

2004

TECHNICAL NEWS

GEAR HUB SYSTEMS

MTB COMPONENTS

ENGLISH



SRAM



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MTB COMPONENTS

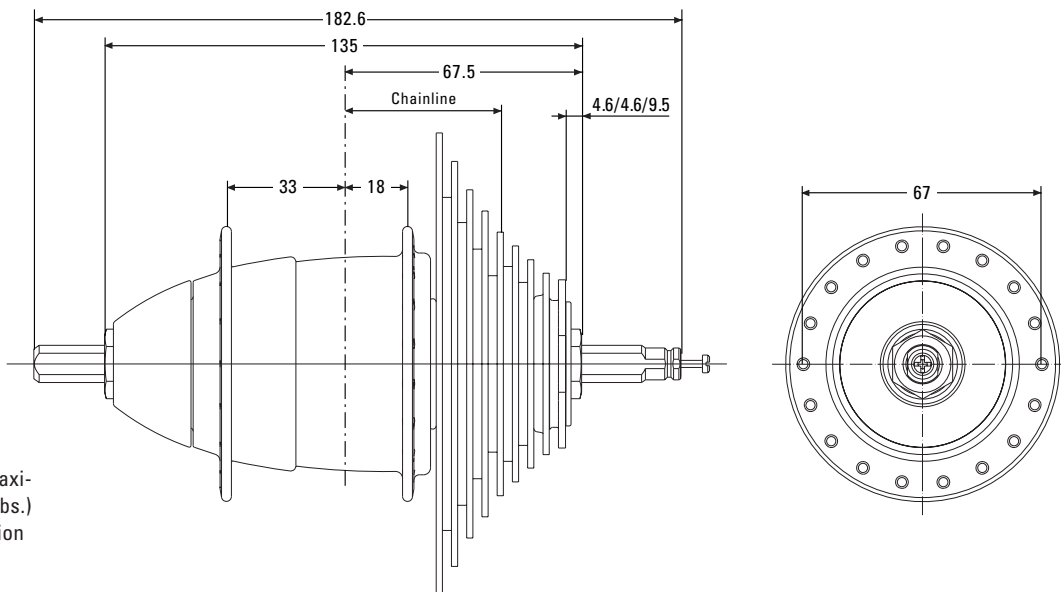
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DUALDRIVE

TECHNICAL DATA / ASSEMBLY REQUIREMENTS



- Expanded gear range
- Efficient design
- Stand-still shifting (mode selector)
- Single chainring design
- Sealed system
- Easy wheel removal
- ESP 1:1 actuation ratio technology
- 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.

ICBS

		DualDrive · without brake			DualDrive · disc brake compatible		
	Version (Speeds)	DualDrive 27	DualDrive 24	DualDrive 21 NEW	DualDrive 27	DualDrive 24	DualDrive 21 NEW
	Brake	None			Interface for Disc brakes		
Axle	Over Locknut Dim.	135 mm			135 mm		
	Length	182.6 mm			182,6 mm		
Spoke	Ends Diameter	FG 10.5			FG 10.5		
	Holes	36 or 32			36 or 32	36	32
	Hole Diameter	2.6 mm			2.6 mm	2.6 mm	2.8 mm
	Hole Ref. ø	67 mm			67 mm		
Ratio	Flange Dist. to 1/2 OLD	33 mm / 18 mm			33 mm / 18 mm		
	Totally	576 % (27spd)	542 % (24spd)	509 % (21spd)	576 % (27spd)	542 % (24spd)	509 % (21spd)
	Totally hub	186 %			←		
	Speed 1	73 %			←		
	Speed 2	100 %			←		
	Speed 3	136 %			←		
	Chainline	45 mm	45 mm	42 mm	45 mm	45 mm	42 mm
	Crankset	33 / 38 Teeth			←		
	Cogset	11-34 Teeth	11-32 Teeth	12-32 Teeth	11-34 Teeth	11-32 Teeth	12-32 Teeth
	Cogset Compatib.	DualDrive 27	DualDrive 24	DualDrive 21	DualDrive 27	DualDrive 24	DualDrive 21
Shifter Compatib.	DualDrive 27	DualDrive 24	DualDrive 21	DualDrive 27	DualDrive 24	DualDrive 21	
Sealing	Extra sealed			←			
Tandem compatib.	—			—			
Disc compatib.	—			SRAM / Magura / Hayes / Shimano			
Weight	970 g			970 g			
Finish	Hub Shell	Aluminum			Aluminum		
	Shifting device	Composite			Composite		

DUALDRIVE TECHNICAL DATA / ASSEMBLY REQUIREMENTS

DERAILLEURS

	DualDrive 27	DualDrive 24	DualDrive 21 <i>NEW</i>
Speeds	9	8	7
Shifter Compatibility	DualDrive 27	DualDrive 24	DualDrive 21
Cage Length	Short, 75 mm	Short, 75 mm	Short, 75 mm
Sprocket, max.	34 Teeth	32 Teeth	32 Teeth
Sprocket, min.	11 Teeth	11 Teeth	11 Teeth
Pulleys	Exchangeable / Bushing	Exchangeable / Bushing	Exchangeable / Bushing
Direct Mount	●	●	●
Weight	258 g	265 g	265 g
Upper Knuckle	Aluminum	Grilon Composite silver	Grilon Composite black
Lower Knuckle	Grilon Composite silver	Grilon Composite silver	Grilon Composite black
Outer Link	Aluminum	Grilon Composite silver	Grilon Composite black
Inner Link	Steel / Zinc coat	Steel / Zinc coat	Steel / Zinc coat
Outer Cage	Forged Aluminum	Grilon Composite black	Steel black
Inner Cage	Grilon Composite black	Grilon Composite black	Grilon Composite black
Hanger Bolt	Aluminum	Steel	Steel

Design

CASSETTES

	DualDrive 27	DualDrive 24	DualDrive 21 <i>NEW</i>
Part No.	—	—	—
Largest Cog	34 Teeth	32 Teeth	32 Teeth
Speeds	9	8	7
Cogs	11/12/14/16/18/21/24/28/34	11/12/14/16/18/21/26/32	12/14/16/18/21/26/32
Spacers	Blue	Black	Grey
Chain compatib.	9spd, HG/IG/PG II comp.	8spd, HG/IG/PG II comp.	7spd, HG/IG/PG II comp.
Weight	320 g	270 g	310 g
Cogs	SAPH 440 steel	←	SAPH 440 steel / 1008 steel
Screws	Steel / Zinc Coat	←	←
Finish	Matte Nickel Plated	Chrome	Chrome

Design

SHIFTERS

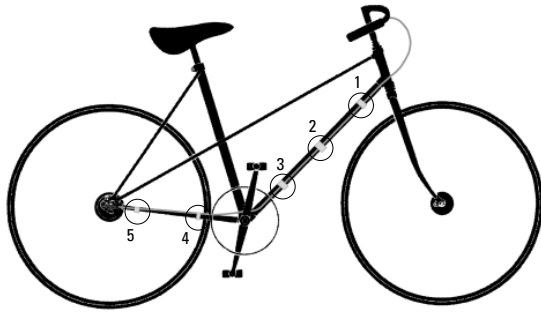
	DualDrive 27		DualDrive 24		DualDrive 21 <i>NEW</i>	Lefthand
Part No.	—	—	—	—	—	—
Clickbox Cable	1400 mm	1500 mm	1600 mm	1700 mm	2100 mm	see Price list
Shifter Type	SRS Twisting-Thumbshifter-Combo (2in1)					Twist shifter
Arrangement	Handlebar, right					left (right: use 5.0 shifter)
Gear Hub	DualDrive					DualDrive
Deraillieur	DualDrive 27		DualDrive 24		DualDrive 21	DualDrive 27 / 24 / 21
Gear Indication Der.	Window		Printed		Printed	Printed
Riding Mode Indic.	Printed		Printed		Printed	Printed
Barrel Adj. Gear Hub	None					Indexing
Barrel Adj. Deraillieur	Indexing					see 5.0 shifter
Clamping Diameter	22.3 mm					22.3 mm
Handlebar, Straight Area	Minimum length = 150 mm					N/A
Cable Routing, Gear Hub	Continuous housing (preassembled)					Continuous housing (preassembled)
Cable Routing, Der.	Open or continuous					Open or continuous
Weight	N/A					N/A
Cables	Stainless steel					Stainless steel
Housing	Glass filled PA – Silver painted					Glass filled PA
Grip Cover	Thermoplastic elastomer, Overmolded					Thermoplastic elastomer, Overmolded
Clamping Collar	Aluminum					Aluminum
Clickbox	Composite					Composite

