

Dealer's Manual

ROAD	MTB	Trekking
City Touring/ Comfort Bike	URBAN SPORT	E-BIKE

SHIMANO *ULTEGRA* 6870 series

ULTEGRA

SW-R610	SM-BTR1
SW-9071	SM-BTR2
SW-R671	BT-DN110
	SM-BMR1
ST-6870	SM-BMR2
ST-6871	BM-DN100
	SM-BA01
FD-6870	SM-BCR1
RD-6870	SM-BCR2
	SM-BCC1
SM-EW90-A	
SM-EW90-B	
EW-SD50	
EW-SD50-I	
SM-EWC2	
SM-JC40	
SM-JC41	

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IMPORTANT NOTICE

- **This dealer's manual is intended primarily for use by professional bicycle mechanics.**

Users who are not professionally trained for bicycle assembly should not attempt to install the components themselves using the dealer's manuals. If any part of the information on the manual is unclear to you, do not proceed with the installation. Instead, contact your place of purchase or a local bicycle dealer for their assistance.

- Make sure to read all instruction manuals included with the product.
- Do not disassemble or modify the product other than as stated in the information contained in this dealer's manual.
- All dealer's manuals and instruction manuals can be viewed on-line on our website (<http://si.shimano.com>).
- Please observe the appropriate rules and regulations of the country, state or region in which you conduct your business as a dealer.

For safety, be sure to read this dealer's manual thoroughly before use, and follow it for correct use.

The following instructions must be observed at all times in order to prevent personal injury and physical damage to equipment and surroundings. The instructions are classified according to the degree of danger or damage which may occur if the product is used incorrectly.

 **DANGER**

Failure to follow the instructions will result in death or serious injury.

 **WARNING**

Failure to follow the instructions could result in death or serious injury.

 **CAUTION**

Failure to follow the instructions could cause personal injury or physical damage to equipment and surroundings.

TO ENSURE SAFETY



Be sure to also inform users of the following:

■ Lithium ion battery

Be sure to observe the following instructions in order to avoid burns or other injury from fluid leakage, overheating, fire, or explosion.

- Use the designated charger to charge the battery. If any non-specified items are used, fire, overheating or leakage may occur.
- Do not heat the battery or throw it into fire. If this is not observed, fire or bursting may occur.
- Do not deform, modify, disassemble or apply solder directly to the battery. Do not leave the battery in places which may exceed 60 °C in temperature, such as places which are exposed to direct sunlight inside vehicles on hot days or near stoves. If this is not observed, leakages, overheating or bursting may cause fire, burns, or other injuries.
- Do not connect the (+) and (-) terminals with metallic objects. Do not carry or store the battery together with metallic objects such as necklaces or hairpins. If this is not observed, short-circuits, overheating, burns or other injury may occur.
- If any liquid leaking from the battery gets into the eyes, immediately wash the affected area with clean water without rubbing the eyes, and then seek medical attention.

■ Battery charger/Battery charger cord

Be sure to observe the following instructions in order to avoid burns or other injury from fluid leakage, overheating, fire, or explosion.

- Do not get the charger wet or use it while it is wet, and do not touch or hold it with wet hands. If this is not observed, problems with operation or electric shocks may occur.
- Do not cover the charger with cloths while it is in use. If this is not observed, heat may build up and the case may become deformed, or fire or overheating may occur.
- Do not disassemble or modify the charger. If this is not observed, electric shocks or injury may occur.
- Use the charger at the specified power supply voltage only. If a power supply voltage other than that specified is used, fire, explosions, smoke, overheating, electric shocks or burns may occur.
- Do not touch metallic parts of the charger or the AC adapter if there is a lightning storm. If lightning strikes, electric shocks may occur.

■ SM-BCR2: Battery charger for SM-BTR2/BT-DN110

- Use an AC adapter with a USB port with a voltage of 5.0Vdc and with a current equal to or higher than 1.0Adc. If the one with a current lower than 1.0A is used, the AC adapter may heat up, potentially causing a fire, smoke, overheating, destruction, electric shock, or burns.

 **WARNING**

- **Be sure to follow the instructions provided in the manuals when installing the product.**

It is recommended to use genuine Shimano parts only. If parts such as bolts and nuts become loose or damaged, the bicycle may suddenly fall over, which may cause serious injury.

In addition, if adjustments are not carried out correctly, problems may occur, and the bicycle may suddenly fall over, which may cause serious injury.

-  Be sure to wear safety glasses or goggles to protect your eyes while performing maintenance tasks such as replacing parts.
- This dealer's manual is for use with the ULTEGRA 6870 series (electronic gear shifting system) only.
For any information regarding the ULTEGRA 6800 series which does not appear in this manual, refer to the Service Instructions included with each component.
- After reading the dealer's manual thoroughly, keep it in a safe place for later reference.

Be sure to also inform users of the following:

- *Intervals between maintenance depend on the use and riding circumstances. Clean the chain with an appropriate chain cleaner regularly. Never use alkali based or acid based solvents, such as rust cleaners. If those solvent be used chain might break and cause serious injury.*
- Check that the wheels are fastened securely before riding the bicycle. If the wheels are loose in any way, they may come off the bicycle and serious injury may result.
- Check the chain for any damage (deformation or crack), skipping, or other abnormalities such as unintended gear shifting. If any problems are found, consult a dealer or an agency.
The chain may break, and you may fall.
- Be careful not to let the hemming of your clothes get caught in the chain while riding. Otherwise you may fall off the bicycle.

■ **About the multi-shift function**

- On this system, the multi-shift function can be configured using E-TUBE PROJECT. The gears will continue to shift when the shifting switch is pressed using the multi-shift function. Shifting speed setting for multi-shift can also be modified. When modifying the gear changing settings for multi-shift, carefully read "Settings customizable in E-TUBE PROJECT" in this dealer's manual.
- If crank revolutions are set to low under faster setting of the multi-shift shifting speed, the chain will be unable to follow the movement of the rear derailleur, possibly leading to issues such as the chain slipping over the tip of the cassette sprocket teeth, the cassette sprocket deforming, or the chain breaking.

Item	Multi-shift speed	Characteristics	Usage notes	Crank rotation speed when operating multi-shift
Very fast	High speed	Quick multi-shifting is possible <ul style="list-style-type: none"> • The crank rotation speed can be adjusted quickly depending on changes in riding conditions. • The speed can be adjusted quickly. 	<ul style="list-style-type: none"> • Over-shifting occurs easily. • If the rotation speed of the crank is low, the chain will be unable to follow the movement of the rear derailleur. The chain may therefore slip over the tip of the cassette sprocket teeth. 	High crank rotation speed
Fast				
Standard	Default setting			
Slow				
Very slow	Low speed	Accurate multi-shifting is possible	Multi-shifting takes some time	

By default it is set to **Normal**.

Fully understand the features of the multi-shift speed, and choose a multi-shift gear shifting setting according to the riding conditions (terrain, riding method, etc.).

■ Lithium ion battery

- Do not place the battery into fresh water or sea water, and do not allow the battery terminals to get wet. If this is not observed, fire, bursting or overheating may occur.
- Do not use the battery if it has any noticeable scratches or other external damage. If this is not observed, bursting, overheating or problems with operation may occur.
- Do not throw or subject the battery to strong shock. If this is not observed, bursting, overheating or problems with operation may occur.
- Do not use the battery if leakages, discoloration, deformation or any other abnormalities occur. If this is not observed, bursting, overheating or problems with operation may occur.
- If any leaked fluid gets on your skin or clothes, wash it off immediately with clean water. The leaked fluid may damage your skin.
- The operating temperature ranges for the battery are given below. Do not use the battery in temperatures outside these ranges. If the battery is used or stored in temperatures which are outside these ranges, fire, injury or problems with operation may occur.
 1. During discharge: -10°C - 50°C
 2. During charging: 0°C - 45°C

SM-BTR1: Lithium ion battery (external type)

- If charging is not complete after 1.5 hours, stop charging. If this is not observed, fire, bursting or overheating may occur.

SM-BTR2/BT-DN110: Lithium ion battery (built-in type)

- If the battery does not become fully charged after 4 hours, stop charging. If this is not observed, fire, bursting or overheating may occur.

■ Battery charger/Battery charger cord**SM-BCR1: Battery charger for SM-BTR1**

- Hold the power plug when connecting or disconnecting the plug. Failure to do so may cause a fire or electric shock.
- If the following occurs, stop using the device and contact a dealer. A fire or electric shock may occur.
 - * If heat or acrid-smelling smoke is coming out from the power plug.
 - * There may be a bad connection inside the power plug.
- Do not overload the electrical outlet with appliances beyond its rated capacity, and use only a 100 – 240V AC electrical outlet. If the electrical outlet is overloaded by connecting too many appliances using adapters, overheating resulting in fire may occur.
- Do not damage the power cord or power plug. (Do not damage, process, let near hot objects, bend, twist or pull them; do not place heavy objects on top or bundle them tightly.) If they are used while damaged, fire, electric shocks or short-circuits may occur.
- Do not use the charger with commercially-available electrical transformers designed for overseas use, as they may damage the charger.
- Always be sure to insert the power plug as far as it will go. If this is not observed, fire may occur.

SM-BCR2: Battery charger for SM-BTR2/BT-DN110

- Do not use any USB cable other than the USB cable which is supplied with the PC linkage device. This may cause a charging error, fire, or failure to connect to PC due to overheating.
- Do not connect the charger to PC when it is on standby. This may cause a PC failure depending on its specifications.
- When connecting or disconnecting the USB cable or the charger, be sure to hold the cable by the plug. Failure to do so may cause a fire or electric shock. If the following occurs, stop using the device and contact a dealer. A fire or electric shock may occur.
 - * If heat or acrid-smelling smoke is coming out from the power plug.
 - * There may be a bad connection inside the power plug.
- If it thunders while charging with an AC adapter with a USB port, do not touch the device, bicycle, or the AC adapter. If lightning strikes, electric shocks may occur.
- Use an AC adapter with a USB port with a voltage of 5.0Vdc and with a current equal to or higher than 1.0Adc. If the one with a current lower than 1.0Adc is used, a charge error may occur or the AC adapter may heat up, leading to a fire.
- Do not use a USB hub when connecting the cable to a computer USB port. This may cause a charging error or fire due to overheating.
- Be careful not to damage the charging cable. (Do not damage, process, let near hot objects, bend, twist or pull them; do not place heavy objects on top or bundle them tightly.) If they are used while damaged, fire, electric shocks or short-circuits may occur.

■ Brake

- Each bicycle may handle slightly differently depending on the model. Therefore, be sure to learn the proper braking technique (including brake lever pressure and bicycle control characteristics) and operation of your bicycle. Improper use of your bicycle's brake system may result in a loss of control or a fall, which could lead to severe injury. For proper operation, consult a professional bicycle dealer or the bicycle's owner's manual. It is also important to practice riding and braking, etc.
- If the front brake is applied too strongly, the wheel may lock and the bicycle may fall forward, and serious injury may result.
- Always make sure that the front and rear brakes are working correctly before riding the bicycle.
- The required braking distance will be longer during wet weather. Reduce your speed and apply the brakes early and gently.
- If the road surface is wet, the tires will skid more easily. If the tires skid, you may fall off the bicycle; therefore, to avoid this, reduce your speed and apply the brakes early and gently.

For Installation to the Bicycle, and Maintenance:

- When the shifting switch is operated, the motor which drives the front derailleur will operate to the shifting position without stopping, so be careful not to get your fingers caught.

■ ST-6871/SW-9071/SW-R671**Points to note about the handlebars**

- Handle inner diameter: Ø19.0 – 22.5mm
- Handle outer diameter: Ø 22.2 – 24.0mm
- Applicable handlebars: Carbon fiber handlebars (with aluminum inserts where the brake levers are installed) or aluminum handlebars.
* Carbon fiber handlebars without aluminum inserts, where the brake levers are installed, cannot be used.

**Be sure to also inform users of the following:****■ Lithium ion battery**

- Store the battery in a safe place away from the reach of infants and pets.

SM-BTR1: Lithium ion battery (external type)

- When you do not use the battery for a long period, remove and charge the battery before storage.

SM-BTR2/BT-DN110: Lithium ion battery (built-in type)

- When you do not use the battery for a long period, charge the battery before storage.

■ Battery charger/Battery charger cord**SM-BCR1: Battery charger for SM-BTR1**

- Disconnect the power plug from the electrical outlet before cleaning the charger.

SM-BCR2: Battery charger for SM-BTR2/BT-DN110

- Disconnect the USB cable or the charging cable when performing maintenance.

NOTE

Be sure to also inform users of the following:

- Be sure to rotate the crank when carrying out any operations which are related to gear shifting.
- Do not keep connecting and disconnecting the small waterproof connector. It may impair the function.
- Be careful not to get water into the terminal.
- The components are designed to be fully waterproofed to withstand wet weather riding conditions; however, do not deliberately place them into water.
- Do not clean the bicycle with a high-pressure washer. If water gets into any of the components, operating problems or rusting may result.
- Handle the product carefully, and avoid subjecting it to any strong shocks.
- Do not use thinners or similar substances to clean the products. Such substances may damage the surfaces.
- If gear shifting operations do not feel smooth, wash the derailleur and lubricate all moving parts.
- Contact the place of purchase for updates of the component software. The most up-to-date information is available on the Shimano website.
- Products are not guaranteed against natural wear and deterioration from normal use and aging.
- For maximum performance we highly recommend Shimano lubricants and maintenance products.

■ Lithium ion battery

- Lithium-ion batteries are recyclable, valuable resources.
For information on used batteries, contact the place of purchase or a bicycle dealer.
- Charging can be carried out at any time regardless of the amount of charge remaining. Always be sure to use the special battery charger to charge the battery until it is fully recharged.
- The battery is not fully charged at the time of purchase. Before riding, be sure to fully charge the battery.
- If the battery has become completely empty, charge it as soon as possible. If you leave the battery without charging it, it will cause the battery to deteriorate.
- The battery is an exhaustible item. The battery will gradually lose its capacity to charging after repeated use.
If the length of time that the battery can be used becomes extremely short, it has probably reached the end of its life, and so you will need to purchase a new battery.
- The life of the battery will vary depending on factors such as the storage method, the usage conditions, the surrounding environment and the characteristics of the individual battery pack.
- If storing the battery away for a long period, remove it when the battery level is 50% or higher or when the green indicator is illuminating in order to prolong its useful life; and it is recommended that you charge the battery about every six months.
- If the storage temperature is high, the performance of the battery is reduced, and its useable time will be shorter. When you use the battery after a long storage period, store the battery indoors where the battery will not be exposed to direct sunlight or rain.
- If the ambient temperature is low, the battery's usable time will be shorter.

SM-BTR1: Lithium ion battery (external type)

- When storing the battery away, remove the battery from the bicycle and install the terminal cover first.
- The charging time is approximately 1.5 hours. (Note that the actual time will vary depending on the remaining battery charge.)
- If the battery feels difficult to insert or remove, apply specified grease (premium grease) to the part that touches the O-ring at the side.

SM-BTR2/BT-DN110: Lithium ion battery (built-in type)

- After removing the battery from the bicycle for storage, install a dummy plug.
- The charging time of an AC adapter with a USB port is about 1.5 hours, and that of computer USB port type about 3 hours. (Note that the actual time will vary depending on the amount of charge remaining in the battery. Depending on the specifications of the AC adapter, recharging via the AC adapter may require as much time (about 3 hours) as recharging via PC.)

■ Battery charger/Battery charger cord

- Use this instrument under the direction of a safety supervisor or the direction for use. Do not allow physically, sensory, or mentally impaired persons, inexperienced persons, or persons with no required knowledge, including children, to use this product.
- Do not allow children to play near the product.

 <p>Europe only</p>	<p>Disposal information for countries outside the European Union</p> <p>This symbol is only valid within the European Union. Contact the place of purchase or your nearest Shimano agent for advice on disposing.</p>
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- Charge the battery indoors to avoid exposure to rain or wind.
- Do not use outdoors or in environments with high humidity.
- Do not place the battery charger on dusty floors when using it.
- Place the battery charger on a stable surface such as a table when using it.
- Do not place any objects on top of the battery charger or its cable.
- Do not bundle the cables.
- Do not hold the battery charger by the cables when carrying it.
- Do not apply excessive tension to the cables.
- Do not wash the battery charger or wipe it using detergents.

SM-BCR2: Battery charger/PC linkage device for SM-BTR2/BT-DN110

- Connect the PC linkage device directly to a computer, without using an intermediate device such as a USB hub.
- Do not ride the bicycle while the PC linkage device and cable are still connected to it.
- Do not connect two or more of the same units to the same connection point. If this is not done, the units may not operate correctly.
- Do not connect or disconnect units again while unit recognition is in progress or after recognition is complete. If this is not done, the units may not operate correctly.
Check the procedures which are given in the user's manual for the E-TUBE PROJECT when connecting and disconnecting units.
- The tightness of the PC link cable will tend to drop after repeated connections and disconnections. If this happens, replace the cable.
- Do not connect two or more PC linkage device at the same time. If two or more PC linkage device units are connected, they will not operate correctly.
In addition, the PC may need to be restarted if operating errors occur.
- PC linkage devices cannot be used while the charger is connected.

■ Rear derailleur

- If gear shifting operations do not feel smooth, wash the derailleur and lubricate all moving parts.
- If the chain keeps skipping, ask the place of purchase to replace the chainrings, sprockets and/or the chain.
- If there is a large gap in the pulleys which causes a lot of noise, ask the place of purchase to replace the pulleys.
- The gears should be periodically washed with a neutral detergent. In addition, cleaning the chain with neutral detergent and lubricating it can be an effective way of extending the life of the gears and the chain.
- If the amount of looseness in the links is so great that adjustment is not possible, you should replace the derailleur.

For Installation to the Bicycle, and Maintenance:

- Be sure to attach dummy plugs to any unused terminals.
- Be sure to use Shimano original tool TL-EW02 to remove the electric wires.
- The motors of the motor unit cannot be repaired.
- Contact Shimano for information regarding the shipment of the battery charger to South Korea and Malaysia.
- Use an electric wire which still has some length to spare even when the handlebars are turned all the way to both sides. Furthermore, check that the shifting lever does not touch the bicycle frame when the handlebars are turned all the way.
- Use the specified cable and cable guide for smooth operation.

■ Electric wires/Electric wire covers

- Secure the electric wires with a zip tie so that they do not interfere with the chainrings, sprockets or tires.
- The strength of the adhesive is fairly weak to prevent the paint on the frame from being peeled off at when removing the electric wire cover, such as when replacing the electric wires. If the electric wire cover is peeled off, replace it with a new one. When removing the electric wire cover, do not peel it off too vigorously. If so, the paint on the frame will peel off, too.
- Do not remove the wire holders which are attached to the built-in type electric wires (EW-SD50-I). The wire holders prevent the electric wires from moving inside the frame.
- When installing to the bicycle, do not forcibly bend the electric wire plug. It may result in a poor contact.

■ Dual control lever

- Dummy plugs are installed at the time of shipment from the factory. Do not remove them except when necessary.
- When routing the electric wires, take care to ensure that they do not interfere with the brake levers.

■ Rear derailleur

- Always be sure to adjust the top adjustment bolt and the low adjustment bolt according to the instructions given in the adjustment section. If these bolts are not adjusted, the chain may become clamped between the spokes and the smallest sprocket and the wheel may lock, or the chain may slip onto the small sprocket.
- Periodically clean the derailleur and lubricate all moving parts (mechanism and pulleys).
- If gear shifting adjustments cannot be carried out, check the degree of parallel of the rear fork ends.
- The tension pulley has an arrow on it to indicate the direction of rotation. Install the tension pulley so that the arrow is pointing clockwise when looking at the outer side of the derailleur.

■ SM-BMR1/Battery mount

- This is supported by the firmware versions 2.0.0 and later.

The actual product may differ from the illustration because this manual is intended mainly to explain the procedures for using the product.

For Installation to the Bicycle:

■ **Notes on reinstalling and replacing components**

- When the product is reassembled or replaced, it is automatically recognized by the system to allow operation according to the settings.
- If the system does not operate after reassembly and replacement, follow the system power reset procedure below to check the operation.
- If the component configuration changes or malfunction is observed, use the E-TUBE PROJECT software to update the firmware of each component to the latest version and perform a check again. Also make sure that the E-TUBE PROJECT software is the latest version. If the software is not the latest version, the component compatibility or the product functions may not be available.

Be sure to also inform users of the following:

■ **About used batteries**

- Lithium-ion batteries are recyclable, valuable resources.
For information on used batteries, contact the place of purchase or a bicycle dealer.

■ **About system power reset**

- When the system fails to operate, it may be recovered by resetting the system power.
- After the battery is removed, about one minute is usually required for the system power to reset.

In the case of using SM-BTR1

- Remove the battery from the battery mount. After about one minute, install the battery.

In the case of using SM-BTR2/BT-DN110

- Disconnect the plug from SM-BTR2/BT-DN110. After about one minute, insert the plug.

■ **Connection and communication with PC**

- PC linkage devices can be used to connect a PC to the bicycle (system or components), and an E-TUBE PROJECT can be used to carry out tasks such as customizing single components or the whole system and updating their firmware.
If your versions of E-TUBE PROJECT software and firmware for each component are not up to date there could be problems operating the bicycle. Check the software version and update it to the latest one.

	PC linkage device	E-TUBE PROJECT	Firmware
SM-BMR2/SM-BTR2	SM-PCE1/SM-BCR2	Version 2.6.0 or later	Version 3.0.0 or later
BT-DN110/BM-DN100		Version 3.0.0 or later	Version 4.0.0 or later * Pre-installed firmware is version 4.0.0.

About compatibility with E-TUBE PROJECT

- For details on compatibility with E-TUBE PROJECT, refer to the following website.
(http://e-tubeproject.shimano.com/compatibility_chart.html)

LIST OF TOOLS TO BE USED

LIST OF TOOLS TO BE USED

The following tools are needed for installation, adjustment, and maintenance purposes.

Tool		Tool		Tool	
	2mm hexagon wrench		Hexalobular[#5]		Handlebar tape cutout tool
	2.5mm hexagon wrench		Snap ring pliers		TL-CT12
	3mm hexagon wrench		Special E-ring removal tool		Shimano original tool TL-EW02
	5mm hexagon wrench		Plastic mallet		
	Screwdriver[#1]		Utility knife		

INSTALLATION

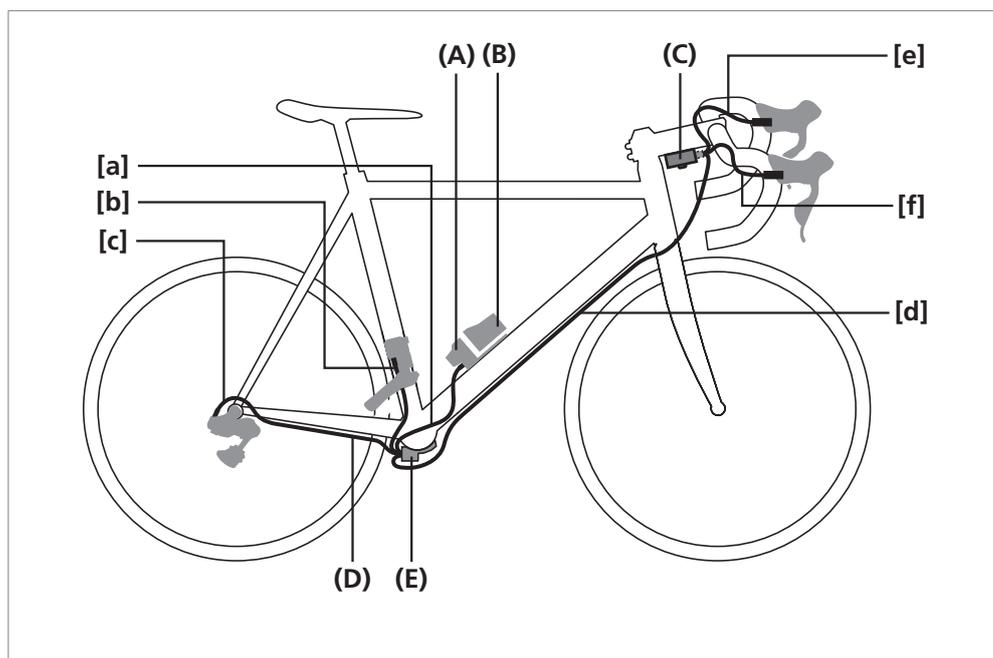
INSTALLATION

This dealer's manual is for use with the ULTEGRA 6870 series (electronic gear shifting system) only.
For any information regarding the ULTEGRA 6800 series which does not appear in this manual, refer to the Dealer's Manual on the website.

