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# Dual Mass Flywheel – Special Tool

## User Instructions



# 1 Table of Content

|                                                              | Page  |
|--------------------------------------------------------------|-------|
| 1 Table of Content                                           | 2     |
| 2 Description of the DMF Special Tool                        | 3     |
| 3 General References                                         | 4     |
| 3.1 Ask your customer                                        | 4     |
| 3.2 General vehicle inspection                               | 4     |
| 3.3 How to handle the DMF correctly                          |       |
| 3.4 Installation                                             | 5     |
| 3.5 Special references                                       | 5     |
| 3.6 Multi-piece repair solutions                             | 5     |
| 4 DMF Function Tests                                         | 6     |
| 4.1 Which test suits which Dual Mass Flywheel?               |       |
| 4.2 Freeplay Measurement with Degree Gauge                   | 8-13  |
| 4.3 Freeplay Measurement by counting starter ring gear teeth |       |
| 4.4 Rock Measurement                                         | 18-19 |
| 5 Rated Values                                               | 20    |

## 2 Description of the DMF Special Tool

A 100% functional test includes among other things testing the characteristics of the arc springs in the Dual Mass Flywheel (DMF) during compression. The testing must be performed at a special test facility as it cannot be carried out with standard workshop equipment. However, the LuK DMF special tool 400 0080 10 allows you to perform the most important measurements – freeplay angle and rock – in a workshop environment.

The freeplay angle is the angle at which the DMF's primary and secondary masses can

be rotated against each other until load is exerted on the arc springs.

Tilting clearance occurs, when the rotating masses of the DMF are tilted towards or away from one another.

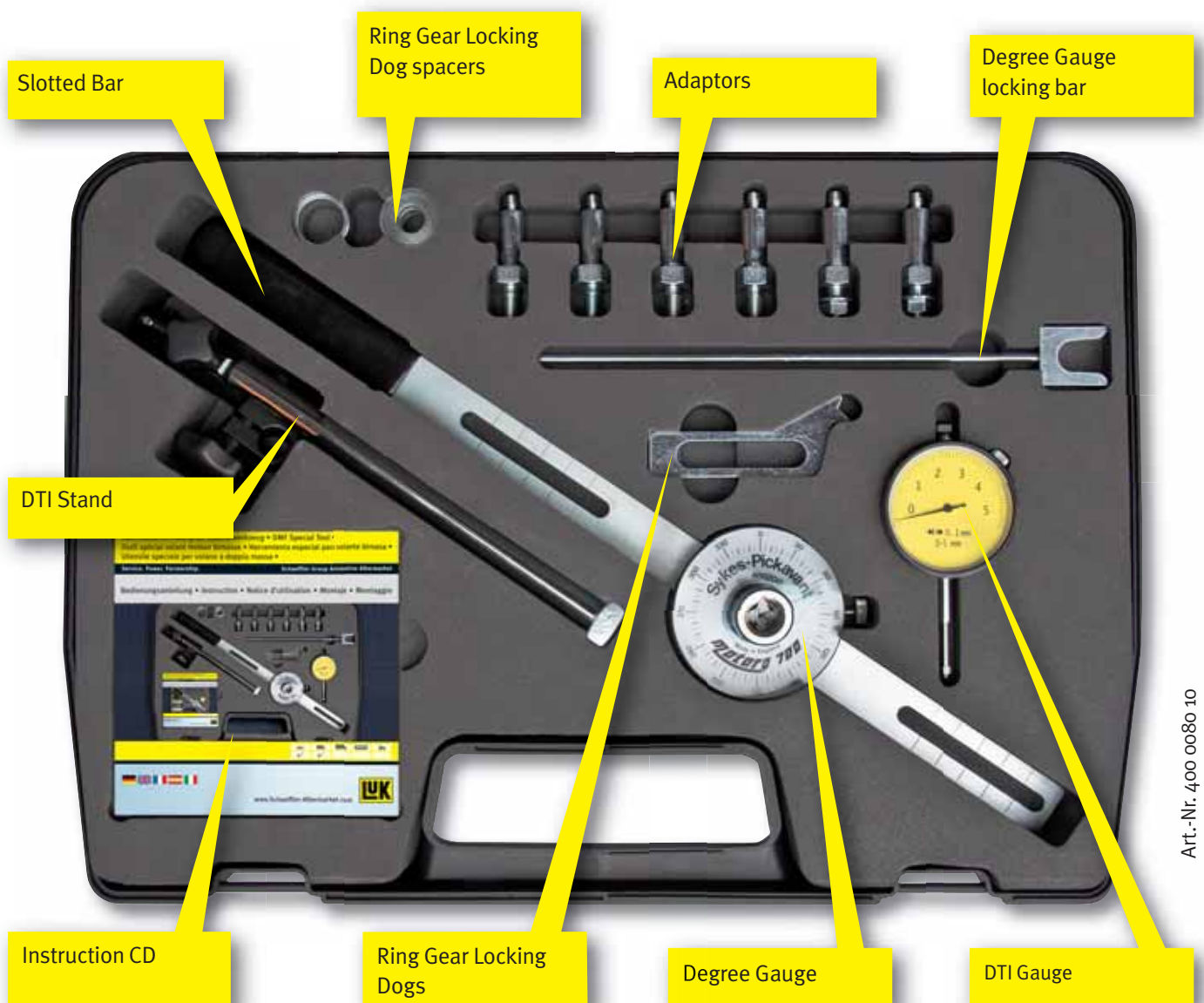
In addition, your assessment of the DMF's operational reliability should be based on the following criteria:

