2003

TECHNICAL NEWS

GEAR HUB SYSTEMS & MTB COMPONENTS

ENGLISH

SRAM

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Publ. No. 2008 E

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Released April 2002

SRAM Technical Documentation,
Schweinfurt/Germany

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GEAR HUB SYSTEMS

MTB COMPONENTS

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- Stand-still shifting (mode selector)
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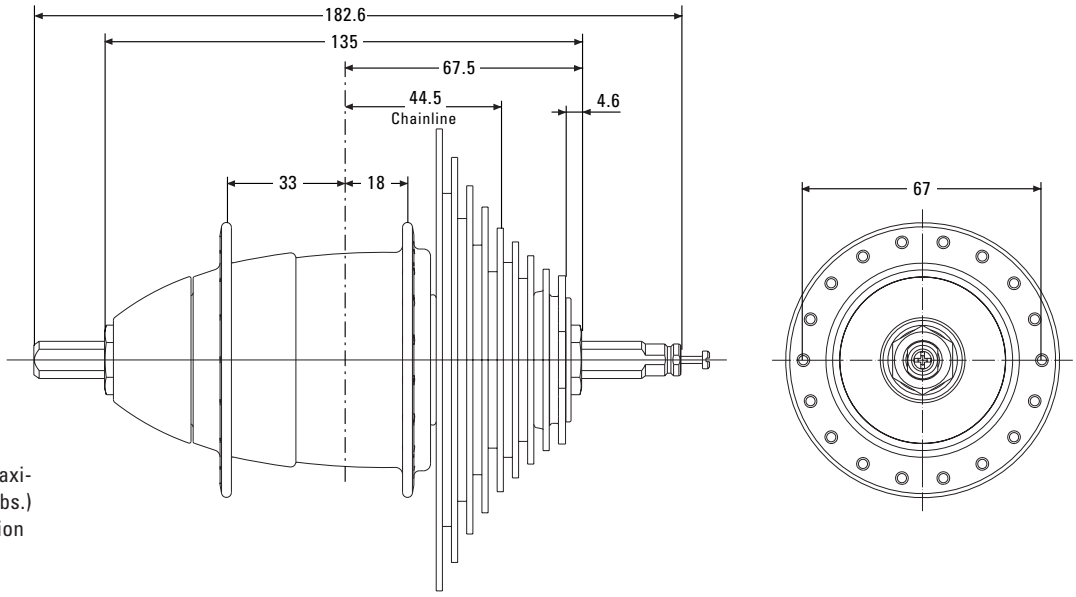
- Improved material use
- Outward facing limit screws
- Low system weight



Caution:
Not suitable for tandems, trademen's delivery bicycles and similar.

Cycle frame:
The strength must be such that with a maximum braking torque of 250 Nm (2200 in.lbs.) on the rear wheel no residual deformation can occur on the rear structure.

HUBS

		DualDrive 27/24 · without brake		DualDrive 27/24 · disc brake compatible	
	Part No.	—	—	—	—
	Brake	None		Interface for Disc brakes	
	Over Locknut Dim.	135 mm		135 mm	
Axle	**Length**	182.6 mm		182,6 mm	
Axle	**Ends Diameter**	FG 10.5		FG 10.5	
Spoke	**Holes**	36	32	36	32
Spoke	**Hole Diameter**	2.6 mm		2.6 mm	
Spoke	**Hole Ref. ø**	67 mm		67 mm	
Spoke	**Flange Dist. to $^1/_2$ OLD**	33 mm / 18 mm		33 mm / 18 mm	
Ratio	**Totally**	576 % (27spd) / 542 % (24spd)		←	
Ratio	**Totally hub**	186 %		←	
Ratio	**Speed 1**	73 %		←	
Ratio	**Speed 2**	100 %		←	
Ratio	**Speed 3**	136 %		←	
	Chainline	45 mm		45 mm	
	Crankset	33 / 38 Teeth		←	
	Cogset	8 / 9 Speed, 11-32/34 Teeth		←	
	Cogset Compatib.	DualDrive 27 / DualDrive 24		←	
	Shifter Compatib.	DualDrive 27 / DualDrive 24		←	
	Sealing	Extra sealed		←	
	Tandem compatib.	—		—	
	Disc compatib.	—		SRAM / Magura / Hayes / Shimano	
	Weight	970 g		970 g	
Finish	**Hub Shell**	Aluminum		Aluminum	
Finish	**Shifting device**	Composite		Composite	

DUALDRIVE
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

DERAILLEURS

		DualDrive 27	DualDrive 24 NEW
	Speeds	9	8
	Shifter Compatibility	DualDrive 27	DualDrive 24
	Cage Length	Short, 75 mm	Short, 75 mm
	Sprocket, max.	34 Teeth	32 Teeth
	Sprocket, min.	11 Teeth	11 Teeth
	Pulleys	Exchangeable / Bushing	Exchangeable / Bushing
	Direct Mount	●	●
	Weight	260 g	220 g
Design	Upper B-Knuckle	Aluminum	Grilon Composite silver
Design	Lower Knuckles	Grilon Composite silver	Grilon Composite silver
Design	Outer Link	Aluminum	Grilon Composite silver
Design	Inner Link	Steel / Zinc coat	Steel / Zinc coat
Design	Outer Cage	Forged Aluminum	Grilon Composite black
Design	Inner Cage	Grilon Composite black	Grilon Composite black
Design	Hanger Bolt	Aluminum	Steel

CASSETTES

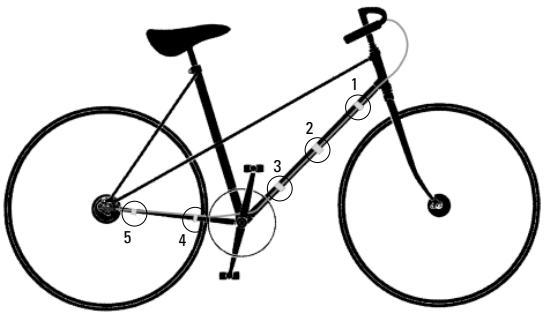
		DualDrive 27	DualDrive 24
	Part No.	—	—
	Largest Cog	34 Teeth	32 Teeth
	Speeds	9	8
	Cogs	11/12/14/16/18/21/24/28/34	11/12/14/16/18/21/26/32
	Spacers	Blue	Black
	Chain compatib.	9spd, HG/IG/PG II comp.	8spd, HG/IG/PG II comp.
	Weight	320 g	270 g
Design	Cogs	SAPH 440 steel	←
Design	Screws	Steel / Zinc Coat	←
Design	Finish	Matte Nickel Plated	Chrome

SHIFTERS

		DualDrive 27					DualDrive 24					Lefthand NEW
	Part No.	—	—	—	—	—	—	—	—	—	—	—
	Clickbox Cable	1400 mm	1500 mm	1600 mm	1700 mm	2100 mm	1400 mm	1500 mm	1600 mm	1700 mm	2100 mm	see Price list
	Shifter Type	SRS Twistring-Thumbshifter-Combo (2in1)					SRS Twistring-Thumbshifter-Combo (2in1)					Twist shifter
	Arrangement	Handlebar, right					Handlebar, right					left (right: use 5.0)
Compat.	Gear Hub	DualDrive					DualDrive					DualDrive
Compat.	Derailleur	DualDrive 9spd					DualDrive 8spd					use 5.0 shifter
	Gear Indication Der.	Window					Printed					see 5.0 shifter
	Riding Mode Indic.	Printed					Printed					Printed
	Barrel Adj. Gear Hub	None					None					Indexing
	Barrel Adj. Derailleur	Indexing					Indexing					see 5.0 shifter
	Clamping Diameter	22.3 mm					22.3 mm					22.3 mm
	Handlebar, Straight Area	Minimum length = 150 mm					Minimum length = 150 mm					—
	Cable Routing, Gear Hub	Continuous housing (preassembled)					Continuous housing (preassembled)					←
	Cable Routing, Der.	Open or continuous					Open or continuous					←
	Weight	N/A					N/A					N/A
Design	Cables	Stainless steel					Stainless steel					Stainless steel
Design	Housing	Glass filled PA – Silver painted					Glass filled PA – Silver painted					Glass filled PA
Design	Grip Cover	Thermoplastic elastomer, Overmolded					Thermoplastic elastomer, Overmolded					Therm. elast., Overm.
Design	Clamping Collar	Aluminum					Aluminum					Aluminum
Design	Clickbox	Composite					Composite					Composite

DUALDRIVE
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

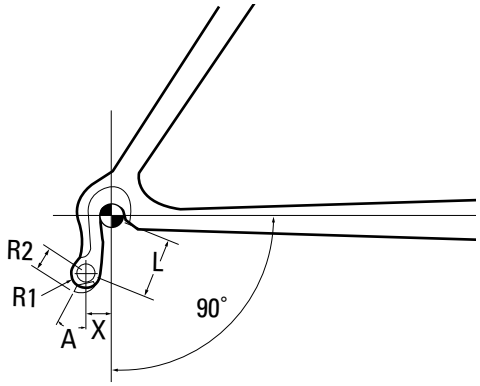
1



Cable routing	DualDrive 27	DualDrive 24 NEW
Hub cable	Along chainstay only	Along chainstay only
Derailleur cable	Along chainstay only	Along chainstay only