■ Electric wire wiring diagram (overall conceptual diagram)

Lithium ion battery (external type) SM-BTR1

External type (SM-JC40)



- (A)** Battery mount
SM-BMR2/BM-DN100
- (B)** Lithium ion battery
(external type) SM-BTR1
- (C)** Junction A
SM-EW90-A/B
- (D)** Electric wire
EW-SD50
- (E)** Junction B
SM-JC40

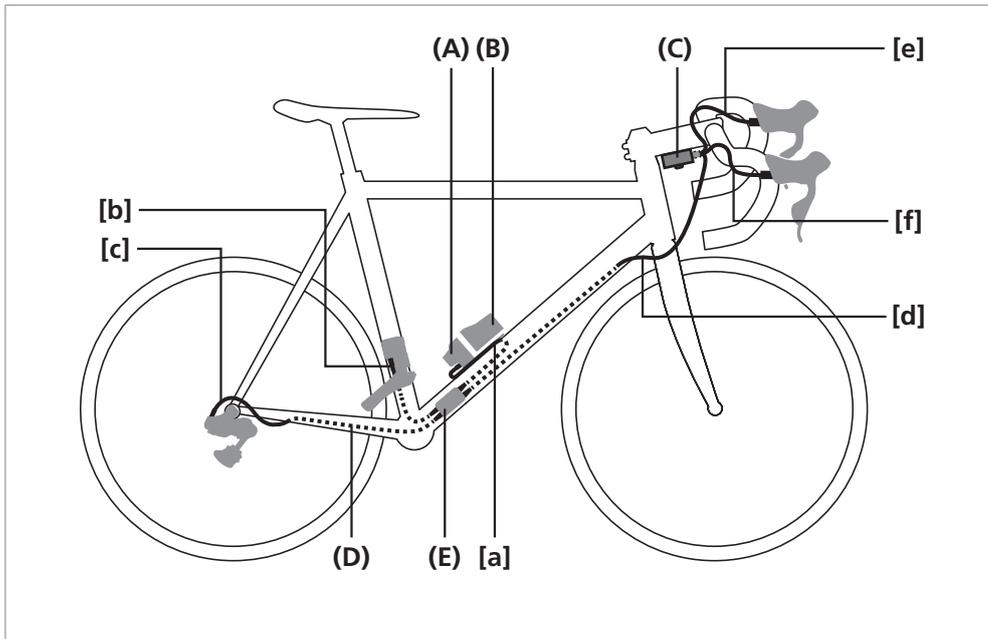


Cable length (EW-SD50)
 [a] + [b] ≤ 900mm
 [a] + [c] ≤ 1100mm
 [d] ≤ 1400mm
 [e], [f] ≤ 500mm

INSTALLATION

▶▶ Electric wire wiring diagram (overall conceptual diagram)

Built-in type (SM-JC41)



- (A) Battery mount
SM-BMR2/BM-DN100
- (B) Lithium ion battery (external type)
SM-BTR1
- (C) Junction A
SM-EW90-A/B
- (D) Electric wire
EW-SD50-I
- (E) Junction B SM-JC41

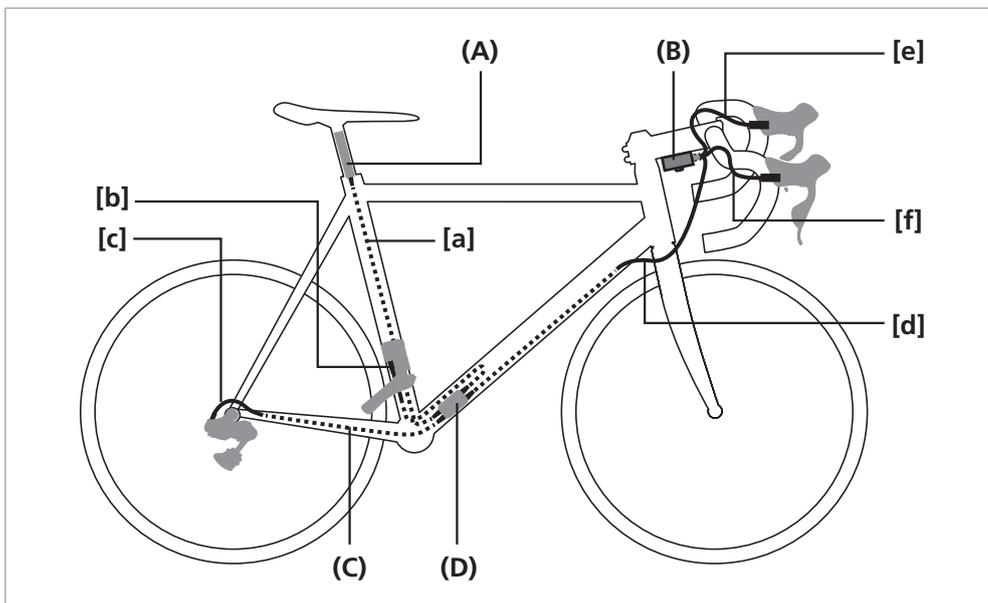


Cable length (EW-SD50)

- [a] + [b] ≤ 1500mm
- [a] + [c] ≤ 1700mm
- [d] ≤ 1400mm
- [e], [f] ≤ 500mm

Built-in battery type SM-BTR2/BT-DN110

Built-in type (SM-JC41)



- (A) Lithium ion battery
(built-in type)
SM-BTR2/BT-DN110
- (B) Junction A
SM-EW90-A/B
- (C) Electric wire
EW-SD50-I
- (D) Junction B SM-JC41



Cable length (EW-SD50)

- [a] + [b] ≤ 1500mm
- [a] + [c] ≤ 1700mm
- [d] ≤ 1400mm
- [e], [f] ≤ 500mm

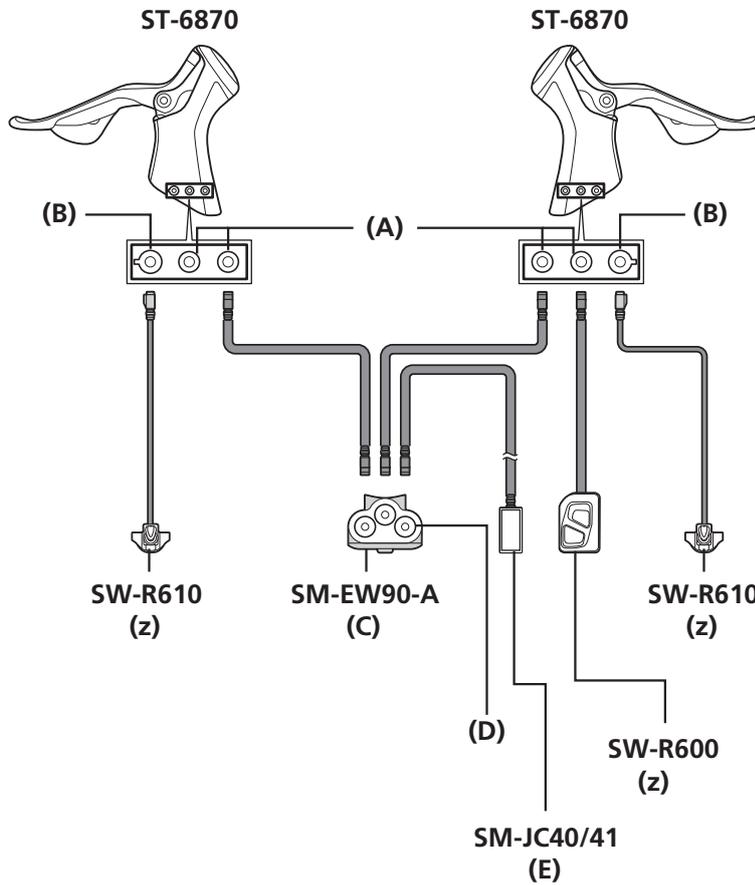
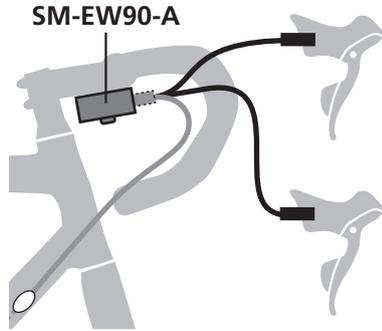
INSTALLATION

▶▶ Electric wire wiring diagram (junction A side)

Electric wire wiring diagram (junction A side)

3 port type

Drop handlebar type



- E-TUBE connector
- Connector for remote sprinter shifter

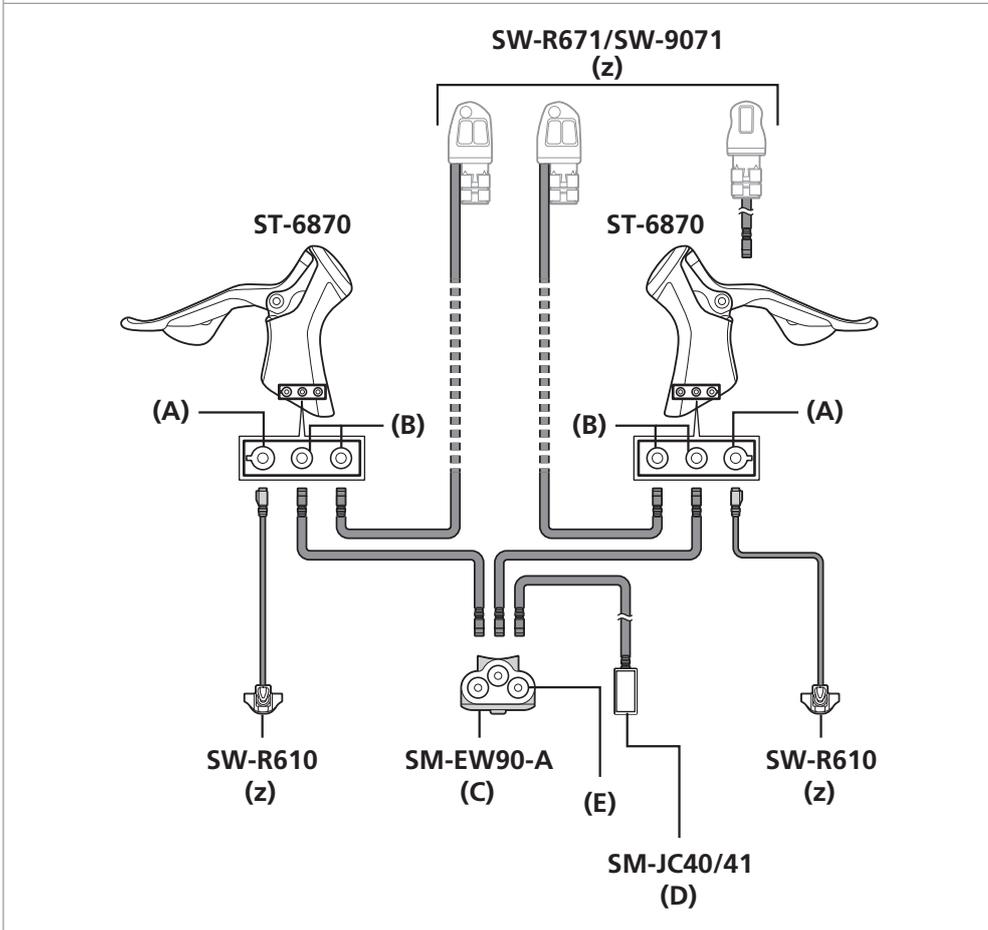
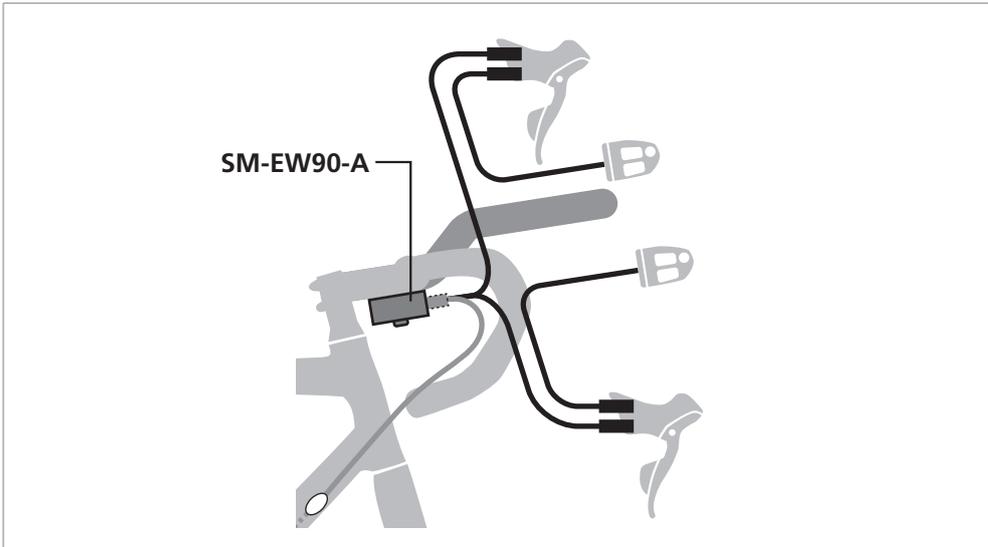
(z) Option

- (A) E-TUBE port x2
- (B) Port for remote sprinter shifter
- (C) Junction A
- (D) E-TUBE port x3
- (E) Junction B

INSTALLATION

▶▶ Electric wire wiring diagram (junction A side)

Clip-on bar type



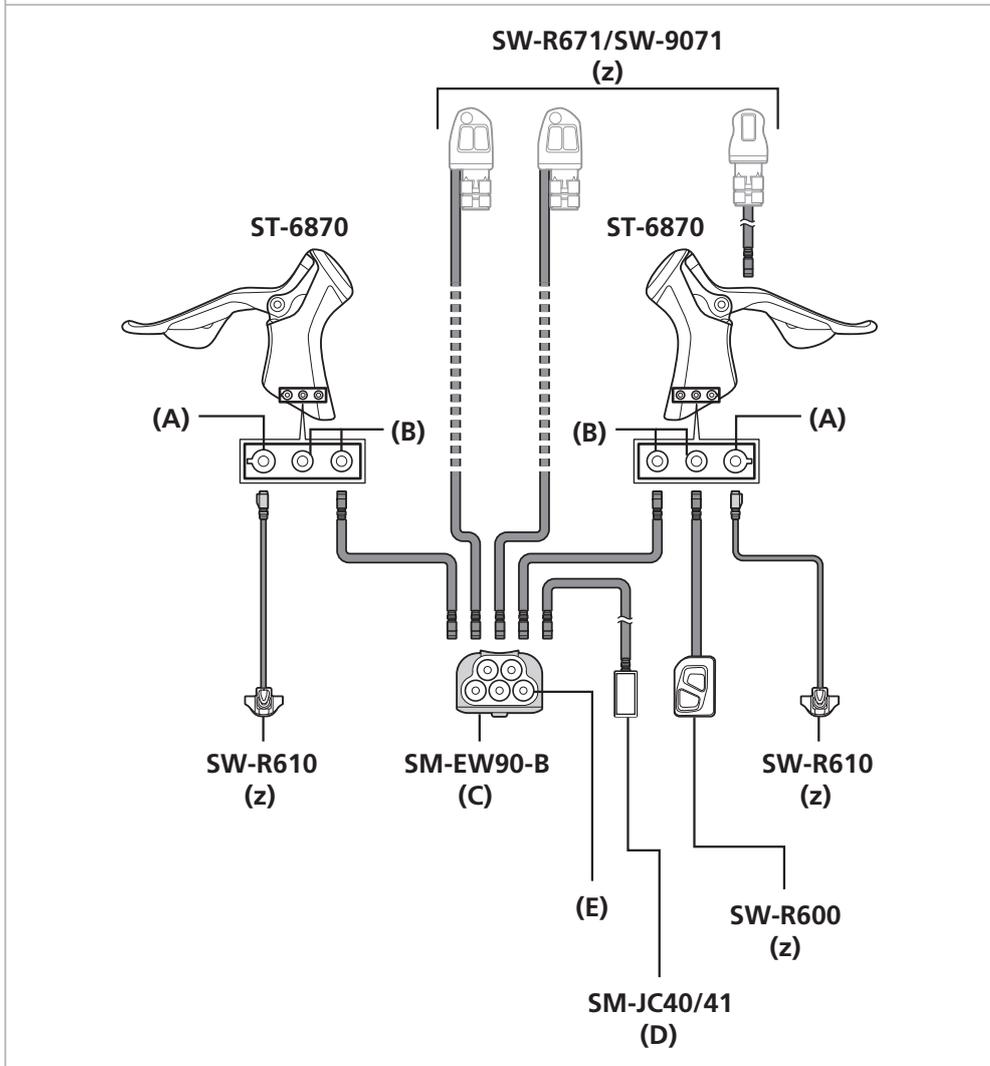
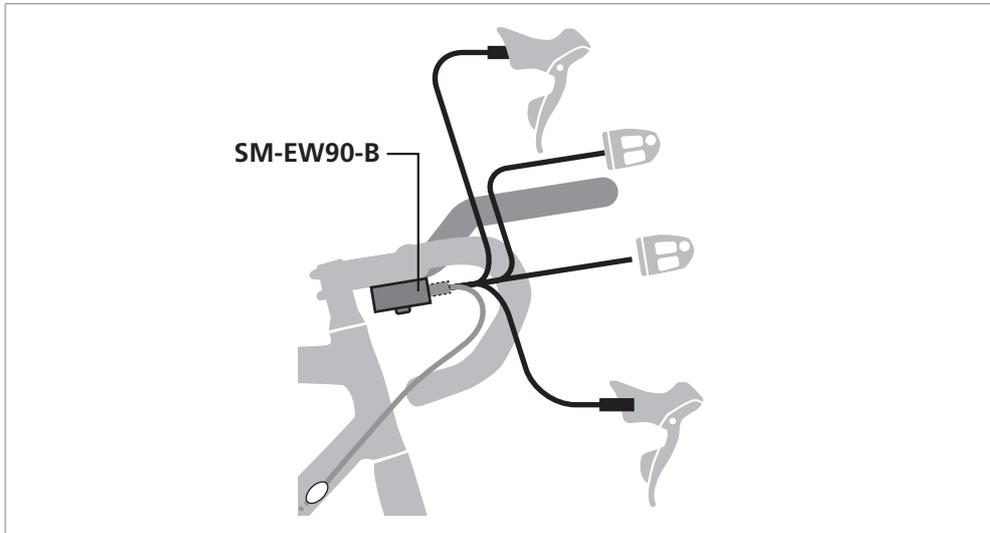
-  E-TUBE connector
-  Connector for remote sprinter shifter

(z) Option

- (A)** Port for remote sprinter shifter
- (B)** E-TUBE port x2
- (C)** Junction A
- (D)** Junction B
- (E)** E-TUBE port x3

5 port type

Clip-on bar type



-  E-TUBE connector
-  Connector for remote sprinter shifter

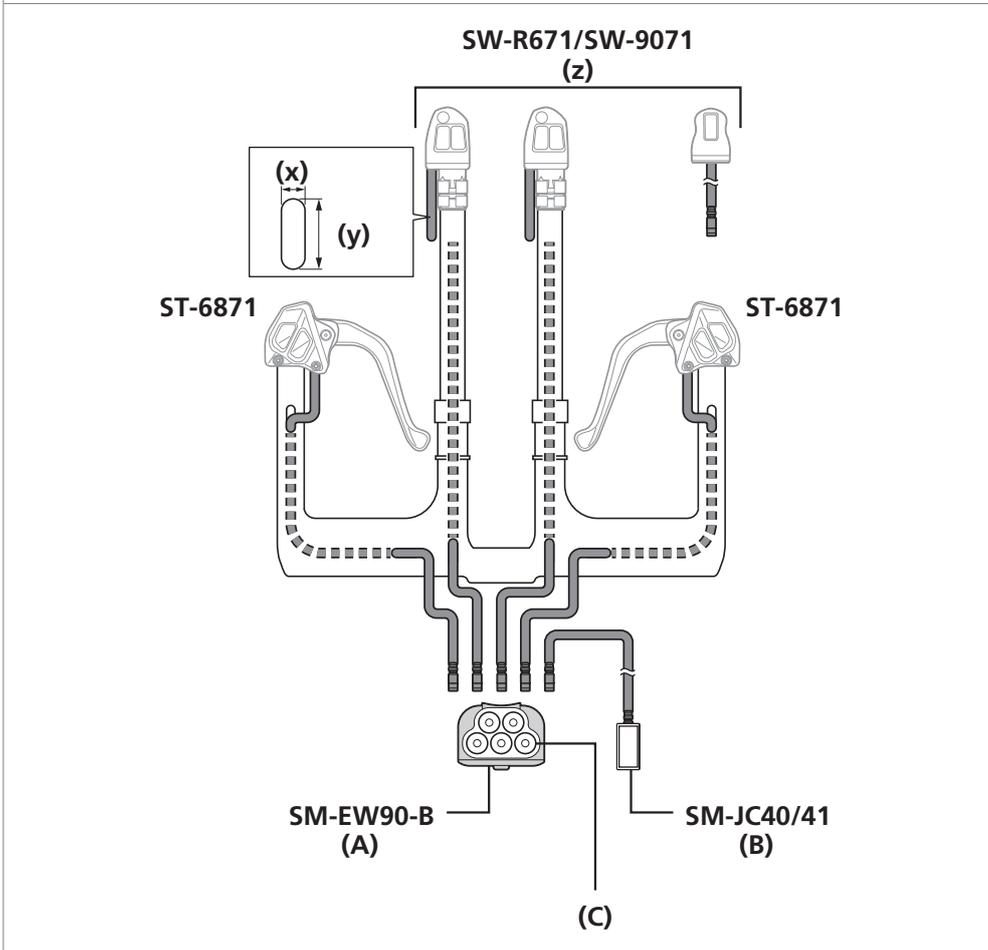
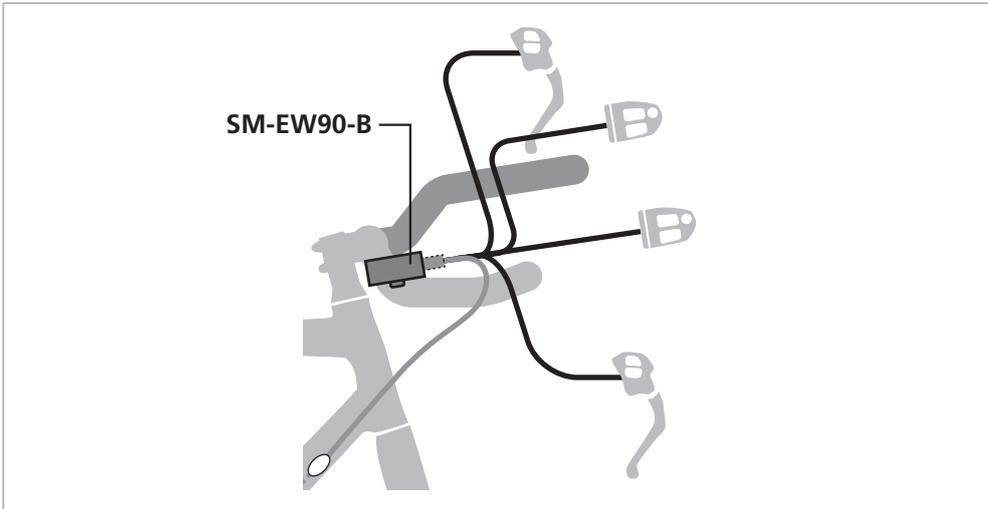
(z) Option

- (A)** Port for remote sprinter shifter
- (B)** E-TUBE port x2
- (C)** Junction A
- (D)** Junction B
- (E)** E-TUBE port x5

INSTALLATION

▶▶ Electric wire wiring diagram (junction A side)

Time trial/triathlon handle type

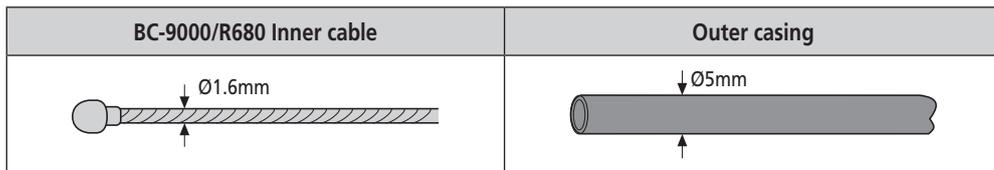


-  E-TUBE connector
 -  Connector for remote sprinter shifter
-
- (x)** 6mm
 - (y)** 18mm
 - (z)** Option
-
- (A)** Junction A
 - (B)** Junction B
 - (C)** E-TUBE port x5

INSTALLATION

▶▶ Installation of the dual control lever and brake cable

■ Installation of the dual control lever and brake cable



⚠ WARNING

- Do not apply grease or other lubricants to the inner cable.
- Be sure to wipe off with a cloth any grease that adheres to the inner fixing section. After wiping off the grease, pass the inner cable through the outer casing. If grease adheres to the fixing section, the holding force of the brake cable may not be sufficient. If the holding force is insufficient, the brake cable will slacken resulting in a loss of brake control and possibly severe injury.

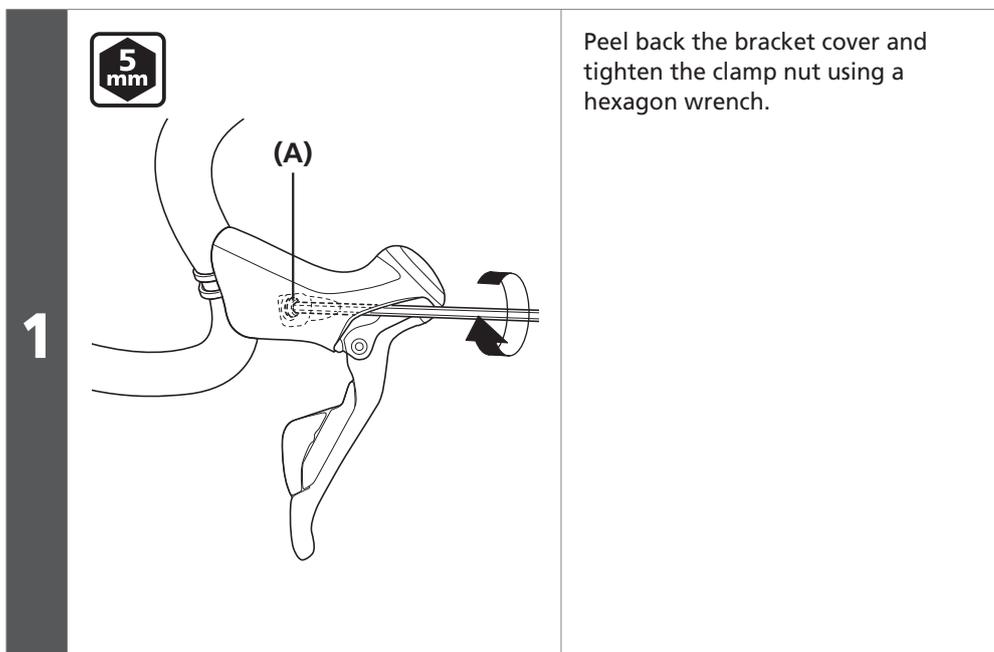
NOTE

- Be careful not let the BC-9000/R680 inner cable come into contact with the brake lever or the metal section (adjustment section) of the caliper brake. Fuzz may be generated when the inner cable is installed or when the coating is damaged during use, but this will not affect its functions.
- Use cables which are long enough that they still have some looseness even when the handlebars are turned all the way to both sides.

📖 TECH TIPS

For information on how to install the brake cable, refer to BR-6800 dealer's manual.

