Sunrise Medical GmbH
Kahlbachring 2-6
69254 Malsch/HD
November 2017

WHEELDRIVE GENERATION 2019

Service manual 2021

REVISION LIST

Revision	Description	Date
R0.01	New manual for 2nd generation WheelDrive. Beta version for 1st generation is taken as basis.	2018-07-17
R1.00	Concept version to sent to Sunrise	2018-08-03
R1.01	Chapter added for battery adjustment	2018-10-24
R1.02	Several small changes	2018-11-05
R1.03	Spare parts added	2018-11-07
R2.00	Pre-release for Sunrise	2018-11-08
R3.00	Spare part article numbers updated	2018-11-12
R3.01	Added retainerblocks	2020-10-07
R3.02	Updated beep list	2020-10-07
R3.03	Updated error list	2020-10-07
R3.04	Spare part article numbers updated	2020-10-07
R3.05	Updated exploded view	2021-01-18
R4.00	Release	2021-01-19

TABLE OF CONTENTS

1 INTRODUCTION

This Service manual is a reference guide for maintenance and inspection, field repair and setting driving behaviour of the WheelDrive.

The overview below explains where you can find what information

Chapter		
1	Introduction	
2	Service plan	Recommended periodic maintenance and checks
3	Repair	Explains how to replace (disassemble, re-assemble) parts for service and repair in the field
4	Setting driving behaviour	Explains how to use PowerTalk on your laptop to finetune driving behaviour to the clients needs
5	Software update	Explains how to update the controller software
Appendix		
A	Trouble shooting flow chart	Helps you to find failures and gives advice on who can fix what
B	Beep ID overview	Explains on the beep and LED signaling for normal use, warnings and errors
C	Modification 2019	Retainer and wiper setting
D	Glossary	Explains frequently used words and definitions
E	Spare parts overview	

NOTES:
For a more general explanation on the WheelDrive and on how to use it in specific circumstance please refer to the ***User Manual****.*

For an explanation how to fit the WheelDrive to the wheelchair please refer to the ***Installation Manual.***

2 SERVICE PLAN

2.1 General

The following overview explains what periodic maintenance needs to be done by the user and the dealer service.

This service/Maintenance plan should be carried out by the dealer every time the WheelDrive is presented for service-related matters.

Time span	What	To be carried out by	
		User	Dealer
Daily	1. Charge batteries after each use	X	
Weekly	2. Check tire pressure	X	
Monthly	3. Inspect tire wear	X	
	4. Inspect cone fixture (support bumper)	X	
	5. Inspect anti-tip functionality	X	
Every 6 months	6. Change batteries Sensorbox (2x AA per side)	X	
Annual Service Appointment (see checklist page 4)	7. Check the driving behaviour with Assist Rim and Drive Rim		X
	8. Inspect the electrical system		X
	9. Inspect the battery		X
	10. Inspect the anti-tip feature		X
	11. Inspect the hand rims		X
	12. Overall inspection		X

To 6. However there is a signaling to warn the user at low battery status, it is recommended to change the batteries of the Sensorbox every 6 months.

Warning

Do not use rechargeable batteries.

2.2 Additional Maintenance requirements prior to any installation

The following points must be carried out prior to any installation and during annual maintenance:

Annual maintenance checklist	**Inspection summary**
Inspect the drive	
Use Assist Rim to drive forwards	
Use Assist Rim to drive backwards	
Use Drive Rim to drive forwards	
Use Drive Rim to drive backwards	
Inspect electrical system	
Check all status LED's	
Check for BEEP signaling	
Check function of all buttons	
Check handle safety feature	

Inspect the battery	
Check for damages	
Check locking in the WheelDrive	
Check charger input rubber	
Inspect anti-tip	
Check movement anti-tip leg	
Check anti-tip wheel	
Check fixture anti-tip	
Check fixation anti-tip bolt	
Inspect Assist Rim	
Check for damages	
Check movement	
Check center position	
Inspect Drive Rim	
Check for damages	
Check movement	
Check center position	
Overall	
Check for tire wear	
Check the cone installation	

2.3 Handle safety feature

Handle safety feature prevents switching on the system with the handle that locks the wheel on the chair in open position.
Be sure to put the handle in closed position when operating the WheelDrive.

2.4 Batteries

The battery is fitted with gold plated contacts. Make sure contacts are clean and undamaged. Clean battery contacts with a damp cloth to prevent extraordinary wear of contacts.

Warning
Do not use other chemical cleaners.

Warning
Ensure the batteries are always fully charged. Not using the batteries for an extended period of time can damage them. Do not use the WheelDrive if the batteries are almost run down and never if the batteries are completely empty. This can seriously damage the batteries and you may run the risk of coming to an unintended standstill.

If the capacity of the batteries is continually decreasing so that the wheelchair can only be used for short trips, this means that the batteries are reaching the end of their lifespan. The batteries then must be replaced.

Warning
Batteries contain acids. Damaged batteries are a serious health hazard.

Warning
When replacing the original battery pack for a new one, make sure that the battery play is checked and adjusted according to the description in chapter 3.4.

2.5 Anti-tip

The anti-tip can be positioned upwards or downwards.
Be sure to put the anti-tip in the downwards position prior to any use, even if one is an experienced user.

Warning
Ensure the fixation of the anti-tip bolt is inspected.
Sunrise Medical will not be responsible in any way, when not using the anti-tip. Risk of serious injury if not used!

2.6 Hand rims

The hand rim safety feature prevents using the WheelDrive when hand rims are operated during startup.
Be sure to leave the hand rims in idle and untouched condition about 3 seconds after switching on the WheelDrive.

Warning
At all time the hand rims must be able to move clearly from other objects. Any disturbance from burrs or bends will affect the drive experience.

2.7 Tires

Tires must perform well under normal conditions. Insufficient inflation or over-inflation will reduce the drive experience. Cracks, bumps, or lack of profile may increase the risk of a flat tire.

2.8 Installation to wheelchair

Badly installed WheelDrive will reduce the drive experience. Refer to the Installation Manual to check the cone and axle setting.

Warning
Cones and axles subject to wear must be replaced! If ignored, hazardous events can occur. Risk of serious injury.

3 REPAIR

This section gives detailed instructions on how to replace the most common service parts, that are prone for wear.

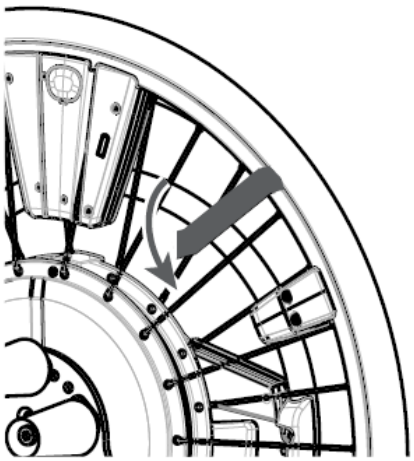
Index

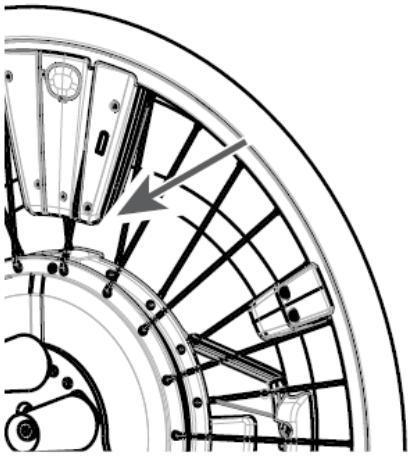
Warning
To prevent the risk of injury, always turn off the WheelDrive and remove the battery before servicing.

3.1 Tire replacement

Warning
Do not remove or change the rim protection tape. The rim protection is custom designed to bear the high pressure tires.

Preparation
Unlock the WheelDrive and remove from wheelchair frame.
Removal of the outer tire only in inwards direction. Do not remove the outer tire on the hand rim side, damage to hand rims is possible.





Replacement tires provided by Sunrise. Model Schwalbe Marathon Plus Evo is designed for indoor- and outdoor use. The Marathon Plus Evo tire has a pre-defined rolling direction. Please pay attention when this type of tire is replaced or removed for any service. Only use identical tire models on left and right wheel because of diameter and rolling resistance differences.

Marathon Plus Evo

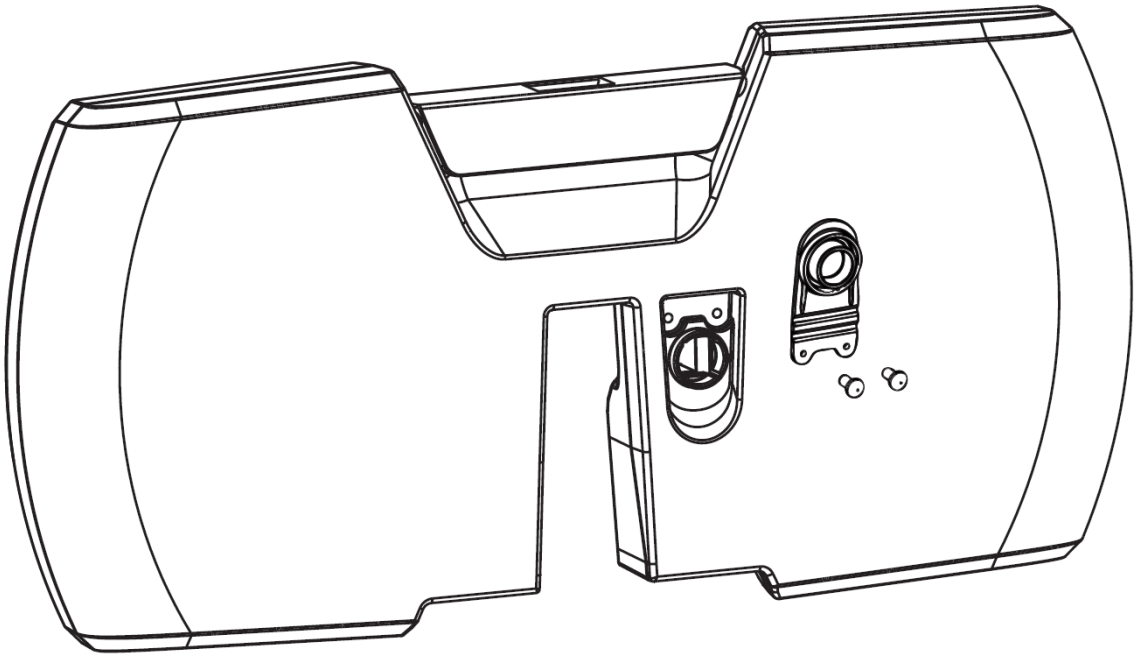
Remove tire like normal wheelchair tires.

Tools used
- normal tire levers

Replacement part
- 9007932 Marathon Plus Evolution Black

3.2 Charger input rubber replacement

Preparation



Unscrew 2 REMFORM M3 x 6. (See above). Use Philips screwdriver.

Replace connector cover.

Screw 2 REMFORM M3 x 6. (See above). Use Philips screwdriver.

Tools used

- Philips Ph1 screwdriver.

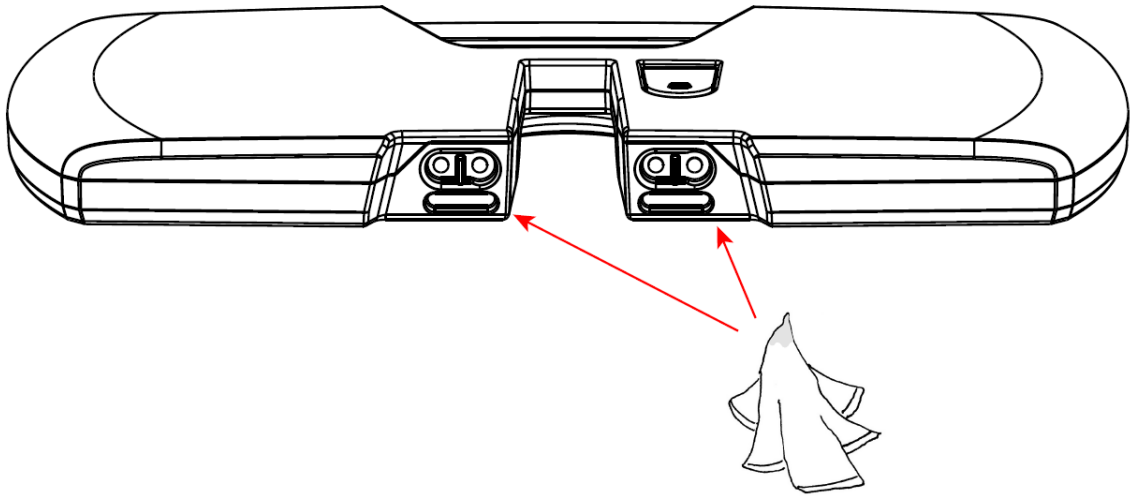
Replacement part

- 9007938 Connection cover + screws

3.3 Battery contacts cleaning

Warning
To prevent the risk of injury, always turn off the WheelDrive and remove the battery.

Preparation



Clean all 4 contacts. The contacts on the left side of the wheel are the power contacts; the contacts on the right side (where the cloth is) are the BMS communication contacts.

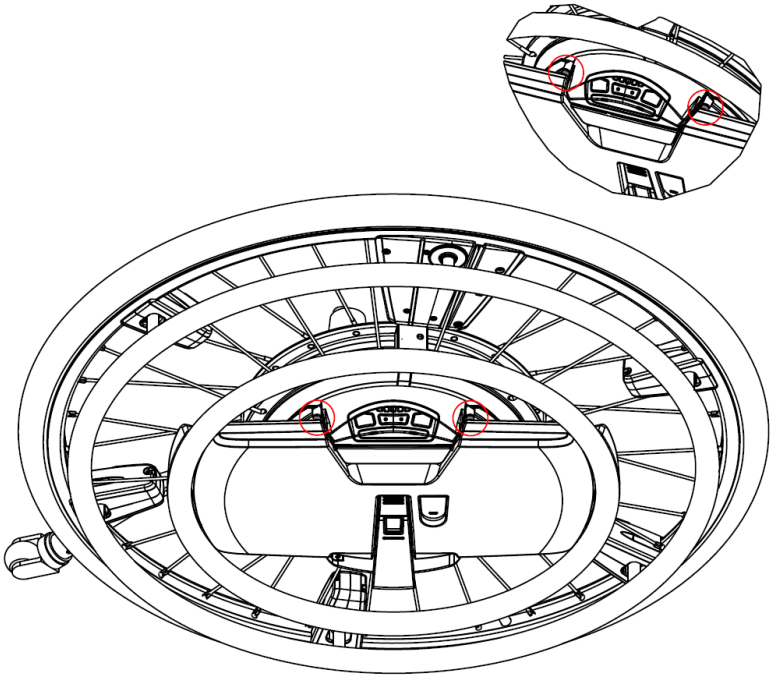
Tools used
- Moist cloth

Sunrise Medical part
-

3.4 Battery replacement

Warning
Always check the play of a new battery pack according to the instructions below

Preparation
Check if set screws indicated below are present



Place the new battery pack into the WheelDrive and check if the battery pack handle snaps correctly into the user interface.

If the handle snaps correctly, then check the play of the battery pack in the direction of the wheel axle. **The play should be minimized as far as possible, but the snapping of the handle must be guaranteed to eliminate the risk of a battery pack dropping out of the WD.**

Adjusting the play can be done by correcting the dept of both set screws next to the user interface (see picture above).

If the handle does not snap, then the set screws must be tightened a bit more until the play and snap function are perfect.

Batteries used in Gen1 WheelDrive should use the rubber cabs on the backside to reduce the play.