- grease egress;
- condition of the friction surface (e.g. signs of thermal load/ thermal cracks);

- noise behaviour;
- condition of the clutch;
- loading condition of the vehicle (towing a trailer, driving school, Taxi, etc.);
- etc.

When uncertain, always replace the DMF along with the clutch.

Further information on the design, function and failure diagnosis methods of a DMF can be found in the LuK technical brochure and on the DVD "Dual Mass Flywheel – Technology & Failure Diagnosis".



Art.-Nr. 400 0080 10

## 3 General References

Always check the Dual Mass Flywheel (DMF) when replacing the clutch. A worn and defective DMF can damage the newly installed clutch.

### 3.1 Ask your customer

In the event of a customer complaint, targeted questions help to identify the fault.

- Which component is not working, what is the customer's complaint?
- When did this problem first occur?
- When does the problem manifest itself?
  - From time to time, often, always?
- Under which operating conditions does the problem occur?
  - e.g. while driving-off, accelerating, shifting up/down, when the vehicle is cold
  - or at operating temperatures?
- Is the engine difficult to start?
- What is the total and annual mileage of the car?
- Are there extraordinary load conditions under which the vehicle operates?
  - e.g. towing a trailer, overloading, Taxi, fleet vehicle, driving school, is it chip tuned?
- Driving habits?
  - City traffic, short/long distance driving, Motorway driving?
- Have the clutch and transmission required an earlier repair?
  - If yes, at what mileage and for what reason?

### 3.2 General vehicle inspection

Check the following prior to proceeding with the repair:

- control unit fault codes (engine, transmission);
- battery power;
- condition and function of the starter motor;
- tuned engine (chip tuning)?

### 3.3 How to handle the DMF correctly

The following instructions provide important information on the correct handling of the DMF.

- A DMF that has been dropped must not be installed!
  - Risk of damaged ball or plain bearing, distorted sensor ring, increased imbalance;
- Remachining of the friction surface is not permissible!
  - The weakening of the friction surface results in insufficient burst speed characteristics.
- Do not apply high axial load on the secondary flywheel of a DMF with plain bearing!
  - This can damage the inner membrane of the DMF.
- It is not permissible to clean the DMF in a parts washing machine, or to use high pressure cleaners, steam cleaners, compressed air or any cleaning sprays.

### 3.4 Installation

What should be considered when installing a DMF?