ST-6870



(A) Clamp nut

Tightening torque



6 - 8 N·m

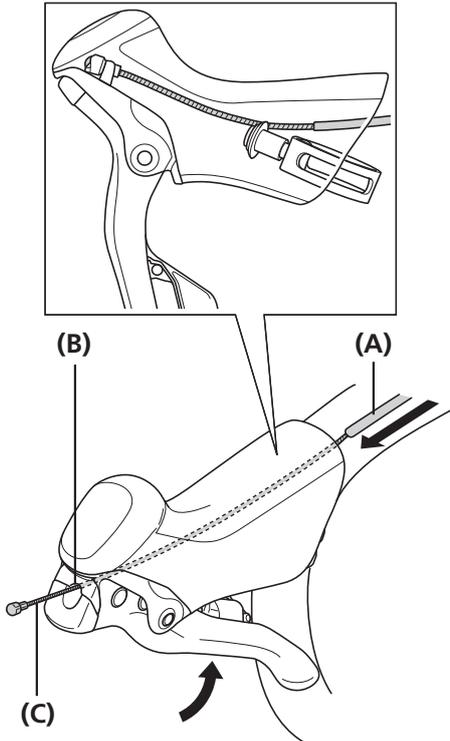
NOTE

- With a carbon handle, even the recommended tightening torque may be too tight and cause damage to the handle, or too loose and not sufficiently attached. For the appropriate torque value, consult with the manufacturer of the completed bicycle or the manufacturer of the handle.
- The clamp band, clamp bolt, and clamp nut of ST-6870 have no compatibility with other products. Do not use components that are used in other products.

INSTALLATION

Installation of the dual control lever and brake cable

2



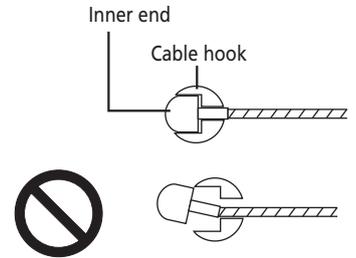
Depress the lever as if to brake and pass the inner cable through.

- (A) Outer casing
- (B) Cable hook
- (C) Inner cable

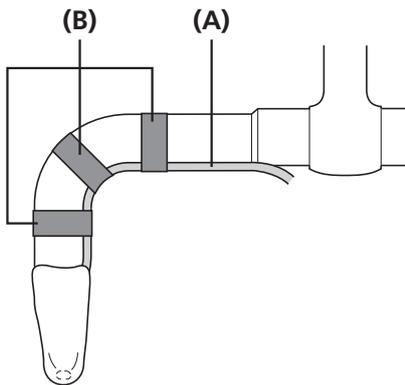
NOTE

Inner end

Make sure that the inner end is firmly set in the cable hook.



3

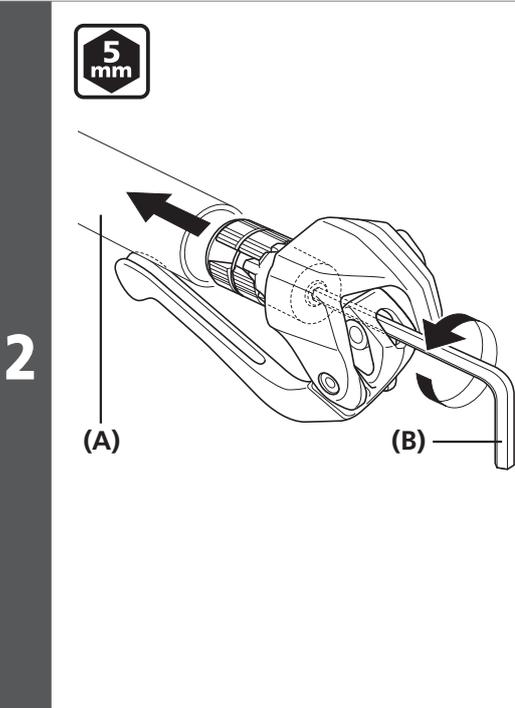


Temporarily secure the outer casing to the handlebar (by using tape or a similar material).

- (A) Outer casing
- (B) Tape

ST-6871

- 1** Route the outer casing into the handlebar.
 When assembling the brake lever, adjust the length of the outer casing so that it can securely fit into the outer casing holder.



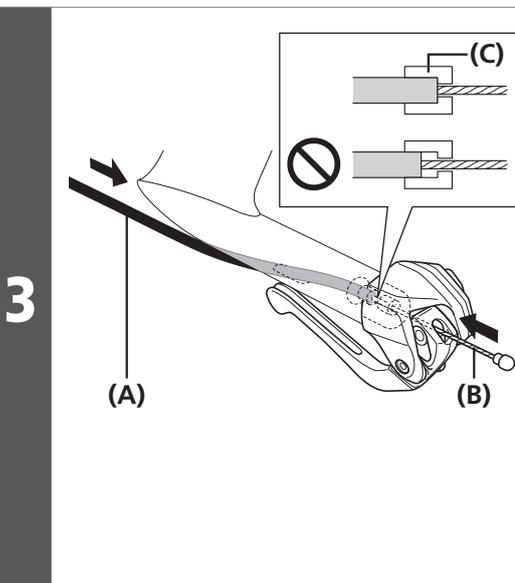
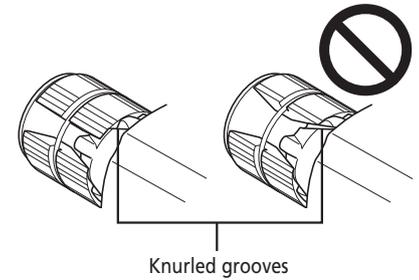
Install the brake lever to the handlebar by tightening counterclockwise with a hexagon wrench.

- (A) Handlebar
 (B) 5mm hexagon wrench

Tightening torque	
	6 - 8 N·m

NOTE

The knurled grooves should be aligned.



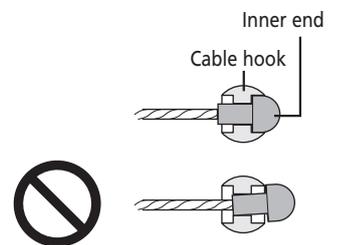
Pass the inner cable through.

- (A) Outer casing
 (B) Inner cable
 (C) Outer casing holder

NOTE

Inner end

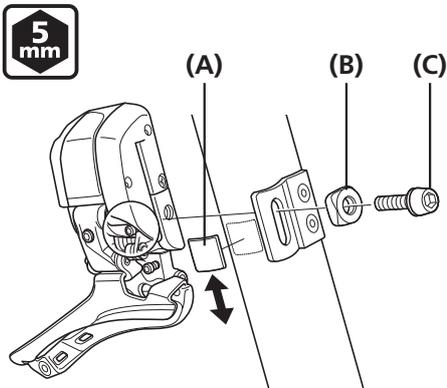
Make sure that the inner end is firmly set in the cable hook.



■ Installation of the front derailleur

Check if the frame to which the front derailleur will be installed is a brazed-on type or band type.

When installing on a brazed-on type frame



Mount the backup plate to the seat tube.

Check the position where the support bolt directly touches the frame when the support bolt of the front derailleur is being adjusted, and attach the backup plate in that position.

After the checking the position, loosen the support bolt and return it to its original position.

After that install the front derailleur to the frame.

- (A) Backup plate
- (B) Mounting washer
- (C) Fixing bolt

Tightening torque



5 - 7 N·m

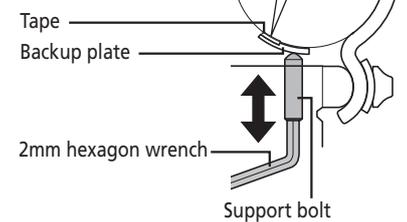
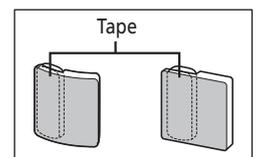
NOTE

If installing the front derailleur to a brazed-on type frame, a backup plate must be attached to the seat tube. Be sure to attach it to prevent the frame from being damaged by pressure from the support bolt.



TECH TIPS

- Position the backup plate tape so that the tape does not come into direct contact with the support bolt.
- There is a backup plate with a curved adhesion surface and one with a flat adhesion surface, as shown in the illustration; use whichever type matches the shape of the frame.

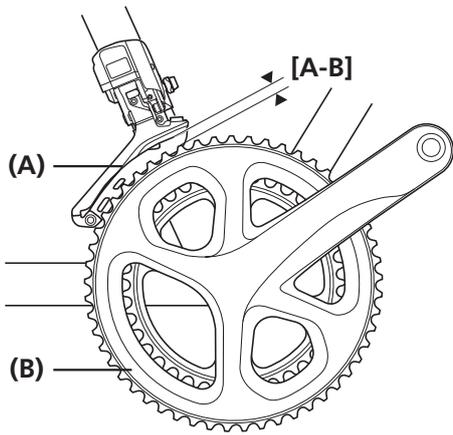


1

INSTALLATION

Installation of the front derailleur

2

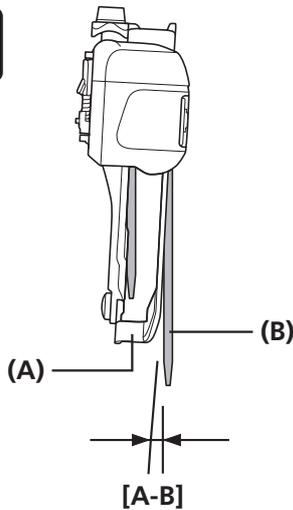


Adjust so that there is a clearance of 1 - 3mm between the chain guide outer plate and the largest chainring.

[A-B] Clearance: 1 - 3mm

- (A)** Chain guide outer plate
- (B)** Largest chainring

3



Use a 5mm hexagon wrench to secure the chain guide outer plate so that the flat part of the plate is directly above the largest chainring and so that the rear edge of the chain guide is within 0.5 - 1mm from the front edge.

[A-B] 0.5 - 1mm

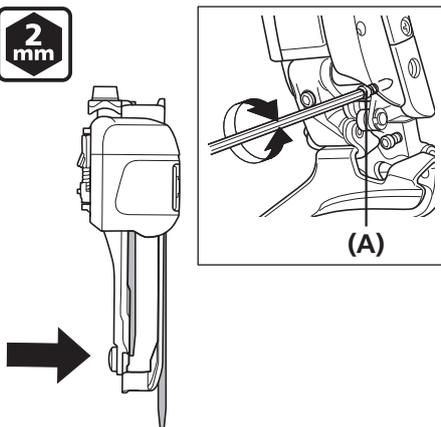
- (A)** Chain guide
- (B)** Front chainwheel (largest chainring)

Tightening torque



5 - 7 N·m

4



Adjust the position of the front derailleur.

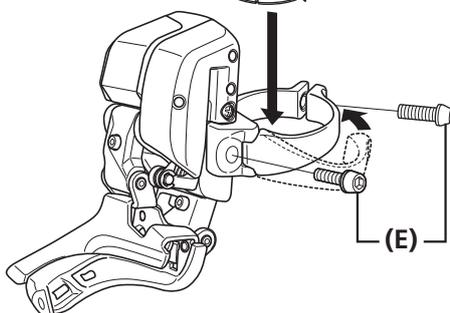
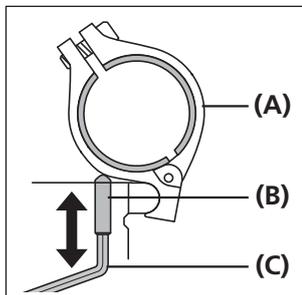
Position the front derailleur so that the flat part of the chain guide outer plate is directly above and parallel to the largest chainring.

Turn the support bolt with a 2mm hexagon wrench to adjust.

- (A)** Support bolt

When installing on a band-type frame

1



Install the clamp band to the front derailleur.

Depending on the frame, mount a band adapter to the clamp band.

After that install the front derailleur to the frame.

- (A) Clamp band
- (B) Support bolt
- (C) 2mm hexagon wrench
- (D) Band adapter (for Ø28.6)
- (E) Fixing bolt

Tightening torque

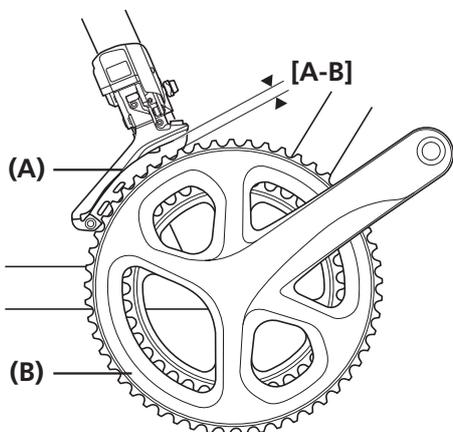


5 - 7 N·m

NOTE

- For installation to a band-type frame, a clamp band (SM-AD90/79/67) is required. Apply the support bolt in this case as well. The backup plate and mounting washer are not required.
- SM-AD11/15 cannot be mounted.

2



Adjust so that there is a clearance of 1 - 3mm between the chain guide outer plate and the largest chainring.

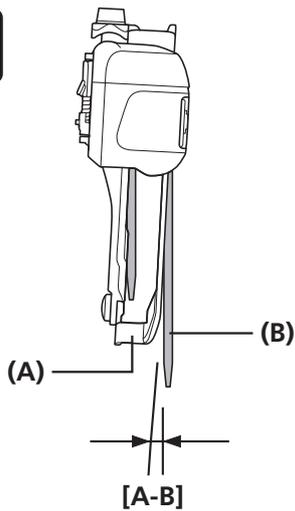
[A-B] Clearance: 1 - 3mm

- (A) Chain guide outer plate
- (B) Largest chainring

INSTALLATION

▶▶ Installation of the front derailleur

3



Use a 5mm hexagon wrench to secure the chain guide outer plate so that the flat part of the plate is directly above the largest chainring and so that the rear edge of the chain guide is within 0.5 - 1mm from the front edge.

[A-B] 0.5 - 1mm

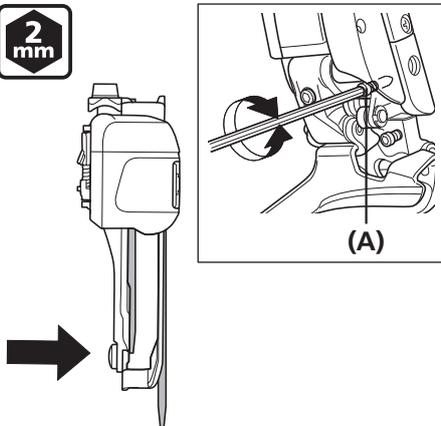
- (A) Chain guide
- (B) Front chainwheel (largest chainring)

Tightening torque



5 - 7 N·m

4



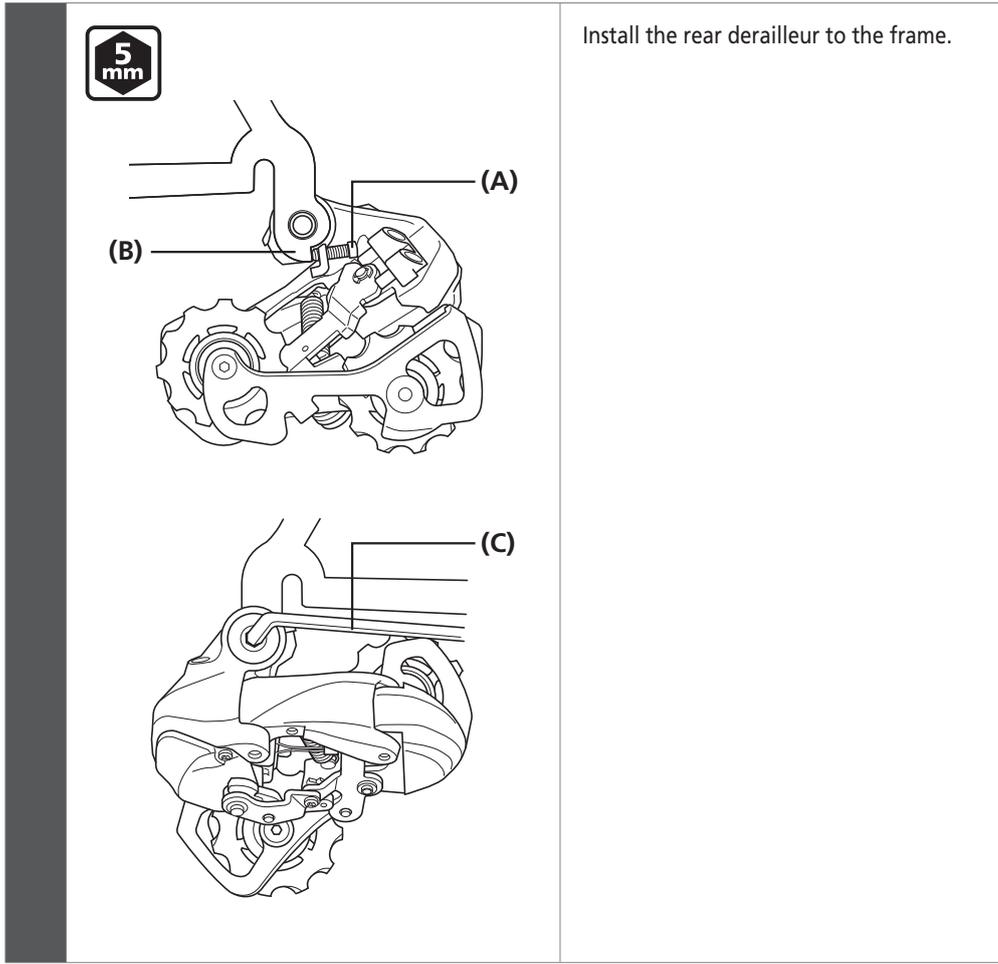
Adjust the position of the front derailleur.

Position the front derailleur so that the flat part of the chain guide outer plate is directly above and parallel to the largest chainring.

Turn the support bolt with a 2mm hexagon wrench to adjust.

- (A) Support bolt

■ Installation of the rear derailleur



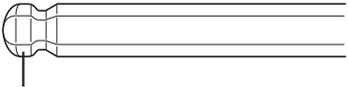
Install the rear derailleur to the frame.

- (A) B-tension adjust bolt
- (B) Fork end tab
- (C) 5mm hexagon wrench

Tightening torque	
	8 - 10 N·m

NOTE

- When installing, be careful that deformation is not caused by the B-tension adjust bolt coming into contact with the fork end tab.
- Make sure to insert the hexagon wrench all the way to the end of the bracket axle tool hole when tightening.
- Do not use a ball point hexagon wrench.



Ball point hexagon wrench

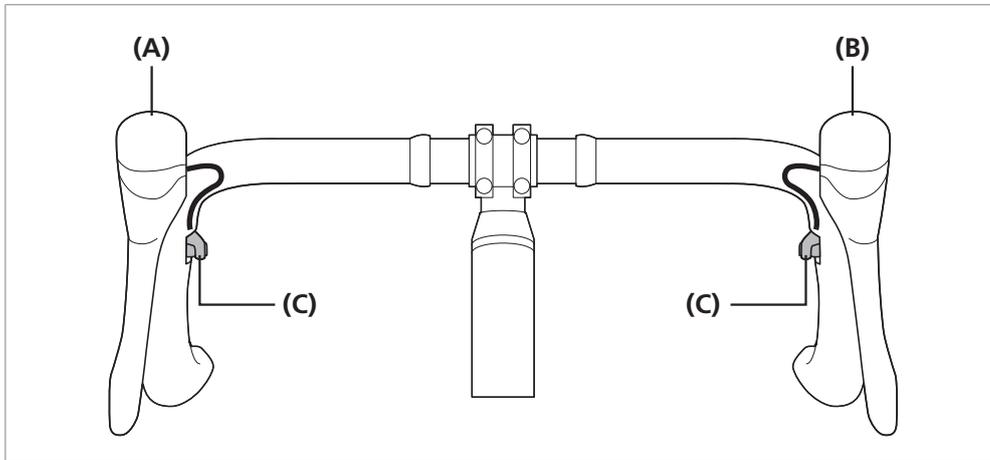
If tightening is performed incorrectly, the following phenomena may result:

- Deformation of the tool hole preventing installation or removal.
- Suboptimal gear shifting performance.

■ Installing the shifting switch

SW-R610 (Sprinter switch)

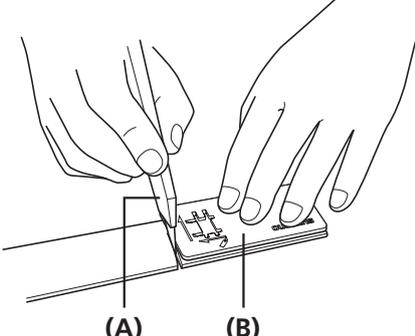
Routing map



- (A)** ST-6870 (R)
- (B)** ST-6870 (L)
- (C)** SW-R610

Installation

1

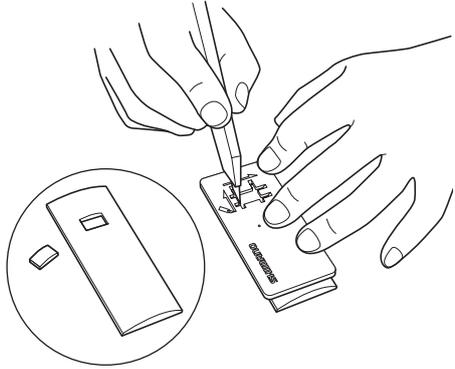
Use a utility knife or similar tool to cut the handlebar tape to the length shown in the illustration.

- (A)** Utility knife
- (B)** Handlebar tape cutout tool

TECH TIPS

Make sure that you handle the utility knife safely and correctly in accordance with the instructions which are provided with the utility knife.

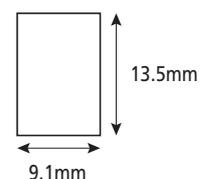
2

Hold the cut handlebar tape against the tool, and then cut out the holes for the switches while following the directions of the arrows on the tool.

TECH TIPS

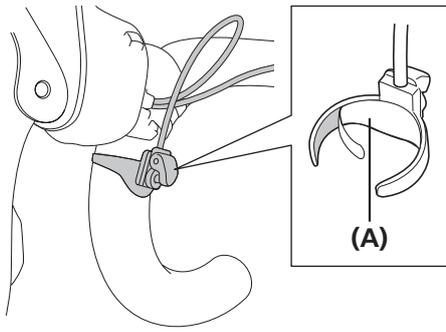
Depending on the material used for the handlebar tape, it may be difficult to cut the tape using the tape cutting tool. If this happens, make a hole of the size shown in the illustration.



INSTALLATION

▶▶ Installing the shifting switch

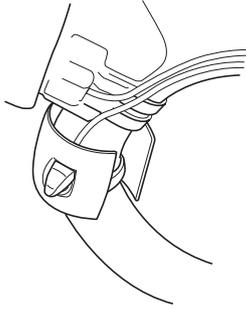
3



Make guide marks on the handlebars at the switch installation positions, and secure the switches with double-sided tape.

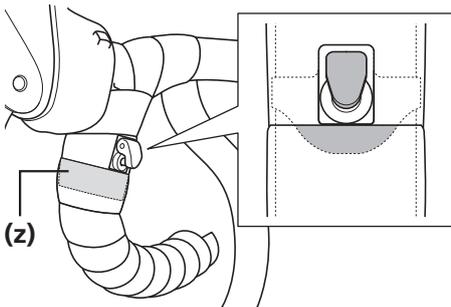
(A) Double-sided tape

4



Align the hole in the handlebar tape which was cut with the switch.

5



Wind on the handlebar tape.

At this time, be sure to overlap the tape below the switches.

(z) Overlap

NOTE

In order to protect the cable, use handlebar tape to secure the cable. Do not secure the cable with the zip tie or the bracket for the cycle computer.



TECH TIPS

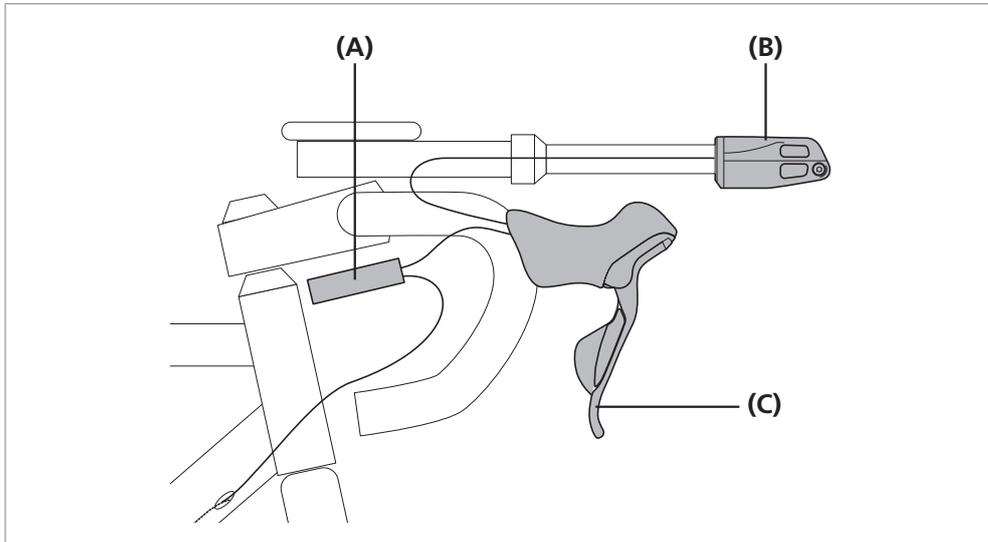
The illustration shows an example of how to wind the handlebar tape. Wind the handlebar tape on securely so that the switches do not move.