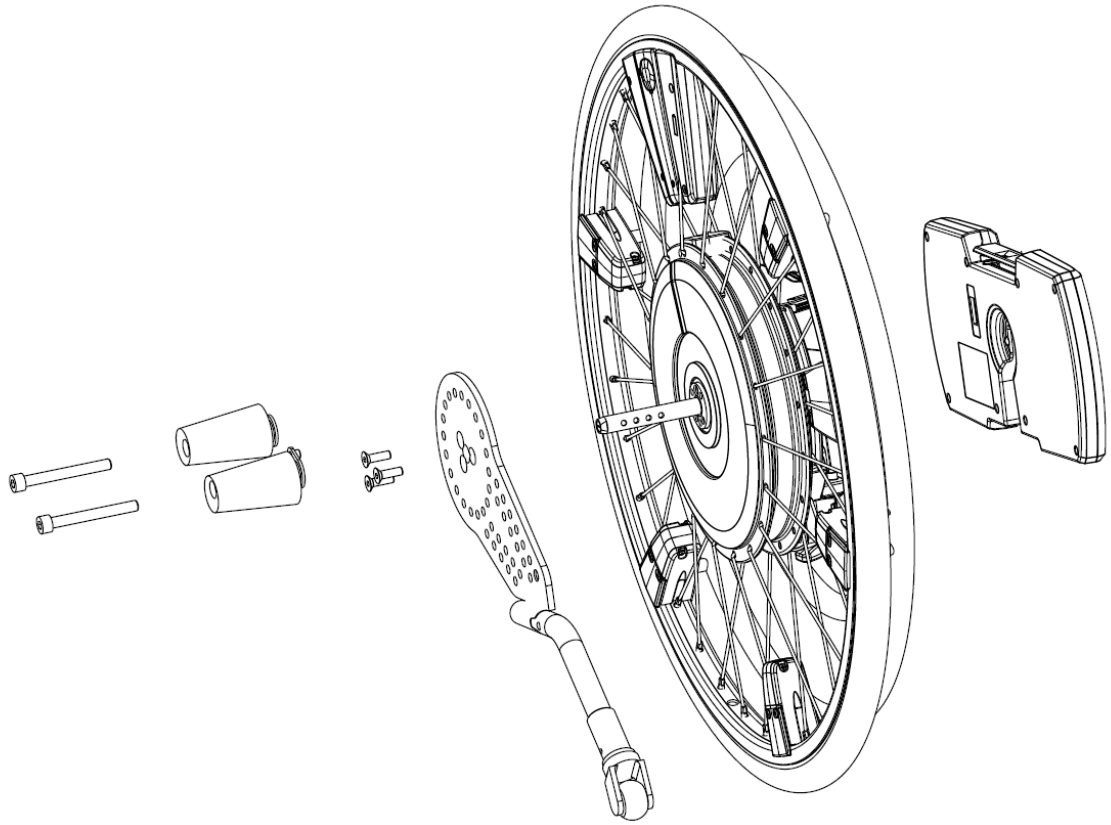
Tools used
- Torx nr 10
- Loctite 243

Replacement part
- **1019489 Battery Pack Quickie (for use together with other Quickie batteries)**
- **1020824 Battery Pack Empulse (for use together with other Empulse batteries)**

3.5 Anti-tip replacement / Anti-tip wheel replacement

Warning
To prevent the risk of injury, always turn off the WheelDrive and remove the battery.

Preparation
Unlock the WheelDrive and remove from frame



Unscrew 3 sunk-head M6 x 20. (See above). Use Allen key No.4.
Replace the Anti-Tip.

NOTE: Anti-tip are right and left oriented.

Screw 3 sunk-head M6 x 20. (See above). Use Allen key No.4. Apply Loctite 243.
Use Loctite cleaner & Loctite fastener before applying Loctite 243 to ensure better locking of bolts.

Replacing anti-tip wheel
Remove the clamping bush. Replace the tip wheel.

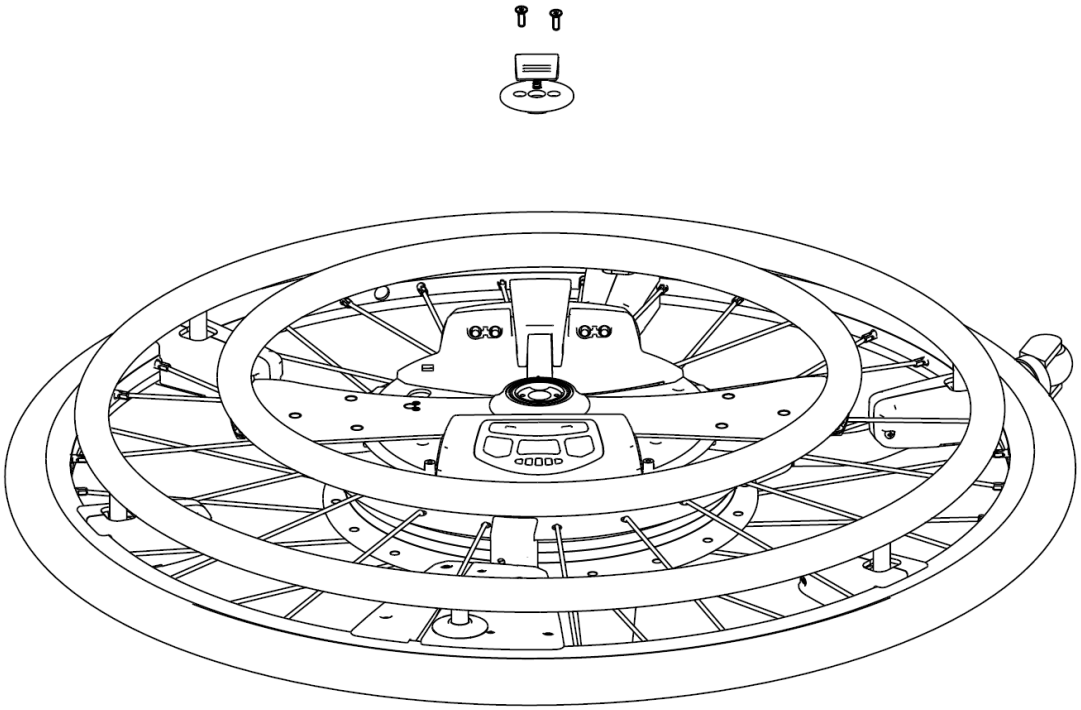
Tools used
- Allen key No4
- Loctite 243

Replacement part
- 9007961 Anti-tip Arm Right
- 9007963 Anti-Tip Arm Left
- 9007959 Anti-tip wheel (set of 2 pcs)

3.6 QR-Unlock mechanism replacement

Warning
To prevent the risk of injury, always turn off the WheelDrive and remove the battery.

Preparation
Unlock the WheelDrive and remove from frame.



Remove the pin that holds the push button first. Remove by tapping it from the right side and take out from left.

Unscrew 2 sunk-head M3x10. (See above). Use Torx nr 10.
Replace the QR Unlock assembly.

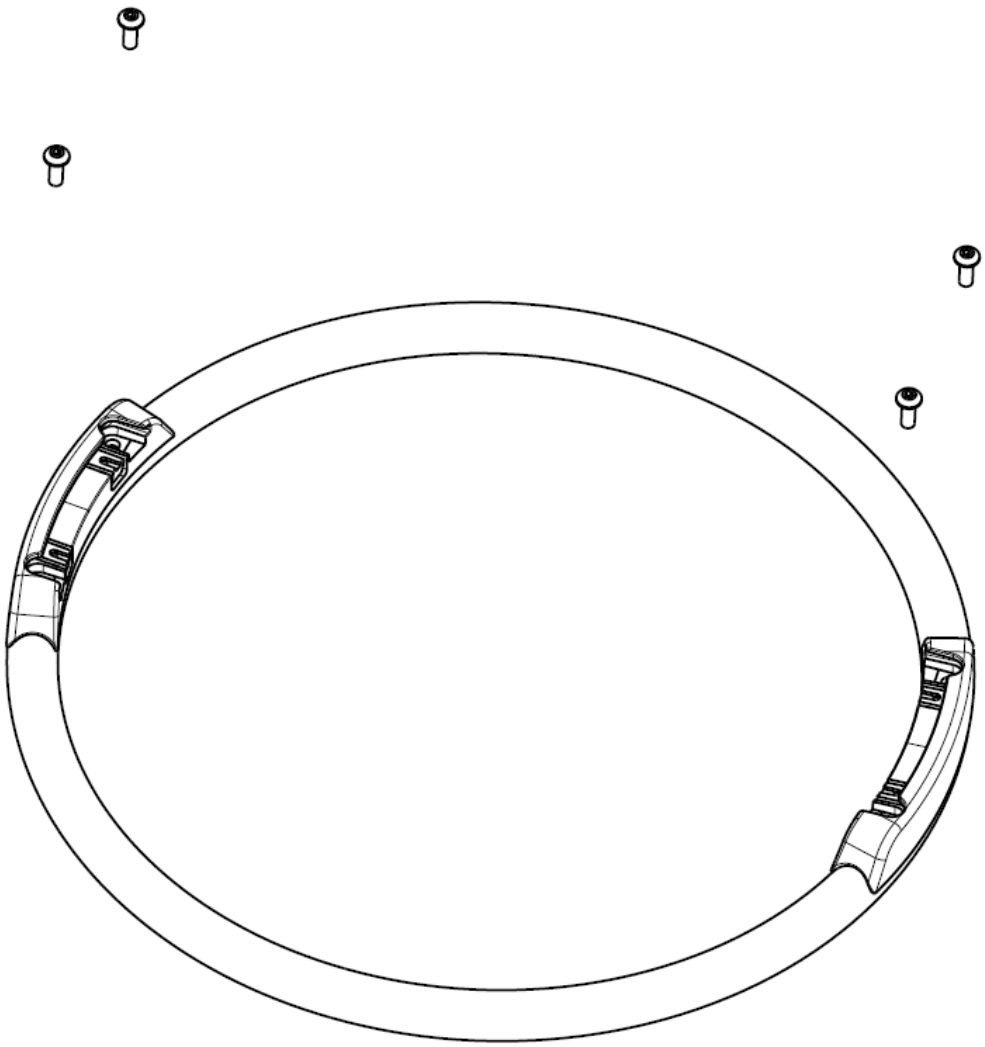
Screw 2 sunk-head M3x10. (See above). Use Torx nr 10. Apply Loctite 243
Torque setting: 0.6 Nm

Tools used
- Torx nr 10
- Loctite 243
- Torque wrench

Replacement part
- 1018670 QR-Unlock mechanism

3.7 **Drive Rim replacement**

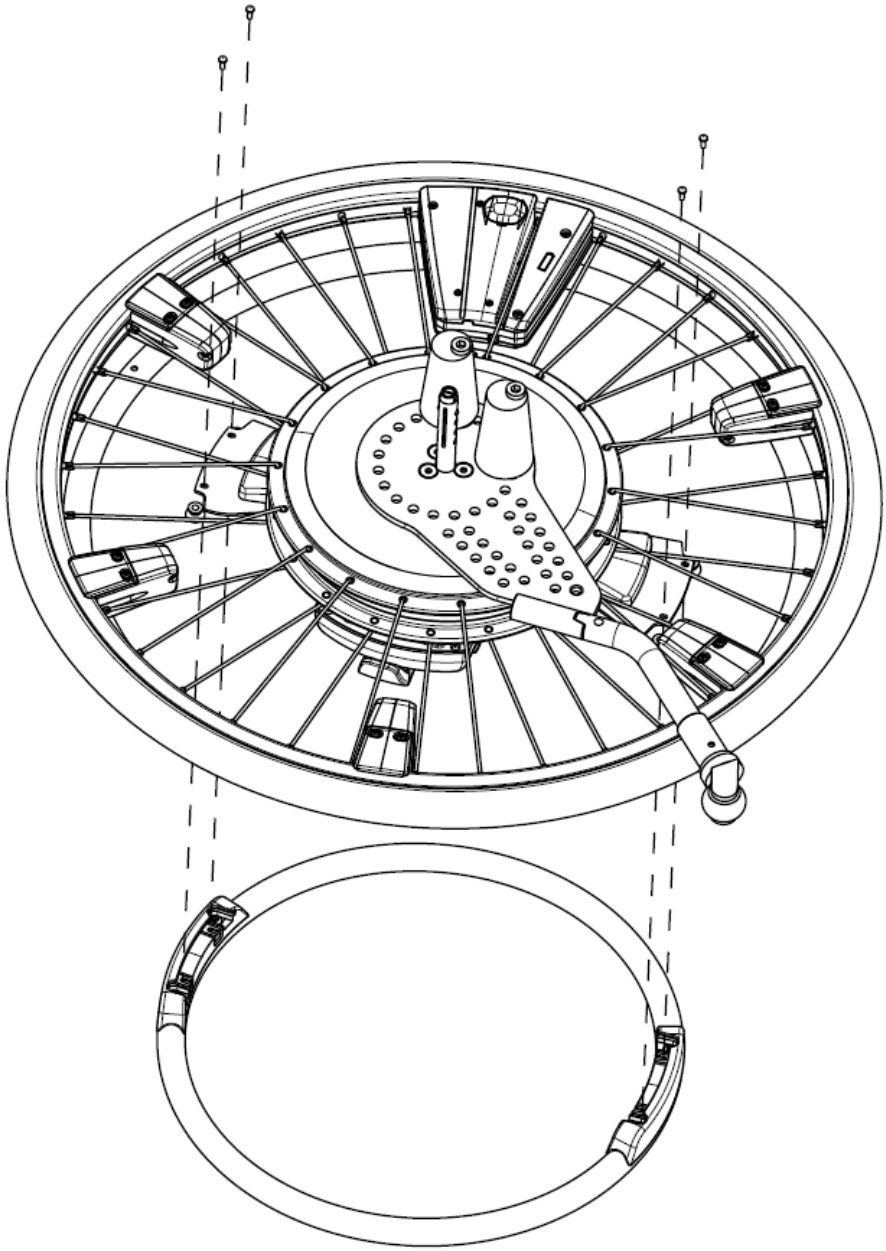
Warning
To prevent the risk of injury, always turn off the WheelDrive and remove the battery.



Unscrew the 4 hexagon socket head screws from the aluminium hoop. Use Allen key no.3
Remove the 2 plastic hoop connectors.

Always use new plastic hoop connectors when replacing the aluminium hoop.
Connect the plastic hoop connectors to the new aluminium hoop.
Apply 2.5 Nm torque and Loctite 243 to fix the 4 hexagon socket head screws.

Tools used
- Allen key no.3
- Torque wrench
- Loctite 243



Slide the new small hoop over the small hoop bracket.
Mount the 4 pan head torx screws, but do not tighten them yet.
Center the small hoop with the bracket and tighten the screws with 1 Nm.

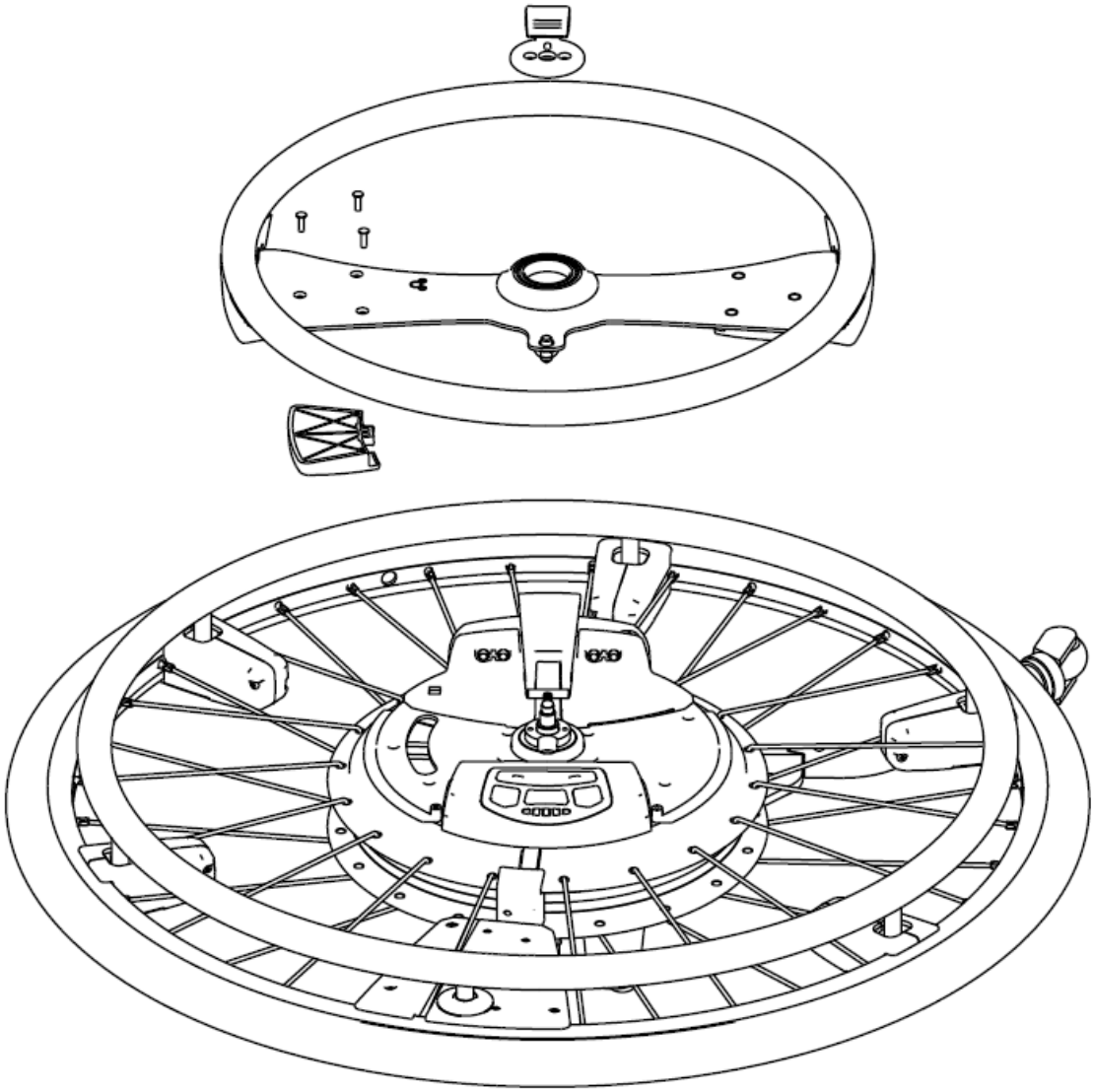
Tools used
- Torx 10 screwdriver
- Torque wrench

Replacement part
- 1019577 Small hoop

3.8 Small hoop bracket replacement (including small handrim)

Warning
To prevent the risk of injury, always turn off the WheelDrive and remove the battery.