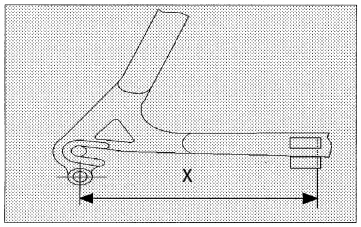
Cable attachement see Fig. 1	Cable housing	Attachement points	Cable stops
Hub	Continuous	1/2/3/4 ***(see Fig. 1)***	—
Derailleur	Continuous	1/2/3/4/5 ***(see Fig. 1)***	—
	Open	—	1/5 ***(Fig. 1)***

2



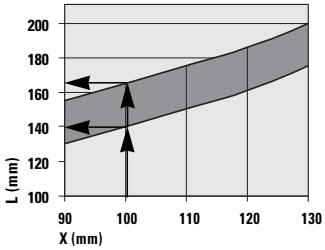
CABLE HOUSING FOR DERAILLEUR

Rear cable stop position



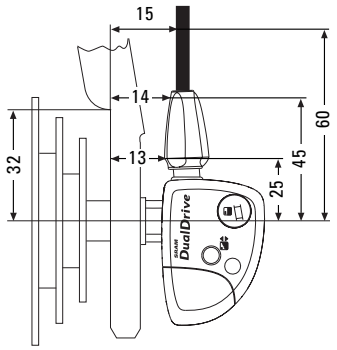
Length X min. 90 mm.
Cable stop below or beside chainstay.

Rear housing length (only DualDrive 27)



Example: Distance X = 100 mm → cable housing length L = 140 – 165 mm.

3



CABLE HOUSING

- Use only new high quality cable and com-pressionless cable housing with end caps.
- When choosing cable housing lengths, be sure to allow enough housing for an extreme turn of the handlebars in both directions.
- Note also, that different stem lengths and cable stop positions effects cable housing length.

DROPOUT

Only flat and no off-set versions.
Dropout thickness: 7 – 8 mm.
Vertical or horizontal dropout slot.
Dropouts must be parallel.

Dropout dimensions: ***see Fig. 2 and 3.***

L	X	A	R1	R2
28	6–10	25°–30°	8.5 max	11.5–13.5
30	7.5–10	25°–30°	8.5 max	11.5–13.5

CRANKSET

Bicycle without chain case:
Use a chain guard disc (at the outer surface of chainring, material no resin)
Use only standard chainring version (non-shifting teeth).

Chainline = 45 mm.

Recommended cranks:
Cyclone:

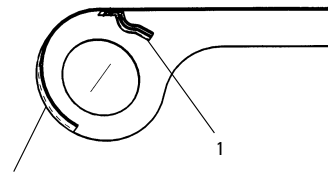
- DualDrive crank for chainguard, 33 T, Part No. CPI-104 (chain guide fork necessary).
- DualDrive crank for Trekking, 33 T, Part No. CY-100W.
- DualDrive crank for MTB, 33 T, Part No. CF-100W.

Truvativ:

- CR-02-XF-SS or CR-02-XF-SSA

DualDrive crank supplier:
Cyclone Precision Inc.
P.O. Box 3-41 · Nantou 540 · Taiwan
Tel.: +886-49-257-829 · Fax: +886-49-257-832
eMail: justin@cpi-cw.com.tw
http://www.cpi-cw.com
or Truvativ · http://www.truvativ.com

4



dA max. 220 mm

CHAIN GUIDE FORK

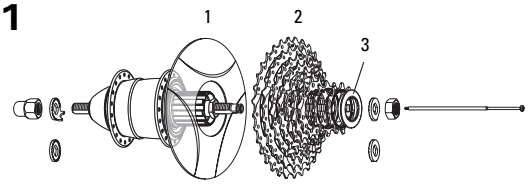
It prevents chain from jumping off front chainring, is bolted inside the chain case (1, ***Fig. 4)***.

HANDLEBAR

Diameter: 22.3 mm.
Minimum length of straight area for shifter: 150 mm.
Recommended are handlebars in curved design.

DUALDRIVE ASSEMBLY

1



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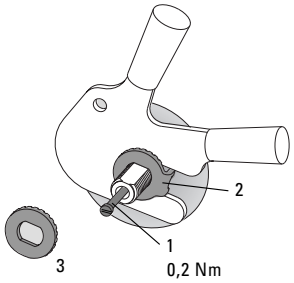

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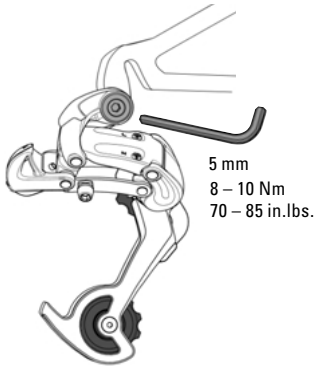

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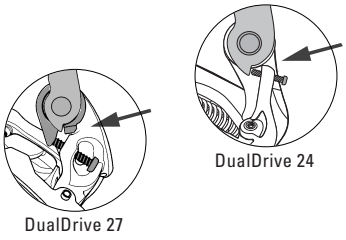

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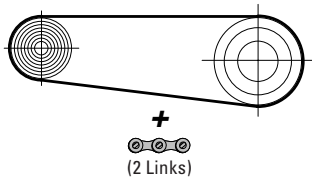

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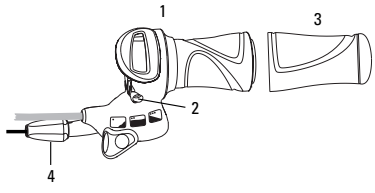


ASSEMBLY HUB

- Lace the wheel as normal.
- Place spoke protector disc (1, ***Fig. 1)*** on shoulder of hub, fit cassette (2) onto driver profile. Screw lock nut (3) with cassette tool (Park Tool FR-5 or SRAM Part No. 4624 411 010), tightening torque: 40 Nm (350 in.lbs.).
- Screw shifting rod (1, ***Fig. 2)*** into the hub axle and tighten it with 0.2 Nm (1.8 in.lbs.).
- Fit wheel in dropouts.
- Place retaining washers (2, ***Fig. 2)*** on both sides of the axle – the serrations must bear against the dropout.
  – Version for horizontal dropouts (2): the lug must engage in the dropout slot.
  – Version for vertical dropouts (3): without lug.
- Tighten up axle nuts. Tightening torque 30 – 40 Nm (266 – 350 in.lbs.).

ASSEMBLY DERAILLEUR

Advice:
Check the rear derailleur hanger alignment. A bent rear derailleur hanger will result in inaccurate index shifting. Outboard side impacts are the most common causes of this type of damage.

- Attach the rear derailleur to the frame's rear derailleur hanger using a 5 mm hex head wrench ***(Fig. 3).***
- Check that the b-adjust washer tab (b-adjust screw at DualDrive 24) is clear of the rear derailleur dropout tab ***(Fig. 4).***
- Tighten the 5 mm hex hanger bolt to 8 – 10 Nm (70–85 in.lbs.).

CHAIN LENGTH

A properly measured chain will prevent accidentally shifting to the largest chain ring and cog combination. This type of accidental shifting may cause harmful binding or seizure of the chain and potentially cause severe damage.

- Bypassing the rear derailleur, run the chain around the largest cog/large chainring combination ***(Fig. 5)***.
  – For rear suspension frames, position the rear suspension for the greatest chain length required.
- Add 2 LINKS or 1 link + Power Link to this length for proper chain length.

ASSEMBLY SHIFTER

- Slide the shifter (1, ***Fig. 6)*** onto the handlebar.
- Rotate the shifter until the barrel adjuster (4) is beneath (but out of the way of) the brake lever.
- Tighten the 3 mm hex clamp bolt (2) to 1.9 Nm (17 in.lbs.).
- Slide the handlebar grip (3) onto the handlebar.

Caution:

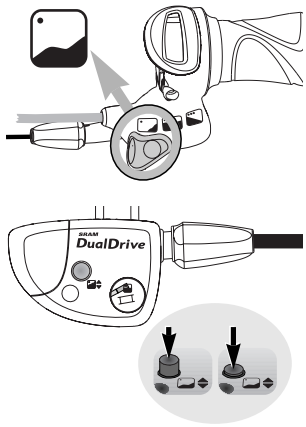
- ***Check that the shifter and brake lever function properly and are unobstructed.***
- ***Handlebar grips provide an axial safety function. For this reason, they should be mounted in such a way as to make sure they do not slip off handlebar.***
- ***Never use lubricants or solvents to install handlebar grips.***
- ***Never ride without the handlebar grips this can result in severe injury or death.***

INSTALLING CLICKBOX

- Fit the cable and avoid small radius.
- Cable attachment points ***see Page 5 / Fig. 1***.
  Cable housing must be movable inside attachment.
- Place shift lever in uphill riding mode / gear position „1" ***(Fig. 7)***.
- Push Clickbox button down ***(Fig. 7)***.
- Push on Clickbox to the stop on the hub axle.
- Press button up.
- Place thumb shift lever in standard riding mode / gear position „2" ***(Fig. 8)***.
- Match up the marks in the Clickbox viewing window by twisting the barrel adjuster.

