unu repair manual

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Version	1.3	November 2016

Reference:

Documentation of changes

- Version numbers smaller than "Version 1.0" are reserved for drafts.
- Integer counting of the version number occurs when major changes are done, such as the addition of new chapters.
- The number counting after the decimal point is intended for the improvement of errors.
- Corrections of spelling mistakes do not need an update for the version number and can be executed continuously.

Below are the relevant changes listed for each version

From Version 1.2 - September 2016:

- Change the indications for screw sizes from "XXer combination wrench" to "XXmm hex bolt".
- Adaptation of several work descriptions to reflect the latest state of the fastest repair.
- Indication of the duration of each work step and the preparatory work.
- Extension adding sub-chapters for symmetrical components, where previously only one side was mentioned and described.

From Version 1.3 - November 2016

- Corrections and an extended listing of necessary tightening torques, previous versions listed the torques of a similar scooter with internal combustion engine.
- The duration of the work steps listed at the end are deliberately coloured as they are no longer valid. The correct duration is listed in the description of each work step.
- Part numbers (Stock Keeping Units, SKU) are listed at the respective section titles, to guide ordering the necessary spare parts

Update 180319

- Split up chapter for motor exchange (2.4.5.4) into two chapters for removing the motor from the swingarm and taking off the cables from the ECU.

General References

- The description in the repair guide is limited to the dismantling, the assembly is in most cases the reverse order and is not explicitly described. Any distinctions of the assembly are indicated either at the respective work step or in the notes.
- The chapters of the repair manual do not specifically refer to the removal of the cable ties as the amount and positioning of these may differ. When assembling, respect the correct number and positioning of the cable ties.
- If screws are to be screwed into existing threads in plastic parts, make sure that the screw is screwed into the existing thread and does not cut any new threads. This is done by turning the screw counterclockwise until the screw slides into the existing thread.
- This document is intended exclusively for internal use and requires the knowledge of professional training, professional experience from a period of professional activity as well as a reliable understanding of the safety issues. The current state of the activities to be carried out and the possible hazards have to be considered. Under no circumstances can any possible danger regarding reparational work, maintenance work or the omission of maintenance work be covered.
- Original or equivalent parts should be used as replacement parts
- Any waste or used should parts be properly disposed of in accordance with local laws and regulations or environmental reasons.
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- No liability for inaccuracies or omissions in these documents can be accepted, even if all conceivable diligience has been exercised to ensure completeness and accuracy.
- All rights to alterations without prior notice at any time are reserved. Unu GmbH is not responsible to make such alterations to products already manufactured.
- All information in these documents is based on the current product information at the time of writing.
- Illustrations and photographs in these documents are for reference only and do not necessarily represent all details of the current models.

Safety Instructions

- There is the risk of an electric shock during direct and indirect contact with charged parts. For this reason, the battery must be disconnected and all charged parts must be cleared of their voltage.

- The output voltage of the battery has a maximum of 57.4V, so that the formation for work on high-voltage system is not necessary.

- Please read these instructions and follow the instructions carefully. To highlight important information, the following symbols and keywords are used: Danger, Warning, Attention and Info. These keywords contain important information, and deserve special attention.

-  Danger

  Dangerous situation, that will certainly result in a serious injury or death if not avoided.

-  Warning

  Dangerous situation, that can result in a serious injury or death if not avoided.

-  Attention

  Dangerous situation, that can result in a mild to moderate injury if not avoided.

-  Info

  Marks information that does not concern any personal injury, e.g. indications of property damage.

2 Repair Instructions

The layout of this repair plan runs from *the outside of the unu* to *the inside of the unu*, from *easy to expand* to *more complex* and from the mechanical part to the electrical part. The individual components of the unu are structured from *at the front of the unu* to *at the rear of the unu* and from *at the top of the unu* to *at the bottom of the unu*.

2.1 Simple Attachment Parts

2.1.1 Mirror (SP-UNU14-190)

Duration:

- Disassembly: 2 minutes
- Assembly: 2 minutes

Preparatory work:

- none

Working steps:

- The mirror on the left and the right both have right turning threads. Screw the mirror threads in as far as possible, then position the mirrors as desired and fix them by tightening the nut (14mm hex).

2.1.2 Front wheel (SP-UNU14-169)

Duration:

- Disassembly: 4 minutes
- Assembly: 6 minutes

Preparatory work:

- none

Working steps:

- Fix the front axe [1] on one side [12mm hex].

- Fix the opposite side [1] with a 14mm hex bolt and unscrew in opposite directions. Pull the axis out and remove the front wheel. Please beware that the speedometer [2] and spacer bushing [3] are not screwed in and that the brake disk can be threaded out of the brake calipher without great resistance.

- When assembling, make sure that the slot on the speedometer gear is located on the latch on the front fork .

2.1.3 Battery container (SP-UNU14-138)

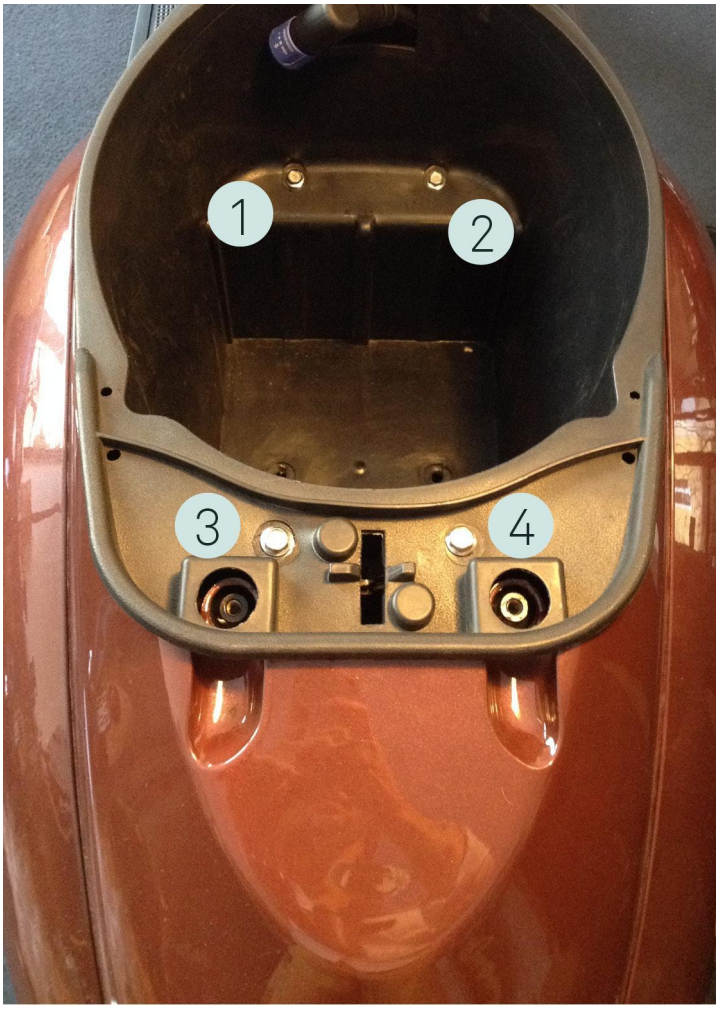
Duration:

- Disassembly: 2 minutes
- Assembly: 2 minutes

Preparatory work:

- none

Working steps:



- Unscrew the four screws [1][2][3][4] (10mm Sechskant) and lift the battery container upwards together with the seat. The luggage rack, already dismantled in this picture, can remain on the vehicle for the removal of the battery holder.

2.1.4 Adjusting the seat (SP-UNU14-120)

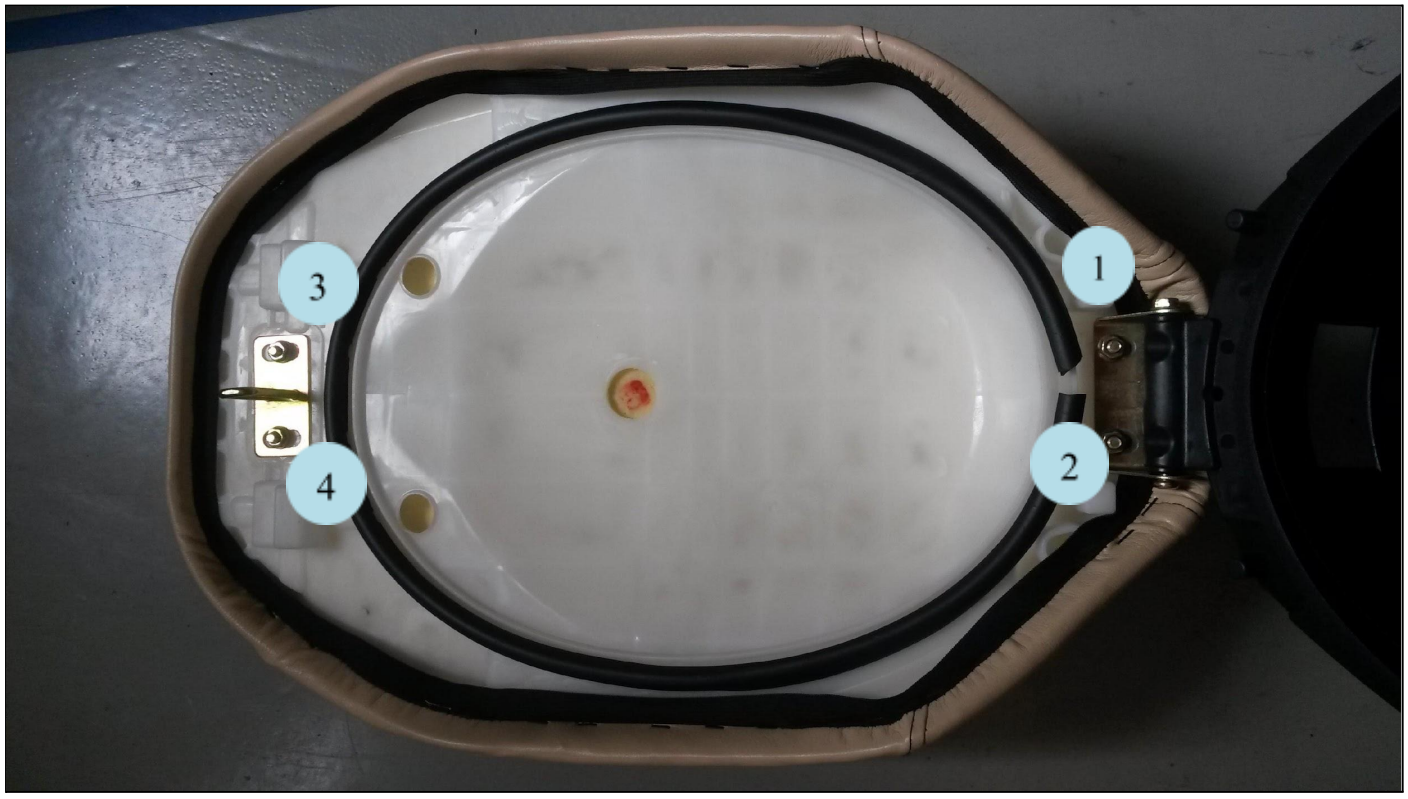
Duration:

- The complete adjustment: 3 minutes

Preparatory work:

- none

Working steps:
When closing the seat slowly, observe if the seat handle automatically falls in the lock. In the case of a deviation to the left / right, the adjustment is made by the screws [1], [2]. In the case of a deviation to the front / rear, the adjustment is made by the screws [3], [4].



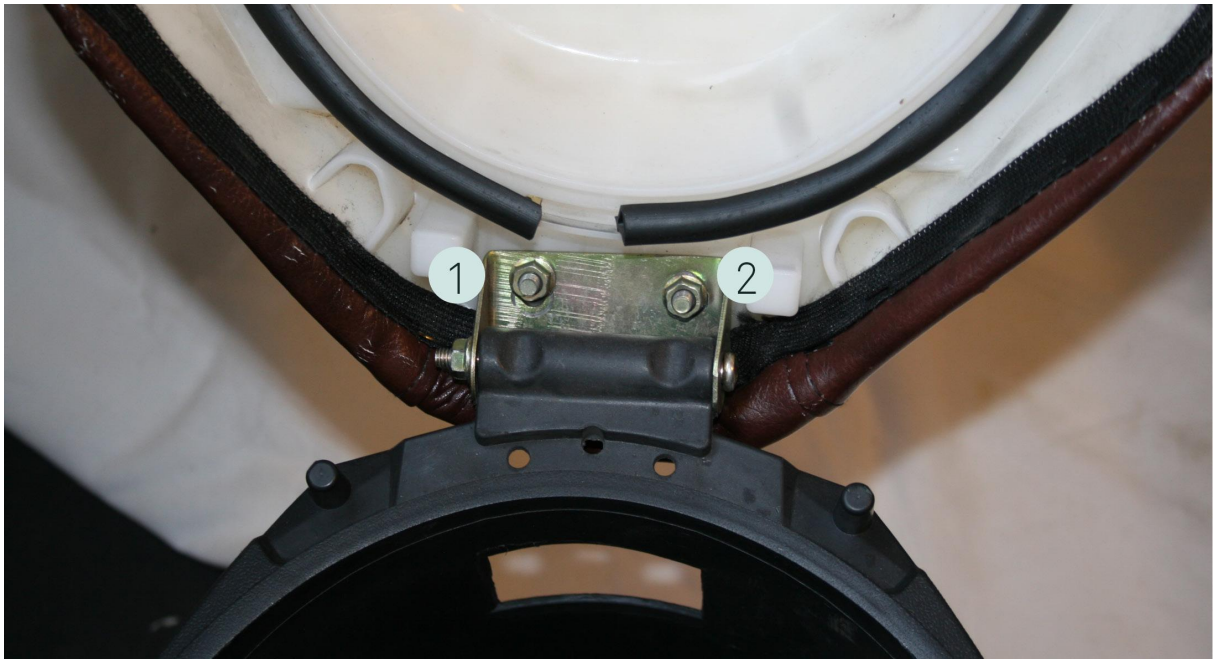
2.1.5 Separate the seat from the battery container (SP-UNU14-120)

Duration:

- Disassembly: 2 minutes
- Assembly: 4 minutes (including the adjustment as in 2.1.4)

Preparatory work:

- none



Working steps:

- Remove the 2 bolt nuts [1][2] (10mm hex bolt) and reattach to new seat
- A new seat is often supplied with a new hinge, but the hinge usually does not have to be replaced.

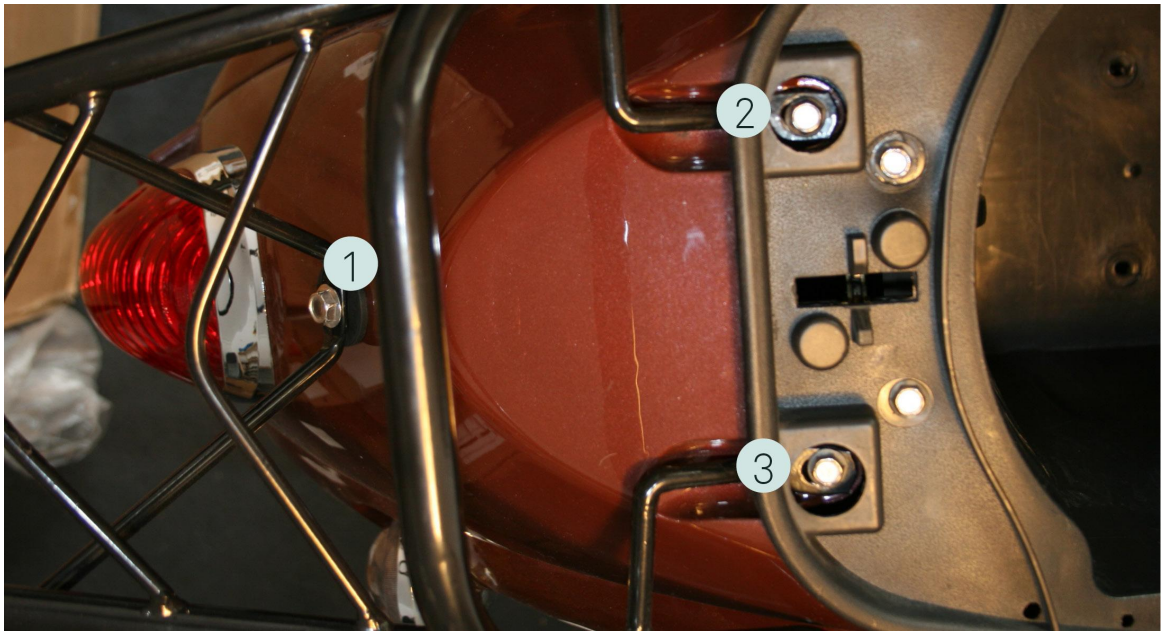
2.1.6 Luggage rack (SP-UNU14-148)

Duration:
- Disassembly: 3 minutes
- Assembly: 3 minutes

Preparatory work:
- none

Working steps:

- Loosen the 3 screws [1] [2] [3] (12mm hex bolt) and pull the luggage rack backwards


1
2
3

2.2 Painted trim parts

For all screws, make sure that the threads and screw crosses are not overturned and thus possibly damaged. Almost all screws are opened counterclockwise. Please follow the correct sequence of preparatory work.

2.2.1 Front light cover (SP-UNU14-101)

Duration:

- Disassembly: 3 minutes
- Assembly: 3 minutes

Preparatory work:

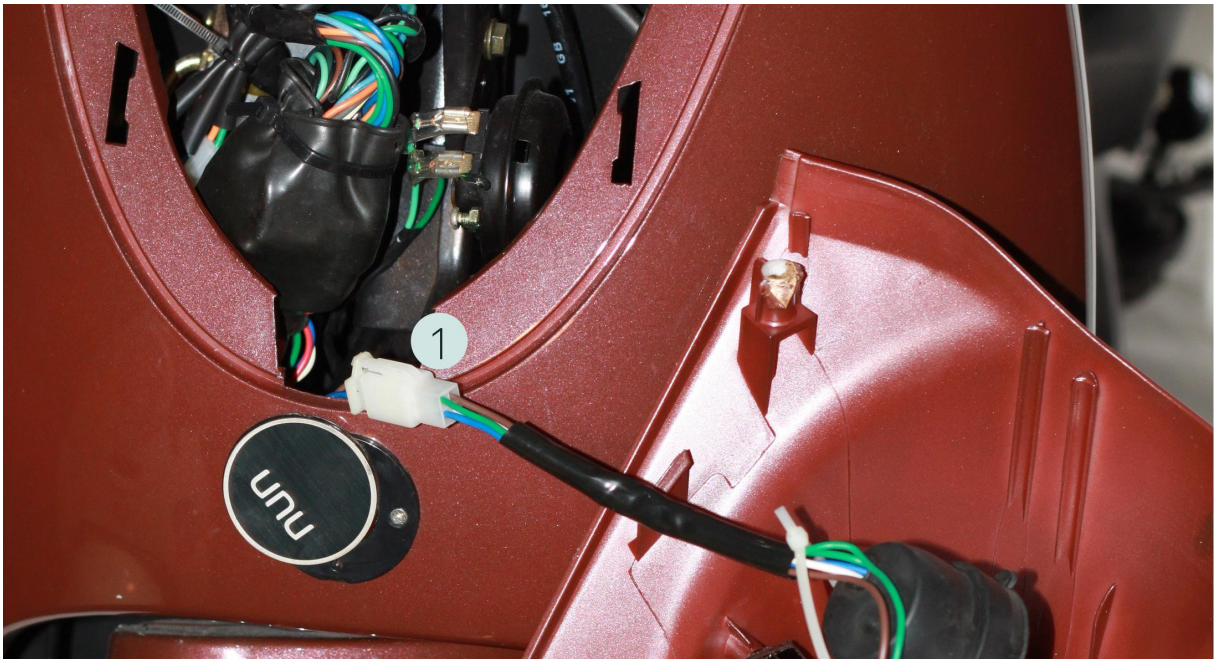
- none

Working steps:

- Slightly lift the unu-logo [1] und rotate upwards
- Unscrew [2] with a 10mm hex bolt. Afterwards, turn the unu-logo back in ist original position

- Unscrew the top cross screws [1] [2] on the front panel back

- Press one hand for stabilization slightly against the front shield [1]. Use the other hand [2] to pull the top edge of the front light cover to release the clicking connections. The connections dissolve with a clearly audible click. (Do not tear too fast! The front light is connected with a cable!)



