Invacare® AVIVA™ RX Series

AVIVA RX20, AVIVA RX40, AVIVA RX40HD

en **Power Wheelchair**
Service Manual

PROVIDER: Keep this manual.
The procedures in this manual MUST be performed by a qualified technician.

Yes, you can.

Contents

1 General

1.1 Introduction

This document contains important information about assembly, adjustment and advanced maintenance of the product. To ensure safety when handling the product, read this document and the user manual carefully and follow the safety instructions.

Find the user manual on Invacare's website or contact your Invacare representative. See addresses at the end of this document.

Invacare reserves the right to alter product specifications without further notice.

Before reading this document, make sure you have the latest version. You find the latest version as a PDF on the Invacare website.

Previous product versions may not be described in this Manual's current revision. If you require assistance, please contact Invacare.

For pre-sale and user information, see the user manual.

For more information about the product, for example product safety notices and product recalls, contact your Invacare representative. See addresses at the end of this document.

1.2 General Information

Service and maintenance work must be carried out taking this document into account.

Note that there may be sections in this document, which are not relevant to your product, since this document applies to all available models (on the date of printing). If not otherwise stated, each section in this document refers to all models of the product.

The models and configurations available in your country can be found in the country-specific sales documents.

It is imperative that you observe safety information.

Information about operation or about general maintenance and care work on the product should be taken from service manual.

Assembly of accessories/options might not be described in this document. Refer to the manual delivered with the accessory/option. Additional manuals can be ordered from Invacare. See addresses at the end of this document.

You can find information about ordering spare parts in the spare parts catalogue.

Spare parts must match original Invacare parts. Only use spare parts which have been approved by Invacare.

The product may only be maintained and overhauled by qualified personnel.

The minimum requirement for service technicians is suitable training, such as in the cycle or orthopedic mechanics fields, or sufficiently long-term job experience. Experience in the use of electrical measuring equipment (multimeters) is also a requirement. Special Invacare training is recommended.

Alterations to the power wheelchair which occur as a result of incorrectly or improperly executed maintenance or overhaul work lead to the exclusion of all liability on the side of Invacare.

If you have any problems or questions contact your provider.

1.3 Notes on Shipping

- If the power wheelchair has to be shipped back to the manufacturer for major repairs, you should always use the original packaging for transport.
- Please attach a precise description of the fault.

1.4 Symbols in This Manual

Symbols and signal words are used in this document and apply to hazards or unsafe practices which could result in personal injury or property damage. This document is printed in greyscale. For your information, the safety messages have the following colour coding according to ANSI Z535.6: Danger (Red), Warning (Orange), Caution (Yellow) and Notice (Blue). See the information below for definitions of the signal words.

DANGER!
Indicates a hazardous situation that will result in serious injury or death if it is not avoided.

WARNING!
Indicates a hazardous situation that could result in serious injury or death if it is not avoided.

CAUTION!
Indicates a hazardous situation that could result in minor or slight injury if it is not avoided.

NOTICE!
Indicates a hazardous situation that could result in damage to property if it is not avoided.

Tips and Recommendations
Gives useful tips, recommendations, and information for efficient, trouble-free use.

Tools
Identifies required tools, components and items which are needed to carry out certain work.

1.5 Images in This Manual

The detailed images in this manual are given marks to identify various components. Component marks in text and operational instructions always relate to the image directly above.

2 Safety

2.1 Safety Information

WARNING!
Installation, Mounting, Maintenance or Repairs Made by Unqualified Persons can Result in Hazardous Situations to You and Others

- The procedures in this service manual, must be performed by a specialised provider or qualified service technician.
- Invacare expects that the qualified technician is familiar with the product, with good technical knowledge to understand and follow the steps of the described instructions in this manual, and equipped with proper tools.
- Do not handle this product or any available optional equipment without first completely reading and understanding these instructions and any additional instructional material such as user manuals, installation manuals or instruction sheets supplied with this product or optional equipment.

- The CE marking is invalidated if components or accessories/options are replaced or added that have not been approved for this product by Invacare.
- In this case, the company that adds or replaces the components or accessories/options is responsible for the conformity assessment/CE marking or for registering the scooter as a special design and for the relevant documentation.

The information contained in this document is subject to change without notice.

2.2 Safety and Fitting Instructions

These safety instructions are intended to prevent accidents at work, and it is imperative that they are observed.

Before any inspection or repair work

- Read and observe this repair manual and the associated user manual.
- Observe the minimum requirements for carrying out the work (see *1.2 General Information, page 3*).

Personal Safety Equipment

Safety Shoes

The power wheelchair, and some of its components, are very heavy. These parts can result in injuries to the feet if they are allowed to drop.

- Wear standardized safety shoes during all work.

Eye Protection

It is possible that battery acid can be discharged when working on defective batteries or when handling batteries improperly.

- Always wear eye protection when working on any defective or possibly defective batteries.

Safety Gloves

It is possible that battery acid can be discharged when working on defective batteries or when handling batteries improperly.

- Always wear acid-proof safety gloves when working on any defective or possibly defective batteries.

General Safety Information and Information About Fitting / Removal

DANGER!
Risk of Death, Serious Injury, or Damage
Lighted cigarettes dropped onto an upholstered seating system can cause a fire resulting in death, serious injury, or damage. Power wheelchair occupants are at particular risk of death or serious injury from these fires and resulting fumes because they may not have the ability to move away from the power wheelchair.

- DO NOT smoke while using this power wheelchair.

WARNING!
Risk of Serious Injury or Damage
Storing or using the power wheelchair near open flame or combustible products can result in serious injury or damage.

- Avoid storing or using the power wheelchair near open flame or combustible products.

CAUTION!
Risk of Crushing
Various components such as the drive unit, batteries, seat etc are very heavy. This results in injury hazards to your hands.

- Note the high weight of some components. This applies especially to the removal of drive units, batteries and the seat.

CAUTION!
Injury Hazard if the Power Wheelchair Starts Moving Unintentionally During Repair Work

- Switch the power supply off (power button).
- Engage the drive.
- Before lifting up, secure the power wheelchair by using chocks to block the wheels.

CAUTION!
Fire and Burn Hazard due to Electrical Short-circuit

- The power wheelchair must be completely switched off before removal of voltage-carrying components! To do this, remove the batteries.
- Avoid short-circuiting the contacts when carrying out measurements on voltage-carrying components.

CAUTION!
Risk of Burns from Hot Surfaces on the Motor

- Allow the motors to cool down before commencing work on them.

CAUTION!
Injury Hazard and Risk of Damage to Power Wheelchair due to Improper or Incomplete Maintenance Work

- Use only undamaged tools in good condition.
- Some moving parts are mounted in sockets with PTFE coating (Teflon™). Never grease these sockets!
- Never use "normal" nuts instead of self-locking nuts.
- Always use correctly-dimensioned washers and spacers.
- When reassembling, always replace any cable ties which were cut during dismantling.
- After completing your work / before renewed start-up of the power wheelchair, check all connections for tight fitting.
- After completing your work / before renewed start-up of the power wheelchair, check all parts for correct locking.
- Only operate the power wheelchair with the approved tyre pressures (see technical data).
- Check all electrical components for correct function. Note that incorrect polarity can result in damage to the control system.
- Always carry out a trial run at the end of your work.