Preparation
Unlock the WheelDrive and remove from frame.

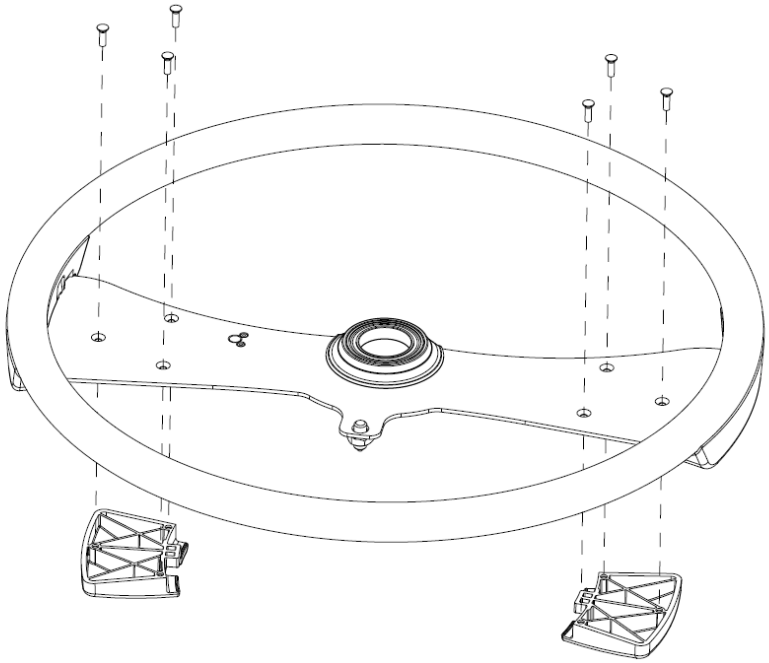


Remove the QR Unlock mechanism (see §3.6)

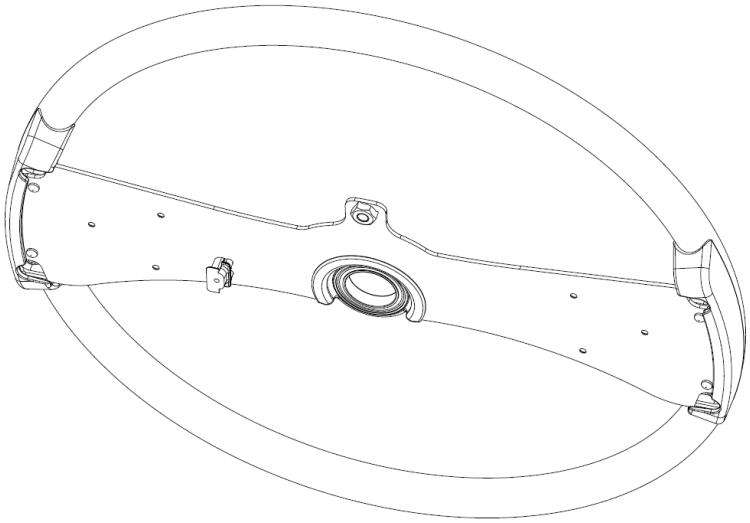
Unscrew 3 sunk-head 3.0x8. (See above). Use torx 10 screwdriver.
Remove the clamp from the Drive Rim Bracket.
Unscrew User Interface. 2x M3x6. Use torx 10 screwdriver. Remove retainer block,
Now carefully turn and lift the follower out of the spring legs.
Lift the small hoop assembly of the bearing guidance part.

Tools used
- Torx 10 screwdriver

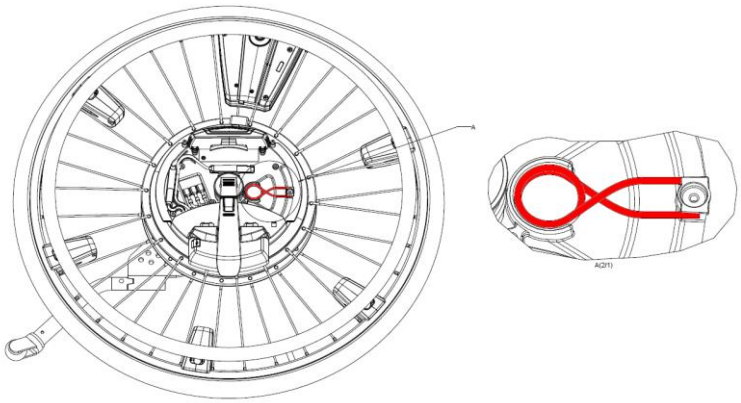
Assemly of new small hoop assembly:



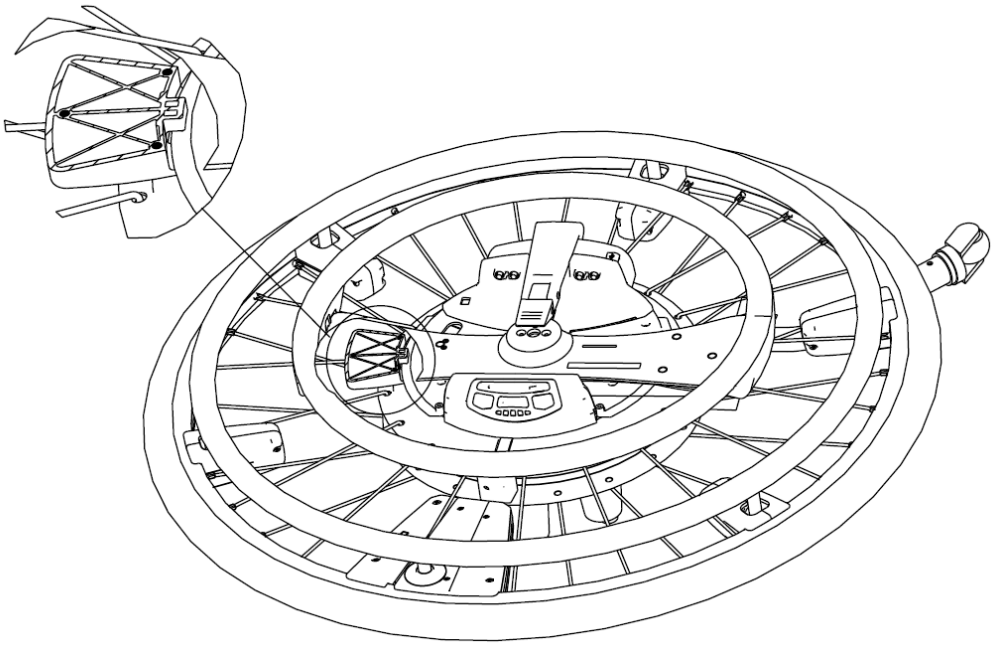
Remove the 2 clamps from the small hoop bracket by unscrewing the 6 sunk-head screws.



Follower is pre-mounted to the small hoop bracket.



Place the new small hoop carefully with the bearing over the aluminium part and slide the follower between the spring legs.



Fix the 2 clamps to the bracket by tightening the 6 sunk head screws with 3 Nm.
Check the spring function by moving the Drive Rim forward and back.
Add a new wiper, adjust position and check function. See chapter 3.9.

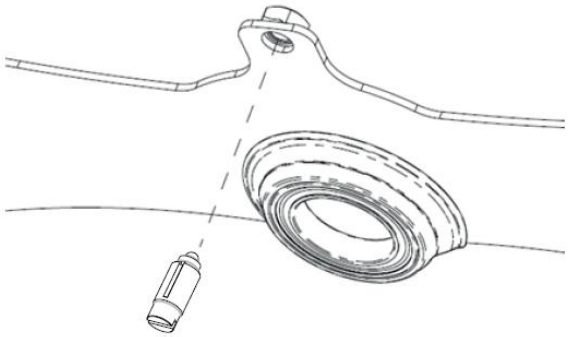
Tools used

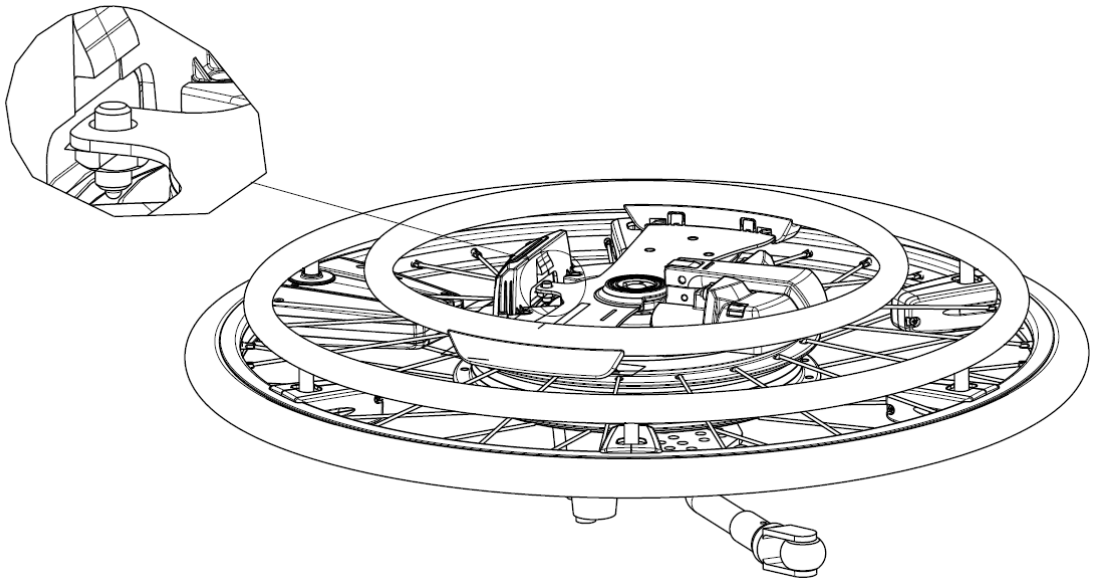
- Torx 10 screwdriver

- Replacement part
- 1019488 Drive Rim Assy **2nd generation**

3.9 **Wiper replacement**

Warning
To prevent the risk of injury, always turn off the WheelDrive and remove the battery.





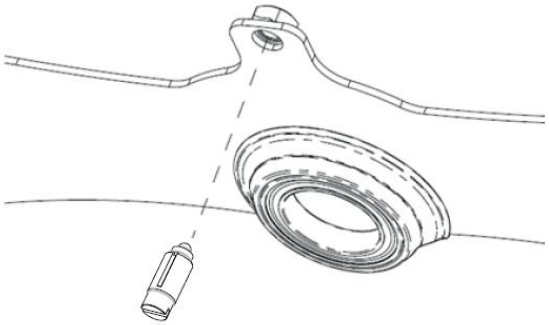
Remove the Small Hoop Bracket from the WheelDrive, see §3.8
Remove remains of old Loctite using a M6 thread tap.
The wiper is equipped with a nylon strip. This prevents the wiper to loosen from the bracket.
Do not apply Loctite.
Screw the new wiper into the bracket plate (not too far, approximately 1 thread run)

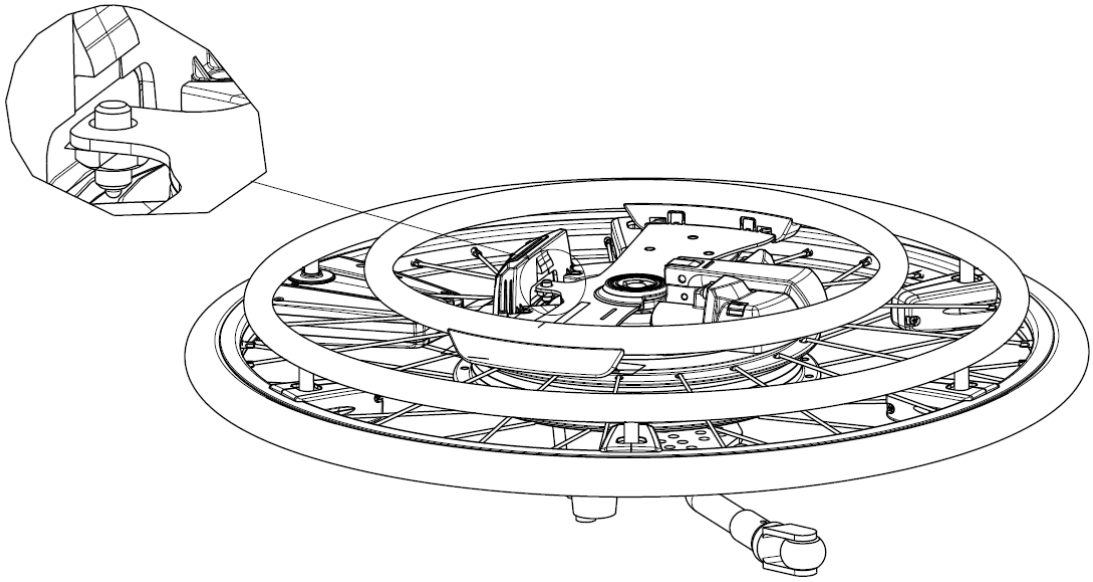
See Appendix D for detailed instructions.

Tools used
- Flat screw driver
- Tap M6
- 1020851 Wiper 4.3 mm spare

3.10 **Wiper adjustment**

Warning
To prevent the risk of injury, always turn off the WheelDrive and remove the battery.