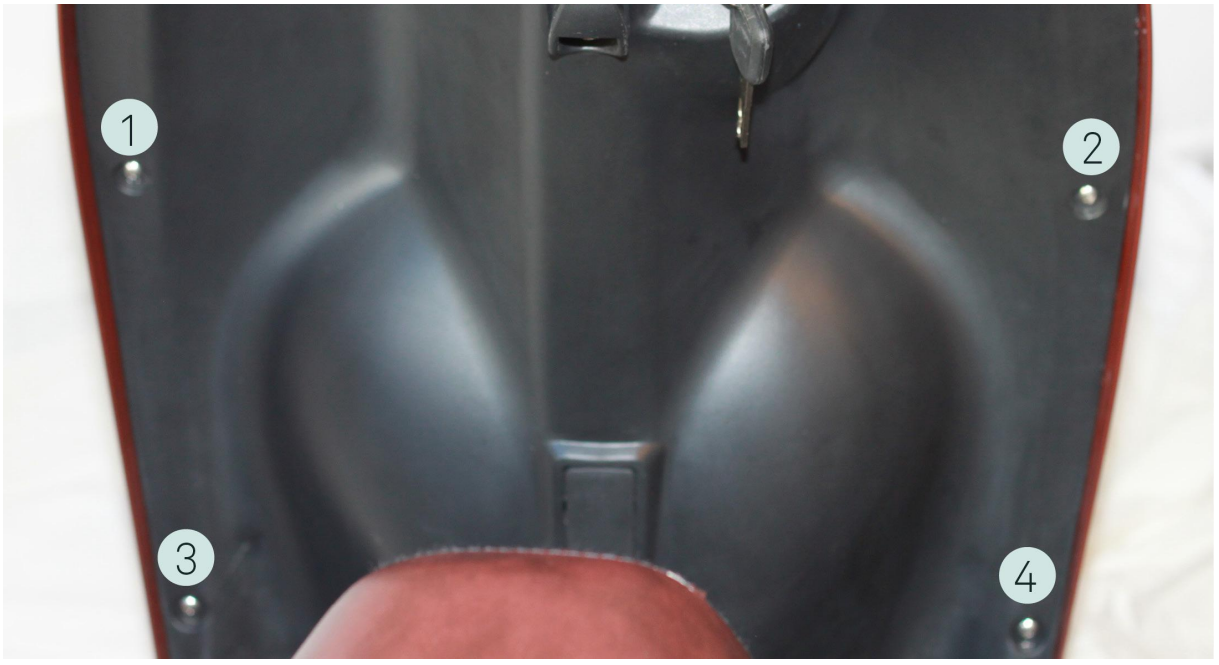
- Disconnect the front light connector [1] from the cable harness

2.2.2 Front panel (SP-UNU14-104)

Duration:
- Disassembly: 3 minutes
- Assembly: 3 minutes

Preparatory work:
- 2.2.1 Front light cover

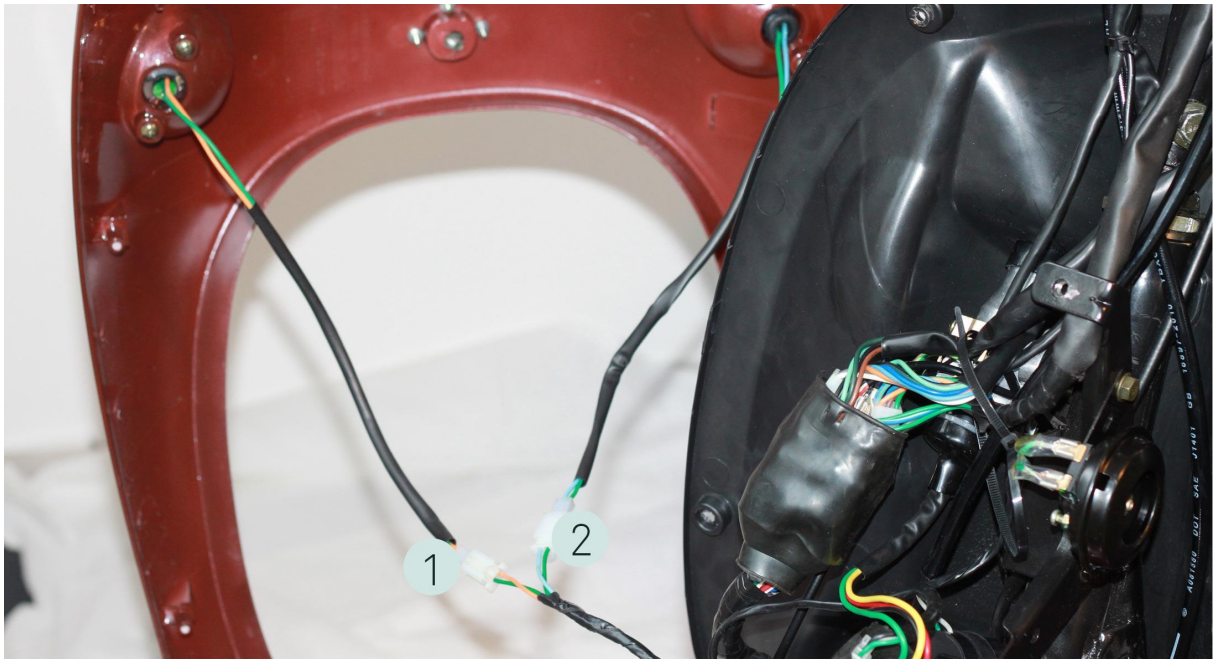
Working steps:



- Unscrew the four cross-head screws [1] [2] [3] [4]

• Unscrew the cross-head screws [1] [2] on both sides, the picture above shows the left side (analogue on the right side)

• Unscrew [1] with a 10mm hex bolt. (Do not allow it to slide off, it can be difficult to reach when the screw falls into the lower area of the cabling)



• Disconnect both connectors [1] [2] (left turn signal: orange / green and right turn signal: turquoise / green) from the cable harness.

2.2.3 Front wheel - front cover (SP-UNU14-102)

Duration:

- Disassembly: 6 minutes
- Assembly: 6 minutes

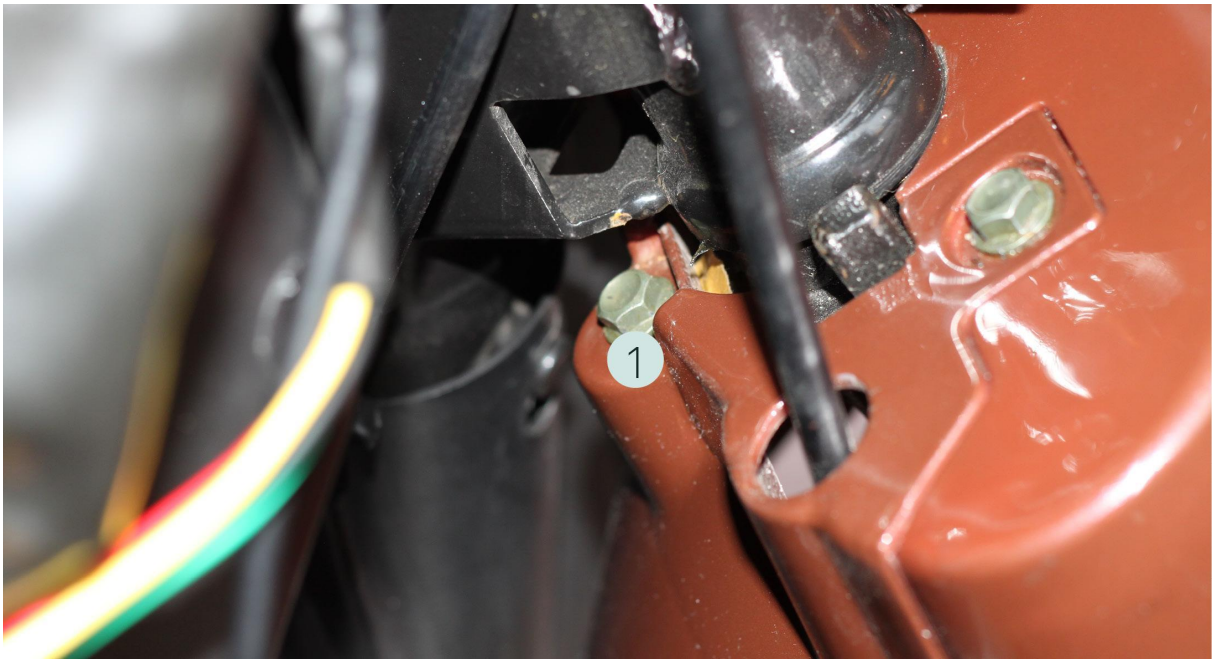
Preparatory work:

- 2.2.1 Front light cover
- 2.2.2 Front panel

Working steps:

- Unscrew the cross-head screws left [1] and right [2] from below.

- Unscrew [1] and [2] with a 10 mm hex bolt



- When only replacing the front part of the cover, loosen the screw [1] (10mm hex bolt) on the rear part of the mudguard several times until the front part can be removed.
  Attention: The screw can be difficult to access, but can be reached with a narrow ratchet attachment or a spring extension.

- If also the rear part of the cover should be removed, refer to 2.2.3.2:
  Unscrew [1] (10mm hex bolt) on the rear part of the mudguard. To remove the rear part, the speedometer cable and front brake hose must be threaded out . Caution: The back part must be slightly bent when removing it, but be careful not to break it.

2.2.3.1 Front wheel – rear cover (SP-UNU14-103)

Duration:
- Disassembly: 5 minutes
- Assembly: 5 minutes

Preparatory work:
- 2.2.1 Front light cover
- 2.2.2 Front panel
- 2.2.3 Front wheel - front cover

Working steps:

- Unscrew [1] (10mm hex bolt) on the rear part of the mudguard. To remove the rear part, the speedometer cable and front brake hose must be threaded out . Caution: The back part must be slightly bent when removing it, but be careful not to break it.

2.2.4 Steering cover (SP-UNU14-110)

Duration:
- Disassembly: 1.5 minute
- Assembly: 1.5 minute

Preparatory work:
- 2.1.1 Mirrors
- 2.4.2 Speedometer

Working steps:
- Unscrew (10mm hex bolt) on the steering cover. When reapplying, make sure that the cables and the brake hose are not pushed in by the edges of the cover. If necessary, firmly fix the cables and the brake hose with cable ties.

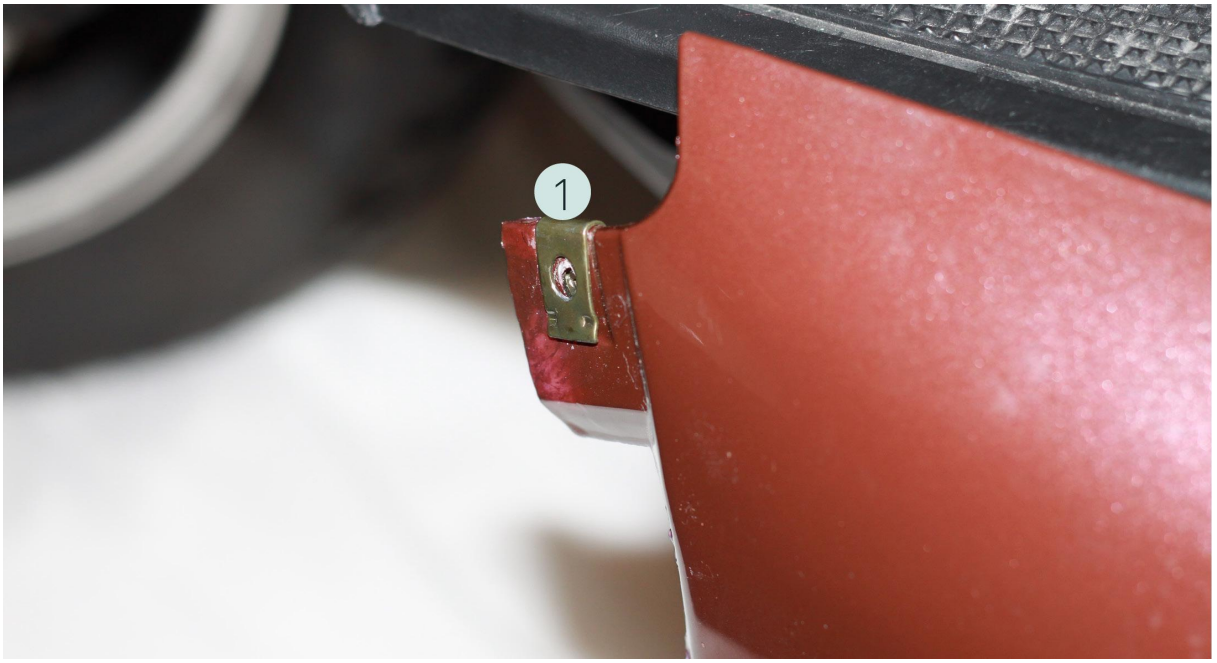
2.2.5 Left side panel (SP-UNU14-107)

Duration:
- Disassembly: 1 minute
- Assembly: 2 minutes

Preparatory work:
- none

Working steps:

- Unscrew the cross-head screws [1] and [2] and pull the left side panel ca. 2 cm in direction of the rear wheel (see arrow). Afterwards pull the whole panel sideways away from the unu.



- Make sure that the plug-in nut [1] is placed correctly for the assembly (with the arching inwards)

2.2.5.1 Right side panel (SP-UNU14-108)

All the steps are analog to the previous chapter: 2.2.5 Left side panel.

2.2.6 Complete rear panel section (SP-UNU14-105, 111, 112)

Duration:
- Disassembly: 7 minutes
- Assembly: 8 minutes

Preparatory work:
- 2.1.3 Battery container
- 2.1.5 Luggage rack

Working steps:

- Unscrew the cross-head screws [1],[2] and [3] on both sides and loosen the interconnected part at each screw by lifting the rear of the joint on the painted panel of the unpainted part.

- When assembling, pay attention to any small gap dimensions and position the tabs [1] and [2] carefully above the screw holes.

2.2.7 Rear left panel (SP-UNU14-111)

Duration:

- Disassembly:3 minutes

- Assembly: 3 minutes

Preparatory work:
- 2.1.3 Battery container
- 2.1.6 Luggage rack
- 2.2.6 Rear middle, left and right panel
- 2.3.4 Number plate rack
- 2.3.8 Foot plate rack

Working steps:

- Disconnect the rear left pannel from the middle panel by unscrewing the cross-head screws and desliding the mutual connections. Disconnect the two panels by taking out the cross-head screws and open the sliding connection on the upper edge.
- When assembling, make sure that all sliding connections are fitting correctly.

2.2.7.1 Rear right panel (SP-UNU14-111)

All the steps are analog to the previous chapter: 2.2.7 Rear left panel.

2.2.8 Rear middle panel (SP-UNU14-105)

Duration:
- Disassembly: 0 minutes
- Assembly: 0 minutes

Preparatory work:
- 2.1.3 Battery container
- 2.1.5 Luggage rack
- 2.2.6 Complete rear panel
- 2.3.4 Number plate rack
- 2.2.7 Rear left and right panel
- 2.5.7 Rear light

Working steps:

- When all preparatory work has been carried out, the side panel center part is removed.

2.2.9 Rear fork left cover (SP-UNU14-109)

Duration:
- Disassembly: 1 minute
- Assembly: 2 minutes

Preparatory work:
- None

Working steps:

- Unscrew [1] and [2] with a 10mm hex bolt and remove the cover

2.2.9.1 Rear fork right cover (SP-UNU14-108)

Duration:

- Disassembly: 1 minute
- Assembly: 2 minutes

Preparatory work:

- None

Analogue working steps to the rear fork left cover as described on 2.2.9.

2.3 Unpainted trim parts

2.3.1 Seater cask front cover (SP-UNU14-136)

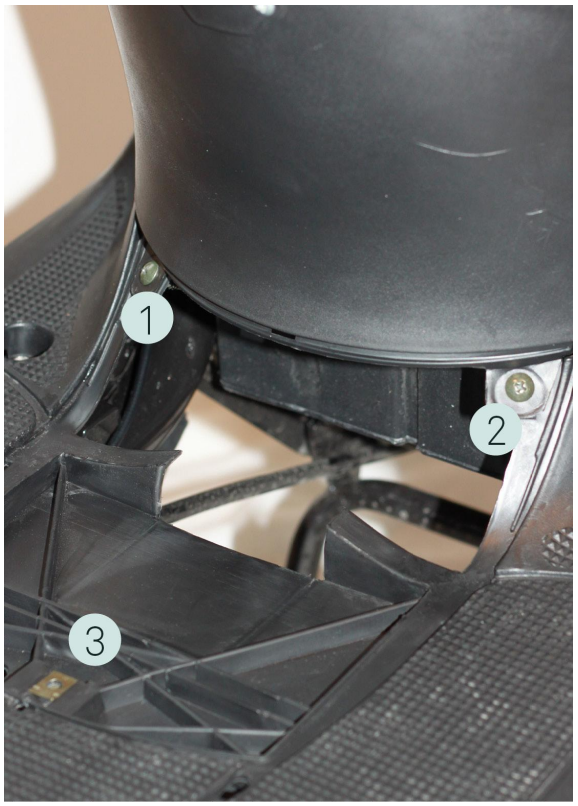
Duration:

- Disassembly: 3 minutes
- Assembly: 4 minutes

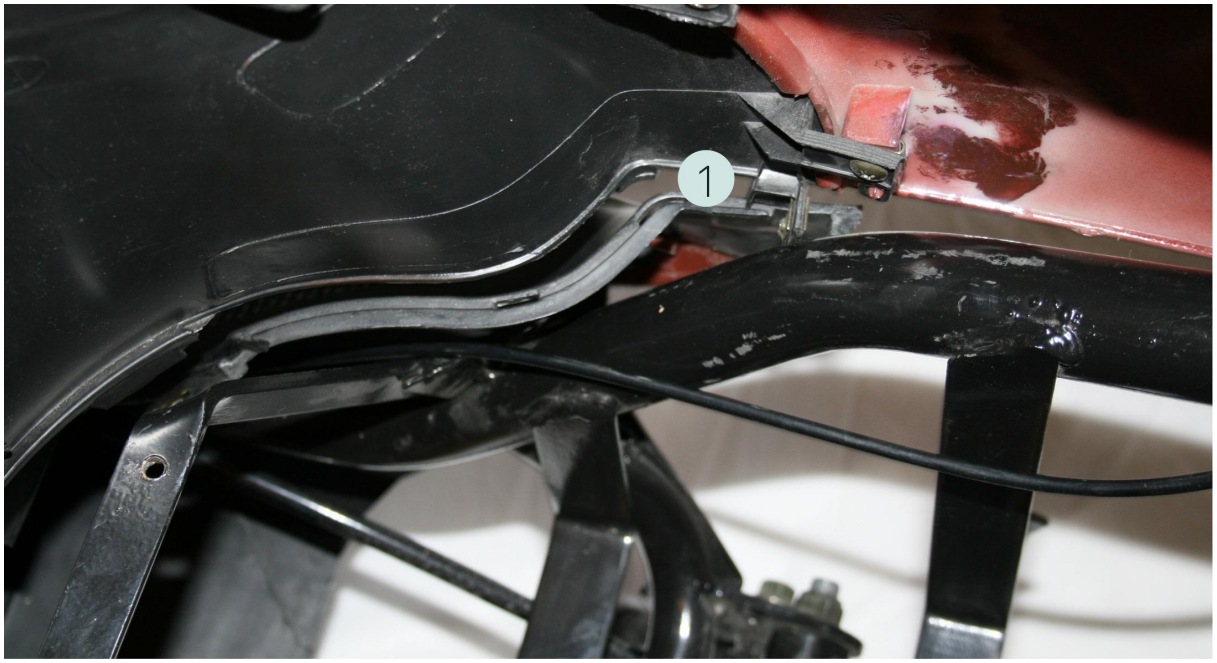
Preparatory work:

- 2.2.6 Complete rear panel
- 2.1.3 Battery container
- 2.1.5 Removing the seat
- 2.3.8 Foot plate cover

Working steps:



- Unscrew the cross-head screws [1] and [2] under the insert in the footboard



- Remove the cross-head screws [1] on both sides. (The painted parts should already be removed at this point.)
- Vor der Entnahme des Teils mit einem Schlitzschraubenzieher die Aufnahmepunkte der Haltenasen leicht dehnen. Achtung: Wird dieser Schritt missachtet können die Haltenasen abreißen
- To remove this part, use a slotted screwdriver to slightly expand the holding points of the retaining rings. Caution: If this step is not observed, the holding rings can break off.

2.3.2 Front storage cover (SP-UNU14-137)

Duration:

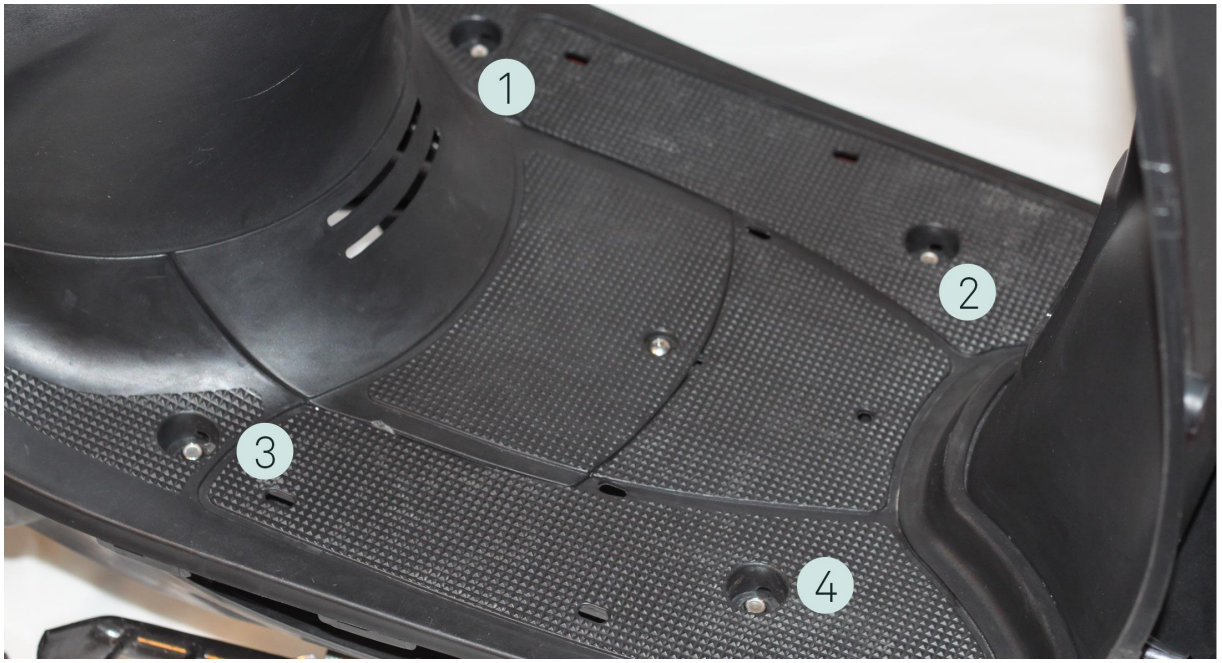
- Disassembly: 5 minutes
- Assembly: 5 minutes

Preparatory work:

- 2.2.1 Front light cover
- 2.2.2 Front panel
- 2.2.5 Left and right side panels
- 2.3.9 Hook

Working steps:

- Unscrew the cross-head screws [1] as depicted on the left and right side of the unu.



- Unscrew [2] and [4] with a 10mm hex bolt. (Screws [1] and [3] are removed in later parts)

- Bend the front panel backwards so that the foot plate can be lifted easily and the triple connection with the underbody can be disconnected.
- Push the front panel 2 cm away from the foot plate to release the connection

2.3.3 Foot plate (SP-UNU14-132)

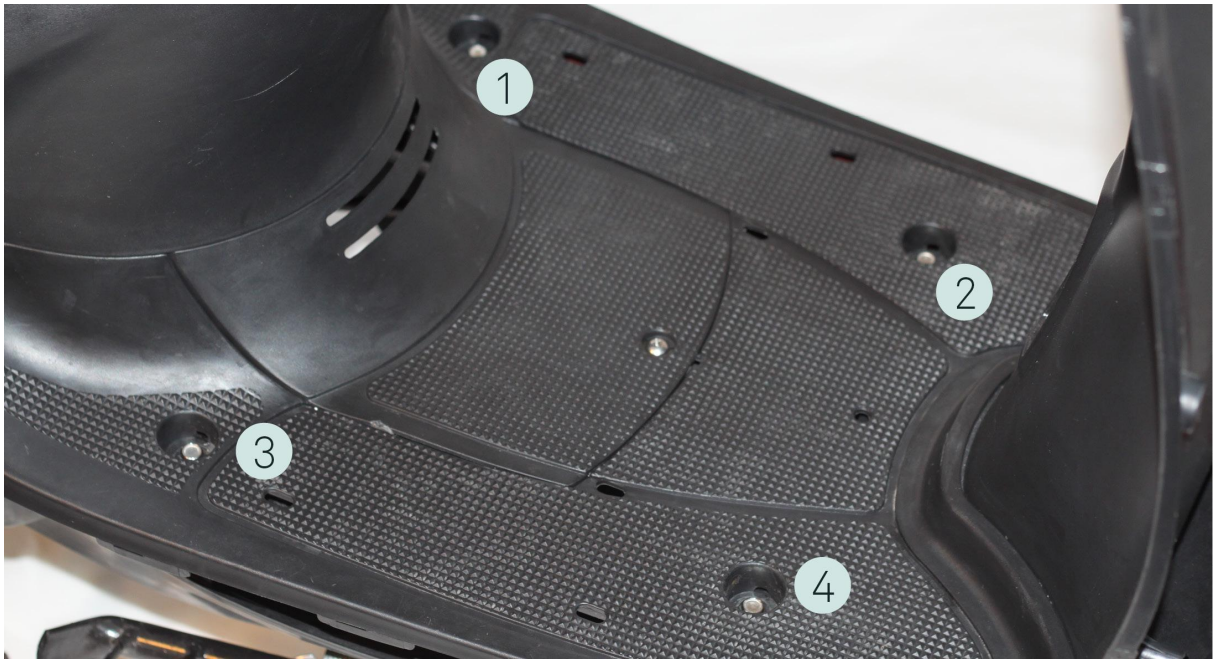
Duration

- Disassembly: 3 minutes
- Assembly: 5 minutes

Preparatory work:

- 2.1.3 Battery container
- 2.1.5 Luggage rack
- 2.2.1 Front light cover
- 2.2.2 Front panel
- 2.2.5 Left and right side panel
- 2.3.1 Seater cask front cover – together with the painted trim parts
- 2.3.2 Front storage cover

Working steps:



- Wenn die Vorarbeiten ausgeführt wurden, müssen noch die Schrauben [1][3] (10mm Sechskant) herausgedreht werden. Zudem verbinden an beiden Außenseiten je eine Kreuzschraube das Trittbrett mit der Unterbodenverkleidung.
- After the preparatory work has been carried out, unscrew [1] and [3] with a 10mm hex bolt. On both outer sides, a cross-headed screw connecting the footboard with the underfloor covering must be removed.

