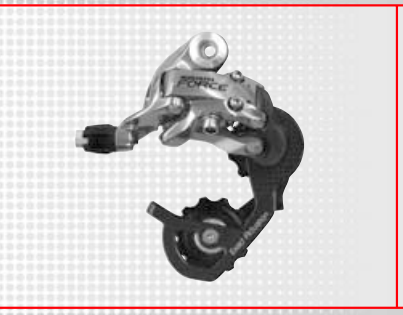
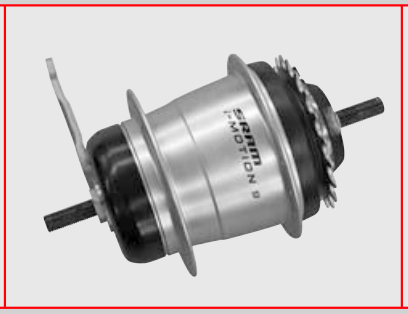
2007

NEW TECH. SPECIFICATONS

GEAR HUB SYSTEMS
ROAD COMPONENTS
MTB COMPONENTS

ENGLISH

SRAM®

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Publ. No. 2012 E

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Released May 2006

SRAM Technical Documentation
Schweinfurt/Germany

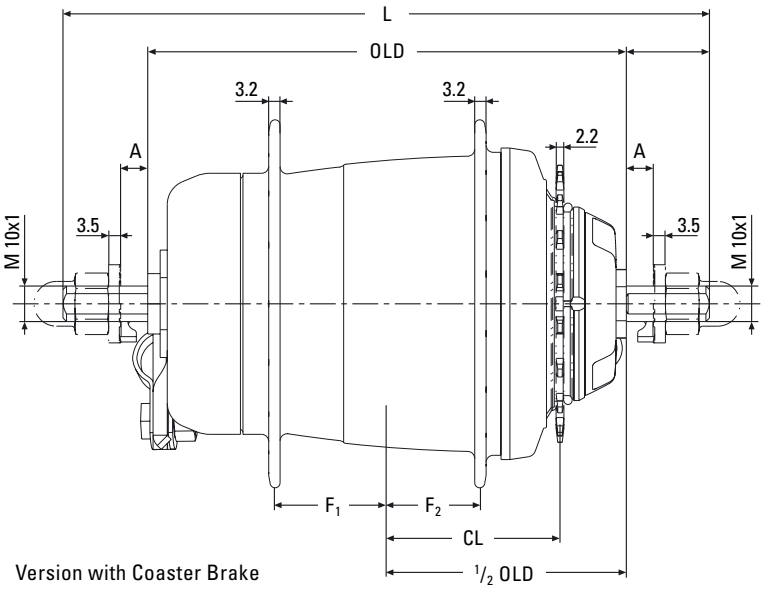
CONTENTS
GEAR HUB SYSTEMS / ROAD AND MTB COMPONENTS

GEAR HUB SYSTEMS

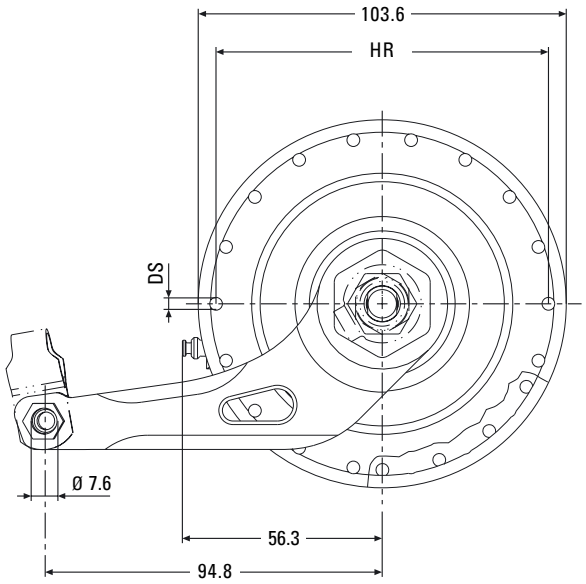
ROAD COMPONENTS

MTB COMPONENTS

i-MOTION 9
TECHNICAL DATA / ASSEMBLY REQUIREMENTS



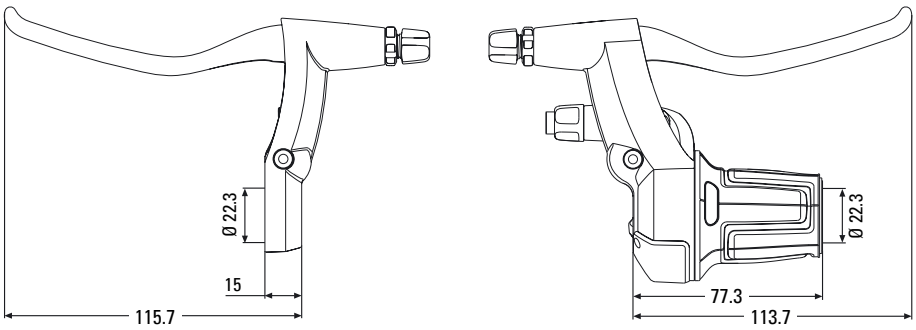
Version with Coaster Brake



HUBS

		i-MOTION 9 with Coaster Brake		i-MOTION 9 for i-BRAKE	i-MOTION 9 for Disc Brake	i-MOTION 9 without Brake
	Type	—		—	—	—
	Speeds	9		—	—	—
	Brake	With Coaster Brake		i-BRAKE compatible	Disc Brake compatible	None
Over Locknut Dim., OLD		135 mm		—	—	—
Axle	Length, L	182 mm		—	—	—
Axle	Ends Diameter	M 10x1		—	—	—
Dropout Width Dim., A		min. 4 mm / max. 10 mm		—	—	—
Spoke	Holes	36 and 32		—	—	—
Spoke	Hole Diameter, DS	2.6 mm		—	—	—
Spoke	Hole Ref. ø, HR	93.6 mm		—	—	—
Flange Dist. to 1/2 OLD		F_1 = 26.5 mm / F_2 = 31.5 mm		—	—	—
Gear Hub Ratio	Totally	340 %	Gear steps	←	←	←
Gear Hub Ratio	Speed 1	0.542	↧	←	←	←
Gear Hub Ratio	Speed 2	0.621	14%	←	←	←
Gear Hub Ratio	Speed 3	0.727	17%	←	←	←
Gear Hub Ratio	Speed 4	0.853	17%	←	←	←
Gear Hub Ratio	Speed 5	1.000	17%	←	←	←
Gear Hub Ratio	Speed 6	1.172	17%	←	←	←
Gear Hub Ratio	Speed 7	1.375	17%	←	←	←
Gear Hub Ratio	Speed 8	1.611	17%	←	←	←
Gear Hub Ratio	Speed 9	1.844	14 %	←	←	←
Chain	Line, CL	48.9 mm		—	—	—
Chain	Ratio	1.73 – 1.90		—	—	—
Chain	Dimension	1/2" x 1/8" and 1/2" x 3/32"		—	—	—
Compatibility	Sprocket	18 / 19 / 20 / 21 / 22 Teeth		—	—	—
Compatibility	Shifter	i-MOTION 9 IBS SL und i-MOTION 9 SL			—	—
Compatibility	Hand Brake Lever	—		—	—	—
Compatibility	Tandem	Not suitable for tandems, trademen's delivery bicycles and similar				—
	Weight	2400 g		—	—	—
Finish	Hub Shell Material	Aluminum		—	—	—
Finish	Finish	Satin matt „Lux" anodized		—	—	—

i-MOTION 9
TECHNICAL DATA / ASSEMBLY REQUIREMENTS



SHIFTERS

		i-MOTION 9 IBS SL	i-MOTION 9 SL
	Version	i-MOTION 9 IBS (integrated Brake Lever)	i-MOTION 9
	Cable Length	1400 mm / 1500 mm / 1600 mm / 1700 mm	1400 mm / 1500 mm / 1600 mm / 1700 mm
	Shifter Type	SRS Twist shifter with integrated Brake Lever	SRS Twist shifter
	Arrangement	Handlebar, right hand	Handlebar, right hand
	Compat. Gear Hub	i-MOTION 9	i-MOTION 9
	Gear Indication	Window	Window
	Barrel Adjuster	Indexing	Indexing
	Clamping Diameter	22.3 mm	22.3 mm
	Handlebar, Straight Area	Minimum length = 150 mm	Minimum length = 150 mm
	Cable Routing	Continuous housing (preassembled)	Continuous housing (preassembled)
Brake Lever	Compatibility	Linear-Pull, i-BRAKE, Avid BB Disc	—
Brake Lever	Leverage	2.32	—
Brake Lever	Cable Pull	24 mm	—
Brake Lever	Reach Adjust	Yes	—
Brake Lever	Barrel Adjuster	Yes	—
Brake Lever	Lever Size	4 Finger	—
Brake Lever	Material	Forged Aluminum	—
	Weight	N/A	N/A
Design	Shifter Cable	Stainless steel	Stainless steel
Design	Housing	Cast Aluminum	Cast Aluminum
Design	Grip Cover	Thermoplastic elastomer	Thermoplastic elastomer
Design	Clamping Collar	Aluminum	Aluminum
Design	Finish	Mercury silver painted	Mercury silver painted

BRAKE LEVERS

		SRAM i-BRAKE BL	
	Version	i-BRAKE 60 BL, left hand	i-BRAKE 60 BL, right hand
	Arrangement	Handlebar, left hand	Handlebar, right hand
	Clamping Diameter	22.3 mm	←
	Compatibility	Linear-Pull, i-BRAKE, Avid BB Disc	←
	Leverage	2.32	←
	Cable Pull	24 mm	←
	Reach Adjust	Yes	←
	Barrel Adjuster	Yes	←
	Lever Size	4 Finger	4 Finger
	Weight	N/A	N/A
Design	Housing	Cast Aluminum	←
Design	Lever	Forged Aluminum	←
Design	Clamping Collar	Aluminum	←
Design	Finish	Mercury silver painted	←

i-MOTION 9
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

CYCLE FRAME

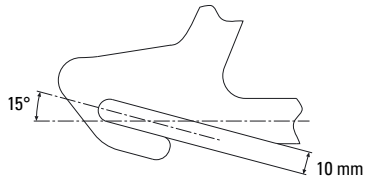
The strength must be such that with a maximum braking torque of 250 Nm (2200 in.lbs.) on the rear wheel no residual deformation can occur on the rear structure.