DUALDRIVE ASSEMBLY

7



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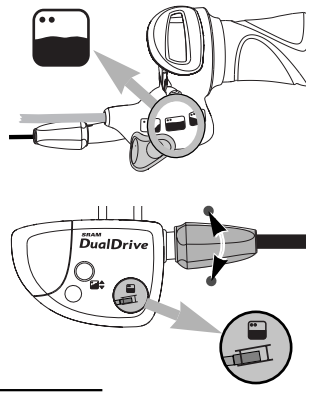

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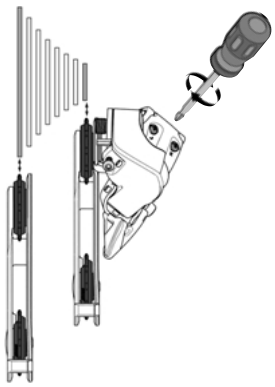

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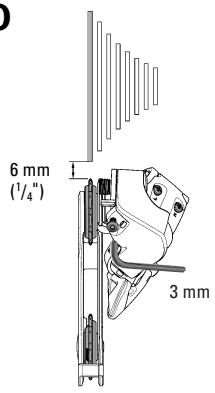

DERAILLEUR ADJUSTMENT

Limit screw adjustment:

- View the rear derailleur and pulleys from behind the rear of the bicycle ***(Fig. 9)***.
- Using a small screwdriver, turn the limit screw marked 'H' on the outer link of the derailleur to align the upper guide pulley center with the outboard edge of the smallest cog – clockwise moves the guide pulley inboard towards the wheel.
- While turning the crank, push the rear derailleur towards the larger cogs by hand.
- Align the upper guide pulley under the largest cog, center to center, by turning the limit screw marked 'L' on the outer link – clockwise moves the guide pulley outboard away from the spokes.

Chain gap adjustment:

Chain gap is the distance between the upper guide pulley and the cog the chain is riding on. Optimal chain gap is small enough to allow quick, efficient shifts to and from any cog, but large enough to allow smooth shifts to and from the largest cog.

- Shift chain to the small chain ring.
- While turning the crank, push the rear derailleur inboard by hand to the largest cog.
- Hold the derailleur in this position while making the following adjustment.
- Use a 3 mm hex wrench, turn the b-adjust screw until the chain gap equals approximately 6 mm (1/4") from tip of the cog to tip of upper guide pulley ***(Fig. 10)***.

– Turn the b-adjust screw clockwise to increase the chain gap.
– Turn the b-adjust screw counterclockwise to decrease the chain gap.

Advice:
Do not use the b-adjust screw to adjust the rear derailleur to act as a chain-tensioning device or to prevent chain suck. This increases the chain gap causing poor shifting performance.

Index shifting adjustment:

- Check that the chain and the rear derailleur are in the smallest cog position.
- Measure and cut the rear piece of cable housing. Make sure that it is not too short or long ***(DualDrive 27: see page 5 for figure and chart).***
- Rotate the twist shifter until the largest number and gear indication tab/dash line up.
- Turn the twist shifter barrel adjuster (4, ***Fig. 6)*** clockwise fully into the shifter, then turn counterclockwise 1 full turn.
- Feed the shifter cable through the rear derailleur cable housing, stops and cable guides.
- Feed the rear derailleur cable through the rear derailleur-housing stop and through the cable guide on the fin.
- Pull the cable tight and position it under the cable anchor washer ***(Fig. 11)***.
- Tighten the 5 mm hex cable anchor bolt to 4 – 5 Nm (35–45 in.lbs.).
- Rapidly shift the chain and derailleur up and down the cassette several times. If the cable slips repeat the two former steps.
- Shift the chain to the smallest cog.
- While pedaling, move the shifter up one detent.
  – If the chain hesitates or does not shift to the second cog, increase the cable tension by turning the shifter barrel adjuster counterclockwise.
  – If the chain shifts beyond the second cog, decrease the cable tension by turning the shifter barrel adjuster clockwise.
- Repeat the two former steps until shifting and cable tension is accurate.
- While turning the crank, shift the chain up and down the cassette and chain rings several times to ensure that your derailleur is indexing smoothly.

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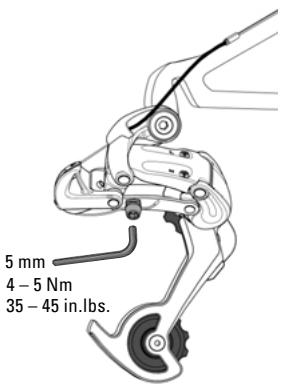
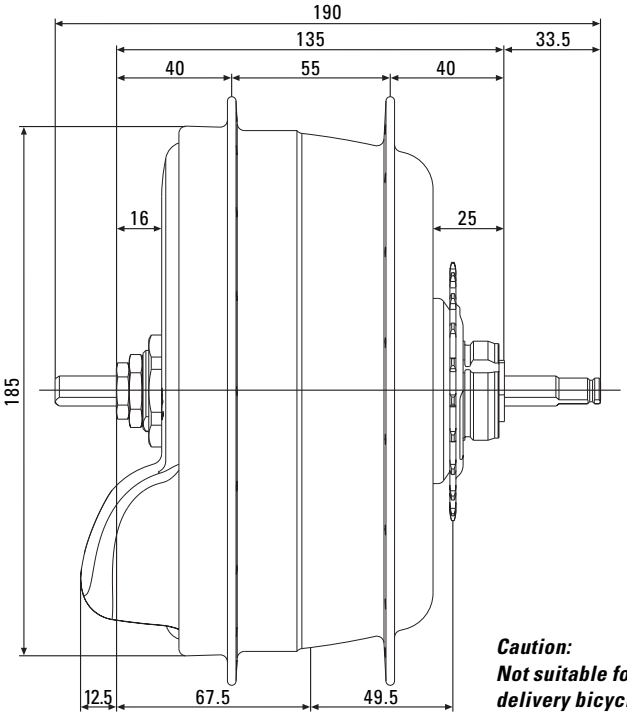
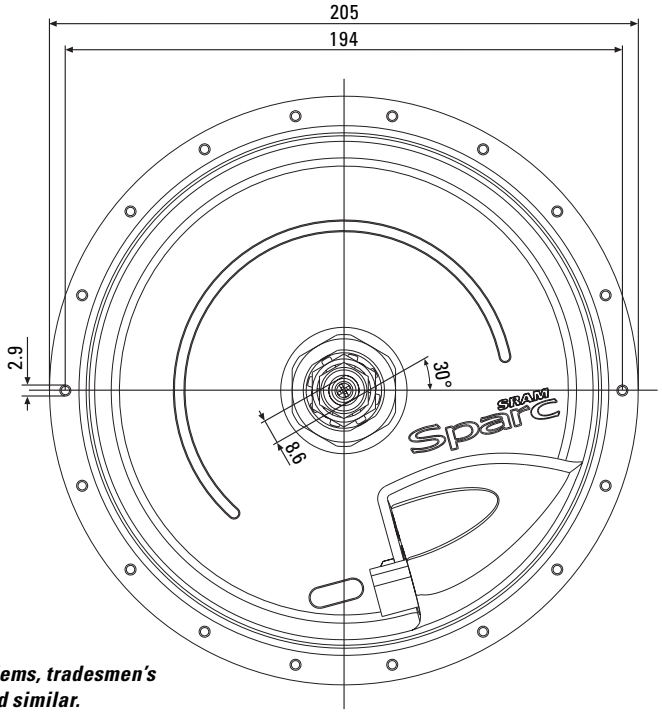


SPARC
TECHNICAL DATA / ASSEMBLY REQUIREMENTS





Caution:
Not suitable for tandems, tradesmen's delivery bicycles and similar.

HUB

		Sparc hub		NEW
	Version	Europe 28"	Europe 20"	USA 26"
V max.	Econ Mode	18 km/h	18 km/h	14 mph
	Speed Mode	24 km/h	24 km/h	18 mph
Electric Drive	Engine Type	2 x 12V DC engines		
	Power	2 x 100 W max.		
	Assist Type	Pedal controlled		
	Assist Ratio	Econ / Speed		
	Brake	None		
	Over Locknut Dim.	135 mm		
Axle	Length	190 mm		
	Ends Diameter	FG 10.5		
Spoke	Holes	36		
	Hole Diameter	2.9 mm		
	Hole Reference ø	194 mm		
Gear Hub Ratio	Totally	249 %		
	Speed 1	63 %		
	Speed 2	78 %		
	Speed 3	100 %		
	Speed 4	128 %		
	Speed 5	158 %		
Chain	Usable Dimension	1/2" x 1/8" or 1/2" x 3/32"		
	Line	49.5 mm (only off-set sprockets)		
	Ratio	1.7 – 1.9	2.3 – 2.6	1.8 – 2.6
	Shifter Compatib.	Sparc Shifter		
	Frame Compatib.	Dropouts max. 7 mm / OLD 135 mm		
	Weight	2500 g		

SHIFTER

	Sparc Shifter		
Part. No.	—	—	—
Shifter Type	Twist Shifter		
Cable	1500 mm	1600 mm	1700 mm
Gear Indication	Window		
Clamping Diameter	22.3 mm		
Handlebar, Straight Area	Minimum length = 150 mm		
Weight	70 g		

REM.CON.