→ **Observe the specifications of the vehicle manufacturer!**

- Check the shaft oil seals (engine and transmission side) for oil leaks and replace, if necessary.
- Check starter ring gear for damage and tight fit.
- Always use new fixing bolts.
- Verify that the distance between the speed sensors and the DMF sensing pins/sensor ring is correct.
  - Varies depending on the vehicle make.
- Ensure the dowel pins are fitted correctly.
  - Dowel pins must not be forced into or pushed out of the Dual Mass Flywheel.
  - Dowel pins forced further into the DMF score the primary mass (noise).
- Use a cloth dampened with solvent to clean the contact surface of the DMF.
  - No solvent must penetrate the interior!
- Ensure you use clutch bolts of the required length.
  - Bolts which are too long score the primary flywheel (noise) and can even lock it.
  - Bolts which are too long damage the ball bearing or extract it from its seat.

### 3.5 Special references

The following is permissible on some vehicle makes and models and has no effect on the operation of the clutch components:

- Small trails of grease on the DMF rear face (engine side) leading from the holes towards the flywheel edge.
- The secondary flywheel can be rotated by several centimetres against the primary flywheel and does not automatically return to its original position.
  - On a DMF with friction control disc a hard knock can be felt and heard.
- Depending on the design, axial play between the primary and secondary masses can be up to 2mm.
  - On some models with plain bearing axial play can be up to 6mm.
- Each DMF has a tilting clearance.
  - For ball bearings it can be up to 1.6mm, and up to 2.9mm for plain bearings.
  - Primary and secondary flywheel must never knock against each other!

### 3.6 Multi-piece repair solutions

Many vehicle manufacturers choose to equip new models with a Dual Mass Flywheel – and the trend is growing. This is thanks to the technical benefits provided by the DMF as well as the need for increasing noise comfort while reducing emissions of state-of-the-art engines. The DMF characteristics are precisely attuned to each vehicle and its engine.

The market offers alternative, multi-piece repair solutions to substitute the DMF.

These kits typically include:

- a conventional rigid flywheel,
- a clutch pressure plate,
- a clutch driven plate and
- a release bearing.

#### Caution!

**These multi-piece repair solutions do not comply with the vehicle manufacturer's specifications!**

The clutch driven plate used on these applications is not able to provide full damping of the torsional vibration generated by the engine due to its smaller torsional angle in comparison with a DMF. As a result, noise emissions and vibration-induced damage to the power train can occur.

## 4 DMF Function Tests

The LuK Special Tool allows you to perform the following tests on the Dual Mass Flywheel:

- measuring the freeplay angle
- measuring the rock

These tests in combination with a visual inspection with regard to grease egress, thermal load, clutch condition, etc. allow for a reliable assessment of the DMF's operational condition.

The freeplay angle is the angle at which primary and secondary flywheels can be rotated against each other until load is exerted on the arc springs. The measuring points are both end stops in the left-hand and right-hand direction of rotation. The measured freeplay serves as wear indicator. The measuring points for the freeplay in both directions is when the secondary mass is pushed against the spring and allowed to return to rest.

Rock describes the clearance between both DMF masses which allows them to be tilted towards and away from each other.

### Caution!

Some DMF have a friction control disc that can be felt as a hard stop in one direction. In this case apply greater force to rotate the secondary mass a few more millimetres until spring resistance can be felt and then allow it to return. This also rotates the friction control disc in the DMF.



#### 4.1 Which test suits which Dual Mass Flywheel?



On Dual Mass Flywheels with an even number of threads to secure the clutch pressure plate the slotted bar can be mounted centrally making it possible to determine the freeplay angle using a degree gauge. As this measuring method can be used on almost all DMF types it should be the preferred method – see Chapter 4.2.



There are a few DMF types with an odd number of mounting threads for the clutch pressure plate making it impossible to mount the slotted bar centrally. In this case, the freeplay angle must be measured by counting the teeth of the starter ring gear – see Chapter 4.3.