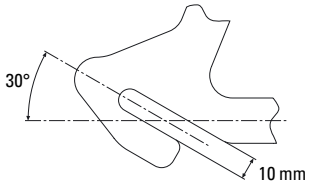
DROPOUT

Only flat and no off-set versions.
Dropout thickness: 4 – 10 mm.
Dropouts must be parallel.

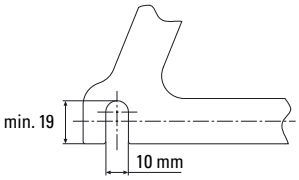
Dropout dimensions: ***see figures on the right.***

Standard dropout

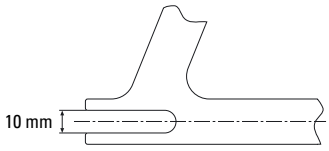




Vertical dropout

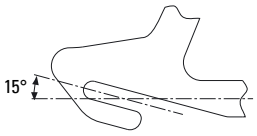
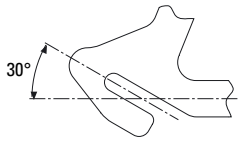
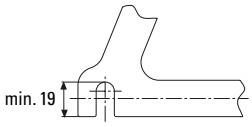
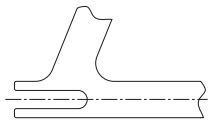
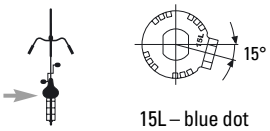
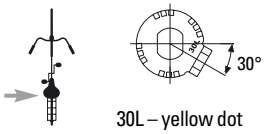
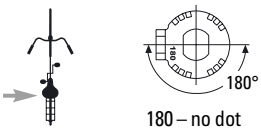
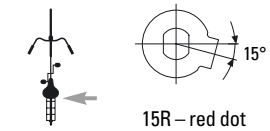
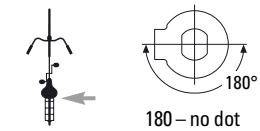


Reversed dropout



RETAINING WASHERS

The following table shows the required combination of dropouts and retaining washers.

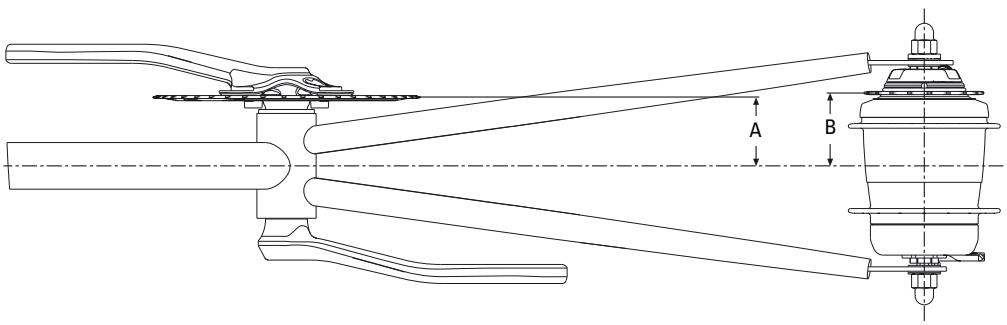
Type of dropout				
Required retaining washers for left hand side (non driving side)	 15L – blue dot	 30L – yellow dot	 white dot	 180 – no dot
Required retaining washers for right hand side (driving side)	 15R – red dot	 30R – green dot	 white dot	 180 – no dot

CRANKSET

The specification of cranksets and bottom brackets need to comply with the following dimensions.

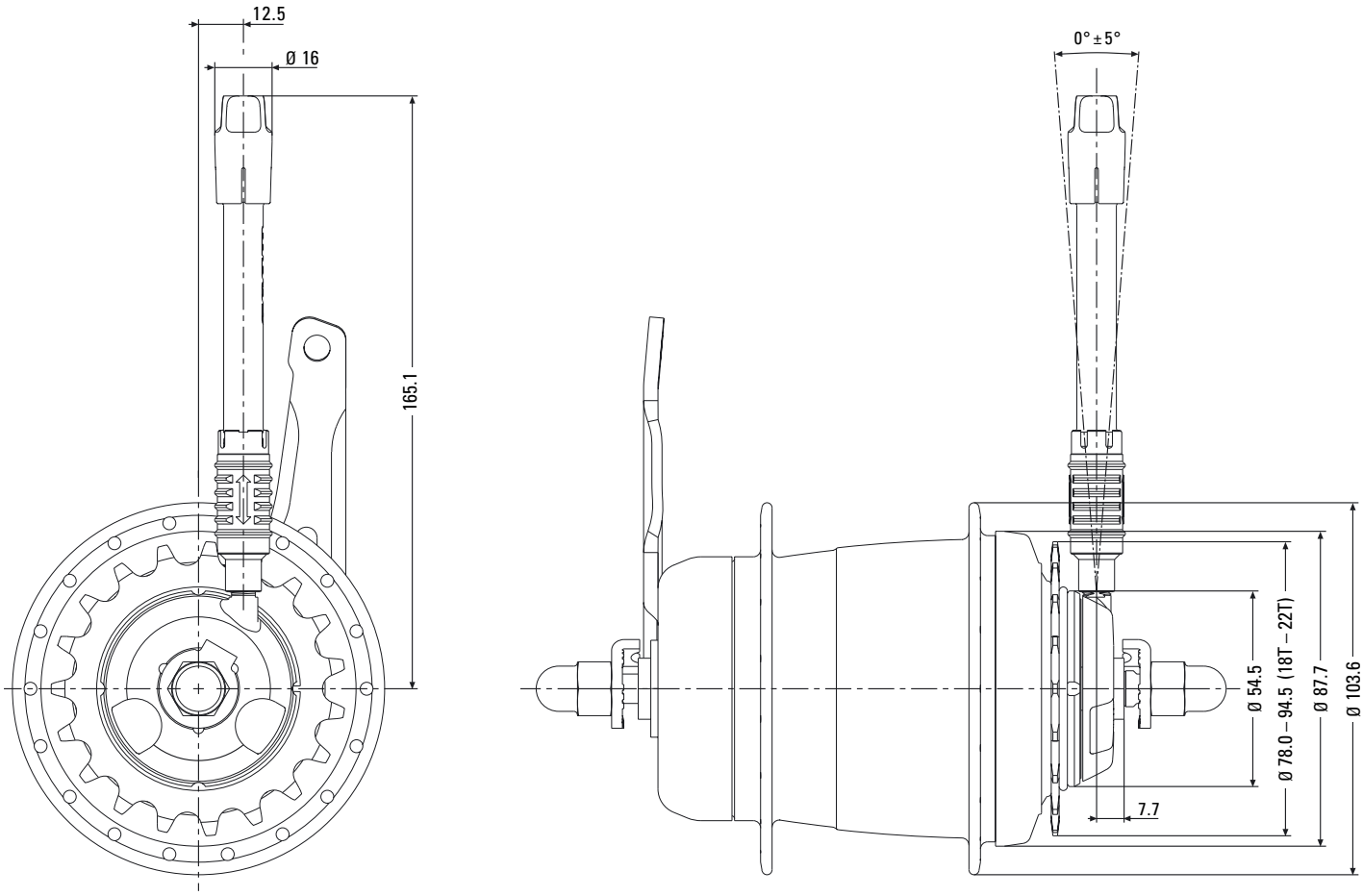
A = 48.8 mm ± 5 mm

B = 48.8 mm (rear Chainline)



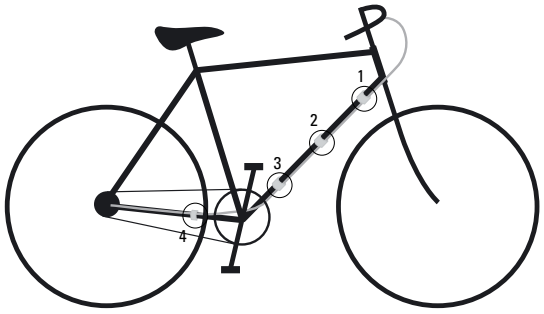
HUB DIMENSIONS

The frame design needs to consider the given measures in the figures to assure best possible integration of hub and chain case.

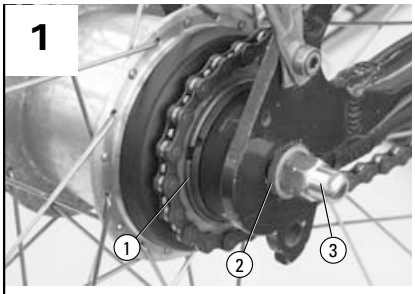


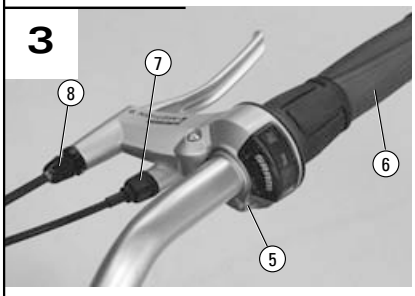
CABLE ROUTING

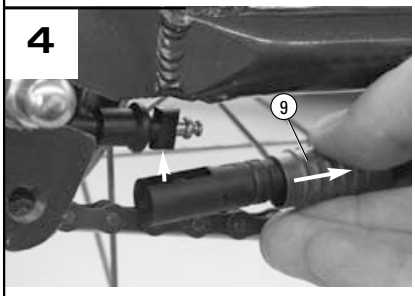
Cable routing along chainstay only.
Continuous cable housing only.
Cable attachement points see Figure.