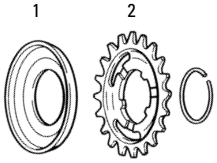
	Sparc Remote Control Unit				
Part. No.	—	—	—	—	—
Cable	1500 mm	1600 mm	1700 mm	1800 mm	2200 mm
Mode Selector	Off / Econ / Speed				
Mode Indication	Printed				
Clamping Diameter	22.3 mm				
Cable Connection	3.5 mm stereo jack				
Weight	45 g				

BA.BOX

	Sparc Battery Box				
Part No.	—	—	—	—	—
Cable	650 mm	750 mm	850 mm	1400 mm	1950 mm
Battery	12V / 7Ah lead battery				
Charger	12V / 1.5A		12V / 2.0A		
Charging time	4 hours 45 minutes		3 hours 30 minutes		
Luggage carrier comp.	Struts: ø 8 mm / dist. 68 mm center to center / parallel				
Weight	3000 g				

SPARC ASSEMBLY

1



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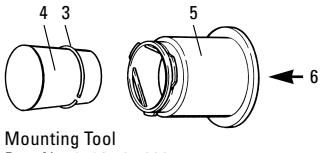
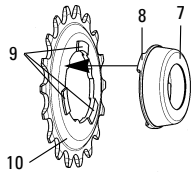


Mounting Tool
Part No. 0582 104 000

3



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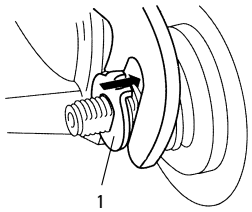

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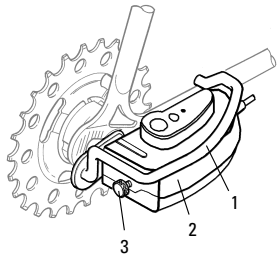

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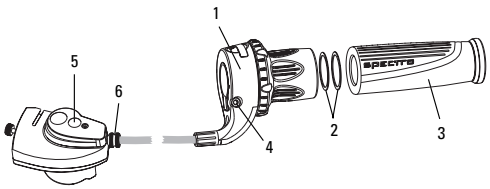


LACING THE WHEEL

1-cross only. All spoke heads must be positioned at the outside of the spoke flange. Spoke tension about 1000 N recommended.

ASSEMBLY HUB

- Place the dust cap (1, ***Fig. 1)*** and sprocket (2) on the driver. Toothing close to the hub (only sprocket version off-set).
- Push sprocket circlip (3, ***Fig. 2)*** onto the cone of tool sleeve (4). Place tool sleeve with large diameter on the driver.
- Push the spring end of sliding sleeve (5) of the tool over the tool sleeve. Thrust sliding sleeve in direction (6), this forces circlip into the recess of the driver.
- Remove tool and check that the circlip is seated correctly.
- Turn dust cap (7, ***Fig. 3)*** until the three lugs (8) are between the three beads (9) on the sprocket (10).
- Position dust cap and push towards sprocket until it is felt to lock into place.
- Placing the wheel in the rear frame.
  Advice:
  Dropouts must be parallel.
- Mount the chain.
- Fit non-turn washer (1, ***Fig. 4)*** to the outside of the dropouts. The serrations must bear against the dropout and the lug must engage in the dropout slot.
- On the sprocket side fit the protective bracket (1, ***Fig. 5)*** directly below the axle nut. Tightening torque on acorn or hex nuts 30 – 40 Nm (266 – 350 in.lbs.).

Advice:

- ***If a different protective bracket is used the thickness of the attachment plate must be max. 3 mm.***
- ***Do not use additional washers.***
- ***A minimum of 1 thread turn must be visible in front of the axle nut!***

ASSEMBLY SHIFTER

- Slide shifter (1, ***Fig. 6)*** onto handlebar.
- Add 2 thrust washers (2).
- Mount fixed grip (3) onto end of handlebar.
- Without applying pressure, slide shifter against fixed grip.
- Adjust shifter on handlebar and tighten with bolt (4) with a torque of 1.5 Nm (13 in.lbs.).

Caution:

- ***Check that the shifter and brake lever function properly and are unobstructed (realign if necessary).***
- ***Fixed grips provide an axial safety function. For this reason, they should be mounted in such a way as to make sure they do not slip off handlebar.***
- ***Never use lubricants or solvents to install fixed grips.***
- ***Never ride without the fixed grips. The turning grip may loosen from housing and slip off handlebar – this can result in severe injury or death.***

- When fitting the cable (1, ***Fig. 7)*** avoid small radius.
- Last attachment point is on the lower rear wheel fork (2, ***Fig. 7)*** immediately behind the chain wheel.
  Cable housing must be movable inside attachment.

INSTALLING CLICK BOX

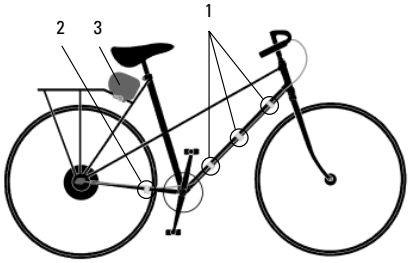
- Insert shift rod (1, ***Fig. 8)*** in shift tube (2) (oil parts lightly) and then push into axle bore as far as the stop. Turn slot (6) in shift tube to a position where it is easily visible.
- Push locating sleeve (3) with guiding rib (4) to the front onto the hub axle – making sure that the internal lug (5) is guided in the slot (6) of the shift tube until it can be felt – and heard – to engage.
- Turn locating sleeve on the axle (7) until the guiding rib (4) is facing roughly upwards.
- Push on clickbox (2, ***Fig. 5)*** to the stop on the axle. The guiding rib (4, ***Fig. 8)*** of the locating sleeve thereby engages in the slot on the housing. In the end position tighten up the knurled bolt (3, ***Fig. 5)*** by hand. Assembly can be performed independently of the gear setting but it is best done at shifter position “2”.

ADJUSTMENT HUB

- Be sure to reset rotational shifter from 4th. to 3rd gear.
- Match up the arrow marks in the Clickbox viewing window (5, ***Fig. 6)*** by turning the adjusting screw (6).

SPARC ASSEMBLY

7



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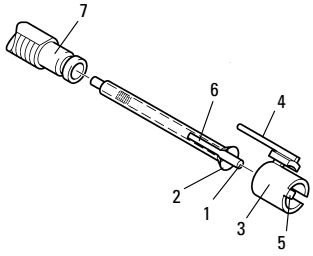

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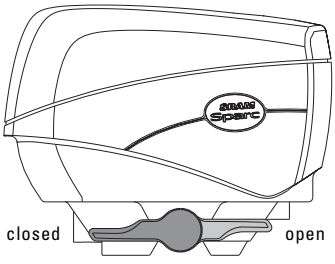

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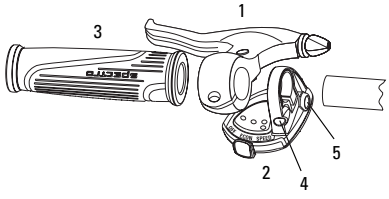


ASSEMBLY BATTERY BOX

- Pull both quick releases outward and turn them to the „open“ position ***(Fig. 9)***.
- Position battery box onto luggage carrier struts (3, ***Fig. 7)***.
- Push quick releases inwards and turn them to the „closed“ position.
- Slide plug of battery cable in the slot of the battery box until it snaps in.
- Attach cable along the frame or luggage carrier strut.
  Advice:
  Last attachment point of the cable at the rear fork: approx. 8 cm away from the axle end.
  Do not jam the cable between frame and rear hub and keep it away from the rotating hub shell.
- Slide plug in the slot on the hub until it snaps in.

Advice:
Closed elements such as brazed-on eye bolts are not suitable because plug will not pass through.

STORING THE BATTERY

The battery box should be stored fully charged in a dry and cool place.
We recommend charging the battery once a month.

ASSEMBLY REMOTE CONTROL UNIT

- Slide remote control unit (1, ***Fig. 10)*** onto handlebar.
- Mount brake lever (2) and fixed grip (3).
- Adjust remote control unit on handlebar and tighten the bolt (4) with a torque of 1.5 Nm (13 in.lbs.).
- Slide plug of remote control cable in the slot (5) of the remote control unit until it snaps in.
- Attach cable along the frame.
  Advice:
  Last attachment point of the cable at the rear fork: approx. 8 cm away from the axle end.
  Do not jam the cable between frame and rear hub.
  Make a cable loop between plug and cable attachment point to avoid tensile load.
- Slide the plug straightly in the slot on the hub until it snaps in.
  Angular installation may damage the slot.