2.3.4 Number plate rack (SP-UNU14-144)

Duration

- Disassembly: 2 minutes
- Assembly: 2 minutes

Preparatory work:

- None

Working steps:

- Unscrew the 2 nuts with a 10mm hex bolt. They are accessible from below.

2.3.5 Rear fender (SP-UNU14-131)

Duration

- Disassembly: 3 minutes
- Assembly: 3 minutes

Preparatory work:

- 2.3.4 Number plate rack

Working steps:

- Unscrew the 4 cross-head screws from the inside. The picture depicts [1] and [2], the other screws can be found on the other side of the number plate rack.

2.3.6 Frame under cover (SP-UNU14-130)

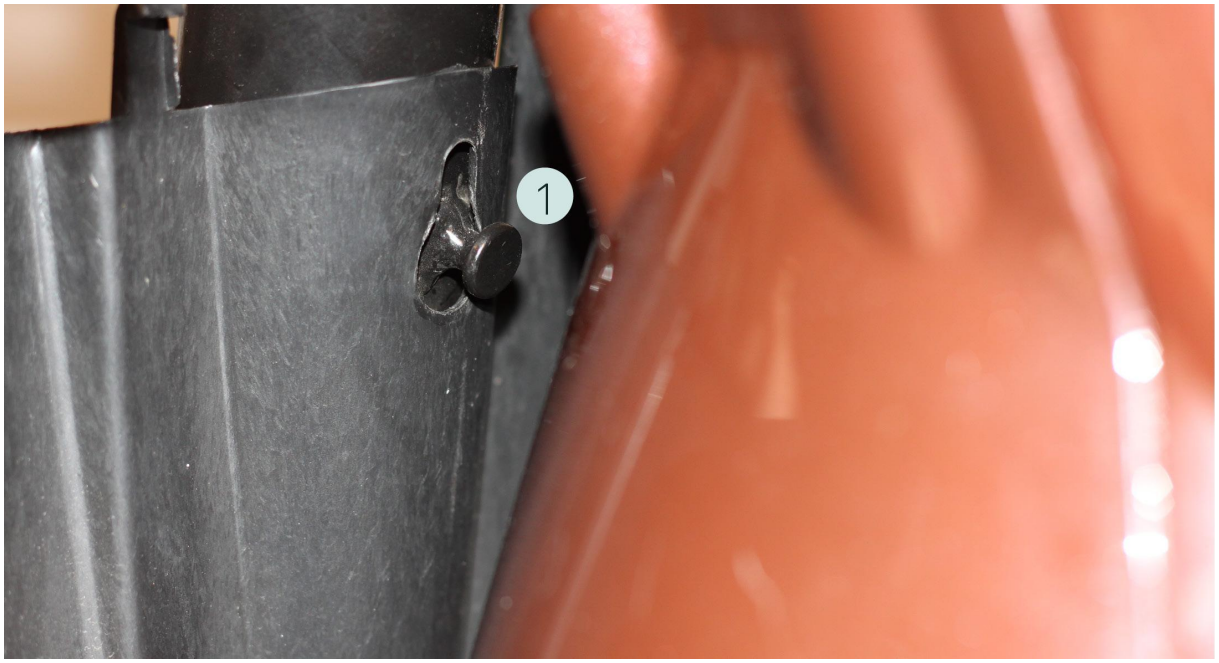
Duration

- Disassembly: 3 minutes
- Assembly: 3 minutes

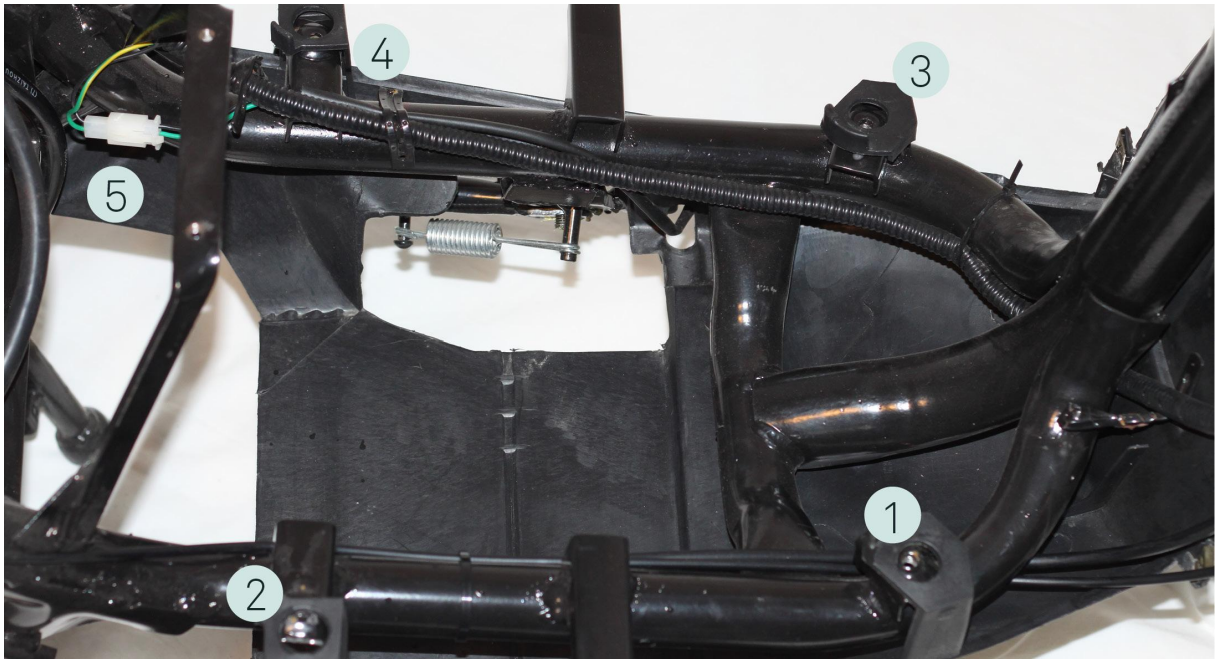
Preparatory work:

- 2.1.3 Battery container
- 2.1.5 Luggage rack
- 2.2.1 Front light cover
- 2.2.2 Front panel
- 2.2.5 Left and right side panel
- 2.2.6 Complete rear panel
- 2.6.8 Side stand switch

Working steps:



- Unhook the underpanel from the frame at the front wheel [1]



- Press the joint bars of the lower panel [1] [2] [3] [4] to the side and remove the underfloor cover.
  ([5] is the connector of the side stand switch, which should already have been plugged out during the preparatory work.)

2.3.7 Rear wheel cover (SP-UNU14-134)

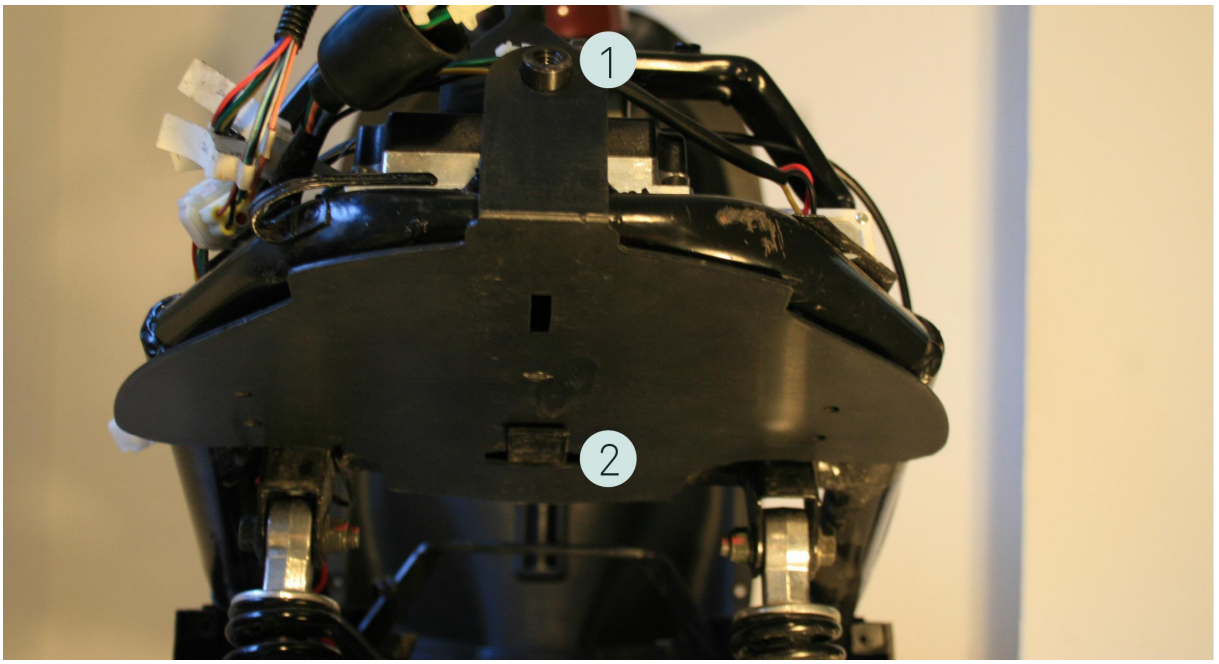
Duration

- Disassembly: 2 minutes
- Assembly: 2 minutes

Preparatory work:

- 2.1.3 Battery container
- 2.8.3 Luggage rack

Working steps:



- Unlike in the displayed picture, the dismantling of the rear panel is not necessary for this step, even if it is easier to do without the panel mounted on the unu. Instead of dismantling the complete panel, just removing of the luggage rack and slightly lifting the panel from the rear is recommended for the dismantling of the rear wheel cover.

- Unhook the rear wheel cover by pulling out the tab at [1] and [2].

- When reassembling, it is useful to let a second person control the positioning of the tab [1] while inserting the frame and the panel from below.

2.3.8 Foot plate cover (SP-UNU14-133)

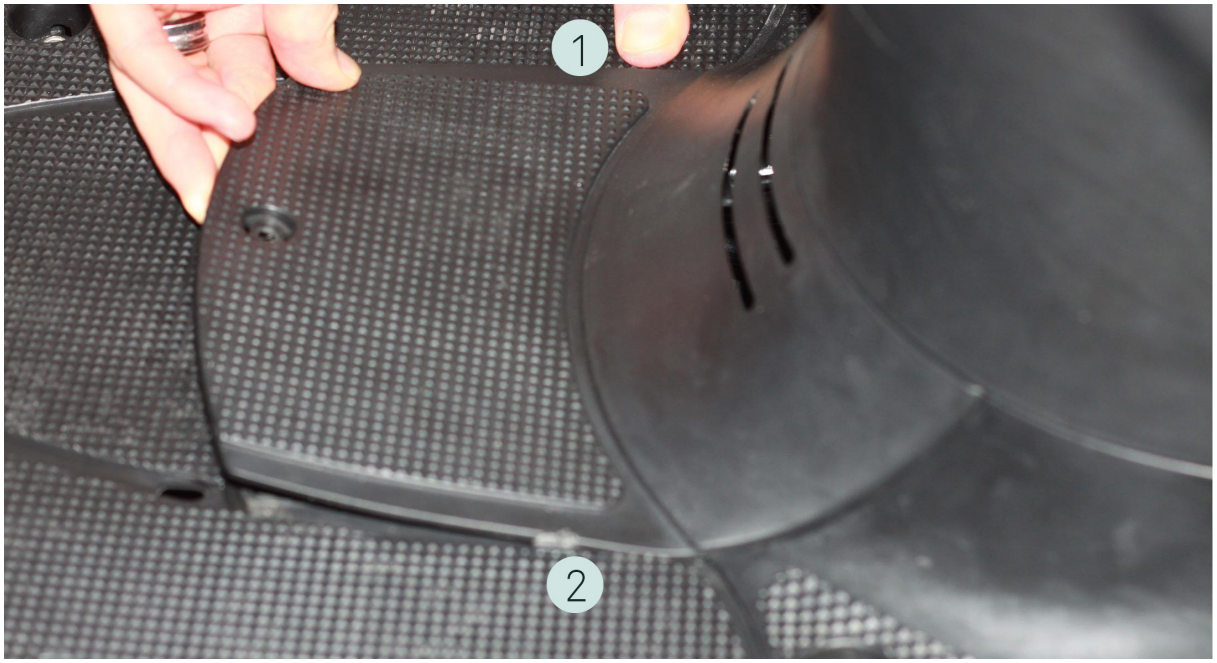
Duration

- Disassembly: 1 minute
- Assembly: 1 minute

Preparatory work:

- None

Working steps:



- Unscrew the small cross-headed screw in the middle and lift gently at the pressure points [1] and [2].
- When reassembling, replace the cover from the back to the front and make sure that the inserts do not get out of position, since the rear corners are difficult to be put back into position afterwards.

2.3.9 Hook (SP-UNU14-135)

Duration

- Disassembly: 1 minute
- Assembly: 1 minute

Preparatory work:

- None

Working steps:

- Unscrew the bolt using a 10mm hex.

2.4 Mechanics

This chapter concerns parts related to steering, suspension, brakes and speed indication

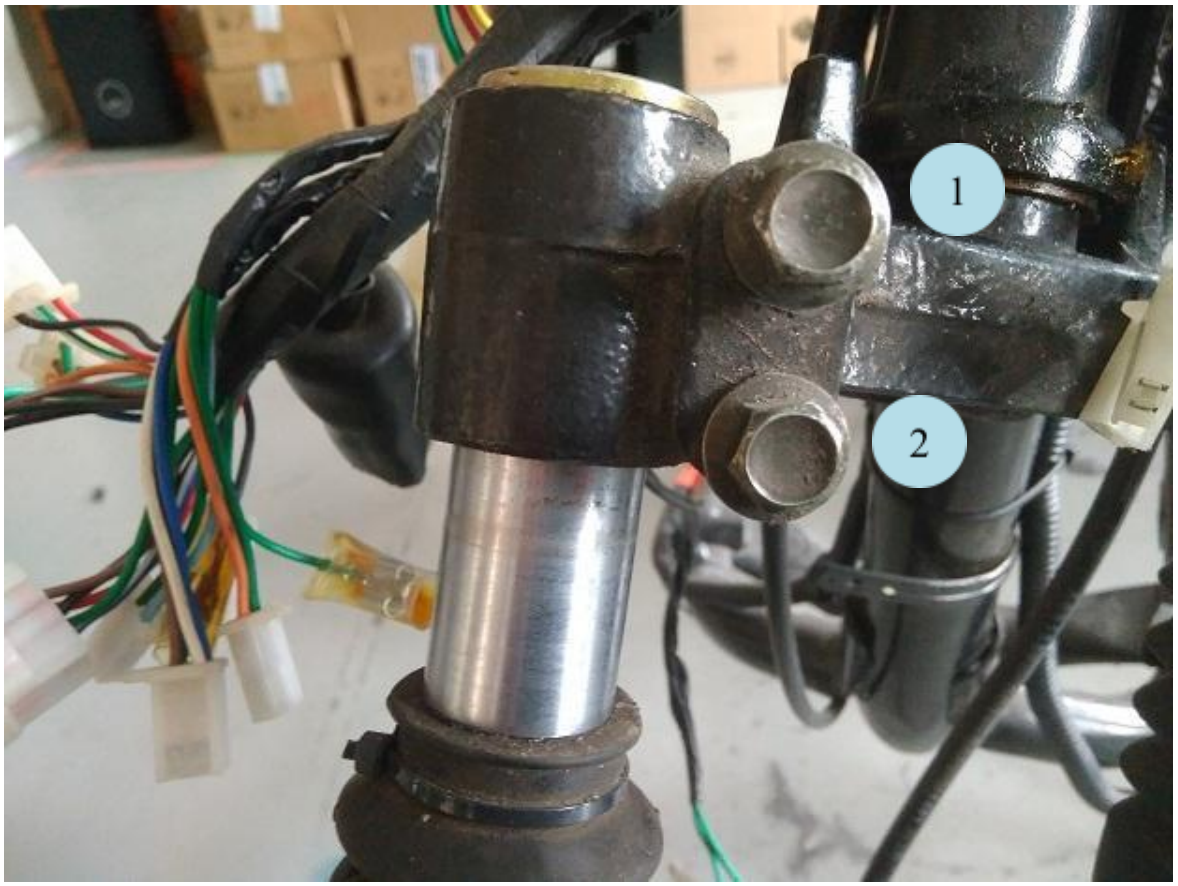
2.4.1 Front suspension set (SP-UNU14-145)

Duration
- Disassembly: 8 minutes
- Assembly: 10 minutes

Preparatory work:

- 2.2.1 Front light cover
- 2.2.2 Front panel
- 2.2.3 Front wheel – front cover
- 2.1.2 Front wheel
- 2.4.5.1 Front brake system (hydraulic)

Working steps:



- Unscrew [1] and [2] both 12mm hex bolt on both shock absorbers. Do not remove one screw before the other is loosened as well, unscrew both bolts gradually at the same time.

- Unscrew the cover screw (with 12mm hex bolt) and pull the suspension strut downwards out of the fork. Caution:The shock absorbers are filled with oil and might spill when they are tilted.
- Remove the screws of the hose (with 10mm hex bolt) on both shock absorbers.
- Attention during assembly: tighten both screws gradually until both screws have reached the prescribed tightening torque.

2.4.2 Speedometer (SP-UNU14-160)

Duration

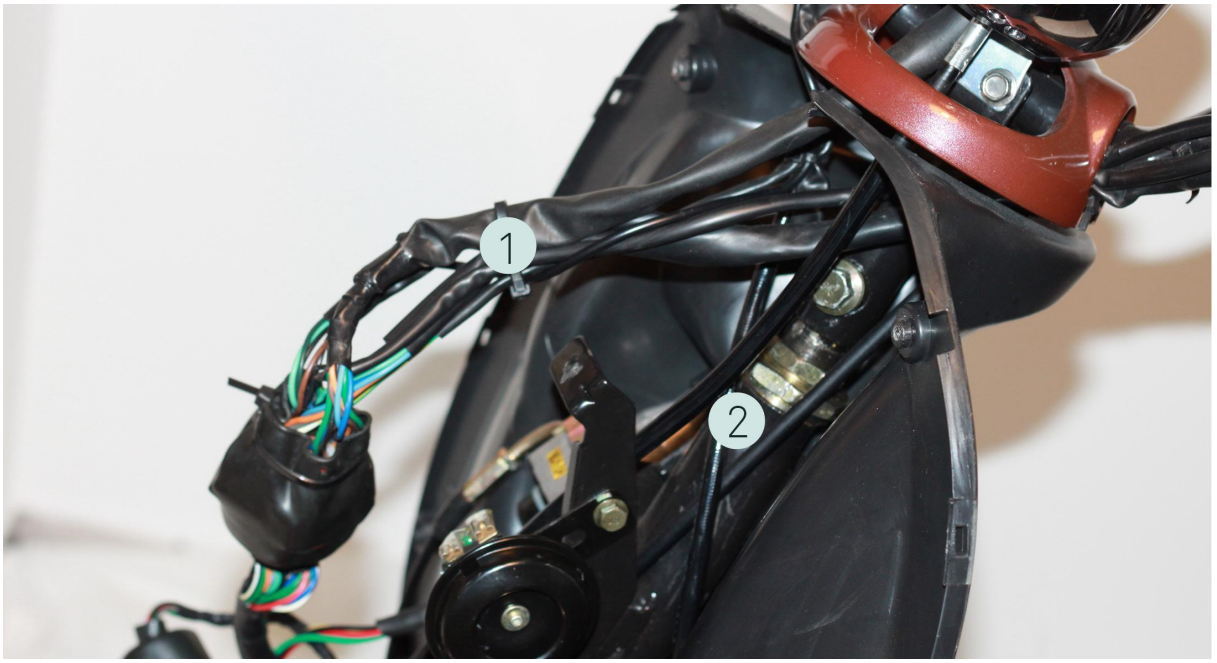
- Disassembly: 8 minutes
- Assembly: 10 minutes

Preparatory work:

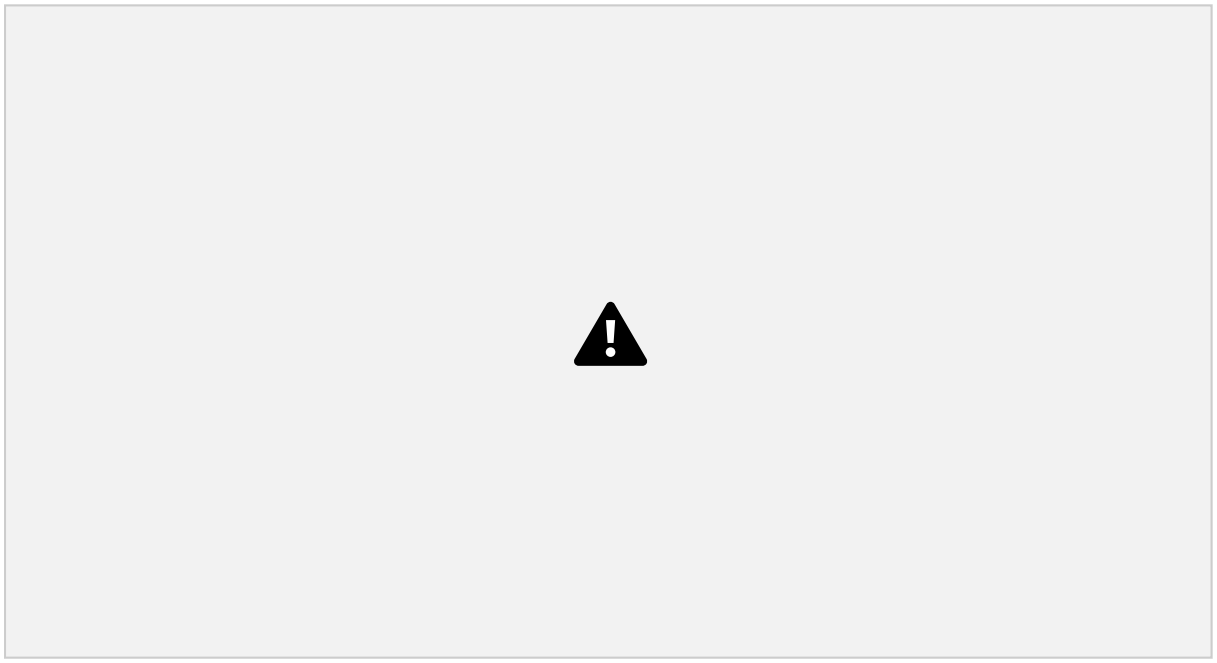
- 2.2.1 Front light cover

Working steps:

- Unscrew the speedometer cable at the connection [1] to the speedometer display. To make sure the nut does not slip too far into the wiring, fix an adhesive strip on the cable 3 or 4 cm under the connection.