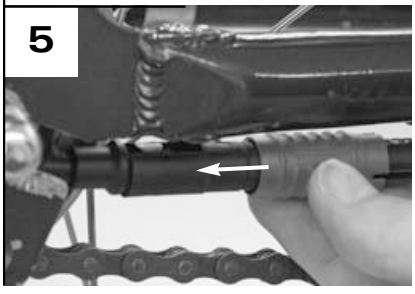


i-MOTION 9 ASSEMBLY









ASSEMBLY HUB

- Lace the wheel as normal.
- Place the dust cap and sprocket on the driver.
- Push sprocket circlip (1, ***Fig. 1)*** onto the driver. Check that the circlip is seated correctly.
- Place the wheel in the rear frame.
- Fit retaining washers on both axle ends (2, ***Fig. 1)***. The serrations must bear against the dropout and the lug must engage in the dropout slot.
  Advice:
  Use proper retaining washer corresponding to your dropout slot (see Table „RETAINING WASHERS" on page 4)
- Tighten up axle nuts (3, ***Fig. 1)***. Tightening torque on axle nuts 30 – 40 Nm (266 – 350 in.lbs.).
- Mount the brake lever using a suitable frame clamp (4, ***Fig. 2)***.
  Caution:
  Mount the brake lever between the two straps of the frame clamp.
  The clamp must be seated on the frame without play.
  Use a self-locking nut! Tightening torque: 2 – 3 Nm (18 – 27 in.lbs.).

ASSEMBLY SHIFTER

Advice:

- ***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 effect cable housing length.***
- Slide the shifter onto the handlebar.
- Align the shifter depending on personal preference.
- Tighten the 3 mm hex clamp bolt (5, ***Fig. 3)*** to 3 Nm (27 in.lbs.).
- Slide the handlebar grip (6) 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!

INSTALLING SHIFTING CABLE

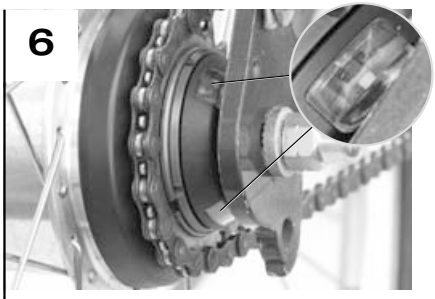
- Fit the cable and avoid small radius.
- Cable attachment points ***see „CABLE ROUTING" on Page 5*** .
  Cable housing must be movable inside attachment.
- Place shifter in gear position „1".
- Push back snap-on sleeve of the connector tube (9, ***Fig. 4)***. The opening should be visible.
- Connect the cable to the hub by sliding the opening of the connector tube on the plug of the hub ***(Fig. 4)***.
- Secure connection by pushing back the snap-on sleeve of the connector tube ***(Fig. 5)***.

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.

ADJUSTMENT

- Shift up and down several times to take out initial slack in the cable.
- Place shifter from gear position „7" back to gear „6".
- Match up the yellow/red marks in the window of the hub ***(Fig. 6)*** by turning the barrel adjuster.
  You can use either the barrel adjuster at the shifter (7, ***Fig. 3)*** or the barrel adjuster at the connector tube (10, ***Fig. 7)***.

6



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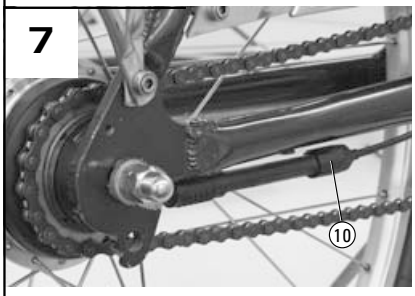

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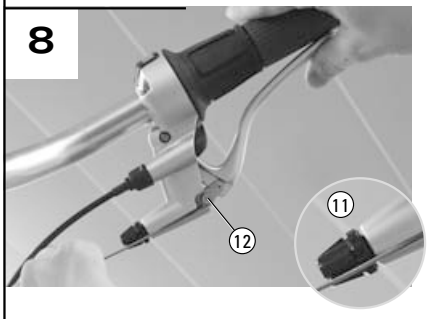

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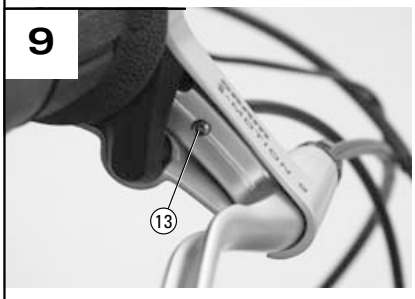


INSTALLING BRAKE CABLE

Caution:
The integrated Brake Lever on the i-MOTION shifter is only compatible with i-BRAKE, Avid BB Disc and Linear Pull brakes.

Advice:
- ***Only use new, high-quality brake cables and compression-free cable housings 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 handlebar positions effect cable housing length..***

- Line up the brake lever barrel adjuster, lock ring, and housing cable slots (11, ***Fig. 8)***.
- Install the cable head into the cable socket in the lever (12).
- Set up the brakes and brake pads per brake instructions.
- Actuate each brake lever 5 – 10 times. Check that all brake system components are functioning properly!

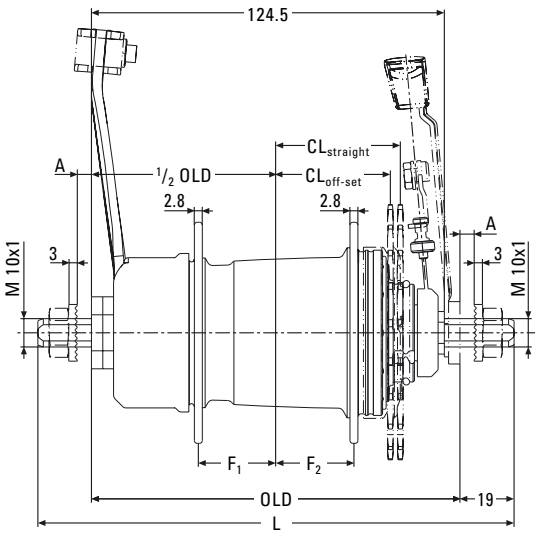
Reach Adjustment:
- Use a 2 mm hex wrench to turn the reach adjustment screw (13, ***Fig. 9)*** clockwise to bring the lever closer to the handlebars.
- Turn the screw counterclockwise to move the lever further away.

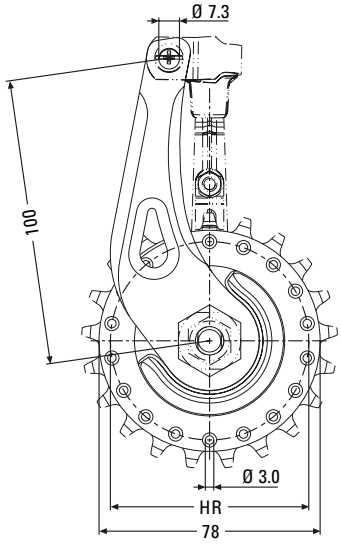
Caution:
- ***After any adjustment to the reach, always check the brake cable tension to ensure proper brake system performance. Readjust the cable tension if necessary.***
- ***Check that all the brake system components are functioning properly.***

i-MOTION 3
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

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.

DROPOUT
Only flat and no off-set versions.
Dropout thickness: 4 – 8 mm.
Dropouts must be parallel.





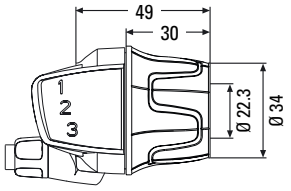
Version with Coaster Brake

HUBS

		i-MOTION 3 for i-BRAKE		i-MOTION 3 with Coaster Brake	i-MOTION 3 for Band Brake	i-MOTION 3 without Brake
	Type	—		—	—	—
	Speeds	3		—	—	—
	Brake	i-BRAKE compatible		With Coaster Brake	Band Brake compatible	None
	Over Locknut Dim., OLD	130 mm		—	—	—
Axle	Length, L	168 mm and 178 mm		—	—	—
Axle	Ends Diameter	M 10x1		—	—	—
Axle	Dropout Width Dim., A	min. 4 mm / max. 8 mm		—	—	—
Spoke	Holes	28 / 32 / 36		—	—	—
Spoke	Hole Diameter, DS	3.0 mm		—	—	—
Spoke	Hole Ref. ø, HR	70 mm		—	—	—
Spoke	Flange Dist. to 1/2 OLD	F_1 = 27.3 mm / F_2 = 27.6 mm		—	—	—
Gear Hub Ratio	Totally	186 %	Gear steps	←	←	←
Gear Hub Ratio	Speed 1	0.734	↧	←	←	←
Gear Hub Ratio	Speed 2	1.000	36 %	←	←	←
Gear Hub Ratio	Speed 3	1.362	36 %	←	←	←
Chain	Line, CL	44.0 mm (straight) / 40.5 mm (off-set)			—	—
Chain	Ratio	24", 26", 28" = 2.0 – 2.4 / 20" = 2.0 – 2.5			—	—
Chain	Dimension	1/2" x 1/8" and 1/2" x 3/32"		—	—	—
Compatibility	Sprocket	16 / 17 / 18 Teeth (straight) / 19 / 20 / 21 Teeth (off-set)			—	—
Compatibility	Shifter	SRAM i-MOTION 3		—	—	—
Compatibility	Hand Brake Lever	N/A		—	—	—
Compatibility	Tandem	Not suitable for tandems, trademen's delivery bicycles and similar				—
	Weight	N/A		—	—	—
Finish	Hub Shell Material	Steel		—	—	—
Finish	Finish	Ni-Chrome plated		—	—	—