Design

DUALDRIVE TECHNICAL DATA / ASSEMBLY REQUIREMENTS



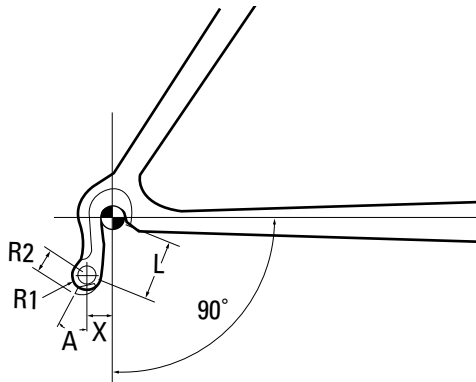
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Cable routing	DualDrive 27 / DualDrive 24 / DualDrive 21
Hub cable	Along chainstay only
Deraillleur cable	Along chainstay only

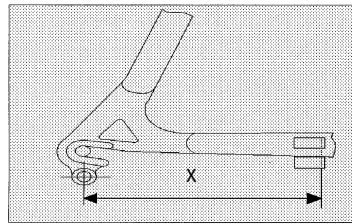
Cable attachment see Fig. 1	Cable housing	Attachement points	Cable stops
Hub	Continuous	1/2/3/4 (see Fig. 1)	—
Deraillleur	Continuous	1/2/3/4/5 (see Fig. 1)	—
	Open	—	1/5 (Fig. 1)

2



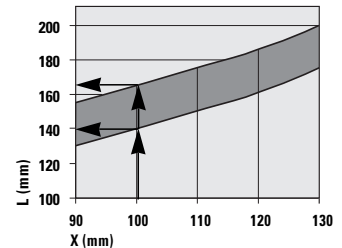
CABLE HOUSING FOR DERAILLEUR

Rear cable stop position



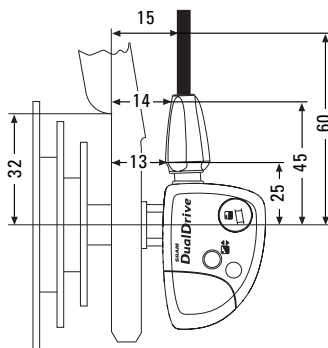
Length X min. 90 mm.
Cable stop below or beside chainstay.

Rear housing length



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

3



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.

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.

Ask for recommended DualDrive-cranksets at:

- Truvativ
<http://www.truvativ.com>
- Tien Hsin Industries
<http://www.thindustries.com>

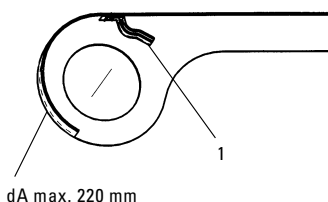
DROPOUT

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

4



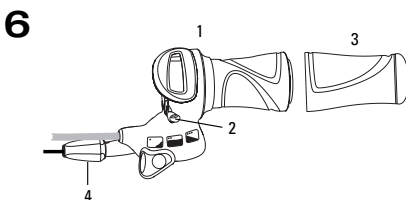
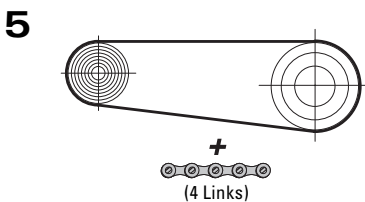
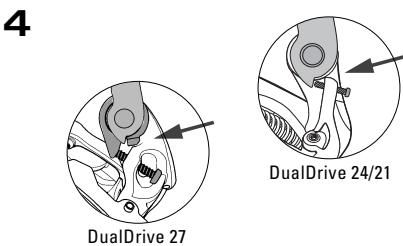
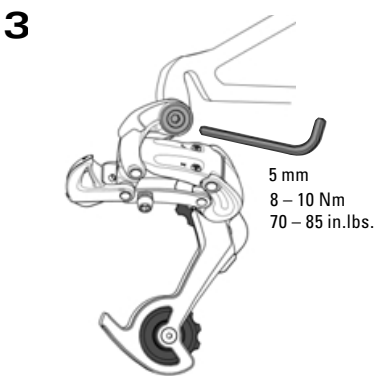
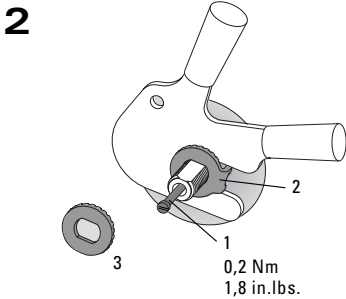
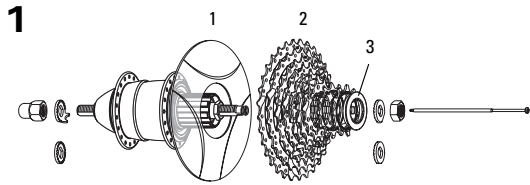
CHAIN GUIDE FORK

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.
Check the compatibility of intended handlebars and brake levers.

DUALDRIVE ASSEMBLY



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 (**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.

- 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 24/21) 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

- 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 4 LINKS or 3 link + Connecting 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 – 2.5 Nm (17 – 22 in.lbs.).
- Slide the handlebar grip (3) onto the handlebar.

Caution:

- **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.**
- **Check that the shifter and brake lever function properly and are unobstructed (realign) if necessary.**

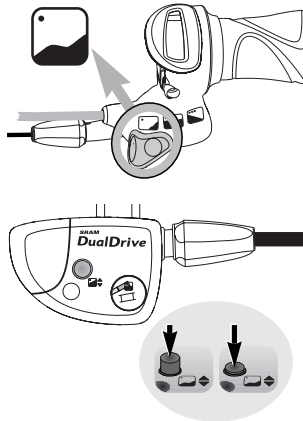
INSTALLING CLICKBOX

- 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 (**Fig. 8**).

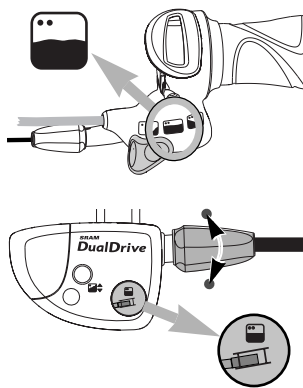
DUALDRIVE ASSEMBLY



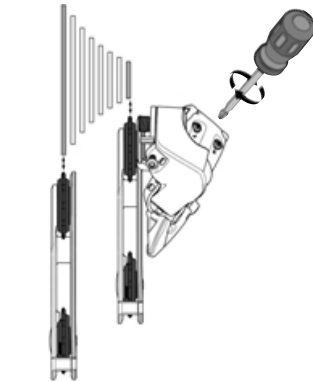
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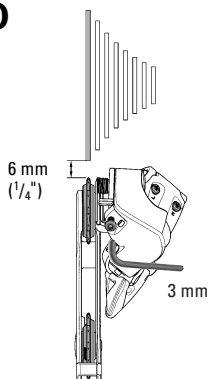
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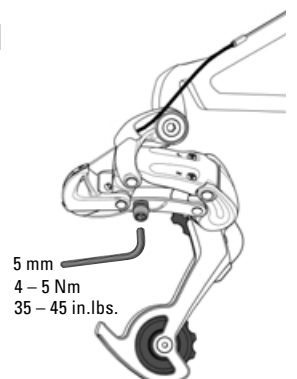
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10



11



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 ($\frac{1}{4}$ ") 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.