- Unplug the speedometer connector from the wiring harness [1].



- The two screws (with a 10mm hex bolt) mounting the tachometer on the handlebars can be unscrewed from the front with a long nut or with the front light cover removed, using a ring or open-end wrench.
- A new speedometer can be set to the correct mileage before installation. Incorrect operation can however lead to damage to the counter, therefor a prior notification for technical support is required.

2.4.3 Speedometer cable (SP-UNU14-182)

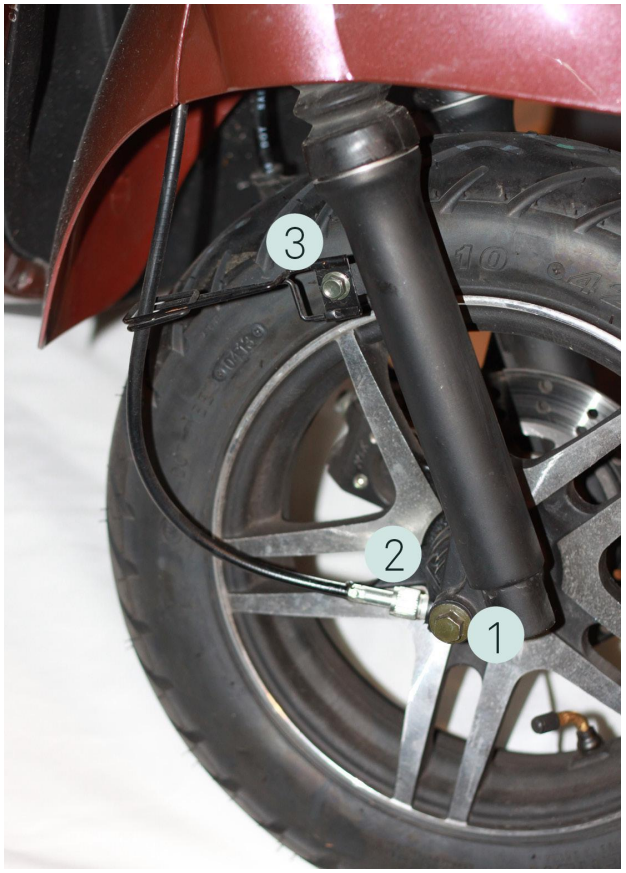
Duration

- Disassembly: 2 minutes
- Assembly: 3 minutes

Preparatory work:

- 2.2.1 Front light cover

Working steps:



- Unscrew the speedometer cable from the speedometer display (as described in 2.4.2) and at the speedometer drive gear at [2]. Because the inner shaft is unattached at one of the ends, it could slide out and should be secured.

- Remove the speedometer cable. It is possible a cable tie has to be cut in order to remove the speedometer cable as a whole.

- When reassembling: Insert the speedometer cable through the opening of the front light cover and thread through the opening of the fender. After installation, make sure that steering is not restricted by the cable.

2.4.4 Speedometer drive gear (possibly with spacer washer) (SP-UNU14-183)

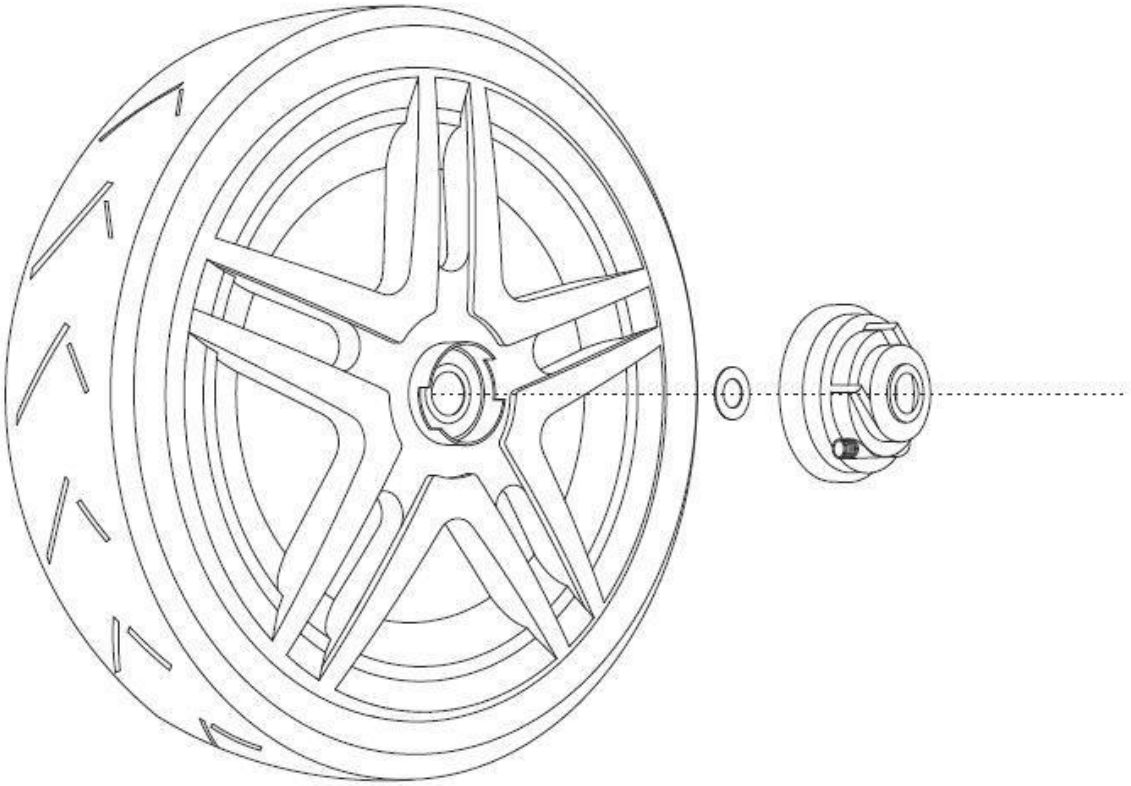
Duration
- Disassembly: 1 minute
- Assembly: 1 minute

Preparatory work

- 2.1.2 Front wheel

Working steps

- Disconnect speedometer cable from the the drive gear, if it is still connected.
- Before installing, make sure to generously grease the internal gearbox and the sealing ring.
- If a spacer washer is provided (to remove certain squeaking noises), lightly grease it and place it between the ball bearing and the drive gear on the front axis as shown below.



2.4.5 Brakes

The unu has 3 different brake systems.
Pulling the right brake lever results in:

Once a click is heard, the pin behind the brake lever is released and the electric motor recuperating energy (KERS: Kinetic Energy Recuperation System).
With stronger pulling, the (hydraulic) front brake is activated and results in the brake pads pressing the brake disk.
Pulling the left brake lever results in:
The left brake lever is attached directly via a wire rope with the drum brake in the rear wheel. At the same time, the energy recuperating system is activated.

Info

- Always exhaust the air from the brake pipe when the brake lever reacts spongy, if the brake pressure increases when pumping the brake lever or when a screw connection of the brake pipe has been loosened.
  Brake fluid can damage the painted surfaces, immediately wipe off any spilled brake fluid.

Warning

- After any work is done on the brake system, make sure to check the brake pressure, the brake fluid level, if leaks are present in the brake pipe and all of the screw connections before driving the unu.

- Set the rear drum brake to the position of assembly.

2.4.5.1 Front brake system (hydraulic) (SP-UNU14-170)

Duration

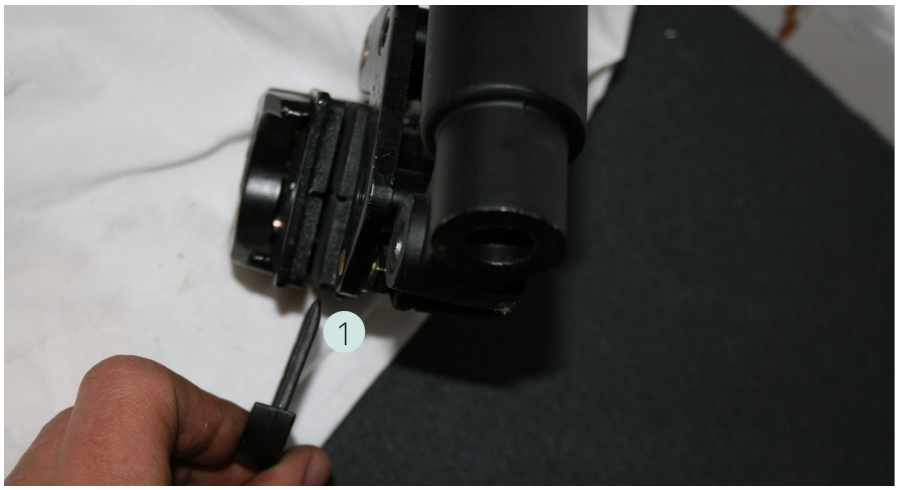
- Disassembly: 7 minutes
- Assembly: 8 minutes

Preparatory work:

- 2.2.1 Front light cover
- 2.2.2 Front panel
- 2.2.3 Front wheel – front cover

Working steps:

1. Remove the brake caliper



- Turn the screws [2] and [3] (12 or 13mm hex bolts) counterclockwise to remove the brake caliper from the suspension fork.
- Caution! Do not pull the brake lever if the brake pads are not held apart by a brake disc or a spacer.

- Press the spacer [1] between the brake pads when reassembling the brake system.

2. Remove the complete brake handle system on the right side of the handlebar, together with the fluid reservoir.

- Unscrew the two screws (8mm hex bolts) at the holding clamp next to the fluid reservoir.
- Disconnect the cables from the brake light switch on the right side.
  (Alternatively, dismantle the brake light switch via a screw accessible from below)
- Some cable ties will have to be removed and reattached beofre reassembling the front panel of the unu.

2.4.5.2 Brake disk (SP-UNU14-170-D)

Duration

- Disassembly: 5 minutes
- Assembly: 5 minutes

Preparatory work

- 2.1.2 Front wheel

Working steps:

- Gradually loosen the 3 screws [1] at the same time and only then unscrew them completely (with a 6mm Allen key)
- When reassembling, tighten the three screws first lightly. In a second round, tighten all screws gradually with the necessary torque.

2.4.5.3 Brake pads (SP-UNU14-170-E)

Duration

- Disassembly: 4 minutes
- Assembly: 4 minutes

Preparatory work:

- None

Working steps:

- If the brake caliper isn't removed yet, unscrew the bolts [2] and [3] (12 or 13mm hex bolts) and take the brake caliper from the braking disk.

- Unscrew the bolts [1] holding the brake pads in place (4mm Allen) and remove both brake pads.
- Clean the brake caliper, particularly around the brake pistons and the brake pads

Assembly:

- Slide the brake piston back in place. It is recommended to press the brake lever twice with the brake pads removed, until the cylinder slightly moves out of the saddle. This makes it easier to push the piston back.
- Check that the bracket [2] can be moved easily.
- Pay attention to the correct positioning of the brake lining spring (with the bulge up
- Insert the brake pads and tighten the bolts [1] (4mm Allen).
- Make sure to check the if the brake is correctly functioning before driving the unu.

2.4.5.4. Rear wheel including the motor (SP-UNU14-175, 176 or 177)

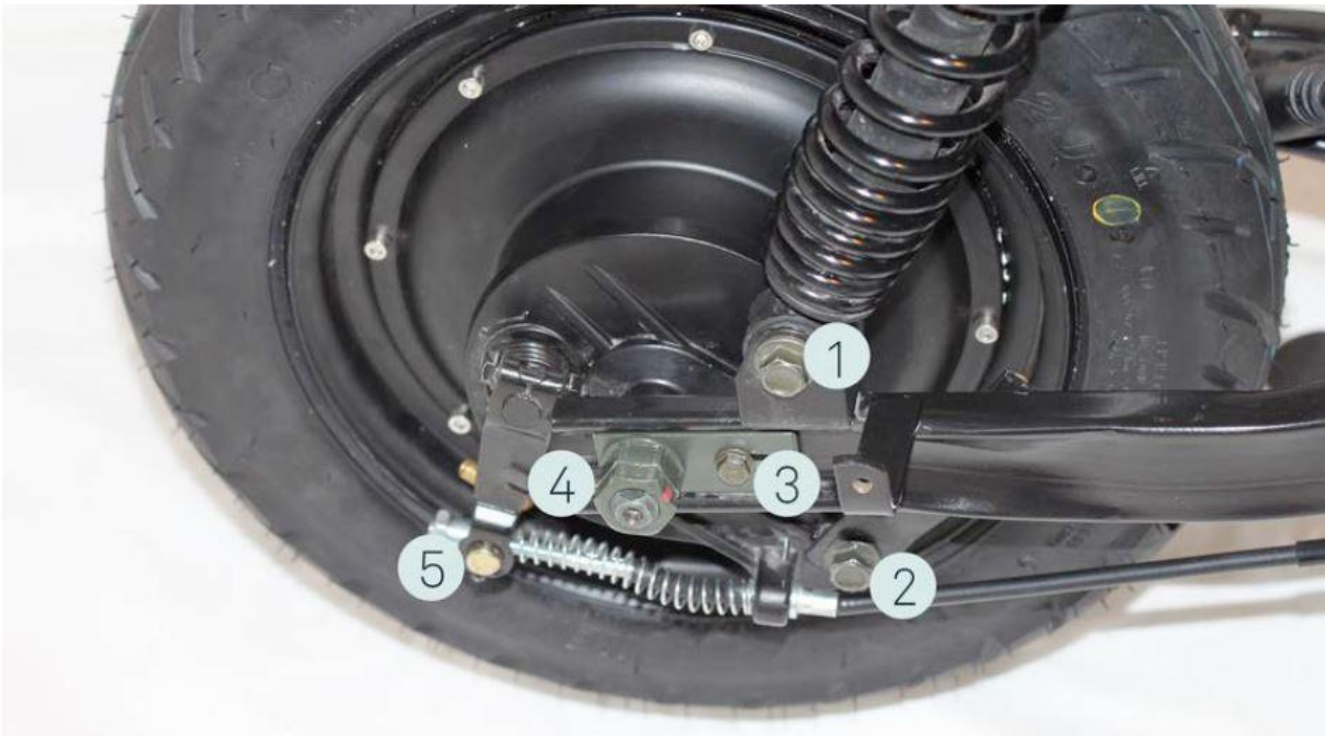
Duration

- Disassembly: 15 minutes
- Assembly: 15 minutes

Preparatory work:

- 2.2.9 Rear fork cover left & right

Working steps:



- Loosen the adjusting nut [5]. This will release the brake cable at the rear wheel, so you can pull out the brake cable.
- Loosen the screw [2] and remove the locking plate. The upper screw on the plate does not need to be removed, loosening it by a few turns will do.
- Unscrew the nut [4] (24mm hex bolt), then remove the screw [3] (10mm hex bolt).
- Pull the rear wheel out of the swingarm.

Necessary torques to be ensured during reassembly:
Main nut on rear axis: 45Nm
Locking nut on rear axis: 65Nm

Single nut on Bosch-motor: 60Nm

2.4.5.4.1 Detaching the motor cable from the ECU

Duration

- Disassembly: 4 minutes
- Assembly: 4 minutes

Preparatory work:

- 2.1.3 Battery container
- 2.2.6 Complete rear panel section

Working steps:

- Disconnect the main motor cable from the three poles of the ECU and the signal connector from the controller.
- All motors of the version before the introduction of the Bosch-motor will show a second large connector, which is not plugged into anything. Should this plug be removed for disassembly, then a reliable insulation on both cable ends should be ensured before re-installation.

2.4.5.5 Rear drum brake (SP-UNU14-178)

Duration

- Disassembly: 1 minute
- Assembly: 1 minute

Preparatory work:

- 2.4.5.4 Rear wheel including the motor

Working steps:

- Remove the brake unit from the motor housing. Pay attention to the correct inclusion of the spacer rings and that the drum brake does not grind against the motor housing after assembly. The Non-Bosch motors have a 3mm spacer between drum motor housing and drum brake and an 8mm spacer outside of the drum brake. The Bosch-Motors only have a spacer between motor housing and drum brake, if these two parts were grinding against each other after the original assembly.

2.4.5.6 Rear brake cable (Bowden cable) (SP-UNU14-181)

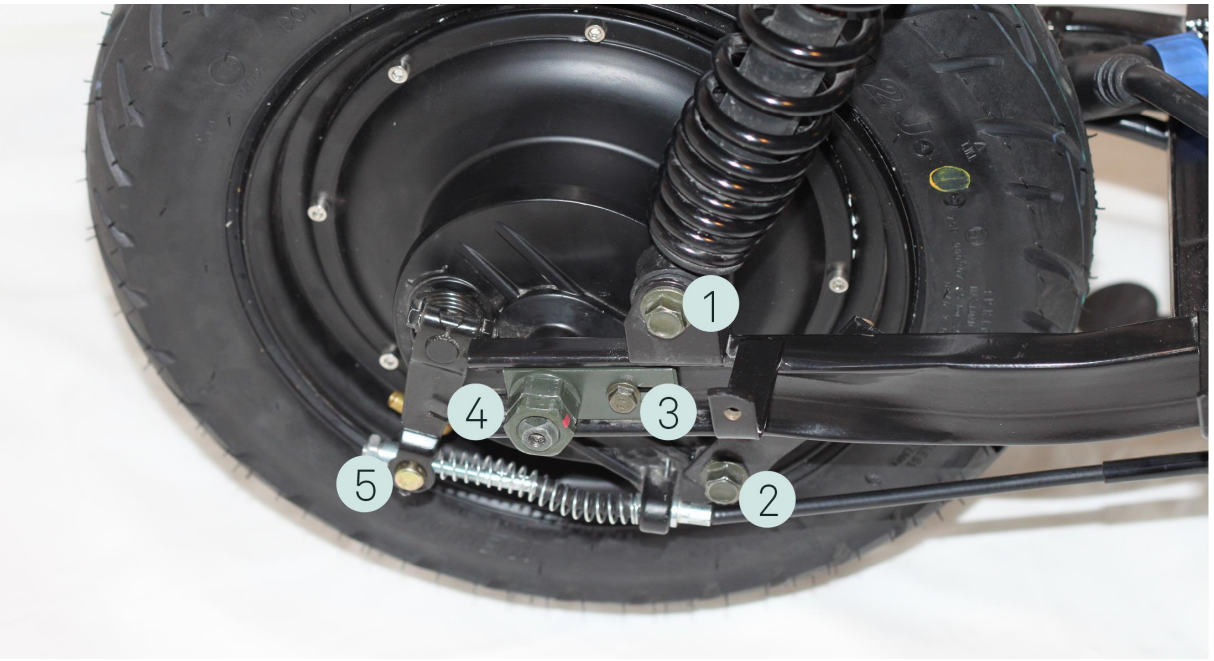
Duration

- Disassembly: 5 minutes
- Assembly: 5 minutes

Preparatory work:

- 2.2.1 Front light cover

Working steps:



- Unscrew the adjusting nut [5]. This will release the rear brake cable, so you can thread out the cable.

- Unscrew the brake cable with the cross-headed screw [1]

- Unscrew the brake cable with the cross-headed screw and unscrew the nut [2] (10mm hex bolt) on the brake lever on the left. Remove the brake lever.
- Thread out the end of the Bowden cable.

Assembly:

- Place the Bowden cable from the front through the opening, which is obtained by removing the front light cover and guide the cable in the direction of travel to the right of the steering column between the underbody cover and the front panel inside.

- If necessary, reach from behind into the gap under the footboard to pull the end of the Bowden cable to the rear side of the unu.

- Insert the Bowden cable into the rear brake steering and tighten the adjusting nu[illegible]e desired braking force is achieved
- Secure the Bowden cable with a cable tie to the rear swing arm, so that it can not be pinched or jammed by the fastening screw of the main stand.

2.4.6 Handlebar (SP-UNU14-152)

Duration

- Disassembly: 2 minutes
- Assembly: 3 minutes

Preparatory work:

- 2.1.1 Mirror
- 2.2.1 Front light cover
- 2.2.2 Front panel
- 2.6.1 Throttle
- 2.2.4 Steering cover
- 2.4.2 Speedometer
- 2.6.3 Switching group on handlebar, left side
- 2.6.4 Switching group on handlebar, right side

Working steps:

- Unscrew the screw and remove the handlebar.
- In rare cases, the screw is not mounted from the front but from the rear side. In such a case it is necessary to loosen the inside of the front panel, so that it can be bent back several centimeters to have access to the screw.
- Caution: After assembly, ensure the handlebar is correctly aligned and fixed in the straight-ahead position.

2.4.7 Steering bar (SP-UNU14-151)

Duration

- Disassembly: 5 minutes
- Assembly: 5 minutes

Preparatory work:

- 2.2.1 Front light cover
- 2.2.2 Front panel
- 2.2.3 Front wheel – front and back cover
- 2.4.1 Front suspension set

Working steps:

- Remove the connecting screw to the handlebar

- Unscrew the locking nut (1) and the adjusting nut (2).
- Remove the fork.
- Be careful not to allow the bearings to stick to the grease when the fork is removed, as they will fall off.

Assembly:

- Before assembly, ensure adequate greasing of the bearings.
- If the front wheel is correctly adjusted, it has to be relieved of any load
- Tighten the adjusting nut (2) until the fork can only be rotated difficult.
- Loosen the adjusting nut (2) until the fork can be turned from stop to stop without resistance, but the fork is not allowed to have any radial clearance.
- Tighten the locking nut (1) while holding the adjusting nut (2) so that the position does not change.
- Check whether the position has changed and whether the steering can move unrestricted from one side to the other.

Important: The resistance when twisting the fork must be the same over the whole adjustment range. If this is not the case, either the bearing shells are not parallel or the steering shaft is warped.

2.5 Lighting & Reflectors

Info
Do not touch any light bulbs with bare hands, use a clean cloth.

