SCS M2 Engineering UDR, Sportplatzstr. 19, 87493 Lauben, Germany

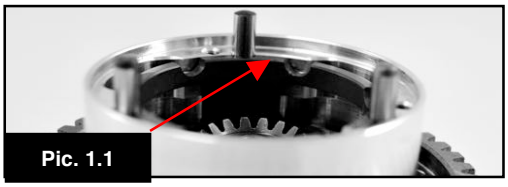
Assembly of the Powerlock Differential

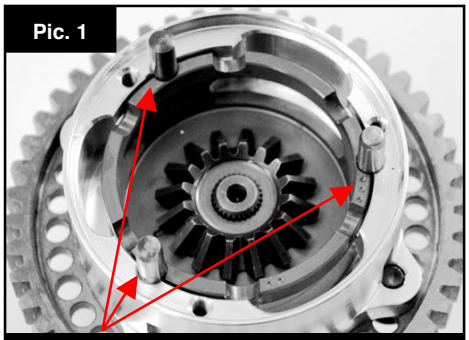
For the assembly please also take notice of the exploded drawing.
Flange sleeves, shaft seals and bearings were professionally pre-mounted into the aluminium differential housings left and right by SCS M2 Engineering. Check the external fins on burrs, if necessary remove them. Make sure you do not deform the fins.

Assembly of the Powerlock Differential housing A left side (Pic. 1)

- Fix the steel gearwheel on the left side of the aluminium housing as pictured, use screw retention lacquer / thread locker
- Insert 1 external fins into the housing (optional 1x 0,5mm & M10322 or 2x 0,5mm)
- Place 1 carbon disc 32x2,4mm on top (optional M10215, M10225, M10226 or M10227)
- Insert the ramp with L marking into the aluminium housing A.
- Push the bevel gear through the ramp and arrest in the carbon disc.
- Twist the ramp until the three boring halves are congruent with the borings of the diff housing. Now put in the fixing pins 4x18mm.
- Press the diff. bevel gear axle into the left aluminium housing.
- Check the ramp on free movement (by moving it up and down)

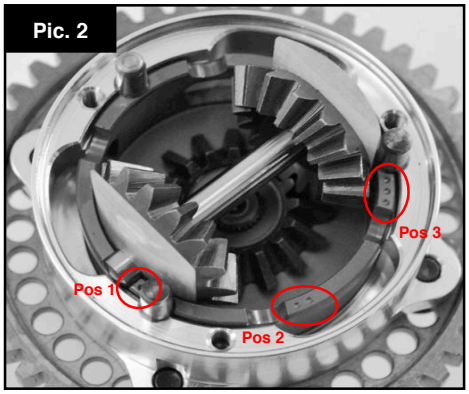
Important: The edge of the ramp must always be lower compare to the aluminum housing. See **Pic. 1.1** (> - 0,1mm). Corrective: Grinding carbon disc by 0,1mm or use different fin thicknesses


Pic. 1.1


Pic. 1
Twist the ramp until the three boring halves are congruent

Variety of locking effect (Pic. 2)

On the acceleration side you have the choice of 3 different ramp angles (barrier/locking effect). These are marked on the front with 1, 2 or 3 points (**Pic. 2**). The higher the number, the more locking effect you will have with this torque regulated diff. As a base setup we recommend to start in Pos. 1 with touring and formula cars, in Pos. 2 with trucks.
The ramps on the brake side has theoretical no locking effect.
Furthermore the oil quantity has an influence on the locking effect (22ml filling), the less oil you use the more locking you will have (minimum 7ml / maximum 25ml oil)
- Equip the diff axle with the bevel gears B and diff spacer discs epoxy and place them in the corresponding ramp according to the desired locking effect.