Screw in the wiper until the white tip of the wiper just touches the potentiometer foil; the wiper tip should be pressed in approximately 0.25 to 0.5 mm

Screw the wiper down 360o twice (= 2 full turns)

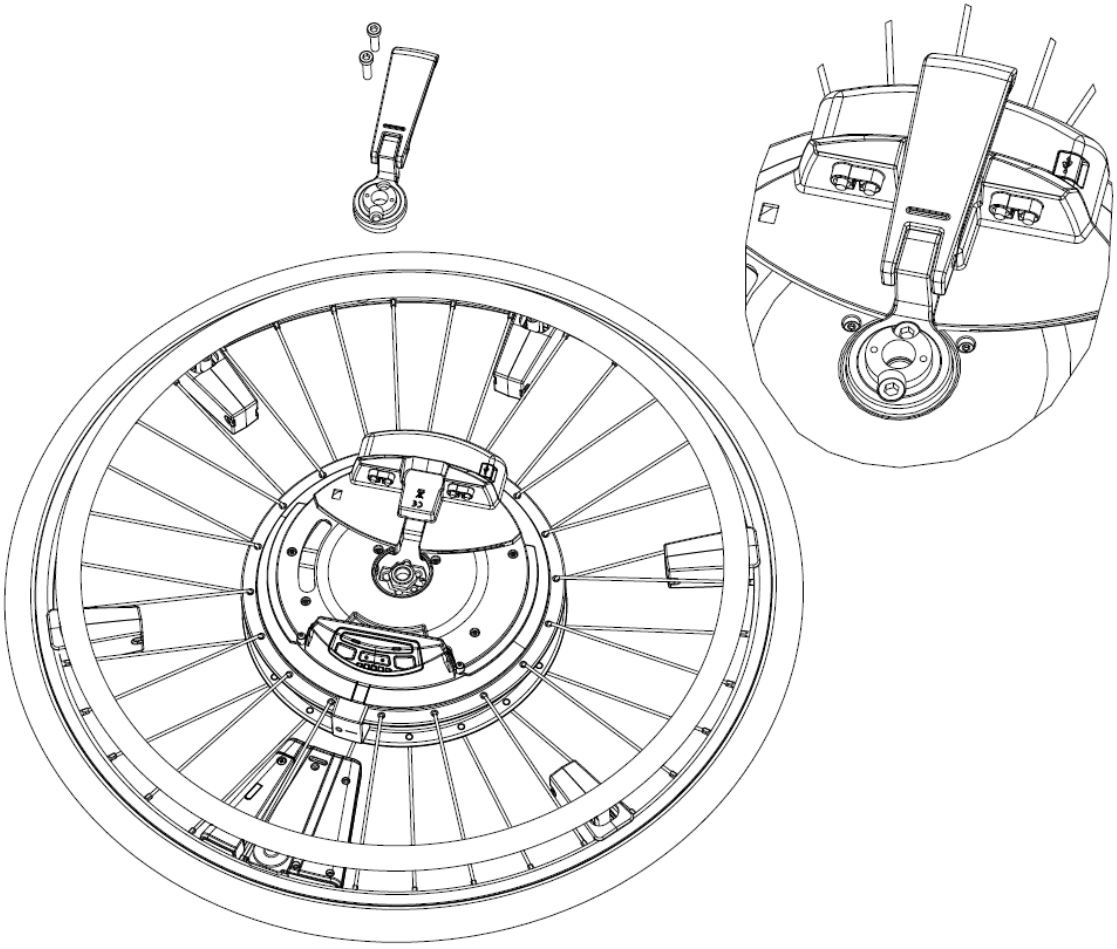
See Appendix D for detailed instructions.

Tools used
- Flat screw driver
- Wiper check tool

3.11 **Handle and bracket replacement**

Warning
To prevent the risk of injury, always turn off the WheelDrive and remove the battery.

Preparation
Unlock the WheelDrive and remove from frame



Remove the QR Unlock mechanism (See §3.6)
Remove the Drive Rim (See §3.7)

Unscrew 2 Hexagon Bolt M6x25. (See above). Use allen key no 4.
Replace Handle and Bracket assembly.
Be sure not to clamp any wires below!
Screw 2 Hexagon Bolt M6x25. Use allen key no. 4 Apply Loctite 243.
Torque setting: 8Nm.

Replace the Drive Rim (See §3.7)
Replace the QR Unlock mechanism (See §3.6)

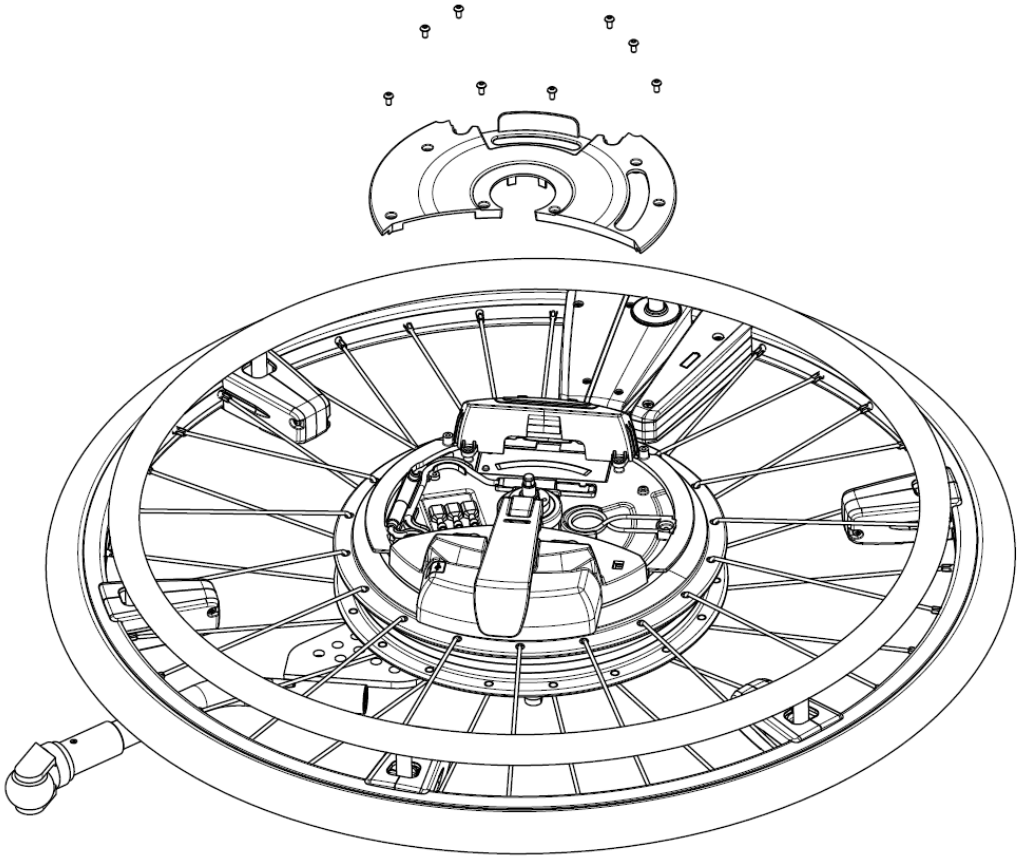
Tools used
- Allen key no. 4
- Loctite 243

Replacement part
- 9007943 Handle + Bracket

3.12 **Middle housing replacement**

Warning
To prevent the risk of injury, always turn off the WheelDrive and remove the battery.

Preparation
Unlock the WheelDrive and remove from frame



Remove the QR Unlock mechanism (See §3.6)
Remove the Drive Rim (See § 3.7)
Unscrew 2 UI screws. Use Torx 10.

Unscrew 6 Hexagon Screw M3x6 (See above). Use Torx 10
Remove the middle housing.
Replace the middle housing.
- Make sure cables are not twisted or located faulty.
- Make sure the spring is located correctly.

When placed, the housing should look smooth and equal. No bumps!
Screw 6 Hexagon Screws M3x6. Use Torx 10.
Apply Loctite 243.
Torque setting 0.6 Nm.

Replace the Drive Rim (See §3.7)
Replace the QR Unlock mechanism (See §3.6)

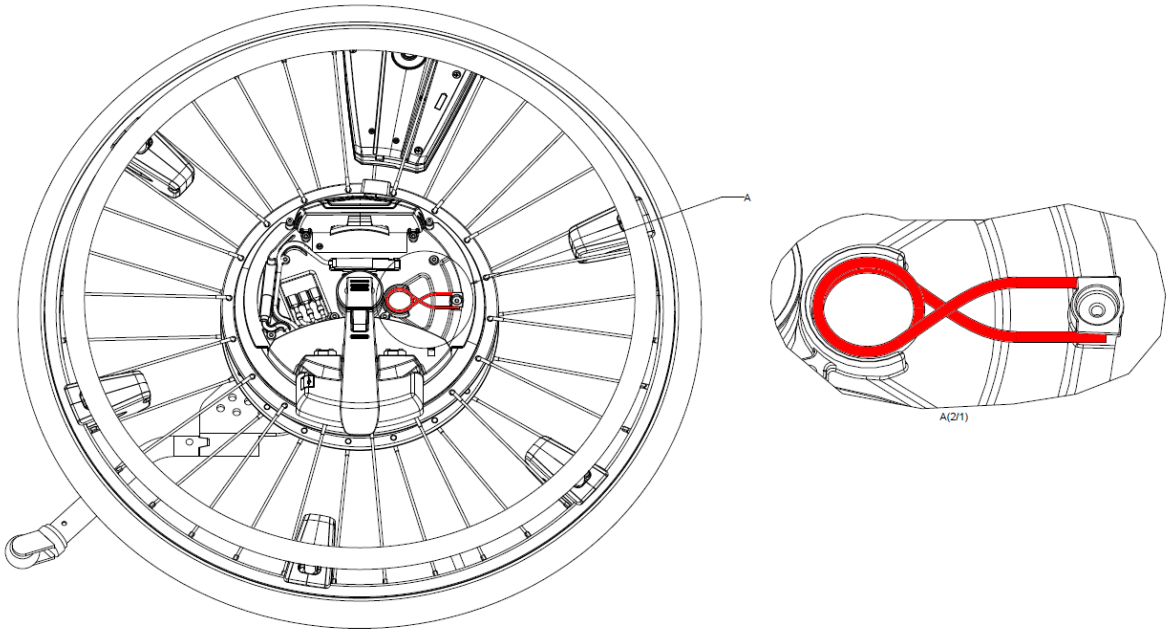
Tools used
- Torx 10
- Loctite 243

Replacement part
- 1019494 Housing Middle

3.13 Spring and follower replacement

Warning
To prevent the risk of injury, always turn off the WheelDrive and remove the battery.

Preparation
Unlock the WheelDrive and remove from frame



Remove the QR Unlock mechanism (See §3.6)
Remove the Drive Rim (See §3.7)
Remove the Middle Housing (See §3.12)

Remove the spring (See picture above)
Remove the Follower from small hoop bracket
Replace the spring. The spring can be mounted in 2 directions. Make sure the spring legs are facing downwards when put on a flat surface.
Replace the Follower. It can fit only 1 way. Attention.
See Appendix D for detailed instructions.

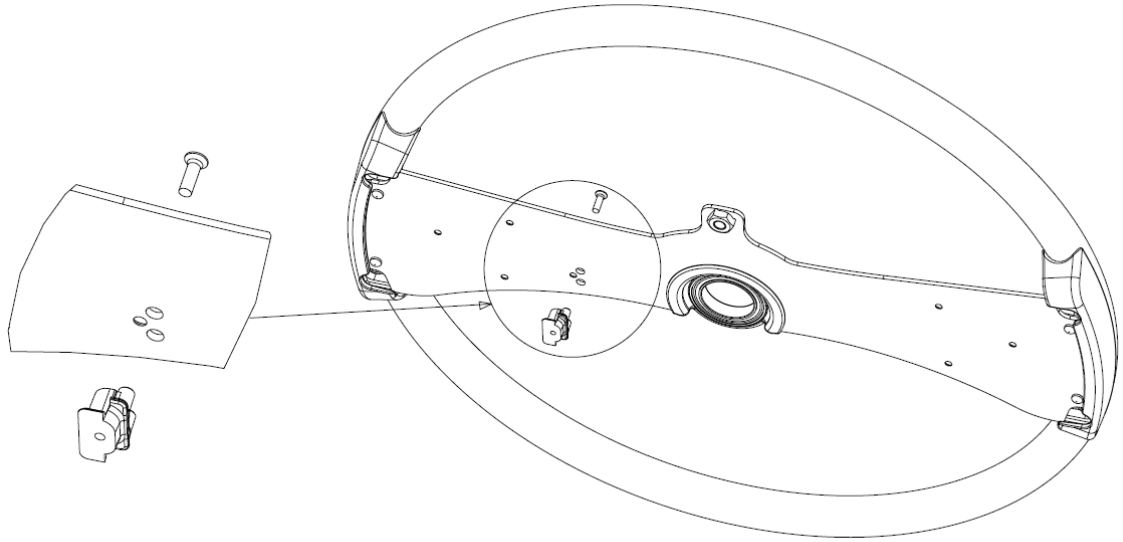
Replace the Middle Housing (See §3.12)
Replace the Drive Rim (See §3.7)
Replace the QR Unlock mechanism (See §3.6)

Tools used
- Pliers

Replacement part
- 1020856 Spring+follower

Preparation

Unlock the WheelDrive and remove from frame



Remove the Follower from small hoop bracket
Replace the Spring and Follower
Be sure to position it correctly!

Replace the Middle Housing (See §3.12)
Replace the Drive Rim (See §3.7)
Replace the QR Unlock mechanism (See §3.6)

Tools used

- Torx 10 screwdriver

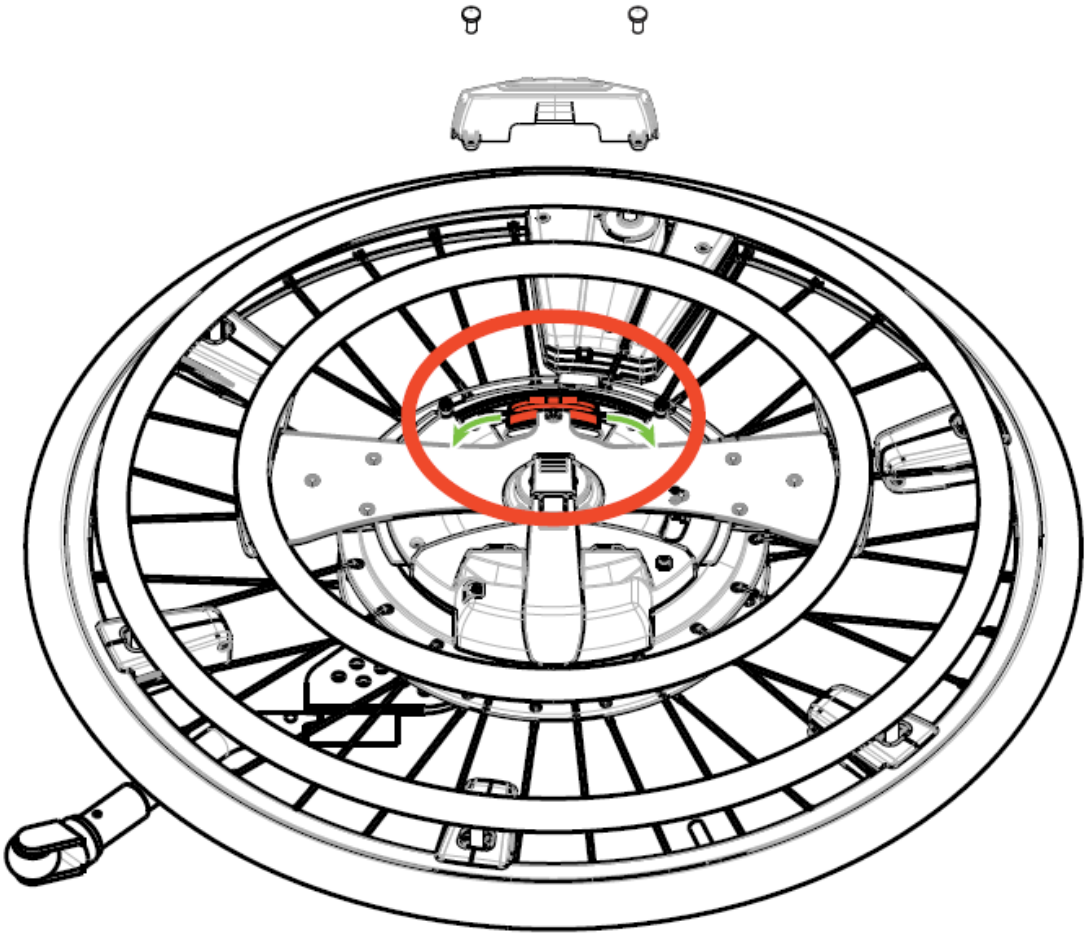
Replacement part

- 1020856 Drive Spring+follower Gen2019

3.14 **Replace retainerblock**

Warning
To prevent the risk of injury, always turn off the WheelDrive and remove the battery.

Preparation
Unlock the WheelDrive and remove from frame



Remove the 2 screws that hold the UI (See §3.16)
Fold the UI a little backwards. Be carefull not to damage the band-cable.
Push the Drive Rim to left or right position (like when operating it)
Remove the old Retainer block.
Check the number, 2A or 2B and replace with similar.
See Appendix D for detailed instructions.