2.5.1 Front light (SP-UNU14-140)

Duration

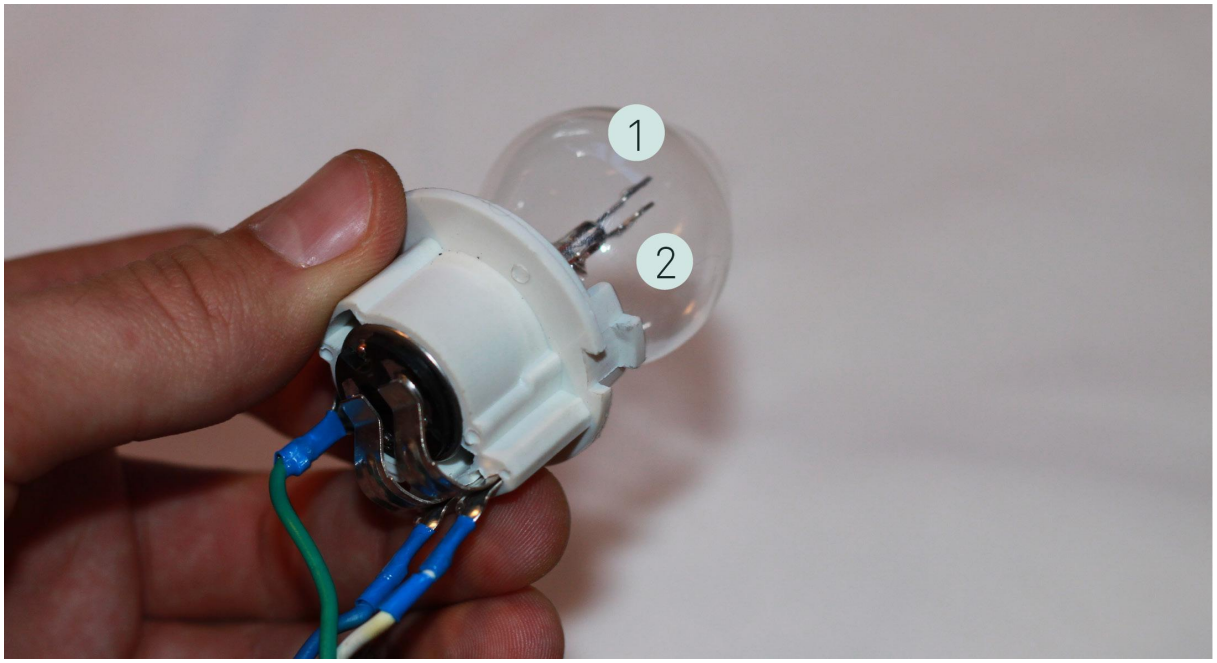
- Disassembly: 2 minutes
- Assembly: 2 minutes

Preparatory work:

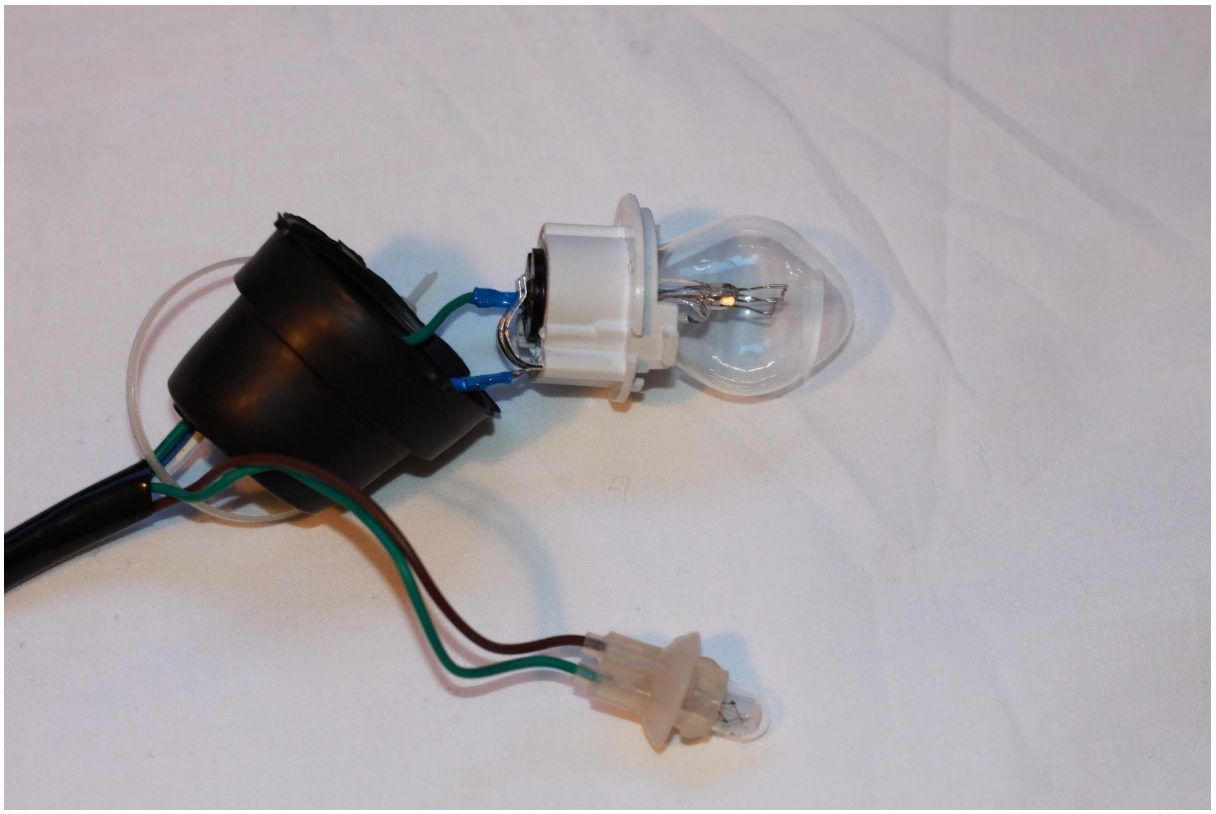
- 2.2.1 Front light cover

Working steps:

- Remove the rubber cap
- Open the sockets of the lights (top: dim light, bottom: parking light) by turning them counterclockwise



- Press the light bulb of the dim/parking light lightly into the socket and unscrew b[illegible]g to the right.
- When installing the bulbholder, make sure that the longer tungsten filament [1] is at the top and the lower tungsten filament [2] for the low beam is at the bottom.
- (Check that the contact terminals touch the bottom and the light bulb during installation)



• Info: The parking light bulb is plugged in and it can be pulled out directly to change it.

2.5.2 Flasher (SP-UNU14-162)

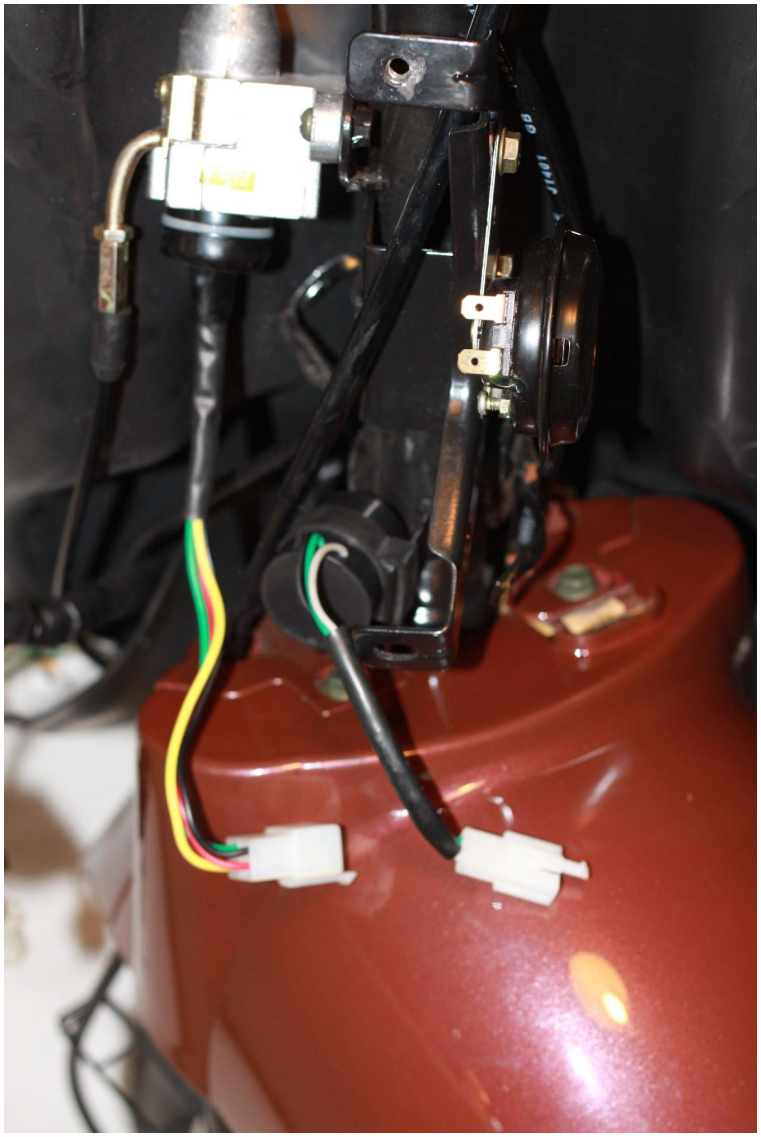
Duration

- Disassembly: 2 minutes
- Assembly: 2 minutes

Preparatory work:

- 2.2.1 Front light cover

Working steps:



- Remove the flashing relay from the rubber strap or take the flasher and strap out when replacing the whole set.
- Before installing a new relay, it is recommended to insulate the cable inputs with hot glue.

2.5.3 Turning light front left (SP-UNU14-142-A)

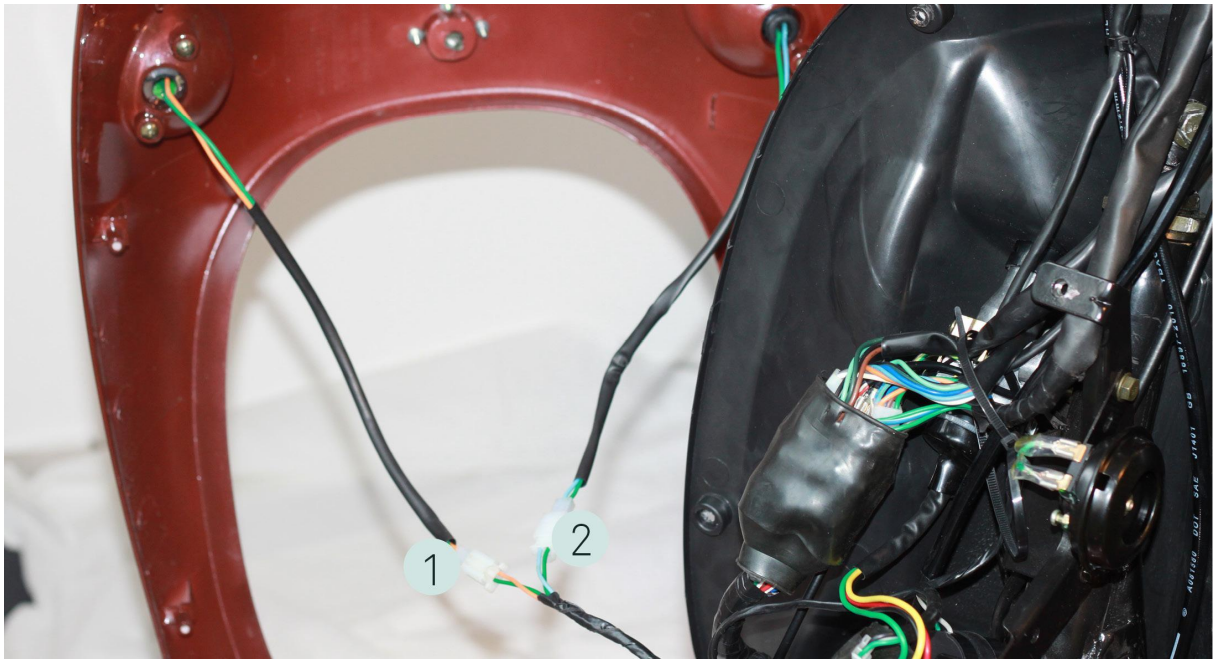
Duration

- Disassembly: 1 minute
- Assembly: 1 minute

Preparatory work:

- 2.2.1 Front light cover
- 2.2.2 Front panel

Working steps:



Unscrew the 2 cross-head screws and remove the left-hand indicator from the front plate and unplug it at [1]. Analogue for the right turn signal, unplug the connection at the plug [2].

2.5.4 Turning light front right (SP-UNU14-142-B)

Duration

- Disassembly: 1 minute
- Assembly: 1 minute

Preparatory work:

- 2.2.1 Front light cover
- 2.2.2 Front panel

Working steps:

- Refer to 2.5.3

2.5.5 Turning light rear left (SP-UNU14-142-C)

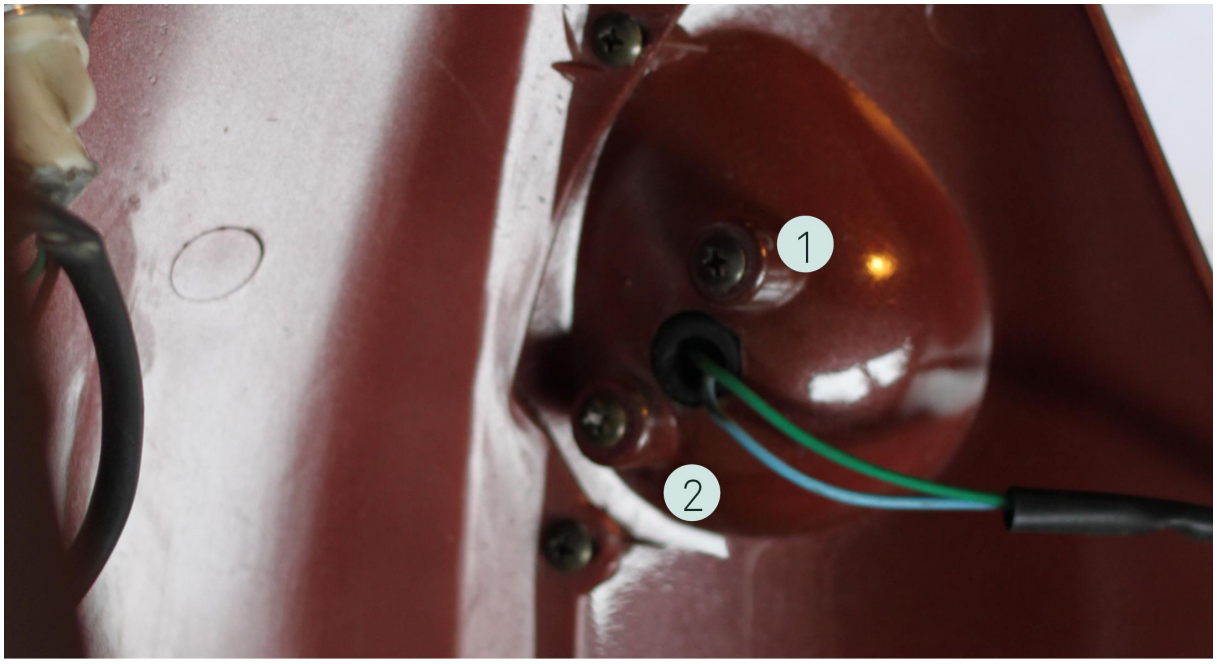
Duration

- Disassembly: 1 minute
- Assembly: 1 minute

Preparatory work:

- 2.1.3 Battery container
- 2.1.6 Luggage rack
- 2.2.6 Complete rear panel (painted trim parts)

Working steps:



- Remove the 2 cross-headed screws [1][2] and remove the turning light.

2.5.6 Turning light rear right (SP-UNU14-142-D)

Duration

- Disassembly: 1 minute
- Assembly: 1 minute

Preparatory work:

- 2.1.3 Battery container
- 2.1.6 Luggage rack
- 2.2.6 Complete rear panel (painted trim parts)

Working steps:

- Analogue for the rear left turning light as explained 2.5.5

2.5.7 Rear light (SP-UNU14-141)

Duration

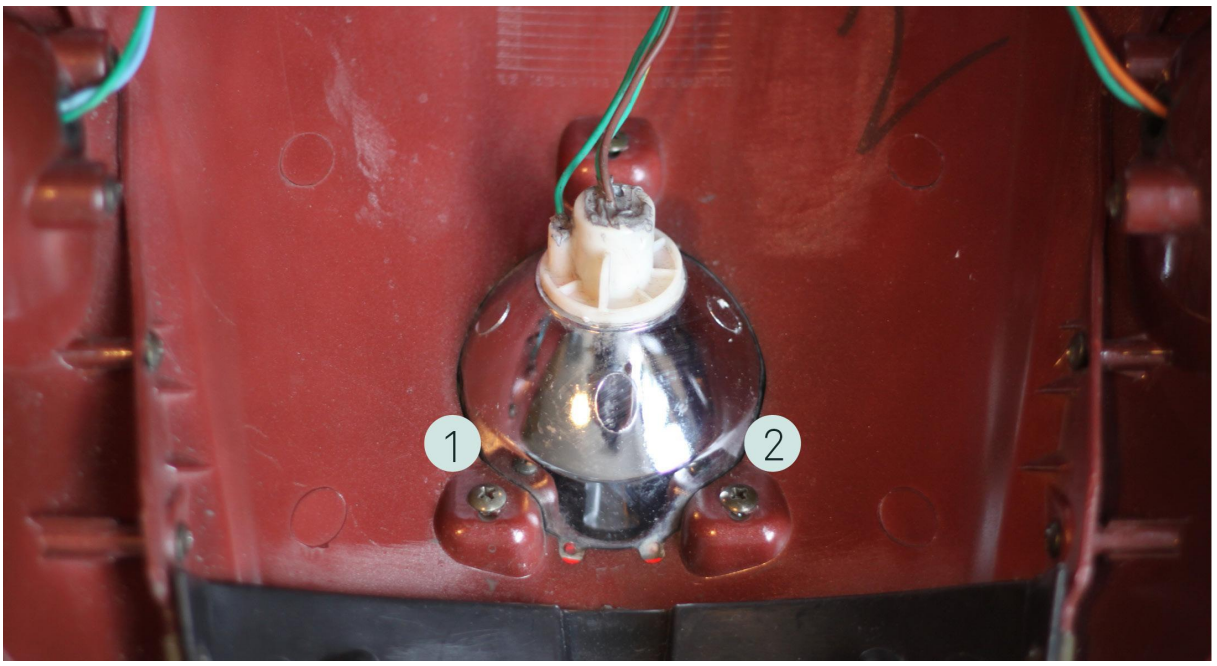
- Disassembly: 1 minute
- Assembly: 1 minute

Preparatory work:

- 2.1.3 Battery container
- 2.1.6 Luggage rack

- 2.2.6 Complete rear panel (painted trim parts)

Working steps:



- Remove the 2 cross-headed screws [1][2] and take out the backlight.

2.5.8 Red rear reflector (SP-UNU14-143)

Duration

- Disassembly: 1 minute
- Assembly: 1 minute

Preparatory work:

- none

Working steps:

- Unscrew the nut (10mm hex bolt) and remove the reflector.

2.5.9 Yellow left side reflector(SP-UNU14-158)

Duration

- Disassembly: 1 minute
- Assembly: 1 minute

Preparatory work:

- none

Working steps:

- Unscrew the nut [1] (10mm hex bolt) and remove the reflector.

2.5.10 Yellow right side reflector (SP-UNU14-158)

Duration

- Disassembly: 1 minute
- Assembly: 1 minute

Preparatory work:

- none

Working steps:

- Unscrew the nut [1] (10mm hex bolt) and remove the reflector.

2.6 Electric

2.6.1 Throttle (SP-UNU14-172)

Duration

- Disassembly: 3 minutes
- Assembly: 2 minutes

Preparatory work

- 2.2.1 Front light cover

Working steps:

- Disconnect the throttle cable connector from the cable harness. The plug is located inside the black protective cover under the front light panel.

- Loosen the Allen screw (4mm) under the accelerator throttle with two full turns a[illegible]ve the throttle grip from the handlebar.
- There will be a few cable ties to cut. Before continuing, install new cable ties so that no hose or cable is rubbing against a panel.