Pic. 2

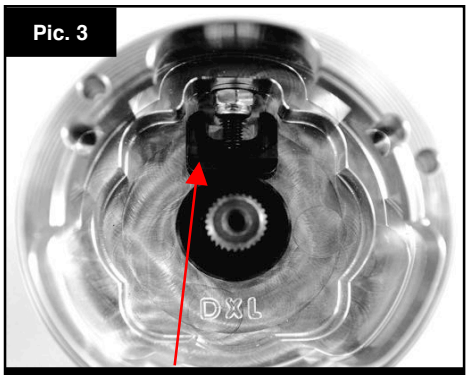
Assembly of the Powerlock Differential housing B right side (Pic. 3 & 4)

-First mount the preload slide. Insert screw, spacer and o-ring from the outside. Fit spacer, nut and preload slide inside. Secure the screw by using the nut, so that the screw can be turned easily. Make sure that the o-ring seals the differential housing correctly.
Hint: Apply a drop of oil on the o-ring before tightening to prevent a damage on the o-ring.
- The preload slide can be adjusted now. For assembly reason, the preload slide should be turned in maximum to the inside (**Pic. 3**).
- Place the preload plate on the preload slide.
- On top of the preload plate place the preload compensator, with the compensator facing down
- Place 1 external fin on top of the preload compensator (optional 1x 0,5mm & M10322).
- After that put 1 carbon disc 32x2,4mm on top of the fin (optional M10215, M10225 or M10226).
- Insert the ramp with R marking into the aluminium housing B.
- Push the bevel gear through the ramp and arrest in the carbon disc.
- Twist the ramp until the three boring halves are congruent with the borings of the diff housing.
- Press the diff. Bevel gear axle into the right aluminium housing.

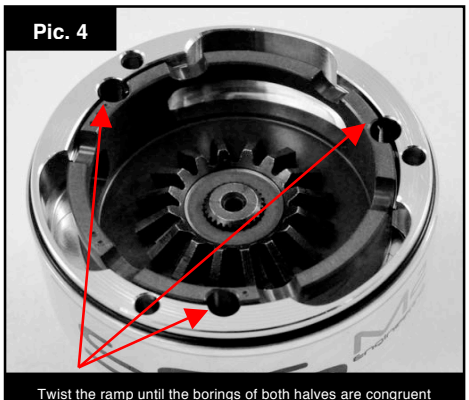
Important: The edge of the ramp must always be lower compare to the aluminum housing. See **Pic. 1.1** (> - 0,1mm). Corrective: Grinding carbon disc by 0,1mm or use different fin thicknesses.

Hint: The carbon discs are liable to wear and should be checked regularly. The thickness of the carbon discs should be between 2,2 and 2,4mm. This could be adjusted by additional external fins (optional M10322).

- Check the ramp on free movement (by moving it up and down) by using the 3 pins (4x18mm).
- Fix the o-ring on the aluminium housing B.



Pic. 3
Mount the preload slide and turn it completely to the inside


Pic. 4
Twist the ramp until the borings of both halves are congruent

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Mounting of the complete Powerlock Differential

- Check that both halves are assembled correct. Make sure the ramps and gears do not slip out of the housings.
- Put 1 pin into the other aluminium housing.
- Stick together the housing carefully. Check that the diff bevel gear axle stays in position.