INSTALLATION

▶▶ Installing the shifting switch

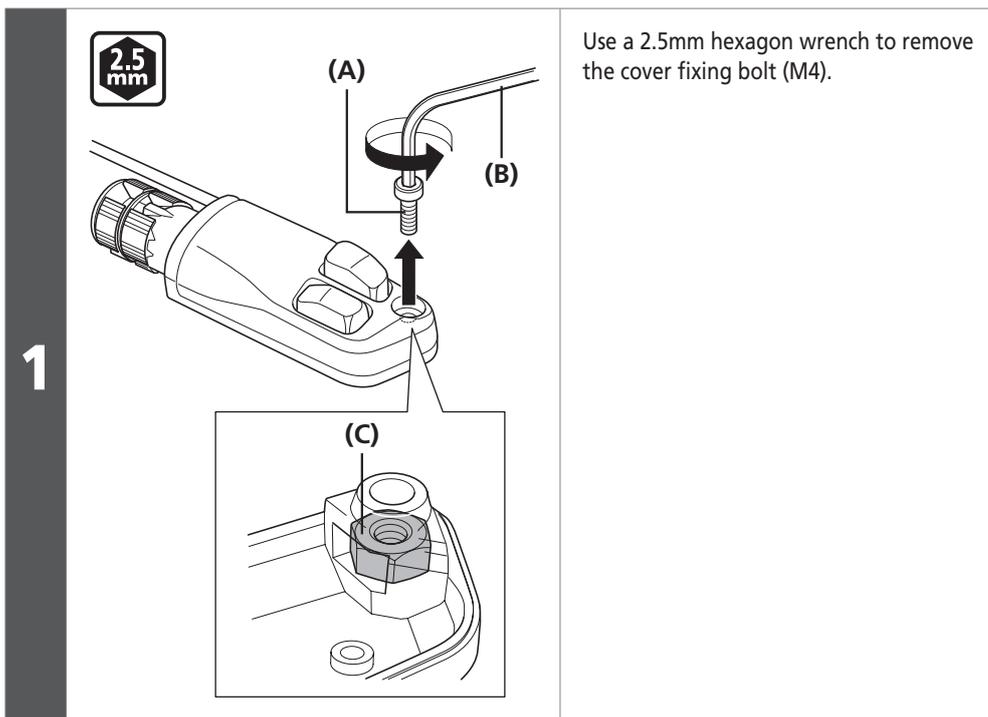
SW-R671 (Shifting switch for aero bar)

Routing map

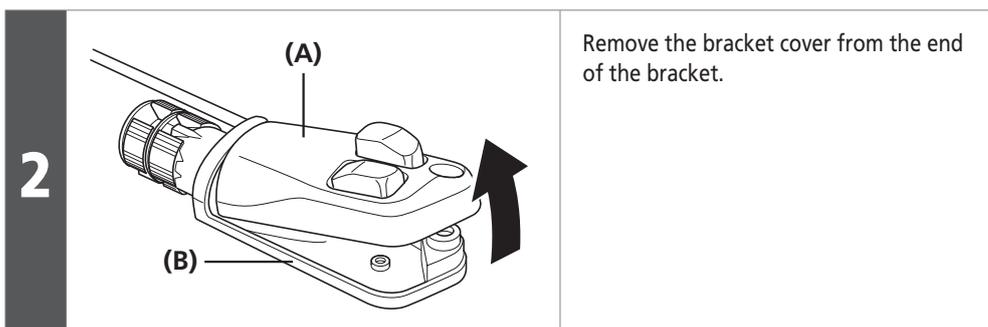


- (A) Junction A
- (B) SW-R671
- (C) ST-6870

Installation



- (A) Cover fixing bolt
- (B) 2.5mm hexagon wrench
- (C) Cover fixing nut

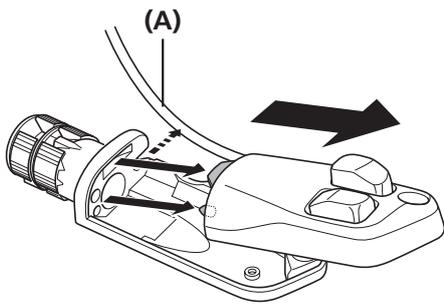


- (A) Bracket cover
- (B) Bracket

INSTALLATION

▶▶ Installing the shifting switch

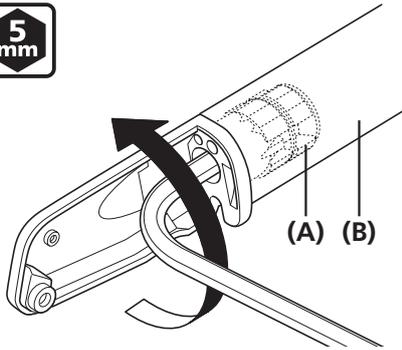
3



Disengage the two hooking tabs, and then remove the switch cable from the bracket groove.

(A) Switch cable

4



Place the bracket onto the end of the aero bar.

Adjust the direction of the switch operation surface at this time.

Use a 5mm hexagon wrench to turn the pull-up bolt counterclockwise to tighten it in order to install the bracket to the aero bar.

(A) Pull-up bolt

(B) Aero bar

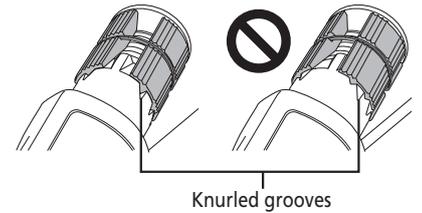
Tightening torque



5 - 6 N·m

NOTE

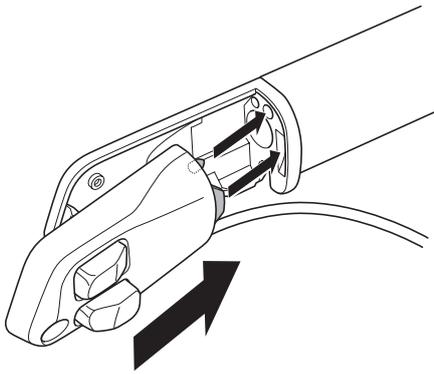
The knurled grooves should be aligned.



INSTALLATION

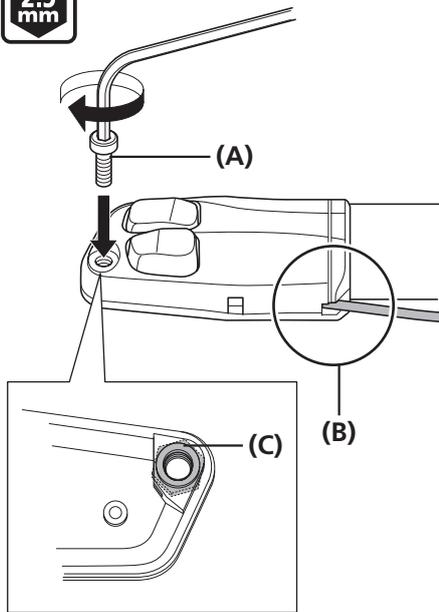
▶▶ Installing the shifting switch

5



Insert the hooking tabs, match it up with the bracket cover to install the bracket.

6



Check that the switch cable is protruding from the bracket groove, and then tighten the cover fixing bolt.

- (A) Cover fixing bolt
- (B) Bracket groove
- (C) Cover fixing nut

Tightening torque



1.2 - 1.6 N·m



TECH TIPS

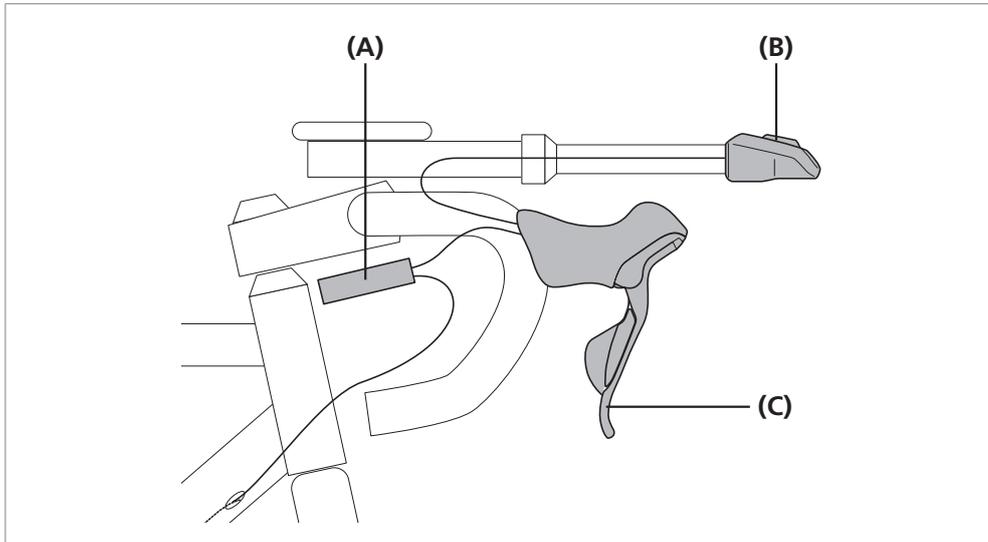
Check that the thread of the cover fixing nut (M4) is visible.

INSTALLATION

▶▶ Installing the shifting switch

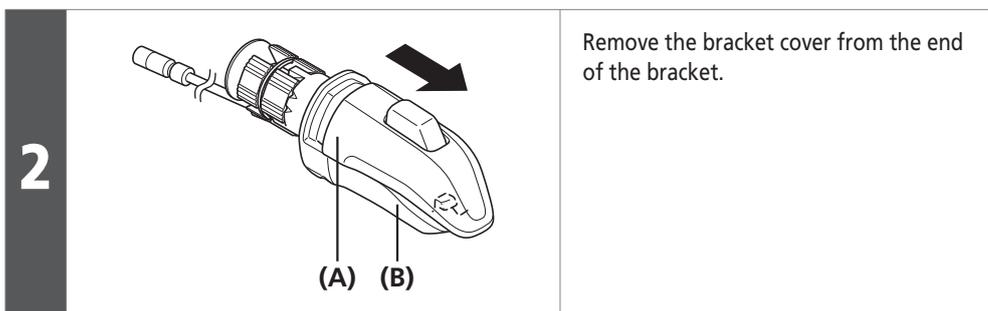
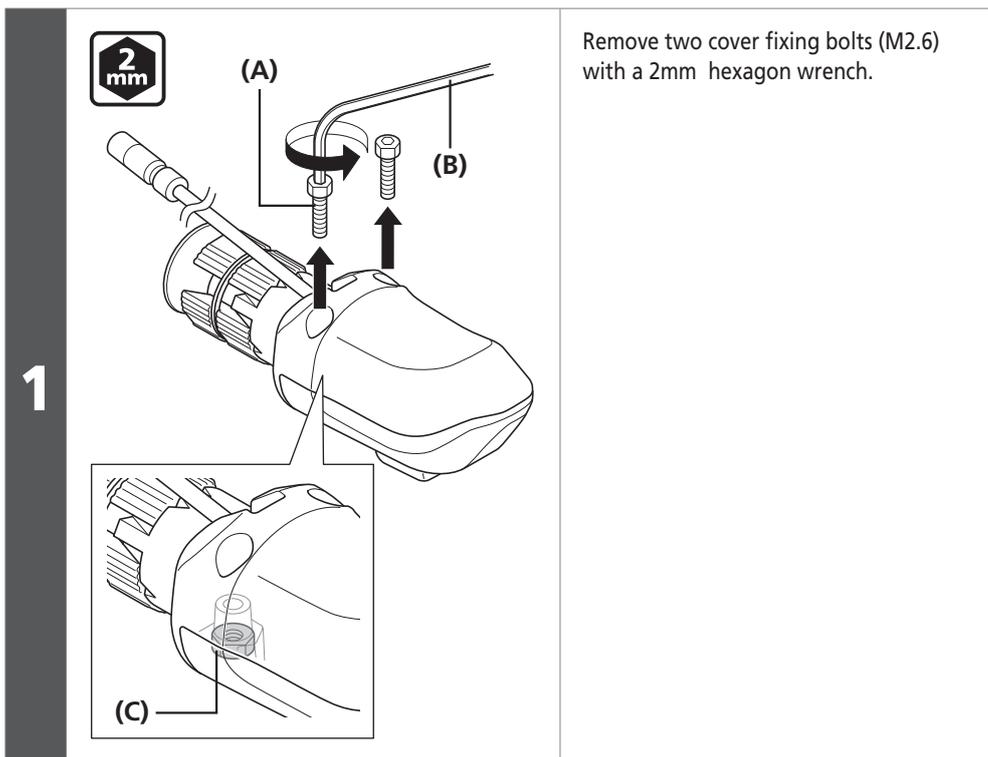
SW-9071 (Shifting switch for aero bar)

Routing map



- (A) Junction A
- (B) SW-9071
- (C) ST-6870

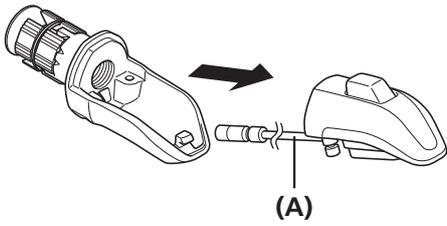
Installation



INSTALLATION

▶▶ Installing the shifting switch

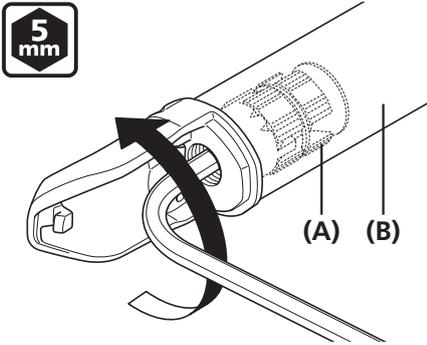
3



Disengage the two hooking tabs, and then remove the switch cable from the bracket groove.

(A) Switch cable

4



Place the bracket onto the end of the aero bar.

Adjust the direction of the switch operation surface at this time.

Use a 5mm hexagon wrench to turn the pull-up bolt counterclockwise to tighten it in order to install the bracket to the aero bar.

(A) Pull-up bolt

(B) Aero bar

Tightening torque

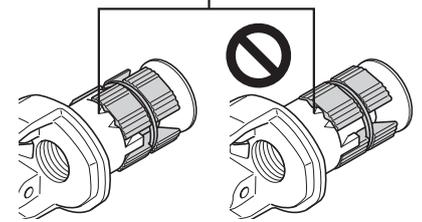


5 - 6 N·m

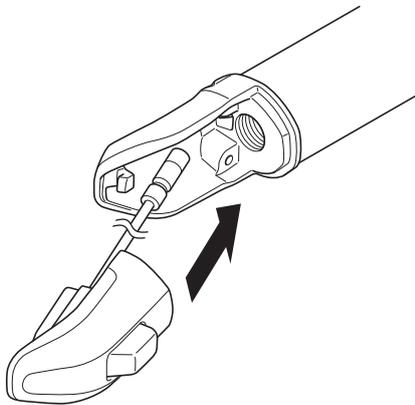
NOTE

The knurled grooves should be aligned.

Knurled grooves



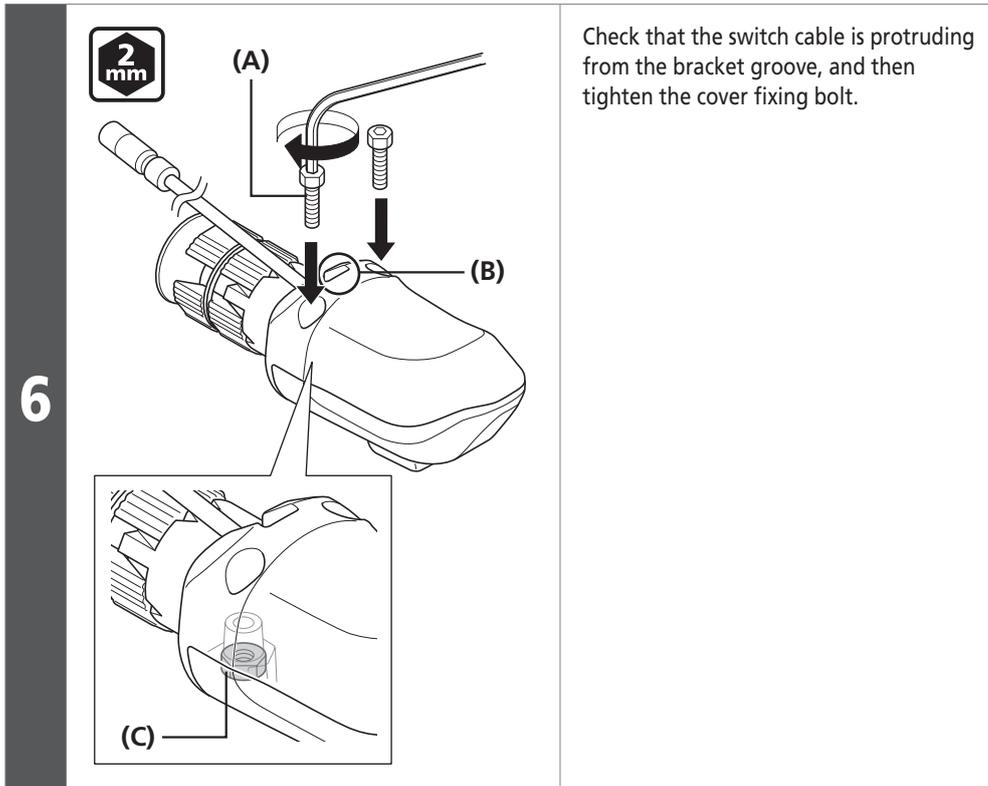
5



Insert the hooking tabs, match it up with the bracket cover to install the bracket.

INSTALLATION

▶▶ Installing the shifting switch



- (A) Cover fixing bolt
- (B) Bracket groove
- (C) Cover fixing nut

Tightening torque



1.2 - 1.6 N·m



TECH TIPS

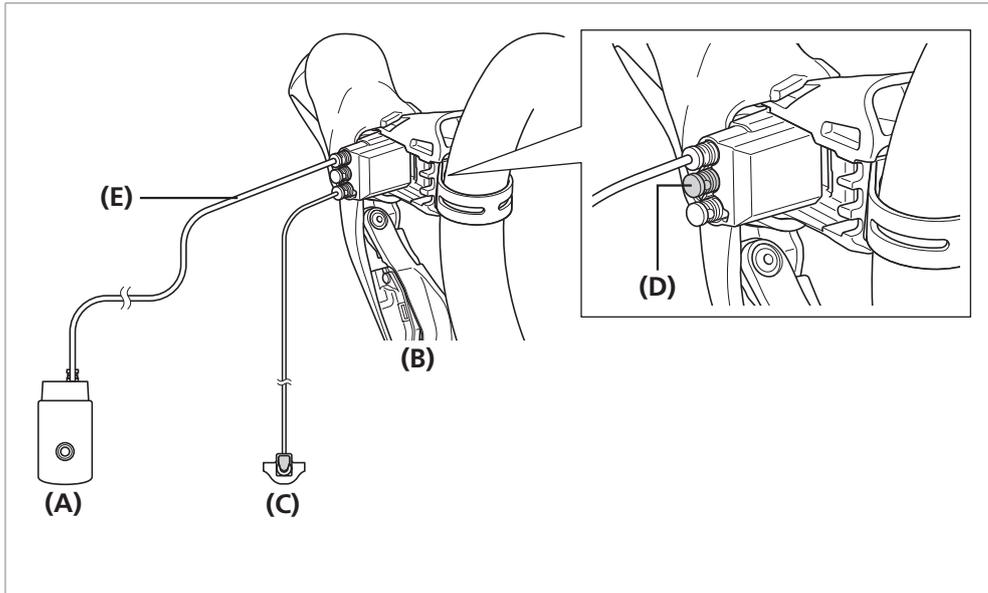
Check that the thread of the cover fixing nut (M2.6) is visible.

INSTALLATION

▶▶ Installation of junction A

Example of routing the electric wire

* The illustration shows an example for ST-6870/SW-R610.

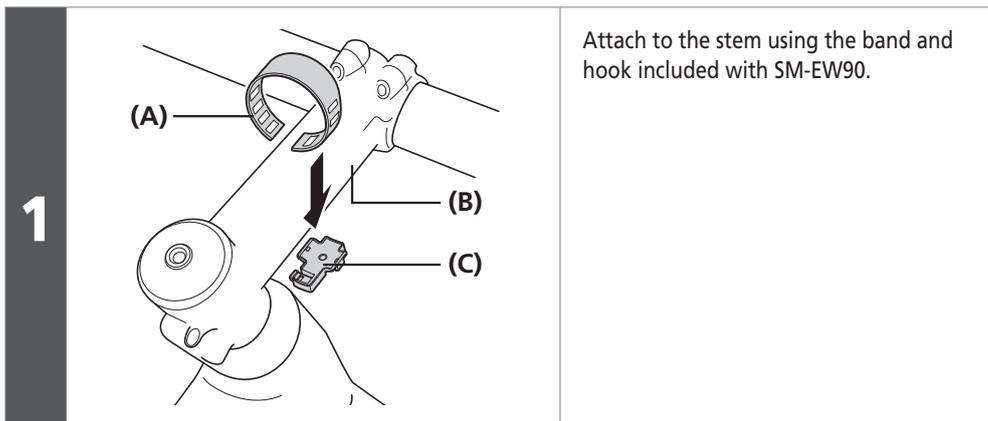


- (A) SM-EW90
- (B) ST-6870 (R)
- (C) Right shifting switch
- (D) Dummy plug
- (E) Electric wire

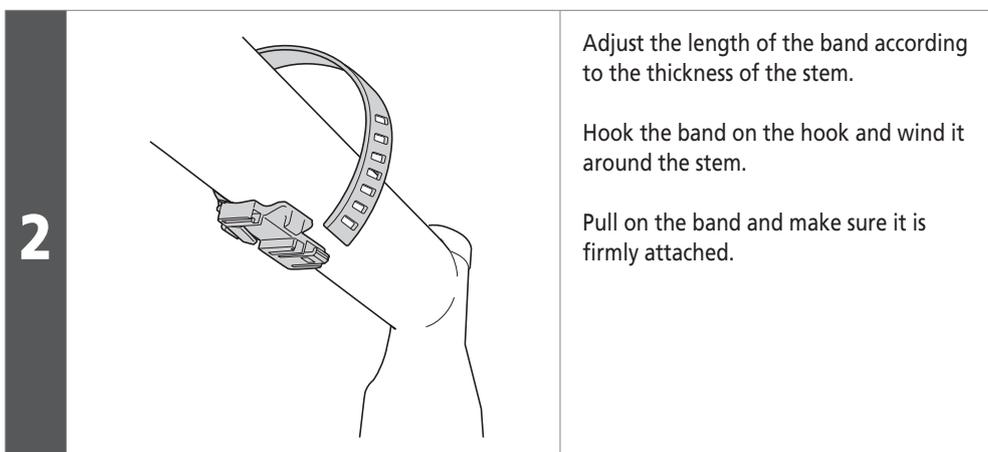
TECH TIPS

- This varies depending on the combination of the dual control lever and the gear-shifting switch. For details, refer to the electric wire wiring diagram (junction A).
- For waterproof purposes, use Shimano original tool TL-EW02 on unused ports and install dummy plugs.

■ Installation of junction A

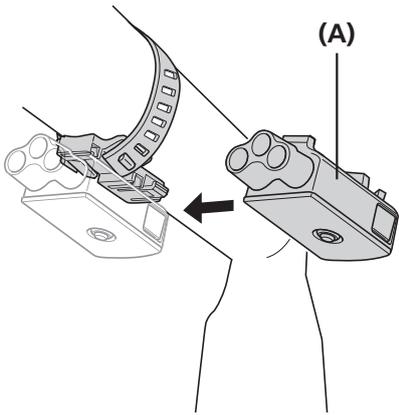
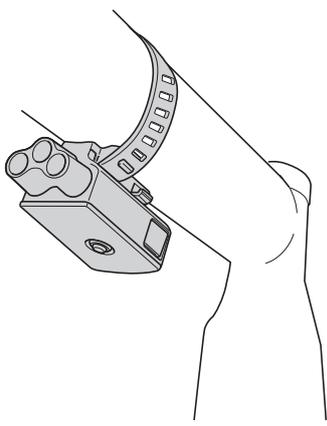


- (A) Band
- (B) Stem
- (C) Hook



INSTALLATION

▶▶ Installation of junction B

3		Slide SM-EW90 into the rail section of the hook to install it.
	Finished image 	

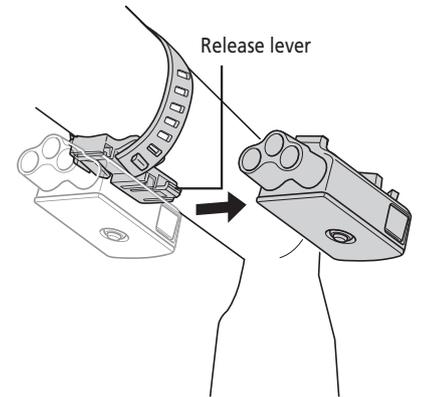
(A) SM-EW90 Junction A



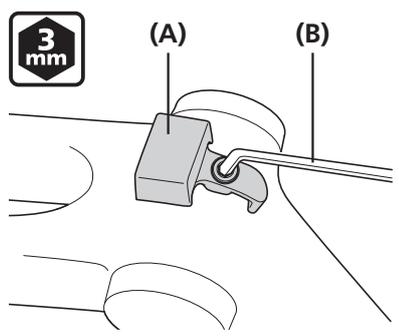
TECH TIPS

Removal

Pull up the release lever to slide junction A in the direction of the arrow for removal. Forcibly pulling up the release lever may break the lever.

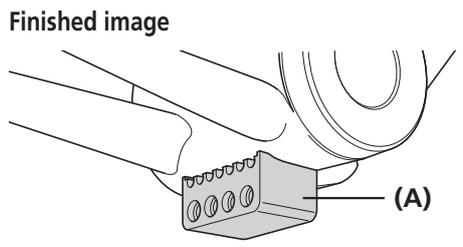


■ Installation of junction B

1		Remove the wire guide from the frame, if attached.

(A) Wire guide

(B) 3mm hexagon wrench

2	Finished image 	Attach junction B using the wire guide mounting hole.

(A) Junction B

■ Installing the battery

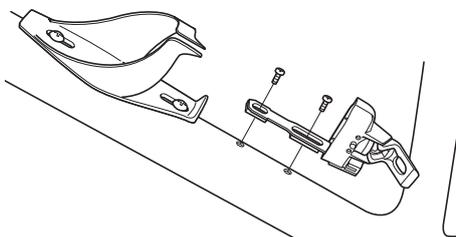
External battery (SM-BTR1)

Installing the battery mount

Set the battery mount into position.

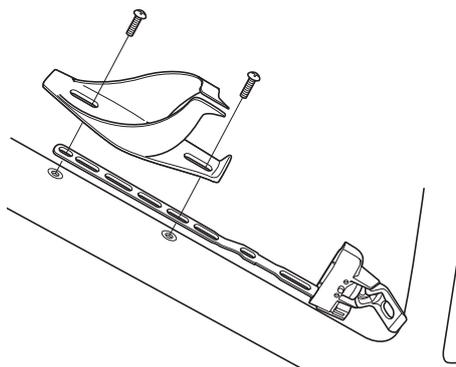
Use the bottle cage fixing bolt to temporarily install the battery mount onto the bottom of the bottle cage.

Short type



Use the included M4 bolts to secure the short type.

Long type



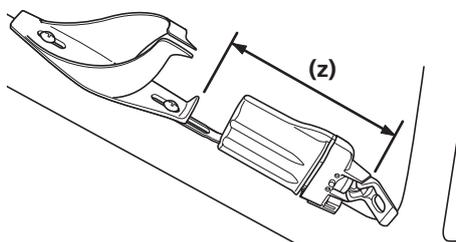
For the long type, secure it with the bolts supplied with the frame or the bottle cage.

Refer to the Service Instructions for the bottle cage for details on the tightening torques.

Short type Tightening torque	
	1.2 - 1.5 N·m

1

2



Leave a space of 108mm or more at the end of the battery mount.