2.6.2 Horn (SP-UNU14-174)

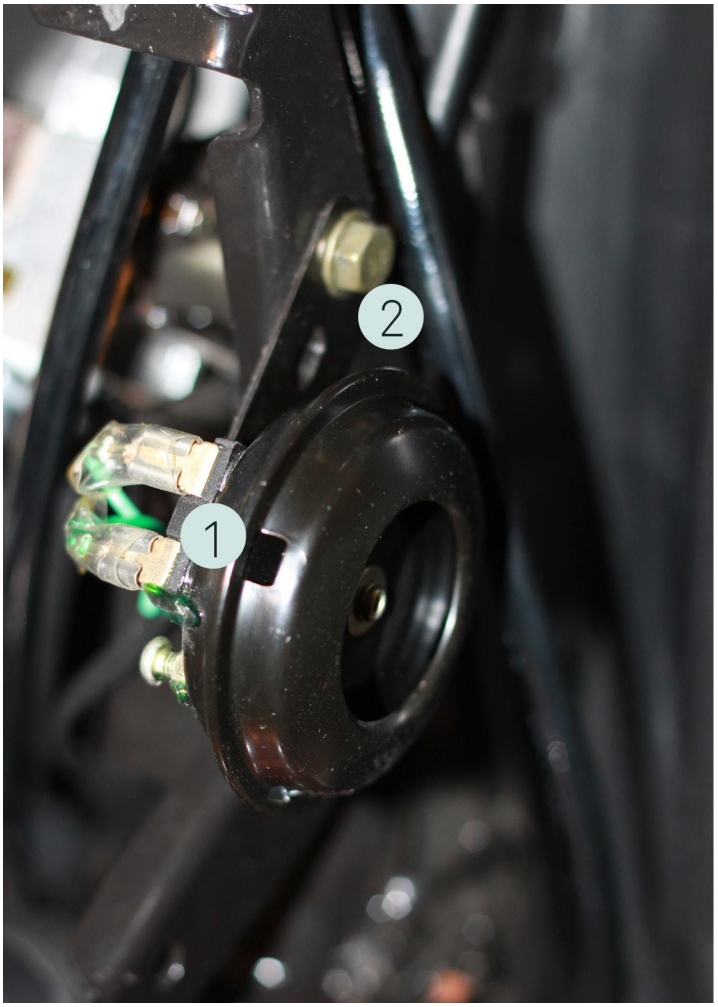
Duration

- Disassembly: 2 minutes
- Assembly: 2 minutes

Preparatory work:

- 2.2.1 Front light cover

Working steps:



- Disconnect both connectors [1] from the horn
- Unscrew [2] (10mm hex bolt) and remove the horn

2.6.3 Handlebar Button Assembly Left (SP-UNU14-163)

Duration

- Disassembly: 3 minutes
- Assembly: 3 minutes

Preparatory work:

- 2.1.1 Mirror
- 2.2.1 Front light cover

Working steps:

- Unscrew the cross-headed screws and remove the brake lever.
- Disconnect the connector. The plug is located inside the black protective cover under the front light panel.
- There will be a few cable ties to cut. Before reassembling the unu, install new cable ties so that no hose or cable is rubbing against a panel.
- Unscrew the cross-headed screws at the handlebar and remove the button group at the handlebar afterwards

2.6.4 Handlebar Button Assembly Right (SP-UNU14-164)

Duration

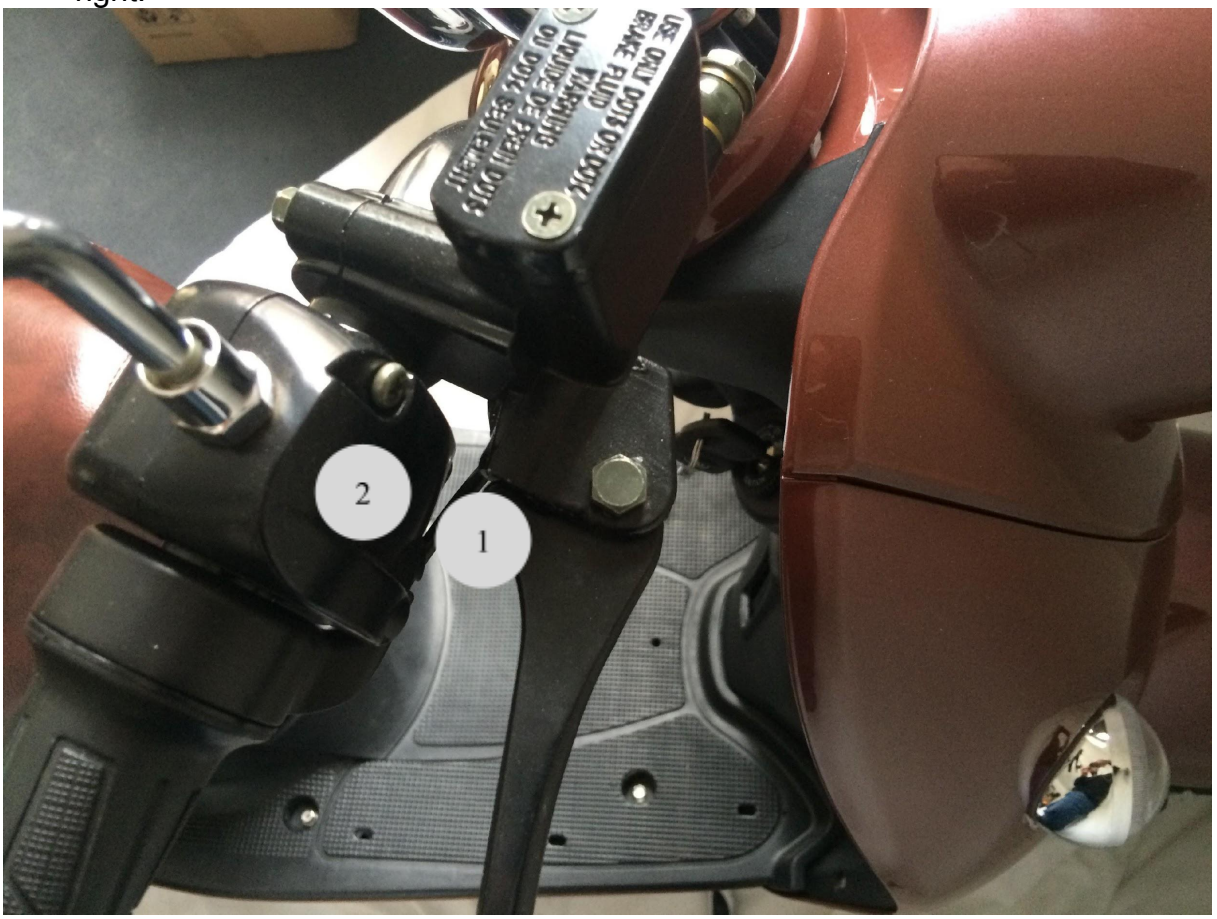
- Disassembly: 3 minutes
- Assembly: 3 minutes

Preparatory work:

- 2.1.1 Mirror
- 2.2.1 Front light cover

Working steps:

- Unscrew the cross-headed screws and remove the brake lever.
- Disconnect the connector, the plugs are located in the black protective cover under the front panel.
- Remove the cross-headed screws at the handlebar and remove the button group on the right.



2.6.5 Main cable (3- or 4-pin) (SP-UNU14-1 61)

Duration

- Disassembly: 6 minutes
- Assembly: 6 minutes

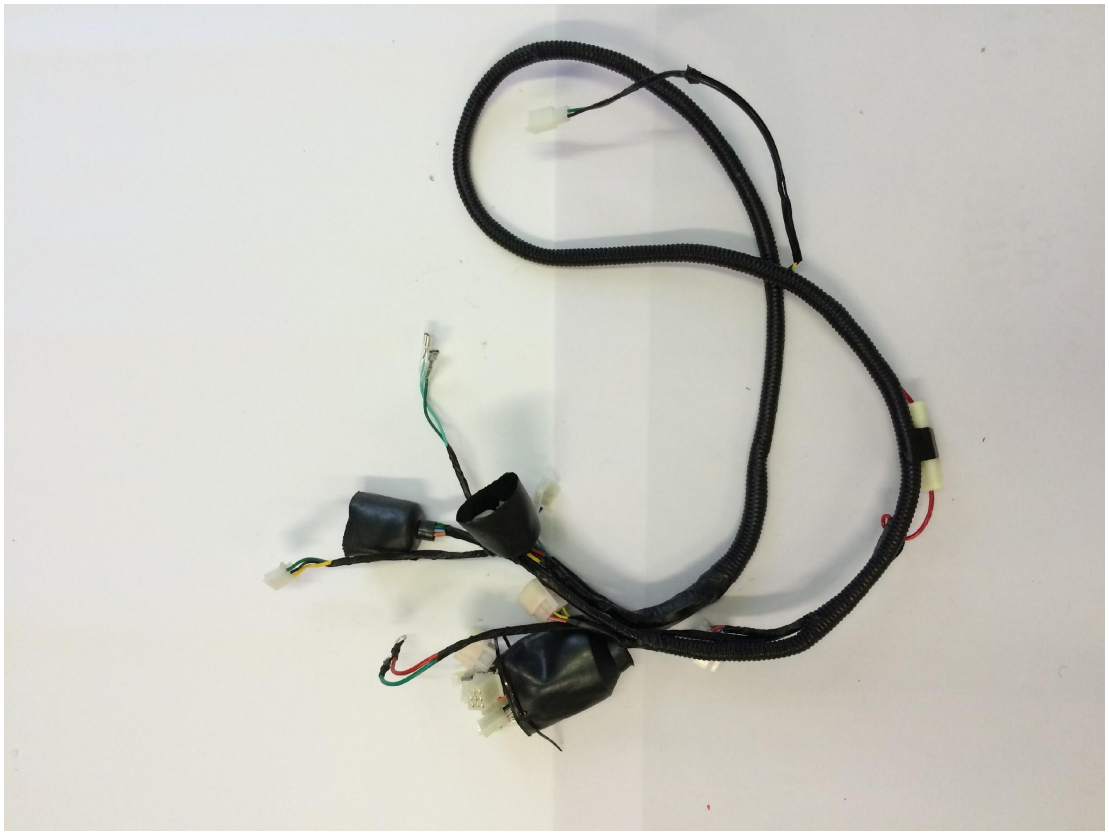
Preparatory work:

- 2.1.3 Battery container
- 2.1.5 Luggage rack
- 2.2.1 Front light cover
- 2.2.2 Front panel
- 2.2.6 Complete rear panel

Attention:

When plugging in the connectors, make sure that the plug-in fuses lock into place and that all pins are completely inserted.
The cable harness must be adequately fixed with cable ties to prevent fraying and rattling noises.

Working steps:



- Unscrew the 2 cross-headed screws between the underbody and the inside of the front panel.
- Remove the protective cable covers from the main cable and disconnect all connected plugs.

- Remove cable harness from the rear

2.6.6 Controller (SP-UNU14-165, 166, 167)

Duration

- Disassembly: 6 minutes
- Assembly: 6 minutes

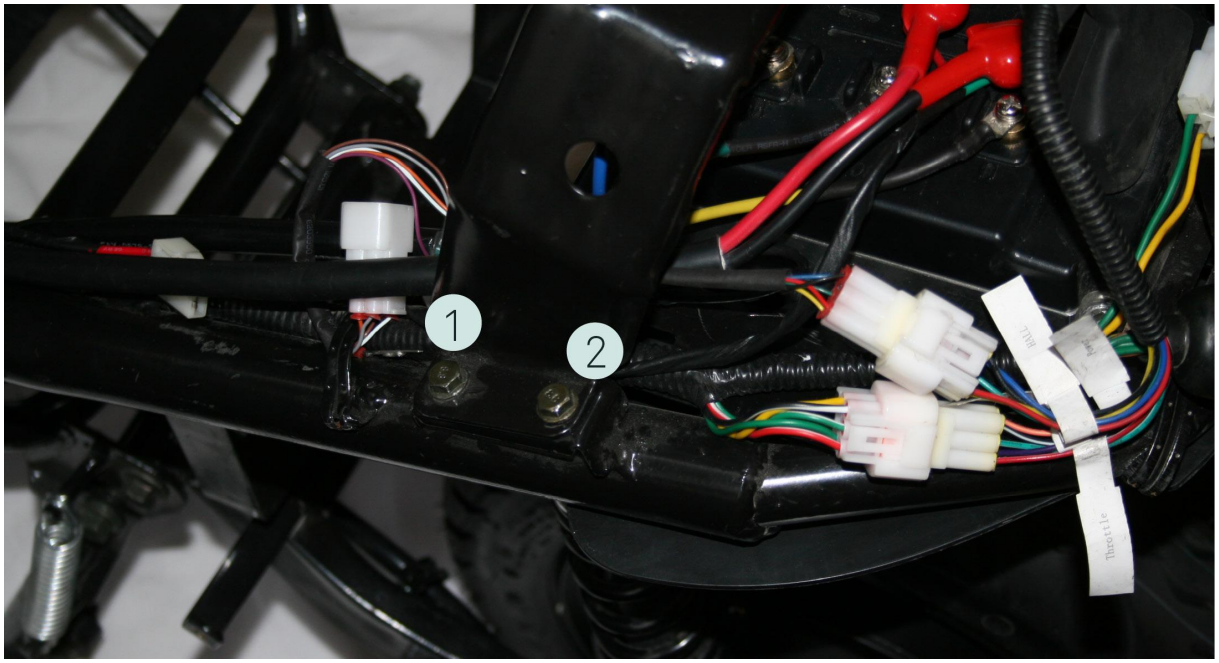
Preparatory work:

- 2.1.3 Battery container
- 2.1.6 Luggage rack
- 2.2.6 Complete side panel

Attention
Danger of cable fire if the screws on the controller are not tightened enough and the transition resistance is increased.

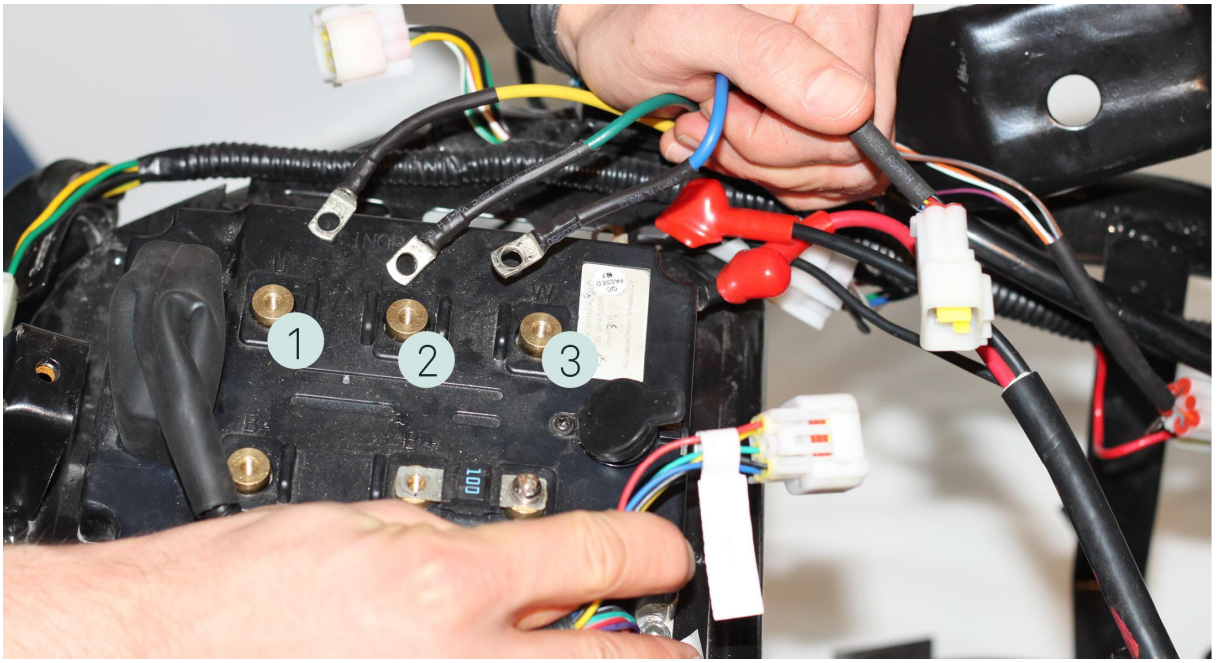
Info
Danger of damage to the motor and controller when the phases are interchanged. Please pay attention to the color coding during assembly.

Working steps:

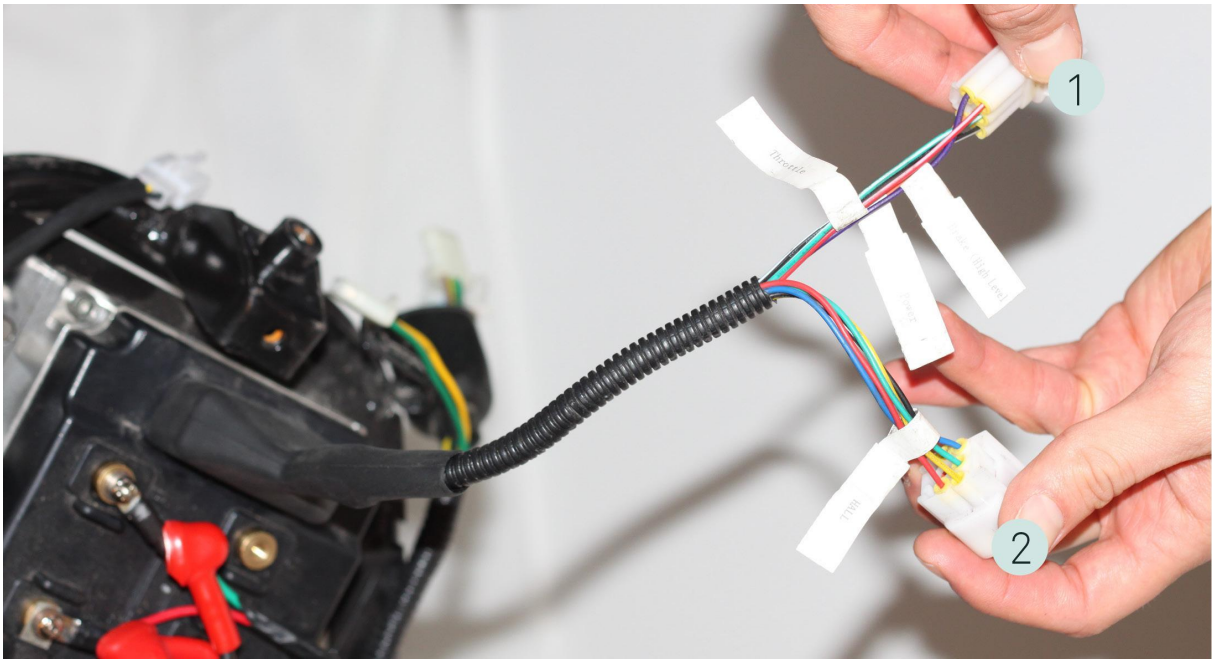


- Unscrew the screws [1] [2] (10mm hex bolt) and the screws analogue on the other side. Then, remove the traverse.
- Remove all other screw connections and desconnect the main plug from the control unit.

Assembly:



- The rear wheel motor is to be connected to the controller as follows:
- [1] – yellow cable
- [2] – green cable
- [3] – blue cable



- Connect the Hall sensor [2] as shown in the previous figure.

2.6.7 12V DC Converter (SP-UNU14-168)

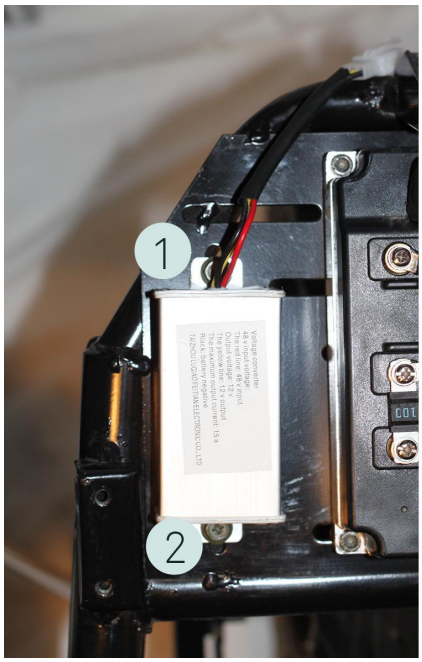
Duration

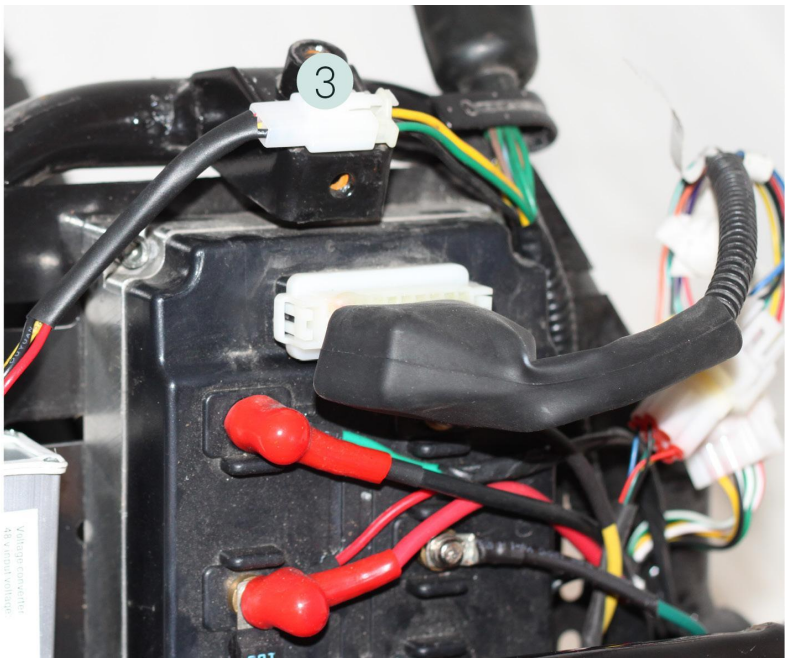
- Disassembly: 3 minutes
- Assembly: 4 minutes

Preparatory work:

- 2.1.3 Battery container
- 2.1.5 Luggage rack
- 2.2.6 Complete rear panel

Working steps:





- Unscrew [1] and [2] and remove the 12V DC converter
- Disconnect plug [3]

2.6.8 Side stand switch (SP-UNU14-147)

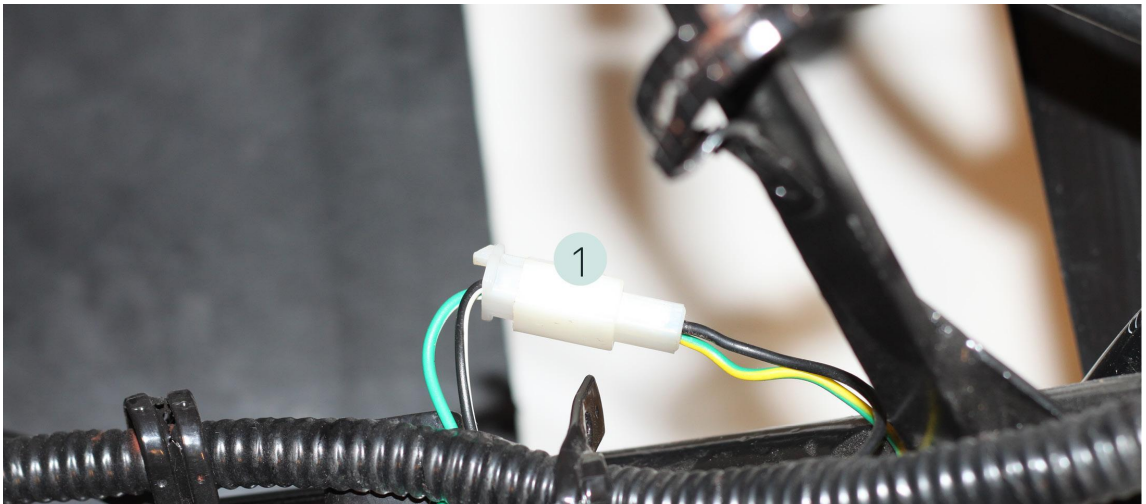
Duration

- Disassembly: 3 minutes
- Assembly: 3 minutes

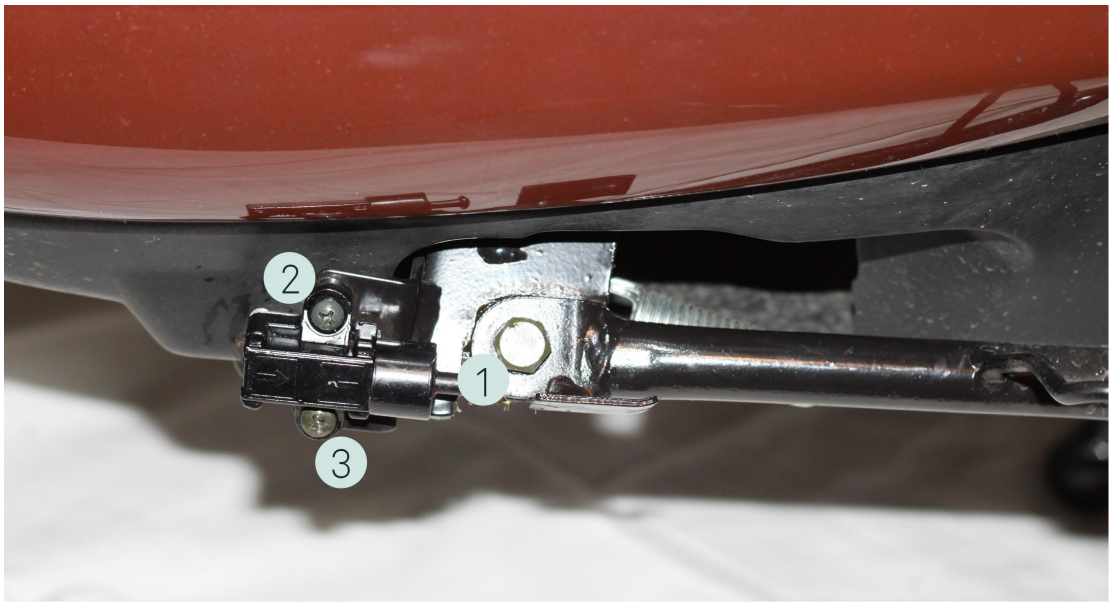
Preparatory work

- None

Working steps:



- Grab the cable from the space between the footboard and the underbody, from the rear. Follow the cables until the plug [1] and disconnect. If necessary, disconnect cable ties.



