

Invacare® Cetus®

Scooter

Service Manual



CE

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Cetus

This product has passed certifications of CE, GMP Taiwan, ISO 9001 and ISO 13485.

In case of any discrepancy between the illustrations and accessories in this manual and the actual vehicle, the actual vehicle shall prevail.

CTM reserves the right to design and modify this scooter.

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1 GENERAL INFORMATION

1-1 Repair instruction

Foreword:

The service manual is the technical data for maintenance and inspection of all parts of the Cetus. Its contents are arranged in parallel with pictures and texts, with the key items of "work order", "work points", and "inspection and adjustment", so as to provide maintenance standards for technical personnel.

If the content and type contained in this repair manual are slightly different from those of the actual vehicle, the actual vehicle shall prevail. If the illustration or instruction of this manual is different from those of the actual vehicle due to the change of the vehicle style or structure, the actual vehicle shall prevail.

For all materials, illustrations, instructions and specifications in this manual, the company reserves the right to modify and revise them at any time without notice and free of liability, according to the latest product information at the time of approval and publication of the product.

This service manual should not be reproduced or scanned without permission.

Notes before maintenance:

Please read the service manual carefully before maintenance, so as to determine the correct cause of failure and carry out maintenance.

Please follow the instructions of the operation procedures in the service manual to avoid injuries to personnel and damage to the scooter during operation.

Before the maintenance of the scooter, it is recommended to turn off the battery first to avoid the risk of electric shock during maintenance.

During maintenance, due to the complexity of some steps, the number of maintenance technicians is suggested to be more than two for better and safer operation.

When using manual / electric / pneumatic tools, please refer to the torque specification to avoid damage to the scooter.

In case of any discrepancy between the illustration in the service manual and the actual vehicle, the actual vehicle shall prevail.

Please properly preserve the parts of the dismantled scooter to avoid loss.

The new product does not include screws, gaskets, fixing accessories and other parts. When replacing the new product, the above-said parts disassembled from the old product shall be used to assemble the new product. If the parts removed from the old product have abnormal phenomena such as corrosion, damage, deformation, etc., please replace them first.

After the scooter is disassembled, please follow the instruction to reassemble it correctly to avoid scooter damage or personnel injury.

After the maintenance of the scooter is completed, it is recommended to ride/operate the scooter to confirm that the issue has been eliminated.

The motor will generate heat during running. If it is needed to repair the scooter, please wait for the motor to be cool before operation to prevent scald.

When repairing the scooter, please put the gearshift lever into the D gear to avoid the moving of the scooter.

It is strictly prohibited to disassemble and repair the scooter when it is powered on.

Please refer to the instructions on the last page of the service manual for the scooter failure.

Personal safety equipment preparation:

- **Safety goggles**
In case of leakage of lead-acid battery fluid during maintenance, they can prevent eyes damage.
- **Steel head safety shoes**
They can prevent foot injuries when carrying or assembling the scooter.
- **Working gloves**
When relocating or disassembling iron parts, the friction can be increased to effectively hold the objects. In case of dealing with the leakage of lead-acid battery fluid, acid-resistant gloves are needed.
- **Repair tools**
Please prepare the tools according to the reference tools in the notes of each maintenance item.

Maintenance instruction:

In order to keep your electric vehicle in optimal use, please carry out regular maintenance.

Clean and check the following:

- Whether the front/rear tire pressure is within the normal range of 35-40 psi.
- Whether the front/rear tire pattern is lower than the normal value by more than 0.5 mm.
- Whether the frame and components are cleaned.
- Whether the joints and lock points are correct and whether there is corrosion.
- Whether the rearview mirror and rear retro reflector are in good condition.
- Motor, battery, controller and other components are free of maintenance. Please do not disassemble them without authorization. In case of any problems, please send them for repair immediately.
- It is strictly forbidden to rinse with high pressure water so as to prevent electronic components and wiring from becoming wet and causing accidents.

- It is strictly forbidden to clean with corrosive solvents or detergents to avoid discoloration and deformation of plastic parts and painted surfaces.
- When cleaning the shell, please wipe it with a neutral solution.
- When cleaning the metal part of the vehicle shroud, please wipe it with a dry cloth.
- For the internal electrical appliances and wiring of the vehicle shroud, please try to avoid the contact of the detergents and the water. If it is needed to wipe the surface, it is recommended to use a dry cloth.

It is recommended that the following parts be oiled and lubricated for every 3,000 km or every six months of use.

Front/rear axle	
Seat holder fixing hole	
Upper and lower copper beads set of center bar	

 **Caution:**

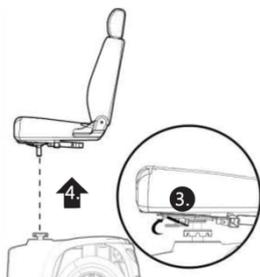
Oiling is prohibited on the following parts: shroud, tires, brake drums, electromagnetic brakes, and brake rubber block.

2 BATTERIES/CHARGER

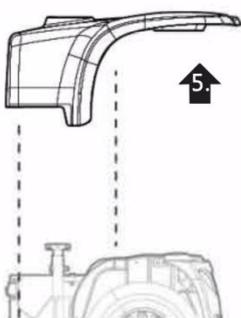
2-1 Battery power-off:

No tools

1. The scooter power is off.
2. The gearshift of the scooter is adjusted to the D gear.
3. Pull the handle on the left side of the seat.
4. The scooter seat can be removed.



5. Remove the upper shroud of the rear shroud of the scooter.



6. Remove the scooter power connector (1pcs).



Power cut-off completed.

Please refer backward for reassembly.

Caution:

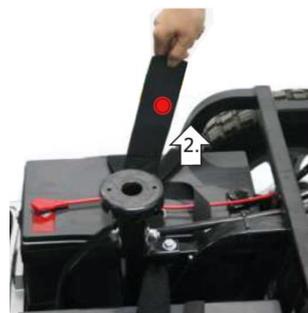
Before the maintenance of the scooter, please cut off power first. If the power is not cut off first, it may cause the risk of electric shock.

Before the maintenance of the scooter, please park it in an open and flat ground and make sure the gearshift lever is put in the D gear.

2-2 Battery removal:

Sleeve Tool #10 x 1pcs
Cross screwdriver x 1pcs

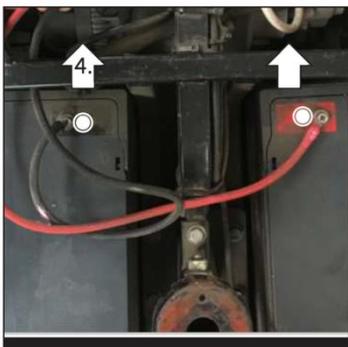
1. Refer to 2-1 Battery power-off: The scooter power-off treatment.
2. Loosen the entire belt.



3. Remove the positive terminal on the battery connection cable and the battery.
4. Remove the negative terminal on the battery connection cable and the battery.



- Remove the positive and negative terminals on the battery power cable and the battery.



- The battery can be removed. Please refer backward for reassembly and replacement.

⚠ Caution:

The battery itself is very heavy. Please be careful not to carry more than you can handle.

The positive and negative terminals on the battery should not be touched with metal tools to avoid danger.

The red connector of the power cable shall be connected to the red positive terminal; the black connector shall be connected to the black negative terminal.

To replace the battery, please remove the screws of each positive and negative terminal in order.

After the battery is installed, please lock the positive and negative terminals in order, otherwise it will be dangerous.

If parking the scooter for a long time (for more than one week), please fully charge the battery and then unplug the power supply, and pay attention to the placement of the power plug to avoid the danger of short circuit.

2-3 Battery connection cable set maintenance:

Cross screwdriver x 1pcs

- Refer to 2-1 Battery power-off: The scooter power-off treatment.
- The battery is connected to the cable set and the circuit breaker is pushed up.



- After the circuit breaker is pushed up, the reset is completed (as shown below).



After resetting, switch on to confirm that the scooter is operating normally.

If it is still abnormal, please replace with a new battery.

 **Caution:**

During the running of the scooter, in case of voltage overload, the battery connection cable set enables the scooter to automatically cut off power through circuit breakers.

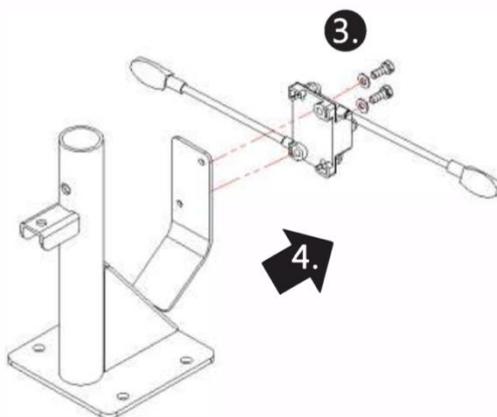
The scooter may be affected by the climbing and loading, causing the circuit breaker to automatically cut off the power. It is recommended to park on flat ground or reduce the load before repairing.

When resetting the power breaker, please switch the main power to OFF, and then cut off the battery power before referring to the above steps to reset.

2-4 Battery connection cable set disassembly:

Hex wrench 17 x 2pcs

1. Refer to 2-1 Battery power-off: The scooter power-off treatment.
2. Please refer to the 2-2 Battery removal: Untie the connection cable.
3. Remove the fixing screws (M6x16Lx2pcs) from the seat holder.
4. The battery connection cable set can be removed.



Please refer backward for reassembly and replacement.