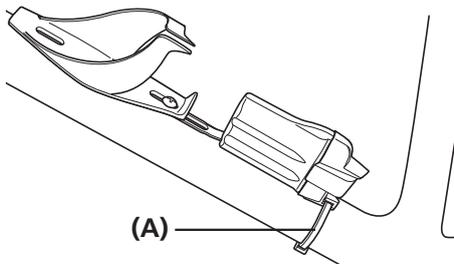
Check that the battery can be inserted and removed while the bottle cage is installed.

(z) 108mm

INSTALLATION

▶▶ Installing the battery

3



Tighten the bolt of the bottle cage to secure the battery mount.

For the long type, use the accessory zip tie to secure the battery mount to the frame.

(A) Zip tie



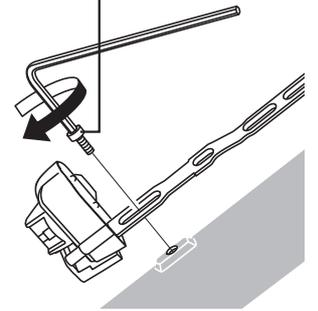
TECH TIPS

If there is a mounting boss on the frame

If there is a mounting boss on the frame, the battery mount can be secured to the frame with a bolt.



Battery mount mounting bolt (M4x15mm)



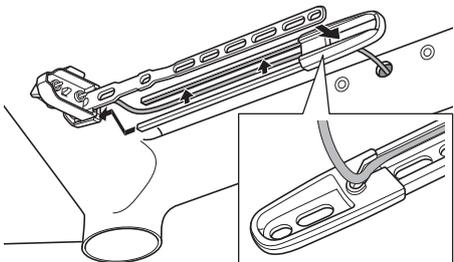
Tightening torque



1.2 - 1.5 N·m

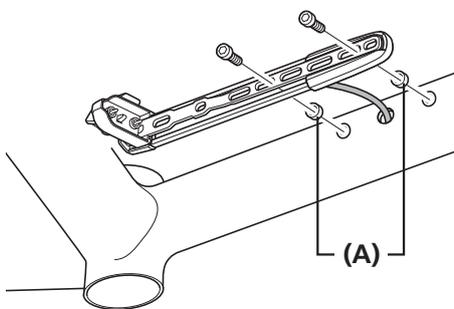
Installation of the electric wire covers

1



Set the electric wire for the battery mount into the groove in the electric wire cover for the battery mount.

2



Place the accessory spacers in between the battery mount and the frame and then secure them by tightening the bolts.

(A) Spacer



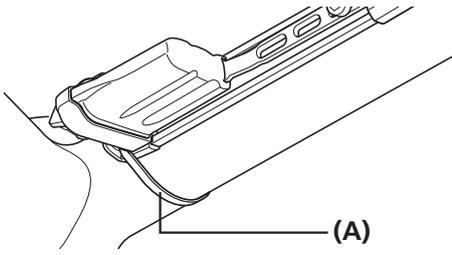
TECH TIPS

- If installing the bottle cage, it is easier to install it at this stage.
- Refer to the Service Instructions for the bottle cage for details on the tightening torques.

INSTALLATION

▶▶ Installing the battery

3



Use the accessory zip tie to secure the battery mount to the frame.

(A) Zip tie

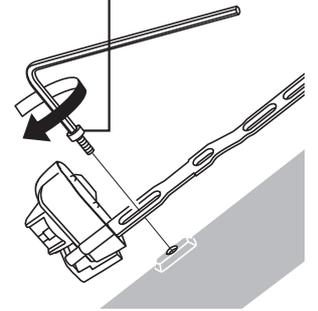


TECH TIPS

If there is a mounting boss on the frame
If there is a mounting boss on the frame, the battery mount can be secured to the frame with a bolt.



Battery mount mounting bolt
(M4x15mm)



Tightening torque



1.2 - 1.5 N·m

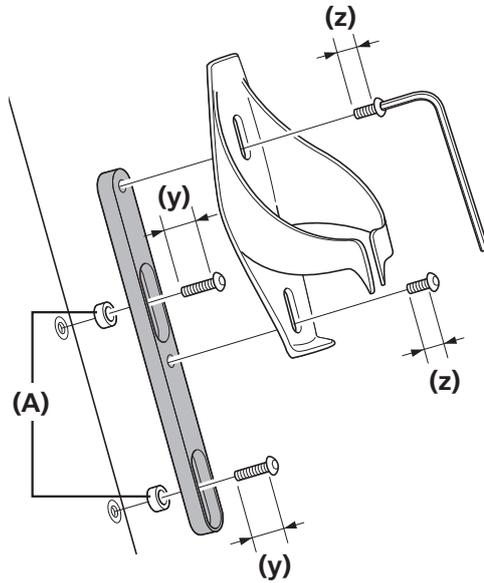
INSTALLATION

▶▶ Installing the battery

Installation of the bottle cage adapter

If the bottle cage which is installed to the seat tube interferes with the battery, move the position of the bottle cage upward.

The installation position for the bottle cage can be moved upward by a minimum of 32mm and a maximum of 50mm from the original installation position.



(y) 15mm

(z) 10mm

(A) Spacer

Tightening torque



3 N·m



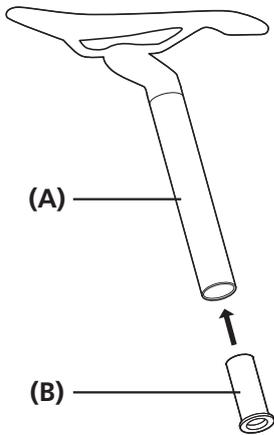
TECH TIPS

- If it interferes with the mounting boss for the front derailleur, use the included spacer.
- Refer to the Service Instructions for the bottle cage for details on the tightening torques.

Built-in battery (SM-BTR2/BT-DN110)

Installing the battery

1



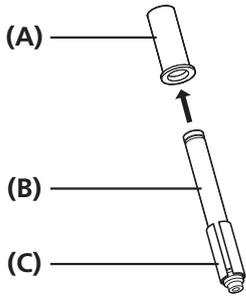
Insert the seat post collar into the seat post.

- (A) Seat post
- (B) Seat post collar

NOTE

Seat post collar is not included.

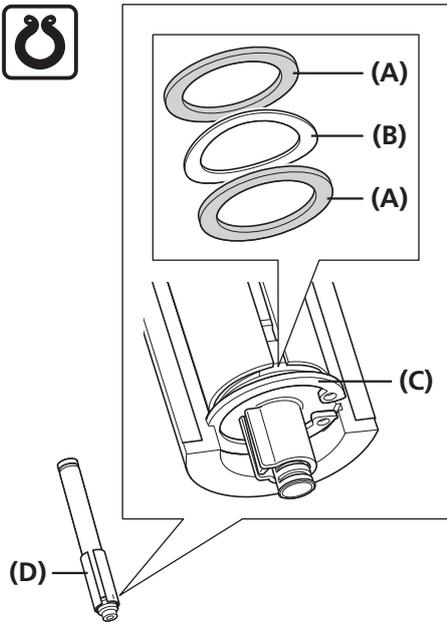
2



Insert internal battery into the collar from the bottom of seat post.

- (A) Seat post collar
- (B) Built-in battery (SM-BTR2/BT-DN110)
- (C) Battery adapter

3



Mount a wave washer between two washers to the groove of the battery adapter, and fix them in place with a snap ring.

- (A) Washer
- (B) Wave washer
- (C) Snap ring
- (D) Battery adapter

 **TECH TIPS**

- Secure the built-in battery into the seat post. Depending on the frame, the way the battery is installed may differ. For details, consult with the manufacturer of completed bicycles.
- Use snap ring pliers (with a claw diameter of 2.0mm or less) to mount the snap ring.

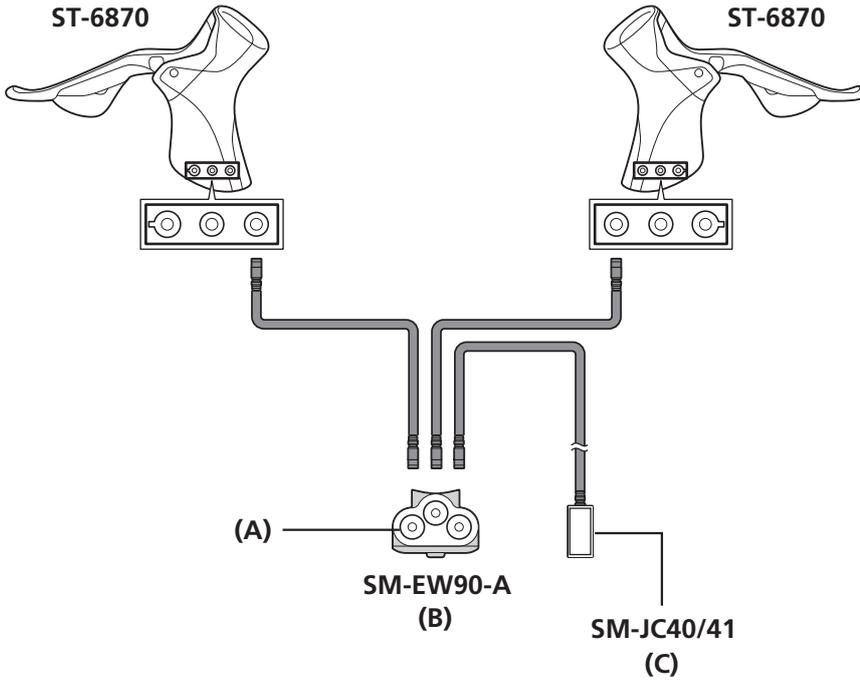
CONNECTION OF ELECTRIC WIRES

CONNECTION OF ELECTRIC WIRES

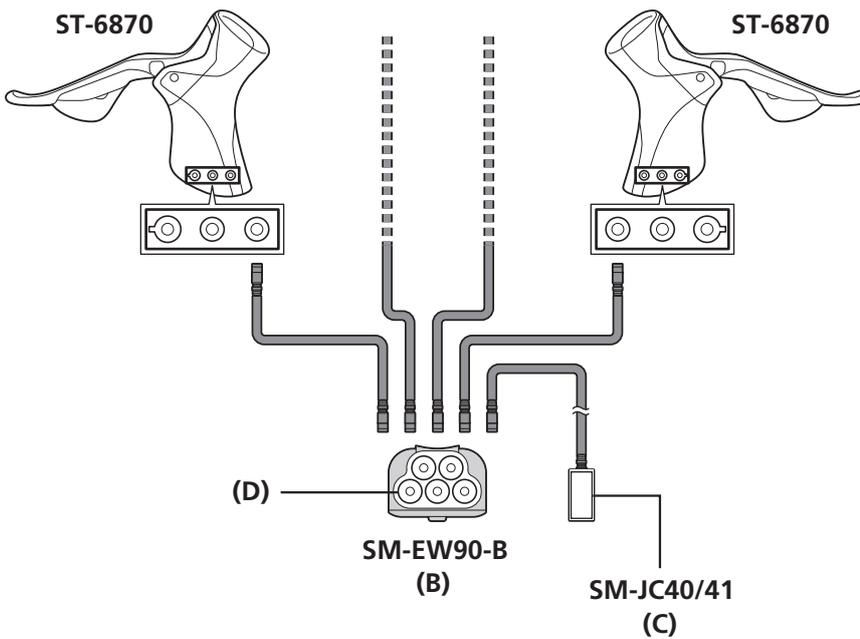
■ Connection of junction A

ST-6870 with SM-EW90 routing map

In the case of 3 ports



In the case of 5 ports



- (A) E-TUBE port x3
- (B) Junction A
- (C) Junction B
- (D) E-TUBE port x5

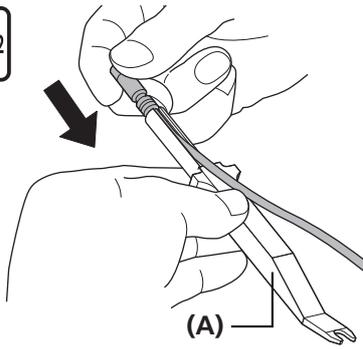


TECH TIPS

Wire SM-EW90 with a sufficient margin to allow the positioning of ST-6870 and the full turning of the handle.

Connection of electric wires

TL-EW02



Set so that the projection on the connector is aligned with the groove on the narrow end.

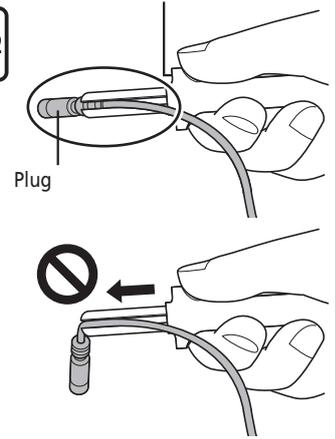
(A) Shimano original tool TL-EW02

NOTE

Use the Shimano original tool when connecting/disconnecting the electric wires. When installing the electric wire, do not forcibly bend the plug. It may result in a poor connection. When connecting electric wires, push them in until you feel and hear a click.

Shimano original tool TL-EW02

TL-EW02



■ Connection of junction B

External type (SM-JC40)

1

TL-EW02 (A) (B) (C) (D) (E) (F)

Connect the electric wires to junction A and junction B.

- (A) SM-EW90-A Junction A
- (B) SM-EW90-B Junction A
- (C) E-TUBE port x3
- (D) E-TUBE port x5
- (E) Shimano original tool TL-EW02
- (F) Junction B

TECH TIPS

When connecting electric wires, push them in until you feel and hear a click.

Connect the electric wires to the front derailleur, the rear derailleur and the battery mount.

2

Front derailleur

(A)

Rear derailleur

(A)

Battery mount

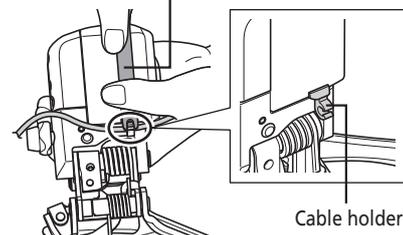
(A)

- (A) Shimano original tool TL-EW02

TECH TIPS

FD-6870 has a cable holder on the back side. After connection, attach the cable as shown in the illustration. If the electric wire is difficult to attach, remove the rear wheel.

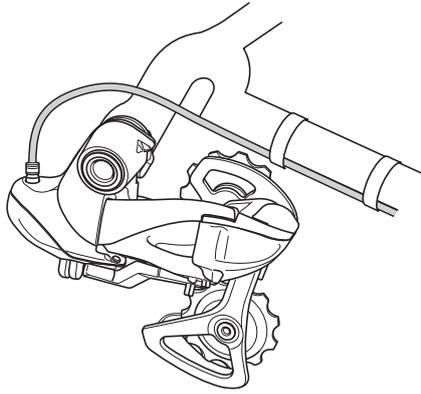
Shimano original tool TL-EW02



* Using the wider end of the Shimano original tool TL-EW02, attach the electric wire on the cable holder.

▶▶ Connection of junction B

3



Temporarily secure the electric wire along the frame with tape, and connect it to junction B.

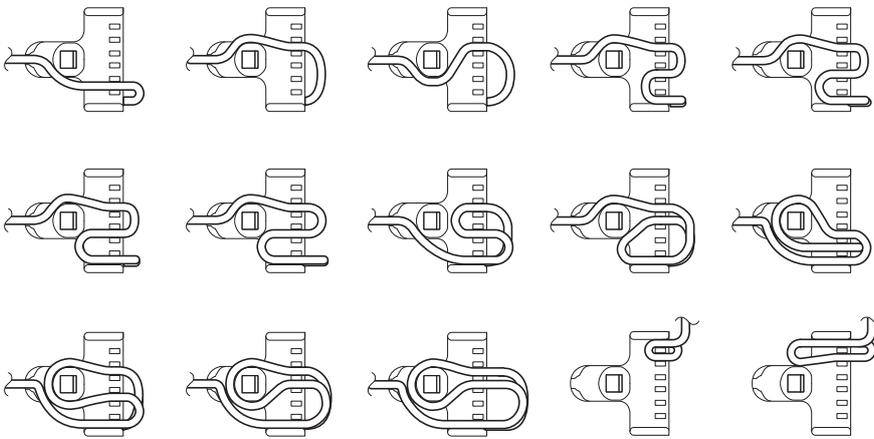
NOTE

When routing the electric wire to the rear derailleur, be sure to install it to the bottom of the chainstay to avoid any interference between the cable and the chain.

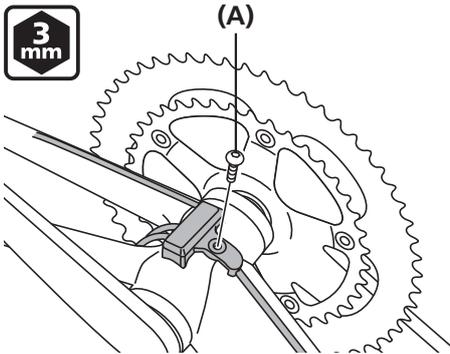
4

Wind any excess length of electric wire inside junction B to adjust the length.

Example of adjusting junction B length



5



Once the electric wires have been routed, secure junction B underneath the bottom bracket shell.

(A) Junction B fixing bolt
(10.5mm or 15mm)

Tightening torque

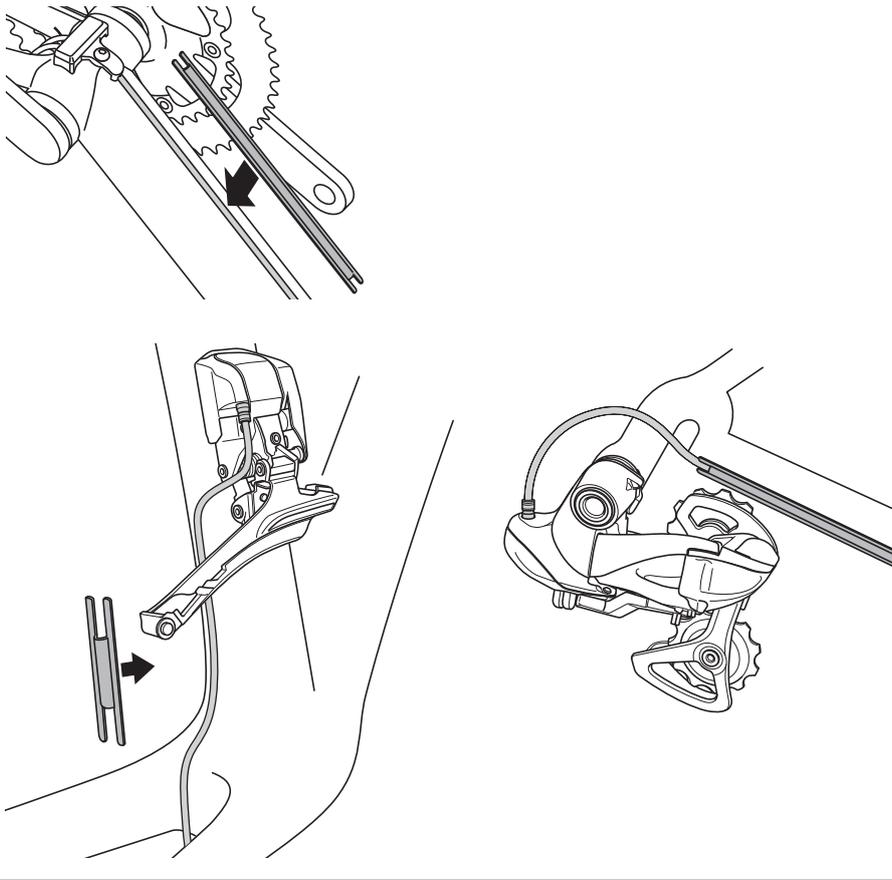


1.5 - 2 N·m

Next, install the electric wire cover onto the frame.

Place the electric wire cover over the electric wires, and then attach it to the frame.

6

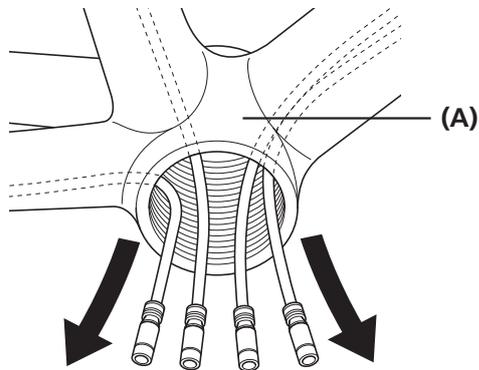


NOTE

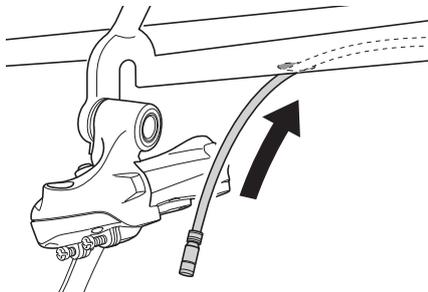
To ensure adhesion, before installing the electric wire cover, wipe off the grease on the frame with alcohol or a cleaner.

Built-in type (SM-JC41)

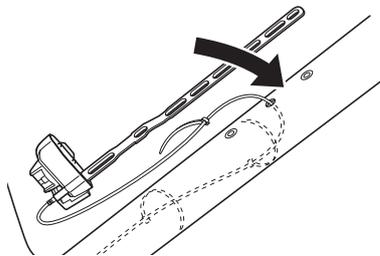
First pass the electric wires for junction A, the battery mount, the front derailleur and the rear derailleur through the holes in the frame into the bottom bracket shell.



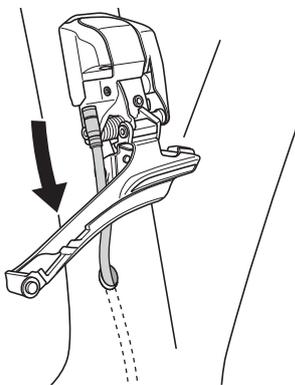
Electric wire for rear derailleur



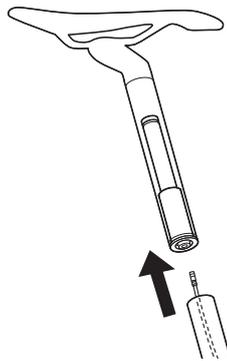
Electric wire for battery mount
[In the case of an external battery (SM-BTR1)]



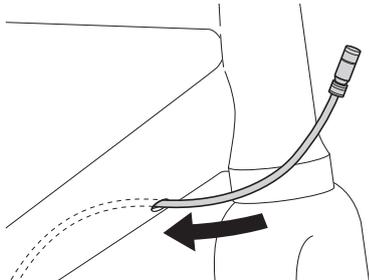
Electric wire for front derailleur



Electric wire for battery mount
[In the case of a built-in battery (SM-BTR2/BT-DN110)]



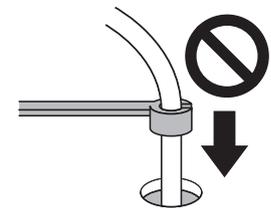
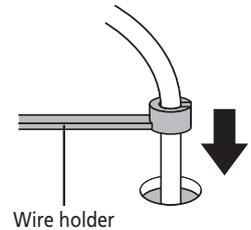
Electric wire for junction A



(A) Bottom bracket shell

 TECH TIPS

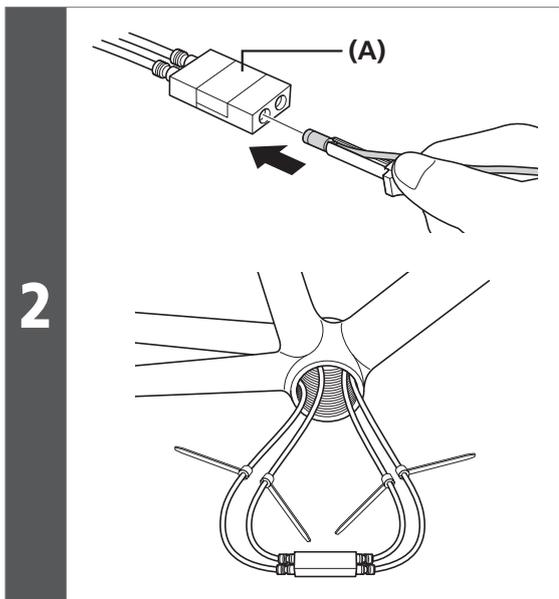
The electric wires for built-in use can be inserted only in one direction. Make sure that you insert them from the direction shown in the illustration.



1

CONNECTION OF ELECTRIC WIRES

▶▶ **Connection of junction B**



Connect each electric wire to junction B.

(A) SM-JC40/41
Junction B



TECH TIPS

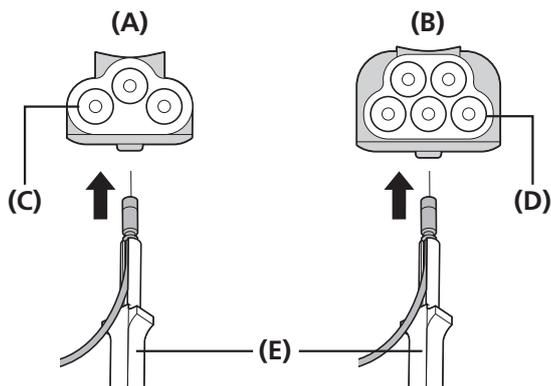
When connecting electric wires, push them in until you feel and hear a click.

2

▶▶ Connection of junction B

Connect the electric wire to junction A, the front derailleur, the rear derailleur, and the battery mount.

TL-EW02



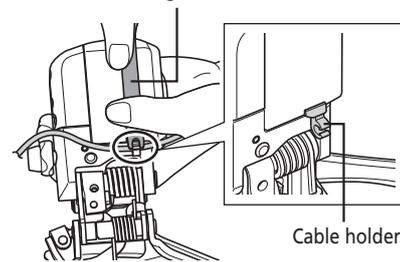
- (A) SM-EW90-A
Junction A
- (B) SM-EW90-B
Junction A
- (C) E-TUBE port x3
- (D) E-TUBE port x5
- (E) Shimano original tool TL-EW02

 **TECH TIPS**

FD-6870 has a cable holder on the back side. After connection, attach the cable as shown in the illustration.

If the electric wire is difficult to attach, remove the rear wheel.