CAUTION!
Any Changes to the Drive Program can affect the Driving Characteristics and the Tipping Stability of the Power Wheelchair

- Changes to the drive program may only be carried out by trained Invacare providers.
- Invacare supplies all power wheelchairs with a standard drive program ex-works. Invacare can only give a warranty for safe power wheelchair driving behavior - especially tipping stability - for this standard drive program.

CAUTION!
Risk of Injury
Adaptions to the power wheelchair can influence the performance.

- When adaptions with third party products are made, this is only allowed within the scope of a valid combination agreement.
- The maximum values and restrictions of both products shall be observed.
- Machining, bending, welding, or bracing on any safety relevant components is not allowed.

Mark all current settings for the power wheelchair (seat, armrests, backrest etc.), and the associated cable connecting plugs, before dismantling. This makes reassembly easier. All plugs are fitted with mechanical locks which prevent release of the connecting plugs during operation. To release the connecting plugs the safety locks must be pressed in. When reassembling ensure that these safety locks are correctly engaged.

3 Hygiene

3.1 Handling of Returned Used Products

When reconditioning or repairing returned power wheelchairs:

- Take precautions for yourself and the product.
- Use protection equipment as specified locally.

Before Transport (According to Biological Agents Ordinance)

Treat product according to following process steps:

Process Step	Component	Application	Conditioning technique	Work Station
Manual cleaning	Surface of used device	Before repair or reconditioning	Use saturated towel to apply cleaning detergent and remove residues after impact.	Cleaning and disinfection
Disinfection	Surface of used device	Before repair or reconditioning	Use saturated disinfectant wipes and clean* the device surface.	Cleaning and disinfection

*Invacare uses detergent "Nücosept special" 1.5% in water ml/ml

Disinfection Tools

- Disposable wipes (fleece)
- Brushes to clean areas difficult to access

Further Information

For more information contact your Invacare service department.

4 Setup

4.1 General Information on Setup

The tasks described in this chapter are intended to be performed by trained and authorized service technicians for initial setup. They are not intended to be performed by the user.

4.2 Adjusting Seating Position

In order to adapt power wheelchair optimally to requirements of user, we recommend that you ask your authorised Invacare provider to adjust seat depth individually. Adapting seat to user's seating position depends on which seat has been fitted, and should be carried out in the following sequence.

1. Adjusting lower leg length and seat depth, see *4.2.1 Adjusting Lower Leg Length, page 7* and *4.2.2 Adjusting Seat Depth, page 7*.
2. Adjusting centre of gravity of seat, see *4.2.3 Adjusting Centre of Gravity of Seat, page 8*.
3. Checking that swivel castors can move freely.
4. Repetition of steps 1 to 3, if necessary.
5. Adjusting seat height, see *4.5 Adjusting Seat Height, page 13*.

CAUTION!
Risk of Injury After Tilting of Power Wheelchair Caused by Blocked Castors
— Always check seat depth settings for both forward and reverse movement. Make sure castors can rotate freely and have not contact to any fixed power wheelchair component.

CAUTION!
Risk of Tipping Over
Any change in seating position can negatively influence stability of power wheelchair.
— Always make sure the wheelchair is stable and will not tip over, after adjusting seating position.

CAUTION!
Any Changes to Drive Program can Affect Driving Characteristics and Tipping Stability of Power Wheelchair
— Changes to drive program may only be carried out by trained Invacare specialist provider.
— Invacare supplies all power wheelchairs with a standard drive program ex-works. Invacare can only give a warranty for safe power wheelchair driving behavior - especially tipping stability - for this standard drive program.

CAUTION!
Risk of Crushing
The seat is very heavy. Risk of injury to hands and feet.
— Pay attention to hand and feet.
— Use proper lifting techniques.

4.2.1 Adjusting Lower Leg Length

Invacare offers a range of legrests which can be adjusted individually. See user manual.

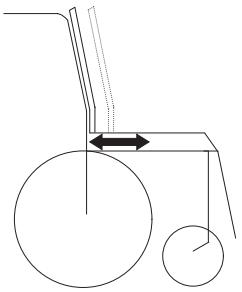
4.2.2 Adjusting Seat Depth

Modulite Seat:

The seat depth Ⓐ can be adjusted by moving the position of the backrest in relation to the seat surface. See user manual of Modulite.

Ultra Low Maxx Seat:

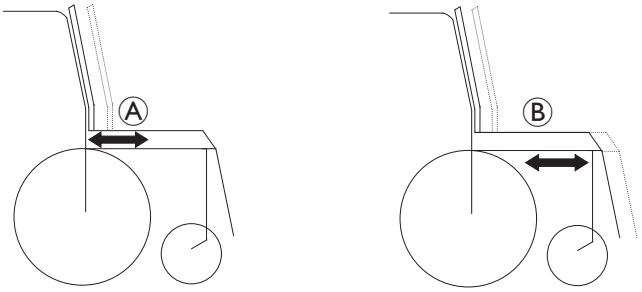
The seat depth Ⓐ can be adjusted by moving the position of side rails with front seat plates in relation to the backrest. See user manual of Ultra Low Maxx.



4.2.3 Adjusting Centre of Gravity of Seat

The centre of gravity of the seat can be adjusted by mounting the seat frame farther towards the front or the rear of the seat.

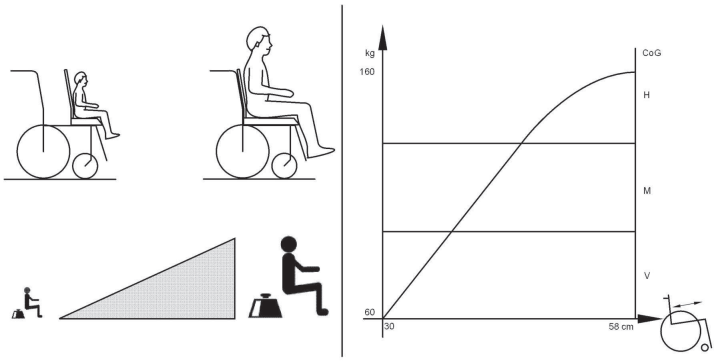
CAUTION!
The seating system of the power wheelchair is delivered ex works with an optimally adjusted centre of gravity (CoG). Any change in this adjustment setting can negatively influence the stability of the power wheelchair.
— You must perform an individual risk analysis every time you change the centre of gravity of the seating position, in order to ensure the safety and stability of the power wheelchair.



Ⓐ: Seat depth

Ⓑ: Centre of gravity of the seat

The user weight and seat depth have strong influences on the choice of the centre of gravity (CoG). If the user is heavy and the seat depth is greater, the focus should be the farther back. For best possible driving characteristics of rear-wheel drive wheelchairs, the weight should be distributed: 30 – 40 % front and 60 - 70 % rear. For centre wheel drives, the weight should be distributed 25 % front, 50 % centre and 25 % rear.

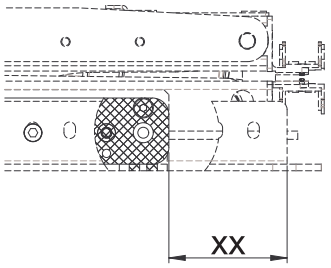


CAUTION!
Risk of Damage due to Collisions of the Legrests with Other Parts of the Power Wheelchair.
— Set the legrests to the smallest angle before adjusting the seat centre of gravity.
— Pay attention with adjusting the seat centre of gravity that the legrests do not touch any other parts of the wheelchair. This ensures that the legrests can not collide with other parts of the wheelchair.

