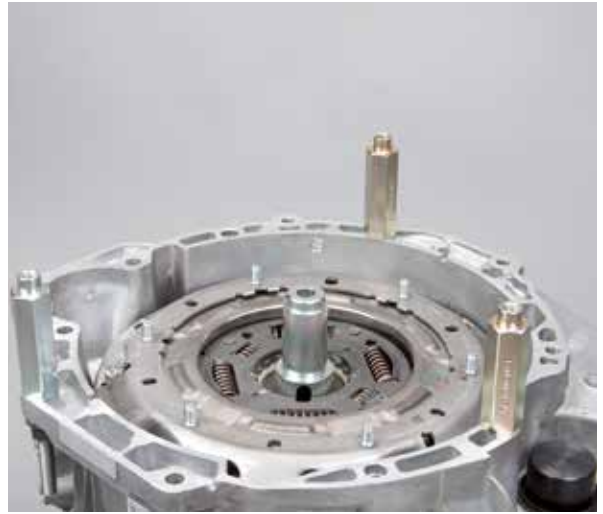


- Mount three threaded bolts (KL-0500-6021 or KL-0500-6022) with collar nuts on the transmission bell housing

Note:

Bolts with a long or short thread are used, depending on the mounting options on the transmission.

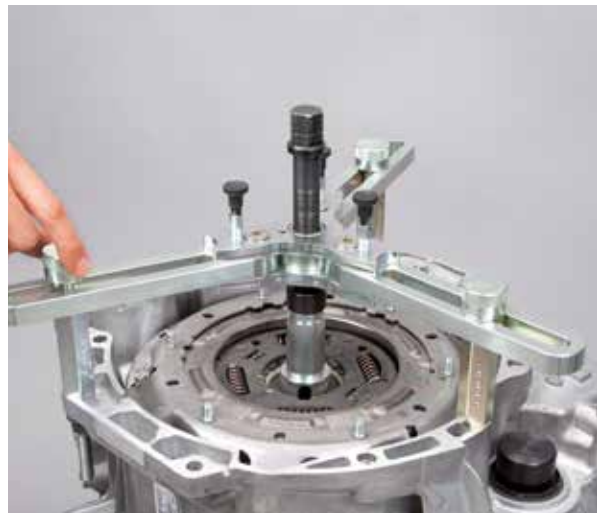
- Position the threaded bolts at an angle of approximately 120° to each other



- Mount the puller (KL-0500-60) with the thumb screws (KL-0500-6020) on the threaded bolts such that they are stress-free

Note:

The spindle must be centred in relation to the clutch, must be inserted into the press-in sleeve and must move freely (must be greased).



- Tighten three hexagon-socket head screws on the puller



- Turn the spindle via the press-in sleeve to press the clutch onto the hollow shaft; the pressing process is complete as soon as the retaining-ring groove is fully visible in one of the windows of the press-in sleeve and the amount of force required to turn the spindle increases significantly

Attention:

Turning the spindle any further will damage the bearing arrangement in the hollow shaft. This will result in damage to the transmission.

Note:

The spindle should be operated with a torque wrench that is set to a maximum permissible torque of 9 Nm. The force required to turn the spindle must not cause the torque wrench to release! If the torque wrench is released before the clutch has reached its end position, the installation has not been completed correctly.

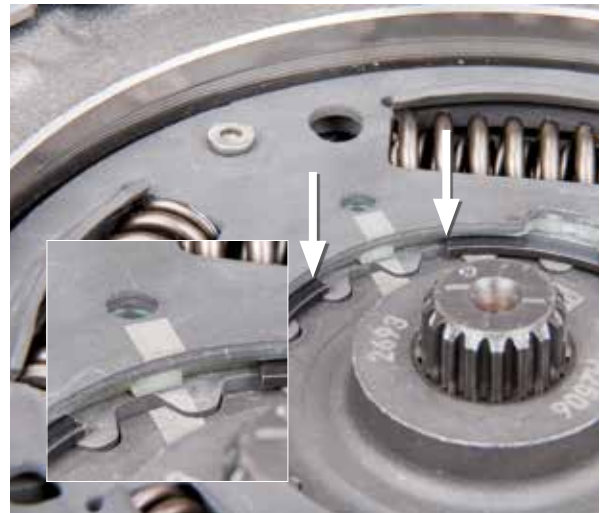
- Using snap ring pliers, install a new retaining ring (KL-0192-12) on the hollow shaft. The side of the retaining ring on which the opening is smaller must face upwards



- Install the hub of the upper clutch disc (K1); the correct position is marked with a line



- Insert the retaining ring such that the gap in the ring is positioned centrally in relation to the plastic pin



4.6 Releasing the transport fasteners on the double clutch

- Remove both servo motors



- Insert the unlocking key (KL-0500-8011) with the marking (on the ribbed surface) facing upwards into the lever actuator for K2



- Turn the unlocking key anti-clockwise until a noise can be heard. Then turn the key one more revolution
- Max. 12 revolutions

Attention:

The unlocking key is pre-loaded and must not be released suddenly. Turn the key back slowly to release the spring force; otherwise, the lever actuator will be damaged.