i-MOTION 3
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

SHIFTER

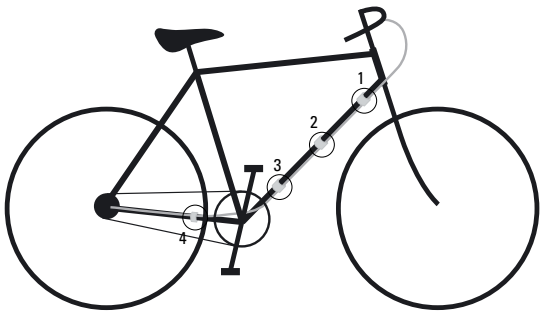


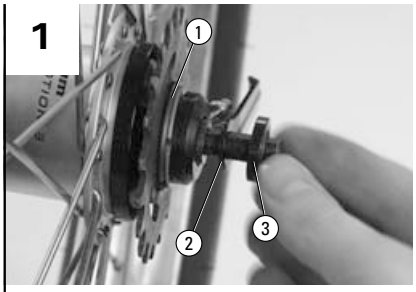
SHIFTERS

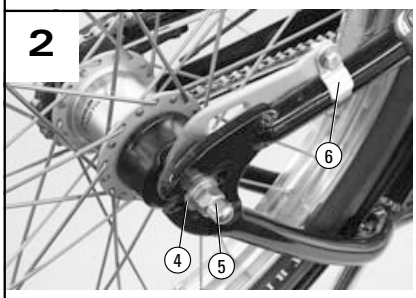
		i-MOTION 3 shifter
	Version	i-MOTION 3
	Cable Length	1400 mm / 1500 mm / 1600 mm / 1700 mm
	Shifter Type	SRS Twist shifter
	Arrangement	Handlebar, right hand
	Compat. Gear Hub	i-MOTION 3
	Gear Indication	Window
	Barrel Adjuster	Indexing
	Clamping Diameter	22.3 mm
	Handlebar, Straight Area	Minimum length = 150 mm
	Cable Routing	Continuous housing (preassembled)
Design	Weight	N/A
Design	Shifter Cable	Stainless steel or zinc coated steel
Design	Housing	Injection molded plastic
Design	Grip Cover	Thermoplastic elastomer
Design	Clamping Collar	Aluminum
Design	Finish	Silver painted

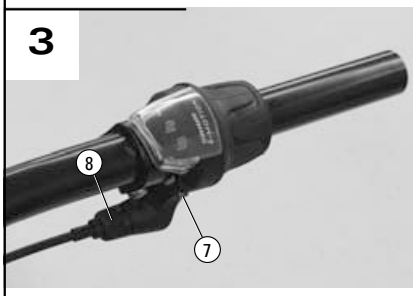
CABLE ROUTING

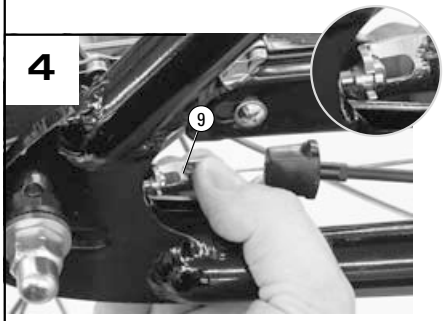
Cable routing along chainstay only.
Continuous cable housing only.
Cable attachement points see Figure.

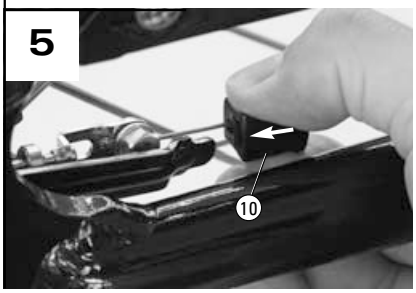












ASSEMBLY HUB

- Lace the wheel as normal.
- Place the sprocket on the driver.
- Push sprocket circlip (1, ***Fig. 1)*** onto the driver. Check that the circlip is seated correctly.
- First slide the cable stop bracket (2, ***Fig. 1)*** onto the axle end of sprocket. Thereafter mount the washer with rubber insert (3) to fix the cable stop bracket.
- Place the wheel in the rear frame.
- Fit retaining washers on both axle ends (4, ***Fig. 2)***. The serrations must bear against the dropout.
- Tighten up axle nuts (5, ***Fig. 2)***. Tightening torque on axle nuts 30 – 40 Nm (266 – 350 in.lbs.).
- Mount the brake lever using a suitable frame clamp (6, ***Fig. 2)***.
  Caution:
  Mount the brake lever between the two straps of the frame clamp.
  The clamp must be seated on the frame without play.
  Use a self-locking nut! Tightening torque: 2 – 3 Nm (18 – 27 in.lbs.).

ASSEMBLY SHIFTER

Advice:

- ***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 effect cable housing length.***
- Slide the shifter onto the handlebar.
- Align the shifter depending on personal preference.
- Tighten the 2.5 mm hex clamp bolt (7, ***Fig. 3)*** to 1.7 Nm (15 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 the handlebar!

INSTALLING SHIFTING CABLE

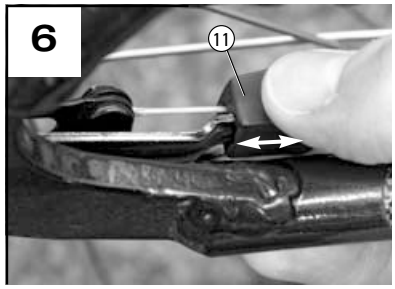
- Fit the cable and avoid small radius.
- Cable attachment points ***see „CABLE ROUTING“ on Page 10*** .
  Cable housing must be movable inside attachment.
- Place shifter in gear position „1“.
- Connect the cable to the hub by attaching the link (9, ***Fig. 4)*** to the cable nipple of the hub.
- Slide the plastic retainer onto the cable stop bracket (10, ***Fig. 5)***.

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.

ADJUSTMENT

The shifting system is pre-adjusted ex factory.In 3rd gear the cable must be adjusted taut, but not too much.

- Place shifter in gear position „3“.
- Check while pulling back the plastic retainer (12, Fig. 6) on the cable stop bracket that the cable can not be pulled out of the gear hub.
  – Setting is too loose: Place the shifter in gear position „1“. Increase cable tension by using the barrel adjuster at the shifter.
  – Setting is too high: the shifter won‘t shift into 3rd gear or the hub doesn‘t shift in 1st gear or will permanently switch between 1st and 2nd gear.Place the shifter in gear position „1“.Decrease cable tension by using the barrel adjuster at the shifter.
- Place the shifter in gear position „3“ and check again, until there isn‘t any play in the cable.

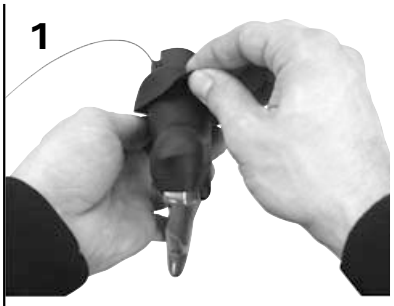


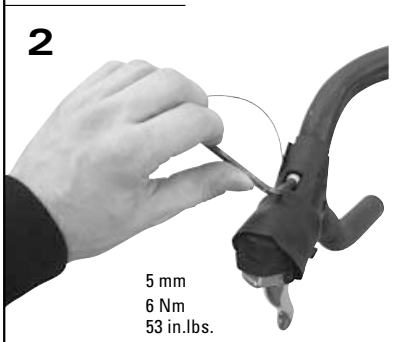
FORCE / RIVAL · DOUBLE TAP SHIFTERS
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

FORCE RIVAL

		Force		Rival	
	Version	Double Tap Shifter	Double Tap Shifter	Double Tap Shifter	Double Tap Shifter
	Shifter Type	Front	Rear	Front	Rear
	Speeds	2	10	2	10
Compatibility	**Derailleur**	SRAM Force / Rival	SRAM Force / Rival	SRAM Force / Rival	SRAM Force / Rival
	Crankset	SRAM Force / Rival	SRAM Force / Rival	SRAM Force / Rival	SRAM Force / Rival
	Cable & Housing	1.1 mm high quality shifter cables, 4 or 5 mm compressionless cable housing with end cap / maximum diameter of 5.8 mm			
		1.6 mm high quality brake cables with road-style cable end and brake cable housing with end caps			
	Cable Pull Release	Double Tap	Double Tap	Double Tap	Double Tap
	Cable	Teflon Coat. Stainl. Steel	Teflon Coat. Stainl. Steel	Stainless Steel	Stainless Steel
	Gear Indication	None	None	None	None
	Barrel Adjuster	None	None	None	None
	Clamping Diameter	22.3 mm	22.3 mm	22.3 mm	22.3 mm
	Weight	305 g	305 g	330 g	330 g

FORCE / RIVAL · DOUBLE TAP SHIFTERS
ASSEMBLY





A S S E M B L Y

- Flip hood cover by hand. Slide shifter onto handlebar ***(Fig. 1)***.
  Tighten the 5 mm hex clamp bolt to 6 Nm (53 in.lbs.) ***(Fig. 2)***.
- Feed the shifter cables and brake cables through the cable housings and stops.
  Make sure the shifter cable is fully released (easiest (lowest) gear for front shifter or the hardest (highest) gear for rear shifter).
- Replace hood cover.
- Attach the front/rear shifter cable to the front/rear derailleur.
  Attach the front/rear brake cable to the front/rear brake.
- Adjust indexing per derailleur instructions.

Installation of brake cable:

- Actuate brake lever. Make sure the countersunk side of the hole is visible (1, ***Fig. 3)***.
  Feed the brake cable through the cable holder, cable housing and cable stops.
- Pull the cable snug. Make sure that the cable nipple is firmly seated in the cable holder.
- Attach the cable to the brake and adjust per brake instructions.

Caution:
Always check the front and rear brake levers for proper operation.