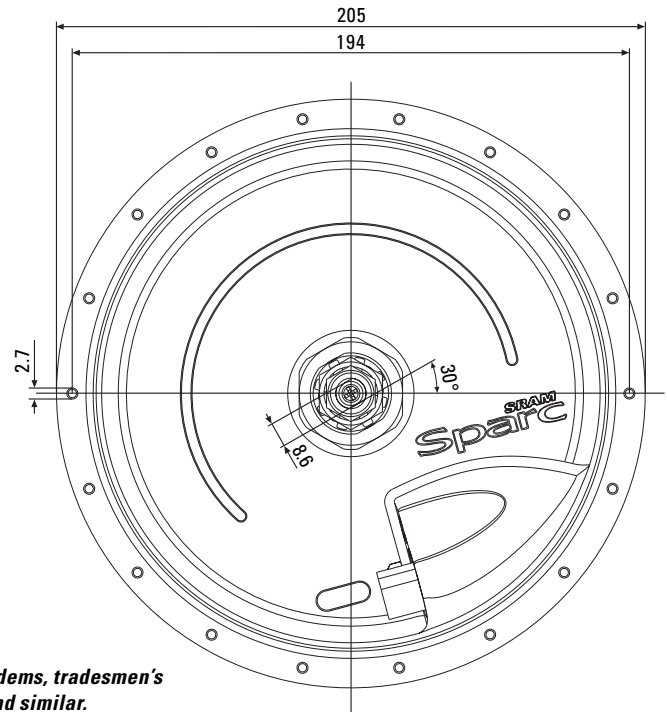
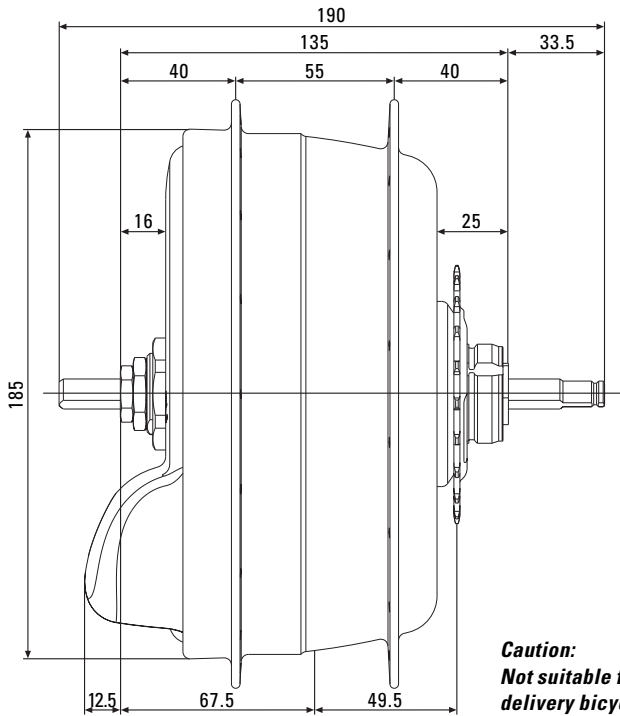
Advice:

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 (**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.

SPARC TECHNICAL DATA / ASSEMBLY REQUIREMENTS



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

BUCH

		Sparc hub			
Electric Drive	V max.	Version	Europe 28"	Europe 20"	USA 26"
		Econ Mode	18 km/h	18 km/h	14 mph
		Speed Mode	24 km/h	24 km/h	18 mph
		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		
		Length	190 mm		
Axle		Ends Diameter	FG 10.5		
		Holes	36		
		Hole Diameter	2.9 mm		
Spoke		Hole Reference ø	194 mm		
		Totally	249 %		
		Speed 1	63 %		
Gear Hub Ratio		Speed 2	78 %		
		Speed 3	100 %		
		Speed 4	128 %		
		Speed 5	158 %		
		Usable Dimension	1/2" x 1/8" or 1/2" x 3/32"		
Chain		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 NEW			
Part No.	—	—	—	—	—
Shifter Type	Twist Shifter				
Cable (mm)	1500	1600	1700	1900	—
Gear Indication	Window				
Clamping Diameter	22.3 mm				
Handlebar, Straight Area	Minimum length = 150 mm				
Weight	89 g				

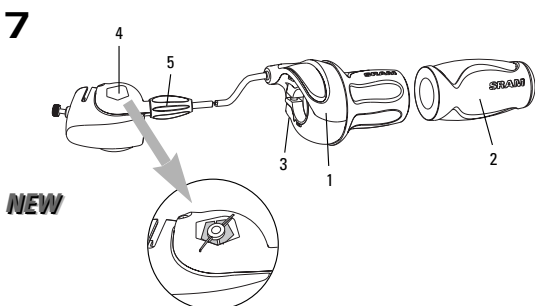
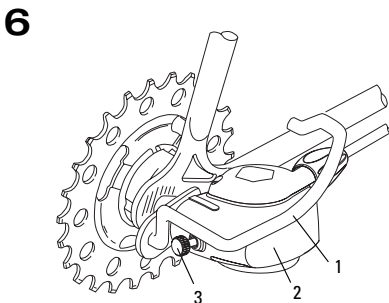
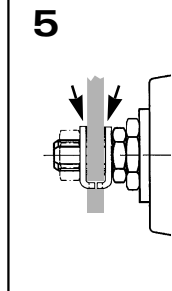
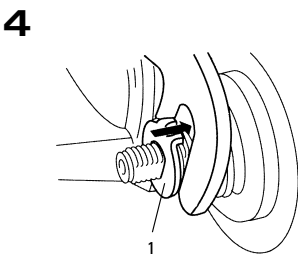
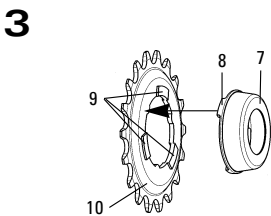
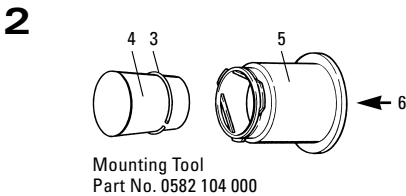
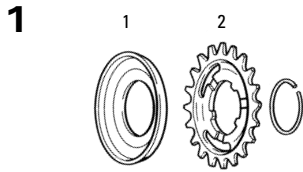
REMOTE CONTROL

		Sparc Remote Control Unit					
Part No.	—	—	—	—	—	—	—
Cable (mm)	1500	1600	1700	1800	2000	2200	—
Mode Selector	Off / Econ / Speed						
Mode Indication	Printed						
Clamping Diameter	22.3 mm						
Cable Connection	3.5 mm stereo jack						
Weight	45 g						

BATTERY BOX

		Sparc Battery Box					
Part No.	—	—	—	—	—	—	—
Cable (mm)	650	750	850	1400	1650	1950	—
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



LACING THE WHEEL

Version Europe 28" / USA 26":

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

Version Europe 20":

- 1-cross:
Use only rim „Rigida 20x406 59 (L 01 12 E)“ (or contact SRAM).
All spoke heads must be positioned at the outside of the spoke flange.
Spoke tension about 1000 N recommended.
- Radial lacing:
No restrictions.
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 retaining washers (1, Fig. 4) on both axle ends. The serrations must bear against the dropout and the lug must engage in the dropout slot.
In case of little space e.g. by thick dropouts, both retaining washers should be assembled on the left axle end (Fig. 5).
- On the sprocket side fit the protective bracket (1, Fig. 6) directly below the axle nut. Tightening torque on acorn or axle 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.
- At least the beginning of the axle thread must be visible in front of the axle nut.

ASSEMBLY SHIFTER

Advice:

- Contrary to the old shifter version the shifter cable of the new version runs above the brake lever. Maybe you need 50 mm more cable length.
- 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 handlebar positions effects cable housing length.
- Slide shifter (1, Fig. 7) onto handlebar.
- Mount fixed grip (2) onto end of handlebar.
- Slide shifter against fixed grip, adjust shifter on handlebar and tighten with bolt (3) with a torque of 1.5 Nm (13 in.lbs.).

Caution:

- Never use lubricants or solvents to install fixed grips.
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.
- Check that the shifter and brake lever function properly and are unobstructed (realign if necessary).

- When fitting the cable (1, Fig. 8) avoid small radius.
- Last attachment point is on the lower rear wheel fork (2, Fig. 8) immediately behind the chain wheel.
Cable housing must be movable inside attachment.

INSTALLING CLICK BOX

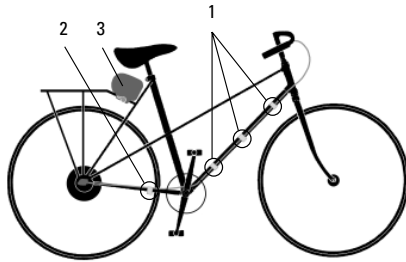
- Insert shift rod (1, Fig. 9) in shift tube (2) (oil parts lightly) and then push into axle bore as far as the stop. Turn slot (6) in shift tube to a position where it is easily visible.
- Push locating sleeve (3) with guiding rib (4) to the front onto the hub axle – making sure that the internal lug (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.
- Place shifter in gear position “2”.
- Push on clickbox (2, Fig. 6) to the stop on the axle. The guiding rib (4, Fig. 9) of the locating sleeve thereby engages in the slot on the housing. In the end position tighten up the knurled bolt (3, Fig. 6) by hand (0,3 Nm / 2,7 in.lbs.).

ADJUSTMENT HUB

- Be sure to reset rotational shifter from 4th. to 3rd gear.
- Match up the arrow marks in the Clickbox viewing window (4, Fig. 7) by turning the adjusting screw (5).