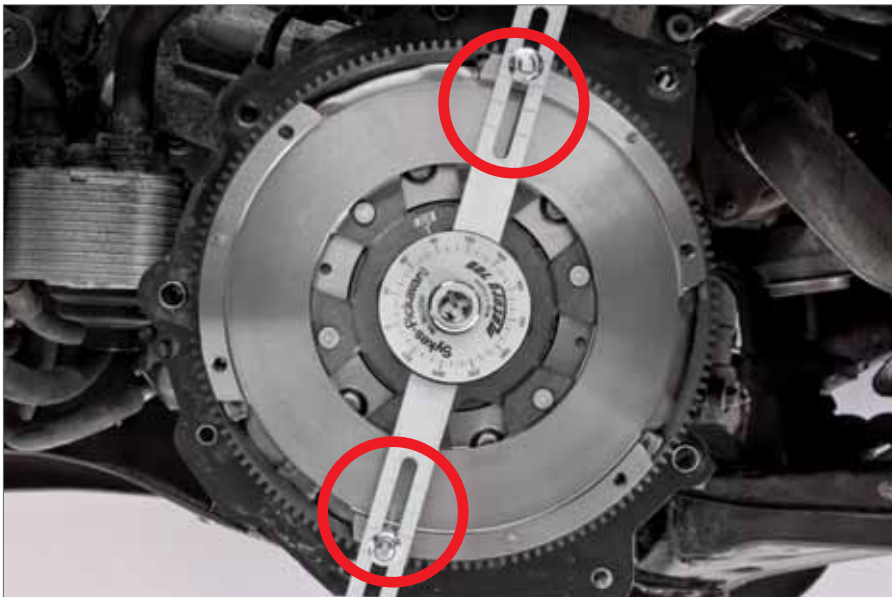
The above distinction makes no difference when measuring rock – see Chapter 4.4.

## 4.2 Freeplay Measurement with Degree Gauge

1. Remove the gearbox and clutch according to the manufacturer's instructions.



2. Screw the appropriate adapters (M6, M7 or M8) into two vertically opposing clutch bolt holes on the DMF and torque down.



3. Centralise the slotted bar on the adapters by using the graduations and tighten the nuts. The degree gauge must be positioned centrally on the DMF.





4. Lock the DMF using the locking dogs and, if necessary, appropriate spacers to align the locking tool flush with the starter ring gear.

If the distance exceeds the size of the provided spacers, use additional washers.



If the locking tool can only be mounted to hole with a dowel fitted, use the adaptor sleeve provided over the dowel



5. Bolt the dial gauge stand to the engine block using a suitable bolt i.e. a gearbox bolt and, if required, the adaptor sleeve can be used similar to the locking tool.



The same bolt can be used to fasten the locking dogs and the dial gauge stand if required.



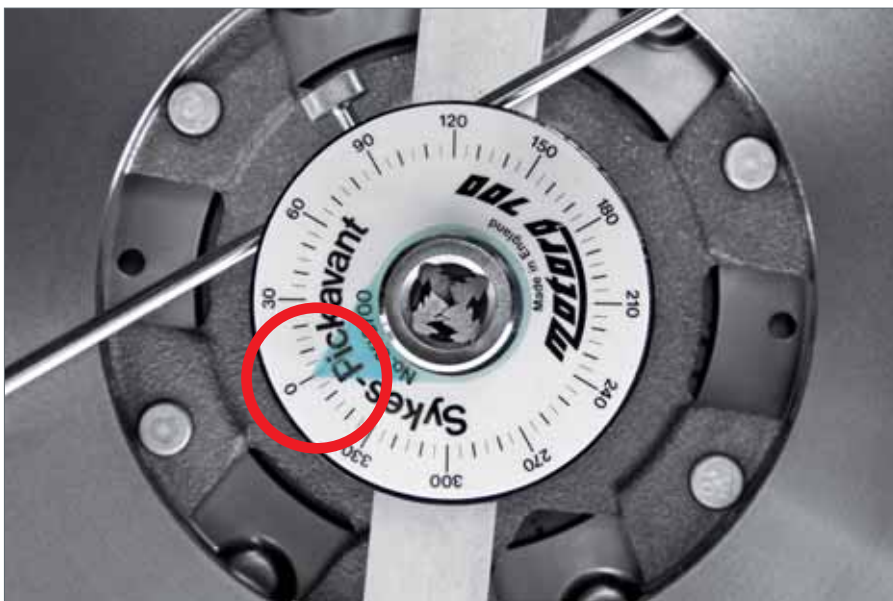
6. Fit the degree gauge locking bar to the degree gauge and the Dial gauge stand and tighten the knurled screw.



