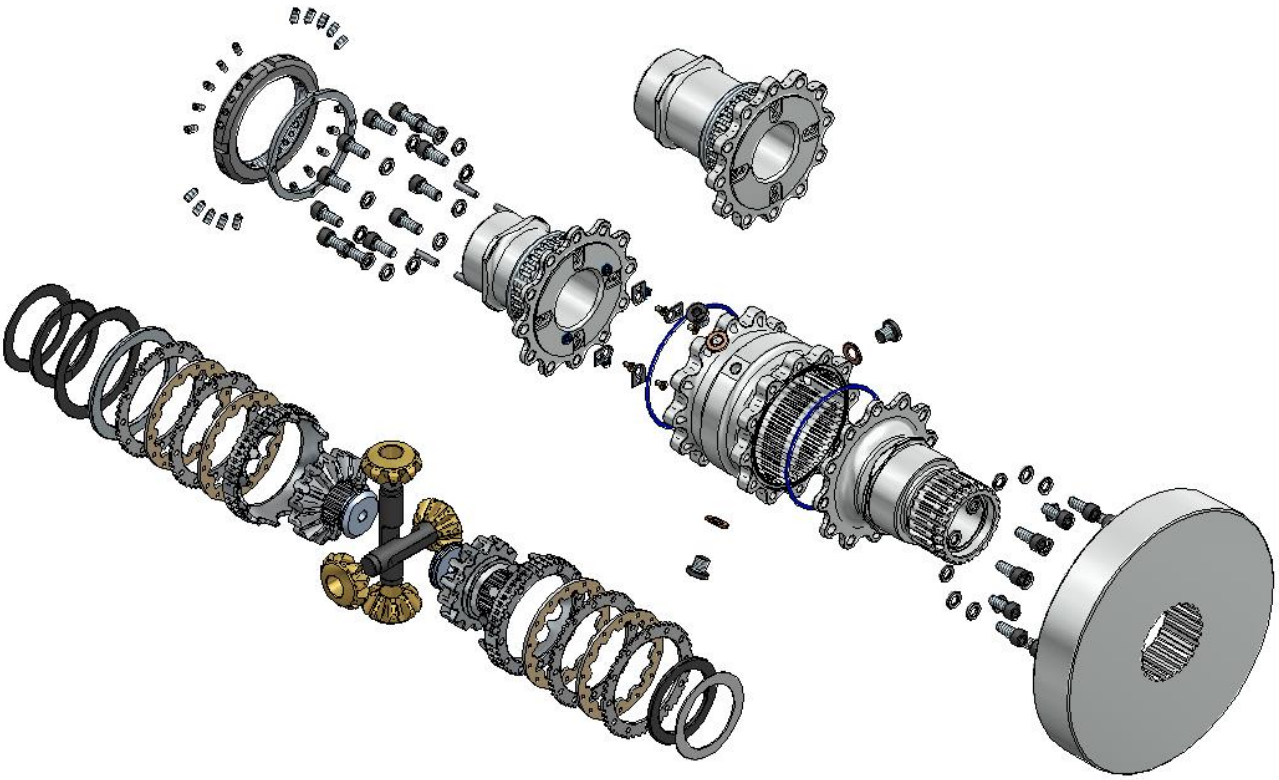
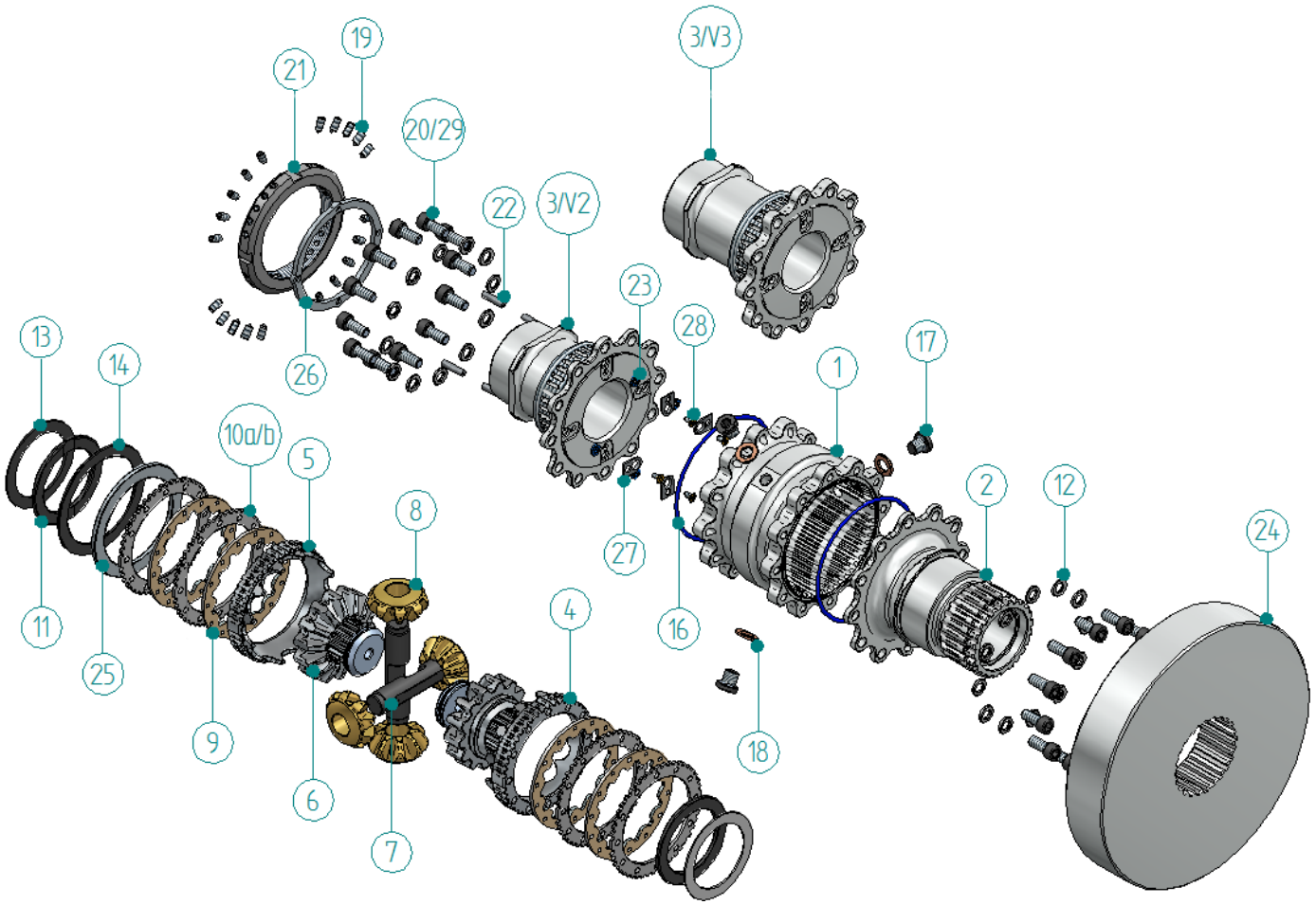
Assembly- and disassembly instruction Formula Student Adjustable Limited Slip Differential 2017