8



ASSEMBLY BATTERY BOX

- Pull both quick releases outward and turn them to the „open“ position (**Fig. 10**).
- Position battery box onto luggage carrier struts (**3, Fig. 8**).
- 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.

ASSEMBLY REMOTE CONTROL UNIT

- Slide remote control unit (**1, Fig. 11**) 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.

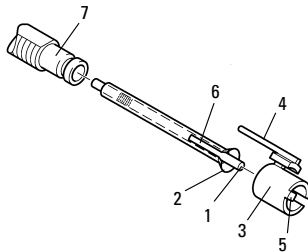
Make a cable loop between plug and cable attachment point to avoid tensile load.

- 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.

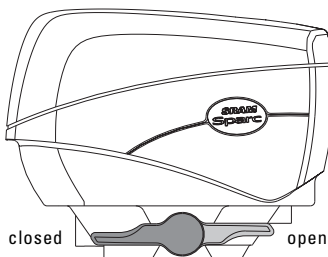
9



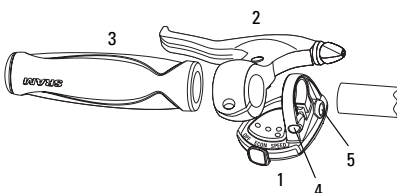
STORING THE BATTERY

The battery box should be stored fully charged in a dry and cool place. All batteries are shipped with an additional documentation about the last charging date within our SRAM facility. This documentation of battery charging also allows you to fill in the dates of additional charge actions that you would need to perform if the batteries stay in your warehouse over a longer period of time. You can identify the next necessary charge date at a glance (at least 6 months after last charge).

10



11



X.0 / X.9 / X.7 / 5.0 / 4.0 / 3.0 • REAR DERAILLEURS

TECHNICAL DATA / ASSEMBLY REQUIREMENTS

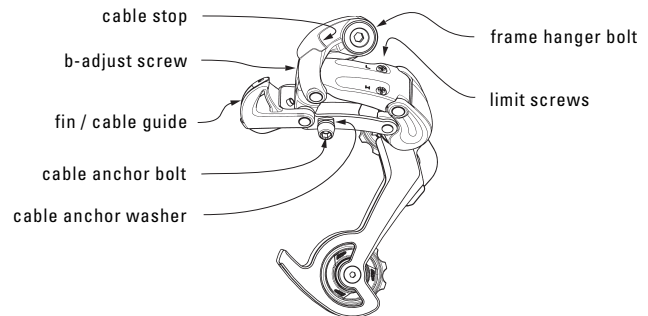


1:1

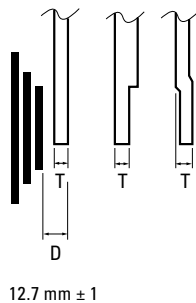
X
·
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	X.0	X.9	<i>NEW</i>	X.7	<i>NEW</i>	5.0	<i>NEW</i>	4.0	3.0
Part No.	—	—	—	—	—	—	—	—	—
Speeds	9/8	9/8		9/8		8		9/8/7	
Shifter Compatibility	SRAM X.0 / 9.0 / 7.0 / 5.0 / 4.0 / 3.0			←		←			
Chain Capacity	Total	37 T	45 T	45 T	45 T	45 T		45 T	
	Cage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

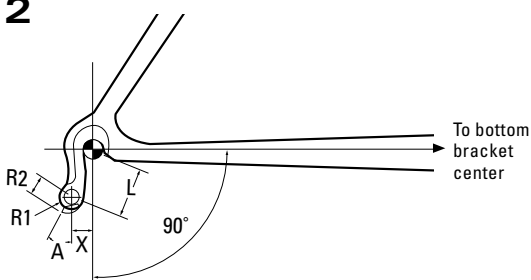
DERAILLEUR ANATOMY



1



2



COMPATIBILITY

Shifters	SRAM® X.0, X.9, X.7, 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)

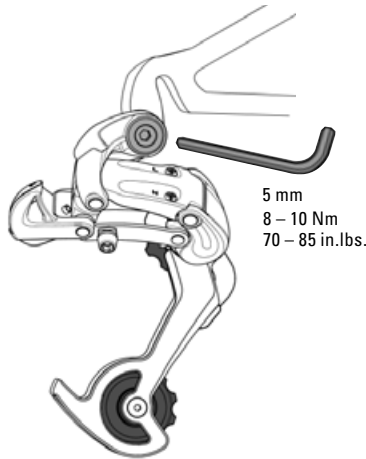
- For optimal ESP rear derailleur performance, the recommended rear derailleur hanger length (L) should be 28 – 30 mm.

- 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 / X.9 / X.7 / 5.0 / 4.0 / 3.0 • REAR DERAILLEURS ASSEMBLY

1



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.

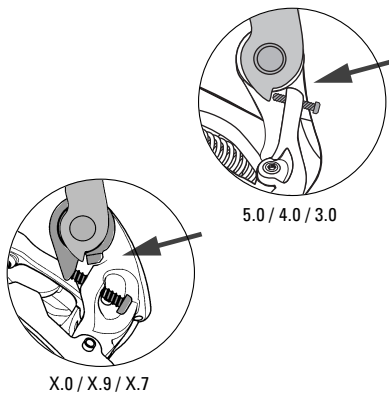
Advice:

- **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.**

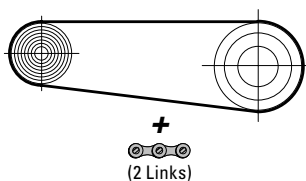
INDEX SHIFTING ADJUSTMENT

- 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.

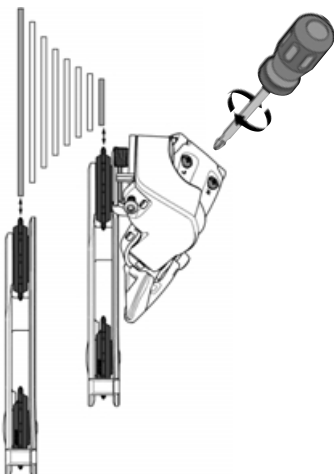
2



3



4

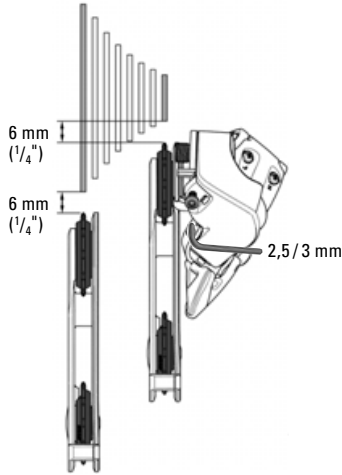


X.0 / X.9 / X.7 / 5.0 / 4.0 / 3.0 • REAR DERAILLEURS ASSEMBLY



1:1

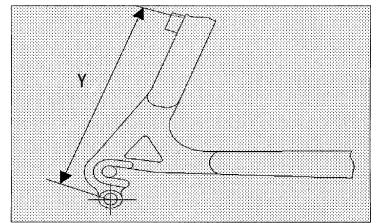
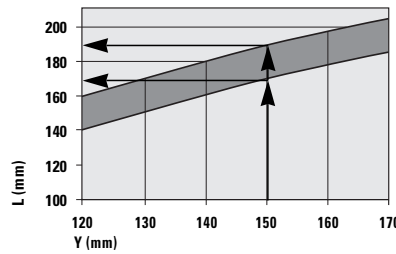
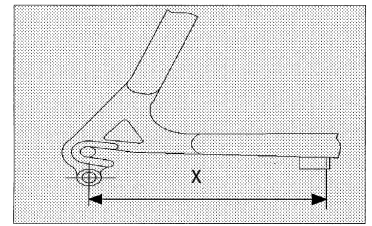
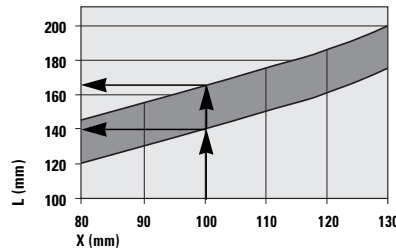
5



- 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.

CHART / LENGTH OF CABLE HOUSINGS

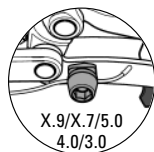
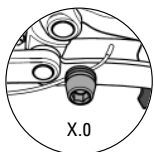
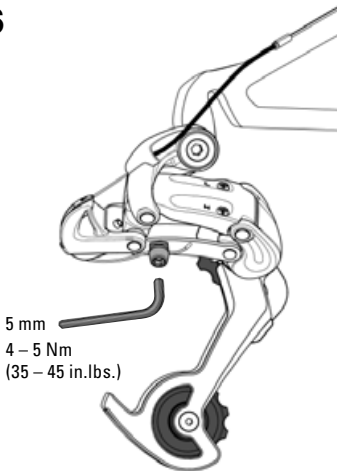
Example: Distance X = 100 mm → cable housing length L = 140 – 165 mm.