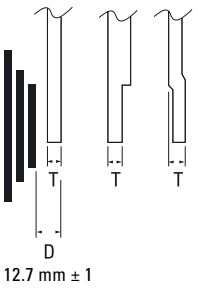
FORCE / RIVAL · REAR DERAILLEURS
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

ROAD

FORCE RIVAL

		Force	Rival	
	Speeds	10	10	
Compatib.	Shifter Compatibility	SRAM Double Tap shifters (Force / Rival)		
	Cogsets	SRAM OG 1070 and 10 speed Shimano cogsets (largest Cog maximum 28 teeth)		
	Chains	SRAM PC 1090R / PC 1090 / PC 1070 and Shimano 10 speed chains		
	Cranks / Chainrings	10 seed compatible, 53-39 / 50-34 / 50-36 / 48-34 / 52-36		
Chain Capacity	Total	31 T	31 T	
	Max Sprocket	28 T	28 T	
	Min Sprocket	11 T	11 T	
	Front Difference	16 T	16 T	
	Parallelogram Spring	Steel	Steel	
	Pulleys	Cartridge bearing	Cartridge bearing	
	Direct Mount	Yes	Yes	
	Cable & Housing	1.1 high quality cables, 4 or 5 mm compressionless cable housing with end cap / maximum diameter of 5.8 mm		
	Weight	176 g	186 g	
Design	B-Knuckle	Aluminum	Aluminum	
	Outer Link	Aluminum	Aluminum	
	Inner Link	Magnesium	Aluminum	
	Outer Cage	Carbon Comp.	Aluminum	
	Inner Cage	Aluminum	Aluminum	
	Hanger Bolt	Aluminum	Aluminum	

1



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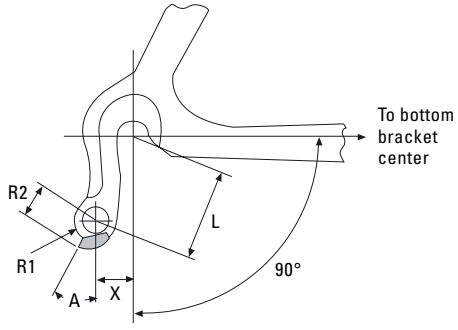
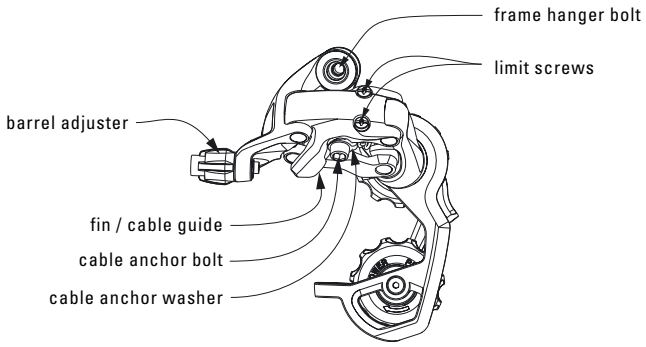


DERAILLEUR ANATOMY



FRAME DIMENSIONS

(see figure 1 and 2)

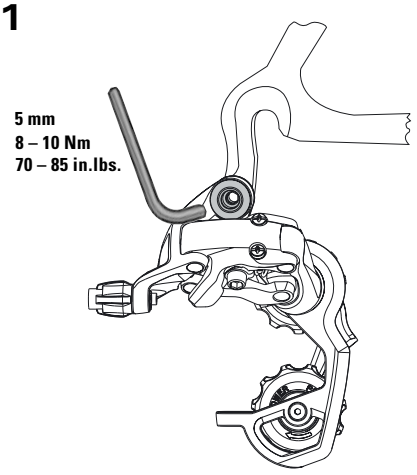
For optimal rear derailleur performance, the recommended rear derailleur hanger length (L) should be 24 – 26 mm.

L	X	A	R1	R2	T
24	4 – 10	30° – 35°	8.5 max	11.5 – 12.5	7 – 8
26	6 – 10	30° – 35°	8.5 max	11.5 – 12.5	7 – 8

Chainstay length ≥ 405 mm

FORCE / RIVAL · REAR DERAILLEURS ASSEMBLY

1



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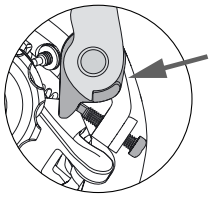

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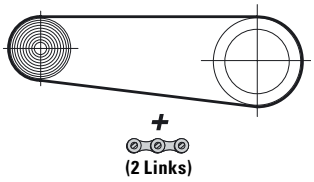

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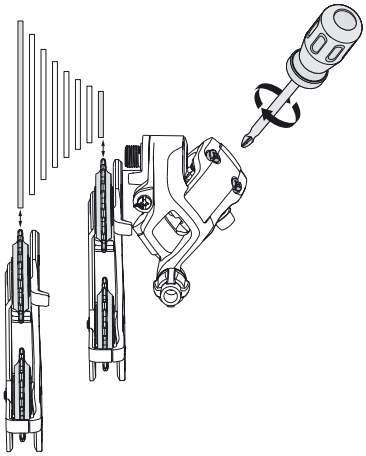


ASSEMBLY

Advice:

Check the rear derailleur hanger alignment. A bent rear derailleur hanger will result in inaccurate index shifting.

- 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 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.) ***(Fig. 1)***.

CHAIN LENGTH

A properly measured chain will prevent damage in case of 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)***.
- Add 2 LINKS or 1 link + connection 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 ***(Fig. 4)***.
- 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 ***(Fig. 4)***.

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 the chain to the small chain ring.
- Check the chain gap between the tip of the smallest cog and the tip of the upper guide pulley. While turning the crank, push the rear derailleur by hand to the largest cog and check the chain gap in this position. ***(Fig. 5)***.
- Using a screw driver, turn the b-adjust screw until the minimum chain gap in either position equals approximately 6 mm.

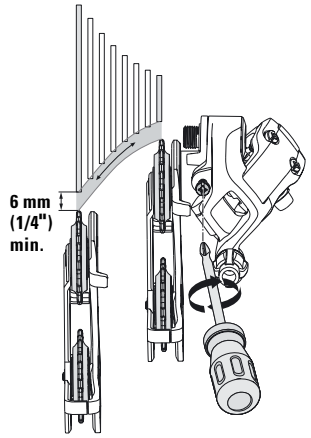
Advice:

- ***Setting the chain gap at this point of your installation may be considered a rough estimate. 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.
- Cut the rear piece of cable housing. Make sure that it is not too short or long ***(Fig. 6).***
- Make sure the shifter cable is fully released (hardest/highest gear at rear shifter).
- Turn the rear derailleur barrel adjust clockwise fully into the derailleur, then turn counterclockwise 1 full turn.
- Feed the rear shifter cable through the rear derailleur cable housing, stops and cable guides.
- Thread the cable through the rear derailleur barrel adjuster and around the cable guide on the fin ***(Fig. 6)***.
- Pull the cable tight and position it under the cable anchor washer.
- 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 derailleur barrel adjuster counterclockwise.
  - If the chain shifts beyond the second cog, decrease the cable tension by turning the derailleur 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.

5



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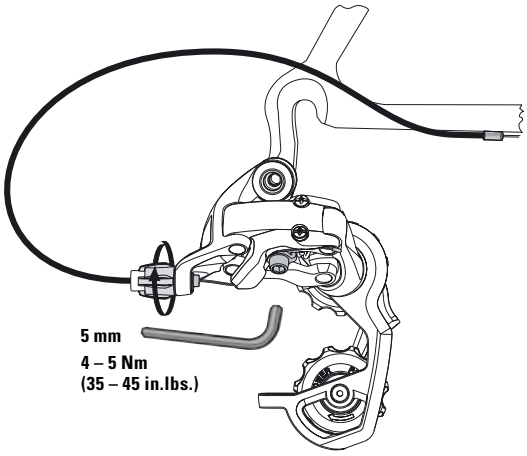
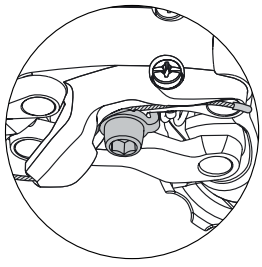




TROUBLESHOOTING

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.

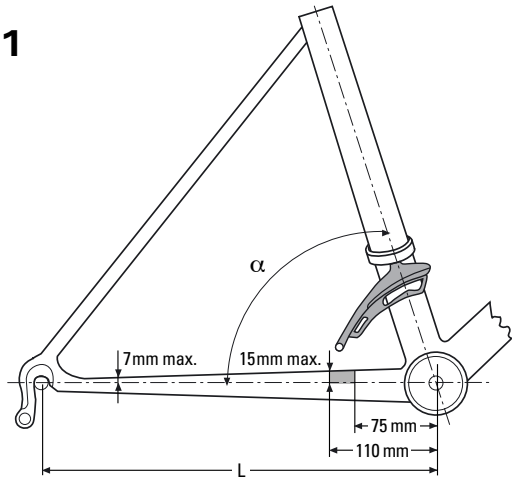
FORCE / RIVAL · FRONT DERAILLEURS
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

ROAD

FORCE RIVAL

		Force	Rival	
Clamp	Braze-on	Yes	Yes	
	31.8 mm	Yes	Yes	
	34.9 mm	Yes	Yes	
Compatibility	Rear Compatibility	10 speed	10 speed	
	Shifter Compatible	SRAM Double Tap Shifter (Force / Rival)		
	Chains	SRAM PC 1090R / PC 1090 / PC 1070 and Shimano 10 speed chains		
	Cranks / Chainrings	10 seed compatible, 53-39 / 50-34 / 50-36 / 48-34 / 52-36		
	Maximum Tooth Difference	16T	16T	
	Cable Routing	Bottom Pull	Bottom Pull	
	Chainstay Angle	61 – 66°	61 – 66°	
	Mount Type	Down Swing	Down Swing	
	Chain Line	44,5 mm	44,5 mm	
	Weight	Braze-on: 88 g / 31.8 mm: 103 g / 34.9 mm: 104 g		
Design	Band Material	Forged Aluminum	Forged Aluminum	
	Outer Link	Aluminum	Aluminum	
	Inner Link	Aluminum	Aluminum	
	Chain Cage	Steel Chrome Plated	Steel Chrome Plated	

1



FRAME DIMENSIONS

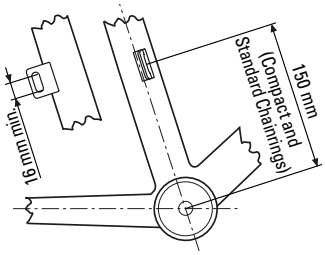
(see Fig. 1)

The seat tube should be positioned in the center of the bottom bracket shell.

Length of chainsty:
- Road L > 405 mm.
- Rear frame alignment must be symmetrical.

Chainstay angle:
α = 61° – 66°.

Chainline:
44.5 mm.
(Measurement from the center of the bracket to the center of middle chainring.)