19
21
20/29
22
3/V2
3/V3
23
28
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1
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10a/b
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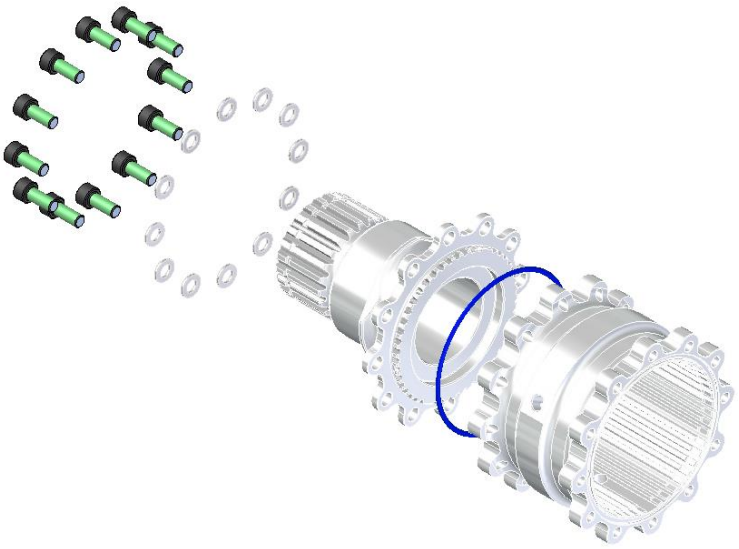
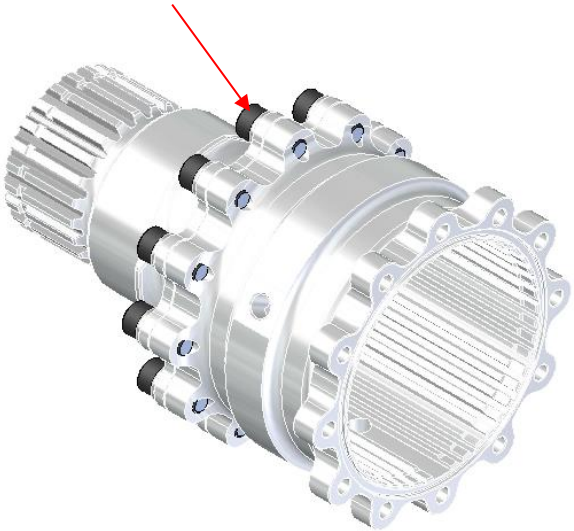
Pos.	Partnumber	Rev.	Title	Additional Details	Material	Amoun	Weight
	DSD-100-100-00712	0	M-Diff Formula Student V2 RAG 4x2 60°/45° (50°/40°) (45°/30°) standard	...			4,297 kg
	400-999-0002	0	Hook Spanner	in Stock		1	
	889-005-0406	0	Mounting Stump	Production	D-42V	1	
	889-005-0407	0	Mounting Stump V2	Production	D-42V	1	
1	DSD-240-600-0006	0	Limited Slip Differential Body Formula Student RAG 4x2 standard	Production	D-AF 53	1	0,269 kg
2	DSD-240-700-0005	0	Limited Slip Differential Bodycover Formula Student RAG 4x2 standard	Production	D-AF 53	1	0,296 kg
3	DSD-240-700-0148	0	Limited Slip Differential Cover Formula Student V2 RAG 4x2 standard	Production	D-AF 53	1	0,297 kg
4	DSD-240-040-0041	0	Pressure Ring 01 35,7 60°/45° (50°/40°) (45°/30°) Cover Side	Production	D-18	1	0,107 kg
5	DSD-240-040-0040	0	Pressure Ring 01 60°/45° (50°/40°) (45°/30°) Body Side	Production	D-18	1	0,107 kg
6	DSD-240-100-0141	0	Side Gear 01 Symmetric	in Stock	D-18	2	0,187 kg
7	DSD-240-020-0005	2	Differential-Axle 01 with Flattening	Production	D-18	2	0,069 kg
8	DSD-240-070-0411	0	Bevel Gear 01	Production	D-18	4	0,054 kg
9	DSD-240-350-0109	0	Inner Friction Disc 01 perforated Molybdenum	Production	D-CK	4	0,023 kg
10a	DSD-240-300-0109	0	Outer Friction Disc 01 2,00 perforated	Production	D-CK	4	0,023 kg
10b	DSD-240-300-0110	0	Outer Friction Disc 01 (alternatively to Spacer Washer)	Production	D-CK	1	0,017 kg
11	DSD-240-010-0101	0	Thrust Washer 01	in Stock	D-18	2	0,024 kg
12	DSD-100-900-0011	0	Disc 11,00 6,40 1,50	Production	Steel	24	0,001 kg
13	DSD-240-080-0102	0	Plate Spring 01/08	in Stock	D-51V	2	0,008 kg
14	DSD-240-400-0134	0	Spacer Washer 01	Production	D-CK	1	0,017 kg
15	DSD-240-060-0134	0	Press Fit Cover 01B	Production	D-42V	2	0,032 kg
16	DSD-100-900-0024	0	O-Ring DIN ISO 3601-1 75,00x2,40x1,60	in Stock	FKM	2	0,001 kg
17	DSD-240-900-0010	0	Cylinder Bolt DIN 908 M8x1x8 3.6 black	in Stock	3.6	3	0,005 kg
18	DSD-100-900-0012	0	Copper Sealing Ring 14 8 1,5	in Stock	Copper	3	0,001 kg
19	889-005-05110	0	Ball Pressure Piece M4	in Stock	Steel	20	0,001 kg
20	DSD-100-900-0007	0	Cylinder Bolt DIN 912 M6x14 12.9 black	in Stock	12.9	24	0,006 kg
21	DSD-240-500-0110	0	Slotted Nut M60x0,75	Production	D-42V	1	0,158 kg
22	DSD-240-950-0009	2	Thrust Pin Formula Student	Production	Steel	4	0,002 kg
23	400-040-0096	0	Quad Ring 3,68	in Stock	Silicone	4	0,000 kg
24	DSD-240-500-0002	0	Chain Wheel Adapter Semi Finish Part Formula Student	Customers	D-AF 53	1	1,746 kg
25	DSD-240-400-0116	1	Disc 71,80 56,00 3,00	Production	D-18	1	0,036 kg
26	DSD-240-500-0111	0	Disc 60,40x70x3 bright	Production	D-CK	1	0,023 kg
27	DSD-240-500-0112	0	Plate Formula Student	Production	D-CK	4	0,001 kg
28	900-250-00258	0	Countersunk Screw DIN 7991 M2,5x8 10.9 bright	in Stock	10.9	4	0,000 kg