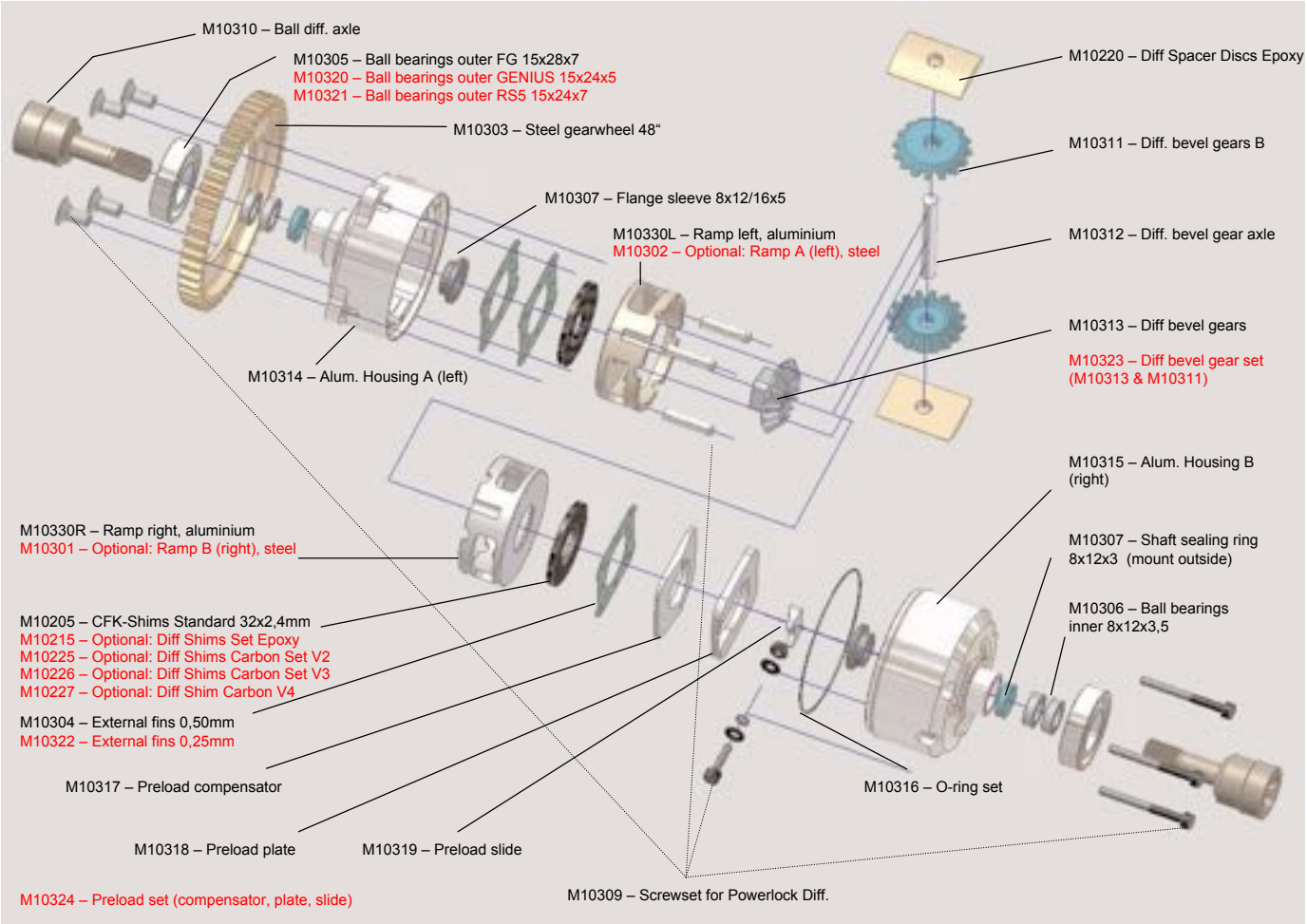
Hint: The ball diff axles can be turned slightly, so that the housing halves fits properly.
- Always verify that ramps, pins and gears are in position and don´t slide out during assembly.
- Assembly both aluminium housings with the M3x30mm screws (without thread lock).

Important: Hand-screwed the aluminium housings, check always that ball diff axle can be turned easily. Before tighten up the screws completely use a rubber mallet and hit slightly on the ball diff axles to settle the inner parts.

Hint: Close the preload slide with the preload screw slightly by turning it clockwise. This is necessary that the car can rotate easily in midcorner, as well that the car is not nervous on exit and snappy when going on power.

Attention: The preload screw has no influence on the amount of locking effect. It is just there to compensate the play in the system.

- Finally put out a drive shaft (ball diff axle) and fill in 22ml oil.



Problem with the assembly?

- It is impossible to turn the ball diff axles after assembly the aluminium housings!
  - Corrective 1: Preload screw is not fully open (turn screw anti clock wise)
  - Corrective 2: Check again Pic. 1.1, remove 1 external fin (1 must be at least in) out of the left housing (optional M10322), or
  - Corrective 3: Grinding carbon discs by 0,1mm to approx 2,3mm

Too much locking effect respectively the rear end of the car is sliding away on power?