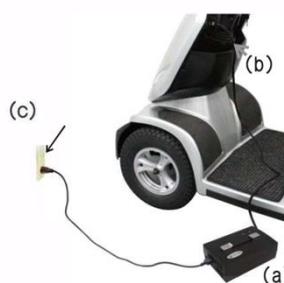
 **Caution:**

In order to avoid the overvoltage of battery, the battery connection cable set has a high voltage protection function. If the battery connection cable set is damaged, please replace with a new one directly.

When reassembling the battery connection cable, please pay attention to the battery "+" / "-" terminals and connect them correctly to avoid danger or damage.

2-5 Charging operation instruction:

Limited to original charger



Charging indicator:

Standby: red light

Charging: orange light

Full charged: green light

Step 1: Open the charger socket (b) cover, take the charger (a) attached to the vehicle, insert the charging plug into the car charger socket (b), and then plug the other AC power plug (c) into the power socket. Then check if the charging indicator light on the charger (a) is on. If so, the charging is in progress.

Step 2: For safety reasons, please operate according to the above method. After fully charged, please turn off the charger (a), then unplug the 110V power plug, and then pull out the charging plug.

Step 3: When fully charged, the charging indicator light will turn green, but do not stop charging immediately. In order to fully charge the battery, you can charge it again.

- **Charger failure and troubleshooting**

The power charging indicator light (red light) is not on:

Troubleshooting → Confirm whether the socket has normal voltage. If the socket voltage is normal, please replace with a new charger directly.

The charging indicator light (orange light) is not on:

Troubleshooting → Confirm that the charging output connector is properly connected to the battery connector. If it is correct, it may be a battery failure and a new charger should be replaced with.

The charging indicator light (orange light) changes quickly (to green light):

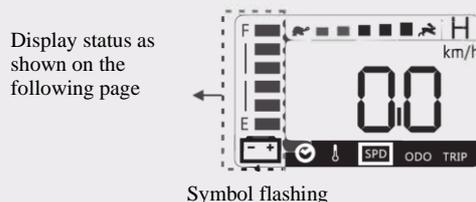
Troubleshooting → Confirm that the battery is fully charged. If it is not full, it may be a battery failure and a new charger should be replaced with.

 **Caution:**

Charging time is about 8 hours (depending on battery discharge degree). Please do not charge continuously for more than 15 hours.

Please charge in a well-ventilated place, and avoid charging in outdoor or rainy environments.

The display panel automatically switches to the SPD speedometer mode while in the charging state.



The AC power plug must be plugged directly into the AC socket on the wall. Do not use an extension cable or adapter plug to avoid danger. When connecting, please make sure that both ends of the connectors are dry and clean.

- **Battery electricity table:**

Battery residual display						
Electric quantity	100 % 6 cells	85 % 5 cells	70 % 4 cells	55 % 3 cells	40 % 2 cells	30 % (1 cell flashes) 20 % or less
Cell number status display						Warning indicator, continuous flashing
After the power is turned on, an alarm will be set off when the electric quantity is lower than 30 % (beeping for three times)						

- **Charging indication table:**

Charging indication	Electric quantity	Cell number status display
	40 % 2 cells Loop display	
55 % 3 cells Loop display		

Charging indication	70 % 4 cells Loop display	
	80 % 5 cells Loop display	
	90 % 6 cells Loop display	
	100 % 6 cells Constantly on	
Incremental frequency	0.5 seconds	
Action characteristics	<p>1. The state of the cell number only increases upwards and does not decrease.</p> <p>2. The charger PIN3 (CH3) is used as the determination signal. When CH3 is grounded, it enters the charging mode, and KEY ON or KEY OFF is not limited.</p> <p>3. Press any key, backlight will be turned on, and it will automatically turn off if no touching the button within five seconds.</p>	
Remarks	The cell number status display is for reference only, and the exact judgment still depends on the indicator light on the charger.	

3 CONTROL PANEL

3-1 Main switch and upper control panel instruction:

No tools

Main power switch (A)

1. Rotate clockwise to “turn on the power”.
2. Rotate counterclockwise to “turn off the power”.

The main switch shall be turned on when driving the vehicle. Please turn off the main switch when stopping the vehicle so as not to waste electricity.

During running, turning the key to the “turn off the power” will start the brake and cause a sudden stop, which may be dangerous.



Panel control instruction:



- B. Warning light: Press to turn on, press again to turn off.
When the warning light is on, if the main power is turned off and the warning light still remains on.
- C. Mode switching: Please refer to the next page for detailed setting steps.
- D. Buzzer: The buzzer sets off alarm after pressing.
- E. Left direction light: Left direction light reminder

- F. Headlights: Lighting function during running
- G. Right direction light: Right direction light reminder
- H. Acceleration: Press to accelerate for 1 level, speed fine adjustment from level 1 to level 5.
- J. Deceleration: Press to decelerate for 1 level, speed fine adjustment from level 5 to level 1.
- I. High/low speed switching: coarse adjustment for 2 levels. When the H light is on, it is the high speed mode; when the H light is off, it is the low speed mode.

Speed indication	H % (maximum)	L % (minimum)
	20	10
	40	20
	60	30
	80	40
	100	50

High/low speed depends on the current set speed.

3-2 Upper control panel adjustment:

Panel function setting steps

Press K to switch to the mode to be set.

1. Time mode
2. Temperature mode
3. Speedometer mode
4. Mileage accumulation mode
5. Trip accumulation mode

Pressing L+M for more than 3 seconds at the same time will enter the setting state. The backlight will automatically turn on.

After entering the setting state, according to one of the following modes you choose, follow the instructions to set.



1. Time mode

Press K to enter the “minute” or “hour” setting mode.

Press L to increase the number, press M to decrease the number; Press and hold for 2 seconds, the number will run continuously.

2. Temperature mode

Press L or M to switch the display unit between Celsius (range from -20 °C to 50 °C) and Fahrenheit (range from -4 °F to 122 °F).

3. Speedometer mode

Press L or M to switch the setting unit:

- When "km/h" is displayed, it means "kilometers/hour".
- When "MPH" is displayed, it means "miles/hour".
- When "/h" is displayed, no speed is displayed.

The display unit of mileage accumulation \square and the trip accumulation \square are displayed according to the speedometer setting unit.

The data displayed at the speed has a certain error value. The data is for reference only.

4. Mileage accumulation mode

The digital display range is from 0 to 99999.

When the total mileage reaches the full digit of 99999 km (62149 mile), it will automatically return to zero and recalculate.

The display unit is set according to the speedometer; if “/h” is set in the speedometer, this mode displays the number of hours.

S81201-92800~B

5. Trip accumulation mode

The digital display range is from 0.0 to 999.9.

When the mileage reaches 999.9, it will stop accumulating (no recalculation).

Press K for 3 seconds to return to zero.

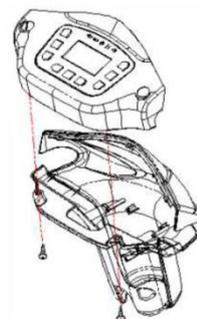
Setting mode can be closed and the latest setting can be automatically saved, according to the following methods:

- Keep still for more than 15 seconds without action.
- Press any key other than K, L, M.

3-3 Control panel maintenance:

Cross screwdriver x 1pcs
Straight screwdriver x 1pcs

1. Refer to 2-1 Battery power-off: The scooter power-off treatment.
2. Remove the two lock points on the top shroud.



3. Use the straight screwdriver to open the control panel.



 **Caution:**

If there is a problem with the control panel, please reconnect the main cable connector first. If there is no effect, please replace with a new one directly.



3-4 Panel wiring instruction:

Cross screwdriver x 1pcs

1. Refer to 2-1 Battery power-off: The scooter is powered off.
2. Refer to 3-3 Control panel maintenance: Open the upper control panel.



3. Check the corresponding connector.
 - A. Main control cable connector
 - B. Buzzer switch connector
 - C. VR initiator controller connector
 - D. Cyclometer transmission wiring connector

 **Caution:**

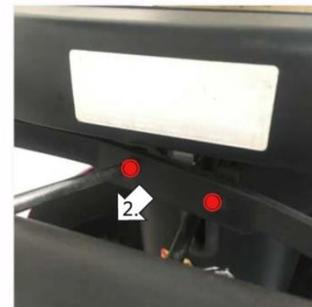
The shape and color of different panel connectors are different, which avoids the wrong connection of the connector, but please do not modify the connector or circuit, which may cause serious problems.

For faults related to electrical products of the scooters, it is recommended to check the above connectors first to confirm whether they fall off and cause an abnormality.

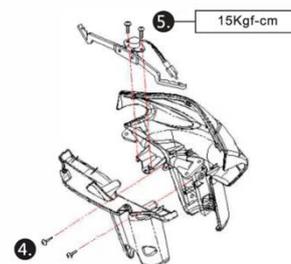
3-5 Maintenance of the VR initiator controller:

Cross screwdriver x 1pcs

1. Refer to 2-1 Battery power-off: The scooter is powered off.
2. Remove the head actuating lever clamping screws (M4 x12Lx2pcs).



3. Please refer to 3-3 upper control panel maintenance to open the control panel.
4. Remove the VR initiator controller after the fixing screws on the inside of the head steering lever are removed (M4 x12Lx2pcs).



Please refer backward for reassembly and replacement.

⚠ Caution:

Please refer to the previous page for upper control wiring maintenance, re-connect the connector B of the VR initiator controller. If it is of no effect, please replace with a new controller.