Pos.	Partnumber	Rev.	Title	Additional	Material	Amount	Weight
	DSD-100-100-00713	0	M-Diff Formula Student V3 RAG 4x2 60°/45° (50°/40°) (45°/30°)	...			4,406 kg
	400-999-0002	0	Hook Spanner	in Stock		1	
	889-005-0406	0	Mounting Stump	Production	D-42V	1	
	889-005-0408	0	Mounting Stump V3	Production	D-42V	1	
1	DSD-240-600-0006	0	Limited Slip Differential Body Formula Student RAG 4x2 standard	Production	D-AF 53	1	0,269 kg
2	DSD-240-700-0005	0	Limited Slip Differential Bodycover Formula Student RAG 4x2	Production	D-AF 53	1	0,296 kg
3	DSD-240-700-0147	0	Limited Slip Differential Cover Formula Student V3 RAG 4x2 standard	Production	D-AF 53	1	0,389 kg
4	DSD-240-040-0041	0	Druckring 01 35,7 60°/45° (50°/40°) (45°/30°) Deckelseite	Production	D-18	1	0,107 kg
5	DSD-240-040-0040	0	Druckring 01 60°/45° (50°/40°) (45°/30°) Gehäuseseite	Production	D-18	1	0,107 kg
6	DSD-240-100-0141	0	Side Gear 01 Symmetric	in Stock	D-18	2	0,187 kg
7	DSD-240-020-0005	2	Differential-Axle 01 with Flattening	Production	D-18	2	0,069 kg
8	DSD-240-070-0411	0	Bevel Gear 01	Production	D-18	4	0,054 kg
9	DSD-240-350-0109	0	Inner Friction Disc 01 perforated Molybdenum	Production	D-CK	4	0,023 kg
10a	DSD-240-300-0109	0	Outer Friction Disc 01 2,00 perforated	Production	D-CK	4	0,023 kg
10b	DSD-240-300-0110	0	Outer Friction Disc 01 (alternatively to Spacer Washer)	Production	D-CK	1	0,017 kg
11	DSD-240-010-0101	0	Thrust Washer 01	in Stock	D-18	2	0,024 kg
12	DSD-100-900-0011	0	Disc 11,00 6,40 1,50	Production	Steel	24	0,001 kg
13	DSD-240-080-0102	0	Plate Spring 01/08	in Stock	D-51V	2	0,008 kg
14	DSD-240-400-0134	0	Spacer Washer 01	Production	D-CK	1	0,017 kg
15	DSD-240-060-0134	0	Press Fit Cover 01 B	Production	D-42V	2	0,032 kg
16	DSD-100-900-0024	0	O-Ring DIN ISO 3601-1 75,00x2,40x1,60	in Stock	FKM	2	0,001 kg
17	DSD-240-900-0010	0	Cylinder Bolt DIN 908 M8x1x8 3.6 black	in Stock	3.6	3	0,005 kg
18	DSD-100-900-0012	0	Copper Sealing Ring 14 8 1,5	in Stock	Copper	3	0,001 kg
19	889-005-05110	0	Ball Pressure Piece M4	in Stock	Steel	20	0,001 kg
20	DSD-100-900-0007	0	Cylinder Bolt DIN 912 M6x14 12.9 black	in Stock	12.9	12	0,006 kg
21	DSD-240-500-0110	0	Slotted Nut M60x0,75	Production	D-42V	1	0,158 kg
22	DSD-240-950-0009	2	Thrust Pin Formula Student	Production	Steel	4	0,002 kg
23	400-040-0096	0	Quad Ring 3,68	in Stock	Silicone	4	0,000 kg
24	DSD-240-500-0002	0	Chain Wheel Adapter Semi Finish Part Formula Student	Customers	D-AF 53	1	1,746 kg
25	DSD-240-400-0116	1	Disc 71,80 56,00 3,00	Production	D-18	1	0,036 kg
26	DSD-240-500-0111	0	Disc 60,40x70x3 bright	Production	D-CK	1	0,023 kg
27	DSD-240-500-0112	0	Plate Formula Student	Production	D-CK	4	0,001 kg
28	900-250-00258	0	Countersunk Screw DIN 7991 M2,5x8 10.9 bright	in Stock	10.9	4	0,000 kg
29	900-100-00620	0	Cylinder Bolt DIN 912 M6x20 12.9 black	in Stock	12.9	12	0,007 kg

