Gripper Differentials — Differential Unit Assembly Guide

Revision: 1.0
Date: October 2025

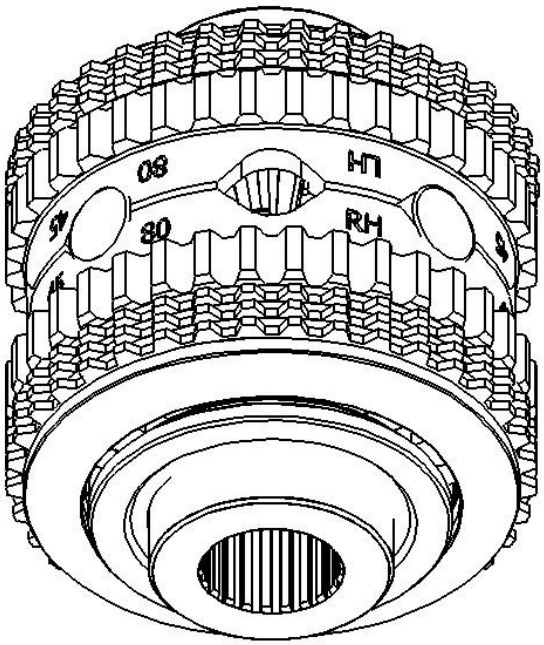
1. INTRODUCTION

1.1 Purpose

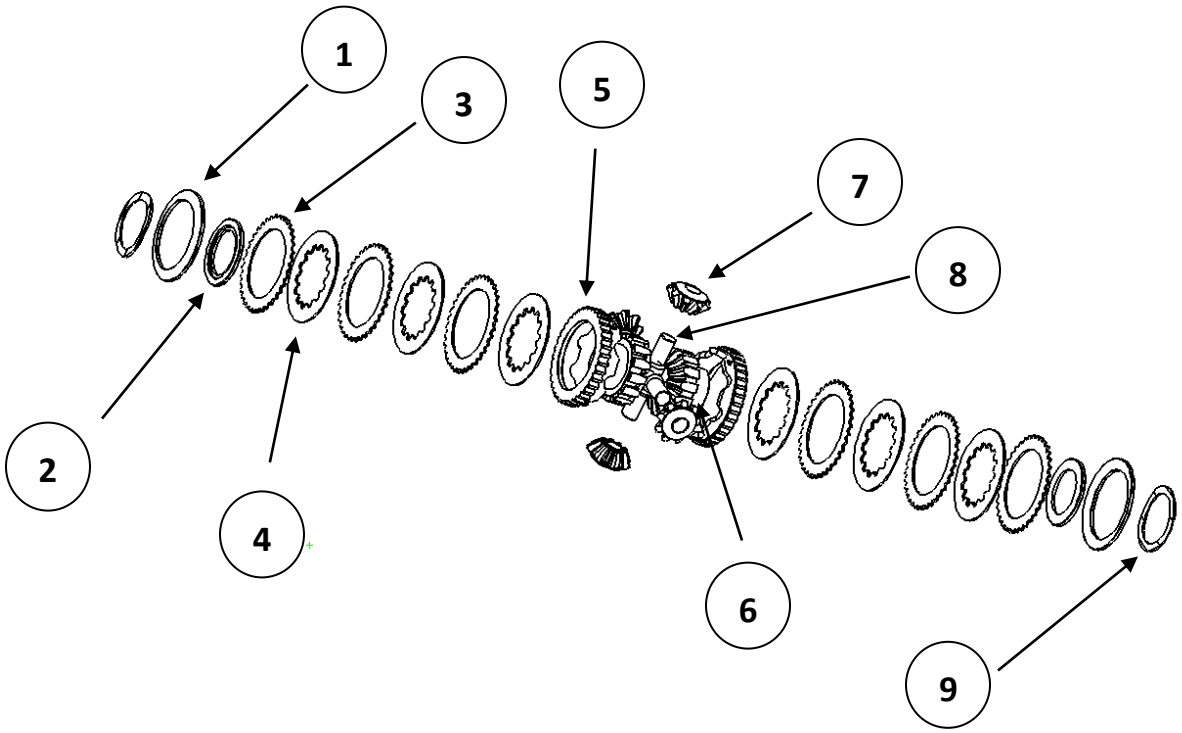
This manual provides step by step instructions for the assembly of the Gripper differential. It is intended for trained technicians and engineer's familiar with mechanical assembly.