3-6 Steering lever shroud maintenance:

Cross screwdriver x 1pcs

1. Refer to 2-1 Battery power-off: The scooter is powered off.
2. Turn and remove the head adjustment handle.

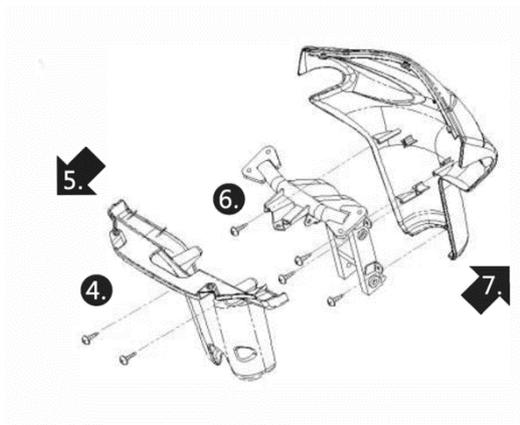


3. Remove the head actuating lever clamping screws (M4 x12Lx2pcs).



4. Remove the head steering lever back shroud clamping screws (M4 x12L x2pcs).
5. Remove the head steering lever back shroud.
6. Remove fixing screws of the head steering lever front shroud (M4 x12L x2pcs).

7. Remove the head steering lever back shroud.

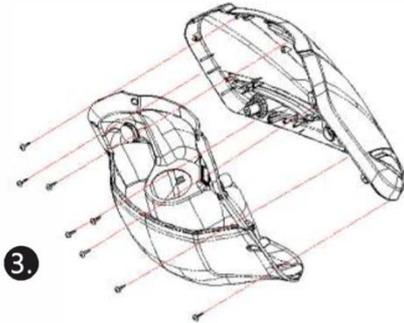


4 FRONT SECTION OF ELECTRONICS/LIGHTS

4-1 Front slanting maintenance:

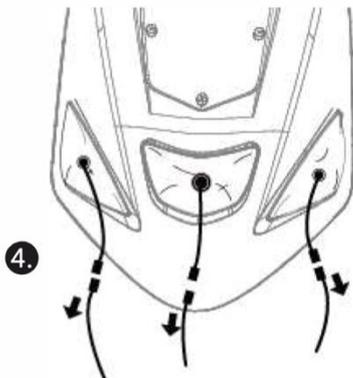
Cross screwdriver x 1pcs

1. Refer to 2-1 Battery power-off: The scooter is powered off.
2. Please refer to 3-6 Steering lever shroud maintenance: Remove the shroud.
3. Remove the screws around the front compartment (M4 x12L x8pcs).



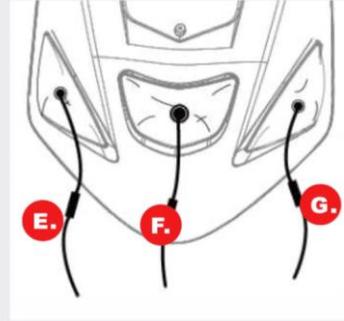
4. Remove the front slanting connectors (3pcs). The front slanting can be removed after the connector is removed.

Please refer backward for reassembly and replacement.



⚠ Caution:

The front slanting is combined with the front light and has three connectors. Please refer to the figure below.

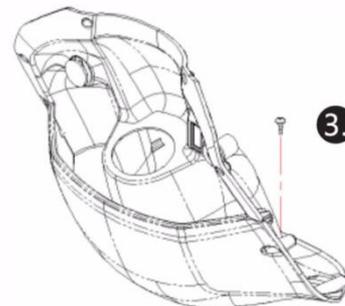


- E. Left turn light
- F. Headlight
- G. Right turn light

4-2 Compartment back shroud maintenance:

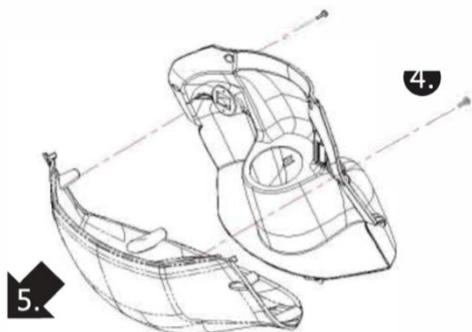
Cross screwdriver x 1pcs

1. Refer to 2-1 Battery power-off: The scooter is powered off.
2. Please refer to 4-1 Front slanting maintenance: remove the front slanting.
3. Remove the locking screws (M4 x12Lx 1pcs) on the front compartment.



4. Remove the two screws from the compartment (M4 x12L x2pcs).

5. The rear compartment can be separated.



Please refer backward for reassembly and replacement.

⚠ Caution:

In this step, only the back shroud of the compartment can be removed. If it is needed to remove the front shroud of the compartment, please refer to 5-2 Maintenance of front shroud of front compartment.

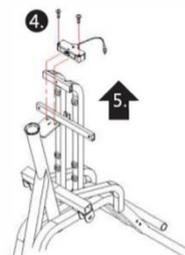
4-3 Turning deceleration set maintenance:

Cross screwdriver x 1pcs

1. Refer to 2-1 Battery power-off: The scooter is powered off.
2. Please refer to 4-1 Front slanting maintenance: open the front slanting.
3. Remove the turning deceleration set connector.



4. Remove the locking screw (M5 x 13L x 2pcs).
 5. The turning deceleration set can be removed.
- Please refer backward for reassembly and replacement.



⚠ Caution:

The turning deceleration set is used to control the turning and deceleration of the scooter. If the turning and deceleration function are abnormal, please check whether the micro switch connector is falling off. If the connector is normal, please replace with a new micro-switch.

Some scooters do not use the turning and deceleration set. They may adopt the gyroscope to achieve the function of turning and deceleration. For details, please refer to: 4-5 Gyroscope Maintenance.

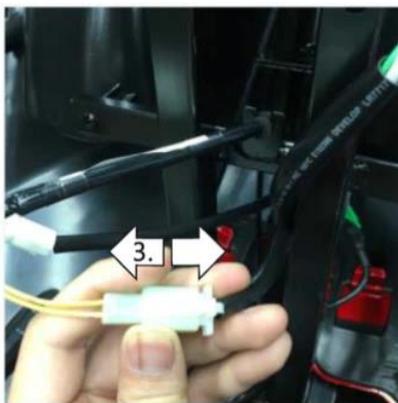
The arrow on the micro-switch box must be aligned with the arrow on the micro switch launch pad.



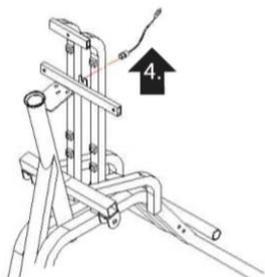
4-4 Temperature sensor maintenance:

Cross screwdriver x 1pcs

1. Refer to 2-1 Battery power-off: The scooter is powered off.
2. Please refer to 4-1 Front slanting maintenance: remove the front slanting.
3. Remove the temperature sensor connector.



4. The temperature sensor can be removed from the slot.



Please refer backward for reassembly and replacement.

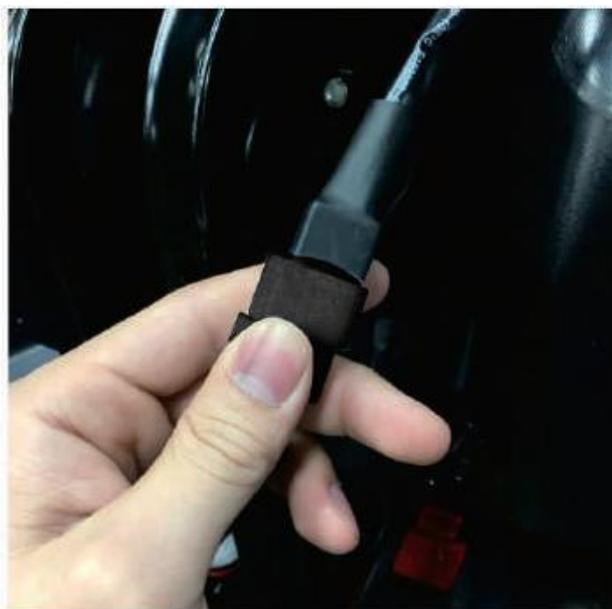
Caution:

The temperature sensor is fixed with the slot of the frame. Please fix it tightly when reassembling so as to avoid falling off.

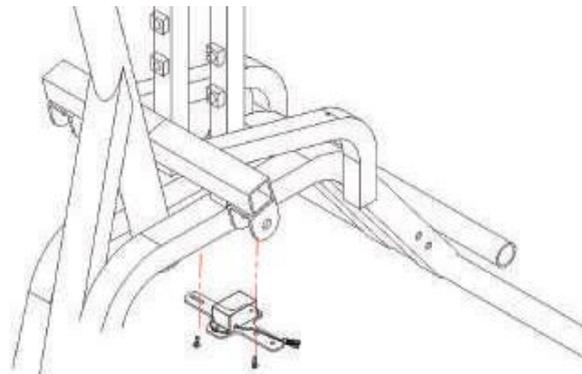
4-5 Gyroscope Maintenance:

Cross screwdriver x 1pcs

4. Refer to 2-1 Battery power-off: The scooter is powered off.
5. Please refer to 4-1 Front slanting maintenance: open the front slanting.
6. Remove the gyroscope connector.

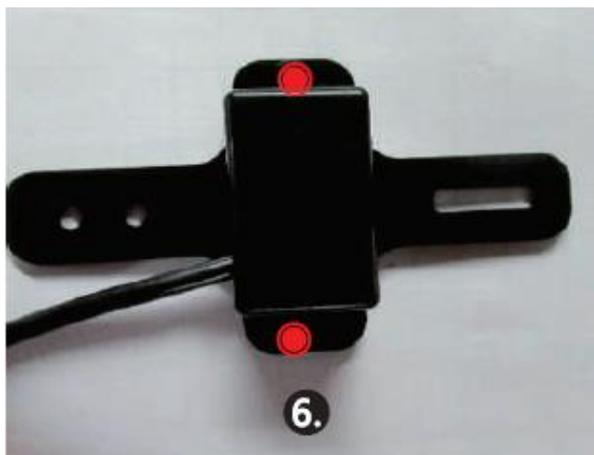


7. Remove the locking screw (M4 x 12L x 2pcs).



8. The gyroscope set can be removed. Please refer backward for reassembly and replacement.

- Remove the locking screw (M3 x 6L x 2pcs) from the holder.