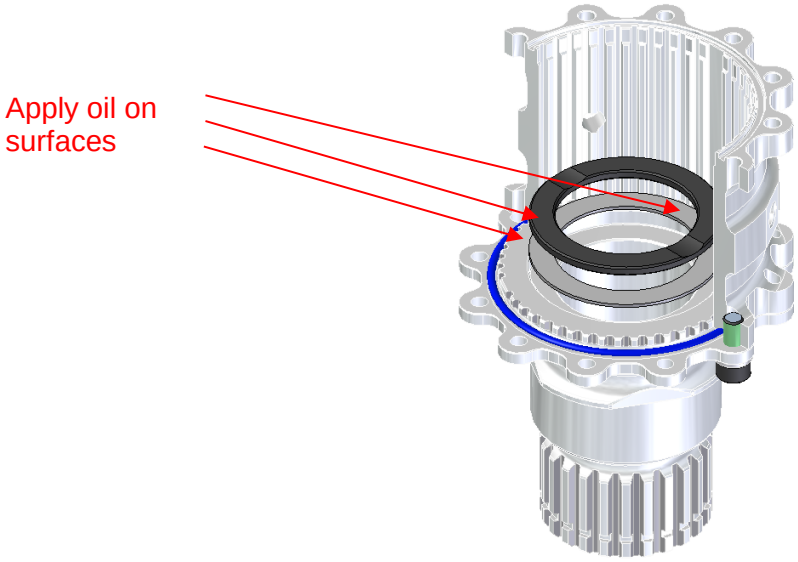
During the assembly of a Drexler Automotive adjustable limited slip differential Formula Student 2017 all function-relevant measurements will be measured and put down on a setup sheet.
Therefore it is necessary, that the layers of the multi-disc clutches, remain in the same order as during the first assembly and become interchanged!
After measuring the constructed size, as well as the single parts, the differential is assembled as it can be seen at the drawing below. Further every differential is equipped with a running number for better traceability. First of all the differential body (Pos. 1), the O-ring (Pos. 16) and the differential cover are assembled with 12 pieces of cylinder bolts M6x14 (pos. 20) and the fitting flat washers (Pos. 12). Lubricants can be used to position the O-Ring. The torque in the property class 12.9 is about 15 Nm. An adhesion is not intended to keep assembly and disassembly simple.



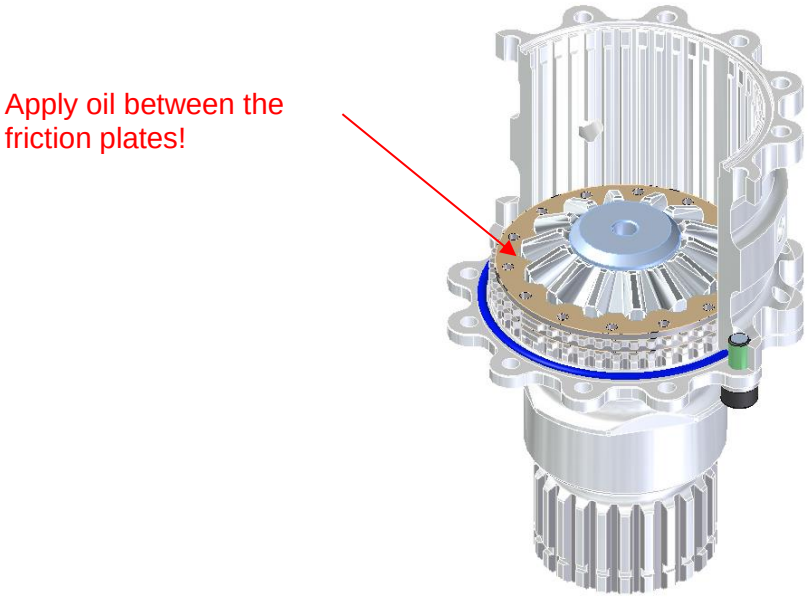
Tightening torque of the 12 x M6x14 screws: about **15 Nm**!