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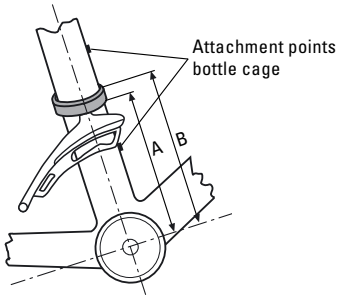


NECESSARY CLEARANCE FOR CLAMP VERSION

(see Fig. 2)

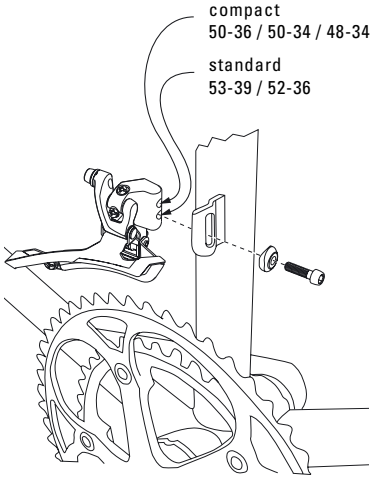
- Be sure to leave enough clearance between bottle cage holes and clamp location.
- Lower bottle cage hole is usually placed between 90 – 110 mm over bottom bracket center.

Necessary clearance see Fig. 2

Large Chainring		48 T	50 T	52 T	53 T
Clamp band position	A	135 mm	139 mm	143 mm	145 mm
	B	152 mm	156 mm	160 mm	162 mm

FORCE / RIVAL · FRONT DERAILLEURS ASSEMBLY

1



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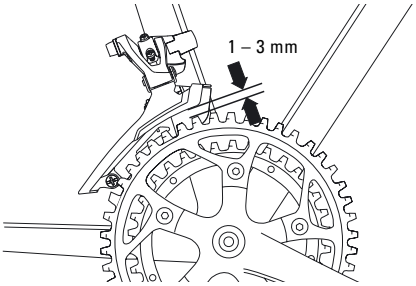

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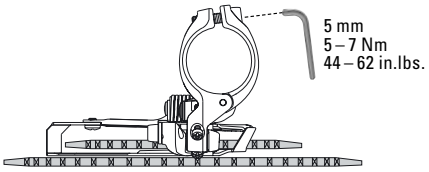

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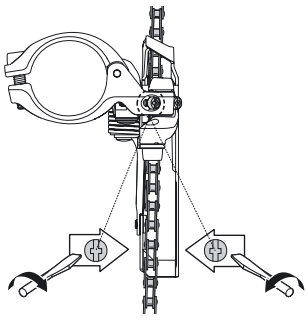
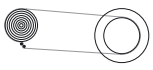




ASSEMBLY

- Attach the front derailleur to the seat tube. Direct mount version (see ***Figure 1):*** use upper thread for compact chainrings (50-36 / 50-34 / 48-34) or lower thread for standard chainrings (53-39 / 52-36).
- Adjust the position along the seat tube so that clearance between the front derailleur cage and the large chainring is 1 – 3 mm ***(Fig. 2)***.

  At the same time, align the front derailleur cage outerplate to be parallel with the chainrings ***(Fig. 3)***.
- Tighten the 5 mm hex clamp bolt to 5 Nm (44 in.lbs.).

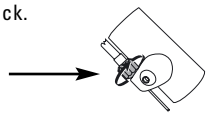
LOW LIMIT ADJUSTMENT

(see Fig. 4)

- Place the chain on the largest rear cog and the small front chainring.
- Adjust the low limit screw ***(Fig. 4)*** so that the chain is positioned close to the inner cage plate without actually touching it (clearance between the front derailleur cage inner plate and the chain is 0.5 – 1 mm).

CONNECTING CABLE

- Check that the chain and the front derailleur are in the small chainring position.
- Make sure the shifter cable is fully released (easiest/lowest gear at front shifter).
- Turn the barrel adjuster on the frame fully into the housing, then turn 1 full turn back.



- Feed the front shifter cable through the cable housing and stops. Route cable through a cable guide beneath the bottom bracket.
- Run the cable under the cable anchor washer and hold taut ***(Fig. 5)***.
- Tighten the 5 mm hex cable anchor bolt to 5 Nm (44 in.lbs.).
- Shift the chain up and down the chainrings several times to take out initial slack in the cable.
- If necessary re-tension the cable and tighten cable anchor bolt.

HIGH LIMIT ADJUSTMENT

(see Fig. 6)

- Set the chain to the smallest rear cog and the large front chainring.
- Adjust the high limit screw so that clearance between the front derailleur cage outer plate and the chain is 0.5 – 1 mm.

INDEX SHIFTING ADJUSTMENT

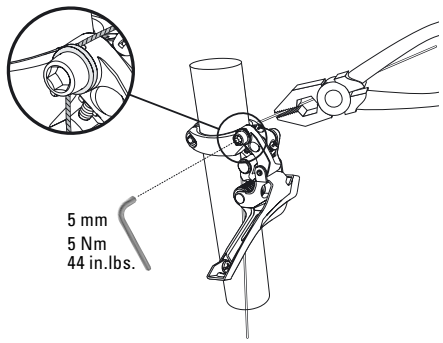
(see Fig. 7)

Shift the chain onto the largest rear sprocket and small chainring. Make sure the left shifter is set in the middle position – if the chain scrapes against the inner cage plate, turn the adjusting barrel on the shifter clockwise until the chain shifts smoothly and free of obstruction.

FORCE / RIVAL · FRONT DERAILLEURS ASSEMBLY

ROAD

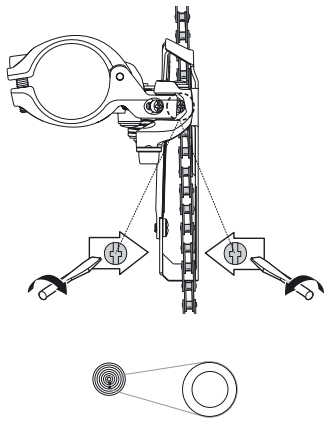
5



A D V I C E

Avoid using extreme gear combinations as these combinations cause striping noise and excessive wear!

6



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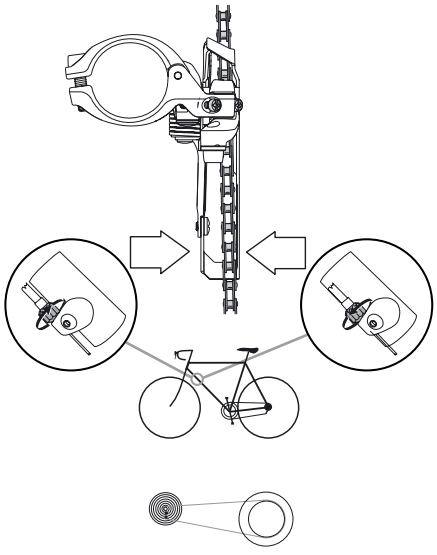


T R O U B L E S H O O T I N G

Problem	Cause	Remedy
Shifter actuated, chain fails to change chainring.	Shift cable incorrectly clamped.	Check shift cable and correct as necessary (cable clamp; cable housing stops; cable recess in shifter; cable tension).
	High / low limit screw poorly adjusted.	Correct limit screws.
	Clearance between cage and large chainring is too big / small.	Correct position (1 – 3 mm).
Chain falls over large / small chainring.	High / low limit screw poorly adjusted.	Correct limit screws.
Force required to actuate gears is too high.	Excessive cable friction, pinched or poorly routed cable.	Lubricate or replace cable and housing. Check for excessive bending of cable housing.
Crank collides with front derailleur.	High gear limit screw incorrectly adjusted.	Correct high limit screw.
	Cage not parallel with chain-ring.	Correct the front derailleur position.

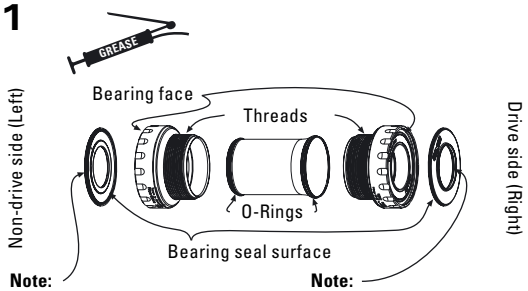
FORCE / RIVAL · CRANKSETS W. GXP BOTTOM BRACKET TECHNICAL DATA / ASSEMBLY REQUIREMENTS

FORCE RIVAL

		Force	Force Compact	Rival	Rival Compact
	BB Type	GXP External Bearing	←	GXP External Bearing	←
Compatibility	BB Thread	BSA or Italian	←	BSA or Italian	←
Compatibility	Bolt Circle Diam.	130 mm	110 mm	130 mm	110 mm
Compatibility	Chainring Ratio	53 / 39 T	50 / 34 – 50 / 36 T	53 / 39 T	50 / 34 – 50 / 36 T
Compatibility	Chains	SRAM PC 1090R / PC 1090 / PC 1070 and Shimano 10 speed chains	←		←
Compatibility	Chainline	44.5 mm	←	44.5 mm	←
Compatibility	Minimum Chainstay	405 mm	←	405 mm	←
	Crank Lengths	165 / 170 / 172.5 / 175 / 177.5 / 180 mm		165 / 170 / 172.5 / 175 / 177.5 / 180 mm	
	Bearing	Sealed Cartridge Bearing		Sealed Cartridge Bearing	
	Weight	740 g	720 g	780 g	770 g
Finish	BB Cup	Forged Alloy	←	Forged Alloy	←
Finish	Crank Arm	Carbon Fibre	←	AL 6066 Aluminum	←
Finish	Chainring	AL 7075-T6 Aluminum with TNT Finish		AL 7075-T6 Aluminum with Hard Anodizing	
Finish	Chainring Bolts	AL 7075-T6 Aluminum	←	AL 7075-T6 Aluminum	←

FORCE / RIVAL · CRANKSETS W. GXP BOTTOM BRACKET ASSEMBLY

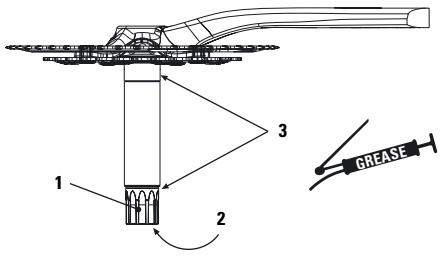
1



Note:
Non-drive side bearing seal has smaller inner diameter than drive-side seal

Note:
Drive side bearing seal has larger inner diameter than non-drive side seal

2



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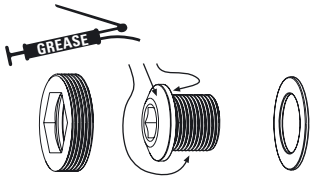


NECESSARY TOOLS

- Torque wrench
- 8 mm hex, 16 mm (5/8") hex
- Bottom Bracket installation tool (Truvativ GXP tool, Park™ BBT9 or equivalent)

Supplies:
- Grease

PARTS PREPARATION

- Assure the frame's bottom bracket shell threads are clean and undamaged, there should be no paint or dirt present. Have your bottom bracket shell chased and faced by your bike shop for best results. Check to make sure the threads of your GXP bottom bracket match the threads in the bottom bracket shell of your frame.