7. Use the slotted arm to rotate the secondary flywheel anticlockwise until the arc spring force can be felt.

**Caution!**

Some DMF have a friction control disc that can be felt as a hard stop in one direction. In this case apply greater force to rotate the secondary mass a few more millimetres until spring resistance can be felt and then allow it to return. This also rotates the friction control disc in the DMF.



8. Slowly release the slotted arm allowing the arc springs to relax. Set the degree gauge pointer to "0" .



9. Use the slotted arm to rotate the secondary flywheel clockwise until the arc spring force can be felt .

**Caution!**

Some DMF have a friction control disc that can be felt as a hard stop in one direction. In this case apply greater force to rotate the secondary mass a few more millimetres until spring resistance can be felt and then allow it to return. This also rotates the friction control disc in the DMF.





10. Slowly release the slotted arm allowing the arc springs to relax. Read off the degree gauge and compare the measurement against the rated value - see rated value table in Chapter 5.

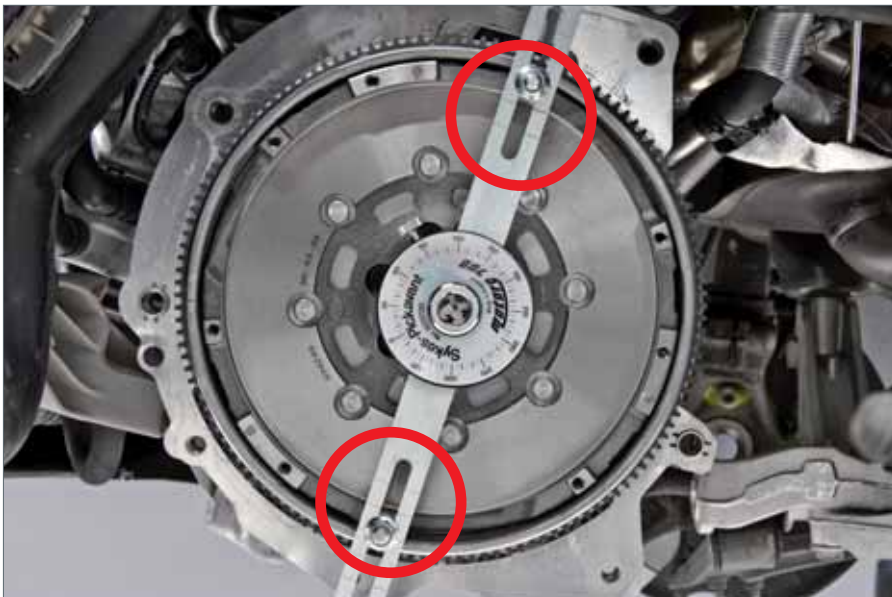


### 4.3 Freeplay Measurement by counting starter ring gear teeth

1. Remove the gearbox and clutch according to the manufacturer's instructions.



2. Screw the appropriate adapters (M6, M7 or M8) into two approximately vertically opposing clutch bolt holes on the DMF and torque down.



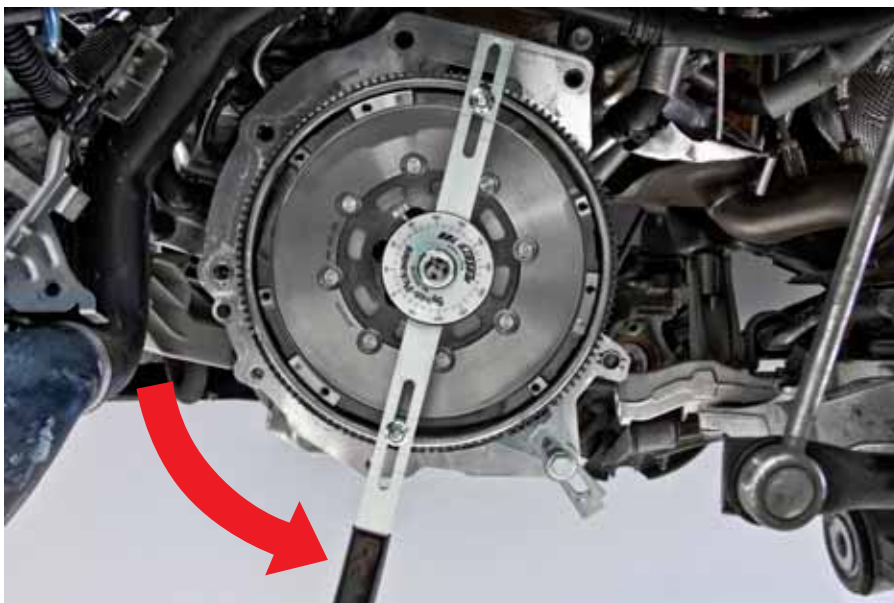
3. Centralise the slotted bar on the adapters by using the graduations and tighten the nuts. As there are an odd number of clutch bolt holes, the slotted arm cannot be fixed centrally on the DMF.