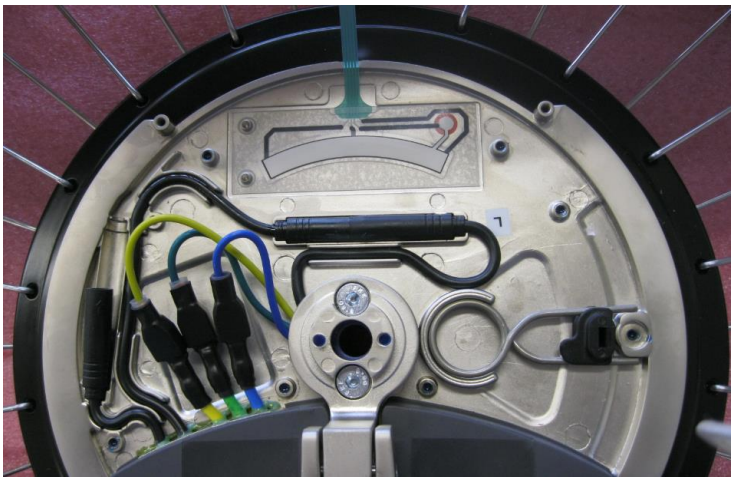
Tools used
- Torx 10

Replacement part
- 1020854 Retainers generation 2019

3.15 **Sensor foil replacement**

Warning
To prevent the risk of injury, always turn off the WheelDrive and remove the battery.

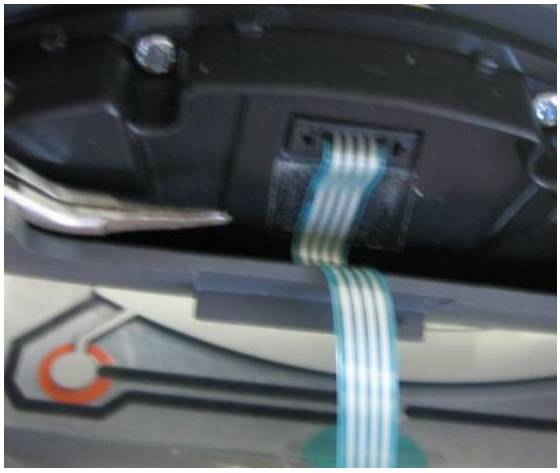
Preparation
Unlock the WheelDrive and remove from frame.



Remove the QR Unlock mechanism (See §3.6)
Remove the Drive Rim (See §3.7)
Remove the Middle Housing (See §3.12)

The sensor foil is located at position shown in picture above.
Remove the protection sticker (with version nr information) off the UserInterface.
Carefully remember how the flat cable is positioned, it is needed later for replacing the flat cable.
Below is the connector that connects the sensor foil.

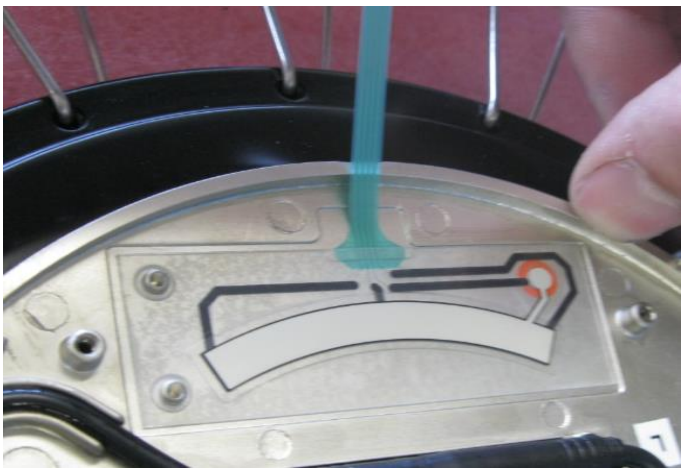
Tools used
- Pliers



Open the connector carefully. Use pliers or scalpel to open the release strip. (See above)
Remove the sensor foil out of the connector by pulling the flat cable backwards.
Remove sensor foil from plate. It helps by heating the surface.
Clean glue residu, make sure surface is smooth before sticking new foil.
Check for sharp burrs, they could puncture the new foil!

Tools used

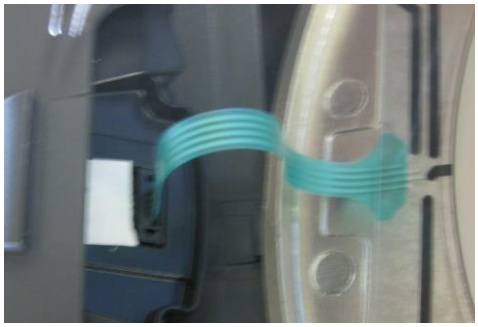
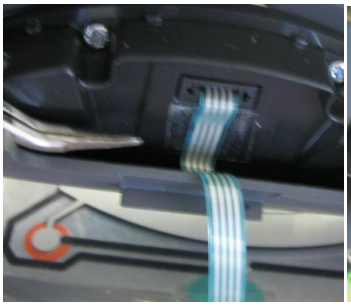
- Pliers – Scalpel
- Cleaning fluid – Isopropanol (cleaning alcohol)



Remove the protective layer from the backside of the new sensor foil.
Place the sensor foil at the position marked at the picture above.
Be sure to place it in the correct place. (See above)
Apply some pressure on the foil for good bonding.

Replacement part

- 1018676 Sensor foil


Replace the flat cable at the connector and close the connector. Use small flat screwdriver. Push until you feel resistance.
Make sure the flat cable is not in a <90° degrees angle this may damage the flat cable. Use protection sticker to hold flat cable in an approx. 100° degrees' angle.
Replace the protection sticker. Make sure it bonds to the housing (see above).

Replace the Middle Housing (See §3.12)
Replace the Drive Rim (See §3.7)
Replace the QR Unlock mechanism (See §3.6)

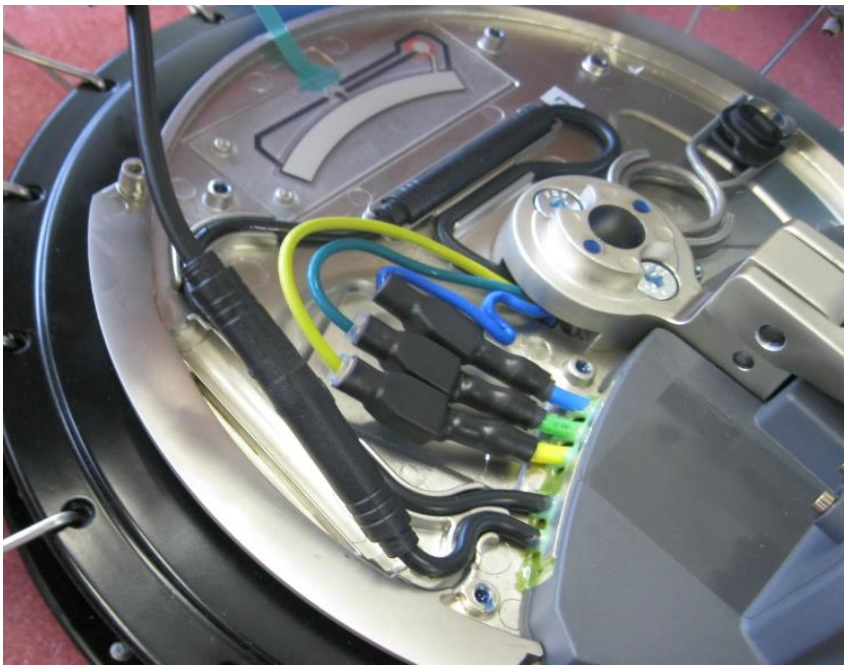
Tools used

- small flat screwdriver

3.16 User Interface replacement

Warning
To prevent the risk of injury, always turn off the WheelDrive and remove the battery.

Preparation
Unlock the WheelDrive and remove from frame.



Remove the QR Unlock mechanism (See §3.6)
Remove the Drive Rim (See §3.7)
Remove the Middle Housing (See §3.12)
Remove the flat cable of the sensor foil (See §3.15)

Disconnect the cable attached to the UserInterface at the left side. Just pull the connector in opposite direction. (See above)
Replace the UserInterface.
Reconnect the cable attached to the UserInterface at the left side. Connector fits only 1 way.
Reconnect the flat cable of the sensor foil (See §3.15)

Replace the Middle Housing (See §3.12)
Replace the Drive Rim (See §3.7)
Replace the QR Unlock mechanism (See §3.6)

Tools used
- Pliers
- Torx 10

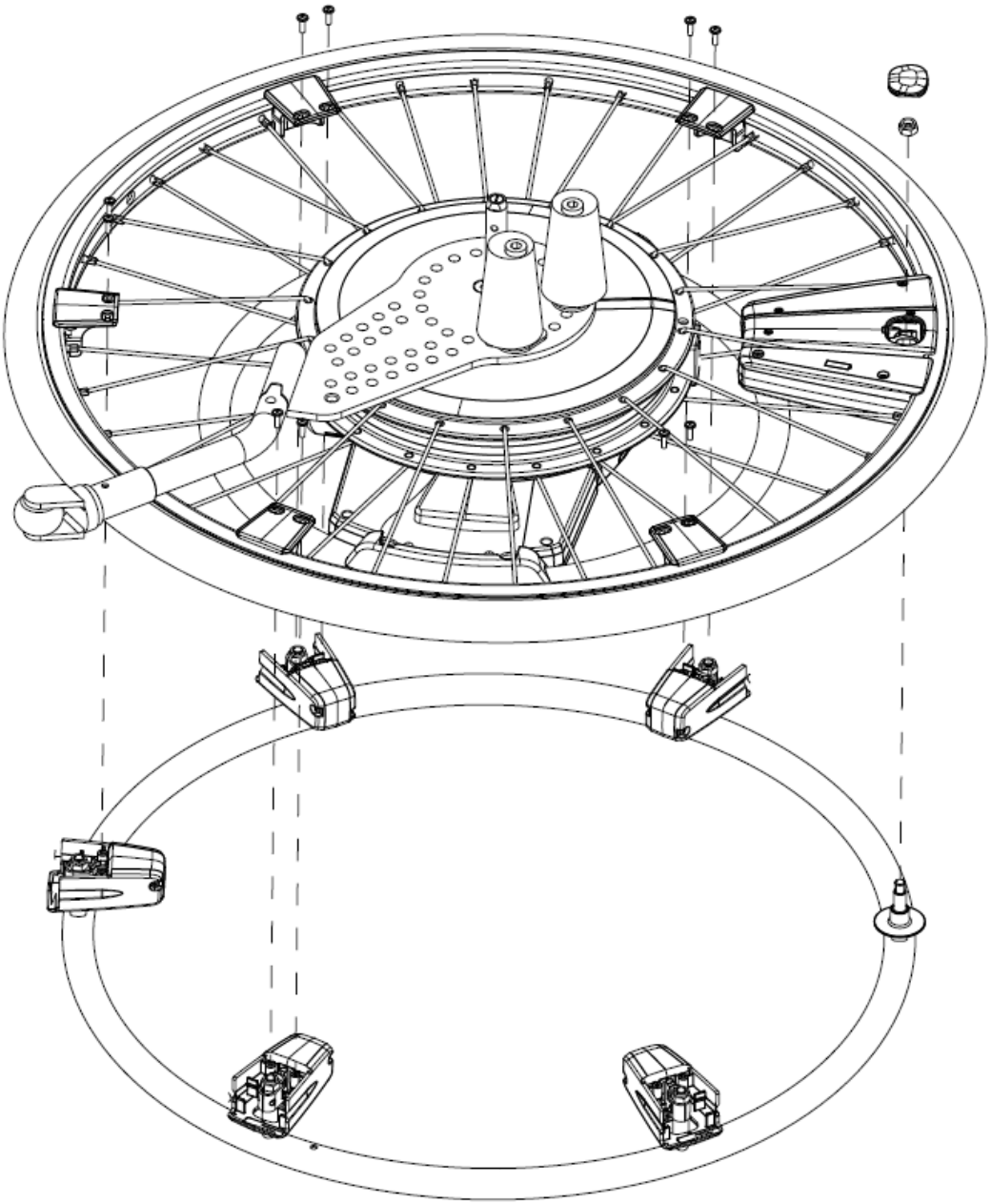
Replacement part

- 1019578 UI 2nd gen spare

3.17 **Assist rim + support blocks replacement**

Warning
To prevent the risk of injury, always turn off the WheelDrive and remove the battery.

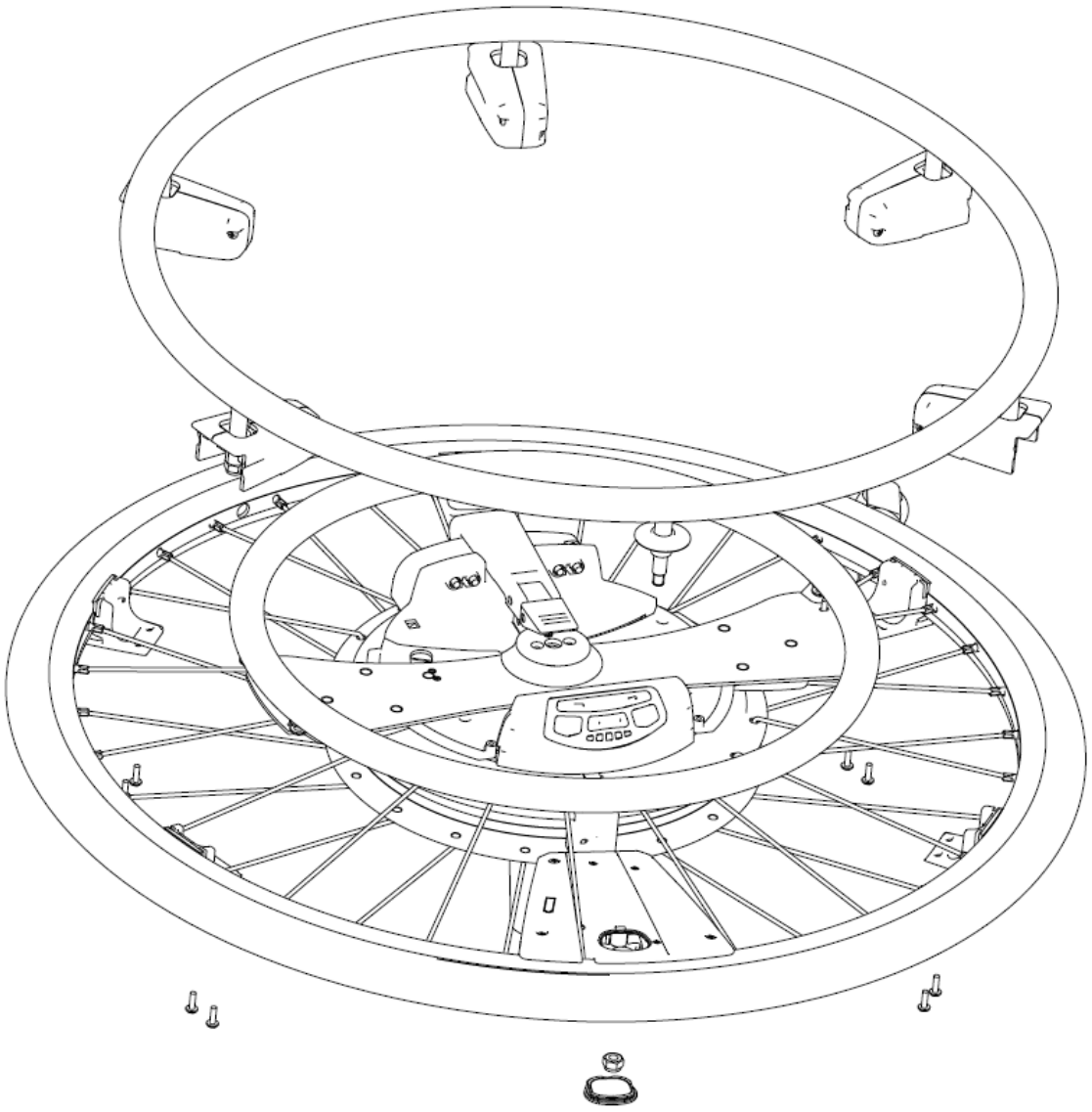
Preparation
Unlock the WheelDrive and remove from frame.