Seat Systems

For details on Modulite or Ultra Low Max Seat, see the following chapters.

4.3 Adjusting Wheelbase Length— Modulite Seat



On the Modulite seat, the wheelbase length is adjusted via the lateral profiles, see *4.3.1 Telescopic Seat Frame, page 9*.

The following tables list the recommended module positions depending on the wheelbase length and the seat depth. The xx value is the distance between the rear edge of the height-adjustment bracket and the rear edge of the main frame.

For more information about the recommended yy value (distance between seat rail connector and rear edge of main frame) see chapter *Adjusting Wheelbase Length* in the service manual of the Modulite Seating system.

Variant narrow base — Recommended positions of module

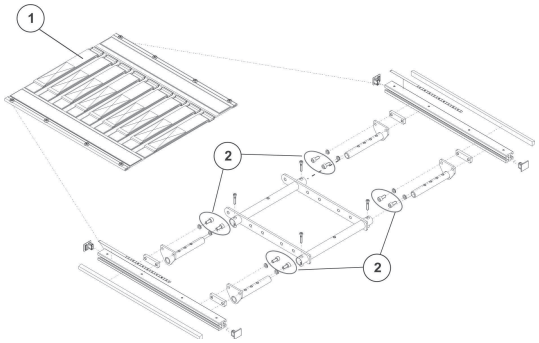
Wheelbase	Seat Depth	Distance xx	Comment
460 mm	410 mm/ 16 inch	N/A	N/A
	460 mm/ 18 inch	N/A	N/A
	510 mm/ 20 inch	N/A	N/A
490 mm	410 mm/ 16 inch	50.0 mm	**Best performance**
	460 mm/ 18 inch	50.0 mm	**Best performance**
	510 mm/ 20 inch	72.5 mm	**Best performance**
520 mm	410 mm/ 16 inch	50.0 mm	Performance considerations
	460 mm/ 18 inch	50.0 mm	Performance considerations
	510 mm/ 20 inch	50.0 mm	Performance considerations

Variant wide base — Recommended positions of module

Wheelbase	Seat Depth	Distance xx	Comment
490 mm	410 mm/ 16 inch	50.0 mm	**Best performance**
	460 mm/ 18 inch	50.0 mm	**Best performance**
	510 mm/ 20 inch	72.5 mm	**Best performance**
520 mm	410 mm/ 16 inch	50.0 mm	Performance considerations
	460 mm/ 18 inch	50.0 mm	Performance considerations
	510 mm/ 20 inch	72.5 mm	Performance considerations
550 mm	410 mm/ 16 inch	50.0 mm	Performance considerations
	460 mm/ 18 inch	50.0 mm	Performance considerations
	510 mm/ 20 inch	50.0 mm	Performance considerations
	580 mm/ 22 inch	72.5 mm	**Best performance**

4.3.1 Telescopic Seat Frame

- 6 mm Allen key

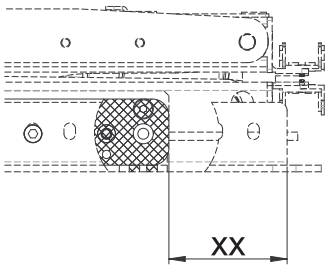


1. Remove seat plate or sling seat (1). See Modulite service manual, “Adjusting seat width/backrest width” chapter.
2. Loosen screws (2) in front and rear, left and right – DO NOT remove.
3. Shift position of seat.
4. Re-tighten screws.
5. Install seat plate or sling seat.

4.4 Adjusting Wheelbase Length— Ultra Low Maxx Seat

- 4 mm Allen key

The following tables list the recommended module positions depending on the wheelbase length and the seat depth. The xx value is the distance between the rear edge of the height-adjustment bracket and the rear edge of the main frame.



Variant Narrow Base — Recommended Positions of Module

Wheelbase	Seat Depth	Tilt and Lifter-Tilt Modules		Fixed Height and Seat Angle Setting	
		Distance xx	Comment	Distance xx	Comment
460 mm	405 mm/ 16 inch	N/A	N/A	72.5 mm	**Best performance**
	430 mm/ 17 inch	N/A	N/A	50.0 mm	**Best performance**
	455 mm/ 18 inch	N/A	N/A	27.5 mm	**Best performance**
	480 mm/ 19 inch	N/A	N/A	27.5 mm	Performance considerations
	505 mm/ 20 inch	N/A	N/A	27.5 mm	Performance considerations
	530 mm/ 21 inch	N/A	N/A	N/A	N/A
	555 mm/ 22 inch	N/A	N/A	N/A	N/A
	580 mm/ 23 inch	N/A	N/A	N/A	N/A
490 mm	405 mm/ 16 inch	72.5 mm	**Best performance**	72.5 mm	Performance considerations
	430 mm/ 17 inch	50.0 mm	**Best performance**	50.0 mm	Performance considerations
	455 mm/ 18 inch	27.5 mm	**Best performance**	27.5 mm	Performance considerations
	480 mm/ 19 inch	27.5 mm	Performance considerations	5.0 mm	**Best performance**
	505 mm/ 20 inch	27.5 mm	Performance considerations	5.0 mm	**Best performance**
	530 mm/ 21 inch	N/A	N/A	N/A	N/A
	555 mm/ 22 inch	N/A	N/A	N/A	N/A
	580 mm/ 23 inch	N/A	N/A	N/A	N/A

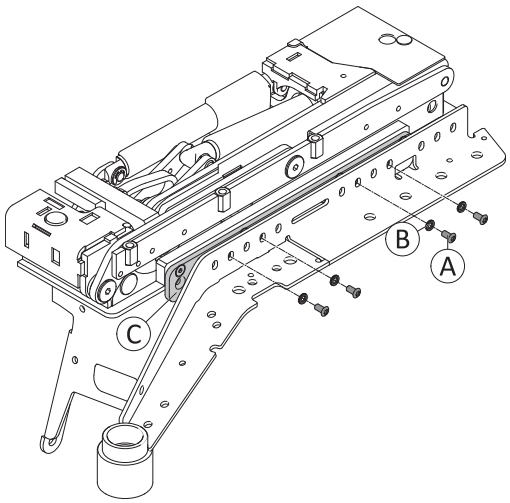
Wheelbase	Seat Depth	Tilt and Lifter-Tilt Modules		Fixed Height and Seat Angle Setting	
		Distance xx	Comment	Distance xx	Comment
520 mm	405 mm/ 16 inch	72.5 mm	Performance considerations	72.5 mm	Performance considerations
	430 mm/ 17 inch	50.0 mm	Performance considerations	50.0 mm	Performance considerations
	455 mm/ 18 inch	27.5 mm	Performance considerations	27.5 mm	Performance considerations
	480 mm/ 19 inch	5.0 mm	**Best performance**	5 mm	Performance considerations
	505 mm/ 20 inch	5.0 mm	**Best performance**	–17.5 mm	Performance considerations
	530 mm/ 21 inch	N/A	N/A	–17.5 mm	**Best performance**
	555 mm/ 22 inch	N/A	N/A	–40.0 mm	**Best performance**
	580 mm/ 23 inch	N/A	N/A	–40.0 mm	**Best performance**