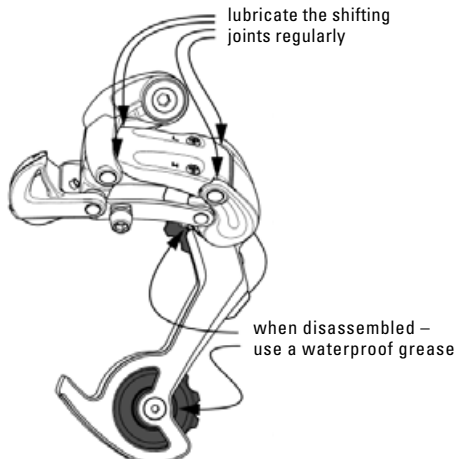
Caution:

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

6



7



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.

X.0 / X.9 / X.7 / ROCKET / ATTACK · TWIST SHIFTERS

TECHNICAL DATA / ASSEMBLY REQUIREMENTS

X.0 X.9		X.0			X.9 <i>NEW</i>	
	Version	Shorty	Shorty	Shorty	Shorty	Shorty
	Shifter Type	Front / Micro adjust	Front / Index	Rear 1:1 / ESP	Front / Micro adjust	Front / Index
	Speeds		3	9 8		3
	Derailleur	SRAM & Shimano	SRAM & Shimano	SRAM X.0/9.0/7.0/5.0	SRAM & Shimano	SRAM & Shimano
	Crankset	Shimano	Shimano		Shimano	Shimano
	Cable Pull Release	SRS	SRS	SRS	SRS	SRS
	Cable	Teflon Coated	←	←	Teflon Coated	←
	Gear Indication	Window	Window	Window	Window	Window
	Barrel Adjuster	Indexing	Indexing	Indexing	Indexing	Indexing
	Clamping Diameter	22.3 mm	22.3 mm	22.3 mm	22.3 mm	22.3 mm
Shifter Length	70 mm	←	←	70 mm	←	

X.9 X.7 ROCKET		X.9 <i>NEW</i>		X.7 <i>NEW</i>		Rocket	
	Version	Shorty	Shorty	Shorty	Shorty	Shorty	Shorty
	Shifter Type	Rear 1:1 / ESP	Front / Micro adjust	Front / Index	Rear 1:1 / ESP	Front / Micro adjust	Front / Micro adjust
	Speeds	9 8		3	9 8		
	Derailleur	SRAM X.0/9.0/7.0/5.0	SRAM & Shimano	SRAM & Shimano	SRAM X.0/9.0/7.0/5.0	SRAM & Shimano	SRAM & Shimano
	Crankset		Shimano	Shimano		Shimano	Shimano
	Cable Pull Release	SRS	SRS	SRS	SRS	SRS	SRS
	Cable	Teflon Coated	Teflon Coated	←	←	Teflon Coated	Teflon Coated
	Gear Indication	Window	Window	Window	Window	Window	Window
	Barrel Adjuster	Indexing	Indexing	Indexing	Indexing	Indexing	Indexing
	Clamping Diameter	22.3 mm	22.3 mm	22.3 mm	22.3 mm	22.3 mm	22.3 mm
Shifter Length	70 mm	70 mm	←	←	70 mm	70 mm	

ROCKET ATTACK		Rocket		Attack		
	Version	Shorty	Shorty	Shorty	Shorty	Shorty
	Shifter Type	Front / Index	Rear 2:1	Front / Micro adjust	Front / Index	Rear 2:1
	Speeds	3	9 8		3	9 8
	Derailleur	SRAM & Shimano	Shimano	SRAM & Shimano	SRAM & Shimano	Shimano
	Crankset	Shimano		Shimano	Shimano	
	Cable Pull Release	SRS	SRS	SRS	SRS	SRS
	Cable	Teflon Coated	←	Teflon Coated	←	←
	Gear Indication	Window	Window	Window	Window	Window
	Barrel Adjuster	Indexing	Indexing	Indexing	Indexing	Indexing
	Clamping Diameter	22.3 mm	22.3 mm	22.3 mm	22.3 mm	22.3 mm
Shifter Length	70 mm	←	70 mm	←	←	

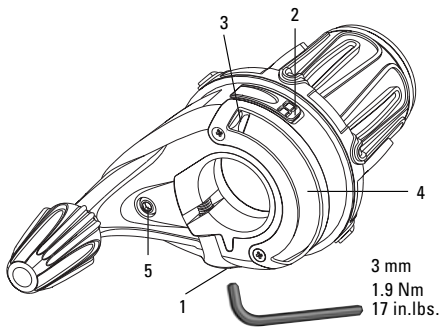
CABLE HOUSING

- 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.

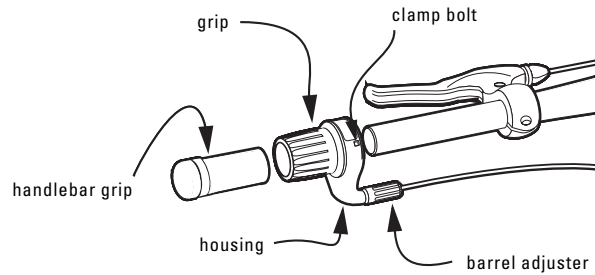
X.0 / X.9 / X.7 / ROCKET / ATTACK • TWIST SHIFTERS ASSEMBLY

1:1
2:1

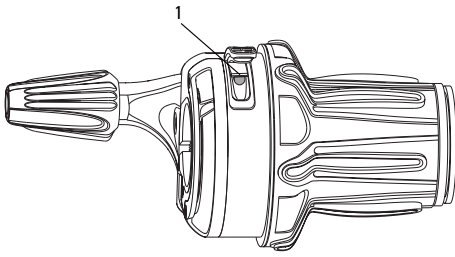
1



SHIFTER ANATOMY



2



ASSEMBLY

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 beneath (but out of the way of) the brake lever.
- Tighten the 3 mm hex clamp bolt (1, Fig. 1) to 1.9 Nm (17 in.lbs.).
- Slide the handlebar grip onto the handlebar.

Caution:

Never use lubricants or solvents to install handlebar grips. Handlebar grips provide safety function.

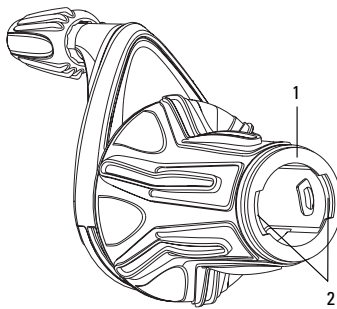
For this reason, they should be mounted in such a way as to make sure they do not slip off handlebar!

- Feed the cable through the cable housing and stops.
- Attach cable to the derailleur.
- Adjust indexing per derailleur instruction.

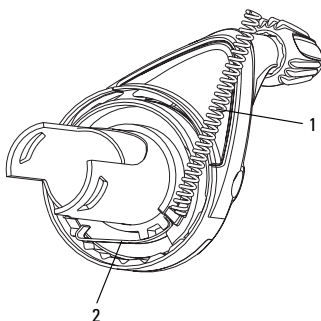
Caution:

- **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!**

3



4



4.0 PRO / MRX PRO • TWIST SHIFTERS

TECHNICAL DATA / ASSEMBLY REQUIREMENTS

4.0 PRO

		4.0 Pro				
Com- pati- bility	Version	Half Pipe	Half Pipe	Half Pipe	Half Pipe	Half Pipe
	Shifter Type	Front / Micro adjust	Front / Index	Rear 1:1 / ESP	Rear 1:1 / ESP	Rear 1:1 / ESP
	Speeds		3	9 NEW	8	7
	Deraillieur	SRAM & Shimano	SRAM & Shimano	SRAM X.0/X.9/X.7/5.0/4.0/3.0		
	Crankset	Shimano	Shimano			
	Cable Pull Release	SRS	SRS	SRS	SRS	SRS
	Cable	Standard Steel	←	←	←	←
	Gear Indication	Window	Window	Window	Window	Window
	Barrel Adjuster	Friction	Friction	Friction	Friction	Friction
	Clamping Diameter	22.3mm	22.3mm	22.3mm	22.3mm	22.3mm
	Shifter Length	86mm	←	←	←	←
	Weight	87 g	87 g	87 g	87 g	87 g