Remove the Sensorbox rubber cap.

Remove the hexagon lock nut that connects the big hoop to the Sensorbox.

Unscrew the 10 flange screws that connect the big hoop assembly to the rim and remove the big hoop assembly.



Place the new big hoop by positioning the support blocks into the rim mount parts and the pin with spacer in the Sensorbox.

Mount the 10 flange screws, but do not tighten them fully.

Position the support blocks in a way that the big hoop pins are centered in the slot of every support block.
Tighten all 10 flange screws with 1 Nm.

Check if the Assist Rim comes back into neutral position when pulling forward and backward.

Place back the rubber Sensorbox cap.

Before use, the new Sensorbox needs calibration, see next chapter.

Tools used

- Torx screwdriver T10

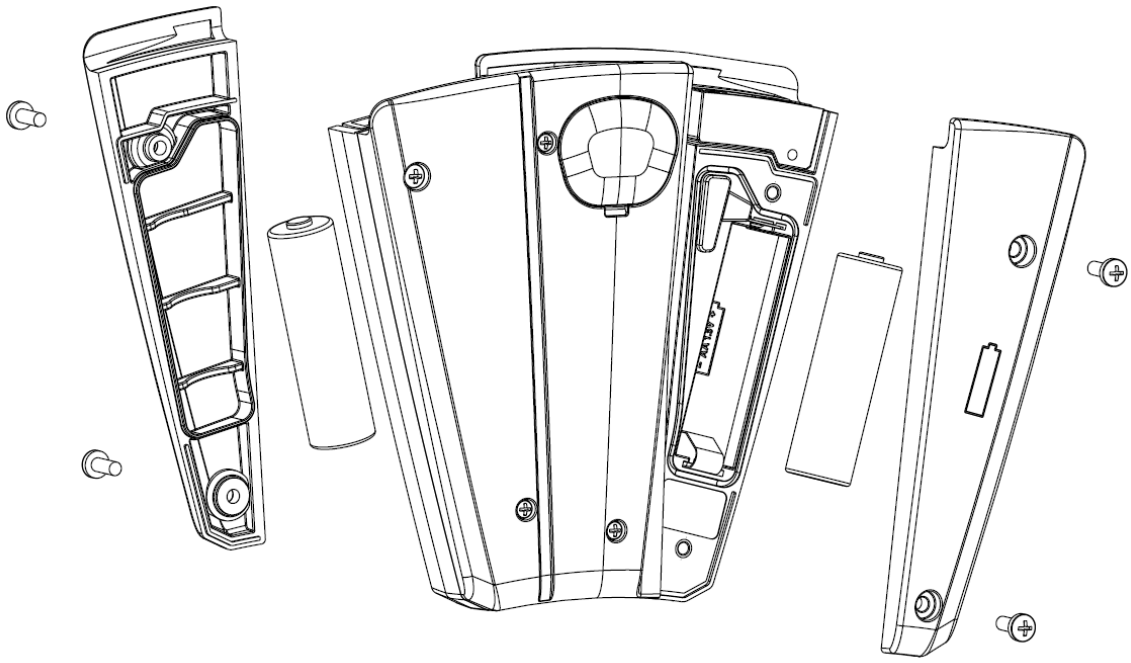
Replacement part

- 1019495 Big hoop assy 2nd gen SPARE

3.18 **Sensorbox - Battery cover replacement / Battery replacement**

Warning
To prevent the risk of injury, always turn off the WheelDrive and remove the battery.

Preparation



The Sensorbox has 2 battery covers; both connected with 2 screws DIN 7985H M3x8.
Unscrew both screws DIN 7985H M3x8. Use a Philips screwdriver.

NOTE: Replace battery when needed or every 6 months. Battery type: A-brand Alkaline AA (LR6) battery, 2700mAh. Plus-Minus symbol is indicated on battery cover.

Place new battery cover.
Screw both screws DIN 7985H M3x8. Use a Philips screwdriver.

Repeat above process for other battery cover when needed.

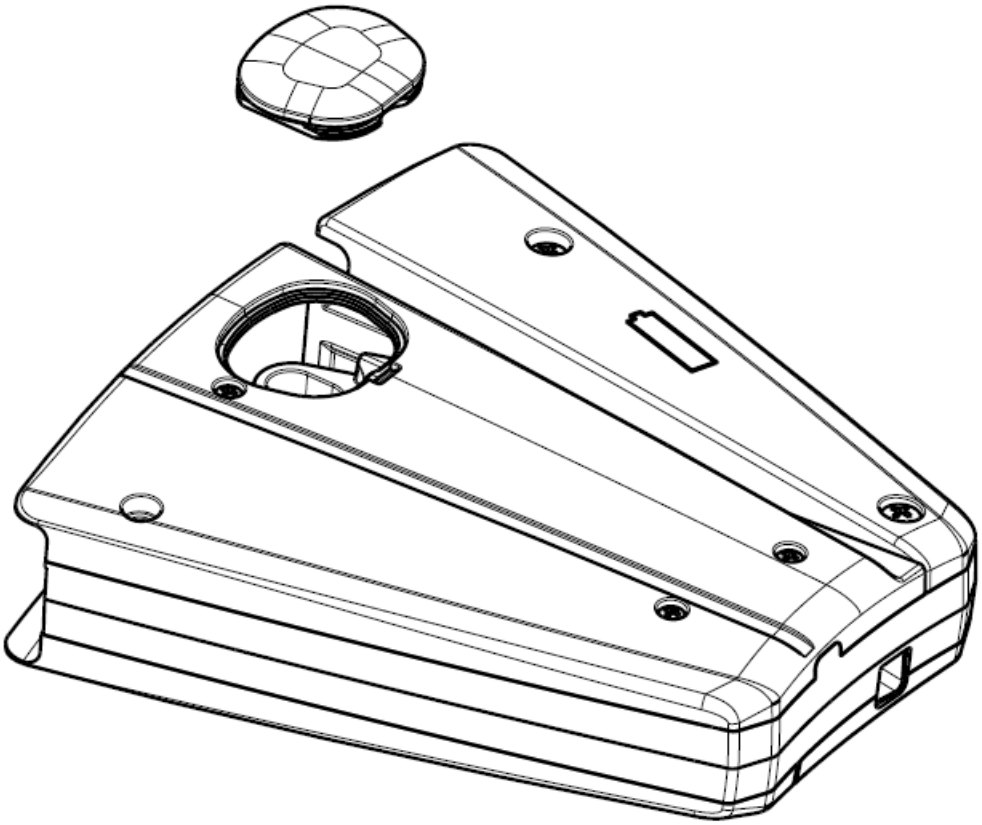
Tools used
- Philips Ph1 screwdriver

Replacement part
- 1019487 Battery Cover 2nd gen SPARE

3.19 Sensorbox cap replacement

Warning
To prevent the risk of injury, always turn off the WheelDrive and remove the battery.

Preparation



Remove the rubber cap with a small flat screwdriver by pressing it between bottom of cap and Sensorbox housing.

Place new cap by pressing into the Sensorbox housing.

Tools used
- Small flat screwdriver

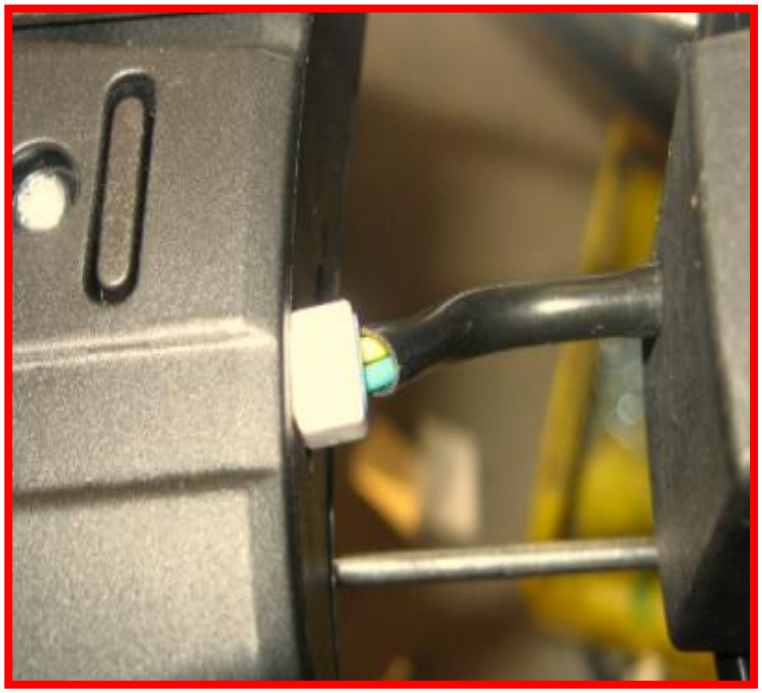
Replacement part
- 1019497 Sensorbox cap 2nd gen SPARE

3.20 **Sensorbox replacement**

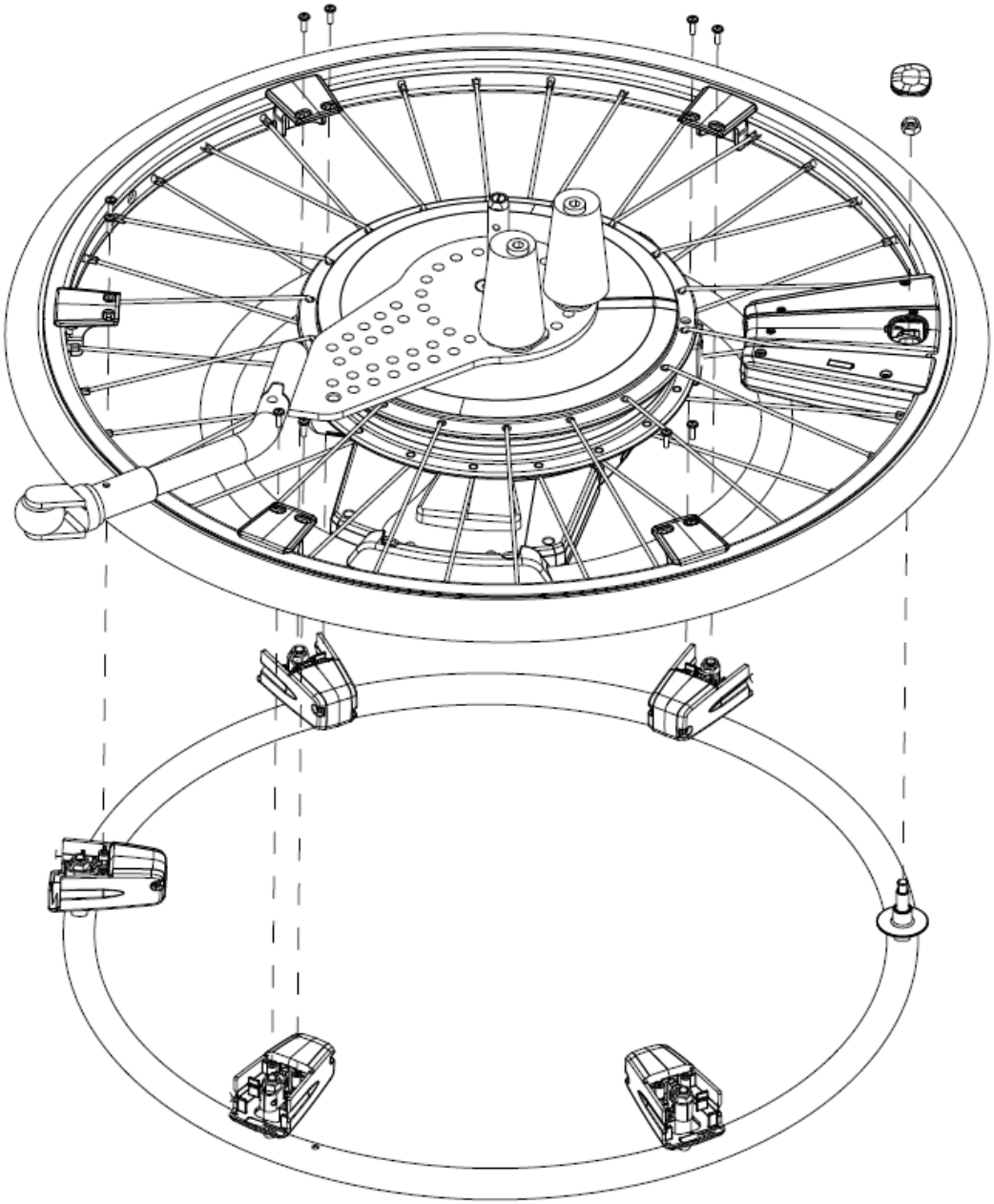
Warning
To prevent the risk of injury, always turn off the WheelDrive and remove the battery.

Preparation
Unlock the WheelDrive and remove from frame.

Remove old batteries from the Sensorbox before recycling. (See §3.18)



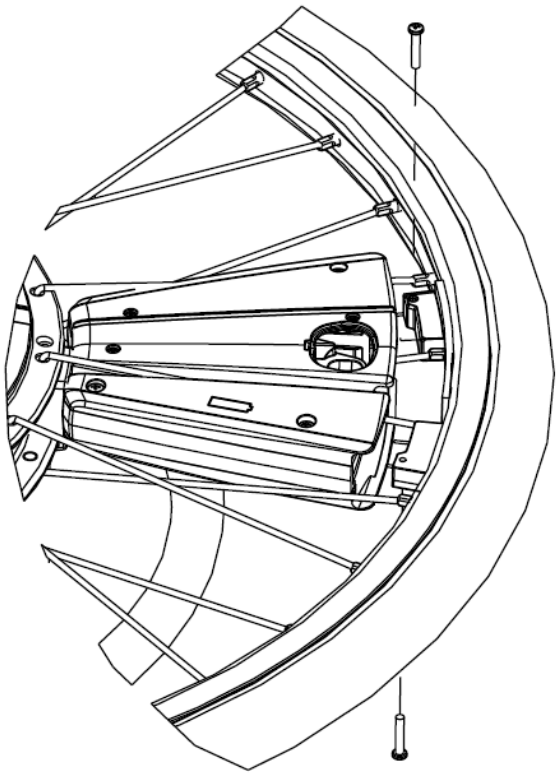
Unlock the cable to the Sensorbox by carefully pressing the connector on one side with a flat screwdriver.



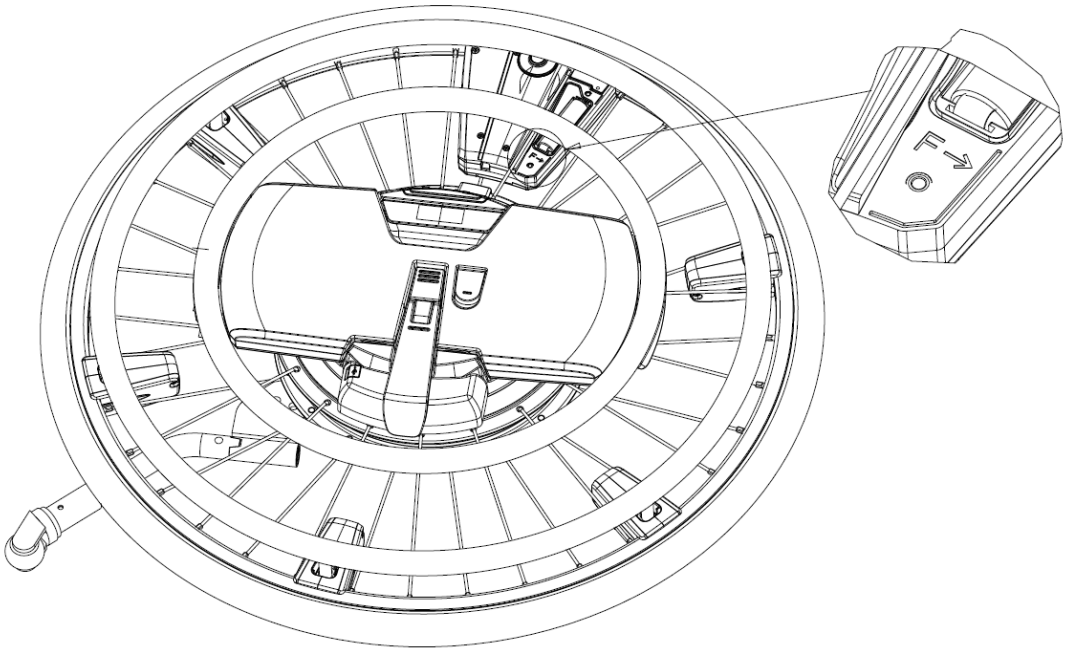
Remove the Sensorbox cap (See §3.19)

Remove the hexagon lock nut that connects the big hoop to the Sensorbox.