- Firstly check if the preload screw is turned clockwise to preload the system, like described above.
- Secondly, check if you built up the differential in Pos 1 with 22ml of oil.
- Thirdly, possibilites to reduce the locking effect of the differential:
  - Diff Shims Carbon Set V2 (29mm diameter), sliced and unsliced will reduce the locking effect even more (M10225)
  - Exchange external fins 0,5mm with holes to external fins without holes 2x 0,25mm (M10322)
  - Diff Shims Carbon Set V3 (29mm diameter) (M10226) in combination with external fins (M10322)
  - Use Diff Shim V4, in combination with V2 or V3 shim (for slippery tracks)

Run-in period and service:

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- For maximum performance change differential oil after the first 30min of testing.
- Frequently oil service is recommended, latest every 2. race weekend.
- Additional check of all carbon shims and epoxy spacers is recommended (latest every 2. race weekend)

new	order number	description (english)	Bezeichnung (deutsch)	content	recommended retail price	weight (gramm)
			POWERLOCK DIFFERENTIAL			
	M10100	Powerlock Differential (FG, HARM, FSONE, BIG5)	Powerlock Differential (FG, HARM, FSONE, BIG5)	1 pc.	**309,90 €**	384,4 g
	M10101	Powerlock Differential (GENIUS)	Powerlock Differential (GENIUS)	1 pc.	**309,90 €**	363,9 g
	M10104	Powerlock Differential (RS5)	Powerlock Differential (RS5)	1 pc.	**309,90 €**	372,8 g
	M10102	Powerlock Differential (CONRAST)	Powerlock Differential (CONTRAST)	1 pc.	**319,90 €**	384,4 g
	M10103	Powerlock Differential (LAUTERBACHER)	Powerlock Differential (LAUTERBACHER)	1 pc.	**319,90 €**	438,8 g
	M10107	Powerlock Differential (MECATECH) no maingear	Powerlock Differential (MECATECH) – kein Zahnrad	1 pc.	**289,90 €**	301,3 g
new	order nr.		DIFFERENTIAL - TUNING PARTS			
	M10215	Diff-Shim Set Epoxy (32/29/26mm)	Differentialscheibenset Epoxy (32/29/26mm)	6 pcs.	**19,90 €**	12,8 g
	M10205	Diff-Shim Carbon Standard (32mm)	CFK-Scheiben Standard (32mm)	2 pcs.	**11,90 €**	3,9 g
	M10225	Diff-Shim Carbon Set V2 (29mm)	Differentialscheibenset Carbon V2 (29mm)	2x2 pcs.	**17,90 €**	6,3 g
	M10226	Diff-Shim Carbon Set V3 (32mm) for low grip tracks	Diff-Shim Carbon V3 (32mm) für rutschige Strecken	2 pcs.	**13,90 €**	3,5 g
	M10227	Diff-Shim Carbon V4 - for dusty tracks and offroad (reduce locking effect by 50%)	Differentialscheibenset Carbon V4 - für staubige Strecken & Offroad (reduziert die Sperrwirkung um 50%)	1 pc.	**13,90 €**	6,3 g
	M10330	Ramp Set Alu V2 (HART COAT)	Rampenset Alu V2 (HART COAT)	1 set	**62,00 €**	18,1 g
	M10120	Diff-Heater for Powerlock	Differentialheizdecke	1 pc.	**42,50 €**	50,7 g
new	order nr.		DIFFERENTIAL - SPARE PART LIST			
	M10110	Differential Oil 50ml	Getriebeöl 50ml	50 ml	**9,90 €**	54,0 g
	M10111	Differential Oil 100ml	Getriebeöl 100ml	100 ml	**14,90 €**	102,0 g
	M10205	Diff-Shim Carbon Standard (32mm)	CFK-Scheiben Standard (32mm)	2 pcs.	**11,90 €**	3,9 g
	M10220	Diff-Spacer Discs Epoxy	Spacer f. Kegelräder, Halbmonde (Epoxy)	1 set	**15,90 €**	3,5 g