- The gyroscope can be removed. Please refer backward for reassembly and replacement.

4-6 Headlight maintenance:

Cross screwdriver x 1pcs

- Refer to 2-1 Battery power-off: The scooter is powered off.
- Please refer to 4-1 Front slanting maintenance: remove the front slanting.
- Remove the headlight connector.



- Remove the front slanting screws (M4 x 12L x 1pcs).



- Remove the headlights from the slot. Please refer backward for reassembly and replacement.

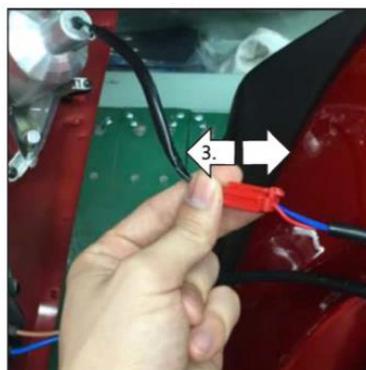
⚠ Caution:

If the headlights are faulty, please check if the headlight connectors and the cable are abnormal. If there is no problem, the bulb may be burnt out. Please replace with a new one directly.

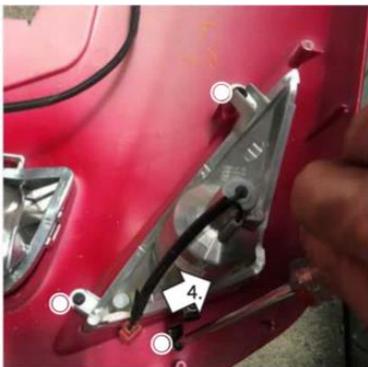
4-7 Front turn light maintenance:

Cross screwdriver x 1pcs

- Refer to 2-1 Battery power-off: The scooter is powered off.
- Please refer to 4-1 Front slanting maintenance: remove the front slanting.
- Remove the front (left) turn light connector on the front compartment.



4. Remove the front (left) turn light screws (M4 x12Lx3pcs).



5. Take out the front (left) turn light from the slot. The disassembly method of the left/right turn light is the same.

Please refer back in reverse for reassembly and replacement.

⚠ Caution:

If the turn light is faulty, please check if the turn light connectors and the cable are abnormal. If there is no problem, the bulb may be burnt out. Please replace with a new one directly.

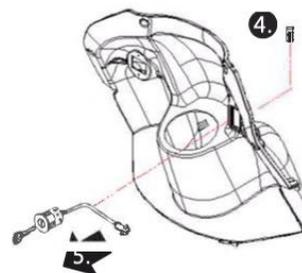
4-8 Main power switch set maintenance:

Cross screwdriver x 1pcs

1. Refer to 2-1 Battery power-off: The scooter is powered off.
2. Please refer to 4-1 Front slanting maintenance: remove the front slanting.
3. Remove the main power connector.



4. Remove the main power switch set from the slot.



5. The entire set of main power switches can be pulled out.

Please refer back in reverse for reassembly and replacement.

⚠ Caution:

If the main power switch set is damaged, please replace with a new one directly. It is forbidden to modify the main power switch set without permission.

4-9 Charging block maintenance:

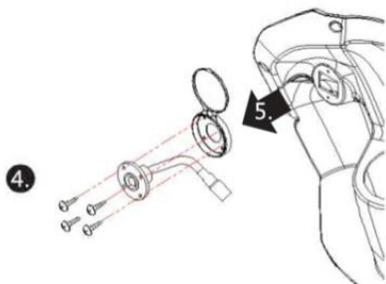
Cross screwdriver x 1pcs

1. Refer to 2-1 Battery power-off: The scooter is powered off.
2. Please refer to 4-1 Front slanting maintenance: remove the front slanting.
3. Remove the charging block connector.



4. Remove the charging block screws from the front compartment (4 pcs).

5. The entire set of charging block can be removed.



Please refer back in reverse for reassembly and replacement.

 **Caution:**

If the charging cover is damaged, it is recommended to replace with a new one to avoid the lack of protection of the charging base, which may cause liquid or sundries to damage the charging base, or even result in damage to the scooter.

If the charging block is faulty, it cannot be charged. In case of a charging failure, please replace with a new one as soon as possible.

Step 4: The screw is located in the charging cover and can be removed after opening the charging cover.

5 STEERING COLUMN

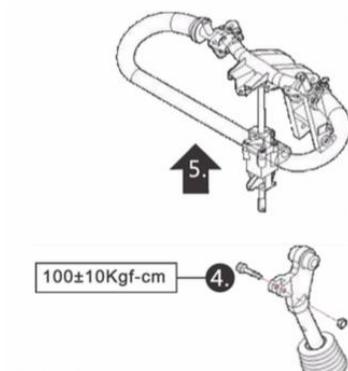
5-1 Steering lever frame maintenance:

Hex wrench 8 x 2pcs
 Allen wrench 4 x 1pcs
 Hex wrench 6 x 1pcs

1. Refer to 2-1 Battery power-off: The scooter is powered off.
2. Please refer to 3-6 head steering lever shroud maintenance: remove the shroud.
3. Remove the screw set (M8 x 30Lx 1pcs) on the steering lever.



4. Remove the screw set (M6 x 30L x 1pcs) that connects the steering lever to the frame.
5. Pull out the entire set of steering set.



Please refer back in reverse for reassembly and replacement.

Caution:

Before removing the steering lever, the scooter's upper control wiring can be taken out after cutting off of the strap (x 1pcs).



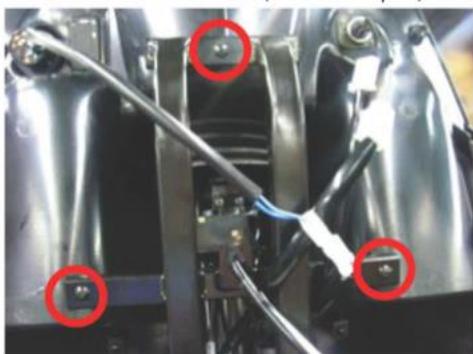
5-2 Maintenance of front shroud of front compartment:

Cross screwdriver x 1pcs

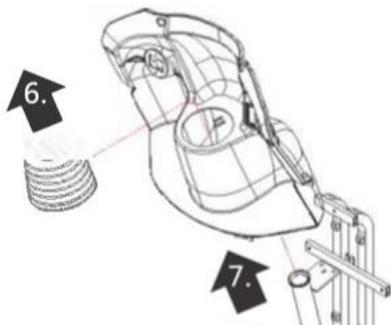
1. Refer to 2-1 Battery power-off: The scooter is powered off.
2. Please refer to 4-1 Front slanting maintenance: remove the front slanting.
3. Please refer to 5-1 Steering lever frame maintenance: remove the steering lever frame.
4. Remove the dust-proof foam below (use the hook-and-loop strap to fix).



- Remove the fixing screws of the front shroud and the frame (M4 x 12L x 3pcs).



- Remove the protective shroud.
- The entire compartment - front shroud can be removed.



⚠ Caution:

After the dust-proof foam is removed, please be sure to reassemble it to avoid the accumulation of dust in the front compartment and even affect the operation of the scooter.

5-3 Front shroud upper cover maintenance:

Cross screwdriver x 1pcs
Sleeve tool #10 x 1pcs

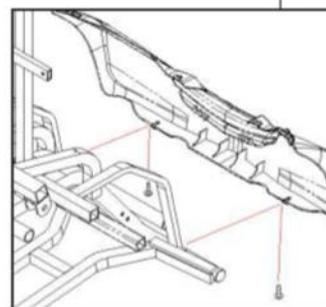
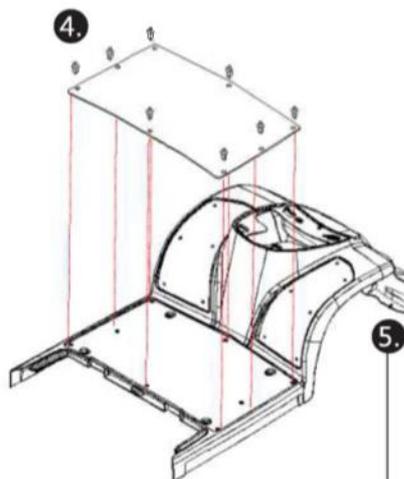
- Refer to 2-1 Battery power-off: The scooter is powered off.
- Please refer to:
 - 2-2 Battery removal.
 - 4-1 Front slanting maintenance.
 - 5-1 Steering lever frame maintenance.
 - 5-2 Maintenance of front shroud of front compartment.

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- Remove the above items.
- Remove the front shroud upper cover screws (M4 x 12L x 2 pcs).

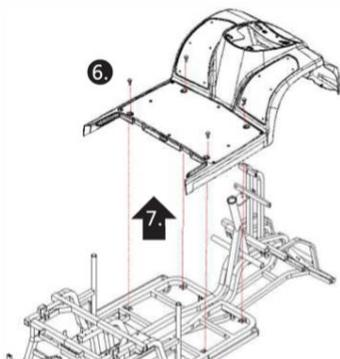


- Remove the rivet (x8pcs) from the pedal.
- Remove the lower shroud screws (M4 x12L x2pcs).