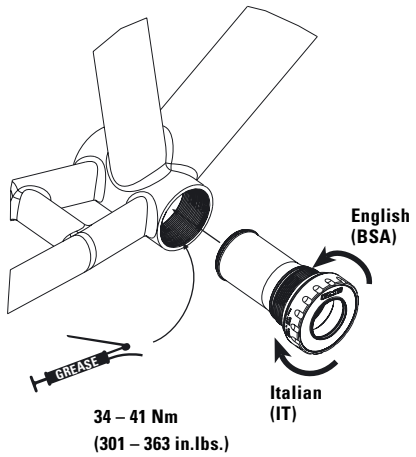
- Prepare the bottom bracket as shown in ***Figure 1***.
  It may be necessary to remove the drive side seal from the spindle.
  Both seals should be pressed into place so that the outer lip seats firmly in the bottom bracket cup groove. Apply grease to the surfaces shown in ***Figure 1***.

- Prepare the crank spindle:
  – Apply grease to splines (1, ***Figure 2)***
  – Apply grease to crankbolt threads (2)
  – Apply grease to spindle bearing race surfaces (3)

- Prepare the self extracting crank bolt:
  Apply grease to the surfaces shown in ***Figure 3.***

FORCE / RIVAL · CRANKSETS W. GXP BOTTOM BRACKET ASSEMBLY

4



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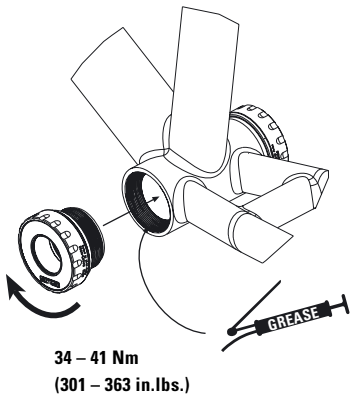

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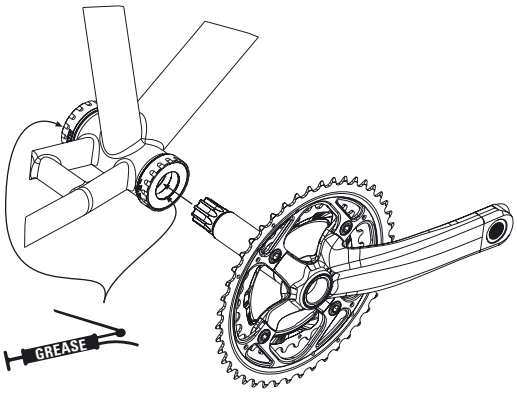

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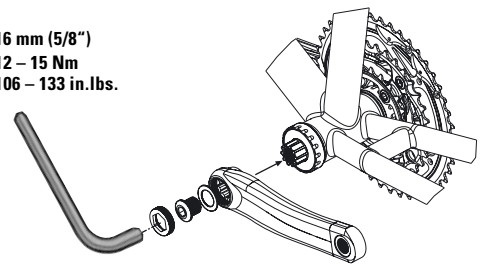


A S S E M B L Y

- Grease frame threads ***(Fig. 4)***. Thread the prepared bottom bracket into the drive side (right side) of the frame (counterclockwise to tighten English (BSA) thread or clockwise to tighten Italian thread) until the flange bottoms against the frame shell face.
  Torque to 34 – 41 Nm (301 – 363 in.lbs.) using a torque wrench. Refer to ***Figure 4.***

- Grease frame threads ***(Fig. 5)***. Thread the prepared left adapter cup into the non-driveside (left side) of the frame (Clockwise to tighten) until the flange bottoms against the frame shell face. Torque the left adapter cup to 34-41 Nm (301 – 363 in.lbs.) using a torque wrench.

- Grease the inner bearing races as shown in ***Figure 6.*** Slide the right crankarm and spindle assembly through the bottom bracket until the left side splines come through the left side bottom bracket cup, and the spindle stops.

- If the crank bolt assembly has not been assembled yet, assemble it and torque as shown in ***Figure 7.*** Use a 16 mm hex and torque wrench to install self extractor and torque to 12 – 15 Nm (106 – 133 in.lbs.).

- Assemble the left crankarm onto the bottom bracket spindle using an 8 mm hex and torque wrench and torque to 48 – 54 Nm (425 – 478 in.lbs.) as shown in ***Figure 7.***

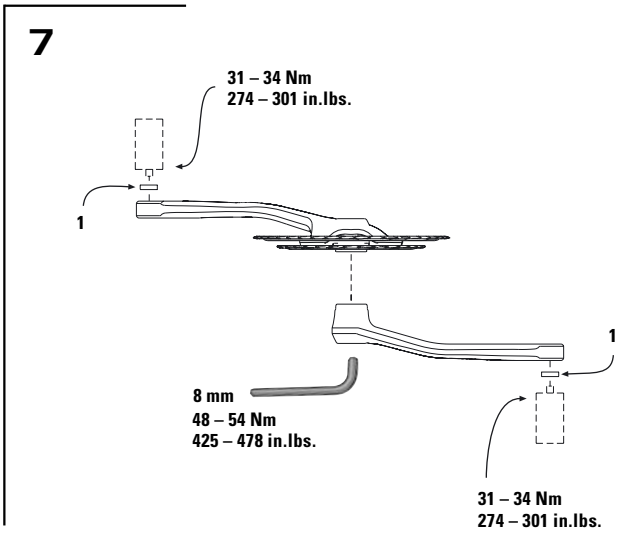
- Check the assembly for play by pulling crankarm away from frame, alternating back and forth. If the crank moves, tighten crankarm bolt until no play is detected. If maximum torque of 48 – 54 Nm (425 – 478 in.lbs.) has been achieved, remove the crankarm from the spindle, apply additional grease, and repeat installation. It may take several installations to eliminate all play.

- Grease the pedal threads, add pedal washers (1, ***Figure 7),*** assemble and tighten the pedals to the crankarms with 31 – 34 Nm (274 – 301 in.lbs.).
  Caution:
  Drivetrain side right hand pedal-thread.
  Non drive side left hand pedal-thread.

Advice:

- ***If creaking of the assembly occurs, check that all parts were torqued to specification, grease is liberally applied on all surfaces noted. Also check chainring bolts (8 – 9 Nm / 80 – 90 in.lbs.) and pedals are installed with proper lubrication and torque.***
- ***GXP seals are designed to prevent contamination and therefore must rub against their sealing surfaces. New GXP seals will feel stiff upon initial installation. This is normal. With use the seals will wear-in and loosen up.***

7



X-9 / X-7 / 3.0 · FRONT DERAILLEURS
TECHNICAL DATA / ASSEMBLY REQUIREMENTS

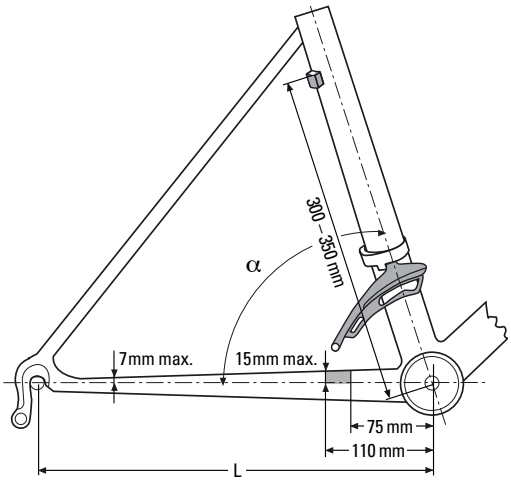
X-9 X-7

		X-9 High Clamp		X-7 High Clamp	
Clamp Size	28.6 mm	—	←	with band adaptor	←
	31.8 mm	original	←	with band adaptor	←
	34.9 mm	original	←	original	←
	Rear Compatibility	9spd	←	9spd	←
	Index Compatible	Yes	←	Yes	←
	Total Capacity	22T	←	20T	←
	Top-Middle Min. Capacity	min. 12T	←	min. 12T	←
	Top Gear Teeth	44T / 48T	←	44T / 48T	←
	Cable Routing	Top Pull Type	Bottom Pull Type	Twin Pull Type (Top and Bottom Pull)	
	Chainstay Angle	66 – 69°	←	66 – 69°	←
	Mount Type	Down Swing	←	Down Swing	←
	Chain Line	47,5 – 51 mm	←	47,5 – 51 mm	←
	Weight	169 g (ø 31,8 mm) / 171 g (ø 34,9 mm)		185 g	←
Design	Band Material	Aluminum, forged	←	Aluminum	←
	Outer Link	Aluminum	←	Aluminum	←
	Inner Link	Aluminum	←	Aluminum	←
	Link Bushing	Outer Sealed	←	Outer Sealed	←
	Chain Cage	Steel Chrome Plated	←	Steel Chrome Plated	←
	Color	Silver, polished	←	Silver, painted	Black, painted

X-7 3.0

		X-7 Low Clamp		3.0
Clamp Size	28.6 mm	—	←	with band adaptor
	31.8 mm	with band adaptor	←	with band adaptor
	34.9 mm	original	←	original
	Rear Compatibility	9spd	←	8spd / 7spd
	Index Compatible	Yes	←	Yes
	Total Capacity	22T	←	20T
	Top-Middle Min. Capacity	min. 12T	←	min. 10T
	Top Gear Teeth	44T / 48T	←	42T / 48T
	Cable Routing	Twin Pull Type (Top and Bottom Pull)		Twin Pull Type (Top and Bottom Pull)
	Chainstay Angle	66 – 69°	←	66 – 69°
	Mount Type	Down Swing	←	Down Swing
	Chain Line	47,5 – 51 mm	←	47,5 – 51 mm
	Weight	175 g (without adaptor) / 180 g (with adaptor)		210 g
Design	Band Material	Aluminum	←	Steel
	Outer Link	Steel	←	Steel
	Inner Link	Aluminum	←	Steel
	Link Bushing	Outer Sealed	←	Bushing
	Chain Cage	Steel Chrome Plated	←	Steel Chrome Plate
	Color	Silver, painted	Black, painted	Black

1



FRAME DIMENSIONS

(see Fig. 1)

- For Top Pull version: upper cable stop should be positioned 300 – 350 mm above bottom bracket center.
- The seat tube should be positioned in the center of the bottom bracket shell.