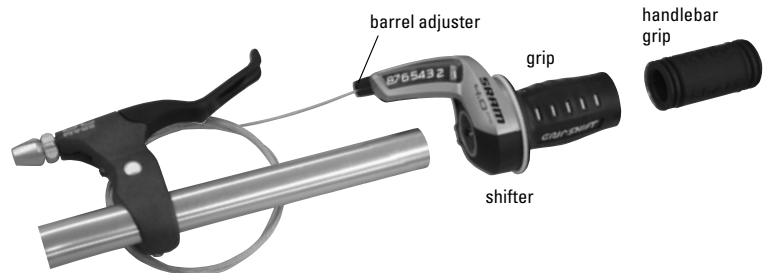
MRX PRO

		MRX Pro							
Com- pati- bility	Version	Half Pipe	Half Pipe	Half Pipe	Half Pipe	Half Pipe	Half Pipe	Half Pipe	
	Shifter Type	Front / Micro adjust	Front / Index	Rear 2:1			Rear Shimano Rapid Rise		
	Speeds		3	9 NEW	8	7	9 NEW	8	7
	Deraillieur	SRAM & Shimano	SRAM & Shimano	Shimano			Shimano Rapid Rise		
	Crankset	Shimano	Shimano						
	Cable Pull Release	SRS	SRS	SRS			SRS		
	Cable	Standard Steel	←	←			←		
	Gear Indication	Window	Window	Window			Window		
	Barrel Adjuster	Friction	Friction	Friction			Friction		
	Clamping Diameter	22.3mm	22.3mm	22.3mm			22.3mm		
	Shifter Length	86mm	←	←			←		
	Weight	87 g	87 g	87 g			87 g		

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.

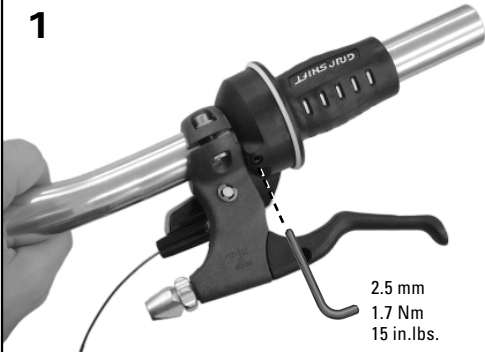
SHIFTER ANATOMY



4.0 PRO / MRX PRO • TWIST SHIFTERS ASSEMBLY



1



ASSEMBLY

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 (**Fig. 1**) to 1.7 Nm (15 in.lbs.).
- Slide the handlebar grip onto bar (**Fig. 2**).

Caution:

Never use lubricants or solvents to install handlebar grips. Handlebar grips provide safety function.

For this reason, they should be mounted in such a way as to make sure they do not slip off handlebar!

- 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 aluminum handlebars such as Hyperlite® type handlebars.

Caution:

- **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!**

2



3.0 COMP / MRX COMP · TWIST SHIFTERS

TECHNICAL DATA / ASSEMBLY REQUIREMENTS

3.0 COMP

NEW		3.0 Comp				
Com- pati- bility	Version	Shorty	Shorty	Shorty	Shorty	Shorty
	Shifter Type	Front / Micro adjust	Front / Index	Rear 1:1 / ESP	Rear 1:1 / ESP	Rear 1:1 / ESP
	Speeds		3	8	7	6
	Derailleur	SRAM & Shimano	SRAM & Shimano	SRAM X.0/X.9/X.7/5.0/4.0/3.0		
	Crankset	Shimano	Shimano			
	Cable Pull Release	SRS	SRS	SRS	SRS	SRS
	Cable	Standard Steel	←	←	←	←
	Gear Indication	Printed	Printed	Printed	Printed	Printed
	Barrel Adjuster	Friction	Friction	Friction	Friction	Friction
	Clamping Diameter	22.3mm	22.3mm	22.3mm	22.3mm	22.3mm
	Shifter Length	67mm	←	←	←	←
	Weight	67 g	67 g	67 g	67 g	67 g

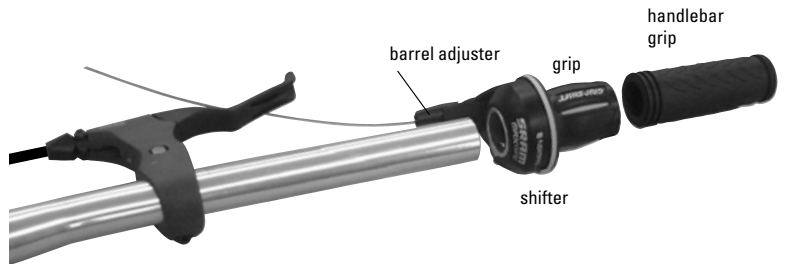
MRX COMP

NEW		MRX Comp							
Com- pati- bility	Version	Shorty	Shorty	Shorty	Shorty	Shorty	Shorty	Shorty	
	Shifter Type	Front / Micro adjust	Front / Index	Rear 2:1			Rear Shimano Rapid Rise		
	Speeds		3	8	7	6	8	7	6
	Derailleur	SRAM & Shimano	SRAM & Shimano	Shimano			Shimano Rapid Rise		
	Crankset	Shimano	Shimano						
	Cable Pull Release	SRS	SRS	SRS			SRS		
	Cable	Standard Steel	←	←			←		
	Gear Indication	Printed	Printed	Printed			Printed		
	Barrel Adjuster	Friction	Friction	Friction			Friction		
	Clamping Diameter	22.3mm	22.3mm	22.3mm			22.3mm		
	Shifter Length	67mm	←	←			←		
	Weight	67 g	67 g	67 g			67 g		

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



3.0 COMP / MRX COMP • TWIST SHIFTERS ASSEMBLY



1



2



3



ASSEMBLY

- Slide the shifter onto the handlebar (**Fig. 1**).
 - If necessary, move the brake lever to allow for shifter and stationary grip.
 - Bar end users – don't forget to leave room for the bar end.
- Rotate the shifter until the barrel adjuster is beneath (but out of the way of) the brake lever.
- Tighten the 2.5 mm hex clamp bolt (**Fig. 2**) to 1.7 Nm (15 in.lbs.).
- Slide the stationary grip onto the handlebar (**Fig. 3**).

Caution:

Never use lubricants or solvents to install handlebar grips. Handlebar grips provide safety function.

For this reason, they should be mounted in such a way as to make sure they do not slip off handlebar!

- Feed the cable through the cable housing and stops.
- Attach the front/rear shifter cable to the front/rear derailleur.
- Adjust indexing per derailleur instructions.

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

Caution:

- **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!**

X.9 / X.7 / ROCKET / ATTACK · TRIGGER SHIFTERS

TECHNICAL DATA / ASSEMBLY REQUIREMENTS

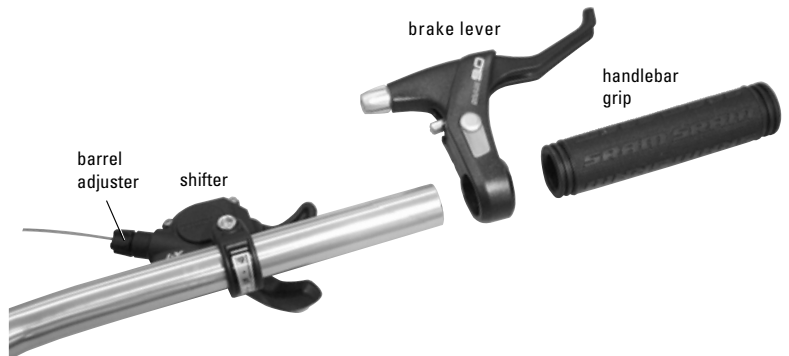
X · 9 X · 7	NEW	X.9		X.7	
	Part No.	—	—	—	—
	Shifter Type	Front / Index	Rear 1:1 / ESP	Front / Index	Rear 1:1 / ESP
	Speeds	3	9	3	9
	Derailleur	SRAM & Shimano	SRAM X.0 / X.9 / X.7	SRAM & Shimano	SRAM X.0 / X.9 / X.7
	Crankset	Shimano		Shimano	
	Cable Pull Release	IT	IT	IT	IT
	Cable	Stainless Steel	←	Stainless Steel	←
	Gear Indication	Window	Window	Window	Window
	Barrel Adjuster	Indexing	Indexing	Indexing	Indexing
Clamping Diameter	22.3 mm	22.3 mm	22.3 mm	22.3 mm	
Shifter Length	26 mm	←	26 mm	←	
Weight	N/A	N/A	N/A	N/A	

ROCKET ATTACK	NEW	Rocket		Attack	
	Part No.	—	—	—	—
	Shifter Type	Front / Index	Rear 2:1	Front / Index	Rear 2:1
	Speeds	3	9	3	9
	Derailleur	SRAM & Shimano	SRAM 2:1 & Shimano	SRAM & Shimano	SRAM 2:1 & Shimano
	Crankset	Shimano		Shimano	
	Cable Pull Release	IT	IT	IT	IT
	Cable	Stainless Steel	←	Stainless Steel	←
	Gear Indication	Window	Window	Window	Window
	Barrel Adjuster	Indexing	Indexing	Indexing	Indexing
Clamping Diameter	22.3 mm	22.3 mm	22.3 mm	22.3 mm	
Shifter Length	26 mm	←	26 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



X.9 / X.7 / ROCKET / ATTACK • TRIGGER SHIFTERS ASSEMBLY



1



ASSEMBLY

- Slide Slide first shifter then brake lever onto handlebar.
Bar end users – don't forget to leave room for the bar end.