Shimano original tool TL-EW02

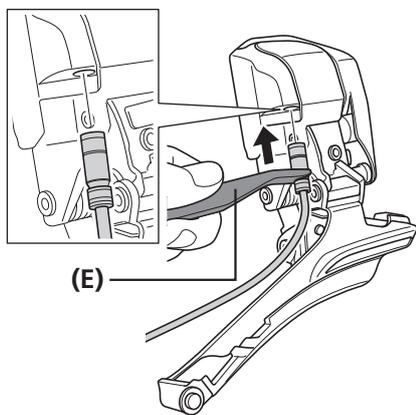


* Using the wider end of the Shimano original tool TL-EW02, attach the electric wire on the cable holder.

3

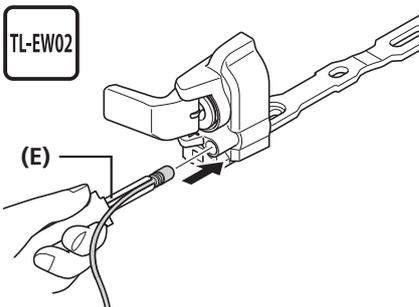
Front derailleur

TL-EW02



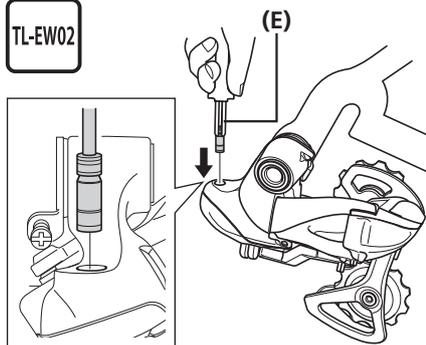
Battery mount

TL-EW02



Rear derailleur

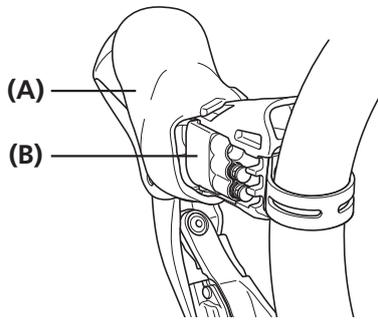
TL-EW02



■ Connecting to the dual control lever

ST-6870

1

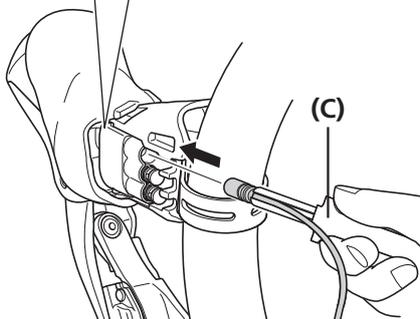
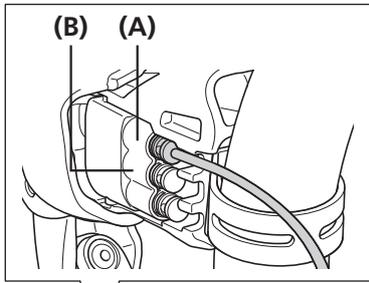


Open up the bracket cover and lift up the connector cover.

- (A) Bracket cover
- (B) Connector cover

2

TL-EW02



Use the TL-EW02 to connect the connector of the electric wire to the terminal on the lever side.

Connect to terminal [X] or terminal [Y].

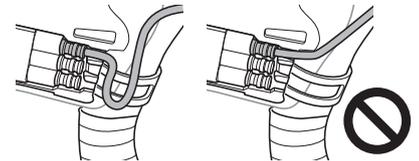
Be sure to push them together until they connect with a click.

Either the top or bottom terminal can be used.

- (A) Terminal [X]
- (B) Terminal [Y]
- (C) Shimano original tool TL-EW02

NOTE

- When the handle is gripped or the bar tape is wound, the electric wires may be pulled out. By allowing sufficient wire length, accidental disconnection can be prevented after winding the bar tape.
- This length margin of electric wire is also necessary to open the bracket cover when additional switch and the SM-PCE1 is connected.



TECH TIPS

The remaining terminal can be used for an additional satellite switch or the SM-PCE1. This is an example connection.

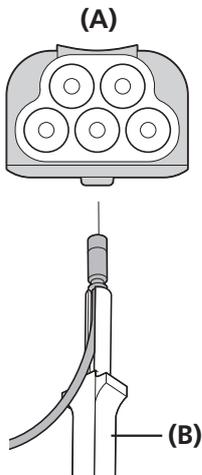
CONNECTION OF ELECTRIC WIRES

▶▶ Connecting to the dual control lever

SW-R671/SW-9071/ST-6871

For the following models, attach the electric wire (fitted type) of the product to junction A.

TL-EW02



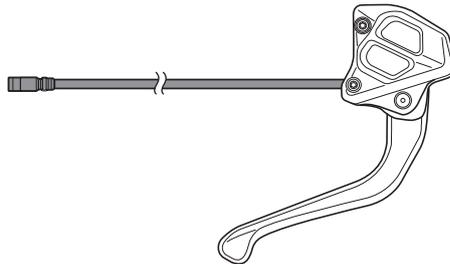
SW-R671



SW-9071



ST-6871

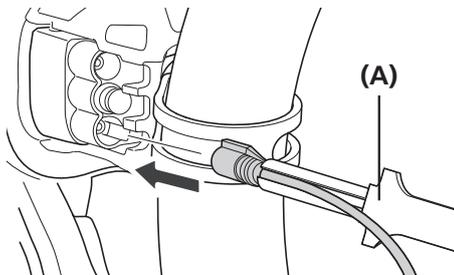


(A) Junction A

(B) Shimano original tool TL-EW02

SW-R610

TL-EW02



SW-R610



(A) Shimano original tool TL-EW02

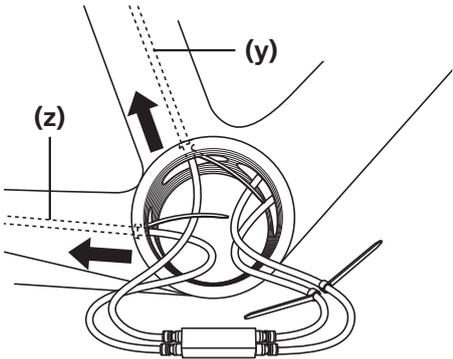


TECH TIPS

The port shape is different only for SW-R610.
Only ST-6870 is supported.

■ Routing junction B and the electric wires inside the frame

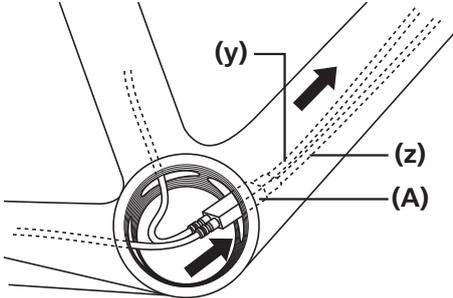
1



Pass the electric wires for the front derailleur and the rear derailleur through the seat tube and chainstay respectively.

- (y)** For front derailleur
- (z)** For rear derailleur

2



Pass the electric wires for junction A, the battery mount, and junction B through the down tube.

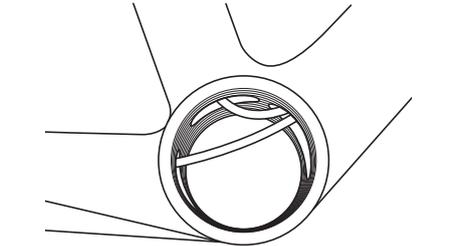
- (y)** For junction A
- (z)** For battery mount
- (A)** Junction B

(A) Junction B

NOTE

Be careful not to damage any parts with the screws of the bottom bracket shell.

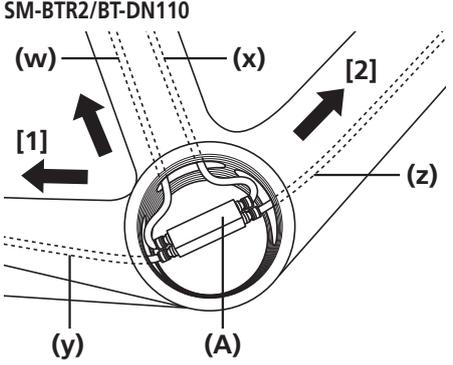
3



Set the electric wires so that only the electric wires for the front derailleur and the rear derailleur are visible inside the bottom bracket shell, and if any extra parts such as wire holders are protruding, push them back inside the frame.

3

SM-BTR2/BT-DN110



Follow the same procedure when using SM-BTR2/BT-DN110 as a battery adapter.

- (w)** For lithium ion battery (built-in type)
- (x)** For front derailleur
- (y)** For rear derailleur
- (z)** For junction A
- (A)** Junction B

(A) Junction B

■ Assembly of the bottom bracket

1

When installing the inner cover to the bottom bracket shell, make sure that the electric wires for the front derailleur and the rear derailleur pass over the top of the inner cover.

(A) Inner cover
(B) Adapter

2

Install the inner cover to the bottom bracket adapter.

(A) Adapter
(B) Inner cover

-
- (A) Inner cover
 - (B) Adapter
-

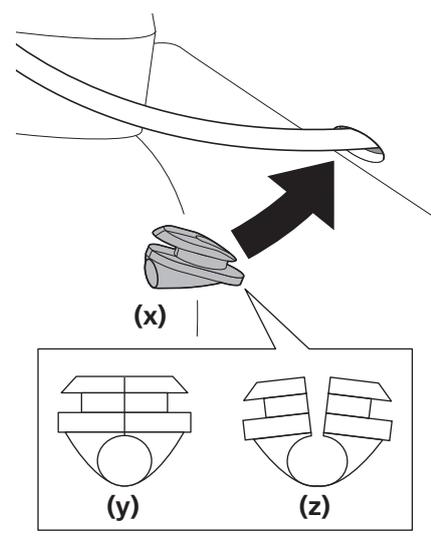
-
- (A) Adapter
 - (B) Inner cover
-

NOTE

If using a frame which does not have enough space between the inside of the bottom bracket shell and the inner cover to route the electric wires use an inner cover which is sold separately.

■ Installation of grommets

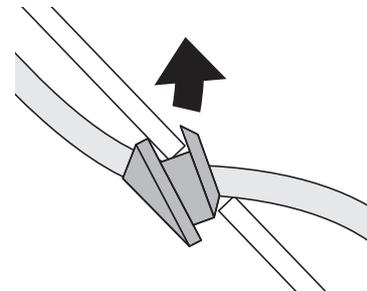
1



Install grommets in appropriate positions for the electric wires.

- (x) Junction A side
- (y) Close
- (z) Open

2



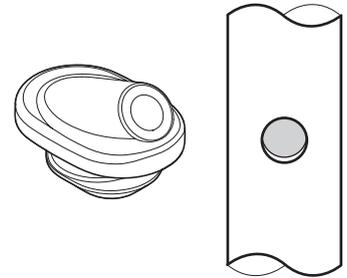
Insert the grommets into the holes in the frame starting with the rear end.



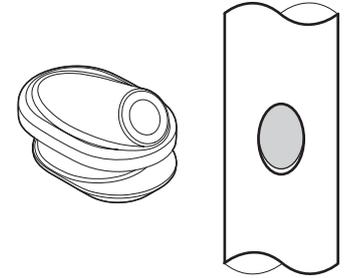
TECH TIPS

There are two types of grommets. Choose one according to the shape of the hole in the frame.

Circle: SM-GM01

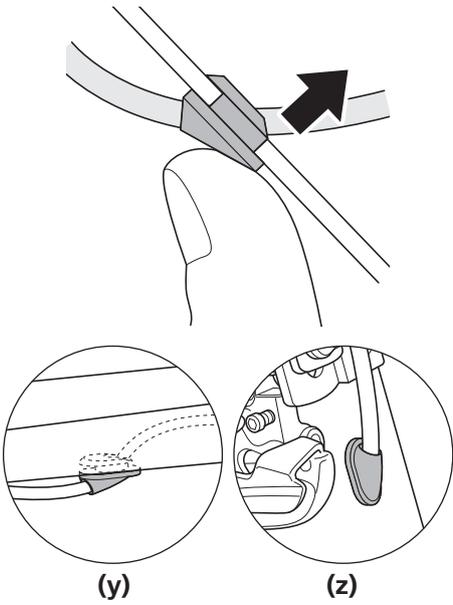


Ellipse: SM-GM02



▶▶ Checking connections

3



Push the other end to set in place.

- (y) Rear derailleur
- (z) Front derailleur

■ Checking connections

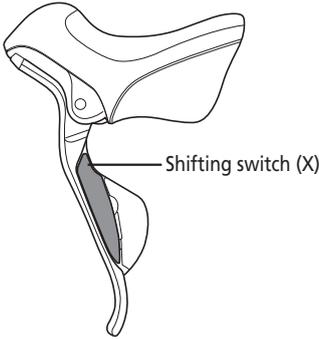
1 After connecting the electric wires to all of the components, install the battery and check the operation.

2

Operate the shifting switches and check that the front and rear derailleurs both operate.

NOTE

To prepare for chain installation, if none is installed, be sure to operate the shifting switch (X) of the left lever one or more times to set the front derailleur to the largest chainring. After that, be sure to remove the battery.

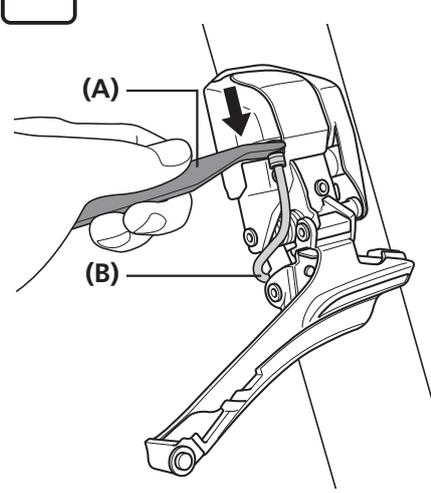


■ Disconnection of the electric wires

FD-6870

1

TL-EW02



With the base portion of the hook firmly held down using the wider end of the Shimano original tool TL-EW02, remove the electric wire.

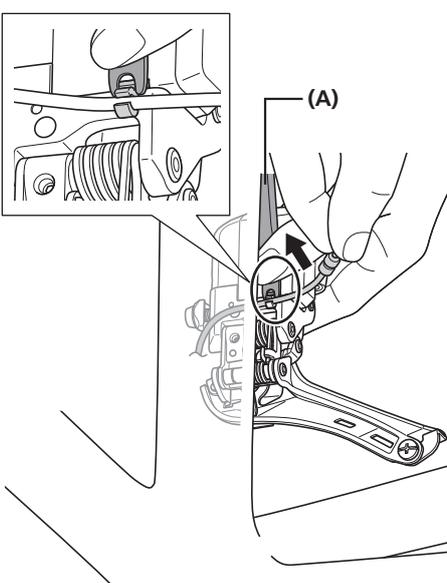
- (A) Shimano original tool TL-EW02
- (B) Electric wire

NOTE

- Do not keep connecting and disconnecting the small waterproof connector. The waterproof section or the connecting section may become worn or deformed, and the function may be affected.
- When removing the electric wire, use the wider end of the Shimano original tool TL-EW02 as shown in the illustration. If you pull too firmly on the connectors, problems with operation may occur.

2

TL-EW02



Remove the electric wire from the cable holder.

If the electric wire is difficult to remove, remove the rear wheel.

- (A) Shimano original tool TL-EW02



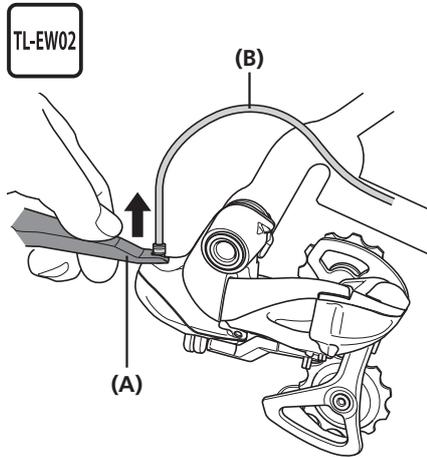
TECH TIPS

Forcibly disconnecting an electric wire may damage the wire.

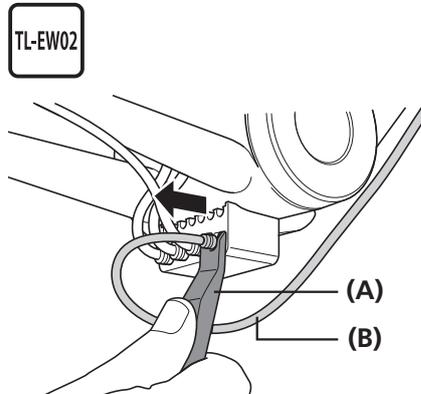
Disconnection of other parts

With the base portion of the hook firmly held down using the wider end of the Shimano original tool TL-EW02, remove the electric wire.

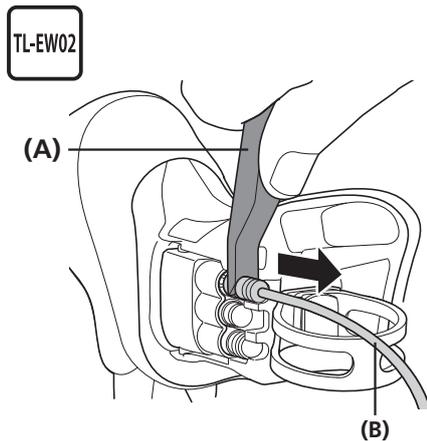
RD-6870



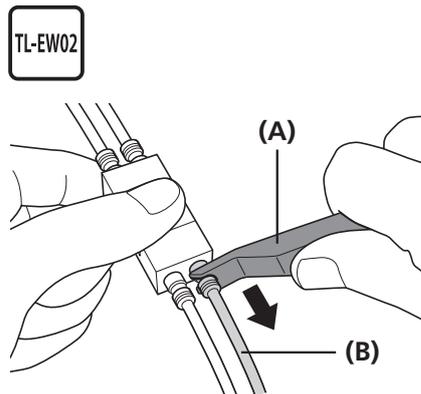
SM-JC40



ST-6870



SM-JC41



- (A) Shimano original tool TL-EW02
- (B) Electric wire

NOTE

- Do not keep connecting and disconnecting the small waterproof connector. The waterproof section or the connecting section may become worn or deformed, and the function may be affected.
- When removing the electric wire, use the wider end of the Shimano original tool TL-EW02 as shown in the illustration. If you pull too firmly on the connectors, problems with operation may occur.

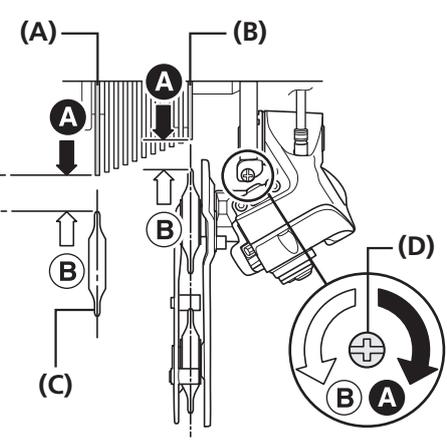
ADJUSTMENT

ADJUSTMENT

■ Adjustment of the rear derailleur

1 Install the battery.

2



Adjust the B-tension adjust bolt.

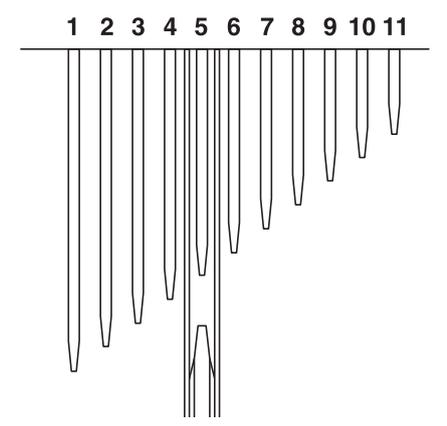
Set the chain on the smallest chainring and the largest sprocket, and turn the crank arm backward.

Turn the B-tension adjustment bolt to adjust the guide pulley to be as close to the sprocket as possible but not so close that it touches.

Next, set the chain to the smallest sprocket and repeat the above to make sure that the pulley does not touch the sprocket.

- (A)** Largest sprocket
- (B)** Smallest sprocket
- (C)** Guide pulley
- (D)** B-tension adjust bolt

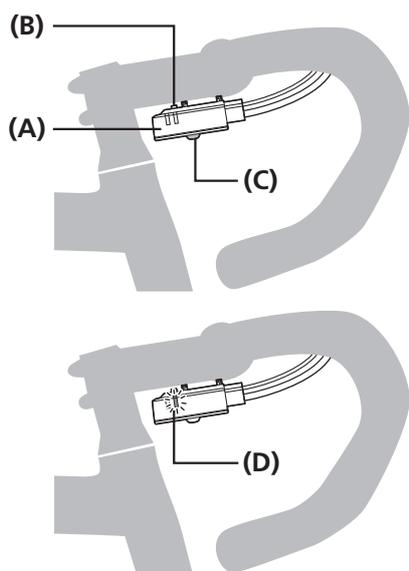
3



Shift the rear derailleur to the 5th sprocket position.

▶▶ Adjustment of the rear derailleur

4



Press the button at the junction A until the red LED illuminates in order to switch to rear derailleur adjustment mode.

- (A) Junction A
- (B) LED window for button
- (C) Button
- (D) Red LED

NOTE

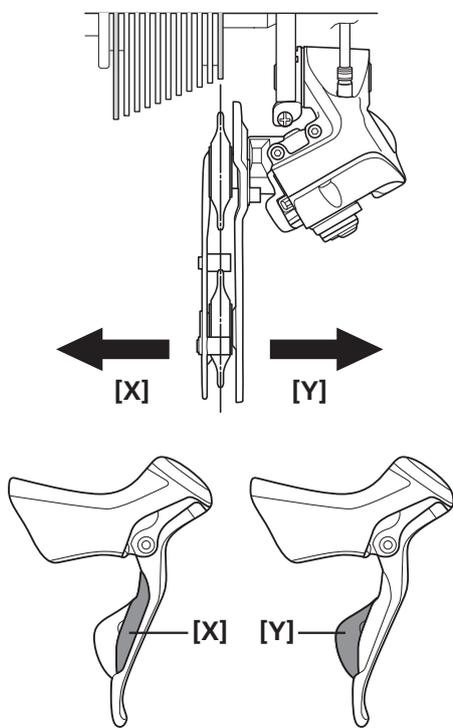
Note that if you keep pressing the button after the red LED has illuminated, RD Protection Reset will begin.



TECH TIPS

For details on RD Protection, refer to "About the RD Protection Function" in the user's manual for the rear derailleur (Di2).

5



If shifting switch [X] is pressed once while the initial setting condition is active, the guide pulley will move one step toward the inside.

If shifting switch [Y] is pressed once, the guide pulley will move one step toward the outside.

The guide pulley can move 16 steps inward and 16 steps outward from the initial position, for a total of 33 positions.



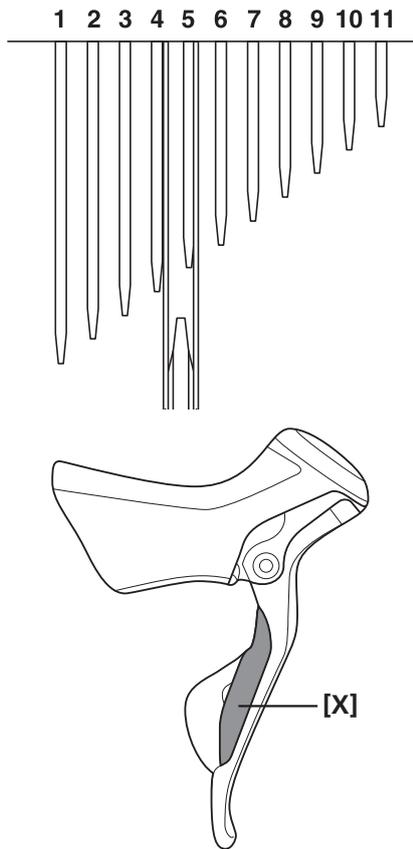
TECH TIPS

When adjusting, the guide pulley will overrun slightly and then move back in an exaggerated movement so that you can check the adjustment direction. When checking the positions of the guide pulley and the sprocket, check the position where the guide pulley finally stops.

ADJUSTMENT

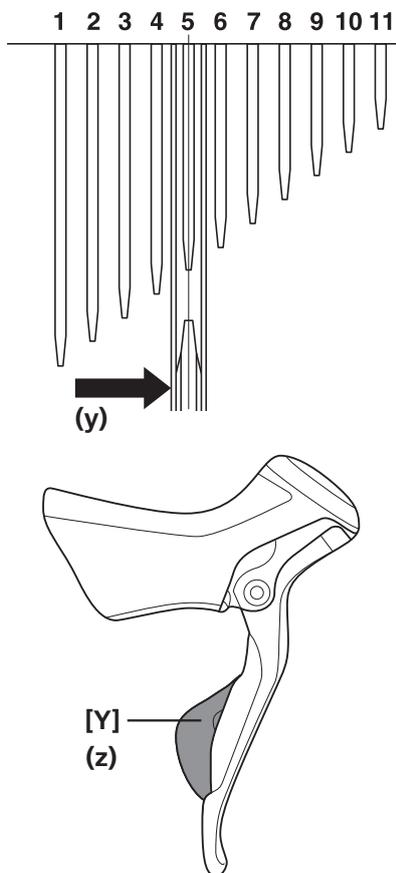
▶ Adjustment of the rear derailleur

6



While turning the front chainwheel, operate shifting switch [X] to move the guide pulley toward the inside until the chain touches the 4th sprocket and makes a slight noise.

7



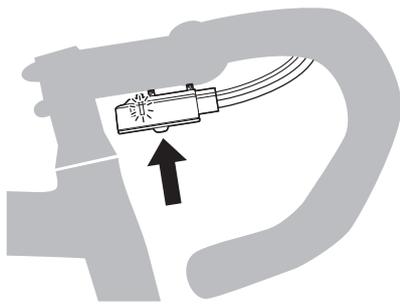
Next, operate shifting switch [Y] 4 times to move the guide pulley toward the outside by 4 steps to the target position.

(y) 4 steps

(z) 4 times

ADJUSTMENT

▶▶ Adjustment of the rear derailleur



Press the button at junction A until the red LED turns off in order to switch from rear derailleur adjustment mode to gear shifting mode.

Shift to each gear and check that no noise is generated at any gear position.

If adjustment is needed, switch back to adjustment mode and readjust the rear derailleur.