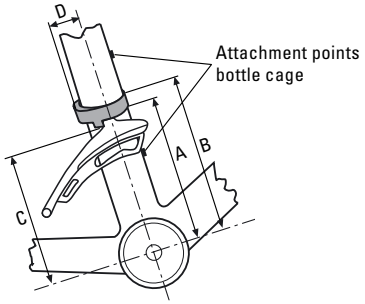
Length of chainsty:

- MTB/Trekking L > 420 mm.
- Rear frame alignment must be symmetrical.

Chainstay angle:
α = 66° – 69°.

Chainline:
47.5 – 51 mm.
(Measurement from the center of the bracket to the center of middle chainring.)

2



NECESSARY CLEARANCE

(see Fig. 2)

- Be sure to leave enough clearance between bottle cage holes and clamp location.
- Lower bottle cage hole is usually placed between 90 – 110 mm over bottom bracket center.

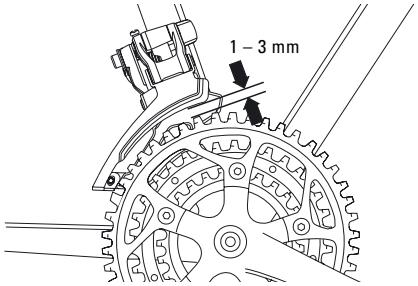
Necessary clearance see Fig. 2		**X-9 High Clamp** 44T	**X-9 High Clamp** 48T	**X-7 High Clamp** 44T
Clamp band position	**A**	130 mm	135 mm	130 mm
	B	152 mm	157 mm	152 mm
	C	100 mm	105 mm	100 mm
Tire clearance	**D**	38 mm	43 mm	38 mm

		X-7 High Clamp 48T	**X-7 Low Clamp** 44T	**X-7 Low Clamp** 48T
Clamp band position	**A**	135 mm	69 mm	74 mm
	B	157 mm	86 mm	91 mm
	C	105 mm	69 mm	74 mm
Tire clearance	**D**	43 mm	43 mm	48 mm

		3.0 42T	**3.0** 48T	
Clamp band position	**A**	114 mm	119 mm	
	B	128 mm	133 mm	
	C	107 mm	112 mm	
Tire clearance	**D**	43 mm	43 mm	

X-9 / X-7 / 3.0 · FRONT DERAILLEURS ASSEMBLY

1



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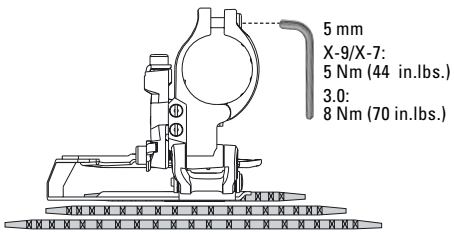

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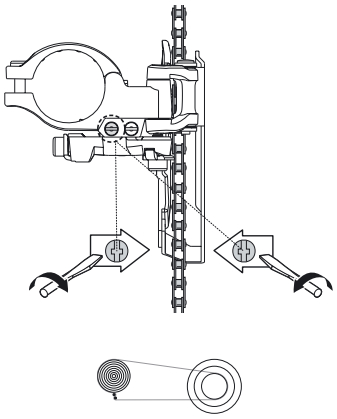

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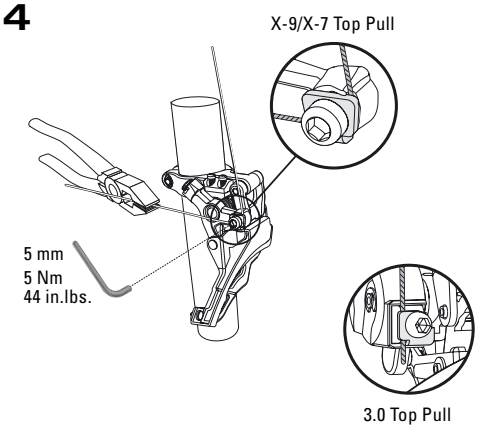


ASSEMBLY

- Attach the front derailleur to the seat tube.
- Adjust the position along the seat tube so that clearance between the front derailleur cage and the large chainring is 1 – 3 mm ***(Fig. 1)***.
  At the same time, align the front derailleur cage outerplate to be parallel with the chainrings ***(Fig. 2)***.
- Tighten the 5 mm hex clamp bolt to 5 Nm (44 in.lbs.) for X-9/X-7 or 8 Nm (70 in.lbs.) for 3.0.

LOW LIMIT ADJUSTMENT

(see Fig. 3)

- Place the chain on the largest rear cog and the smallest front chainring.
- Adjust the low limit screw ***(Fig. 3)*** so that the chain is positioned close to the inner cage plate without actually touching it.

CONNECTING CABLE

- Check that the chain and the front derailleur are in the smallest chainring position.
- Place the front shifter in gear position '1'.
- Turn the front shifter barrel adjuster clockwise fully into the shifter, then turn counterclockwise 1 full turn.
- Feed the front shifter cable through the cable housing and stops.
- Run the cable under the cable anchor washer and hold taut.
  – Top pull ***(Fig. 4)***.
  – Bottom pull ***(Fig. 5)***.
- Tighten the 5 mm hex cable anchor bolt to 5 Nm (44 in.lbs.).
- Shift the chain up and down the chainrings several times to take out initial slack in the cable.
- If necessary re-tension the cable and tighten cable anchor bolt.

HIGH LIMIT ADJUSTMENT

(see Fig. 6)

- Set the chain to the smallest rear cog and the largest front chainring.
- Adjust the high limit screw so that clearance between the front derailleur cage outer plate and the chain is 0 – 0.5 mm.

INDEX SHIFTING ADJUSTMENT

(see Fig. 7)

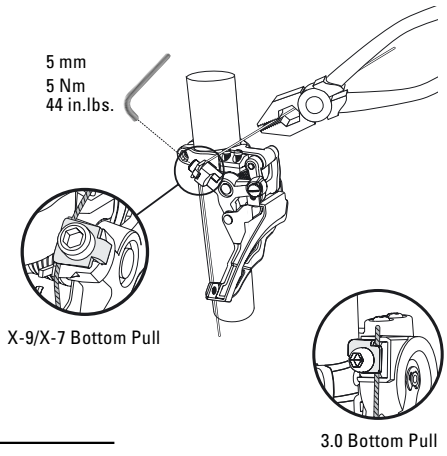
Shift the chain onto the largest rear sprocket and middle chainring – if the chain scrapes against the inner cage plate, turn the adjusting barrel on the shifter clockwise until the chain shifts smoothly and free of obstruction.

MAINTENANCE

- Do not use solvants or corrosive materials to clean the components.
- Lubricate the shifting joints regularly ***(Fig. 9)***.
- Grease any cable guides (e.g. beneath the bottom bracket).

X-9 / X-7 / 3.0 · FRONT DERAILLEURS ASSEMBLY

5



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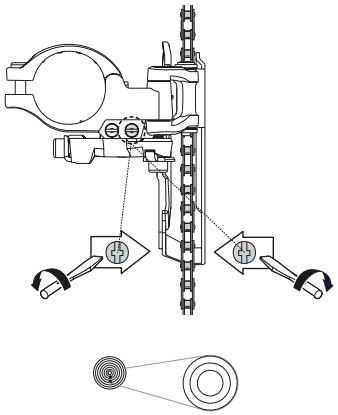

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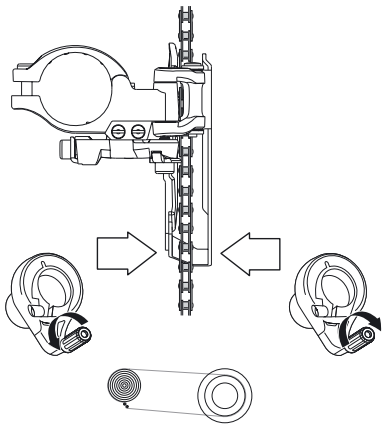

ADVICE

Avoid using extreme gear combinations as these combinations cause striping noise and excessive wear!

TROUBLESHOOTING

Problem	Cause	Remedy
Shifter actuated, chain fails to change chainring.	Shift cable incorrectly clamped.	Check shift cable and correct as necessary (cable clamp; cable housing stops; cable recess in shifter; cable tension).
	High / low limit screw poorly adjusted.	Correct limit screws.
	Clearance between cage and large chainring is too big / small.	Correct position (1 – 3 mm).
Chain falls over large / small chainring.	High / low limit screw poorly adjusted.	Correct limit screws.
Force required to actuate gears is too high.	Excessive cable friction, pinched or poorly routed cable.	Lubricate or replace cable and housing. Check for excessive bending of cable housing.
Crank collides with front derailleur.	High gear limit screw incorrectly adjusted.	Correct high limit screw.
	Cage not parallel with chain-ring.	Correct the front derailleur position.

NOTICES

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