Check:
Switch remote control to „Speed“ position and rotate the rear wheel.
At least 2 green and 1 red LED must gleam.
If not, assemble plugs again completely.
If not, assemble plugs again completely / right.

X.0 / 9.0 / 7.0 / 5.0 / 4.0 / 3.0 · REAR DERAILLEURS
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

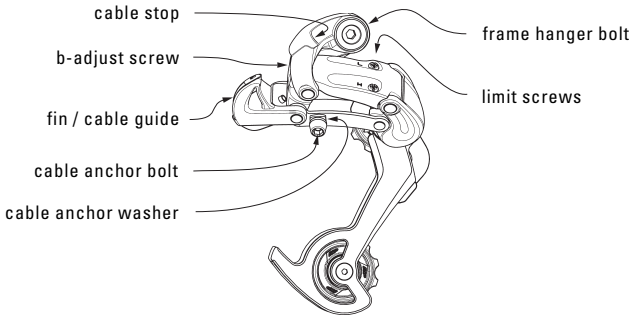
1:1

X.0 9.0 7.0 5.0 4.0 3.0

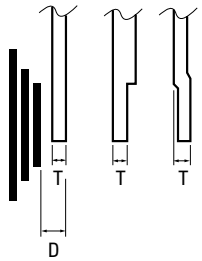
NEW

		X.0		9.0 NEW		7.0	5.0	4.0	3.0
	Part No.	—	—	—		—	—	—	
	Speeds	9/8		9/8		9/8	8	9/8/7	
	Shifter Compatibility	SRAM X.0/9.0SL/9.0/7.0/5.0/4.0/3.0		←		←	←		
Chain Capacity	Total	37 T	45 T	37 T	45 T	45 T	45 T	45 T	
Chain Capacity	Cage Length	Medium	Long	Medium	Long	Long	Long	Long	
Chain Capacity	Max Sprocket	34 T		34 T		34 T	34 T	34 T	
Chain Capacity	Min Sprocket	11 T		11 T		11 T	11 T	11 T	
Chain Capacity	Front Difference	22 T		22 T		22 T	22 T	22 T	
Design	Parallelogram Spring	Titanium		Steel		Steel	Steel	Steel	
Design	Pulleys	Cartr. bearing, stainless		Cartr. bearing		Bushing, hardened	Bushing, hardened	Bushing	
Design	Cogsets & Chains	SRAM/IG & HG 9/8spd		SRAM/IG & HG 9/8spd		SRAM/IG & HG 9/8spd	SRAM/IG & HG 8spd	SRAM/IG & HG 8spd	
Design	Direct Mount	Yes		Yes		Yes	Yes	Yes	
Design	Weight	205 g	210 g	260 g	270 g	265 g	320 g	285 g	275 g
Design	Upper Knuckle	Forged Aluminum / Anod.		Aluminum		Aluminum	Aluminum	Aluminum	Composite
Design	Outer Link	Forged Aluminum		Forged AL / Anodized		Alu die-cast / Painted	Grilon Composite	Grilon Composite	
Design	Inner Link	Aluminum / Anodized		Steel / E-coat		Steel / E-coat	Steel / E-coat	Steel / E-coat	
Design	Outer Cage	Forged AL / Anodized		Forged Aluminum		Stamped AL / Anodized	Steel / E-coat	Steel / E-coat	
Design	Inner Cage	Forged AL / Anodized		Forged Aluminum		Grilon Composite	Grilon Composite	Grilon Composite	
Design	Hanger Bolt	Aluminum / Anodized		Aluminum / Anodized		Aluminum / Anodized	Steel	Steel	

DERAILLEUR ANATOMY

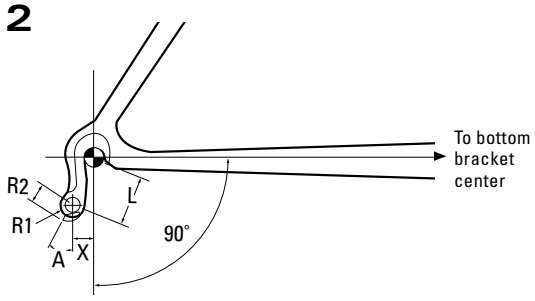


1



12.7 mm ± 1

2



COMPATIBILITY

Shifters	SRAM® X.0, 9.0, 7.0, 5.0, 4.0, 3.0 shifters ONLY
Cogsets	11-30, 11-32, 12-32, 11-34, 12-34
Chains	SRAM Power Chain and Shimano® HG & IG
Chainrings	22-32-42/44, 24-34-46, 26-36-46/48
Cable	1.1 or 1.2 mm high quality cables
Housing	4 or 5 mm compressionless cable housing with end cap maximum diameter of 5.8 mm.

FRAME DIMENSIONS

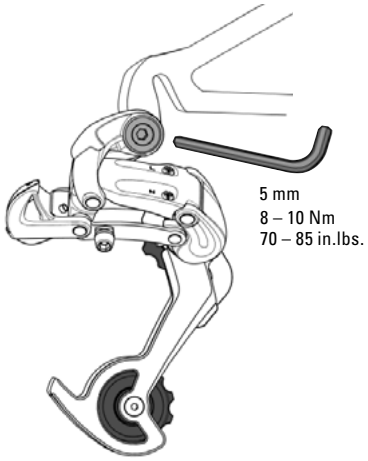
(see figure 1 and 2)

- For optimal ESP rear derailleur performance, the recommended rear derailleur hanger length (L) should be 28 – 30 mm.
- For a given L, use the chart below to determine other ESP rear derailleur hanger specifications.

L	X	A	R1	R2	T
28	6 – 10	25° – 30°	8.5 max	11.5 – 13.5	7 – 8
30	7.5 – 10	25° – 30°	8.5 max	11.5 – 13.5	7 – 8

X.0 / 9.0 / 7.0 / 5.0 / 4.0 / 3.0 · REAR DERAILLEURS ASSEMBLY

1



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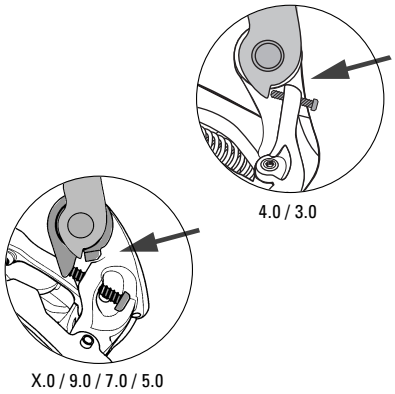

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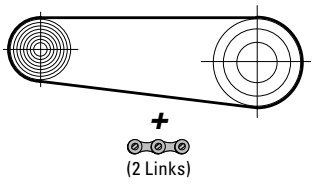

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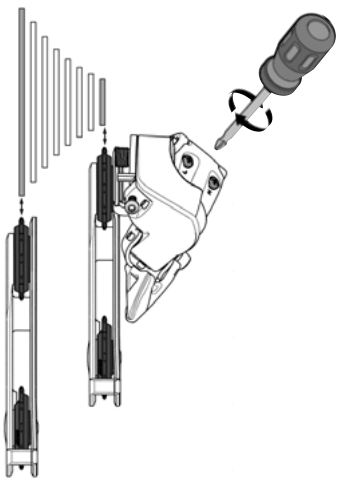


ASSEMBLY

Advice:

Check the rear derailleur hanger alignment. A bent rear derailleur hanger will result in inaccurate index shifting. Outboard side impacts are the most common causes of this type of damage.

- Attach the rear derailleur to the frame's rear derailleur hanger using a 5 mm hex head wrench ***(Fig. 1).***
- Check that the b-adjust washer tab (b-adjust screw) is clear of the rear derailleur dropout tab ***(Fig. 2).***
- Tighten the 5 mm hex hanger bolt to 8 – 10 Nm (70–85 in.lbs.).

CHAIN LENGTH

A properly measured chain will prevent accidentally shifting to the largest chain ring and cog combination. This type of accidental shifting may cause harmful binding or seizure of the chain and potentially cause severe damage.

- Bypassing the rear derailleur, run the chain around the largest cog/large chainring combination ***(Fig. 3)***.
  – For rear suspension frames, position the rear suspension for the greatest chain length required.
- Add 2 LINKS or 1 link + Power Link to this length for proper chain length.

LIMIT SCREWS ADJUSTMENT

- View the rear derailleur and pulleys from behind the rear of the bicycle ***(Fig. 4)***.
- Turn the limit screw marked 'H' on the outer link of the derailleur to align the upper guide pulley center with the outboard edge of the smallest cog – clockwise moves the guide pulley inboard towards the wheel.
- While turning the crank, push the rear derailleur towards the larger cogs by hand.
- Align the upper guide pulley under the largest cog, center to center, by turning the limit screw marked 'L' on the outer link – clockwise moves the guide pulley outboard away from the spokes.

CHAIN GAP ADJUSTMENT

Chain gap is the distance between the upper guide pulley and the cog the chain is riding on. Optimal chain gap is small enough to allow quick, efficient shifts to and from any cog, but large enough to allow smooth shifts to and from the largest cog.