4. Lock the DMF using the locking dogs and, if necessary, appropriate spacers to align the locking tool flush with the starter ring gear.



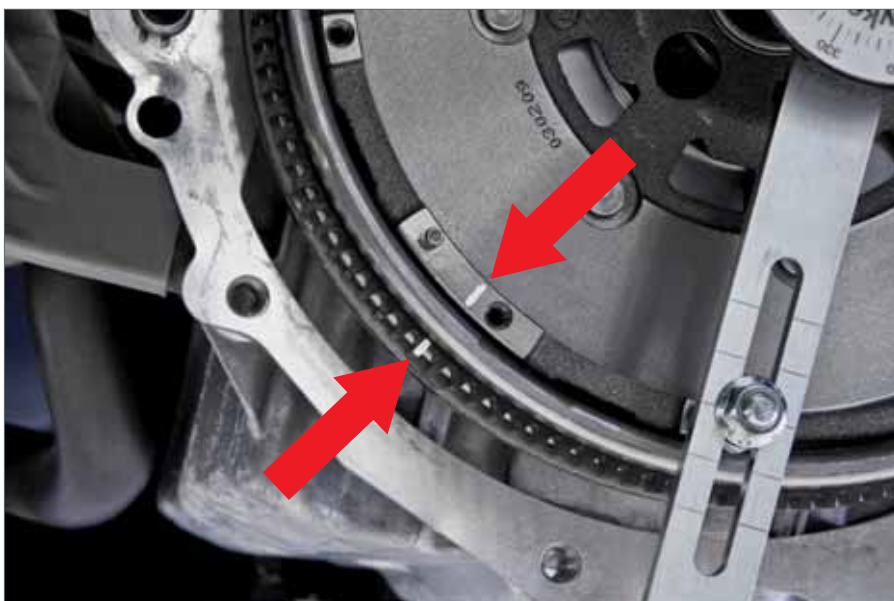
If the distance exceeds the size of the provided spacers, use additional washers. If the locking tool can only be mounted to hole with a dowel fitted, use the adaptor sleeve provided over the dowel.



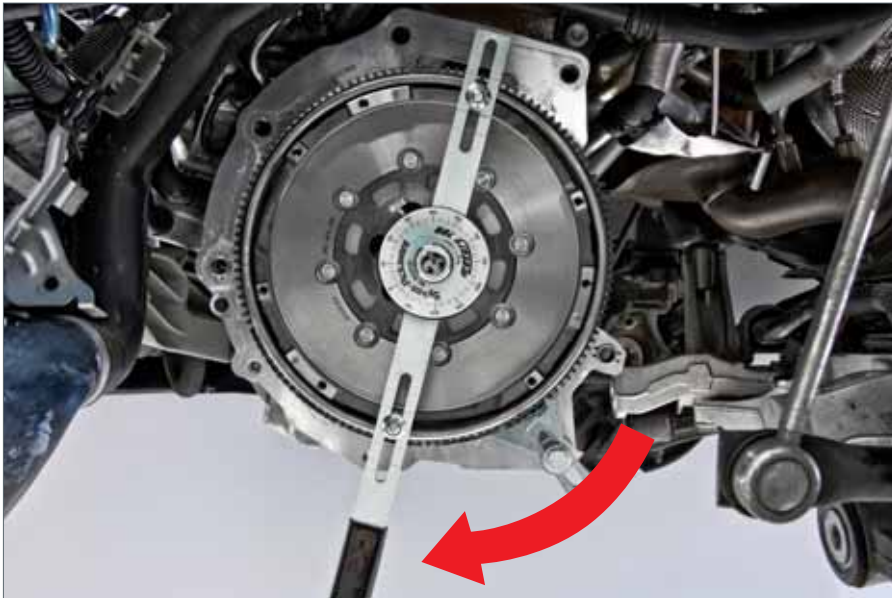
5. Use the slotted arm to rotate the secondary flywheel anticlockwise until the arc spring force can be felt.