- Unscrew the cross-shaped screws [2] [3] and remove the side stand switch

2.6.9 Ignition lock set (SP-UNU14-153)

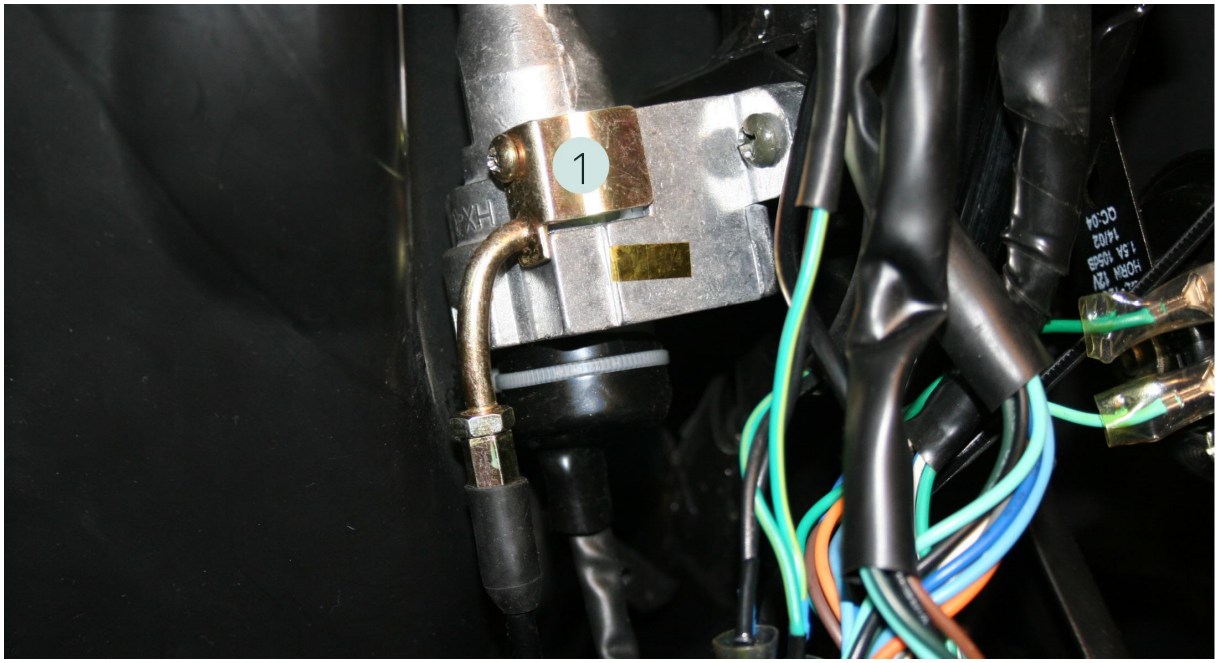
Duration

- Disassembly: 4 minutes
- Assembly: 5 minutes

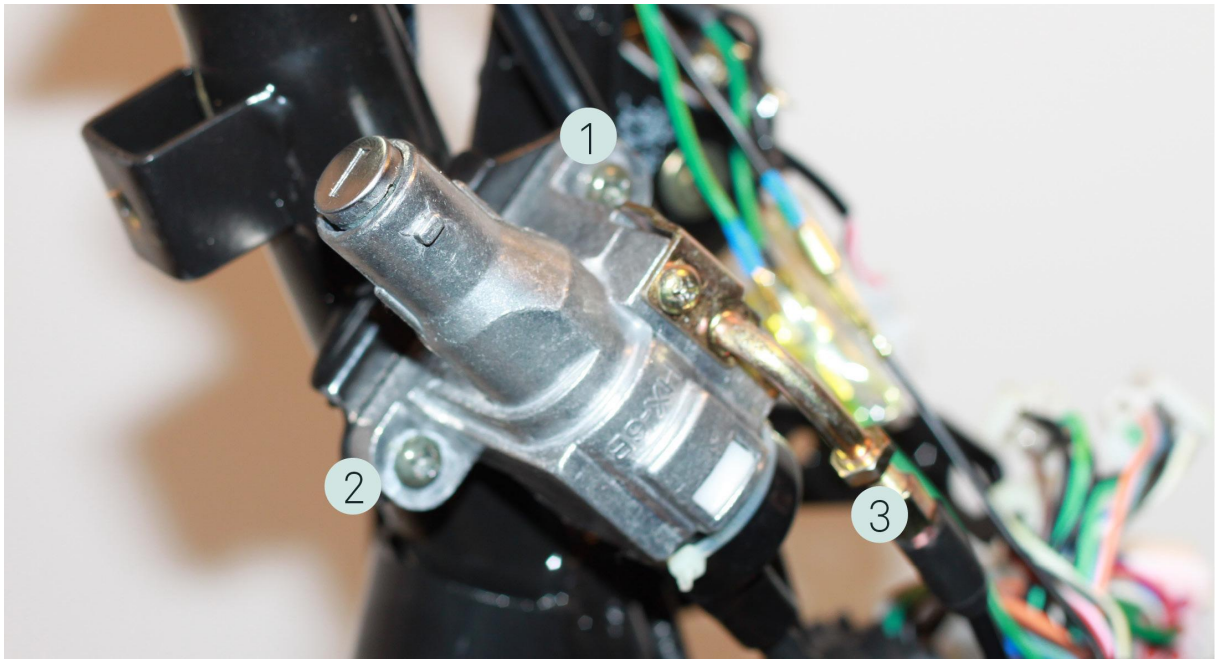
Preparatory work:

- 2.2.1 Front light cover
- 2.2.2 Frontpanel

Working steps:



• Unscrew the cross-headed screw screw [1] and unthread the Bowden cable.



- Unscrew the cross-headed screws [1] and [2].
- When reassembling, tighten the necessary pretensioning for opening the seat lock using the adjusting nuts of the Bowden cable [3] (locknut: 10mm hex bolt).

Info: Increase the preload if the seat lock can not be opened.
In rare cases, the seat box does not open anymore when the key is turned. Then, a specific increase of the pretension helps by several turns of the elongated nut. For this, only the front panel must be removed.

2.6.10 Chogori battery connector cable (SP-UNU14-193)

Duration

- Disassembly: 6 minutes
- Assembly: 6 minutes

Preparatory work:

- 2.1.3 Battery container
- 2.7.1 Seat lock

Working steps:

IMPORTANT: Before working on the controller, the battery must be unplugged and the controller must be unloaded by turning the unu on and off.

- Disconnect the cable tie on the battery connection cable.
- Disconnect the plug connector
- Kreuzschrauben auf dem Steuergerät herausdrehen. Mindestens eine davon lässt sich von oben mit einem langen Kreuzschraubenzieher erreichen. Die zweite ist oftmals am besten erreichbar, nachdem das Sitzschloss abgenommen wurde. Sollte auch jetzt kein direkter Zugang mit einem Schraubenzieher möglich sein, bietet sich eine Ratsche mit dem entsprechenden Aufsatz an
- Unscrew the cross-headed screws on the controller. At least one of them can be reached from above with a long cross-headed screwdriver.
- The second is best to reach after the seat lock has been removed. If even then there is no direct access, a ratchet with the corresponding attachment is recommended.

2.7 Others

2.7.1 Seat lock (SP-UNU14-154)

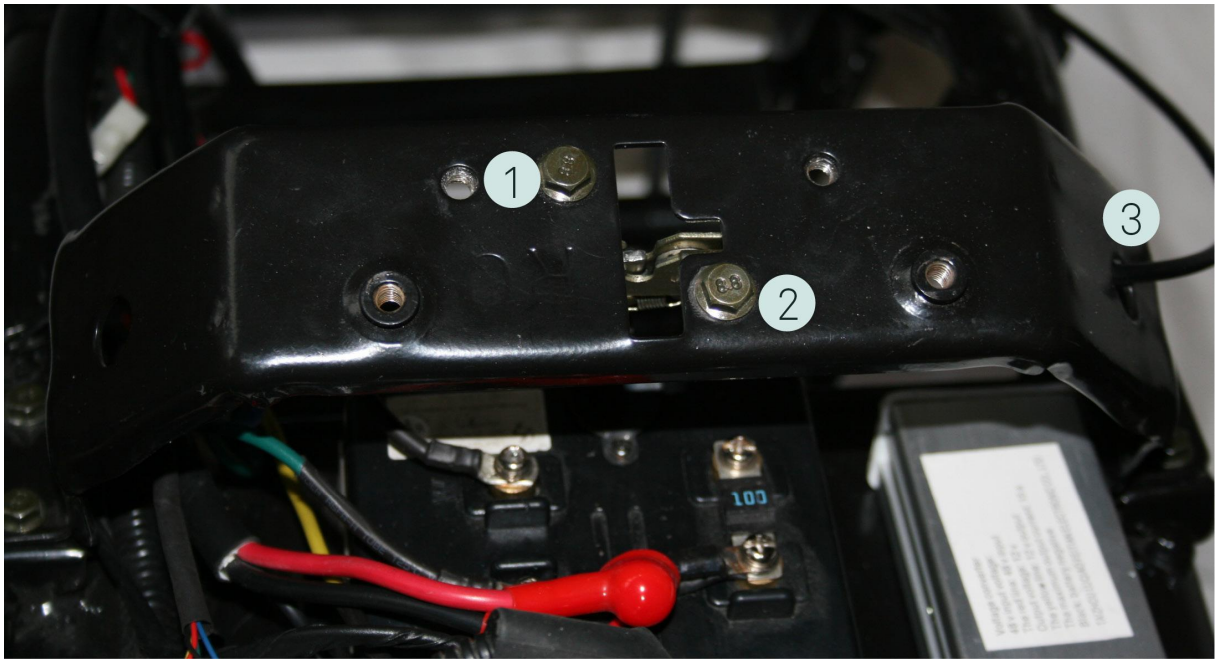
Duration

- Disassembly: 2 minutes
- Assembly: 2 minutes

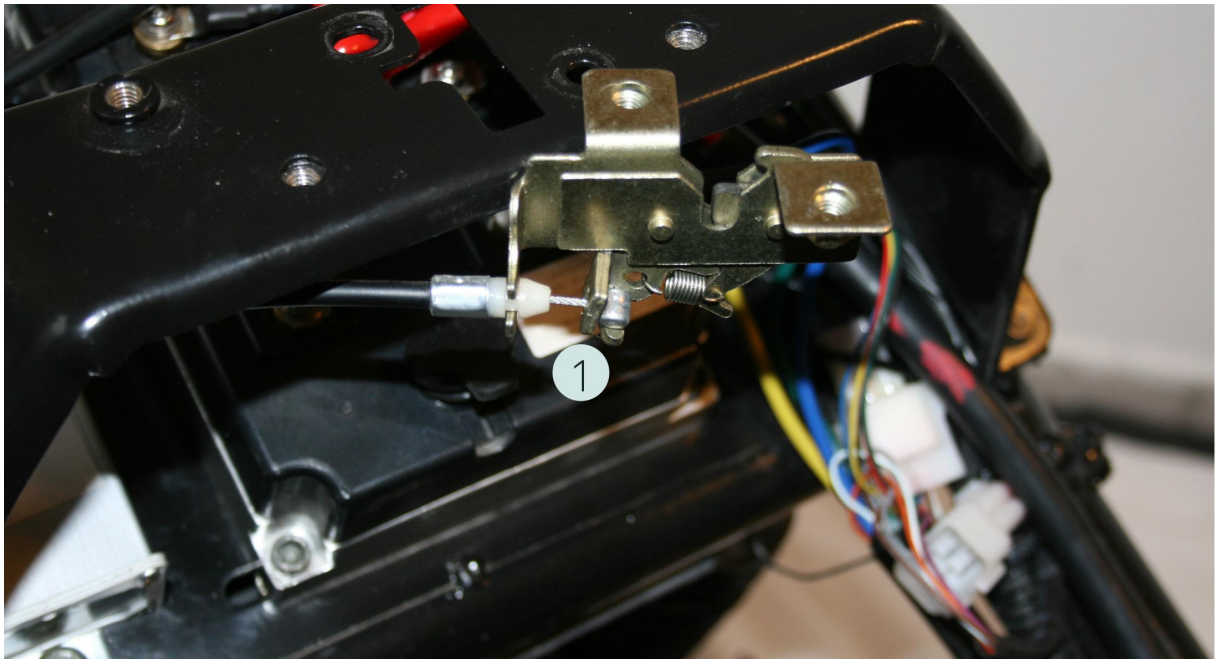
Preparatory work:

- 2.1.3 Battery container

Working steps:



- Unscrew [1] and [2] (10mm hex bolt)



- Disconnect the Bowden cable [1].

2.8 Maintanance

2.8.1 Replace and bleed the brake fluid

Duration

- In total: 15 minutes

Preparatory work:

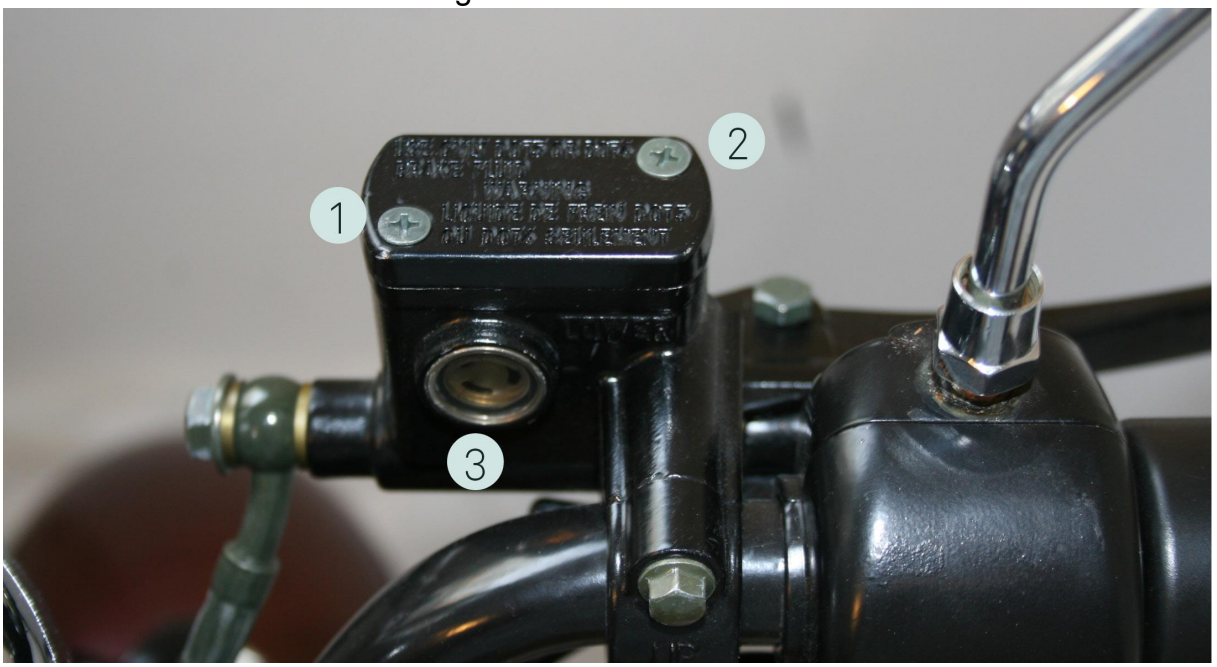
- None

Info

- Always bleed the brake line when the brake lever reacts spongily or if the brake pressure is improved by pumping the brake lever or when a screw connection of the brake line has been released.
- Do not let the fluid level below the minimum mark when changing the brake fluid, as air will enter the system.
- Brake fluid can damage painted surfaces, immediately wipe off any brake fluid dripping on the panels.

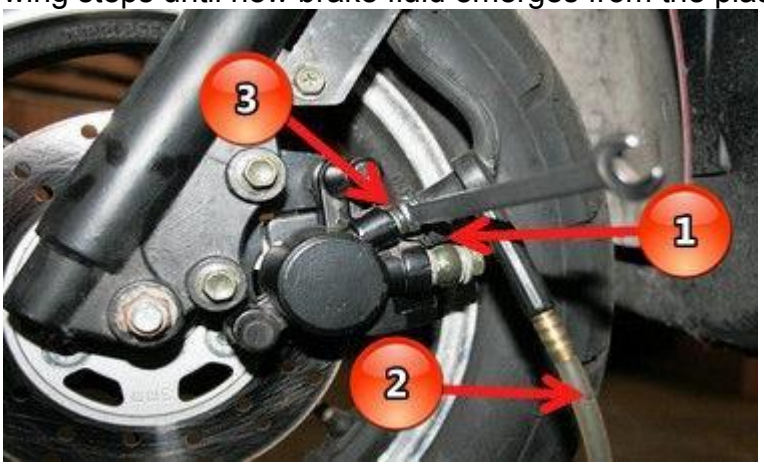
Warnung

- After any work is done on the brake system, make sure to check the brake pressure, the brake fluid level, if leaks are present in the brake pipe and check all of the screw connections before driving the unu.



- Align the handlebar straight, unscrew the cross-headed screws [1] and [2] and remove the container cover.

- Fill the reservoir with new brake fluid. (DOT 4)
- Bleed the main brake cylinder: Slowly tighten the brake lever completely multiple times, until no more air bubbles emerge from the drill holes of the brake fluid reservoir.
- Remove the rubber cap [1] from the bleed valve [3] of the brake caliper
- Connect a transparent plastic hose [2] to the bleed valve [3] and place the other end of the hose in a container.
- Repeat the following steps until new brake fluid emerges from the plastic hose:



Open the bleed valve [3].
Tighten the brake lever and hold.
Close the bleed valve.
Release the brake lever.

3. Tightening torque

- Tighten the bolts with the specified tightening torque to avoid noise and impaired driving behavior
- The list below is a shorte excerpt. A complete list of torque values for each screw/bolt is also available.
- The unit used in the table below is Nm.
- Before re-inserting any screw or bolt, clean threads that are smeared with grease or dirt.

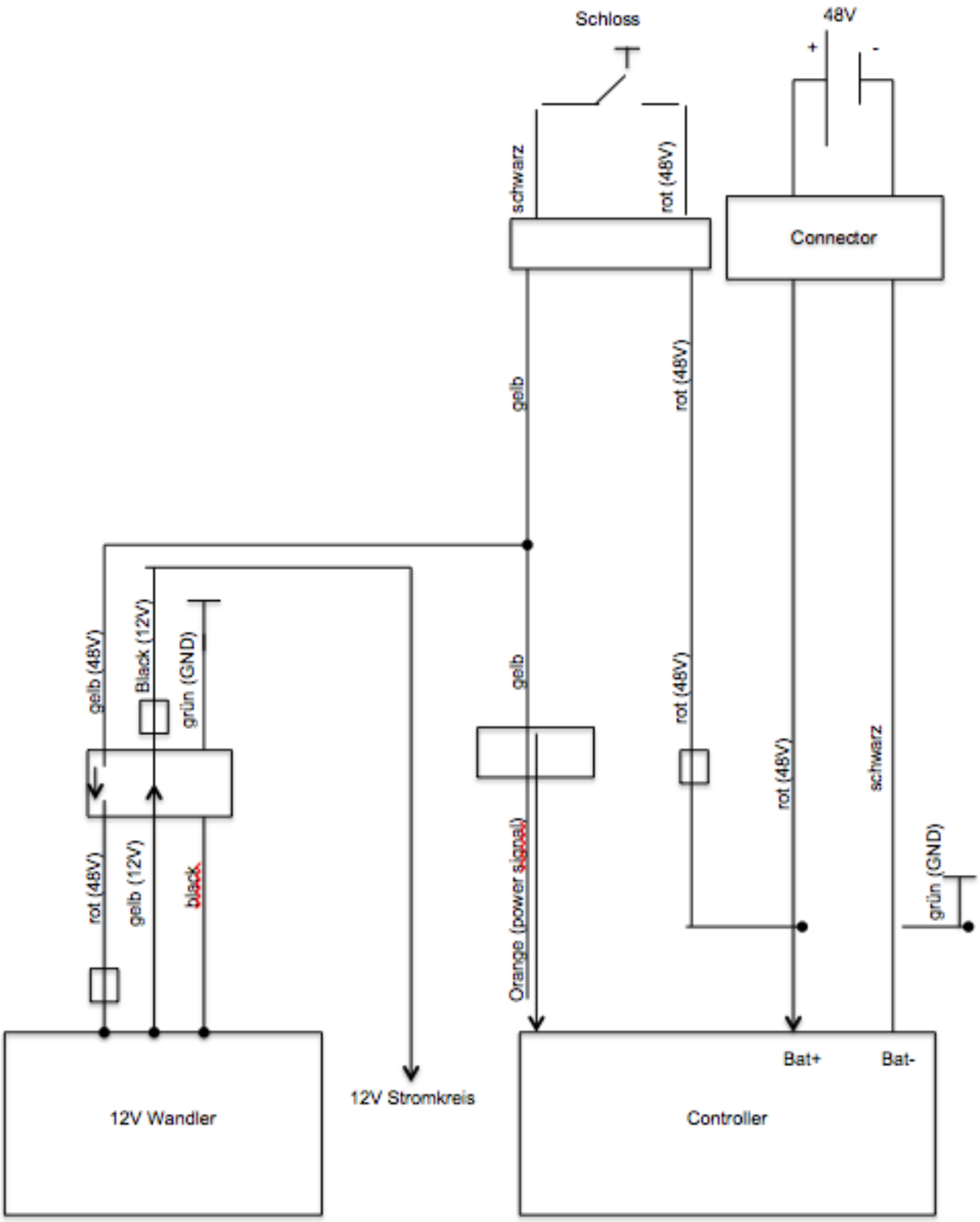
3.1 Table

Component	Screw connection
Front fork and shock absorbers	**Front axle self-locking nut M10 & M12**
	Torque values: 15-20 Nm
	Front shock absorber top end bolt (Allen key 12 mm)
	Torque values: 35-45 Nm
	Suspension arm installation bolt M8
	Torque values: 25-30 Nm
	Front Shock absorber low end bolt (Allen key 6 mm)
	Torque values: 18-20 Nm
Front brake	**Brake lower part (connection to suspension) M8**
	Torque values: 20-25 Nm
	Brake pads fastening bolt (Allen key 4 mm)
	Torque values: 2-4 Nm
	Disc brake plate bolt (Allen key 6 mm)
	Torque values: 20-25 Nm
Steering	**Stearing head lock nut M30/ M25**
	Torque values: M30 5-7 Nm
	Torque values: M25 45-50 Nm
	Handlebar with direction pillar bolt M10
	Torque values: 35-40 Nm
Motor	**Rear shock absorber above install bolt M10**
	Torque values: 20-25 Nm
	Rear shock absorber lower install bolt M10
	Torque values: 20-25 Nm
	Rear wheel hard solid nut (inner/ outer nut) M12
	Torque values: inner nut 30 Nm
	Torque values: outer nut 50 Nm
	Engine braket with the frame joint bolt
	Torque values: 15-20 Nm