Variant Wide Base — Recommended Positions of Module

Wheelbase	Seat Depth	Tilt and Lifter-Tilt Modules		Fixed Height and Seat Angle Setting	
		Distance xx	Comment	Distance xx	Comment
490 mm	405 mm/ 16 inch	95.0 mm	**Best performance**	95.0 mm	**Best performance**
	430 mm/ 17 inch	72.5 mm	**Best performance**	72.5 mm	**Best performance**
	455 mm/ 18 inch	50.0 mm	**Best performance**	50.0 mm	**Best performance**
	480 mm/ 19 inch	50.0 mm	Performance considerations	27.5 mm	**Best performance**
	505 mm/ 20 inch	50.0 mm	Performance considerations	27.5 mm	**Best performance**
	530 mm/ 21 inch	N/A	N/A	N/A	N/A
	555 mm/ 22 inch	N/A	N/A	N/A	N/A
	580 mm/ 23 inch	N/A	N/A	N/A	N/A
520 mm	405 mm/ 16 inch	95.0 mm	Performance considerations	95.0 mm	Performance considerations
	430 mm/ 17 inch	72.5 mm	Performance considerations	72.5 mm	Performance considerations
	455 mm/ 18 inch	50.0 mm	**Best performance**	50.0 mm	Performance considerations
	480 mm/ 19 inch	27.5 mm	**Best performance**	27.5 mm	Performance considerations
	505 mm/ 20 inch	27.5 mm	**Best performance**	5.0 mm	Performance considerations
	530 mm/ 21 inch	N/A	N/A	5.0 mm	**Best performance**
	555 mm/ 22 inch	N/A	N/A	–17.5 mm	**Best performance**
	580 mm/ 23 inch	N/A	N/A	–17.5 mm	**Best performance**

Wheelbase	Seat Depth	Tilt and Lifter-Tilt Modules		Fixed Height and Seat Angle Setting	
		Distance xx	Comment	Distance xx	Comment
550 mm	405 mm/ 16 inch	95.0 mm	Performance considerations	95.0 mm	Performance considerations
	430 mm/ 17 inch	72.5 mm	Performance considerations	72.5 mm	Performance considerations
	455 mm/ 18 inch	50.0 mm	Performance considerations	50.0 mm	Performance considerations
	480 mm/ 19 inch	27.5 mm	Performance considerations	27.5 mm	Performance considerations
	505 mm/ 20 inch	5.0 mm	Performance considerations	5.0 mm	Performance considerations
	530 mm/ 21 inch	5.0 mm	**Best performance**	–17.5 mm	Performance considerations
	555 mm/ 22 inch	5.0 mm	**Best performance**	–40.0 mm	Performance considerations
	580 mm/ 23 inch	5.0 mm	**Best performance**	–40.0 mm	Performance considerations

1. Remove main frame shrouds on both sides, see *10.3 Main Frame Shrouds, page 48*.
2. Remove screws Ⓐ and washers Ⓑ on both sides.
3. Align module Ⓒ according to table for your variant.
4. Insert screws and washers and tighten.
5. Re-install shrouds.



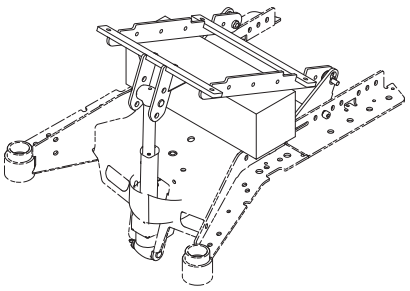
4.5 Adjusting Seat Height

How you adjust the seat height depends on the seating system and the tilt mechanism.

Modulite seat		See *14.2 Replacing Height Adjustment Bracket — Tilt and Lifter-Tilt Modules, page 64*.
Ultra Low Maxx seat	Tilt and lifter-tilt modules	
	Tilt with fixed pivot point	See *4.5.1 Adjusting Seat Height — Tilt with Fixed Pivot Point, page 13*.

4.5.1 Adjusting Seat Height — Tilt with Fixed Pivot Point

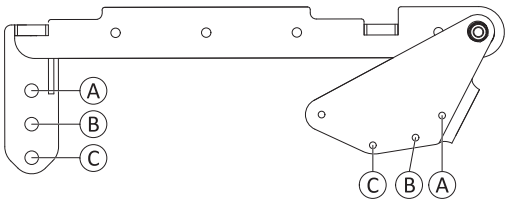
- 10 mm wrench
- Flat screwdriver
- Jacking device

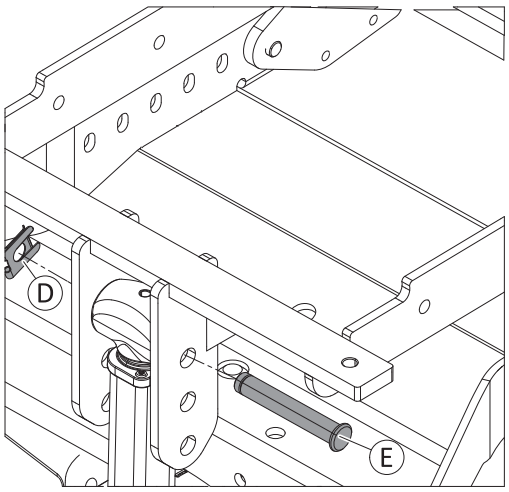


CAUTION!
Risk of Crushing
Seat comes down when front or rear fixing of the seat are removed.
- — Do not remove front and rear fixing of the seat at the same time.
- — Hold the seat in position while removing the actuator.
- — Place a jacking device between seat and chassis, or lower seat carefully to the chassis.

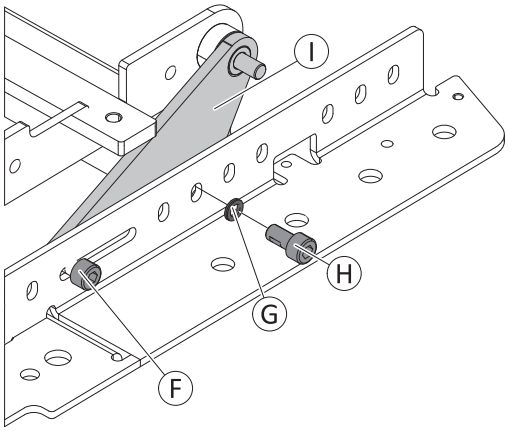
Available Settings

Mounting Position	Seat Height
Ⓐ	435 mm
Ⓑ	460 mm
Ⓒ	485 mm





1. Remove SL retainer clip Ⓓ and pin Ⓔ on top fixation of actuator. Hold seat in position.
2. Adjust seat height on top fixation according to table *Available Settings*.
3. Re-install SL retainer clip and pin.



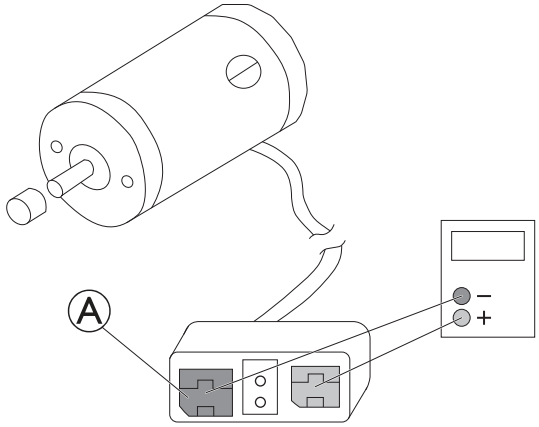
4. Loosen screws Ⓕ on both sides sightly.
5. Loosen and remove screws Ⓖ and washers Ⓗ on both sides.
6. Adjust seat height at height adjustment bracket Ⓘ according to table *Available Settings*
7. Re-install washers and screws.
8. Tighten screws.