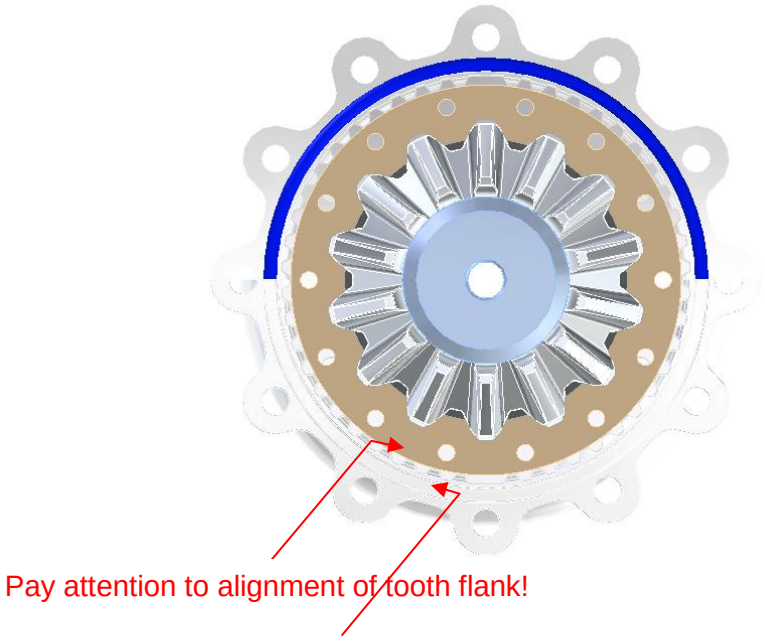
Put the discspring for thrust washer (Pos. 13) and the thrust washer (Pos. 11) in the intended bore.
Caution: Apply oil on every surface.



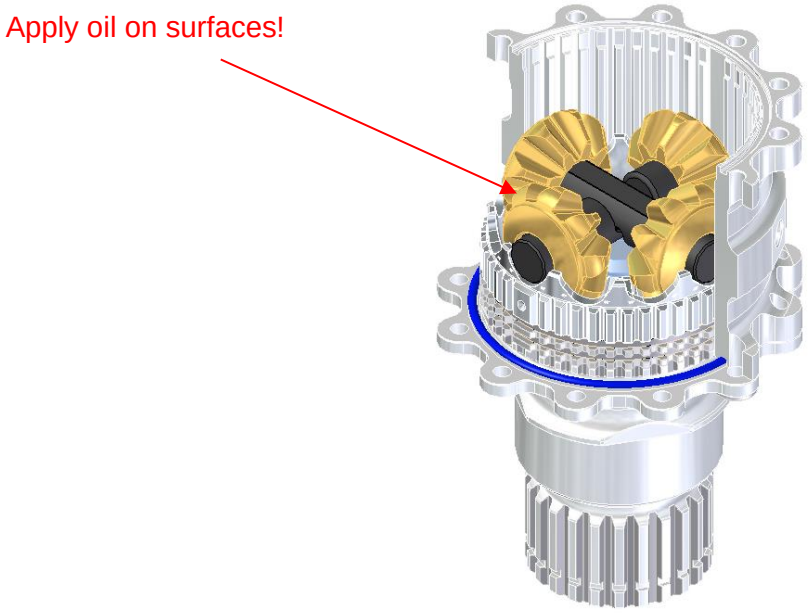
Put the package consisting of two friction plates outer splined (Pos. 10a) and friction plates inner splined Pos. 9) in the differential body and orient to the positioning in the body.
Caution: Apply oil between the friction plates.



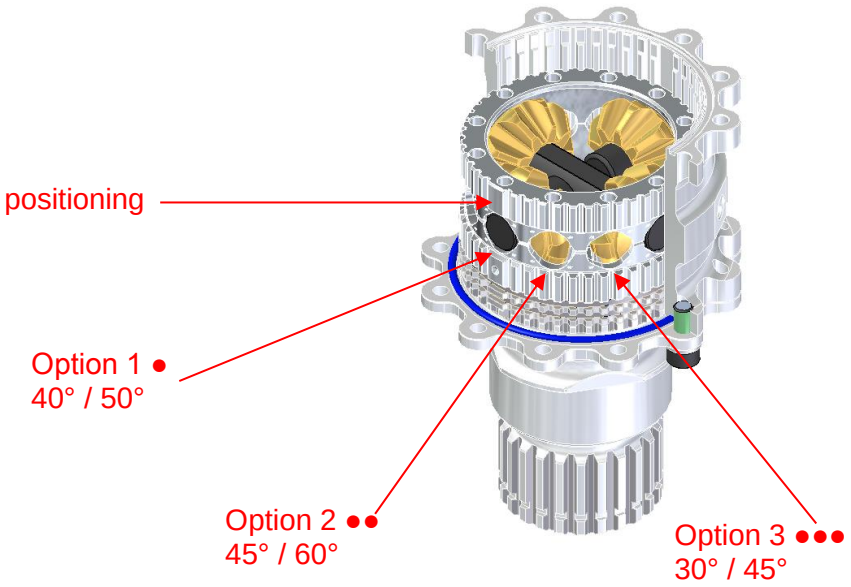
Caution: Fit side bevel gear (Pos. 6) with impressed plug (Pos. 15) in the gearing of the inner splined friction disc and orientate it.