- Remove the pedal screws (M6 x 16L x 4pcs)

- The entire front shroud upper cover can be removed.

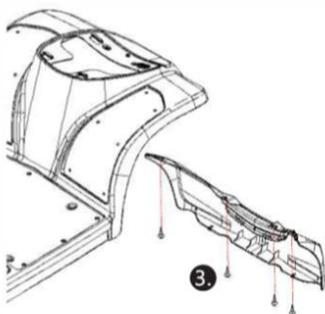


Please refer back in reverse for reassembly and replacement.

5-4 Front fender maintenance:

Cross screwdriver x 1pcs

- Refer to 2-1 Battery power-off: The scooter is powered off.
- Please refer to 5-3 Front shroud upper cover maintenance: Remove the front shroud upper cover.
- Remove the screws from the front shroud (M4 x 12L x 4pcs).



Please refer back in reverse for reassembly and replacement.

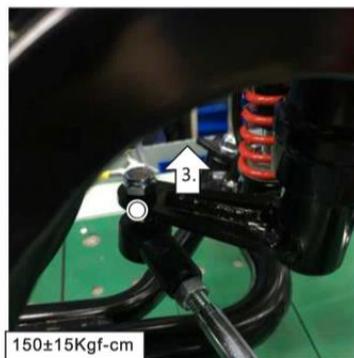
⚠ Caution:

The front fender set can be removed directly from the vehicle and without removing other items.

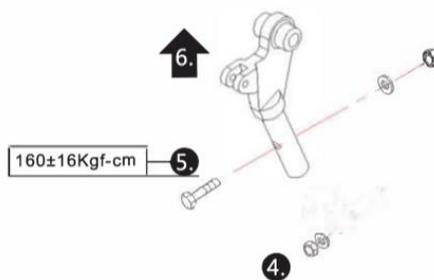
5-5 Center bar maintenance:

Hex wrench 10 x 1pcs
Hex wrench 8 x 2pcs
Hex wrench 13 x 1pcs

- Refer to 2-1 Battery power-off: The scooter is powered off.
- Please refer to:
 - 5-1 Steering lever frame repair: remove the Steering lever.
 - 5-3 Front shroud upper cover maintenance: remove the front shroud upper cover.
- Remove the coupling nut at the front wheel connecting rod and the bottom of the center bar.

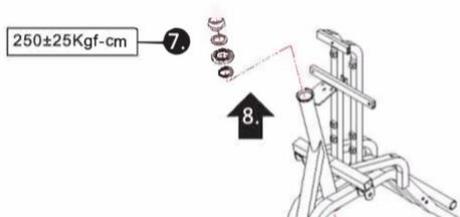


- Remove the clamp screws.
- Remove the fixing screws.
- Remove the lower steering lever connector.

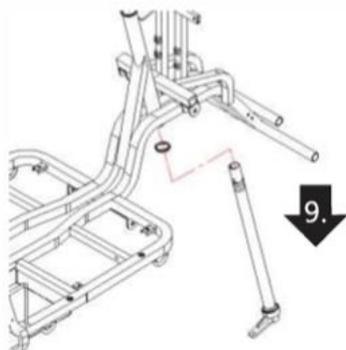


- Remove the center bar bead-bowl nut group.

8. Remove the entire set of bead-bowls.



9. Remove the lower center bar and the steel bead set.



Please refer back in reverse for reassembly and replacement.

⚠ Caution:

Step 3. The front wheel connecting lever is connected to the bottom of the center bar, which must be removed. If it is not disassembled, the center bar will not be able to be removed due to the front wheel suspension.

Step 7. To remove the center bar bead-bowl set, a water channel clamp must be used.



There is a set of steel beads at the bottom of the center bar. Please pay attention to avoid falling or missing when disassembling/reassembling. The beads should be placed at the direction of upwards.



If the steel bead set needs to be reassembled or replaced, it is recommended to apply a small amount of grease to the upper and lower steel bead sets for lubrication.

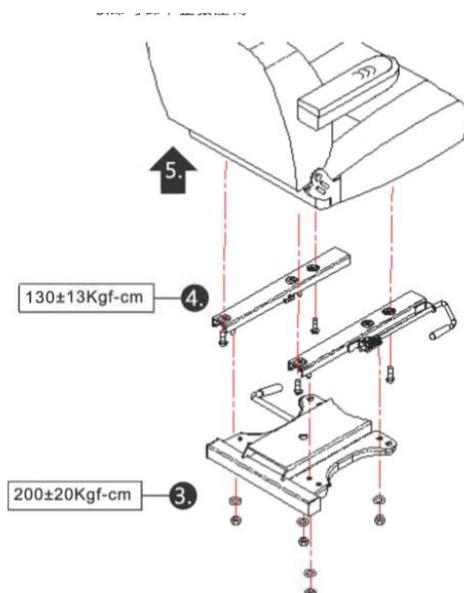
When removing the center bar, it is needed to lift the front end of the whole scooter. It can be operated by two or more people, even with the aid of a mechanical hoist.

6 SEATING

6-1 Seat board maintenance:

Hex wrench 13 x 2pcs

1. Refer to 2-1 Battery power-off: The scooter is powered off.
2. Please remove the seat first.
3. Remove the seat board locking nuts (M8 x 4pcs).
4. Remove the seat rail screws (M8 x15L x 4pcs).
5. The entire seat can be removed.



Caution:

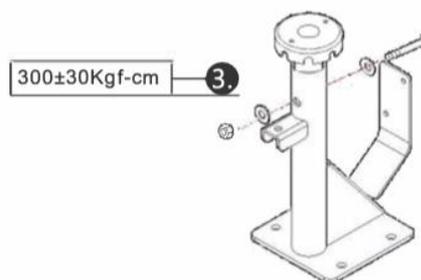
If the seat rail is abnormal or stuck, etc., please replace with a new one directly.

If the seat's tipping regulator malfunctions or the leather is damaged, please replace the entire seat directly, and follow the above steps to reassemble the seat rail/seat board.

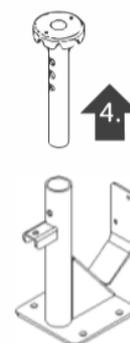
6-2 Seat rotating disk adjustment:

Hex wrench 17 x 2pcs

1. Refer to 2-1 Battery power-off: The scooter is powered off.
2. Remove the seat and rear shroud lower cover.
3. Remove the fixing screw set of the seat rotating disk (M10 x55L x 1pc).



4. The entire set of seat rotating disk can be removed.



Please refer back in reverse for reassembly and replacement.

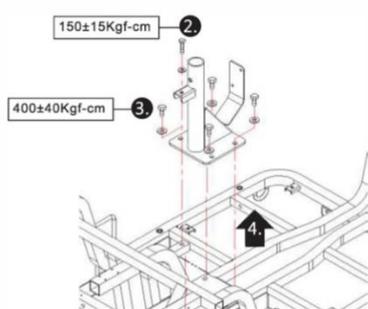
Caution:

The seat rotating disk is the connection between the frame and the seat board. If it is damaged, please replace with a new one directly.

6-3 Seat support maintenance:

Hex wrench 17 x 2pcs
Cross screwdriver x 1pcs

1. Refer to 2-1 Battery power-off: The scooter is powered off.
2. Remove the upper set of fixing screw (M8 x35L x 1pcs).
3. Remove the upper set of fixing screws (M10 x20L x 4pcs).
4. The entire set of seat holder can be removed.



Please refer back in reverse for reassembly and replacement.

6-4 Main controller maintenance:

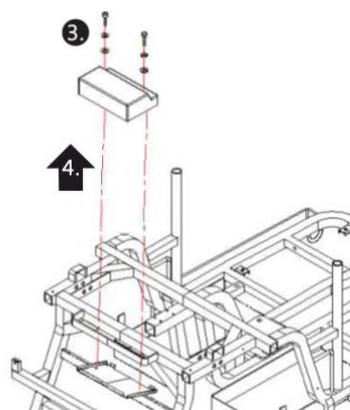
Allen wrench 4 x 1pcs

1. Refer to 2-1 Battery power-off: The scooter is powered off.
2. Remove the main control wire screws (M5 x 12L x 4pcs) and the connector.



3. Main controller wiring instructions:
 - (1). Scooter main cable
 - (2). Motor brake cable
 - (3). Battery "+" "-" pole connector
 - (4). Motor "+" "-" pole connector

4. Remove the main controller fixing screws (ø4 x 25L x 2pcs).
5. The entire set of controllers can be removed.



Please refer back in reverse for reassembly and replacement.

⚠ Caution:

If the function of the electrical equipment of the scooter is abnormal or invalid, the reason may be the controller connector is falling off. First check whether the controller connector is falling off. If it is normal, the controller may be damaged. Please replace with a new one.

Connector 3, 4 motor / battery "+" / "-" pole connector, please do not connect the wrong position. Please note that if the connection is wrong, the controller may be burnt out.



After reassembling or replacing the controller, please confirm to connect the connector and the connector screw, so as to avoid falling off, causing the abnormality of the scooter.

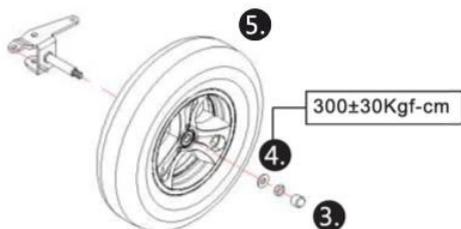
7 WHEELS AND REAR SECTION OF ELECTRONICS/LIGHTS

7-1 Front wheel maintenance:

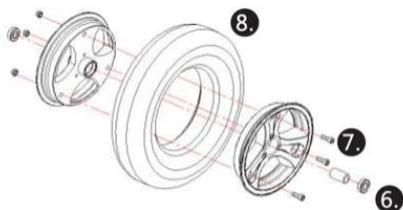
Socket wrench 17 x 1pcs

Allen wrench 8 x 1pcs

1. Refer to 2-1 Battery power-off: The scooter is powered off.
2. Please keep the front wheel of the scooter suspending in midair.
3. Remove the nut cover of the rim outside.
4. Remove the lock nut (M10) and the spacer.
5. Pull out the front wheel.
6. By this step the tire can be replaced.