	M10301	Ramp B (right) f. Powerlock, steel	Rampe B f. Powerlock-Diff., Stahl	1 pc.	**31,00 €**	25,0 g
	M10302	Ramp A (left) f. Powerlock, steel	Rampe A f. Powerlock-Diff., Stahl	1 pc.	**31,00 €**	25,0 g
	M10330	Ramp Set Alu V2 (HART COAT)	Rampenset Alu V2 (HART COAT)	1 set	**62,00 €**	18,1 g
	M10330R	Ramp B (right) f. Powerlock, aluminium, HART COAT	Rampe B f. Powerlock-Diff., Alu, HART COAT	1 pc.	**31,00 €**	9,1 g
	M10330L	Ramp A (left) f. Powerlock, aluminium, HART COAT	Rampe A f. Powerlock-Diff., Alu, HART COAT	1 pc.	**31,00 €**	9,1 g
	M10303	Steel gearwheel 48" for Powerlock (SCS M2)	Stah-Hauptzahnrad 48" (SCS M2)	1 pc.	**38,00 €**	62,7 g
	M10235	Main gearwheel 49" (LAUTERBACHER)	Hauptzahnrad 49" (LAUTERBACHER)	1 pc.	**59,00 €**	117,1 g
	M10304	External fins 0,50mm (with holes)	Außenlamellen 0,50mm (gelocht)	3 pcs.	**19,55 €**	5,9 g
	M10322	External fins 0,25mm (without holes)	Außenlamellen 0,25mm (ungelocht)	3 pcs.	**19,55 €**	3,3 g
	M10305	Ball bearings outer FG (15x28x7mm)	Kugellager außen FG (15x28x7mm)	2 pcs.	**8,00 €**	30,7 g
	M10320	Ball bearings outer GENIUS (15x24x5mm)	Kugellager außen GENIUS (15x24x5mm)	2 pcs.	**8,00 €**	14,0 g
	M10321	Ball bearings outer RS5 (15x24x7mm)	Kugellager außen RS5 (15x24x7mm)	2 pcs.	**8,00 €**	19,1 g
	M10306	Ball bearings inner (8x12x3,5mm)	Kugellager innen (8x12x3,5mm)	4 pcs.	**6,55 €**	4,2 g
	M10307	Shaft sealing ring (8x12x3mm)	Wellendichtring (8x12x3mm)	2 pcs.	**8,10 €**	0,8 g
	M10308	Flange sleeve (8x12/16x5mm), aluminium, coated	Bundbuchse (8x12/16x5mm), Alu, beschichtet	2 pcs.	**11,90 €**	2,6 g
	M10309	Screwset for Powerlock-Diff.	Schraubensatz f. Powerlock-Diff.	1 set	**4,90 €**	17,8 g
	M10310	Ball diff. axle	Kugel-Diff. Achse	1 pc.	**18,90 €**	54,0 g
	M10311	Diff. bevel gears B	Diff.-Kegelzahnrad B (Ausgleichskegelräder)	2 pcs.	**35,90 €**	28,2 g
	M10312	Diff. bevel gear axle	Diff.-Kegelradachse	1 pc.	**5,90 €**	6,3 g
	M10313	Diff. bevel gears	Diff.-Kegelzahnrad, selbstsperrend (Vierkant)	2 pcs.	**45,90 €**	30,3 g
	M10323	Diff bevel set	Diff.-Kegelzahnrad Set	4 pcs.	**74,90 €**	58,8 g
	M10314	Alum. housing A left f. Powerlock Diff.	Alu-Gehäuse A, links, f. Powerlock-Diff.	1 pc.	**46,90 €**	46,8 g
	M10315	Alum. housing B right f. Powerlock Diff.	Alu-Gehäuse B, rechts, f. Powerlock-Diff.	1 pc.	**46,90 €**	58,7 g
	M10316	O-ring set f. Powerlock diff.	O-Ringe für Powerlock-Diff.	1 set	**2,50 €**	0,2 g
	M10317	Preload compensator, aluminium, coated	Preload-Wippe, Alu, beschichtet	1 pc.	**16,90 €**	3,4 g
	M10318	Preload plate, aluminium, coated	Preload-Platte, Alu, beschichtet	1 pc.	**21,90 €**	4,5 g
	M10319	Preload slide, aluminium, coated	Preload-Schlitten, Alu, beschichtet	1 pc.	**21,90 €**	0,6 g
	M10324	Preload set (compensator, plate, slide)	Preload Set (Wippe, Platte, Schlitten)	1 set	**46,90 €**	8,6 g
	M10325	Diff update 2014, light kit (M10330, M10308, M10324)	Diff Update 2014, leichter Satz (M10330, M10308, M10324)	1 set	**99,90 €**	29,4 g
	M10326	Powerlock Diff Service Package	Powerlock Diff Service Paket	1 set	**42,90 €**	25,0 g