- Insert the unlocking key with the marking facing upwards into the lever actuator for K1



- Turn the unlocking key anti-clockwise until a noise can be heard. Then turn the key one more revolution
- Max. 12 revolutions

Attention:

The unlocking key is pre-loaded and must not be released suddenly. Turn the key back slowly to release the spring force; otherwise, the lever actuator will be damaged.



- Apply an extremely thin layer of grease to the spindle of the lever actuators as well as to the shafts of the servo motors



- Install both servo motors using a tightening torque of 5.5 Nm
- Re-install the transmission, observing the vehicle manufacturer's instructions

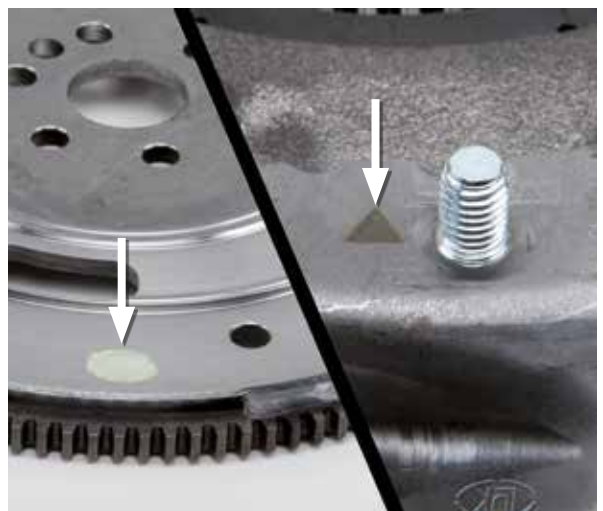


Note:

The double clutch and flywheel are balanced and must be positioned correctly in relation to each other when installed. To ensure correct positioning, a coloured marking is located on the flywheel and a triangle is located on the double clutch. When installing the transmission, both markings must be aligned.

Attention:

Pull the engine and transmission together by hand until the engine flange and the gearbox flange touch across their entire surface. Ensure that the pins in the clutch enter the holes in the flywheel. Only then may the transmission be bolted to the engine. Failure to do so may cause damage to the double clutch.



Note:

The following steps for a transmission that has already been removed are described as an example.

- Screw three nuts 120° by hand onto the stud bolts. When performing this step, observe the tightening sequence and always turn the crankshaft in a clockwise direction
- Tighten the nuts to 12 Nm



- Attach the remaining three nuts
- Tighten all six nuts to 25 Nm following the sequence shown



Attention:

If transmission oil leaks out during the repair, the oil level must be checked and filled up once the transmission is installed. A basic adjustment of the clutch system must then be carried out using a suitable diagnostic tool.

5 Resetting transport fasteners on a previously used double clutch

If a double clutch that has already been used and removed is to be re-installed following, for example, work on the transmission seal, the transport fasteners of the double clutch must be reset. The reset tool kit (part no. 400 0425 10) is required for this procedure.

- Clamp the base plate with spindle (KI-0500-713) in a vice



- Screw the knurled nuts onto two opposing threaded bolts



- Place the double clutch onto the base plate, ensuring that the lever spring is facing upwards
- The knurled nuts must enter the groove of the base plate



- Install pressure piece K2, Ø 131 mm (KL-0500-717)



- Initially, only turn the pressure nut onto the spindle until it is touching the pressure piece



- Place the large return ring for K2 (KL-0500-714) onto the double clutch and insert it into the tabs of the adjuster ring



- Turn the return ring anti-clockwise (in the direction of the arrow on the ring) and hold at the stop



- Use one hand to hold the return ring in this position, while turning the pressure nut downwards with the other hand until the pressure nut reaches the stop

Note:

Transport fastener K2 is reset when a noise is clearly audible.

Attention:

Do not release the return ring until the transport fastener is reset.



- Disassemble the pressure nut, pressure piece and return ring

Note:

An adjustment noise is audible when loosening the clamping nut. This is a technical requirement and merely confirms that the automatic self-adjustment of clutch K2 is working correctly.

- Check that all spring tabs are located in the bores of the lever spring



- Place pressure ring K1, Ø 105 mm (KL-0500-7111), onto lever spring K1



- Insert the adapter into the pressure plate



- Initially, only turn the pressure nut onto the spindle until it is touching the adapter



- Insert the small return ring for K1 (KL-0500-715) into the three slots of the self-adjustment ring for K1



- Turn the return ring clockwise (in the direction of the arrow) as far as the stop



- Use one hand to hold the return ring in this position, while turning the pressure nut downwards with the other hand until the tabs of the transport fastener can be fitted in position
- Remove the return ring



- Fit the tabs on transport fastener K1 in position using the fixing pieces



- Release and unscrew the pressure nut

Note:

An adjustment noise is audible when releasing the pressure nut. This is a technical requirement and merely indicates that the automatic self-adjustment function of clutch K1 is working correctly.



- Remove the remaining special tools
- Check that all tabs of transport fastener K1 are fitted

The double clutch is now prepared for reassembly.