**Caution!**

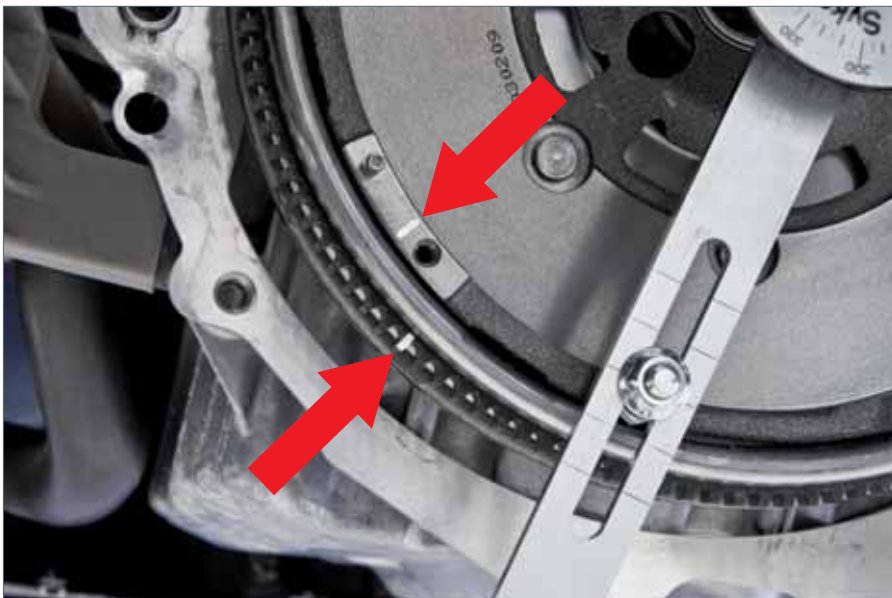
Some DMF have a friction control disc that can be felt as a hard stop in one direction. In this case apply greater force to rotate the secondary mass a few more millimetres until spring resistance can be felt and then allow it to return. This also rotates the friction control disc in the DMF.



6. Slowly release the slotted arm allowing the springs to relax. Mark the secondary flywheel and primary flywheel/starter ring gear with a line .



7. Rotate the secondary flywheel clockwise until the arc spring force can be felt. Slowly release the slotted arm allowing the arc springs to relax.



8. Count the number of teeth of the starter ring gear between the original mark and its current position and compare against the rated value – see rated value table in Chapter 5.



#### 4.4 Rock Measurement



1. Fit the Dial Gauge and arm to the dial gauge stand.



2. Centralise the dial gauge on the adapter and set to the required preload.

**Caution:**

The measurement **should** be done gently. Applying too much force will result in inaccurate measurements and could damage the DMF.





3. Gently push the slotted arm toward the engine (using for example your thumb) until resistance can be felt. Keep the slotted arm in this position while setting the dial gauge to "0".



4. Pull the lever gently in the opposite direction (using for example your finger) until resistance can be felt. Read off the dial gauge and compare the measurement against the relevant rated value – see rated value table in Chapter 5.

## **5 Rated Values**

The rated values for freeplay angle and rock vary depending on the type of DMF. Detailed information is available on this CD, the DMF Data Wheel or on the Internet at:

[www.RepXpert.com](http://www.RepXpert.com) or

[www.Schaeffler-Aftermarket.com](http://www.Schaeffler-Aftermarket.com)

(navigate to Service, Special Tools, DMF Special Tool).

Rated value tables on the Internet are updated on a regular basis with new DMF / DFC introduced.

## Notes

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## Notes

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