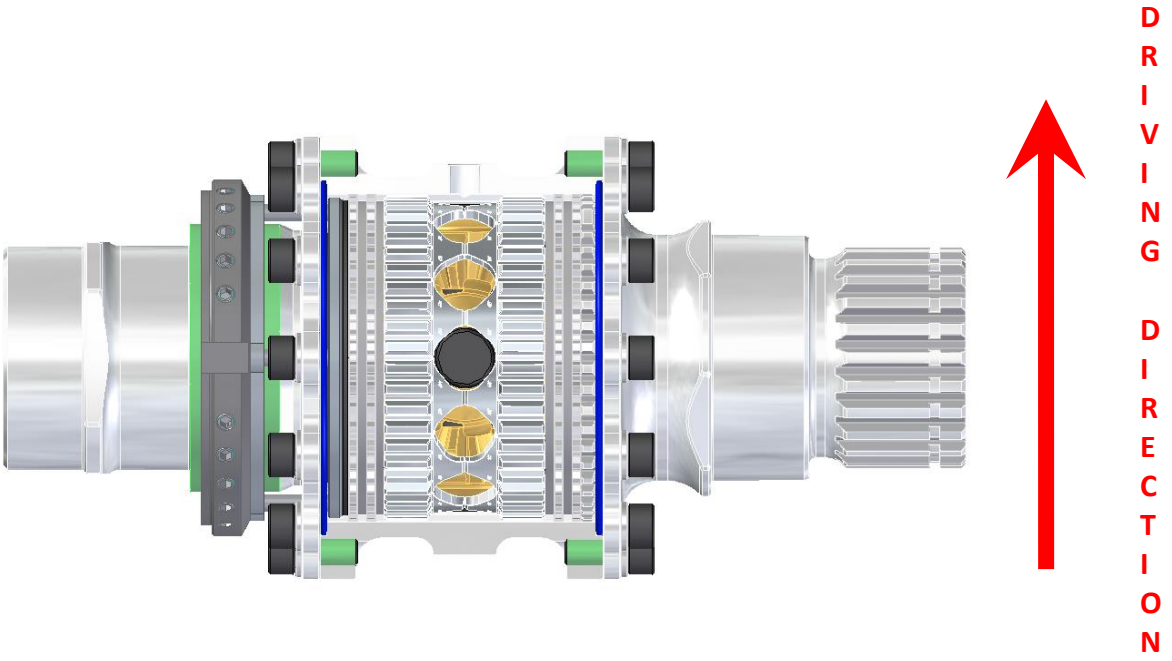
Assemble grinded ramps (Pos. 4) and axle (Pos. 7) with bevel gear (Pos. 8).
Caution: Care for enough lubrication between Pos. 7 and 8.



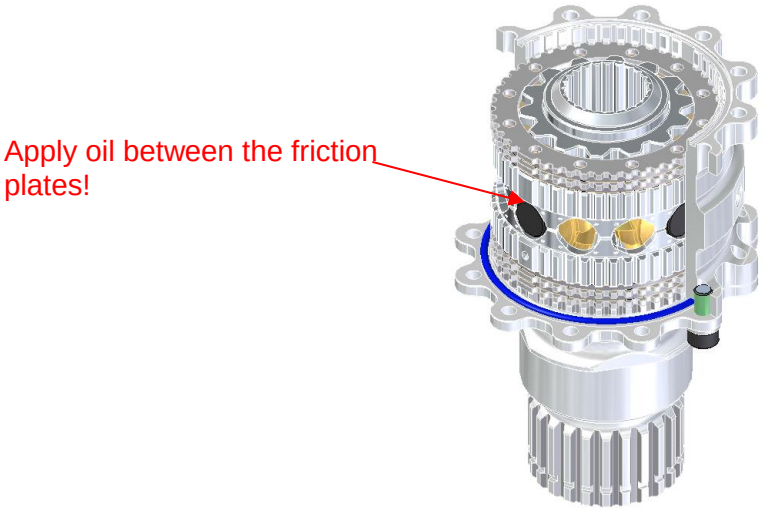
Ramps have 3 different ramp options. The ramp angles are:

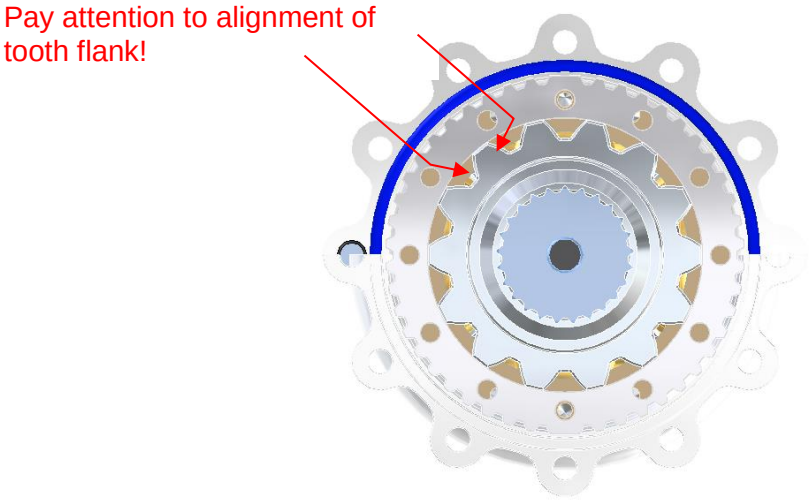


For the first assembly, all differentials are assembled in the basic position 40° / 50° and drivetrain on the right side of the vehicle. This means, that the axles (item no. 6) are in option 1 ● (● marking at ramp). In this installation position the angle with 40° determines the acceleration side. The angle with 50° is the deceleration side.