- Shift chain to the small chain ring.
- While turning the crank, push the rear derailleur inboard by hand to the largest cog.
- Hold the derailleur in this position while making the following adjustment.
- Use a 2,5/3 mm hex wrench, turn the b-adjust screw until the chain gap equals approximately 6 mm ($^1/_4$") from tip of the cog to tip of upper guide pulley ***(Fig. 5)***.

– Turn the b-adjust screw clockwise to increase the chain gap.
– Turn the b-adjust screw counterclockwise to decrease the chain gap.

Advice:

- ***Bicycles equipped with an 11-28 cassette may require you to set the chain gap at the smallest cog. This is due to the shallow angle of the cassette in relation to the steeper movement of the 9spd rear derailleur.***
- ***It is best to measure the rear piece of cable housing between the frame and derailleur after the chain gap is determined. See figure and chart for recommended lengths.***
- ***Do not use the b-adjust screw to adjust the rear derailleur to act as a chain-tensioning device or to prevent chain suck. This increases the chain gap causing poor shifting performance.***

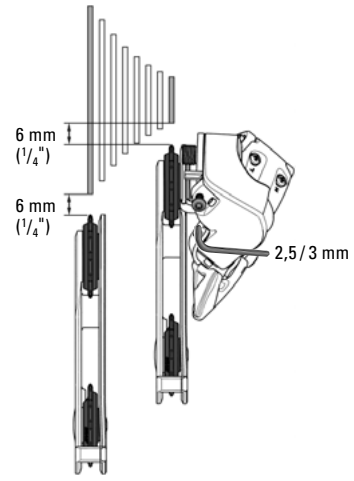
INDEX SHIFTING ADJUSTMENT

- Check that the chain and the rear derailleur are in the smallest cog position.
- Measure and cut the rear piece of cable housing. Make sure that it is not too short or long ***(see figure and chart).***
- Rotate the rear shifter until the largest number and gear indication tab/dash line up.
- Turn the rear shifter barrel adjust clockwise fully into the shifter, then turn counterclockwise 1 full turn.
- Feed the rear shifter cable through the rear derailleur cable housing, stops and cable guides.
- Feed the rear derailleur cable through the rear derailleur-housing stop and through the cable guide on the fin.
- Pull the cable tight and position it under the cable anchor washer ***(Fig. 6)***.
- Tighten the 5 mm hex cable anchor bolt to 4 – 5 Nm (35–45 in.lbs.).
  – Be careful not to crush or deform the cable.
- Rapidly shift the chain and derailleur up and down the cassette several times. If the cable slips repeat the two former steps.
- Shift the chain to the smallest cog.
- While pedaling, move the shifter up one detent.
  – If the chain hesitates or does not shift to the second cog, increase the cable tension by turning the shifter barrel adjuster counterclockwise.
  – If the chain shifts beyond the second cog, decrease the cable tension by turning the shifter barrel adjuster clockwise.

X.0 / 9.0 / 7.0 / 5.0 / 4.0 / 3.0 · REAR DERAILLEURS ASSEMBLY

1:1

5



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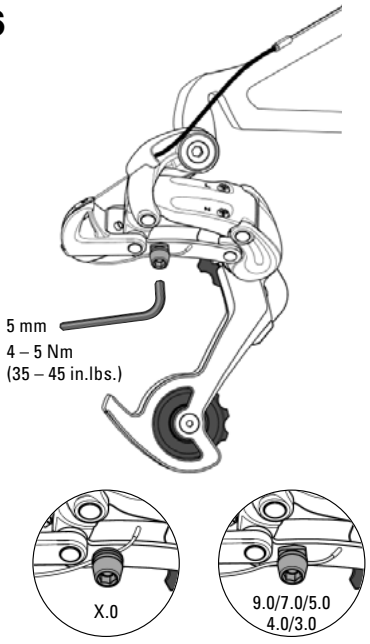
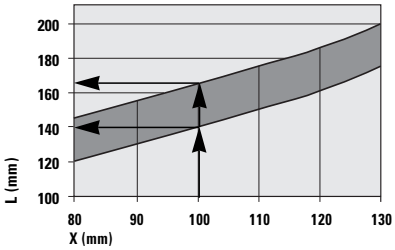
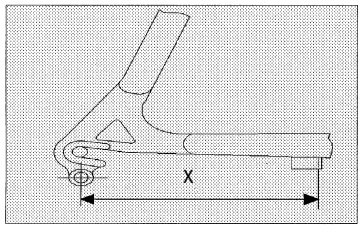


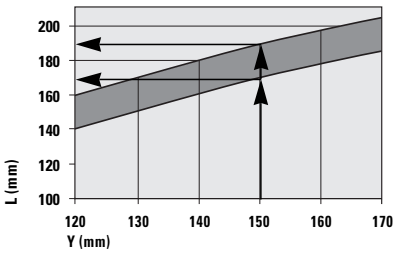
- Repeat the two former steps until shifting and cable tension is accurate.
- While turning the crank, shift the chain up and down the cassette and chain rings several times to ensure that your derailleur is indexing smoothly.

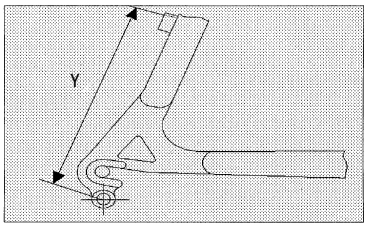
CHART / LENGTH OF CABLE HOUSINGS

Example: Distance X = 100 mm → cable housing length L = 140 – 165 mm.









Caution:
It is imperative to respect the values for the correct length of cable housing.

TROUBLESHOOTING

Problem	Cause	Remedy
Chain jumps from smallest sprocket to frame dropout.	High gear limit screw is not adjusted properly.	Turn in screw H until the guide pulley is aligned with the smallest sprocket.
Difficult or impossible to shift chain onto smallest sprocket.	High gear limit screw is not adjusted properly.	Unscrew screw H until the guide pulley is aligned with the smallest sprocket.
Chain jumps over largest sprocket and falls between the spokes and largest sprocket or inner cage plate scrapes on spokes.	Low gear limit screw is not adjusted properly.	Turn in screw L until the guide pulley is aligned with the largest sprocket.
	Rear derailleur or derailleur hanger is bent.	Straighten or replace.
Delayed shifting.	Clearance between guide pulley / sprocket is too large.	Adjust b-adjust screw by rotating counterclockwise.
Rough shifting behavior.	Clearance between guide pulley / sprocket is too small.	Adjust b-adjust screw by rotating clockwise.
Chain jumps two gears on small sprocket	Shift cable insufficiently tensioned.	Turn barrel adjuster on the shifter counterclockwise.
Delayed shifting onto larger sprocket	Shift cable insufficiently tensioned.	Turn barrel adjuster on the shifter counterclockwise.
Delayed shifting onto smaller sprocket	Shift cable is too tight.	Turn barrel adjuster on the shifter clockwise.
	Excessive cable friction, pinched or poorly routed cable.	Lubricate or replace cable and housing. Check for excessive bending of cable housing.

SRAM ESP · REAR DERAILLEURS
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

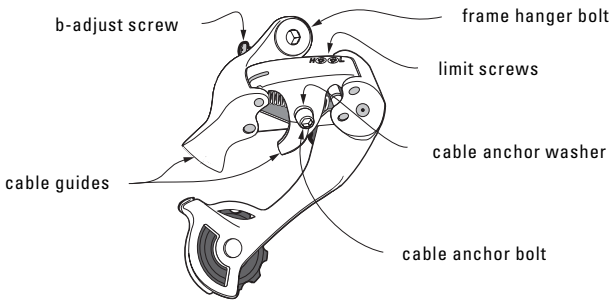
1:1

- 1:1 Actuation Ratio
- Larger Pivots, Links And Cages
- Expanded Gear Range
- Slant Parallelogram Design
- Outward Facing Limit Screws

SRAM ESP

	NEW	SRAM ESP
	Part No.	—
	Speeds	8/7
	Shifter Compatibility	SRAM X.0/9.0/7.0/5.0/4.0/3.0
Chain Capacity	Total	45T
	Cage Length	Long
	Max Sprocket	34T
	Min Sprocket	11T
	Front Difference	22T
	Spring Enhancement	Yes
	Pulleys	Bushing
	Cogsets & Chains	SRAM / IG & HG 8/7spd
	Direct Mount	Yes
	Weight	239 g
Design	Knuckles	Grilon Composite
	Outer Link	Grilon Composite
	Inner Link	Steel / Zinc Coat
	Outer Cage	Grilon Composite
	Inner Cage	Grilon Composite
	Hanger Bolt	Steel

DERAILLEUR ANATOMY



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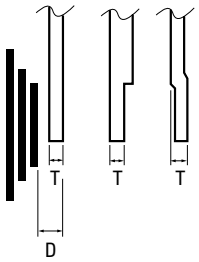
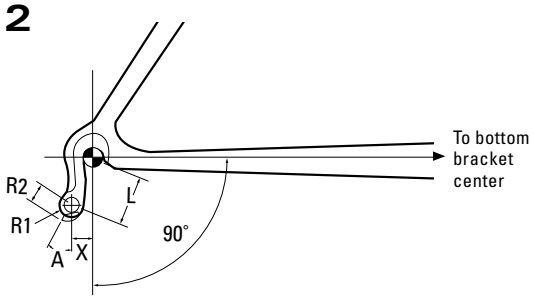


12.7 mm ± 1

2



COMPATIBILITY

Shifters	SRAM 7 & 8spd ESP cable pull shifters only
Cogsets	Min. 11T, Max. 34T
Chains	SRAM Power Chain and Shimano® HG & IG
Chainrings	22-32-42/44, 24-34-46, 26-36-46/48
Cable	1.1 or 1.2 mm high quality cables
Housing	4 or 5 mm compressionless cable housing with end cap maximum diameter of 5.8 mm.