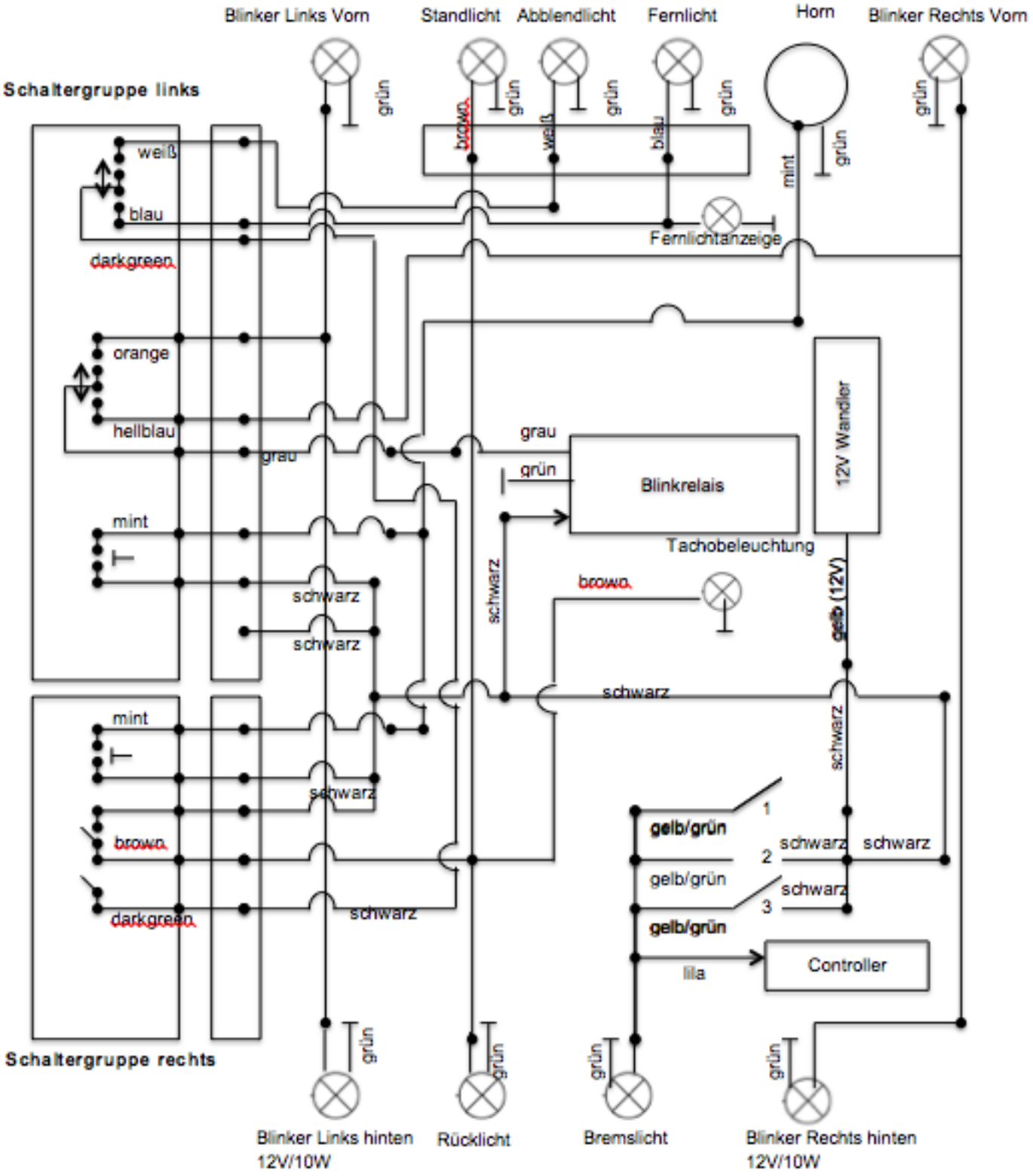
4. Circuit diagram

- The plugs are shown in the top view from the front.
- The display of the plug fuse in the diagrams is intended as an orientation aid for pin numbering.
- The numbering sequence on the side of the cable harness is from left to right and from top to bottom.
- The numbering sequence on the side of the components is mirror-inverted compared to the side of the cable harness, ie. from right to left and from top to bottom.
- For the 12V circuit diagrams, the left side of the diagram shows the main cable. The right side shows the component(s) attached to the main cable.
- The cable colors on the displayed scheme may differ from the cable colors on the unu.
- The cable colors in the list of connectors are indicated on the side of the cable harness. On the side of the components, the color is indicated only if it differs from tthe color on the cable harness side.
- In the circuit diagrams ,the connectors to components are marked with "X" and a number. The name of the component is always displayed right above or under this "X".

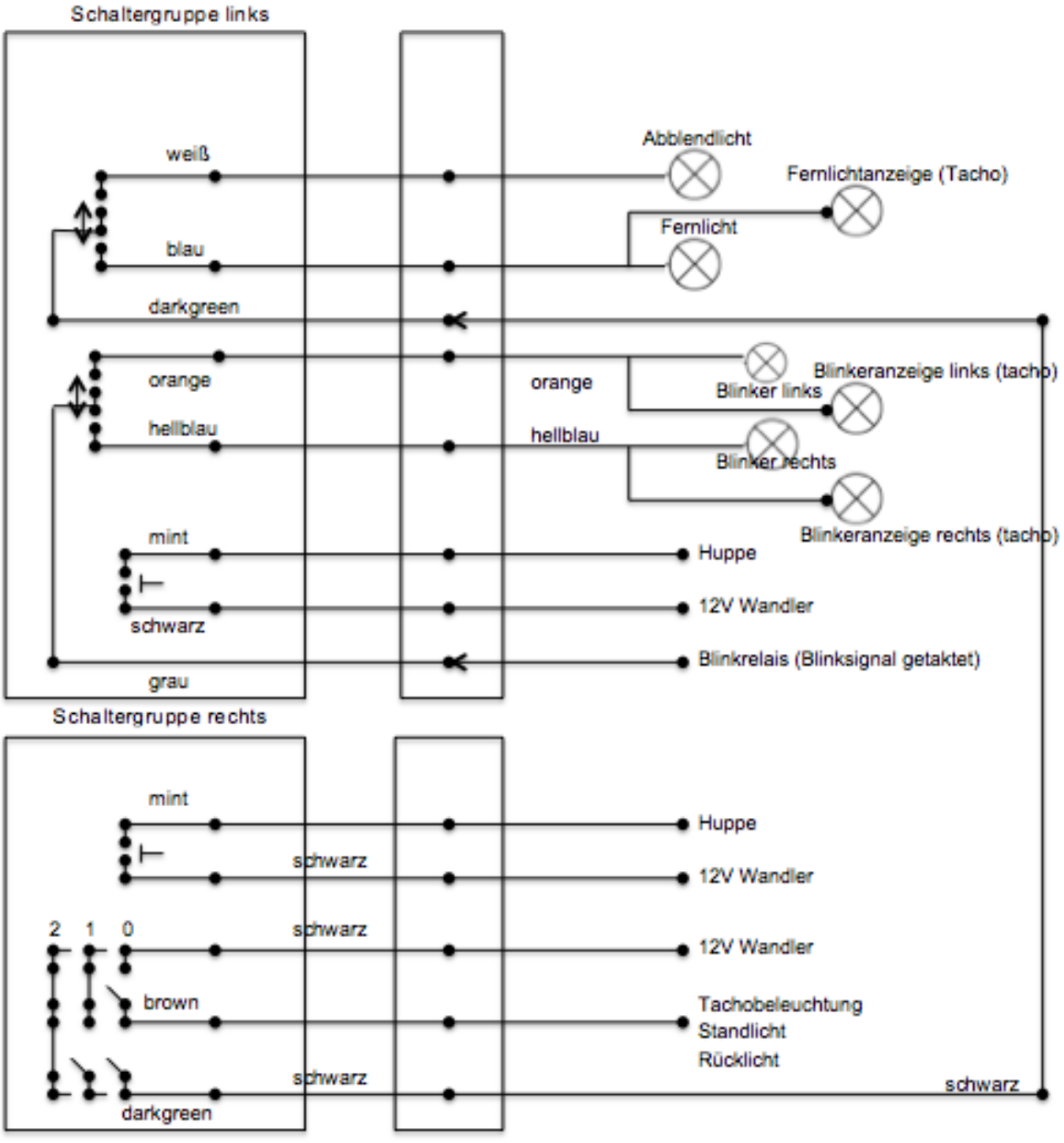
4.1 48V Electric circuit



4.2 12V Electric circuit



4.3 Switchgroup left and right on the handlebar

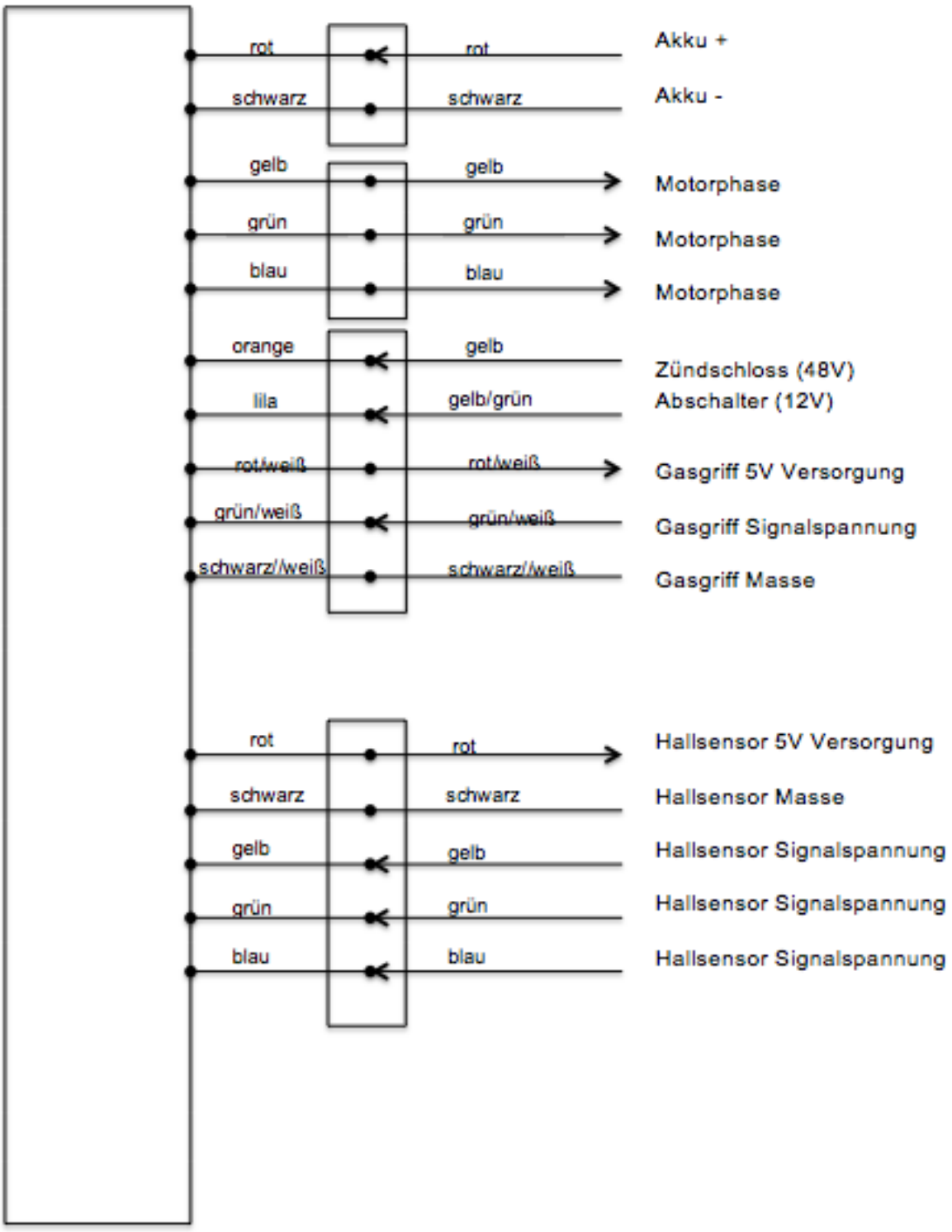


0 – Alle Lichter aus

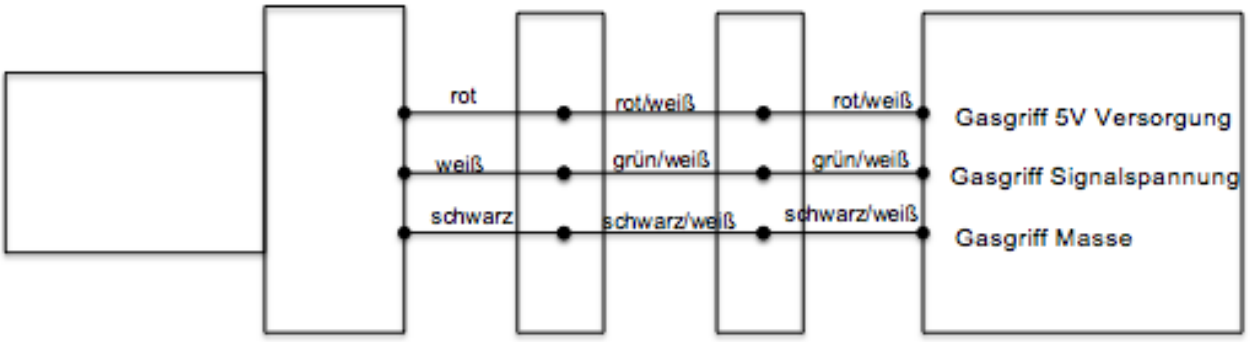
1- Standlicht

2- Fahrlicht, in dieser Stellung bekommt der „Umschlater Abblendlicht/Fernlicht" in der „Schaltergruppe links" Strom.

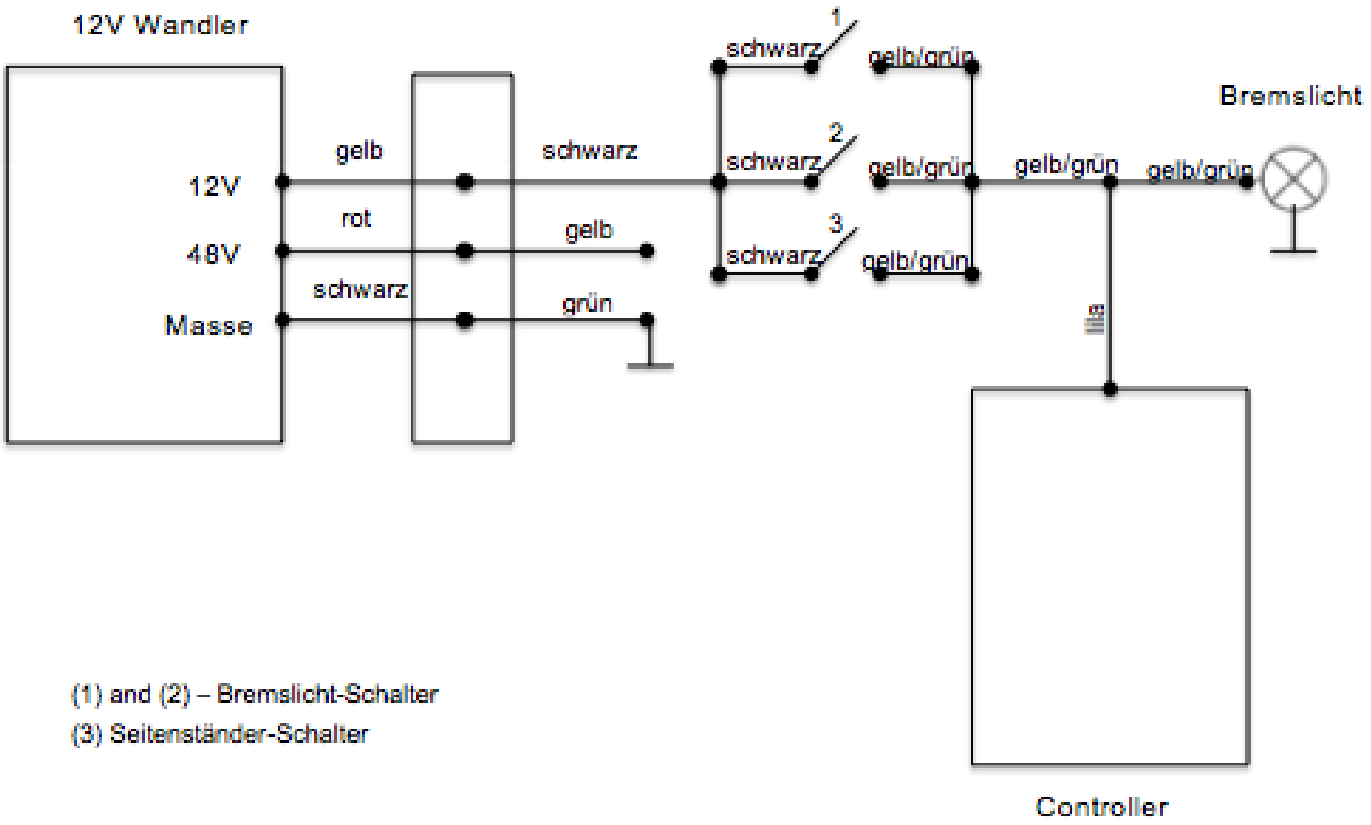
4.4 Controller



4.5 Accelerator throttle

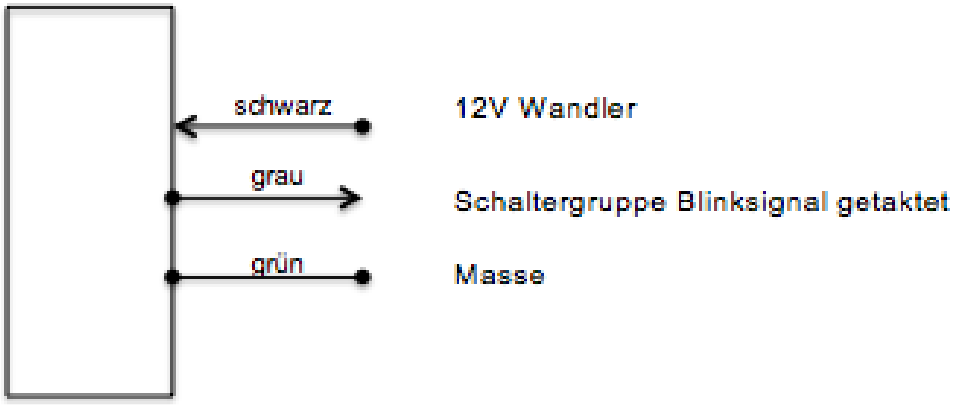


4.6 Brake lamp switch/KERS switch

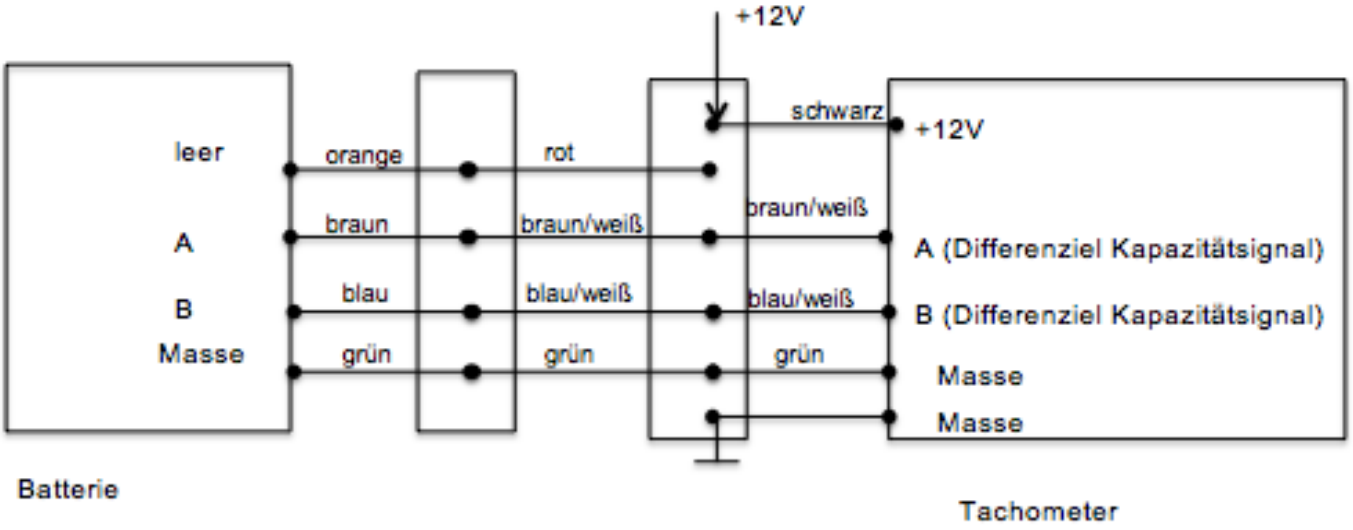


(1) and (2) – Bremslicht-Schalter
(3) Seitenständer-Schalter

4.7 Indicator relay



4.8 Capacity indicator of the battery



5. Time required

- All listed times needed for repair steps include both dis-assembly and assembly.
- The time listed in the top line for each item concerns only the work on the part itself and goes on top of the work required before to gain access to the part to be replaced
- The time listed in the "preparatory work" line shows the sum of all preparation needed.

Attention: All values are now available in a separate file which is available on request.

6. Diagnose

6.1 Controller Self-Diagnose Error Codes

Error	Description	LED Blinking time
Over-Voltage Protection	Battery Voltage is higher than default value	1
Under-Voltage Protection	Battery Voltage is lower than default value	2
Motor Over-Current Protection	Motor phase is short-circuit or phase to ground is short-circuit	3
Stalling Protection	Motor stalling time is over default value	4
Hall Sensor Protection	Hall sensor input is abnormal	5
Mosfet Protection	MOSFET self-checking is abnormal	6
Phase winding disconnect protection	One of the motor phase is disconnected	7
Self-Checking Error Protection	System internal power-on self-checking is abnormal	10
Controller Over-Heat Protection	When controller operation temperature is higher than default value	11
Throttle Protection	Throttle input is abnormal	12
Motor Over-Heat Protection	Motor Temperature is higher than the value of configuration	13
Governor Handle Idle ProtectionBraking Indication	Prohibit Governor Handle Operating when System Power On	14
Braking Indication	Indicating Braking Mode	15
15V Circuit Protection	15V driver voltage is lower than 10V or higher than 18V	16