7. Remove the bearings (2 pcs) and socket (1 pcs).
8. Loosen the rim lock screw (M10 xP1.5 x 35L).
9. The rim can be separated from the tire.



The left/right front wheels can be disassembled in the same way.

Please refer back in reverse for reassembly and replacement.

⚠ Caution:

Standard front tire specifications:

- Tire pressure: 35-40 psi
- Tread pattern standard: more than 0.5 mm

The front wheel left/right disassembly method is the same.

If the tire has abnormalities such as yellowing/deformation/damage/air leakage /shallow tread pattern, please replace with a new one.

Scooter tires are consumables. It is recommended to check daily before running, in order to ensure safety.

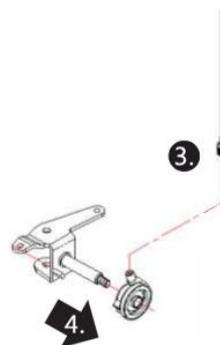
Avoid placing the scooter tires near fire source, water source and heat source to prevent the tire from reducing its serving life.

Avoid scooter tires contacting with chemicals, oil to prevent tire deterioration.

7-2 Speedometer drive maintenance (right front wheel):

No tools

1. Refer to 2-1 Battery power-off: The scooter is powered off.
2. Refer to 7-1 Front wheel maintenance: Remove the right front wheel.
3. Loosen the speedometer cable.
4. Take out the speedometer drive.



Please refer back in reverse for reassembly and replacement.

 **Caution:**

When reassembling the speedometer drive, please note the direction of the slot before fixing.



If the control panel shows the abnormal rotating speed, please first check whether the connectors on both ends of the speedometer cable are fixed. Refer to 3-3 Control panel maintenance.

If the connectors on both ends of the speedometer cable are normal, the speedometer drive may be faulty. Please replace with a new one.

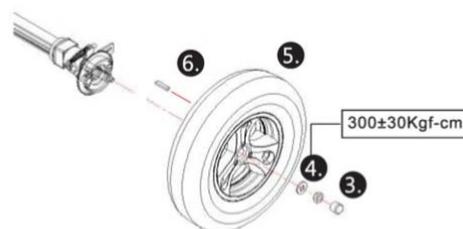
7-3 Rear wheel maintenance:

Socket wrench 17 x 1pcs

Allen wrench 8 x 1pcs

1. Refer to 2-1 Battery power-off: The scooter is powered off.
2. Please keep the rear wheel of the scooter suspending in midair.
3. Remove the nut cover of the rim outside.
4. Remove the lock nut (M10) and the spacer.
5. Pull out the rear wheel.
6. There is a "key" in the middle of the rim. Please remove and keep it properly.

7. By this step the tire can be replaced.



8. Loosen the rim lock screws (M10 x 35L x 3pcs).
 9. The rim can be separated from the tire.
- The left/right rear wheels can be disassembled in the same way.

Please refer back in reverse for reassembly and replacement.

 **Caution:**

Standard rear tire specifications:

- Tire pressure: 35-40 psi
- Tread pattern standard: 0.5 mm or more

The rear wheel left/right disassembly method is the same.

If the tire has abnormalities such as yellowing/deformation/damage/air leakage /shallow tread depth, please replace with a new one.

Scooter tires are consumables. It is recommended to check daily before running to ensure safety.

Avoid placing the scooter tires near fire source, water source and heat source to prevent the tire from reducing its life.

Avoid scooter tires contacting with chemicals, oil to prevent tire deterioration.

Step 6. The function of the "key" is to make the effective rotation of the rear wheel after it is matched with the motor. When reassembling, please insert into the rim gap with correct direction, the round end is facing inward and the square end is facing outward.



7-4 Left/right brake adjustment:

Hex wrench 10 x 1pcs

1. Refer to 2-1 Battery power-off: The scooter is powered off.
2. Refer to 7-3 Rear wheel maintenance: Remove the rear wheel.

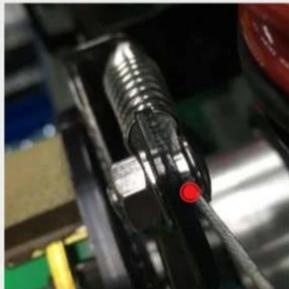
3. Loosen the right brake plate adjustment screw.



It is the same for the left/right brake cables.

**Caution:**

Please insert the brake cable through the locking screw of the brake plate and lock the brake cable. If it is not tightly locked, it may cause a brake system failure or the scooter to behave abnormal.



The other end of the brake cable will be connected to the head brake handle. If the end wiring is in normal condition, it may be that the head brake handle is abnormally connected.

In case that the electromagnetic brake abnormality has nothing to do with the brake plate / brake cable, if it is needed to repair the electromagnetic brake, please refer to the electromagnetic brake repair.

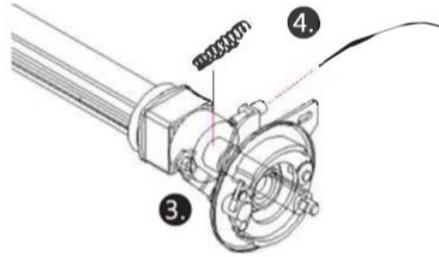
In case of brake failure, check whether the brake cable and the adjustment line are normal. The brake plate may be damaged or worn out. Please replace with a new brake plate.

7-5 Left/right brake plate maintenance:

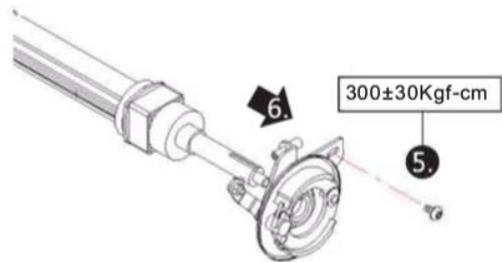
Hex wrench 10 x 1pcs
Cross screwdriver x 1pcs

1. Refer to 2-1 Battery power-off: The scooter is powered off.
2. Please refer to 7-4 Left/right brake adjustment:
3. Loosen the right brake adjustment screw.

4. Pull out the right brake cable and the spring.



5. Remove the brake plate locking screw (M6 x12L x 1pcs).
6. The brake plate set can be removed.



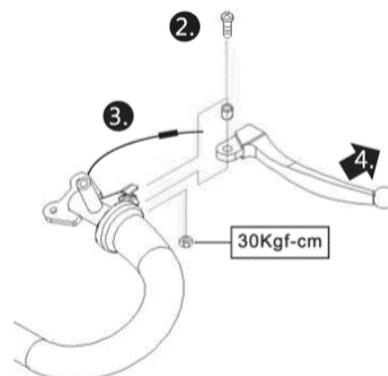
The left/right brake plate can be disassembled in the same way.

Please refer back in reverse for reassembly and replacement.

7-6 Brake handle maintenance:

Cross screwdriver x 1pcs
Hex wrench 8 x 1pcs

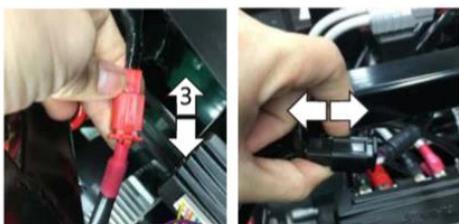
1. Refer to 2-1 Battery power-off: The scooter is powered off.
2. Remove the fixing screw set (M5 x 20L x 1pcs).
3. Remove the brake cable.
4. The brake handle can be removed.



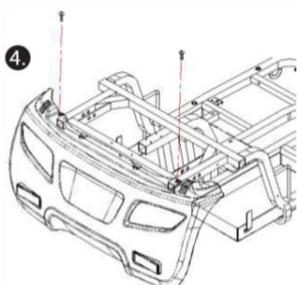
7-7 Rear shrouds group maintenance:

Cross screwdriver x 1pcs

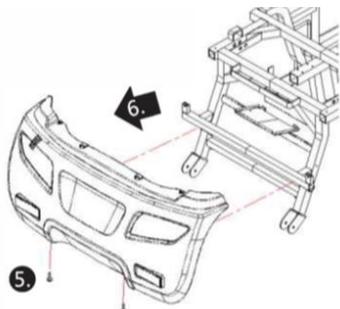
1. Refer to 2-1 Battery power-off: The scooter is powered off.
2. Remove the scooter seat and the rear shroud upper cover.
3. Remove the tail light connector (left: black/right: red).



4. Remove the upper locking screws (M4 x12L x2pcs).



5. Remove the lower locking screws.
6. The rear shrouds group can be removed.

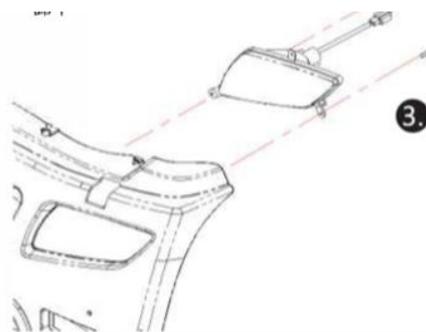


Please refer back in reverse for reassembly and replacement.