FRAME DIMENSIONS

(see figure 1 and 2)

- For optimal ESP rear derailleur performance, the recommended rear derailleur hanger length (L) should be 28 – 30 mm.
- For a given L, use the chart below to determine other ESP rear derailleur hanger specifications.

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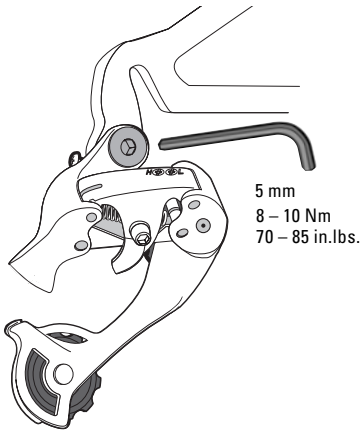
30	7.5 – 10	25° – 30°	8.5 max	11.5 – 13.5	7 – 8

SRAM ESP · REAR DERAILLEURS
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

1



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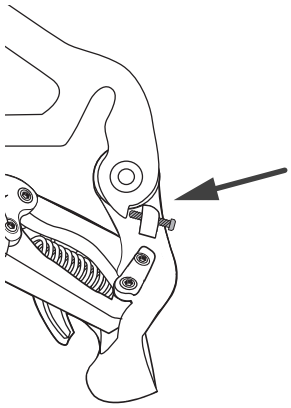

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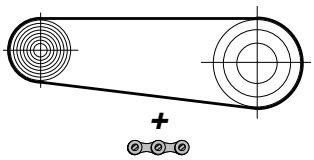

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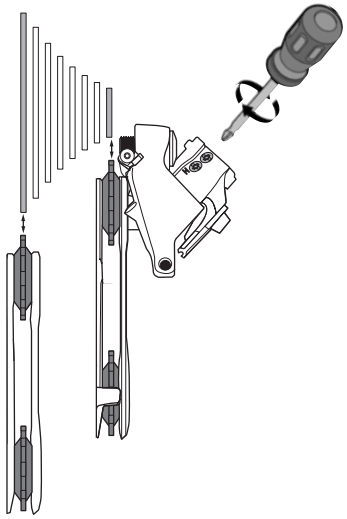


ASSEMBLY

Advice:

Check the rear derailleur hanger alignment. A bent rear derailleur hanger will result in inaccurate index shifting. Outboard side impacts are the most common causes of this type of damage.

- Attach the rear derailleur to the frame's rear derailleur hanger using a 5 mm hex head wrench ***(Fig. 1).***
- Check that the b-adjust screw is clear of the rear derailleur dropout tab ***(Fig. 2).***
- Tighten the 5 mm hex hanger bolt to 8 – 10 Nm (70–85 in.lbs.).

CHAIN LENGTH

A properly measured chain will prevent accidentally shifting to the largest chain ring and cog combination. This type of accidental shifting may cause harmful binding or seizure of the chain and potentially cause severe damage.

- Bypassing the rear derailleur, run the chain around the largest cog/large chainring combination ***(Fig. 3)***.
  – For rear suspension frames, position the rear suspension for the greatest chain length required.
- Add 2 LINKS or 1 link + Power Link to this length for proper chain length.

LIMIT SCREWS ADJUSTMENT

- View the rear derailleur and pulleys from behind the rear of the bicycle ***(Fig. 4)***.
- Using a small screwdriver, turn the limit screw marked 'H' on the outer link of the derailleur to align the upper guide pulley center with the outboard edge of the smallest cog – clockwise moves the guide pulley inboard towards the wheel.
- While turning the crank, push the rear derailleur towards the larger cogs by hand.
- Align the upper guide pulley under the largest cog, center to center, by turning the limit screw marked 'L' on the outer link – clockwise moves the guide pulley outboard away from the spokes.

CHAIN GAP ADJUSTMENT

Chain gap is the distance between the upper guide pulley and the cog the chain is riding on. Optimal chain gap is small enough to allow quick, efficient shifts to and from any cog, but large enough to allow smooth shifts to and from the largest cog.

- Shift chain to the small chain ring.
- While turning the crank, push the rear derailleur inboard by hand to the largest cog.
- Hold the derailleur in this position while making the following adjustment:
- Use a 3 mm hex wrench, turn the b-adjust screw until the chain gap equals approximately 6 mm ($^1/_4$") from tip of the cog to tip of upper guide pulley ***(Fig. 5)***.

– Turn the b-adjust screw clockwise to increase the chain gap.
– Turn the b-adjust screw counterclockwise to decrease the chain gap.

Advice:

- ***Bicycles equipped with an 11–28 or 14–28 cassette may require you to set the chain gap at the smallest cog. This is due to the shallow angle of the cassette in relation to the steeper movement of the rear derailleur.***
- ***Precision index shifting may require small changes of the b-adjustment while setting the proper cable tension.***
- ***Do not use the b-adjust screw to adjust the rear derailleur to act as a chain-tensioning device or to prevent chain suck. This increases the chain gap causing poor shifting performance.***

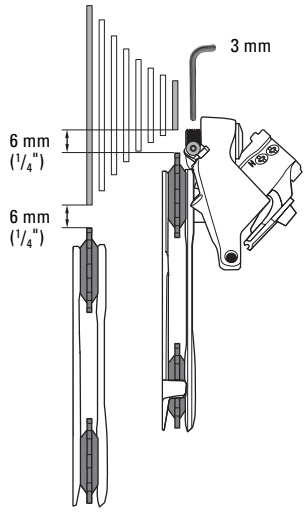
INDEX SHIFTING ADJUSTMENT

- Check that the chain and the rear derailleur are in the smallest cog position.
- Measure and cut the rear piece of cable housing. Make sure that it is not too short or long.
- Rotate the rear shifter until the largest number and gear indication tab/dash line up.
- Turn the rear shifter barrel adjust clockwise fully into the shifter, then turn counterclockwise 1 full turn.
- Feed the rear shifter cable through the rear derailleur cable housing, stops and cable guides.
- Thread the rear derailleur cable through the rear derailleur-housing stop and through the cable guide on the fin ***(Fig. 6)***.
- Pull the cable tight and position it under the cable anchor washer ***(Fig. 6)***.
- Tighten the 5 mm hex cable anchor bolt to 4 – 5 Nm (35–45 in.lbs.)
  – Be careful not to crush or deform the cable.
- Rapidly shift the chain and derailleur up and down the cassette several times. If the cable slips repeat the two former steps.
- Shift the chain to the smallest cog.
- While pedaling, move the shifter up one detent.
  – If the chain hesitates or does not shift to the second cog, increase the cable tension by turning the shifter barrel adjuster counterclockwise.
  – If the chain shifts beyond the second cog, decrease the cable tension by turning the shifter barrel adjuster clockwise.

SRAM ESP · REAR DERAILLEURS ASSEMBLY

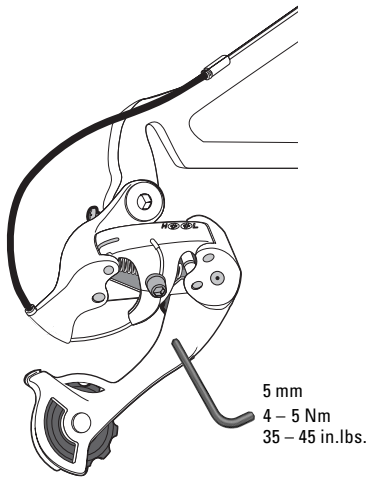
1:1

5



- Repeat the two former steps until shifting and cable tension is accurate.
- While turning the crank, shift the chain up and down the cassette and chain rings several times to ensure that your derailleur is indexing smoothly.