5 Testing

5.1 Testing Motor

- Phillips screwdriver, size 2
- Digital multimeter with resistance measurement

1. Remove rear shroud, see *10.5 Rear Shroud, page 50*.
2. Pull the motor plug out of power module.
3. Connect the digital multimeter to the motor plug contacts Ⓐ and measure the resistance between the contacts.



A resistance of between 0.5 ohms and 5.0 ohms indicates a motor ready for operation. A resistance of between 15.0 ohms and infinity indicates a defective motor. High resistances are normally caused by bad connections or worn carbon brushes.

5.2 Testing Motor Brake

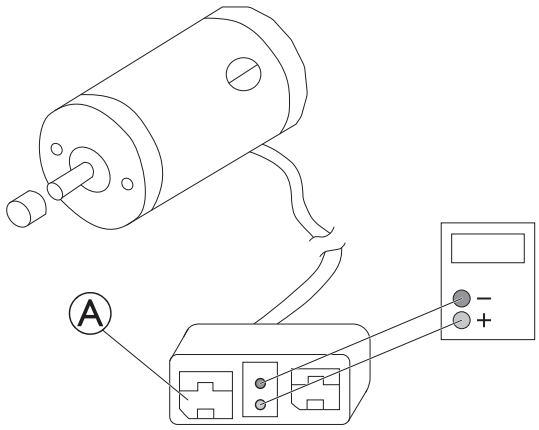
This test should only be carried out on power wheelchairs with conventional motor/gearbox units.

CAUTION!
Risk of Damage to Power Module due to Shorts in Motor Brake
— Never connect a shorted motor brake to an intact power module.
— Always replace shorted brakes immediately.

A defective motor can damage the power module, but a defective power module cannot damage the motor.

- Phillips screwdriver, size 2
- Digital multimeter with resistance measurement

1. Remove shroud, that covers power module, see *10.1 Power Module Shrouds, page 47*.
2. Pull motor plug out of the power module.
3. Connect the digital multimeter to the adjacent central motor plug contacts Ⓐ and measure the resistance between the contacts.
4. If there is a defect, replace the motor and send it to Invacare Service for inspection or repair.



A resistance of between 40 ohms and 80 ohms indicates an intact brake. A resistance of 0 ohms or a very high resistance (mega-ohms or infinity) indicates a short-circuit, a bad connection or a defective brake.

5.3 Rain test

- Check to ensure that the black battery terminal caps are secured in place, gaiter is not torn or cracked where water can enter and that all electrical connections are secure at all times.
- Do not use the power wheelchair if the gaiter is torn or cracked. If the gaiter becomes torn or cracked, replace immediately.

5.4 Field Load Test

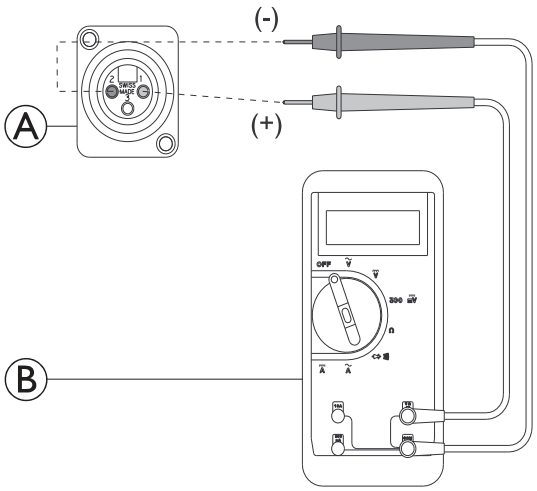
Old batteries loose their ability to store and release power due to increased internal resistance. In this procedure, batteries are tested under load using a digital voltmeter to check battery charge level at the charger connector. The charger connector is located on the remote. When voltage at the output drops 1.0 volts under load (2.0 volts for a pair), replace the batteries.

Read these instructions carefully and the manufacturer's instructions on the digital voltmeter before proceeding.

- Voltmeter

WARNING!
— When performing the following steps, ensure your feet are clear from casters and wall, otherwise injury may result.

1. Switch electronics OFF on remote.
2. Make sure battery is fully charged. An extremely discharged battery will exhibit the same symptoms as a bad battery.
3. Remove footboard / legrests from power wheelchair.
4. Connect voltmeter leads to charger connector Ⓐ on power wheelchair. Most digital voltmeters Ⓑ are not affected by polarity. However, analog meters (meters with swinging needles) can be and should be used carefully.
   A good meter reading should be 25.5 VDC to 26.0 VDC with the chair in neutral.
5. Switch electronics ON on remote.
6. Ensue that your feet are clear from casters and wall.
7. Run power wheelchair in neutral for at least 2 minutes.
8. Sit in power wheelchair and place your feet against a door jam, workbench or other stationary object.
9. Carefully give forward command, trying to drive the power wheelchair through the stationary object. The load should draw between 30 amps to 40 amps from the batteries for 0.3 seconds.
   Performing this step puts a heavy load on the batteries as they try to push through the stationary object. If the wheels spin, have two individuals (one on each arm) apply as much downward pressure as possible on the arms of the power wheelchair.
10. Read meter while motors are straining to determine voltage under load.
    If the voltage drops more than 2.0 volts from a pair of fully charged batteries during the 0.3 seconds, they should be replaced regardless of the unloaded voltages.



5.5 Checking Actuator

- Digital multimeter with resistance measurement

1. Turn OFF controls on remote.
2. If necessary, remove shroud.
3. Take note of the positions of all cables and sockets that they are connected to. Mark connectors and sockets or take a photograph with a digital camera.
4. Unplug actuator.
5. Connect multimeter to the contacts and measure the resistance between the contacts. The plug can have a different shape than shown in illustration.

   A resistance below 1 ohms indicates a short-circuit. Very high resistances indicates (mega-ohms or infinity) indicates a defective actuator. Actuator must be replaced in both cases.

5.6 Checking Battery Charge Level

The following “Dos” and “Don’ts” are provided for your convenience and safety.

DON’T	DO
Don’t perform any installation or maintenance without first reading this manual.	Read and understand this manual and any service information that accompanies a battery and charger before operating the personal transporter.
Don’t perform installation or maintenance of batteries in an area that could be damaged by battery spills.	Move the personal transporter to a work area before cleaning terminals, or opening battery box.
Don’t make it a habit to discharge batteries to the lowest level.	Recharge as frequently as possible to maintain a high charge level and extend battery life.
Don’t use chargers or batteries that are not appropriate for the chair.	Follow recommendations in this manual when selecting a battery or charger.
Don’t put new batteries into service before charging.	Fully charge a new battery before using.
Don’t tip or tilt batteries.	Use a carrying strap to remove, move or install a battery.
Don’t tap on clamps and terminals with tools.	Push battery clamps on the terminals. Spread clamps wider if necessary.

6 Service

6.1 General Warning Information on Installation Work

CAUTION!
Risk of Injury and Damage to Property, if the Maximum Speed Reduction on a Power Wheelchair with a Lifter does not Function Correctly
The power wheelchair's control unit must reduce the maximum possible speed as soon as the lifter is raised.
— Test the maximum speed reduction for correct function after any maintenance work or modifications to the power wheelchair.