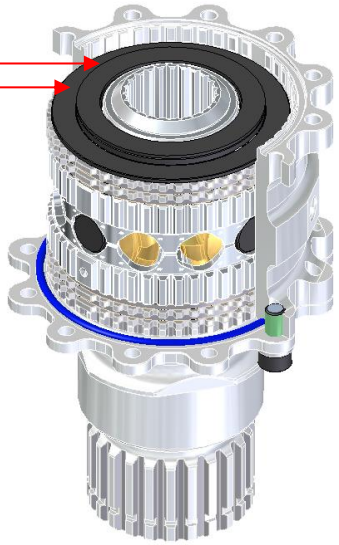
To change the lock-up torque (see page 14) the position of the axles must be rotated and so the differential has to be opened. There are three different adjustments possible. Further there can be gained three more different adjustments by overturning the package of ramps. This leads to a swap of the acceleration and deceleration values.





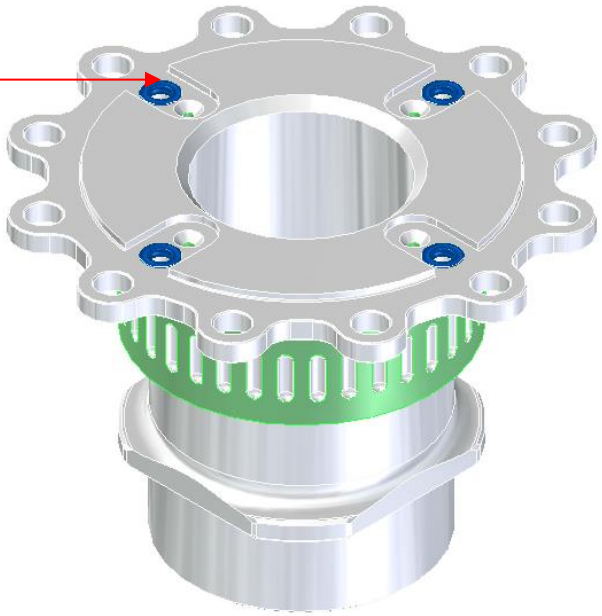
Place a second layer of friction plates (Pos. 9) on the ramp and fit with the gearing of the inner splined friction disc.
Caution: Apply on every friction disc, ramp and friction disc.
Put the discspring preload on the package and on the second side bevel gear the thrust washer and discspring for thrust washer.

Apply oil on surfaces and between components!

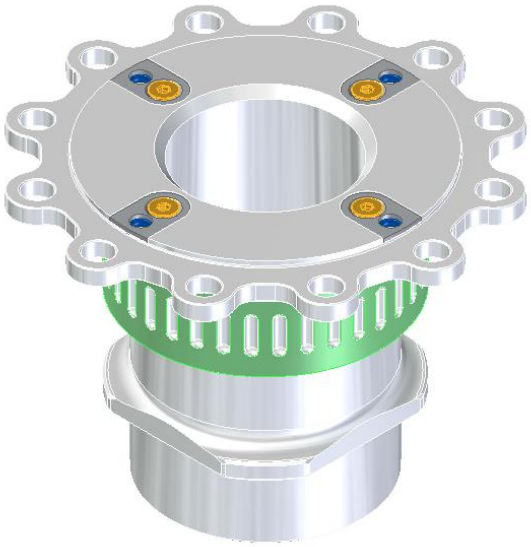


Insert the quad rings (Pos. 23) into the lower four step bores and lubricate the inside.

Apply oil!



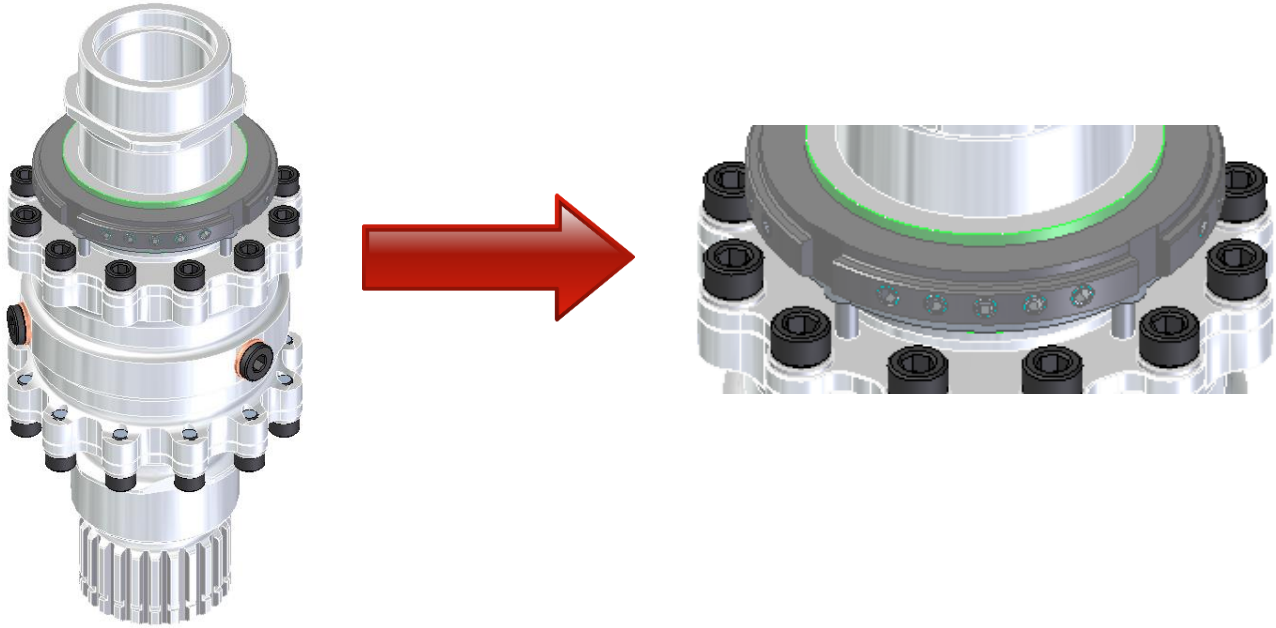
Put the sheet (Pos. 27) in the grooves of the cover (Pos. 3) and screw it with countersunk screws (Pos. 28).