- Slide the handlebar grip onto the handlebar.

Caution:

Never use lubricants or solvents to install handlebar grips. Handlebar grips provide safety function.

For this reason, they should be mounted in such a way as to make sure they do not slip off handlebar!

- Tighten the 5 mm hex clamp bolt to 30 in.lbs. (3.4 Nm).

- Feed the cable through the cable housing and stops. Make sure the shifter is in gear position "1" (front shifter) and "9" (rear shifter).

- Attach the shifter cable to the derailleur.
- Adjust indexing per derailleur instructions.

Caution:

- **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 for proper brake lever operation again!**

2



3 mm
3.4 Nm
30 in.lbs.

PG 990/PG 970/PG 950/PG 850/PG 830/PG 730 · CASSETTES TECHNICAL DATA/ASSEMBLY REQUIREMENTS

PG 990

		PG 990 <i>NEW</i> (formerly 9.0)				
Compati- bility	Application	MTB	MTB			
	Technology	Power Glide II	Power Glide II			
	Largest Cog	34 T	32 T			
	Speeds	9	9			
	Chains	SRAM / Shimano	SRAM / Shimano			
	Hubs	Shimano	Shimano			
	Cogs	11/12/14/16/18/21/24/28/34	11/12/14/16/18/21/24/28/32			
	Lockring torque	40 Nm	40 Nm			
	Weight	300 g	290 g			
	Cogs	SAPH 440 steel	SAPH 440 steel			
Design	Spider	Grilon Composite	Grilon Composite			
	Lockring	Forged Steel	Forged Steel			
	Rivets	Stainless Steel	Stainless Steel			
	Finish	Matte Ni-Chrome Plated	Matte Ni-Chrome Plated			

PG 970

		PG 970 <i>NEW</i> (formerly 7.0)				
Compati- bility	Application	MTB	MTB	Road	Road	Road
	Technology	Power Glide II	Power Glide II	Power Glide II	Power Glide II	Power Glide II
	Largest Cog	34 T	32 T	26 T	23 T	23 T
	Speeds	9	9	9	9	9
	Chains	SRAM / Shimano	SRAM / Shimano	SRAM / Shimano / Campa.	SRAM / Shimano / Campa.	SRAM / Shimano / Campa.
	Hubs	Shimano	Shimano	Shimano	Shimano	Shimano
	Cogs	11/12/14/16/18/21/24/28/34	11/12/14/16/18/21/24/28/32	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
	Lockring torque	40 Nm	40 Nm	40 Nm	40 Nm	40 Nm
	Weight	340 g	330 g	230 g	210 g	210 g
	Cogs	SAPH 440 steel	SAPH 440 steel	SAPH 440 steel	SAPH 440 steel	SAPH 440 steel
Design	Lockring	Forged Steel	Forged Steel	Aluminum	Aluminum	Aluminum
	Screws	Steel / Zinc Coat	Steel / Zinc Coat	Steel / Zinc Coat	Steel / Zinc Coat	Steel / Zinc Coat
	Finish	Matte Ni-Chrome Plated	Matte Ni-Chrome Plated	Nickel-Chrome Plated	Nickel-Chrome Plated	Nickel-Chrome Plated

PG 970
PG 950

		PG 970 <i>NEW</i>	PG 950 <i>NEW</i>			
Compati- bility	Application	Road	MTB	MTB	Road	Road
	Technology	Power Glide II	Power Glide II	Power Glide II	Power Glide II	Power Glide II
	Largest Cog	21 T	34 T	32 T	26 T	26 T
	Speeds	9	9	9	9	9
	Chains	SRAM / Shimano / Campa.	Shimano	Shimano	SRAM / Shimano / Campa.	SRAM / Shimano / Campa.
	Hubs	Shimano	Shimano	Shimano	Shimano	Shimano
	Cogs	11/12/13/14/15/16/17/19/21	11/12/14/16/18/21/24/28/34	11/12/14/16/18/21/24/28/32	12/13/14/15/17/19/21/23/26	12/13/14/15/16/17/19/21/23
	Lockring torque	40 Nm	40 Nm	40 Nm	40 Nm	40 Nm
	Weight	210 g	390 g	380 g	240 g	220 g
	Cogs	SAPH 440 steel	Steel	Steel	SAPH 440	SAPH 440 steel
Design	Lockring	Aluminum	Forged Steel	Forged Steel	Forged Steel	Forged Steel
	Screw	Steel / Zinc Coat	Steel / Zinc Coat	Steel / Zinc Coat	Steel / Zinc Coat	Steel / Zinc Coat
	Finish	Nickel-Chrome Plated	Nickel-Chrome Plated	Nickel-Chrome Plated	Nickel-Chrome Plated	Nickel-Chrome Plated

PG 990/PG 970/PG 950/PG 850/PG 830/PG 730 · CASSETTES

TECHNICAL DATA/ASSEMBLY REQUIREMENTS



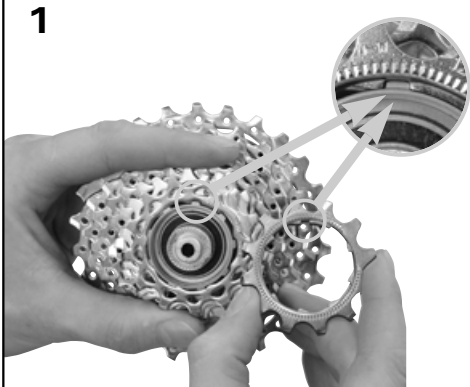
PG 850

		PG 850 <i>NEW</i> (formerly 5.0)			
Compati- bility	Application	MTB	MTB	Road	Road
	Technology	Power Glide II	Power Glide II	Power Glide II	Power Glide II
	Largest Cog	32 T	28 T	26 T	23 T
	Speeds	8	8	8	8
	Chains	SRAM / Shimano	SRAM / Shimano	SRAM / Shimano / Campa.	SRAM / Shimano / Campa.
	Hubs	Shimano	Shimano	Shimano	Shimano
	Cogs	11/12/14/16/18/21/26/32	11/12/14/16/18/21/24/28	12/13/15/17/19/21/23/26	12/13/14/15/17/19/21/23
	Lockring torque	40 Nm	40 Nm	40 Nm	40 Nm
	Weight	280 g	250 g	230 g	220 g
	Design	Cogs	SAPH 440 steel	SAPH 440 steel	SAPH 440 steel
Lockring		Forged Steel	Forged Steel	Forged Steel	Forged Steel
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

PG 830
PG 730

		PG 830 <i>NEW</i> (formerly 3.0)		PG 730 <i>NEW</i>	
Compati- bility	Application	MTB	MTB	MTB	
	Technology	Power Glide II	Power Glide II	Power Glide II	
	Largest Cog	32 T	28T	32T	
	Speeds	8	8	7	
	Chains	SRAM / Shimano	SRAM / Shimano	SRAM / Shimano	
	Hubs	Shimano	Shimano	Shimano	
	Cogs	11/12/14/16/18/21/26/32	11/12/14/16/18/21/24/28	12/14/16/18/21/26/32	
	Lockring torque	40 Nm	40 Nm	40 Nm	
	Weight	220 g	280 g	250 g	
	Design	Cogs	SAPH 440 steel	SAPH 440 steel	SAPH 440 steel
Lockring		Forged Steel	Forged Steel	Forged Steel	
Screw		Steel / Zinc Coat	Steel / Zinc Coat	Steel / Zinc Coat	
Finish		Nickel-Chrome Plated	Ni-Chrome Plated	Ni-Chrome Plated	

PG 990/PG 970/PG 950/PG 850/PG 830/PG 730 · CASSETTES ASSEMBLY

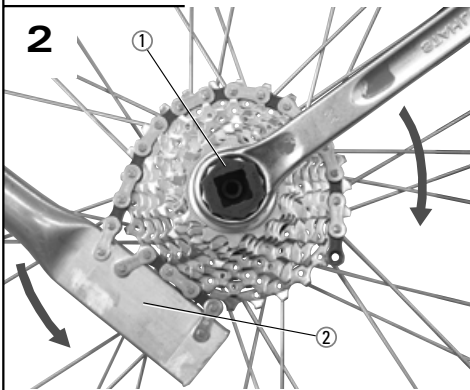


ASSEMBLY

- Position the cassette cluster and individual sprockets on the cassette body by aligning the spline pattern (**Fig. 1**).
- Screw the lockring in to the cassette body and tighten it to 40 Nm (350 in.lbs.) by using a cassette tool (1, **Fig. 2**) like the Park Tool® FR-5 or Shimano® and a chain wrench (2).
- Adjust the rear derailleur according to the installation advice from the derailleur manufacturer.