6.2 Tightening Torques

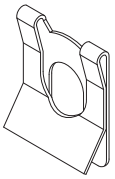
CAUTION!
Risk of Damage to Power Wheelchair due to Improperly Tightened Screws, Nuts or Plastic Connections.
— Always tighten screws, nuts etc. to the stated tightening torque.
— Only tighten screws or nuts which are not listed here fingertight.

The tightening torques stated in the following list are based on the thread diameter for the nuts and bolts for which no specific values have been determined. All values assume dry and de-greased threads.

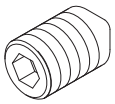
Thread	Tightening Torque in Nm ±10 %
M4	3 Nm
M5	6 Nm
M6	10 Nm
M8	25 Nm
M10	49 Nm
M12	80 Nm
M14	120 Nm
M16	180 Nm

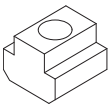
6.3 Glossary of Frequently Used Mounting Hardware

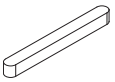
Wedge lock washer 

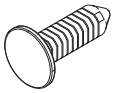
SL retainer clip 

Shaft retaining ring 

Set screw 

T-nut 

Feather key 

Cone-shaped pin 

6.4 Troubleshooting

6.4.1 Operational Faults

Proceed as follows if you have any problems:

1. First assess the possible cause of the problem using the following table.
2. Check the remote status display. Evaluate the flash error code.
3. Carry out the necessary checks and repairs as recommended in the following table.

The various power modules can be fitted in connection with different remotes in the power wheelchair. Rectification of operational faults depends on the power module fitted. The power modules used are described in the corresponding controls manual.

The tables for rectification of operational faults listed in the following chapters are only an excerpt from the original manufacturer's manuals. You can obtain the original manuals from Invacare.

6.4.2 Drive Fault Diagnosis

Problem	Other symptoms	Possible cause	Solution	Documentation
Power wheelchair will not start	The remote status display illuminates normally and shows an error code.	Drive motors disengaged	Engage drive motors	See corresponding remote manual
	Remote status display does not illuminate	Batteries defective	Replace batteries	See *12.5 Replacing Batteries, page 59*
		Completely discharged battery	Pre-charge batteries	See user manual
		Power supply to remote interrupted	Check status of circuit breaker	See user manual
			Check cables between modules for loose connections or damage	See *11.6 Checking Cables, page 57*
		Remote defective	Replace remote	See corresponding remote manual
	Remote status display flashing	Various causes	Assess error code	See corresponding remote manual
Power wheelchair judders in drive mode	None	Batteries defective (unstable voltage)	Replace batteries	See *12.5 Replacing Batteries, page 59*
		Drive motor(s) defective	Replace motor(s)	See *7.1 Drive Components (before 03_2023), page 26* or *7.2 Drive Components (after 03_2023), page 30*
			Replace carbon brushes	See *7.2.2 Checking and / or Replacing Carbon Brushes, page 32*
Power wheelchair pulls to left or right	None	Drive motors running asymmetrically	Change programming to synchronise motors	See LiNX service manual
	Tyre visibly dented	Not enough air in tyre	Check air pressure, replace inner tube and/or valve if necessary.	See *9.9 Replacing Tyres, page 43*
Error message does not clear	None	Bad connections	Check all connecting cables.	See *11.6 Checking Cables, page 57*
		Motor brake defective	Measure internal resistance of brakes, replace motor if defective.	See *5.2 Testing Motor Brake, page 14*, *7.1 Drive Components (before 03_2023), page 26* or *7.2 Drive Components (after 03_2023), page 30*

Problem	Other symptoms	Possible cause	Solution	Documentation
Motors stop and start again	None	Voltage decline	Stop driving and allow controls to cool down.	
Motor runs but loses power	None	High motor load allows power module to lower voltage	Stop driving and allow controls to cool down.	
Motors stop and do not start again	None	High motor load allows power module to lower voltage	Leave power wheelchair switched on and let power module operate. Charge batteries overnight with power wheelchair switched on.	
		Circuit breaker switched off	Check cabling and switch on circuit breaker.	See *11.6 Checking Cables, page 57*
		Motor defective	Check carbon brushes and replace if necessary	See *7.2.2 Checking and / or Replacing Carbon Brushes, page 32*
			Measure internal resistance of motor, replace motor if defective.	See *5.1 Testing Motor, page 14*, *7.1 Drive Components (before 03_2023), page 26* or *7.2 Drive Components (after 03_2023), page 30*
		Power module defective	Replace power module	See *11.1 Replacing Power Module, page 54*
Motors lose power while driving	None	Bad connections	Switch power wheelchair off, wait 10 seconds, switch power wheelchair on again. Check all cabling.	See *11.6 Checking Cables, page 57*
Motor judders or runs irregularly, or only one motor runs	None	Carbon brushes worn	Check carbon brushes and replace if necessary	See *7.2.2 Checking and / or Replacing Carbon Brushes, page 32*
		Clutch(es) defective	Replace clutch	See *7.1.3 Replacing Motor / Gearbox Clutch, page 28*
		Bearing defective	Replacing motor	See *7.1 Drive Components (before 03_2023), page 26* or *7.2 Drive Components (after 03_2023), page 30*
		Collector defective	Measure internal resistance of motor, replace motor if defective	See *5.1 Testing Motor, page 14*, *7.1 Drive Components (before 03_2023), page 26* or *7.2 Drive Components (after 03_2023), page 30*

Problem	Other symptoms	Possible cause	Solution	Documentation
Motors do not run	None	Bad connections	Check all cabling	See *11.6 Checking Cables, page 57*
		Circuit breaker switched off	Check cabling and switch on circuit breaker.	See *11.6 Checking Cables, page 57* and user manual
		Batteries defective	Replace batteries	See *12.5 Replacing Batteries, page 59*
		Cabling to power module or remote defective	Check cabling	See *11.6 Checking Cables, page 57*
		Power module defective	Replace power module	See *11.1 Replacing Power Module, page 54*
	Corroded contacts	Water, salt or urine has penetrated	Check cabling, replace if necessary	See *11.6 Checking Cables, page 57*
Motor makes clicking noise	None	Clutch(es) defective	Replace clutch	See *7.1.3 Replacing Motor / Gearbox Clutch, page 28*
		Bearing defective	Replacing motor	See *7.1 Drive Components (before 03_2023), page 26* or *7.2 Drive Components (after 03_2023), page 30*
		Collector defective	Measure internal resistance of motor, replace motor if defective	See *5.1 Testing Motor, page 14*, *7.1 Drive Components (before 03_2023), page 26* or *7.2 Drive Components (after 03_2023), page 30*
Scraping noise or motor blocked	None	Clutch(es) defective	Replace clutch	See *7.1.3 Replacing Motor / Gearbox Clutch, page 28*
		Bearing defective	Replacing motor	See *7.1 Drive Components (before 03_2023), page 26* or *7.2 Drive Components (after 03_2023), page 30*
		Gearbox defective	Replace gearbox	See *7.1.1 Replacing Motor-Gearbox Unit, page 26*, *7.1 Drive Components (before 03_2023), page 26* or *7.2 Drive Components (after 03_2023), page 30*