O-ring (Pos. 16) into the groove of the body (Pos. 1). Place the cover (Pos. 3) on the body and secure with cylinder screws (Pos. 20). Insert the pressure pins (Pos. 22) into the four holes until they are in contact with the disc (Pos. 26).

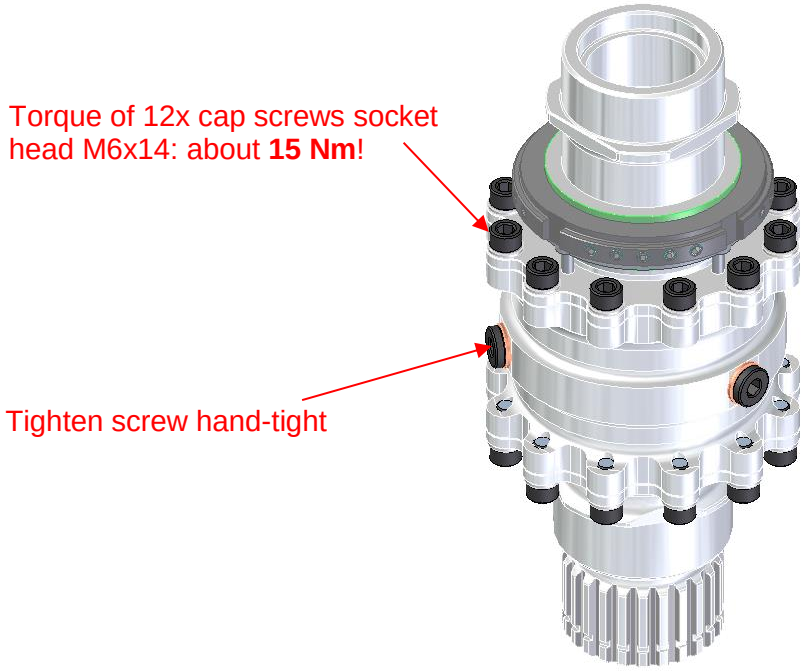
Refit the disc (Pos. 26) and align with the recesses on the pressure pins (Pos. 22).

Screw the slotted nut (Pos. 21) onto the cover (Pos. 3) and align the holes with the grid. Tighten all ball pressure pieces (Pos. 19) and secure with Loctite.
Caution: Do not screw in the ball thrust pieces (Pos. 19) completely! Insert four ball thrust pieces (Pos. 19) into the grooves!



The required basic locking torque is achieved by tightening or loosening the slotted nut (Pos. 21) on the cover (Pos. 3).
Adjustment range: 0 to max 75 Nm

Altogether there will be used 6 grams of oil per limited slip differential for first assembly or revision. Put the differential cover (item no. 2) on the differential body and fix it with flat washers (Pos. 12), O-ring (Pos. 16) and 12 pieces of cap screws socket head M6x14 (Pos. 20). Here a torque of 15 Nm is used. At the first assembly a preload of 30 – 35 Nm can be reached. This value will go down to 25 – 30 Nm when the differential is used (due to removal of unevenness of the friction discs´ coating).



For the inspection, it is sufficient to remove the respective cover (Pos. 2). The body cover should ideally not be disassembled.
On the side of the differential body there are three copper washers (Pos. 18) and three cap screws socket head (Pos. 17). These can be used to fill in the oil (**Castrol Syntrax oil**), without undertaking a revision. Further the screws work during the filling and draining as aeration of the system.
Normally (with consultation of teams) the fill quantity is 6 cl. Firstly it should be cared for, that the oil can drain out of the differential. After every longer test or race the differential should be opened and cleaned (due to removal of unevenness of the friction disc´s coating). Following tighten the screw hand-tight.

Caution:
At the insertion of the flanges the screws should be tightened with 25 Nm. At a revision or amendment of the differentials´ setup it is important to make sure that the layers remain in the same order as during the first assembly.
The chain wheel adapter should be heated up to 50° - 60°C before assembly, if the part does not fit properly on the gearing of the diff body.

Ramp angles and belonging theoretical lock-up torques in percent:

30° → about 88 %
40° → about 60 %
45° → about 51 %
50° → about 42 %
60° → about 29 %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