7-8 Tail light maintenance:

Cross screwdriver x 1pcs

1. Refer to 2-1 Battery power-off: The scooter is powered off.
2. Please refer to 7-7 Rear shrouds group maintenance: remove the rear shrouds group.
3. Remove the fixing screws ($\varnothing 3 \times 10L \times 2$ pcs) on the rear fender and tail lights.



Please refer back in reverse for reassembly and replacement.

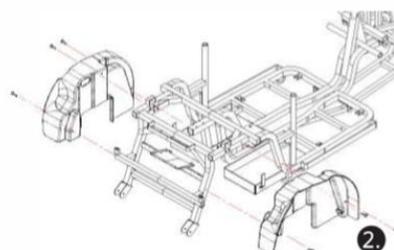
⚠ Caution:

If the tail light of the scooter is damaged, it must be replaced immediately. The tail lights contain the brake lights, positioning lights. If it fails, it may affect the safety of the user.

7-9 Left/right mudguard maintenance:

Cross screwdriver x 1pcs

1. Refer to 2-1 Battery power-off: The scooter is powered off.
2. Remove the three screws ($\varnothing 4 \times 12L \times 3$ pcs) from the left/right mudguard.



Please refer back in reverse for reassembly and replacement.



Caution:

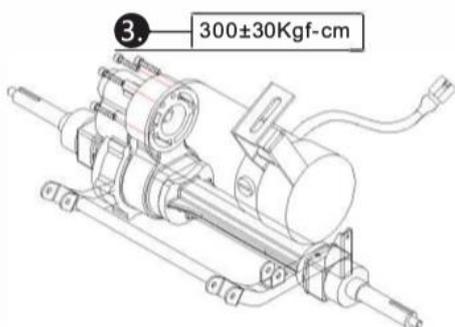
When repairing the rear mudguard of the scooter, it is not necessary to disassemble any parts. It can be removed and replaced directly from the outside.

8 PROPULSION UNIT

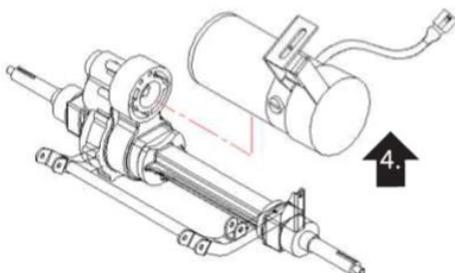
8-1 Motor maintenance:

Allen wrench 5 x 1pcs

1. Refer to 2-1 Battery power-off: The scooter is powered off.
2. Refer to 6-4 Main controller maintenance: Unplug the motor power line.
3. Remove the motor fixing screws (M6 x 50L x 4pcs).



4. The motor group can be taken out.



Please refer back in reverse for reassembly and replacement.

⚠ Caution:

When disassembling the motor, the motor and the differential mechanism can be taken out without removing the rear wheel/rear frame.

When disassembling the motor, it is recommended to be handled by two people. One person removes the screw and one person holds the motor to avoid the danger of the motor falling after the screw is loosened.

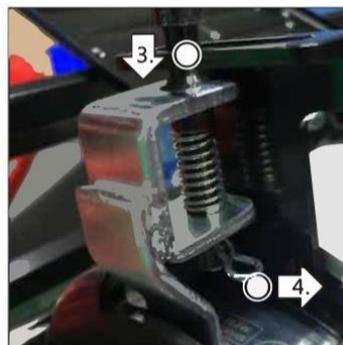


The abnormal sound of the scooter motor during running may be related to the motor/differential mechanism. Please check it first.

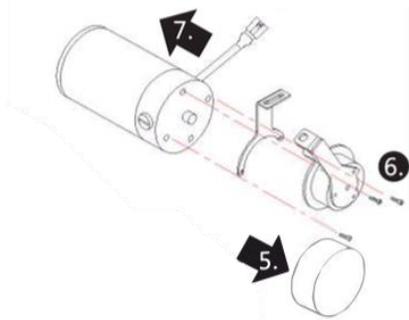
8-2 Electromagnetic brake maintenance:

Cross screwdriver x 1pcs

1. Refer to 2-1 Battery power-off: The scooter is powered off.
2. Refer to 8-1 Motor maintenance: Remove the motor.
3. Press the gear lever down.
4. Pull the slot outward and the gear lever and spring can be taken out.



5. Remove the electromagnetic brake protection shroud.
6. Remove the electromagnetic brake screws ($\varnothing 3 \times 15L \times 3$ pcs).
7. Take out the electromagnetic brake.



Please refer back in reverse for reassembly and replacement.

⚠ Caution:

When reassembling the electromagnetic brake, please pay attention to the position of the gear lever.

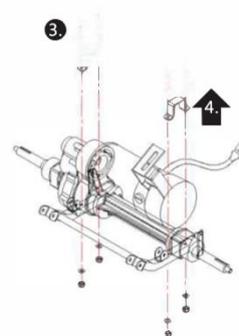
Electromagnetic brakes shall be cleaned regularly. After removing the electromagnetic brake, remove the three hexagon socket screws (pictured as below) on the electromagnetic brake. After removing the brake pad, clean the brake pad with a brush (do not mix with detergent, just clean it with a dry brush).



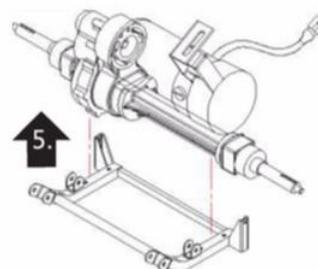
8-3 Differential mechanism maintenance:

Hex wrench 13 x 2pcs

1. Refer to 2-1 Battery power-off: The scooter is powered off.
2. Refer to 6-4 Main controller maintenance: Unplug the motor power line.
3. Remove the motor mount screws (M8 x 45L x 4pcs) on both sides.
4. The motor holder on both sides can be removed.



5. The entire set of differential mechanism can be removed.



Please refer back in reverse for reassembly and replacement.

 **Caution:**

The differential mechanism has a certain weight, so it is recommended to operate it by two or more people during maintenance.



8-4 Rear shock absorber maintenance:

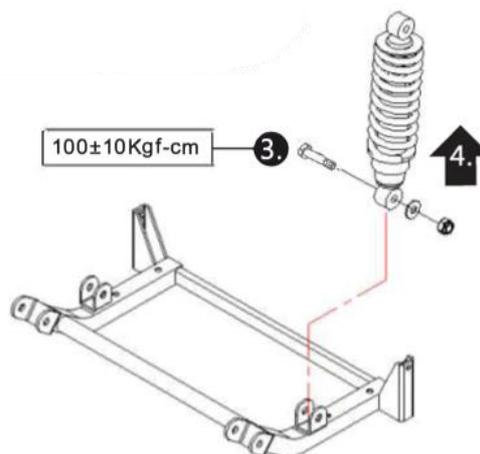
Hex wrench 17 x 2pcs

1. Refer to 2-1 Battery power-off: The scooter is powered off.
2. Remove the rear shock absorber upper fixing screw set (M10 x 67L x 1pcs).



3. Remove the rear shock absorber lower fixing screw set (M10 x 45L x 1pcs).

4. The entire rear shock absorber set can be taken out.



The left/right rear shock absorber can be disassembled in the same way.

Please refer back in reverse for reassembly and replacement.

 **Caution:**

The vibration of the vehicle is mainly absorbed by the shock absorber. If the vibration is too large, it may be related to the shock absorber.

The shock absorber may set off abnormal sound during running. This is mainly due to the collision of the shock absorber with the plate spring, the frame or the shaft, the damage or falling of the rubber pad and the deformation of the shock absorber dust cylinder. Please replace it with new one.

When steering, the incline of the vehicle should be obviously increased, and even causing sideslip. This is mainly because the damping force of the shock absorber is too small to effectively suppress the compression of the spring. Please replace it with new one.

When reassembling the shock absorber spring, the one with the larger number of turns is facing upwards, and the one with the smaller number of turns is facing downward.

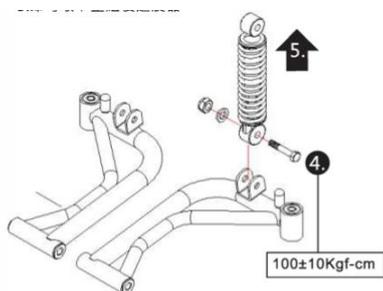
8-5 Front shock absorber maintenance:

Hex wrench 17 x 2pcs

1. Refer to 2-1 Battery power-off: The scooter is powered off.
2. Refer to 5-3 Front shroud upper cover maintenance: Remove the upper shroud.
3. Remove the front shock absorber upper fixing screw set (M10 x 67L x 1pcs).



4. Remove the front shock absorber lower fixing screw set (M10 x 45L x 1pcs).
5. The entire front shock absorber set can be taken out.



The left/right front shock absorber can be disassembled in the same way.

Please refer back in reverse for reassembly and replacement.

⚠ Caution:

The vibration of the vehicle is mainly absorbed by the shock absorber. If the vibration is too large, it may be related to the shock absorber.

The shock absorber may set off abnormal sound during running. This is mainly due to the collision of the shock absorber with the leaf spring, the frame or the shaft, the damage or falling of the rubber pad and the deformation of the shock absorber dust cylinder. Please replace it with new one.

When steering, the incline of the vehicle shroud is obviously increased, and even cause sideslip. This is mainly because the damping force of the shock absorber is too small to effectively suppress the compression of the spring. Please replace it with new one.