6



TROUBLESHOOTING

Problem	Cause	Remedy
Chain jumps from smallest sprocket to frame dropout.	High gear limit screw is not adjusted properly.	Turn in screw H until the guide pulley is aligned with the smallest sprocket.
Difficult or impossible to shift chain onto smallest sprocket.	High gear limit screw is not adjusted properly.	Unscrew screw H until the guide pulley is aligned with the smallest sprocket.
Chain jumps over largest sprocket and falls between the spokes and largest sprocket or inner cage plate scrapes on spokes.	Low gear limit screw is not adjusted properly.	Turn in screw L until the guide pulley is aligned with the largest sprocket.
	Rear derailleur or derailleur hanger is bent.	Straighten or replace.
Delayed shifting.	Clearance between guide pulley / sprocket is too large.	Adjust b-adjust screw by rotating counterclockwise.
Rough shifting behavior.	Clearance between guide pulley / sprocket is too small.	Adjust b-adjust screw by rotating clockwise.
Chain jumps two gears on small sprocket	Shift cable insufficiently tensioned.	Turn barrel adjuster on the shifter counterclockwise.
Delayed shifting onto larger sprocket	Shift cable insufficiently tensioned.	Turn barrel adjuster on the shifter counterclockwise.
Delayed shifting onto smaller sprocket	Shift cable is too tight.	Turn barrel adjuster on the shifter clockwise.
	Excessive cable friction, pinched or poorly routed cable.	Lubricate or replace cable and housing. Check for excessive bending of cable housing.

4.0 PRO / MRX PRO · TWIST SHIFTERS
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

4.0 PRO

NEW		4.0 Pro				
	Part No.	—	—	—	—	
	Shifter Type	Front / Micro adjust	Front / Index	Rear 1:1 / ESP	Rear 1:1 / ESP	
	Speeds		3	8	7	
Compatibility	Derailleur	SRAM & Shimano	SRAM & Shimano	SRAM X.0/9.0/7.0/5.0/4.0/3.0		
Compatibility	Crankset	Shimano	Shimano			
	Cable Pull Release	SRS	SRS	SRS	SRS	
	Cable	Die Drawn Steel	←	←	←	
	Gear Indication	Window	Window	Window	Window	
	Barrel Adjuster	Friction	Friction	Friction	Friction	
	Clamping Diameter	22.3 mm	22.3 mm	22.3 mm	22.3 mm	
	Shifter Length	86 mm	←	←	←	
	Weight	N/A	N/A	N/A	58 g	

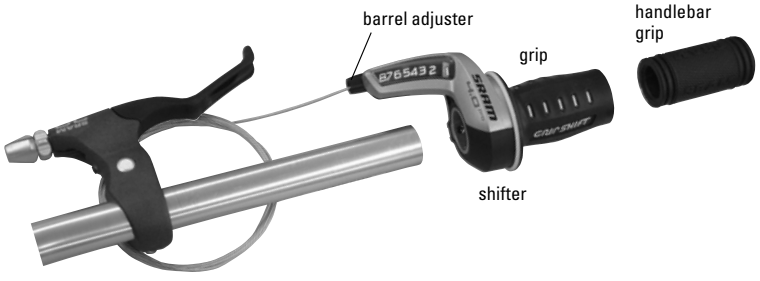
MRX PRO

NEW		MRX Pro						
	Part No.	—	—	—	—	—	—	
	Shifter Type	Front / Micro adjust	Front / Index	Rear 2:1		Rear Shimano Rapid Rise		
	Speeds		3	8	7	8	7	
Compatibility	Derailleur	SRAM & Shimano	SRAM & Shimano	SRAM 2:1 & Shimano		Shimano Rapid Rise		
Compatibility	Crankset	Shimano	Shimano					
	Cable Pull Release	SRS	SRS	SRS		SRS		
	Cable	Die Drawn Steel	←	←		←		
	Gear Indication	Window	Window	Window		Window		
	Barrel Adjuster	Friction	Friction	Friction		Friction		
	Clamping Diameter	22.3 mm	22.3 mm	22.3 mm		22.3 mm		
	Shifter Length	86 mm	←	←		←		
	Weight	N/A	N/A	N/A		N/A		

CABLE HOUSING

- Use only new high quality cable and compressionless cable housing with end caps.
- When choosing cable housing lengths, be sure to allow enough housing for an extreme turn of the handlebars in both directions.
- Note also, that different stem lengths and cable stop positions effects cable housing length.

SHIFTER ANATOMY

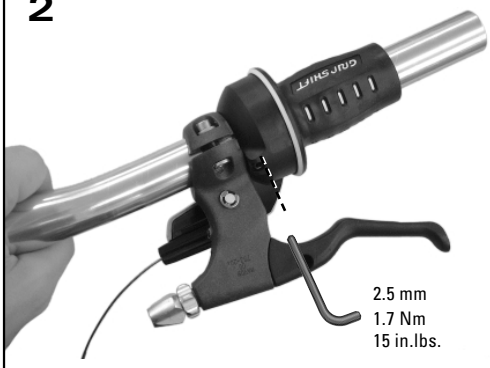


4.0 PRO / MRX PRO · TWIST SHIFTERS ASSEMBLY

1:1
2:1

1

2



3

A S S E M B L Y

Front and Rear:

- Slide the shifter onto the handlebar.
  – If necessary, move the brake lever to allow for shifter and handlebar grip.
  – Bar end users – don't forget to leave room for the bar end.
- Rotate the shifter until the barrel adjuster is above (but out of the way of) the brake lever and the gear indication is clearly visible from the riding position.
- Tighten the 2.5 mm hex clamp bolt to 1.7 Nm (15 in.lbs.).
- Slide the handlebar grip onto bar.
  – Never use lubricants or solvents to install handlebar grips. Handlebar grips provide an axial safety function. For this reason, they should be mounted in such a way as to make sure they do not slip off handlebar!
  – Never ride without the handlebar grips, this can result in severe injury or death.
- Feed the cable through the cable housing and frame stops.
- Attach cable to the derailleur.
- Adjust indexing per derailleur instructions.

Not recommended for use on thin walled alluminum handlebars such as Hyperlite® type handlebars.

Advice:

- ***Always check the front and rear brake levers for proper operation.***
- ***If there is interference between shifters and brake levers, re-adjust lever and shifter placement.***
- ***Check again for proper operation!***

R9 / 3.0 · CASSETTES
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

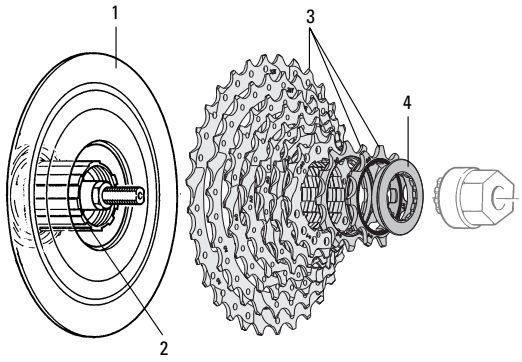
R9

NEW		R9			
	Application	Road	Road	Road	Road
	Technology	Power Glide II	Power Glide II	Power Glide II	Power Glide II
	Largest Cog	26 T	23 T	23 T	21 T
Compatibility	**Speeds**	9	9	9	9
	Derailleurs	Shimano	Shimano	Shimano	Shimano
	Chains	SRAM / Shimano / Campa.	SRAM / Shimano / Campa.	SRAM / Shimano / Campa.	SRAM / Shimano / Campa.
	Hubs	SRAM / Shimano	SRAM / Shimano	SRAM / Shimano	SRAM / Shimano
	Cogs	12/13/14/15/17/19/21/23/26	12/13/14/15/16/17/19/21/23	11/12/13/14/15/17/19/21/23	11/12/13/14/15/16/17/19/21
	Lockring torque	40 Nm	40 Nm	40 Nm	40 Nm
	Weight	230 g	210 g	210 g	200 g
Design	**Cogs**	SAPH 440 steel	SAPH 440 steel	SAPH 440 steel	SAPH 440 steel
	Spacers	Translucent	Translucent	Translucent	Translucent
	Lockring	Aluminum	Aluminum	Aluminum	Aluminum
	Screw	Steel / Zinc Coat	Steel / Zinc Coat	Steel / Zinc Coat	Steel / Zinc Coat
	Finish	Ni-Chrome Plated	Ni-Chrome Plated	Ni-Chrome Plated	Ni-Chrome Plated

3.0

NEW		3.0	
	Application	MTB	MTB
	Technology	Power Glide II	Power Glide II
	Largest Cog	32 T	28 T
Compatibility	**Speeds**	8	8
	Chains	SRAM / Shimano	SRAM / Shimano
	Hubs	SRAM / Shimano	SRAM / Shimano
	Cogs	11/12/14/16/18/21/26/32	11/12/14/16/18/21/24/28
	Lockring torque	40 Nm	40 Nm
	Weight	315 g	275 g
Design	**Cogs**	Steel	Steel
	Spacers	Composite	Composite
	Lockring	Forged Steel	Forged Steel
	Screw	Steel / Zinc Coat	Steel / Zinc Coat
	Finish	Chrome Plated	Chrome Plated

1



A S S E M B L Y

- Snap spoke protector disc (1, ***Fig. 1)*** onto the hub flange.
- Fit cassette (3) onto driver profile (2).
- Screw lock nut (4) with cassette tool (Park Tool FR-5 or SRAM Part No. 4624 411 010), tightening torque: 40 Nm (350 in.lbs.).

Advice:
Due to the optimized stability of the rear wheel, there is less space between the right spoke flange and the sprocket cassette. This means that not all spoke protector discs available on the market will fit. Please carry out a trial assembly run before specifying spoke protector discs (spoke protector discs must not rub against the sprocket cassette).

NOTICES

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