1.2 Safety Information

CAUTION: Incorrect assembly may lead to component failure and severe drivetrain damage which is not covered under the Gripper Lifetime Warranty.
Gripper Differentials should be serviced every two years to maintain the warranty cover.



2. COMPONENT IDENTIFICATION



Internal Parts:

1. Belleville Spring (x2)
2. Thrust Washer (x2)
3. External Clutch Plate
4. Internal Clutch Plate
5. Driver / Ramps (x2)
6. Sun Wheel (x2)
7. Planet Gear (x4)
8. Cross Pin (x2)
9. Wavey Washer (x2)

3. ASSEMBLY PROCEDURE

3.1 BASIC SETUP PROCEDURE

Follow the steps below to ensure correct assembly and preload configuration of the clutch pack:

1. **Internal Clutch Plate Installation**
   Position the first internal clutch plate so that it sits firmly against the face of the driver component.
2. **External Clutch Plate Installation**
   Install the last external clutch plate against the outer side of the clutch pack, ensuring it seats properly against the Belleville on the body and lid side. This should always be an external plate against these components.
3. **Belleville Washer Orientation**
   Verify that all Belleville washers are installed in the correct orientation as per the assembly drawing.
4. **Thrust Washer Orientation**
   Confirm that the thrust washers are oriented correctly, ensuring they seat into the corresponding recesses within the body or lid, flush side against the sunwheel.
5. **Cross Pin Alignment**
   Ensure that the cross pins are positioned at the correct ramp angles on both the left-hand (LH) and right-hand (RH) sides of the assembly.
6. **Driver Positioning**
   Position both drivers so that the LH and RH drivers are matched in orientation and aligned with the correct pin location corresponding to the specified ramp angle. On most builds the LH sits towards to the crownwheel.
7. **Plate Stack Symmetry**
   Measure the total thickness of the plate stacks on each side of the centre pack. Both sides should be approximately equal in thickness.
   Note: A vernier caliper is sufficient for this measurement. Please note this is not the case for all our units, some have and unequal stack (4 x 6 plates) Please get in touch to clarify.
8. **Preload Adjustment Guideline**
   Use the following rule of thumb for preload adjustments:
   - A change of 0.1 mm in stack height corresponds to approximately 10 Nm of preload.
     Adjust accordingly to increase or decrease preload as required.

4. ASSEMBLY

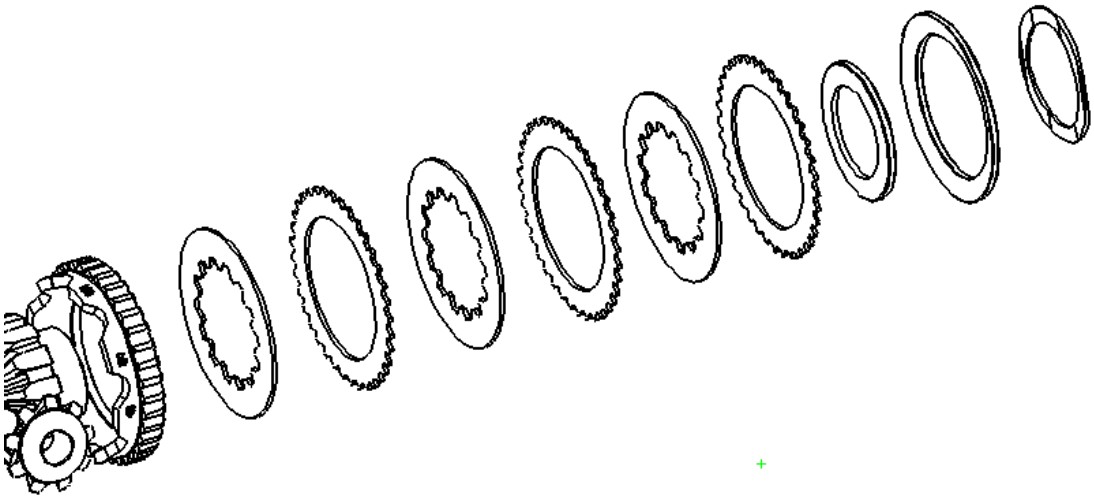
4.1 INITIAL ASSEMBLY

When assembling the internal components from scratch, follow the procedure below to ensure correct fitment and alignment:

1. **Initial Build (Without Wavey Washers)**
   Assemble the internal components without the wavey washers installed. This allows accurate assessment of the end float in the thrust washer.
2. **End Float Verification**
   Measure the end float by checking the axial movement of the sunwheel.
   - Acceptable end float is between 0.10 mm and 0.15 mm per side.
   - The sunwheel should be able to move freely within this range.