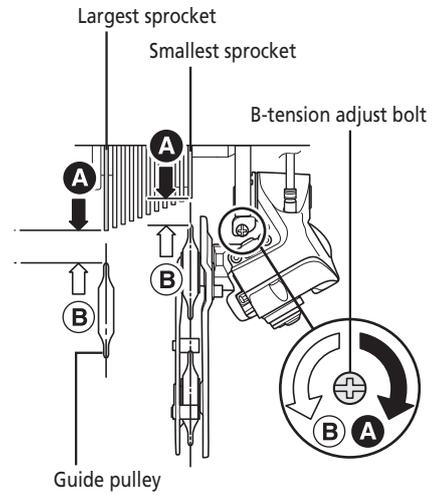
8

NOTE

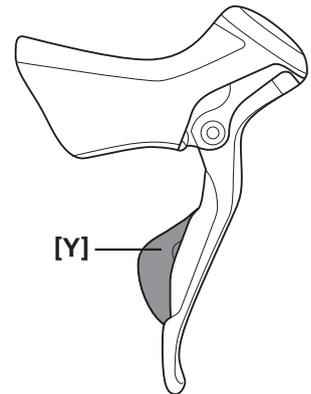
For CS-6800 14-28T

If the shocks generated during internal gear shifting are an issue, follow the below procedure to make adjustments.

- Tighten by turning the B-tension adjust bolt in direction A.

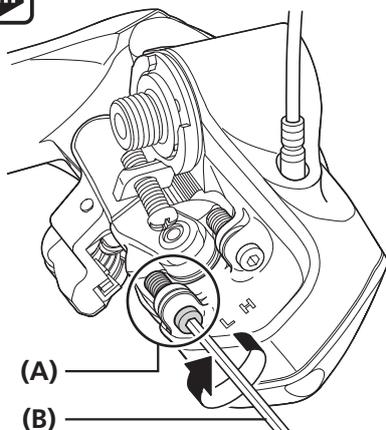


- Change to adjustment mode, operate shifting switch [Y], and move the guide pulley outwards until shift shock is alleviated.



Next, adjust the stopper bolt.

Adjustment of the low-side stopper adjustment bolt



Shift the rear derailleur to the largest sprocket, and then tighten the low-side stopper adjustment bolt until it just touches the left link.

If it is tightened too much, the motor will detect a problem and gear shifting will not operate correctly.

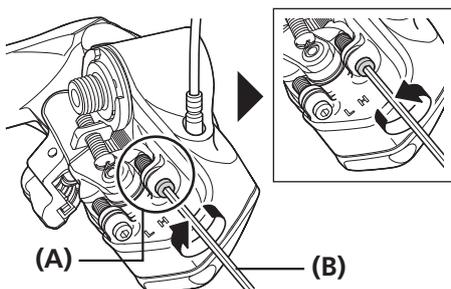
- (A)** Low-side stopper adjustment bolt
- (B)** 2mm hexagon wrench



Possible occurrences if the adjustment bolt is overtightened

- Gears do not shift to the top/low gear. (Even if you shift gears to the top or low gear, the gear may shift back by one gear after about 5 seconds.)
- Noise does not stop.
- The battery level drops quickly. (Load is being placed on the motor)
- The motor may be damaged. (irreparable)

Adjustment of the top-side stopper bolt



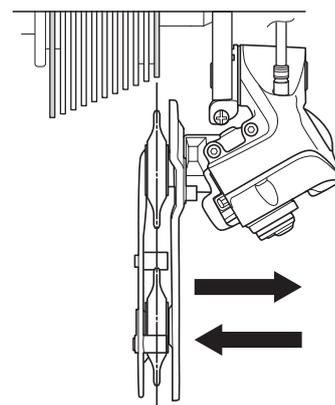
Shift to the smallest sprocket, and then tighten the top-side stopper bolt until it touches the left link at the position where the rear derailleur stops.

From this position, turn the top-side stopper bolt counterclockwise one turn so that an over-stroke allowance can always be maintained.

- (A)** Top-side stopper bolt
- (B)** 2mm hexagon wrench



By shifting from the largest sprocket to the smallest sprocket, the rear derailleur will move toward the outside by the over-stroke allowance and then move back.

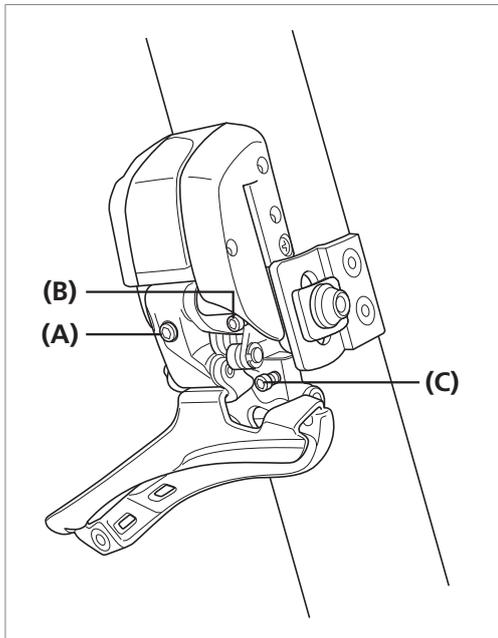


ADJUSTMENT

▶▶ Adjustment of the front derailleur

■ Adjustment of the front derailleur

Checking bolt positions



The low adjustment bolt, the top adjustment bolt and the support bolt are close to each other.

Make sure that you are using the correct bolt for adjustment.

(A) Low adjustment bolt

(B) Support bolt

(C) Top adjustment bolt

NOTE

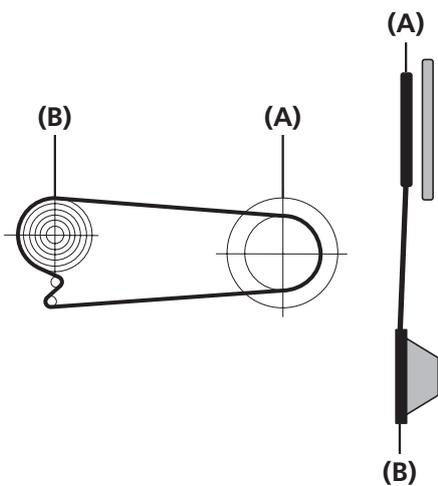
The top adjustment bolt does not have an H marking.

ADJUSTMENT

► Adjustment of the front derailleur

Low adjustment

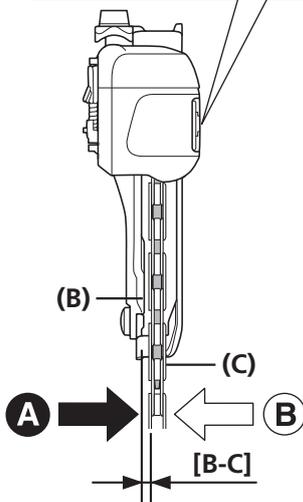
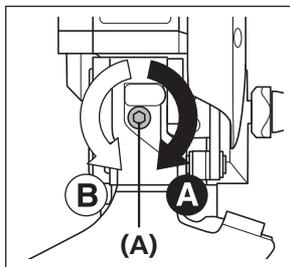
1



Set the chain on the smallest chainring and the largest sprocket.

- (A) Smallest chainring
- (B) Largest sprocket

2



Use a 2mm hexagon wrench to turn the low adjustment bolt.

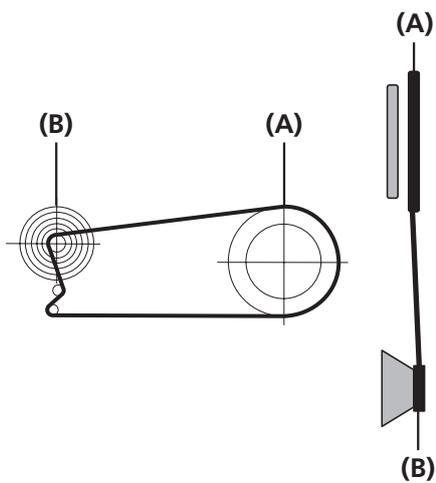
Adjust so that there is a clearance of 0 - 0.5mm between the chain and the chain guide inner plate.

[B-C] 0 - 0.5mm

- (A) Low adjustment bolt
- (B) Chain guide inner plate
- (C) Chain

Top adjustment

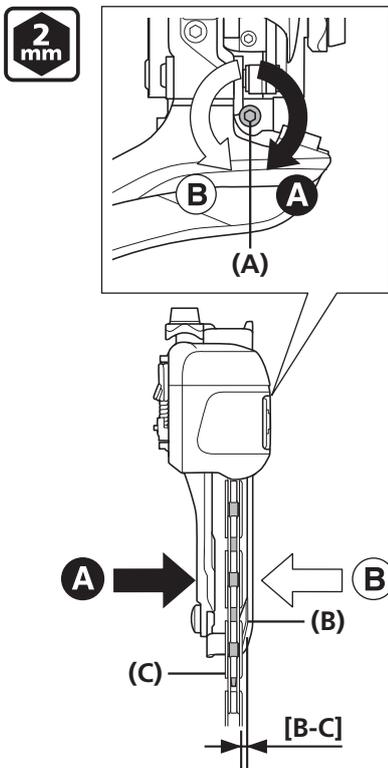
1



Set the chain on the largest chainring and the smallest sprocket.

- (A)** Largest chainring
- (B)** Smallest sprocket

2



Use a 2mm hexagon wrench to turn the top adjustment bolt.

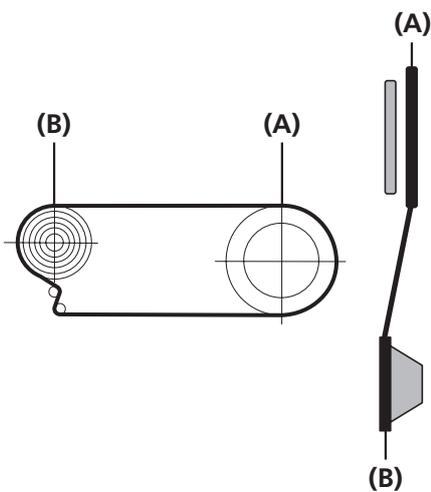
Adjust so that there is a clearance of 0.5 - 1mm between the chain and the chain guide outer plate.

[B-C] 0.5 - 1mm

- (A)** Top adjustment bolt
- (B)** Chain guide outer plate
- (C)** Chain

Top position electrical adjustment

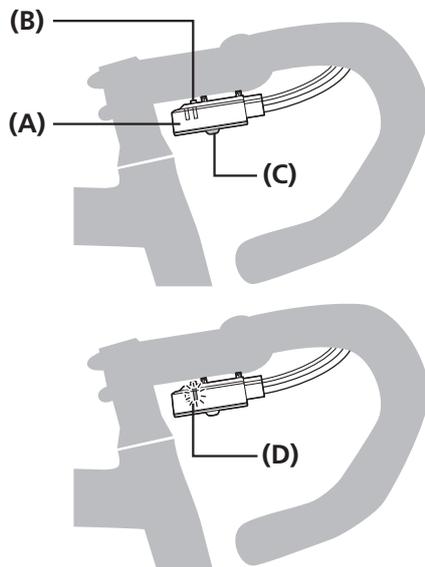
1



Set the rear derailleur to the largest sprocket.

- (A)** Largest chainring
- (B)** Largest sprocket

2



Press the button on junction A until the red LED illuminates in order to switch to adjustment mode.

- (A)** Junction A
- (B)** LED window for button
- (C)** Button
- (D)** Red LED

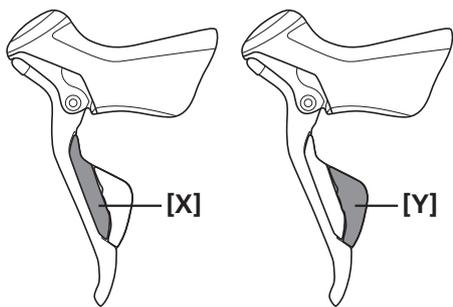
NOTE

Note that if you keep pressing the button after the red LED has illuminated, RD Protection Reset will begin.

ADJUSTMENT

▶▶ Adjustment of the front derailleur

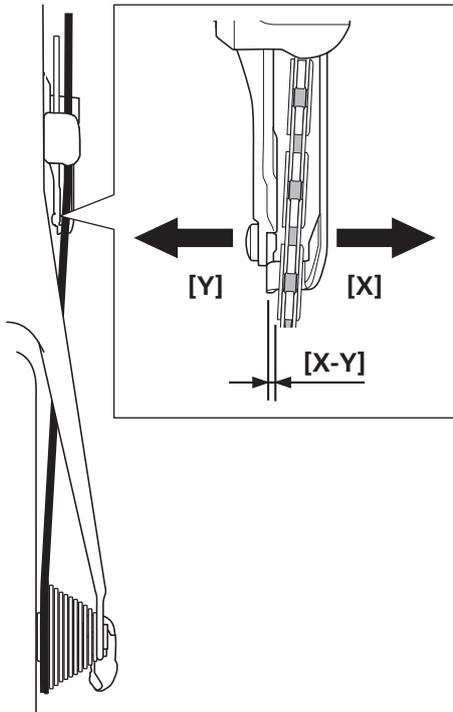
3



Operate shifting switch [X] or [Y].

Adjust so that there is a clearance of 0 - 0.5mm between the chain and the chain guide inner plate.

[X-Y] 0 - 0.5mm



NOTE

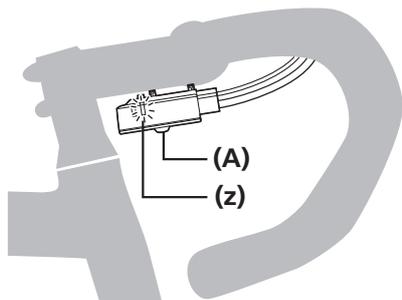
Move the front and rear derailleur to each position, one at a time, and check that the chain guide does not touch the chain.



TECH TIPS

The adjustable range is 25 steps.
(12 steps inward and 12 steps outward from the initial position)

4



Press the button at junction A until the red LED turns off in order to switch from rear derailleur adjustment mode to gear shifting mode.

(z) Turned off

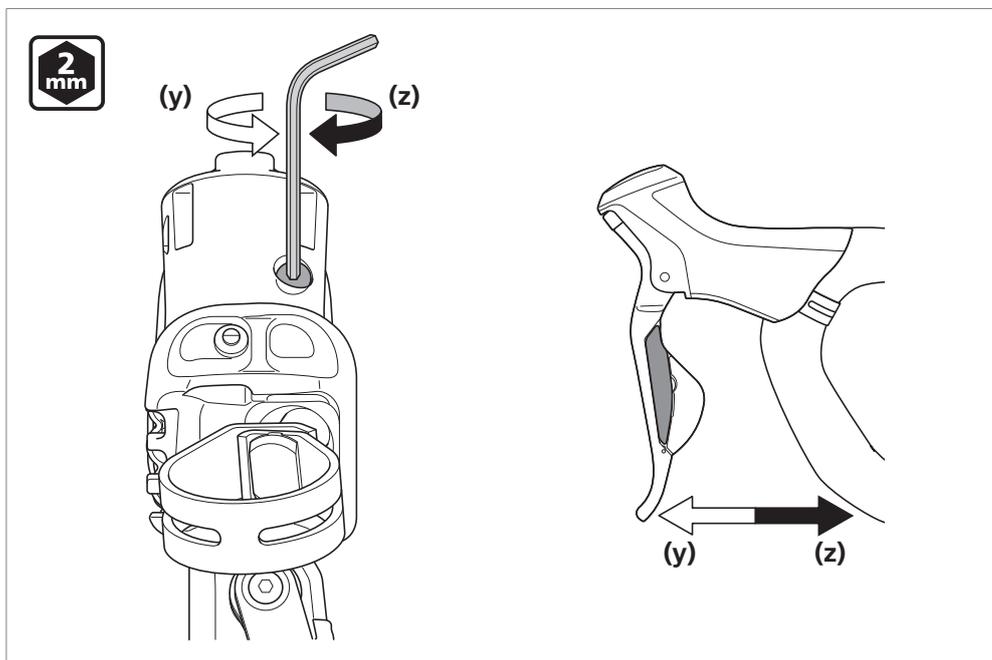
(A) Button

ADJUSTMENT

▶▶ Adjustment of lever stroke

■ Adjustment of lever stroke

ST-6870



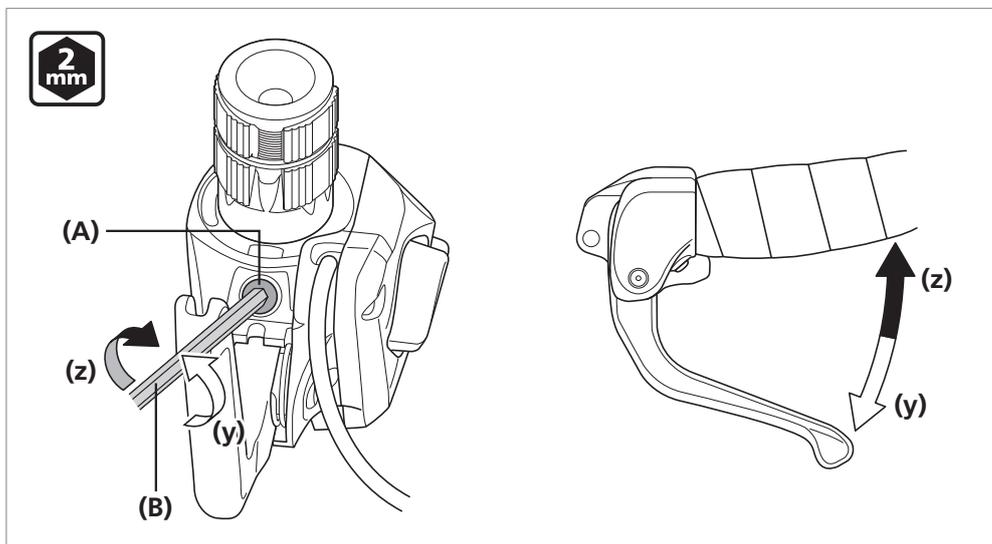
- (y) Counterclockwise:
Increases the lever stroke
- (z) Clockwise:
Decreases the lever stroke

(A) 2mm hexagon wrench

NOTE

Make sure that braking operates properly after the adjustment.

ST-6871



- (y) Counterclockwise:
Increases the lever stroke
- (z) Clockwise:
Decreases the lever stroke

(A) Reach adjustment bolt
(B) 2mm hexagon wrench

NOTE

Make sure that braking operates properly after the adjustment.

CHARGING THE BATTERY

CHARGING THE BATTERY

Use the specified combination of lithium ion batteries, chargers, and linkage devices.

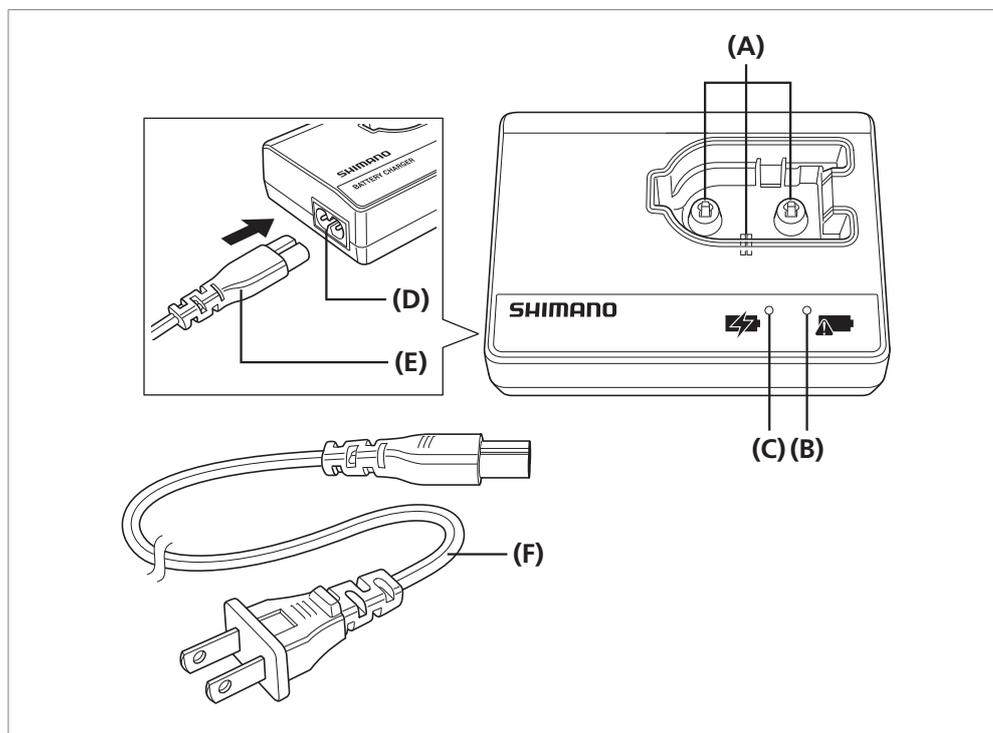
Any other combinations may cause rupture or fire.

Fully understand the precautions for use provided at the beginning of the dealer's manual before using the products.

Names of parts

External type (SM-BCR1/SM-BTR1)

Charger (SM-BCR1)

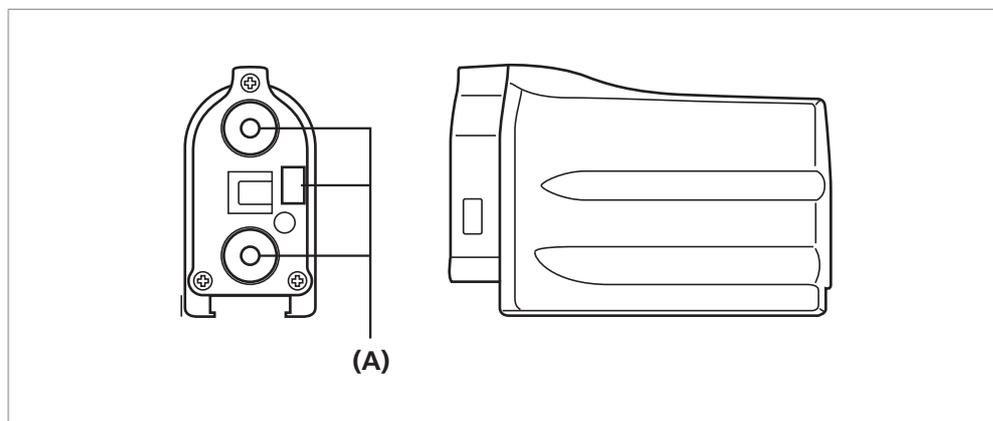


- (A)** Electrical contacts:
If these are modified or damaged, problems with operation will occur. Be very careful when handling them.
- (B)** ERROR indicator:
This flashes when there is an error.
- (C)** CHARGE indicator:
This illuminates while charging is in progress.
- (D)** Power cord connector
- (E)** Power cord:
Insert into the connector.
(Insert all the way)
- (F)** Charger cord (Sold separately)



This is a special charger for charging Shimano lithium ion batteries (SM-BTR1).

Special battery (SM-BTR1)



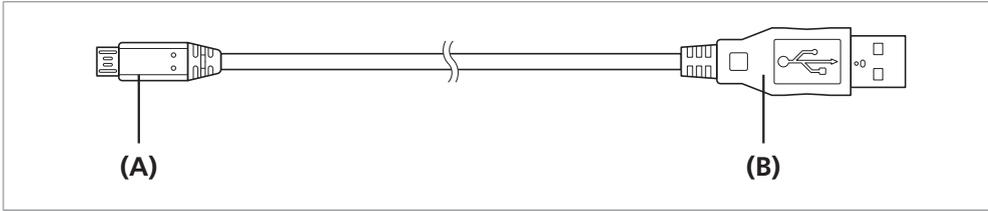
- (A)** Electrical contacts:
If these are modified or damaged, problems with operation will occur. Be very careful when handling them.



This is a lithium ion battery.
Use the special charger (SM-BCR1) to charge it.

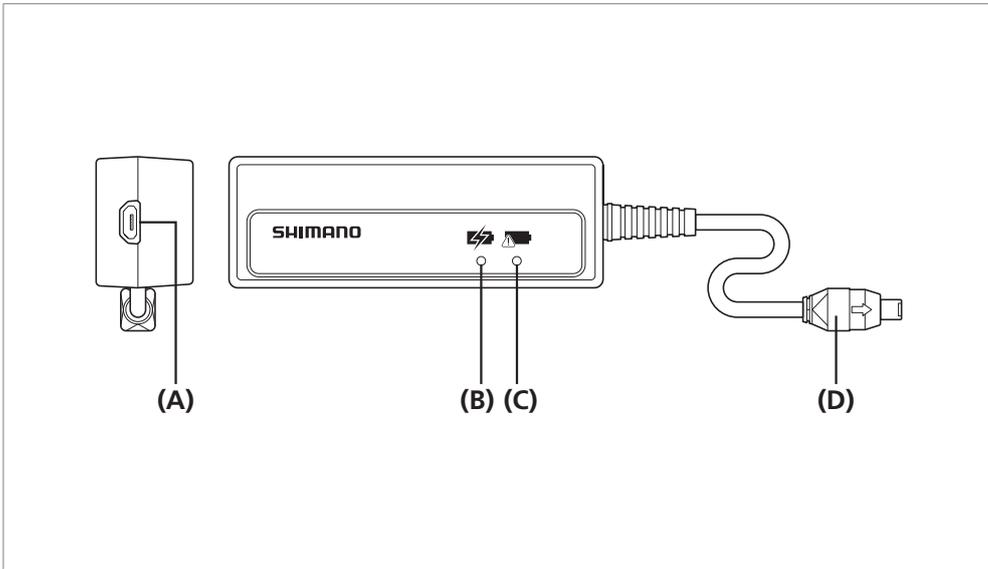
Built-in type (SM-BCR2/SM-BTR2, BT-DN110)

USB cable



- (A)** Micro USB plug:
Connect to the battery charger.
- (B)** USB plug:
Connect to a PC USB port or an AC adapter with a USB port.

Charger (SM-BCR2)



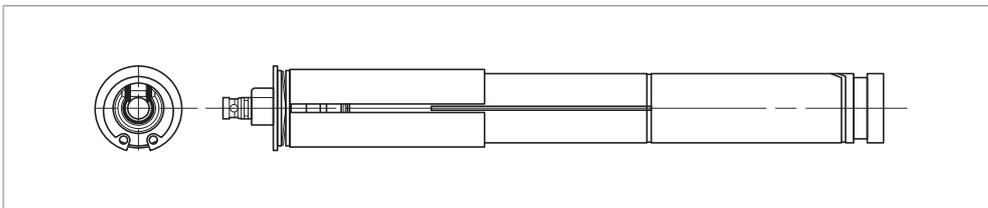
- (A)** Micro USB connector
- (B)** CHARGE indicator
- (C)** ERROR indicator
- (D)** Plug for product connection:
Connect to the junction A or the charging connector of the information display.