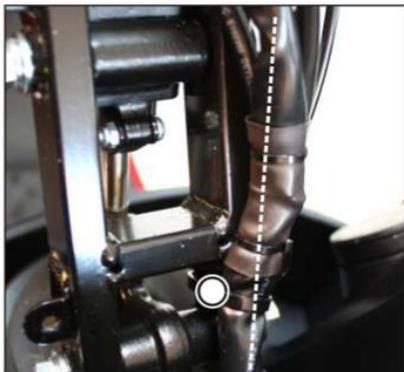
When reassembling the shock absorber spring, the one with the larger number of turns is facing upwards, and the one with the smaller number of the turn is facing downward.

8-6 Main cable maintenance:

Scissors x 1pcs

1. Refer to 2-1 Battery power-off: The scooter is powered off.
2. Refer to:
 - 2-2 Battery removal: Remove the battery connector.
 - 3-4 Panel wiring instruction: Remove the panel wiring.
 - 3-6 Steering lever shroud maintenance: Remove the shroud.
 - 4-1 Front slanting maintenance: Remove the internal connector.
 - 5-3 Front shroud upper cover maintenance: Remove the upper shroud.
 - 6-4 Main controller maintenance: Remove all connectors.
 - 7-7 Rear shrouds group maintenance: Remove the tail-light connector.

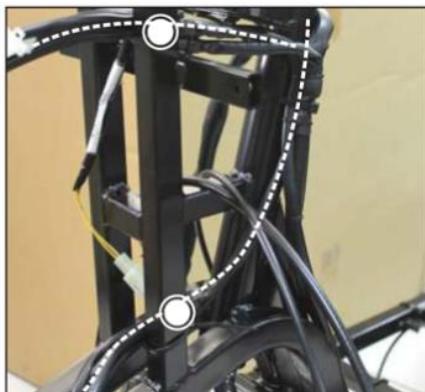
3. The main line goes to the front of the steering lever. Cut the upper strap (x 1pcs).



4. The trace extends to the lower center bar bead-bowl nut. Cut the upper band (x 1pcs).



5. Find the relevant connector on the front of the frame. Cut the straps (2 pcs).
Upper strap fastening: power connector / charging base connector.
Lower strap fastening: headlight / steering light connector.



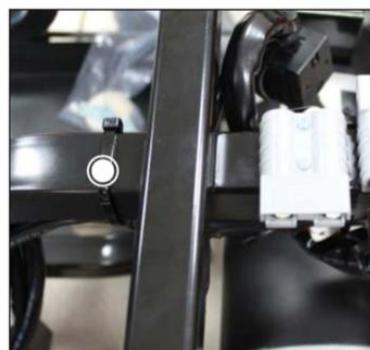
6. Cut the main trace strap on the left side of the front frame (x 2pcs).



7. The main line passes through the groove at the bottom of the frame. Please directly pull it away from the groove.



8. The main line extends to the top of the rear frame and cuts the strap (x 1pcs).



The entire brake cable can be pulled out.

Please refer back in reverse for reassembly and replacement.

 **Caution:**

The cable tie must be neither too loose nor too tight.

All wire set bends should not be less than 90°.

The connectors of each part must be tightly connected and must not be loose.

Step 6. Do not interfere with the micro switch when arranging the line.



Step 6. For the two fixing straps, one for fixing the brake cable and the speedometer wiring (loosen and fix), and the other for fixing the main line (loosen and fix).



If the electric equipment of the scooter is abnormal, please check or replace it first:

Corresponding electrical connectors and equipment.

Upper control panel connector and equipment.

Main controller connector and equipment.

If there is no abnormality, check the main line and replace it with new one.

When the main line is reassembled or replaced, be sure to retie the cut-open fixing straps as described above. Fix it without tightening too tightly.

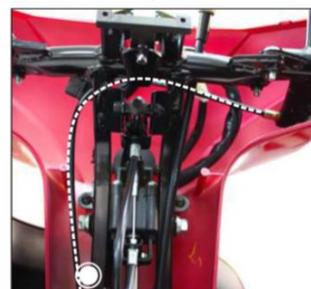
The brake cable trace is in the right side of the scooter, the left side is the main line, and the main line must be fixed on the left side of the frame to avoid interference.

8-7 Brake cable maintenance:

Scissors x 1pcs

Hex wrench 10 x 1pcs

1. Refer to 2-1 Battery power-off: The scooter is powered off.
2. Refer to:
 - 2-2 Battery removal: Remove the battery connector.
 - 3-4 Panel wiring instruction: Remove the panel wiring.
 - 3-6 Steering lever shroud maintenance: Remove the shroud.
 - 4-1 Front slanting maintenance: Remove the internal connector.
 - 5-3 Front shroud upper cover maintenance: Remove the upper shroud.
 - 6-4 Main controller maintenance: Remove all connectors.
 - 7-6 Brake handle maintenance: Remove the brake handle.
 - 7-7 Rear shrouds group maintenance: Remove the tail light connector.
3. Starting from the head, the brake cable goes to the left of the steering lever. Cut the upper fixed strap (x 1pcs).

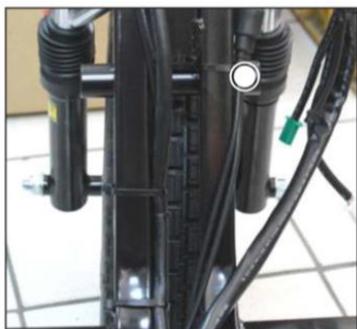


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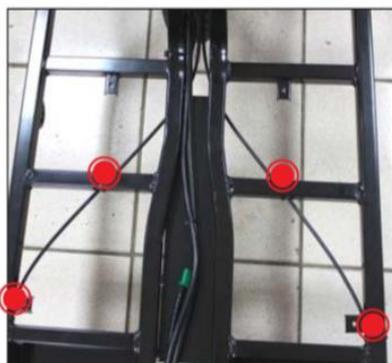
- The trace extends to the right side of the lower center bar bead-bowl nut. Cut the upper fixed strap (x 1pcs).



- The trace extends to the right side of the lower front frame. Cut the upper fixed strap (x 1pcs).

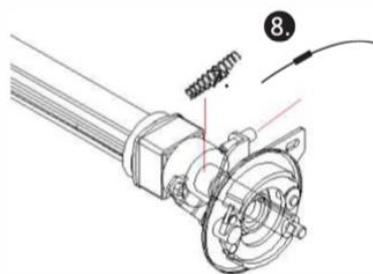


- The brake trace goes separately from the sides of the frame to connect the left/right rear wheel brake disks. Cut the upper fixed strap (x 4pcs).



- Loosen the left/right brake adjustment screws.

- Pull out the left/right brake cable and the spring.



The entire brake cable can be taken out.

Please refer back in reverse for reassembly and replacement.

⚠ Caution:

If the scooter's manual brake fails, please check the brake disk first. If there is no abnormality, check or replace the brake cable.

When the brake cable is reassembled or replaced, be sure to retie the cut-open fixing straps as described above. Fix it without tightening too tightly.

Please let the brake line go in the right side of the scooter, the left side is for the main line, and the brake cable must be fixed on the right side of the frame to avoid interference.

9 CHECK FOR TROUBLESHOOTING

Checking point	Check content	Processing method
Gear lever	Is the gear adjustment abnormal?	8-2 Electromagnetic brake maintenance
Buzzer	Does it set off a sound when working?	3-3 Control panel maintenance
Battery indicator	Will the battery indicator light be on?	3-3 Control panel maintenance
	Is low power alarm displayed or not?	2-5 Charging operation instruction
Rear mirror	Is there a situation of defacement?	Please clean and wipe.
	Is it loose?	Please lock and adjust.
Starter lever	Does it move forward/backward normally?	3-5 Maintenance of the VR initiator controller
	Is the electromagnetic brake normal?	8-2 Electromagnetic brake maintenance
Headlight	Is the warning light/brake normal?	4-6 Headlight maintenance
	Is the headlight/turning light normal?	4-7 Turn light maintenance 7-8 Tail light maintenance
Speed adjustment button	Is the function normal?	3-3 Control panel maintenance
Armrest	Will it shake?	Please fix the fixing screws.
Tire	Is there any air leakage /cracking/yellowing/foreign material penetration?	7-1 Front wheel maintenance 7-3 Rear wheel maintenance
	Is the wheel pattern depth (0.5 mm) sufficient?	
	Is the front/rear wheel shaking when it is rotated?	
Motor	Is there any abnormality/uneven sound during operation?	8-1 Motor maintenance
Charger	Check if the charging operation is normal	2-5 Charging operation instruction
Seat board	Is the whole function smooth and fixed?	6-1 Seat board maintenance
Electric equipment	Did the battery terminal fall off?	2-4 Battery connection cable disassembly
	Is the battery line off or damaged?	2-4 Battery connection cable maintenance

10 INDICATOR LIGHT TROUBLESHOOTING

Number of flashes	Possible reasons	Processing method
1	The battery needs to be charged urgently	Please charge or check the battery as soon as possible.
2	Insufficient battery electric quantity	Please charge as soon as possible or check if the battery related wiring is normal.
3	Battery over voltage	Please check the battery condition after power off.
4	Current or load exceeds the limit of the vehicle	Please lower the climbing angle or reduce the load.
5	The gearshift lever is not set to the D gear	After entering the D gear, restart it.
6	Starter lever is not centered	Release the start lever to restart. If it is invalid, refer to the start lever maintenance.
7	Starter lever or related cable failure	Refer to the panel maintenance. If it is invalid after the connector is reconnected, replace it with a new one.
8	Motor or related cable failure	Refer to the motor maintenance. If it is invalid after the connector is reconnected, replace it with a new one.
9	Controller failure or over temperature	Refer to the controller maintenance, replace with a new controller if it is invalid after the connector is reconnected. Stop the scooter for 10-15 minutes to let the controller cool down.

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