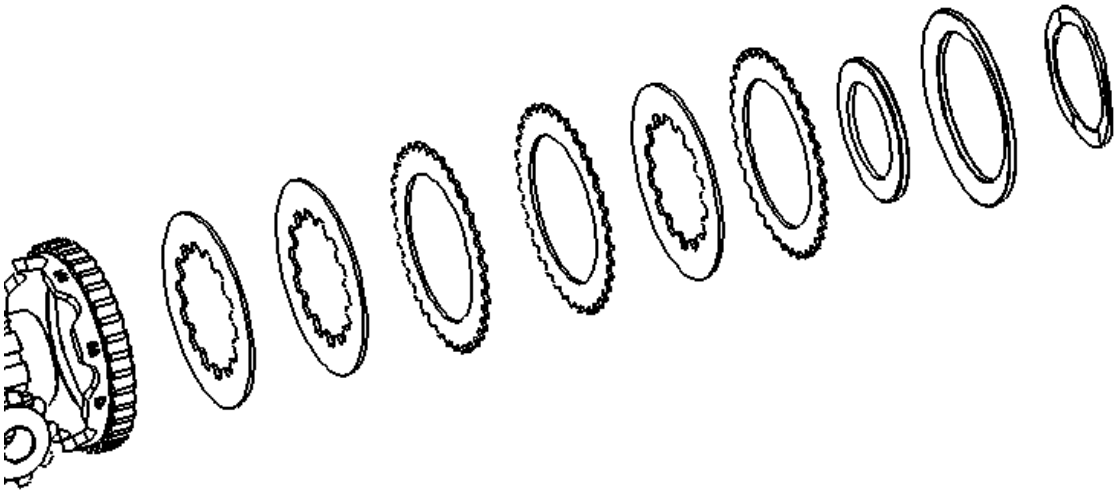
3. **Thrusts**
   Unless excessive wear these will be correctly sized for your differential and should be installed in the same recess when dismantling. These may not be the same both sides so it's crucial to re-assemble these in the correct end of the unit. If a replacement is needed, measure the thickness and the bore diameter and we can supply this part.

4.2 RACE SETUP – PLATE FORMATION



1. INTERNAL CLUTCH PLATE - EXTERNAL CLUTCH PLATE – INTERNAL CLUTCH PLATE - EXTERNAL CLUTCH PLATE – INTERNAL CLUTCH PLATE - EXTERNAL CLUTCH PLATE (6 FRICTION SURFACES – VIEWED LEFT TO RIGHT)

4.3 ROAD SETUP – PLATE FORMATION



1. INTERNAL CLUTCH PLATE - INTERNAL CLUTCH PLATE - EXTERNAL CLUTCH PLATE – EXTERNAL CLUTCH PLATE - INTERNAL CLUTCH PLATE - EXTERNAL CLUTCH PLATE (4 FRICTION SURFACES - VIEWED LEFT TO RIGHT)

5. CHECKS

5.1 ITEMS TO INSPECT PRIOR TO AND DURING INSTALLATION

- **Driveshaft and Flange Length**
  Verify that the driveshafts and flanges are of the correct length and not contacting the internals of the differential. Excessive length may cause contact with the cross pins, resulting in planet gears seizing on the cross pins which subsequently damages the internal components.
  Such damage is classified as installation error and is not covered under warranty. Always confirm correct component fitment prior to final assembly.
- **Differential Housing Shimming**
  Ensure that the differential housing is correctly shimmed when installed into the differential casing. Incorrect shimming can lead to misalignment, premature wear, and potential failure of the assembly.
- **Lubrication**
  Confirm that the unit is filled with the correct grade and quantity of oil prior to operation.
  Refer to the Technical Section of the company website for detailed recommendations on approved lubricants/ Oils.

6. MAINTENANCE OIL RECOMMENDATIONS

6.1 RECOMMENDED OIL CHANGE INTERVALS FOR A CLUTCH-PLATED LSD

USAGE TYPES	REGULAR OIL CHANGE INTERVAL	NOTES
STREET/NORMAL ROAD USE	Every 12,000–15,000 miles (20,000–25,000 km) or annually	Check oil condition periodically for contamination and level.
TRACK / MOTORSPORT USE	After every 3–5 track days or 10–15 hours of running	High temperatures and clutch plate friction rapidly degrade the oil.
OFF-ROAD / COMPETITION	As required based on inspection	Dirt and high loads accelerate oil breakdown.