TECH TIPS

- This is a special charger for charging Shimano lithium ion batteries (SM-BTR2/ BT-DN110).
- If water collects in the product connector, connect the plug only after wiping it off.

Special battery (SM-BTR2/BT-DN110)



TECH TIPS

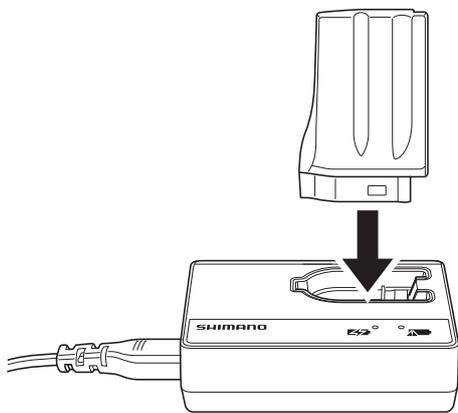
This is a lithium ion battery.
Use the special charger (SM-BCR2) to charge the battery.

■ Charging method

External type (SM-BCR1/SM-BTR1)

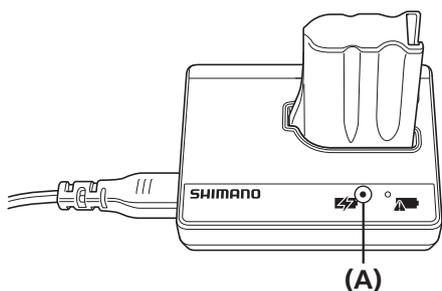
1 Insert the power plug of the battery charger into an electrical outlet.

2



Insert the battery (SM-BTR1) into the battery charger (SM-BCR1) as far as it will go.

3



When the CHARGE indicator (orange) switches off, charging is complete.

4

Disconnect the power plug of the battery charger from the electrical outlet and store the battery charger in a suitable place as specified in the Safety Precautions.

 **TECH TIPS**

Charging takes up to approximately 1.5 hours. (Note that the actual time will vary depending on the remaining battery charge.)

(A) CHARGE indicator

 **TECH TIPS**

If the ERROR indicator flashes, it means that there may be a problem with the battery. Refer to "When charging is not possible" for more information.

Built-in type (SM-BCR2/SM-BTR2, BT-DN110)

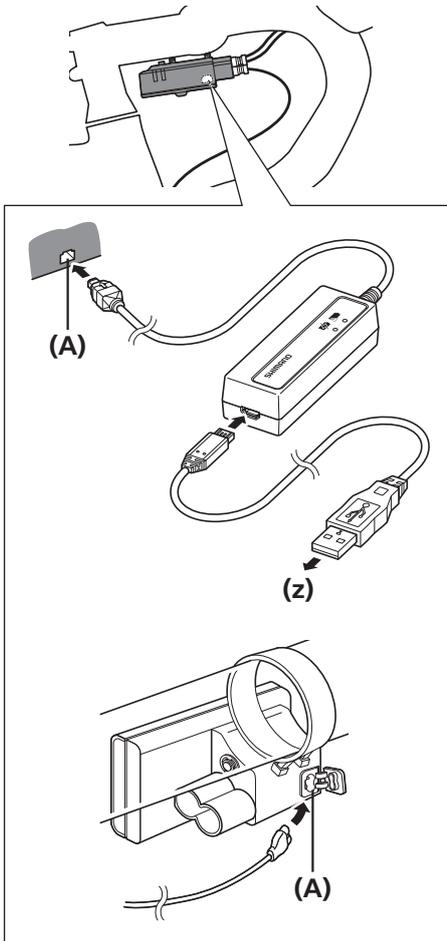
1

Connect the battery to the junction A or information display.

 **TECH TIPS**

- The battery can be charged by using an AC adapter with a USB port or connecting the charger to the USB connector of a PC.

2



Connect the charging cable to the junction A or the charge port of the information display.

(z) To an AC adapter with a USB port or PC

(A) Charging port

 **TECH TIPS**

- The position of the charging port differs depending on the product.
- The charging time of an AC adapter with a USB port is about 1.5 hours, and that of computer USB port type about 3 hours. (Note that the actual time will vary depending on the amount of charge remaining in the battery. Depending on the specifications of the AC adapter, recharging via the AC adapter may require as much time (about 3 hours) as recharging via PC.)

3

When the CHARGE indicator (orange) switches off, charging is complete.

 **TECH TIPS**

If ERROR indicator or CHARGE indicator blinks, refer to "When charging is not possible".

4

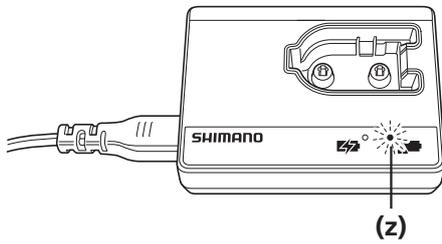
Disconnect the charging cable or USB cable, and keep it at the location specified in the precautions.

CHARGING THE BATTERY

▶▶ When charging is not possible

■ When charging is not possible

External type (SM-BCR1/SM-BTR1)



Remove the battery from the battery charger, disconnect the power plug of the battery charger from the electrical outlet, and then repeat the charging operation.

If charging is still not possible after the above steps have been carried out, the ambient temperature may be too low or too high, or there may be a problem with the battery.

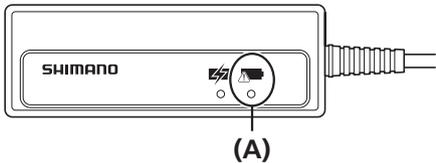
(z) If charging is not possible, the ERROR indicator on the Battery charger will flash.

▶▶ When charging is not possible

Built-in type (SM-BCR2/SM-BTR2, BT-DN110)

- 1** Make sure that only one unit of SM-BCR2 is connected to a PC.
Reconnect the charging cable or USB cable, try charging again.

If the ERROR indicator blinks

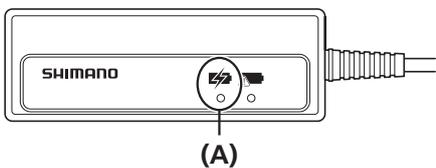


If the ERROR indicator blinks, the ambient temperature during charging may fall outside the operating temperature limits.

Check that the temperature is appropriate.

(A) ERROR indicator

If the CHARGE indicator blinks



If the CHARGE indicator blinks, refer to the following.

- The current capacity of your AC adapter with a USB port is lower than 1.0Adc.
⇒ Use an AC adapter with a USB port with a current capacity equal to or higher than 1.0Adc.
- A USB port is used to connect to the PC.
⇒ Remove the USB hub.

(A) CHARGE indicator

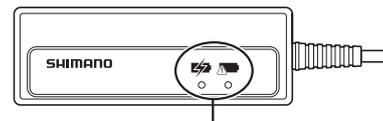
If none of the above (1 to 2) is the case, the battery or junction may be faulty.

3

NOTE

If the CHARGE indicator does not light up or goes out soon, the battery may be fully charged. Check the remaining charge in the battery via junction A or the system information display.

If the battery is low or dead, contact the place of purchase or a bicycle dealer.



If it becomes impossible to charge, the CHARGE indicator (orange) or ERROR indicator of the battery charger will blink.

CONNECTION AND COMMUNICATION WITH PC

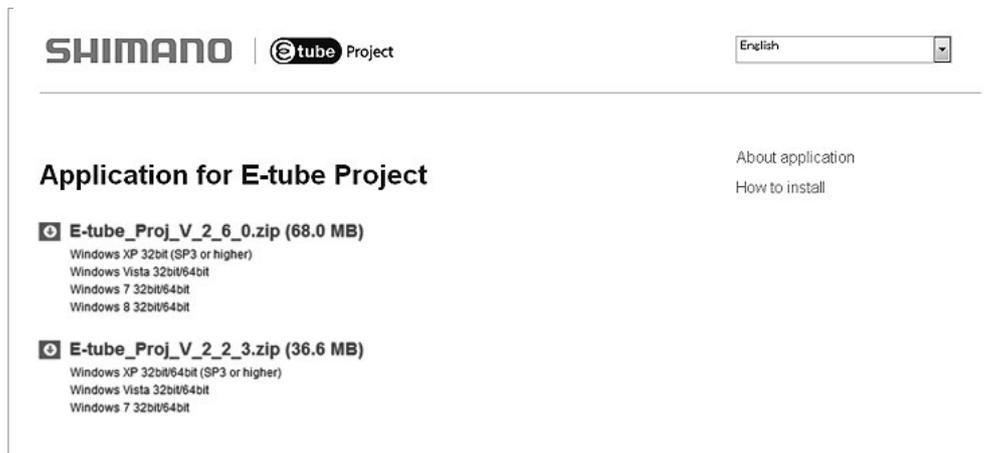
CONNECTION AND COMMUNICATION WITH PC

You can connect the bicycle (system or components) to a PC via a PC linkage device to carry out tasks such as customizing single components or the whole system and updating their firmware.

You need E-TUBE PROJECT to configure the system and update firmware.

Download E-TUBE PROJECT from our support website (<http://e-tubeproject.shimano.com>).

For information on how to install E-TUBE PROJECT, check the support website. For information on how to use E-TUBE PROJECT on your PC, refer to the help manual for E-TUBE PROJECT.



NOTE

You need SM-PCE1 and SM-JC40/JC41 to connect the system to a PC. They are not required if there is an available port. Firmware is subject to change without notice.

System requirements

	PC linkage device	E-TUBE PROJECT	Firmware
SM-BMR2/ SM-BTR2	SM-PCE1/ SM-BCR2	Version 2.6.0 or later	Version 3.0.0 or later
BT-DN110/ BM-DN100		Version 3.0.0 or later	Version 4.0.0 or later * Pre-installed firmware is version 4.0.0.

CAUTION

If your versions of E-TUBE PROJECT software and firmware for each component are not up to date there could be problems operating the bicycle. Check the versions and update them to the latest ones.

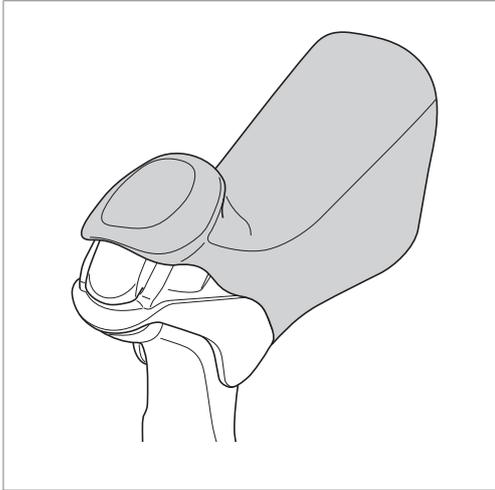
■ Settings customizable in E-TUBE PROJECT

Display settings	Display time	Sets the time until the display turns off when the display monitor is left unattended.
Switch function setting		Modify the shifting switch settings.
Front derailleur adjustment setting		Adjust the front derailleur.
Rear derailleur adjustment setting		Adjust the rear derailleur.
Multi-shift mode setting	Multi-shift mode ON/OFF	Select whether or not to use multi-shift.
	Gear-shifting interval	Sets the gear-shifting interval for multi-shift.
	Gear number limit	Sets the limit on the number of gears shifted when the shifting switch is held down.

MAINTENANCE

MAINTENANCE

■ Replacing the bracket cover



Always replace the bracket cover with the lever removed from the bicycle as shown in the illustration.

The tabs on the bracket cover each fit to a matching slot on the bracket.

NOTE

Note the markings when replacing.
R: for right
L: for left

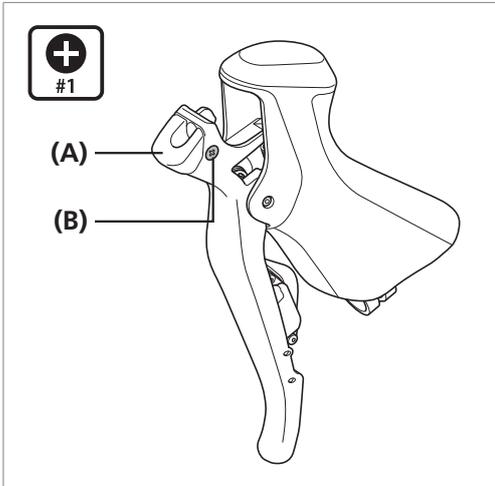
* A label is engraved in the bracket cover.



TECH TIPS

Wipe a little rubbing alcohol inside the bracket cover to make installation easier.

■ Replacing the name plate



Grip the brake lever, remove the name plate mounting screws, and replace the name plate.

(A) Name plate

(B) Screwdriver[#1]

■ Disassembly of the bracket body and lever body

1

Use the Shimano original tool which is sold separately to remove the E-ring.

Align part [2] of the Shimano original tool with the removal direction of the E-ring.

Next, set part [1] against the E-ring and remove the E-ring.

(z) E-ring removal direction

(A) Special E-ring removal tool
Y6RT68000

! CAUTION

When you remove the E-ring, it may pop out; wear protective glasses while removing it. Check that there is no one or no object around you before starting the work.

2

Place the lever with the shifting switch left side up as shown in the illustration.

Insert a hexagon wrench or a similar tool into the hole in the lever axle, and then tap it with a plastic mallet to push out the lever axle.

(A) Hexagon wrench
(B) Lever axle

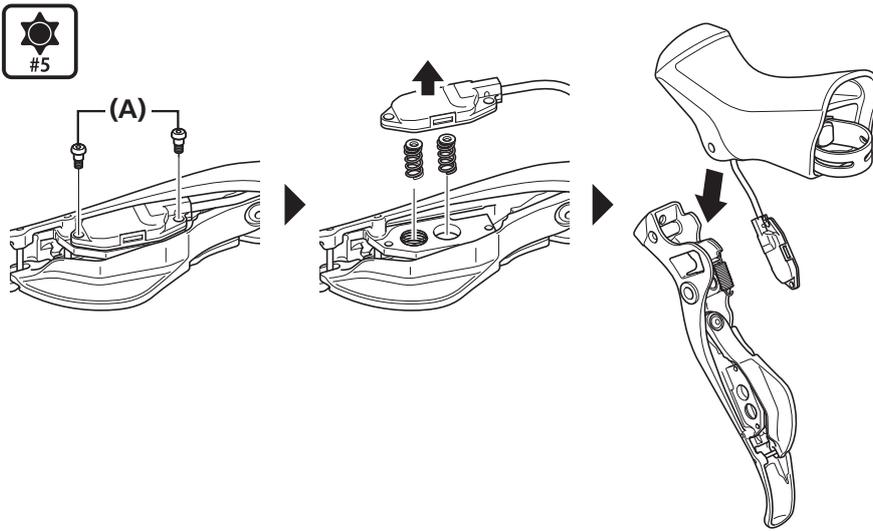
3

Remove the return spring.

(A) Return spring

The bracket body and the lever body can be disassembled after removing the two switch unit fixing screws, the switches and the switch springs.

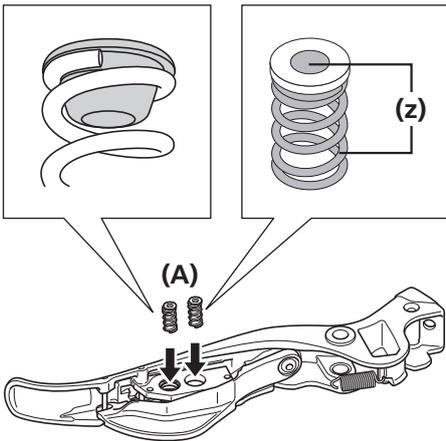
4



(A) Switch unit fixing screw (Hexalobular[#5])

■ Assembly of the switch unit

1

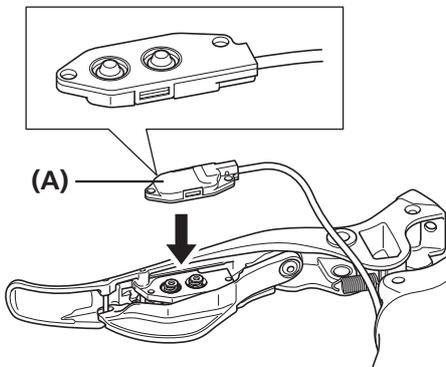


Check that the buttons are attached to the springs, then insert the switch springs into the holes in the switch unit setting plate.

(z) Applying grease
Premium grease (Y-04110000)

(A) Switch spring

2

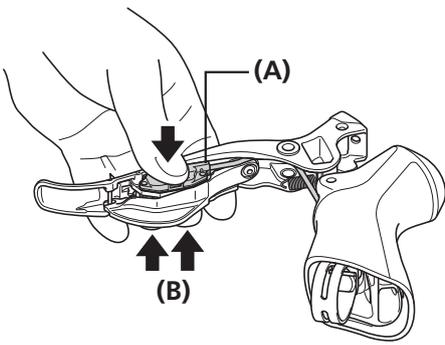


Place the switch unit onto the mounting surface of the setting plate.

(A) Switch unit

▶▶ Assembly of the switch unit

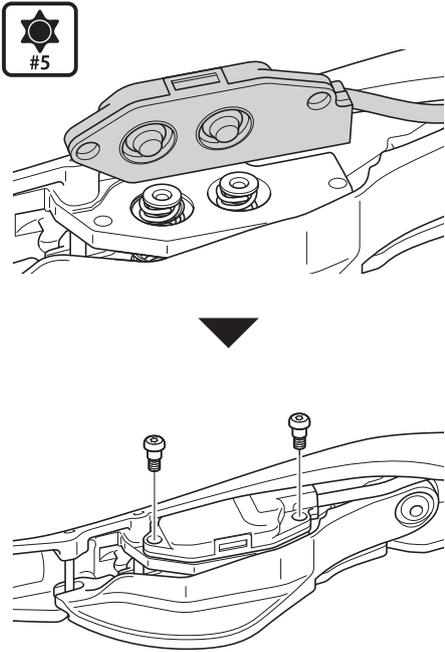
3



Press the switch unit by hand so that the switch springs go into the grooves in the buttons, and then push the shifting switches [X] and [Y] in as far as they will go.

- (A) Switch unit
- (B) Shifting switches [X] [Y]

4



Make a gap between the switch unit and the setting plate and check that the end of the rubber on the switch unit is on the button.

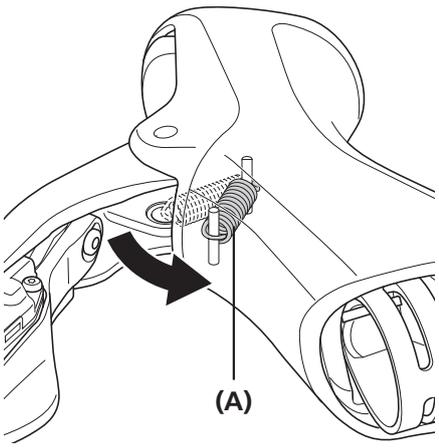
Tightening torque



0.18 N·m

■ Assembly of the bracket body and lever body

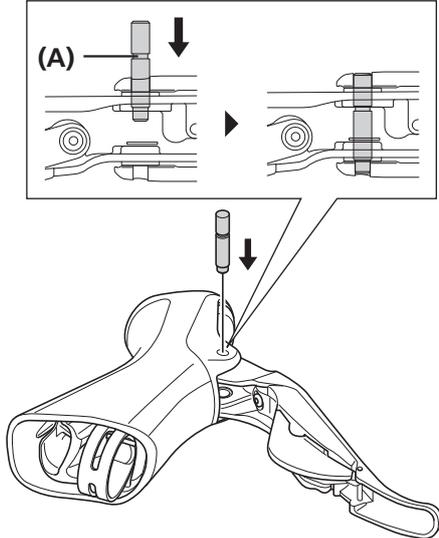
1



Assemble the bracket body and the lever body, and then attach the return spring.

(A) Return spring

2



Place the lever with the shifting switch right side up as shown in the illustration.

Align with the hole in the axle, and then press-fit the lever axle.

(A) E-ring groove

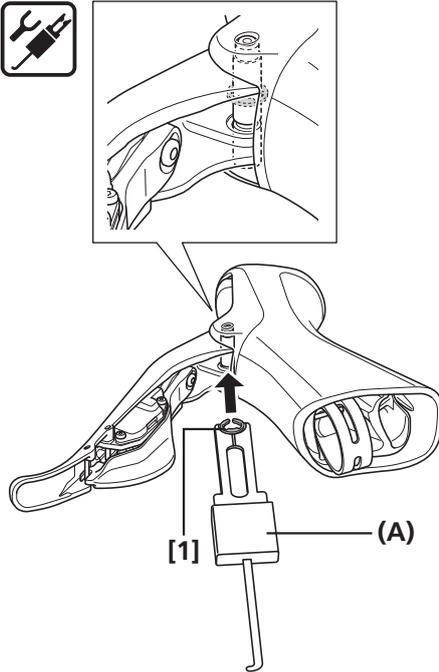
(A) Return spring

(A) E-ring groove

 **TECH TIPS**

- The correct direction for the lever axle is for the E-ring groove to face up.
- Check that the surface of the bracket body and the top end of the lever axle are flush with each other so that the E-ring will fit into the groove.

3



Use part [1] of the Shimano original tool to install the E-ring.

(A) Special E-ring removal tool

(A) Special E-ring removal tool

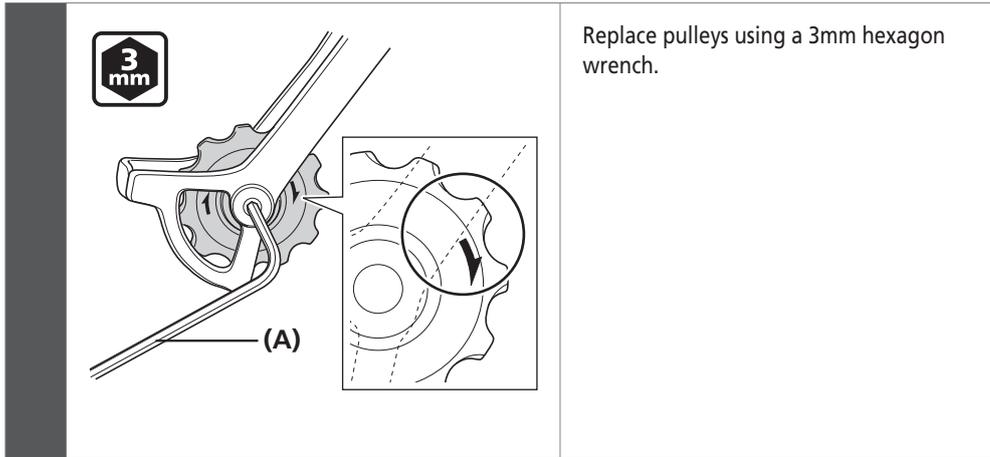
NOTE

Do not use the removed E-ring again.

 **TECH TIPS**

Operate the shifting switches [X][Y] and check that they turn on, and check that the lever operates smoothly.

■ Replacement of the pulley



(A) 3mm hexagon wrench

Tightening torque



2.5 - 5 N·m



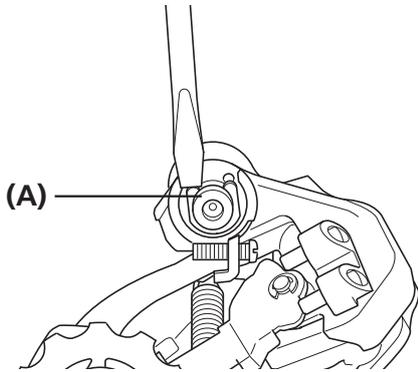
TECH TIPS

Apply sufficient grease to the inside of the pulley cap.

■ Installing the B axle

Removing the B axle

1



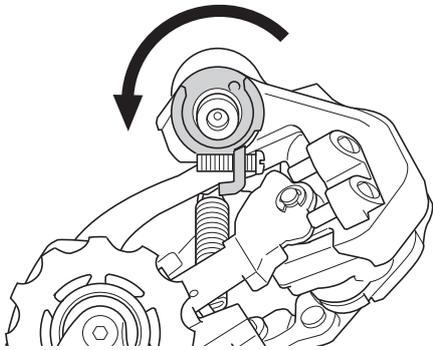
Remove the B axle stop ring using a slotted screwdriver.

(A) B axle stop ring

NOTE

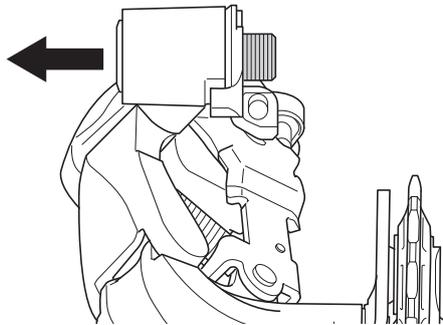
Be careful when removing the B axle stop ring as the stopper plate may pop out under spring force.

2



Use pliers to remove the stopper plate by moving it in the direction of the arrow.

3



Remove the B axle seal ring and the B tension spring, then remove the B axle in the direction of the arrow.

Installation of B axle

1

When mounting the B tension spring, insert the longer end of the spring into the bracket body side and the shorter end of the spring into the hole on the stopper plate side.

(y) Bracket body side
(z) Stopper plate side

- (A) B tension spring
- (B) Stopper plate

NOTE

Apply sufficient grease on the sliding portions (B axle, B axle bearing, B axle washer, stopper plate) and the B tension spring.

2

Temporarily assemble the B tension spring, B body seal ring, stopper plate and B axle to the B body.

(A) B tension spring
(B) Stopper plate

- (A) B tension spring
- (B) Stopper plate

3

Hold the stopper plate with pliers and turn it counterclockwise.

Push in the stopper plate, turning it.

(A) Stopper claw

4

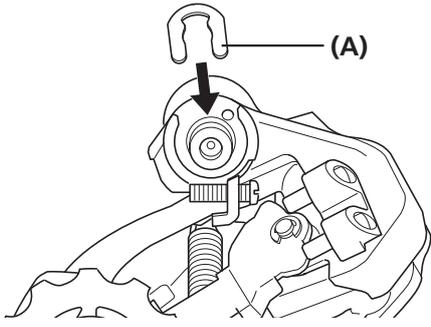
Hook the stopper plate on the stopper claw on the bracket body.

(A) Stopper claw

NOTE

Apply sufficient grease on the B axle washer before installation.

5



Mount the B axle stop ring.

(A) B axle stop ring

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Please note: specifications are subject to change for improvement without notice. (English)

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