Problem	Other symptoms	Possible cause	Solution	Documentation
Gearbox makes clicking noise	None	Gearbox defective	Replace gearbox	See *7.1.1 Replacing Motor-Gearbox Unit, page 26*, *7.1 Drive Components (before 03_2023), page 26* or *7.2 Drive Components (after 03_2023), page 30*
		Drive wheel loose	Tighten drive wheel, secure bolts with thread locking adhesive, if necessary	See *9.4 Replacing Drive Wheel (1–Bolt Installation), page 39*
Gearbox losing oil	None	Sealing ring on drive shaft defective	Replace gearbox if sealing ring defective	See *7.1.2 Replacing or Rotating Motor/Gearbox Unit Sealing Ring, page 27*, *7.1 Drive Components (before 03_2023), page 26* or *7.2 Drive Components (after 03_2023), page 30*
			Check carbon brushes for oil wetting, replace motor if brushes wet	See *7.2.2 Checking and / or Replacing Carbon Brushes, page 32*
Irregular running	None	Drive shaft movable or bent	Check drive shaft, replace gearbox if defective	See *7.1.3 Replacing Motor / Gearbox Clutch, page 28*, *7.1 Drive Components (before 03_2023), page 26* or *7.2 Drive Components (after 03_2023), page 30*
Batteries not being charged	None	Circuit breaker defective	Check circuit breaker	See *12.6 Replacing Circuit Breaker, page 60*
		Cable defective	Check cabling	See *11.6 Checking Cables, page 57*
		Batteries defective	Replace batteries	See *12.5 Replacing Batteries, page 59*
	LEDs blinking on charging unit	Charging unit defective	Replace charging unit	See charger user manual
Short charging period	None	One of the batteries could be defective	Replace batteries	See *12.5 Replacing Batteries, page 59*
Power wheelchair runs too slowly	None	Remote defective	Replace remote	See corresponding remote manual
		Batteries defective	Replace batteries	See *12.5 Replacing Batteries, page 59*

6.4.3 Charging Device Fault Diagnosis

Symptom	Possible cause	Solution
No LEDs illuminating on battery charger	Charging device not connected to mains supply.	Ensure that the battery charger has been plugged in.
	No mains supply	Check the mains supply with a voltmeter.
	Defective mains supply cable.	Check the mains supply cable. Replace damaged cables or send the battery charger to Invacare Service for repair.
	LEDs are burnt out	Send the battery charger to Invacare Service for repair.
	An internal fuse might be burnt out.	Send the battery charger to Invacare Service for repair.
Batteries do not charge	Battery charger not connected to power wheelchair.	Ensure that the battery charger has been connected to the power wheelchair.
	No mains supply	Check the mains supply with a voltmeter.
	Defective mains supply cable.	Check the mains supply cable. Replace damaged cables or send the batterycharger to Invacare Service for repair.
	Battery charger could be defective.	Use a battery charger which you know is working properly to charge the batteries. Send the defective battery charger to Invacare Service for repair.
	Battery voltage is too low to operate power wheelchair.	Replace the batteries, see *12.5 Replacing Batteries, page 59*.

6.5 Service Plan (Once A Year)

CAUTION!
Risk of Injury and Damage to Property, if the Maximum Speed Reduction on a Power Wheelchair with a Lifter does not Function Correctly!
The wheelchair's control unit must reduce the maximum possible speed as soon as the lifter is raised.
— Test the maximum speed reduction for correct function after any maintenance work or modifications to the wheelchair.

Component	Check	Remedy	Notes	✓
Posture belt	Damage to postural belt	Replace belt if damaged	See *Replacing Posture Belt* in service manual of seating system.	
	Belt lock function	Replace belt if damaged	See *Replacing Posture Belt* in service manual of seating system.	
Armrests	Damage to armrests	Replace shroud if damaged		
	Armrest fixings	Tighten screws		
Clothes-guard	Damage to clothes-guard	Replace clothes-guard if damaged		
	Clothes-guard fixings	Tighten screws		
Seat lock	Seat lock defective	Replace seat lock		
Seat tilt	Tight fit of the pin retainers	Replace pin retainers if necessary		
Lifter (manual or electric)	Check screws	Tighten screws		
Powered recline (if fitted)	Damage to backrest	Replace parts if damaged		
	Seams			
	Fixing	Tighten screws		
	Check cable	Replace motor cable if necessary		
	Check function			
Frames (chassis) / battery mounting	Check fixings, welded seams and battery mounting	Tighten screws		
		Replace components if necessary		
DAHL docking station	Check screws	Tighten screws	See *14.3 Mounting Dahl Docking System, page 65*	

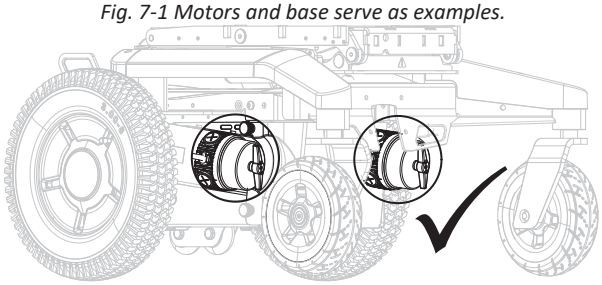
Component	Check	Remedy	Notes	✓
Wheel suspension and wheels	Check drive wheels for tight fit and side play	Adjust, replace wheel hubs	See *9.10 Replacing Drive Wheel Hub (before 10_2022), page 44*	
	Check castors for tight fit, float and side play	Replace wheels, wheel fork or wheel bearings	See *9 Wheels, page 38*	
	Tyres	Repair or replace if damaged	See *9.9 Replacing Tyres, page 43*	
	Check wheel suspension	Repair or replace if damaged	See *9.7 Replacing Castor Fork, page 41*	
	Check straight running	Replace wheels, wheel fork or wheel bearings	See *9.9 Replacing Tyres, page 43*	
Drive units, clutch mechanism	Motors	Check motors	See *5.1 Testing Motor, page 14*	
	Check functions in drive and push modes	Check carbon brushes, replace if necessary	See *7.2.2 Checking and / or Replacing Carbon Brushes, page 32*	
	Check clutch mechanism	Replace motor if necessary.	See *7.1 Drive Components (before 03_2023), page 26* or *7.2 Drive Components (after 03_2023), page 30*	
		Tighten screws/nuts, adjust or replace if necessary		
Brakes	Inspect motor brake	Check motor brake	See *5.2 Testing Motor Brake, page 14*	
Legrests	Check welded seams, interlocking, screws, footplates	Tighten, replace if necessary		
Powered elevating legrests (if fitted)	Check cable	Replace cable if necessary		
	Check contacts			
	Check functions			
Lighting (if fitted)	Check cable	Replace lamp or cable if necessary	See *13 Lighting Unit, page 62*	
	Check function			
Battery mounting	Check battery support and mounting belts for damage	Replace if necessary		

Component	Check	Remedy	Notes	✓
Batteries	Check batteries for damage	Replace batteries if necessary	See *12.5 Replacing Batteries, page 59* and *12.7 Disposing of Dead or Damaged Batteries Correctly, page 61*	
	Check battery voltage	Charge batteries	See user manual	
	Check contacts and terminals	Clean contacts and terminals	See *12 Batteries, page 58*	
Remote / Power modules	Remote, status display blinking	Evaluate error/blink code	See remote manual and controls manual.	
	Fixings	Tighten fixings, replace if necessary		
	Cables and connecting plugs	Tighten cables and connecting plugs, replace if necessary		
	Joystick function	Replace joystick knob if necessary		
		Replace remote if necessary		
	Power supply	Tighten cables and connecting plugs, replace if necessary		
Chair configuration	Check chair configuration version	Update software if newer version available.	See LiNX service manual	
Screws (every six months)	Check screws for tight fit	Tighten screws if necessary		