Unscrew the 10 flange screws that connect the big hoop assembly to the rim and remove the big hoop assembly.



Unscrew both torx screws that connect the Sensorbox to the rim. Use torx screwdriver T10. Remove the Sensorbox from the wheel by sliding it to the centre of the wheel and rotating it between the spokes.



NOTE: The orientation of the Sensorbox is important. The same Sensorbox can be used for a right and left wheel. Cable entry of the Sensorbox must be located towards the rear-end of the wheelchair (when the Sensorbox is located above the user interface).
Below the battery cover of the Sensorbox there is a sign (F→) that must be inline to the forward heading of the wheel.

Place the new Sensorbox between the spokes and slide it over the rim mount part.
Tighten the Sensorbox with both 3x16 torx screws.
Connect the cable to the Sensorbox.

Place back the big hoop and adjust as described in §3.17.

Check if the Assist Rim comes back into neutral position when pulling forward and backward.

Place back the rubber Sensorbox cap.

Before use, the new Sensorbox needs calibration, see next chapter.

Tools used
- Torx screwdriver T10
- Socket or pipe spanner 10
- Torx screwdriver T10
- Flat Screwdriver

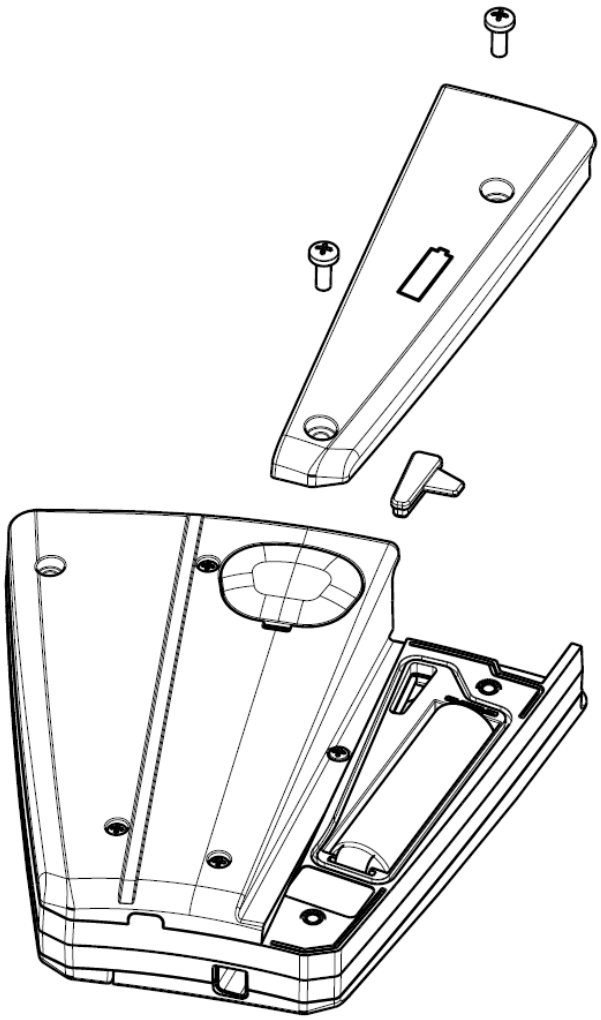
Replacement part
- 1019496 Sensorbox 2nd gen SPARE

3.21 **Sensorbox calibration**

Warning
To prevent the risk of injury, always turn off the WheelDrive and remove the battery.

Preparation
Remove the battery located at the calibration side.

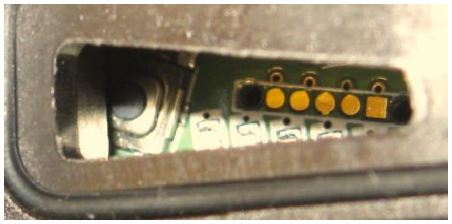
Calibration side



The calibration side of the Sensorbox (See picture above) is the side where the battery cover is located closest to the cable entry. Below this battery cover, the calibration opening can be found below a small rubber cover (left next to the battery)

Place a new battery in position opposite the calibration side. (See §3.18)

Preparation



Place a new battery in position of calibration side and immediately push the switch into the triangular slot (See picture above). Hold until all lights switch on.

When Calibration switch is pushed all LED's ON (See picture above).

CALIBRATION SEQUENCE:
1) Move the Assist Rim to the maximum forward position: Hold until LED go OFF for 1 sec
2) Move the Assist Rim to the maximum rearward position: Hold until LED go OFF for 1 sec
3) Release the Assist Rim to the centre position: Hold until LED go OFF

NOTE: Do not use extreme force to pull the Assist Rim to the maximum positions, but just touch the end of the slot.

Place back the rubber cover after calibration.
Place battery covers (See §3.18)
Test driving function of the Assist Rim.

Tools used

- Small flat screwdriver
- Philips Ph1 screwdriver

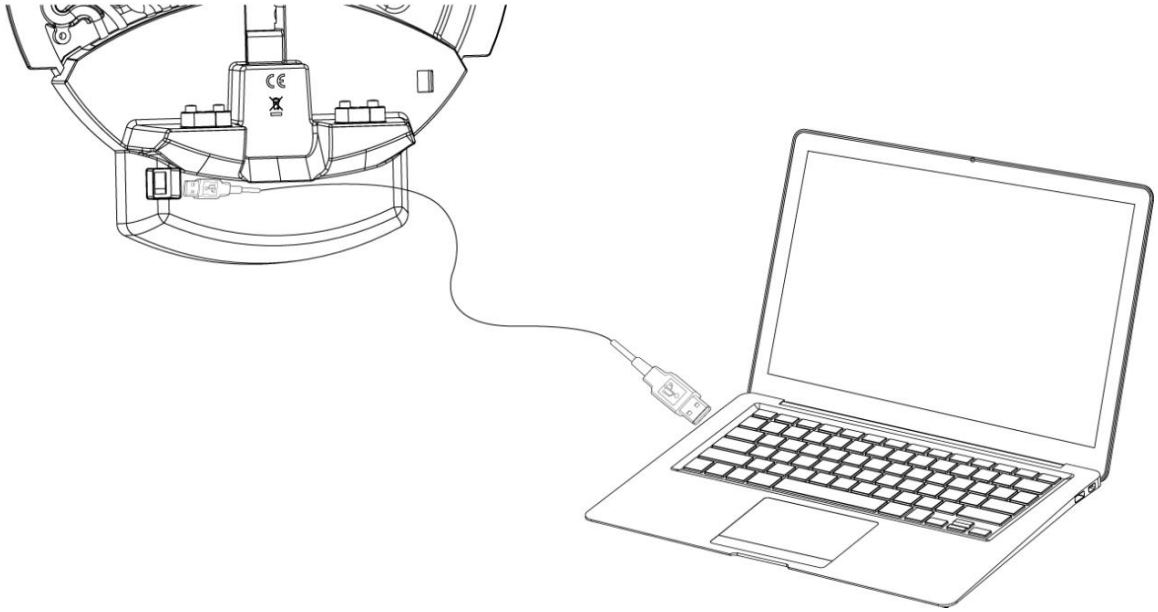
4 SETTING DRIVING BEHAVIOUR (AND OTHER SOFTWARE RELATED TOPICS)

This chapter explains how you can communicate with the WheelDrive controller using your laptop and the PowerTalk2 software to:

- Adjust driving behaviour
- Retrieve user / system data
- Check the Error Log

4.1 Connecting WheelDrive to computer

Preparation
Computer and USB connection



Remove rubber cover on WheelDrive controller.
Make connection between computer and WheelDrive. Make sure to switch WheelDrive on.
Startup the WheelDrive service program “PowerTalk2”.
Select desired COM connection (if not automatically detected).

A separate instruction document for correct use and with all functions of PowerTalk2 is available:

E1801_20181018_PowerTalk 2 manual WheelDrive_Rx.xx

E1801_20181018_WheelDrive Gen 2018 parameter list_Rx.xx

1. Remove cover on WheelDrive Wheel

2. Connect your Laptop with WheelDrive via the Mini USB cable

3. Turn on WheelDrive

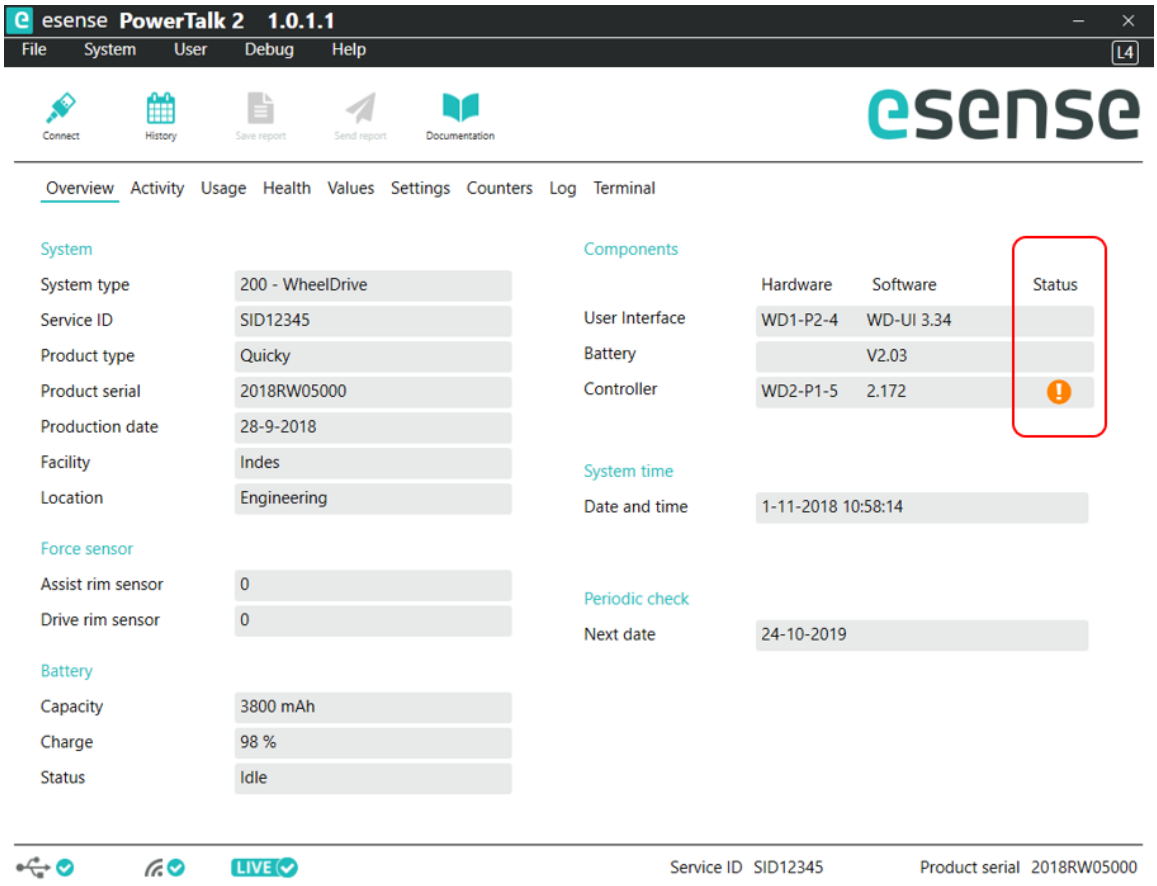
Tools used
- Computer
- Indes WheelDrive program “PowerTalk2”
- USB cable

Replacement part
- 90079412 USB Cover set (10 pcs)

4.2 Updating software

The software in the WheelDrive motor controller (firmware) can be updated on request of the producer. PowerTalk2 can be used to find information about the installed software version and if a newer version is available.

If a newer version is available, this will be indicated in the status bar as shown below.



4.3 How to update

Warning
Make sure both wheels, left and right, always have the same software version and parameter setting.

The information on how to update the controller software can be found in the PowerTalk 2 manual WheelDrive:

E1801_20181018_PowerTalk 2 manual WheelDrive_Rx.xx

APPENDIX A. TROUBLE SHOOTING

See separate insert sheet

APPENDIX B. BEEP OVERVIEW

NORMAL BEEPS	
WHEELDRIVE STARTED	1 beep 0.5s
WHEELDRIVE STOPPED	1 beep, 1s
SELECT PROFILE I	1 beep, 0.5s
SELECT PROFILE II	2 beeps, 0.5s
SELECT PROFILE III	3 beeps, 0.5s

WARNING BEEPS	
HANDLE HANDLE OPEN	1 beep, 1s (same as system off)
CHARGER CONNECTION WHEEL MOTION	beep continous
ASSIST RIM BLOCKED	3 beeps, 0.5s
DRIVE RIM BLOCKED	4 beeps 0.5s
ASSIST RIM BATTERY EMPTY	5 beeps, 1s (first use of PA or at system start)
MAN BATTERY LOW	2 beeps, 1s
CONNECTED TO POWERTALK	1 multi-tone beep up

ERROR BEEPS	
BMS DEFECT	5 beeps, 0.5s
RELEASE HANDLE OPEN	1 beep, 1s (same as system off)
DRIVE RIM FOIL ERROR	6 beeps, 0.5s
WIPER ERROR	6 beeps, 0.5s

Installation instruction Modification kit

(new spring, new wiper and retainer block)

Revision 3.00_20201217

This instruction applies to Gen 2019 Wheeldrive (art.no E1801-0137), the Gen 1 modification kit (E1801-0138) has its own deviating instruction

A. PREPARATION & DISASSEMBLY

1. Remove the wheel from the wheelchair
2. Place the wheel flat on the table *(bottom towards you so that the text on the battery handle is legible)*
3. Remove the battery
4. Remove the small hoop [figure 1]

- Tap the pin out of the block [A] above the axle release lever *(from right to left)* and take the block out together with the attached spring
- Unscrew and remove the round disc in the center of the axis [B]
- Unscrew and remove the 4 black screws on the right side of the bracket plate [C] and remove the hook plate on the back of the bracket
- Remove the small hoop; start on the right so that the left hook plate can be hooked out *(because the bearing has a close fit, some force may be required and the hoop may need to be rocked up and down a bit)*

5. Remove the UI by loosening the 2 screws; leave the flat ribbon cable connected and lay the UI aside [figure 2]

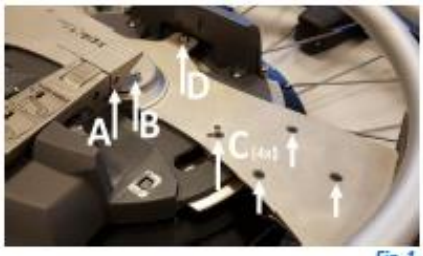


Fig. 1

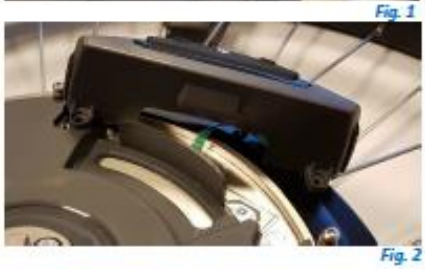


Fig. 2

B. SPRING REPLACEMENT

(In case the spring needs no replacing, move to step C)

6. Loosen the 3 screws on the right side of the gray cover on the top of the controller and lift the cover on the right-hand side approximately 4 cm [figure 3]
7. Remove the old spring together with the gray stopper block
8. Insert the new spring together with the gray stopper block *(the new spring can be distinguished from the old by the triangular gap between the coil and the legs crossing)*

- The spring must have the flattest side at the bottom *(recognizable by placing the spring on the table; the legs should be on the table and not floating in the air)*
- Make sure that the stopper block is mounted correctly between the legs of the spring *(the stopper block has 2 bushings that correspond to holes in the bracket; the bushings must point up and be on the left of the screw hole)*