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).





POWER CHAINS

TECHNICAL DATA / ASSEMBLY REQUIREMENTS

POWER CHAINS

	PC 69	PC 59	PC 49	PC38 Saltshaker <i>NEW</i>	PC38 <i>NEW</i>
Part No.	—	—	—	—	—
Application	MTB / Road	MTB / Road	MTB / Road	MTB / Road	MTB / Road
Compatibility Front	HG / EXA-Drive	HG / EXA-Drive	HG / EXA-Drive	HG / IG / EXA-Drive	HG / IG / EXA-Drive
Compatibility Rear	HG / EXA-Drive	HG / EXA-Drive	HG / EXA-Drive	HG / HG-I / IG / PG / EXA-Drive	HG / HG-I / IG / PG / EXA-Drive
Max. No. of sprockets	9 only	9 only	9 only	max. 8	max. 8
Dimension	1/2" x 11/128"	1/2" x 11/128"	1/2" x 11/128"	1/2" x 3/32"	1/2" x 3/32"
Length	6.8 mm	6.8 mm	6.8 mm	7.1 mm	7.1 mm
Riveting	Step	Step	Step	Step	Step
Chrome Hardened	Yes	Yes	Yes		
Push Power	1500 N / 340 lbs.	1500 N / 340 lbs.	1500 N / 340 lbs.	1500 N / 340 lbs.	1500 N / 340 lbs.
Min. Tensile Strength	9000 N / 2023 lbs.	9000 N / 2023 lbs.	9000 N / 2023 lbs.	9000 N / 2023 lbs.	9000 N / 2023 lbs.
Weight (114 links)	297 g	297 g	297 g	307 g	307 g
External Pin Plate	Nickel Plated	Nickel Plated	Grey	Light Grey	Grey / Polished
Internal Pin Plate	Nickel Plated	Grey	Grey	Light Grey	Brown / Annealed
Connecting Method	Power Link Gold or Pin	Power Link Gold or Pin	Power Link Gold or Pin	Power Link Silver or Pin	Power Link Silver or Pin

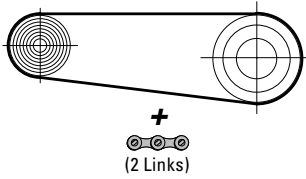
POWER CHAINS

	PC 10 Saltshaker	PC 10	PC1 Saltshaker	PC1
Part No.	—	—	—	—
Application	MTB	MTB	Gear Hubs	Gear Hubs
Compatibility Front	Single / HG	Single / HG	Single	Single
Compatibility Rear	Single / HG	Single / HG	Single	Single
Max. No. of sprockets	max. 7	max. 7	1	1
Dimension	1/2" x 3/32"	1/2" x 3/32"	1/2" x 1/8"	1/2" x 1/8"
Length	6.9 mm	6.9 mm	7.8 mm	7.8 mm
Riveting	Step	Step	Step	Step
Push Power	1000 N / 225 lbs.	1000 N / 225 lbs.	8000 N / 1840 lbs.	8000 N / 1840 lbs.
Min. Tensile Strength	9000 N / 2023 lbs.	9000 N / 2023 lbs.	9000 N / 2023 lbs.	9000 N / 2023 lbs.
Weight (114 links)	300 g	300 g	330 g	330 g
External Pin Plate	Light Grey	Brown	Light Grey	Brown
Internal Pin Plate	Light Grey	Brown	Light Grey	Brown
Connecting Method	Power Link Grey or Pin	Power Link Grey or Pin	Snap Lock or Pin	Snap Lock, 3pcs Link or Pin

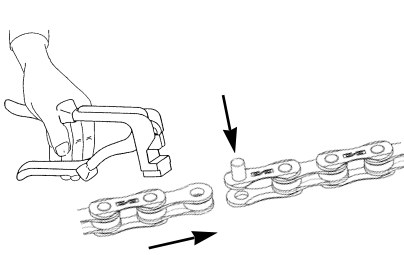
POWER CHAINS ASSEMBLY



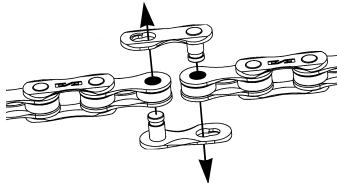
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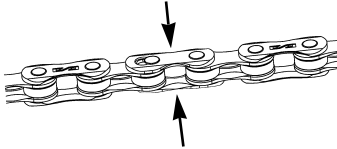
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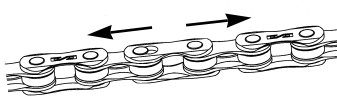
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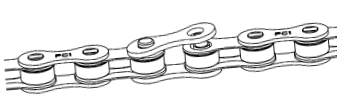
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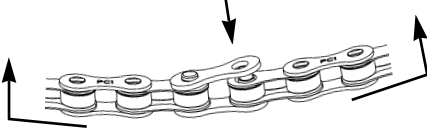
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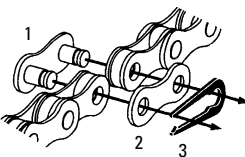
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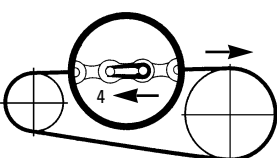
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8



9



PC 69 / PC 59 / PC 49 /
PC 38 / PC 10
(1/2" x 3/32" AND 1/2" x 11/128")

PC 1
(1/2" x 1/8")

Chain length:

- Shorten chain to the length specified by the derailleur manufacturer.
- SRAM derailleurs:
- Place chain over largest front chain-wheel and largest rear sprocket and add 2 links or 1 link + Power Link (Fig. 1).
 - For rear suspension frame, position the rear suspension for the greatest chain length required.

Closing standard version with clamping pin:

Fit chain, bring the two ends together and press pin (Fig. 2) through with assembly tool. The pin must extend by the same amount at both outer plates. It must be possible to move the connecting link slightly.

Power Link connecting links:

Caution:

- Use only as specified, to avoid material damage or the rider to fall off his bicycle resulting in injury.
- Use only Power Link Gold for closing Holow Pin chain versions (no pin).

Power Link Grey	grey coloured for PC 10
Power Link Silver	silver coloured for PC 38
Power Link Gold	gold coloured for PC 69, PC 59, PC 49

Closing:

- Fit chain, bring the ends together and insert both halves of the Power Link into the chain ends. (Fig. 3)
- Press both halves of the Power Link together (Fig. 4) and lock in place by pulling the chain apart. (Fig. 5)

Opening:

- Press both plates of the Power Link together (Fig. 4) while sliding the chain ends together (unlock). Remove the two halves of the link from the chain ends.

Caution:

Always use a new Power Link when fitting a new chain. Failure to shorten the chain properly or to lock it exactly into place may cause damage to the chain and eventually total chain failure, material damage or the rider to fall off his bicycle resulting in injury.

Closing chain with Snap Lock:

- Fit the shortened chain, bring the ends together and connect with the Snap Lock. Place the outer plate on one pin (Fig. 6).
- Gently flex the chain until the outside connector plate snaps into position over the second pin (Fig. 7).

Caution:

- Make sure plate is fully seated in the pin channel and plates are parallel to each other.
- If movement of the connector plate is noticed a new Snap Lock must be used.
- Always use a new Snap Lock when fitting a new chain. Failure to shorten the chain properly or to lock it exactly into place may cause damage to the chain and eventually total chain failure, material damage or the rider to fall off his bicycle resulting in injury.

NOTICES

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