9. Screw the gray controller cover back on; use Loctite


Fig. 3

C. WIPER REPLACEMENT

10. Remove the old wiper [D] from the detached bracket plate *(use a well-fitting screwdriver because the wiper is glued in with Loctite and may require quite a bit of force), (when applicable, remove remains of old Loctite using a M6 thread tap)*
11. Place the new wiper. There are 2 variants, with or without a plastic self-locking strip. In case the wiper is **without** the self-locking mechanism, **apply** Loctite to the threads of the new wiper *(take care not to spill Loctite causing the potentiometer foil to fail or to glue the wiper point to its housing)* In case of using the other wiper **with** the locking-strip, **do not apply** Loctite.
12. Screw the new wiper into the bracket plate *(not too far, approximately 1 thread run)*
13. Re-assemble:

- The hoop bracket *(hook in from the left)* [figure 4]
- Hook plate: 3x black screw, without Loctite *(do not use Loctite for screws in plastic)*
- Secure the spring stopper block: 1x black screw, without Loctite
- Round center disc: 2x screw; use Loctite
- Block axle release lever: reposition the spring and secure the block with the pen *(insert pen at the round head (from left to right) and tap the pen back in)*


Fig. 4

D. RETAINER BLOCK INSTALLATION

(there are 2 different retainer blocks marked "2A" and "2B", that can be chosen from to find an optimal connection with the tolerances on the different parts

14. Start with block 2B (2B is most likely to fit best): place the retainer block under the UI [figure 5] *(rotate the hoop counterclockwise and slide the block in from the right so that the hoop bracket plate with the wiper slides into the slot of the block; after releasing the hoop, make sure the block remains in the middle of the dark grey controller cover)*
15. Screw the UI back on: 2x screw, use Loctite *(make sure that the ears on top of the block fall within the UI and that the flat cable is not folded or pinched)*
16. Check if bracket plate does not get stuck in the slot of the block [figure 6], doing the next steps:

- Rotate the hoop half a turn counterclockwise and release it: assess whether the hoop automatically returns to its neutral position smoothly and does not get stuck or rub in the block
- Repeat this check with half a turn to the right *(if the hoop gets stuck or has obvious friction with the block, double check whether all screws are tightened, especially those at the center bearing)*
- In case the hoop bracket rubs along the bottom (rear) edge of the block: use block 2A instead of 2B (as described above) and check again
- If the hoop plate is still not able to move freely and rubs along the top (front) edge of the block, reconsider if block 2B could be a better fit; in case both blocks continue to give problems: do not build in the retainer block and report to Sunrise service HQ

Fig. 6

E. WIPER ADJUSTMENT

17. Screw in the wiper until the white tip of the wiper just touches the potentiometer foil; the wiper tip should be pressed in approximately 0.25 to 0.5 mm [figure 7] *(to be able to adjust the wiper, the hoop must be rotated to its outermost position to access the wiper with the screwdriver. Be careful not to lean on the hoop during adjustment. Use a small flashlight and set the wiper so that the tip and its shadow on the foil just touch.*
- Rotate the hoop fully back and forward again and check that the tip remains in contact with the potentiometer foil *(throughout the movement)*
- If the tip comes off, the wiper must be turned in a little further *(90° is about 0.25 mm)*
- If you are unsure whether the wiper is turned in too deep, you can check by loosening it again 90 to 180°

18. After finishing the above checks, screw the wiper down 360° twice *(= 2 full turns)*
19. Rotate the hoop fully forward and fully backward: release and check that it always moves back to the center position *(if the hoop does not move back to its center; check if the spring is placed correctly, see step B.)*
20. If the wiper is properly adjusted, the tip protrudes approximately 2 mm *(this is the thickness of the bottom bracket plate)* [figure 8]

Fig. 7

Fig. 8

F. FINAL CHECKS

21. Double check that the wiper tip protrudes 2 mm, placing the check tool in the back of the wiper [figure 9]
- When adjustment is done perfectly the black line in the middle of the green area is exactly at the back end of the wiper *(when it is 0.5 mm around the black line in the green area, the adjustment is OK)*
- When it is in the red area under the green bar, the wiper is not in far enough
- When it is in the red area above the wiper is turned in too deep

22. In case the wiper setting is off, re-adjust the wiper, re-check with the check tool and also check potential friction in the retainer block
- If it is not possible to find the correct adjustment, it is advisable to remove the retainer block and set the wiper to 2mm *(see also step 16 under D.)*
- If the adjustment is successful, the wheel can be put back on the wheelchair

23. Install the battery and turn on the system; make sure the small hoop powers the motor properly
- If the wiper is not in the middle position when turned on, the system will give an error message
- It is also possible to read the sensor signal in PowerTalk [figure 10] (Overview tab - Drive rim sensor). This would indicate 0 if installed correctly. * Value ranges from -400 to 400


Fig.9

QR code linking to Youtube instruction video

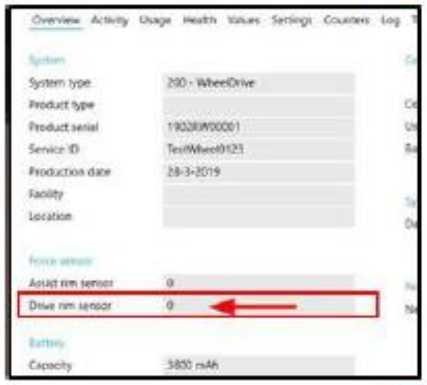


Fig. 10

Required tools:
- Screwdrivers (3x): Torx Tx10, slotted (app. 1x5mm), Philips screwdriver
- Hex wrench (2mm)
- Small hammer
- Driving pin (app. 3-4mm)
- Loctite (blue no 243)
- Recommended for step D: flashlight (e.g. on smartphone)
- M6 thread tap (for removing old Loctite)

Warning:
- *Do not overtighten screws, hand tight is sufficient. Overtightening can damage the thread!*

APPENDIX D. GLOSSARY

Assist Rim
Big hand rim or hoop, located at same position of normal wheelchair.

Drive Rim
Control rim or small hoop; the additional small diameter rim located in the center.

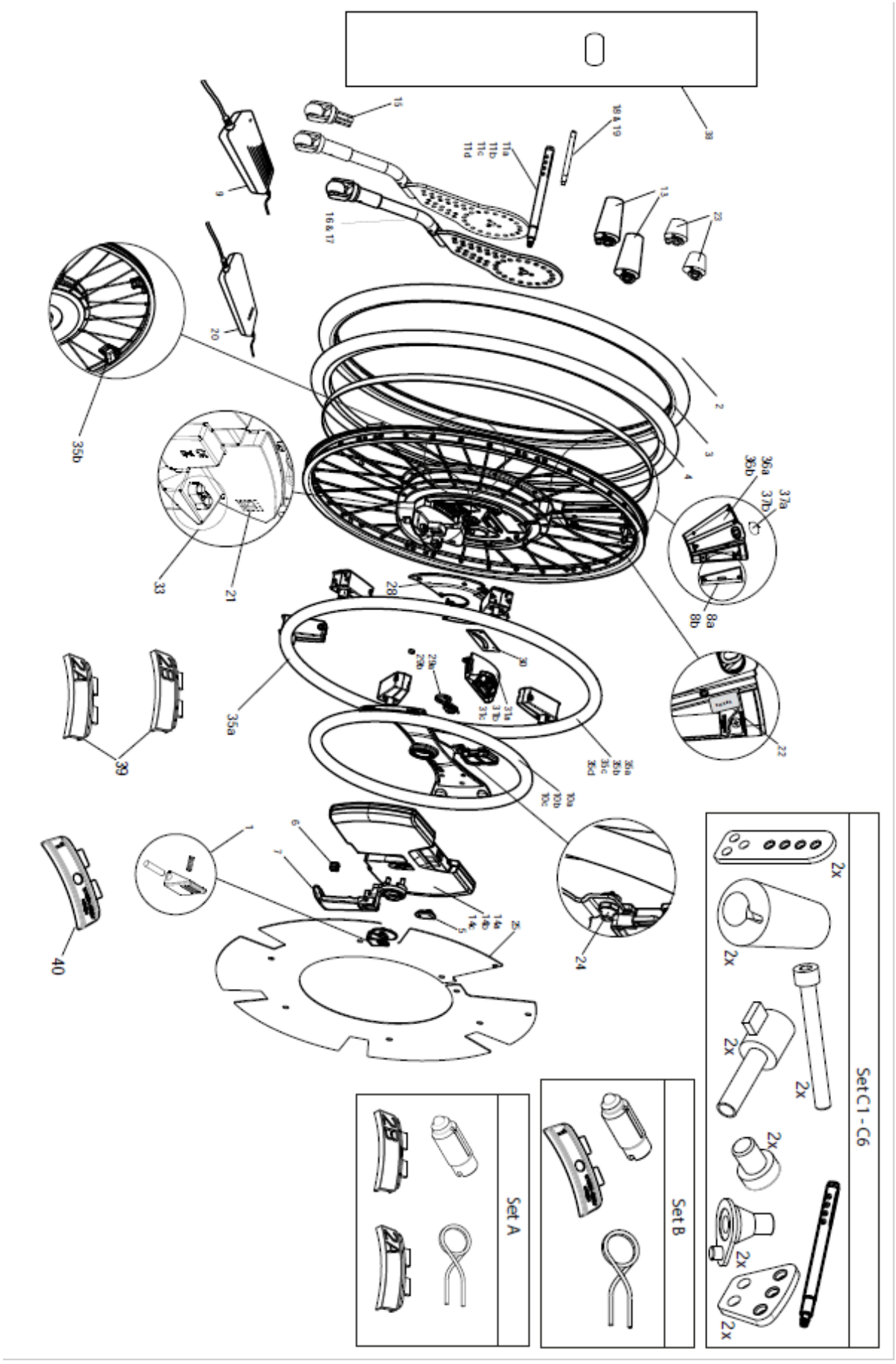
Handle safety feature
Auto shutdown function when handle to release wheel from chair is opened.

Anti-tip
Tip-over protection, located at the back of the wheelchair.

Sensorbox
The biggest triangular shaped box, located between the spokes.

NOTE: see also Appendix E(spare parts) where an exploded view with most relevant parts are illustrated

APPENDIX E. EXPLODED VIEW AND SPAREPARTS



Spareparts WheelDrive Gen1 and Gen2019

Drawing number	Indes item number	Sunrise item number	Description	compatible with gen 1	compatible with gen 2
1	E0706-9023	1018670	QR-Unlocker assy	**yes**	**yes**
2	50-00001	9007932	Marathon plus Evo 24" outer tire	**yes**	**yes**
3	50-00002	1018671	24x1 inner tube	**yes**	**yes**
4	50-00003	9007936	24" Rim cover Polyurethane	**yes**	**yes**
5	E0706-9001	9007938	Connector Cover + screws	**yes**	**yes**
6	E0706-9002	9007941	USB Cover	**yes**	**yes**
7	E0706-9003	9007943	Handle + bracket assy	**yes**	**yes**
8a	E0706-9004	9007946	Battery Cover Gen1	**yes**	**no**
8b	**E1801-9104**	**1019487**	**Battery Cover Gen2019**	**no**	**yes**
9	E0706-9005	9007947	Charger WheelDrive	**yes**	**yes**
10a	E0706-9006	9007950	Drive Rim Assy Gen1	**yes**	**no**
10b	**E1801-9106**	**1019488**	**Drive Rim Assy Gen2019**	**yes**	**yes***
* *When this part is used for Gen1 -> also order E1801-9135 (SRM: 1019494) and E1801-9110 (SRM: 1019489)*					
10c	**E1801-9107**	**1019577**	**Drive Rim Gen2019**	**no**	**yes**
11a	E0706-9007	9007952	QR Assy 12.7 25-75	**yes**	**yes**
11b	E1801-9142	9012368	QR Assy 12,7 25-65	**yes**	**yes**
11c	E0706-9008	9007952	QR Assy 12 25-75	**yes**	**yes**
11d	E1801-9143		QR Assy 12 25-65	**yes**	**yes**
13	E0706-9009	9007954	Support Bumper Assembly	**yes**	**yes**
14a	**E1801-9110**	**1019489**	**Battery Pack Quickie**	**yes**	**yes**

14b	**E1801-9120**	**1020824**	**Battery Pack Empulse**	**yes**	**yes**
14c	**E1801-9111**	**1019590**	**BA Pack front cover Gen2019**	**no**	**yes**
15	E0706-9011	9007959	Anti Tip Wheel	**yes**	**yes**
16	E0706-9012	9007961	Anti tip arm right 24"	**yes**	**yes**
17	E0706-9013	9007963	Anti tip arm left 24"	**yes**	**yes**
18	E0706-9015	9007966	QR Assy 12.7 28 - 38	**yes**	**yes**
19	E0706-9016	9007968	QR Assy 12 28 - 38	**yes**	**yes**
20	E0706-9020		Programmer kit WheelDrive Gen1	**yes**	**no**
21	E0706-9035		Version sticker Controller Gen1	**yes**	**no**
22	E0706-9036	9007973	Version sticker PA box Gen1	**yes**	**no**
23	E0706-9017	9008200	Support Bumper Ass Short	**yes**	**yes**
24	**E1801-9136**	**1020851**	Wiper 4.3mm	**yes**	**yes**
25	**E1801-9118**	**1019491**	**Spoke guard**	**yes**	**yes**
28	**E1801-9135**	**1019494**	**Housing middle**	**yes**	**yes**
29a	E0706-9041	1020857	Spring+follower Gen1	**yes**	**no**
29b	**E1801-9141**	**1020856**	**Spring+follower Gen2019**	**no**	**yes**
30	E0706-9027	1018676	Sensorfoil	**yes**	**yes**
31a	E0706-9028	1018677	UI Right Gen1	**yes**	**no**
31b	E0706-9029	1018678	UI Left Gen1	**yes**	**no**
31c	**E1801-9128**	**1019578**	**UI bidirectional Gen2019**	**no**	**yes****

** *Only use this part for Gen2019*

33	E0706-9030	1018679	Battery Contact	**yes**	**yes**
35a	**E1801-9132**	**1019495**	**Big hoop assy Gen2019 (including rim mount parts)**	**yes*** **	**yes**

*** *When this part is used for Gen1 -> also order E1801-9101 (SRM: 1019580) and E1801-9133 (SRM: 1019496) use E1801-9134 (SRM: 1019591) tool to mount the parts.*

35b	**E1801-9101**	**1019580**	**Rim mount parts Gen2019**	**yes**	**yes**
n.a.	**E1801-9134**	**1019591**	**Drilling tool rim mounts Gen1**	**yes**	**no**
36a	E0706-9033	1018682	Sensorbox Gen1	**yes**	**no**
36b	**E1801-9133**	**1019496**	**Sensorbox Gen2019**	**yes**	**yes**
37a	E0706-9014	1018680	Sensorbox Caps Gen1	**yes**	**no**
37b	**E1801-9114**	**1019497**	**Sensorbox cap Gen2019**	**no**	**yes**
38	E0706-9034		WheelDrive Packaging Set	**yes**	**yes**
set A	**E1801-9137**	**1020852**	Modification kit Gen2019	**no**	**yes**
set B	**E1801-9138**	**1020853**	Modification kit Gen1	**yes**	**no**
39	**E1801-9139**	**1020854**	Retainers Gen2019	**no**	**yes**
40	**E1801-9140**	**1020855**	Retainer Gen1	**yes**	**no**
set C1	E0706-5000	9008490	Installation parts 12 mm 25-75	**yes**	**yes**
set C2	E0706-5001	9008491	Installation parts 12,7 mm 25-75	**yes**	**yes**
set C3	E0706-5002	9008494	Installation parts 12 mm short	**yes**	**yes**
set C4	E0706-5003	9008495	Installation parts 12,7 mm short	**yes**	**yes**
set C5	E0706-5004	9012379	Installation parts 12 mm 25-65	**yes**	**yes**
set C6	E0706-5005	9012378	Installation parts 12,7 mm 25-65	**yes**	**yes**
n.a.	**E1801-9121**	**1019493**	**Wheel R24" Gen2019**	**no**	**yes**
n.a.	**E1801-9122**	**1019492**	**Wheel L24" Gen2019**	**no**	**yes**

Preparation

Tools used

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Replacement part

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