7 Drive Components

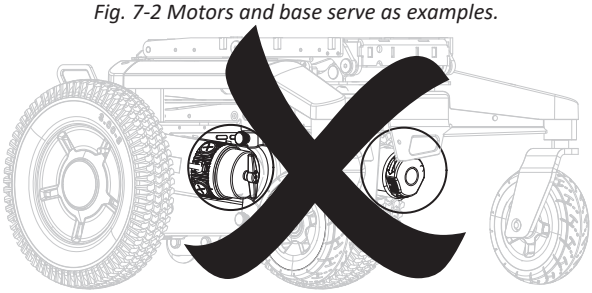
7.1 Drive Components (before 03_2023)

Fig. 7-1 Motors and base serve as examples.



Always combine motors of the same type.

Fig. 7-2 Motors and base serve as examples.

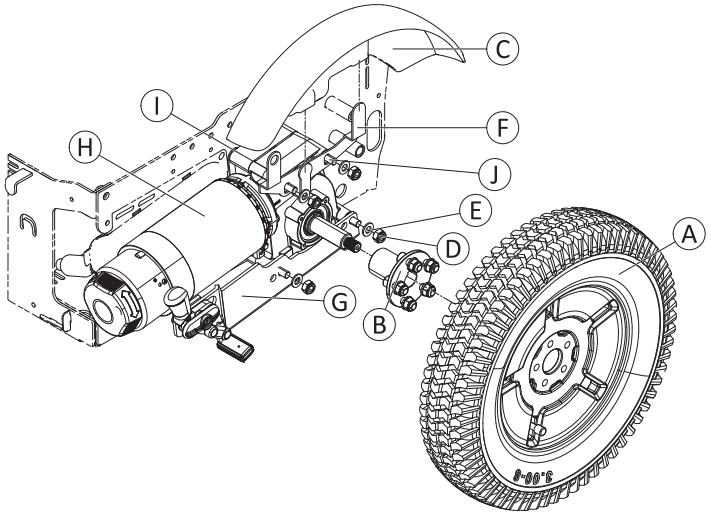


Do not combine motors of different types.

CAUTION!
Risk of Injury or Damage if Different Motor Types are Combined or if Motors are not Configured Correctly!
If different motor types are combined, the wheelchair turns on the spot and the user may fall out of the wheelchair. If the motors are not configured correctly, the wheelchair may not react correctly to control inputs. This may cause unintended movement of the wheelchair and the user may fall out of the wheelchair.
- Do not combine different motor types. Always ensure they are a matching pair.
- Write new Chair configuration file to the chair.
- Conduct “Adaptive Load Compensation (ALC)” calibration after changing the motors and writing new chair configuration.

7.1.1 Replacing Motor-Gearbox Unit

- 13 mm wrench
- 19 mm wrench
- Jacking device



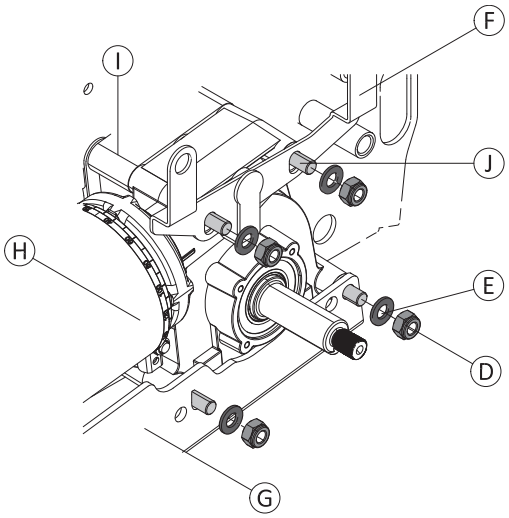
- Ⓐ Wheel
- Ⓑ Wheel hub
- Ⓒ Fender
- Ⓓ Nut
- Ⓔ Washer
- Ⓕ Fender mount
- Ⓖ Wheel lock mount
- Ⓗ Motor-gearbox unit
- Ⓘ Width adapter[1]
- Ⓙ Bolts[2]

1 Optional component.

2 Available in two different lengths. If a width adapter is retrofitted, the bolts must be replaced.

Removing Unit

1. Turn off electronics.
2. Unplug motor cable at power module.
3. Remove wheel including wheel hub.
4. Remove fender, see *10.6 Replacing Fender on Drive Wheel, page 50*.
5. Loosen and remove nuts Ⓓ and washers Ⓔ.
6. If fitted, remove mounts for wheel lock Ⓖ and fender Ⓕ.
7. Pull off unit Ⓗ of bolts Ⓙ.
8. If fitted, remove adapter Ⓘ.



Installing Unit

1. Check that sealing ring and unit are correctly mounted. Nut must be located on the outside and rotation of motors must follow the specifications.
2. Install parts in reverse order.
3. Plug in motor cable to power module.
4. Perform calibration process, see in LiNX service manual.
5. Test all functions.

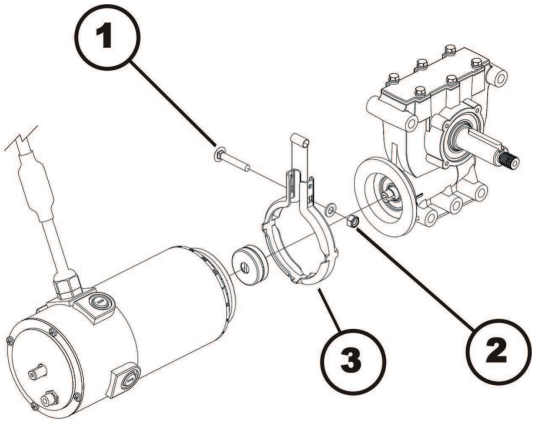
7.1.2 Replacing or Rotating Motor/Gearbox Unit Sealing Ring

CAUTION!
Risk of Crushing
The motor / gearbox unit is very heavy. Risk of injury to hands.
— Pay attention to heavy weight.

- 6 mm Allen key
- 5/8" (16 mm) Allen key
- 7/8" (22 mm) Allen key
- 5/16" (8 mm) Allen key
- Phillips screwdriver size 2
- 10 mm socket wrench
- 1/2" (13 mm) socket wrench
- 1/4" (6 mm) socket wrench
- 5/16" (8 mm) socket wrench
- Torque wrench 0 - 25 Nm (or similar)
- Torque wrench 10 - 80 Nm (or similar)
- Jacking device 2x

Removing Sealing Ring

1. Remove motor / gearbox unit, see *7.1.1 Replacing Motor-Gearbox Unit, page 26*.
2. Use wrench to loosen and remove nut (2) including washer.
3. Remove screw (2), which secures sealing ring (3).
4. Carefully bend sealing ring apart and remove it.



Installing Sealing Ring

1. Install sealing ring so square hole for carriage screw is on inside of power wheelchair.
2. Insert carriage screw through sealing ring.
3. Install washer and self-locking nut.
4. Do not tighten nut completely, as motor orientation must be adjusted during installation.

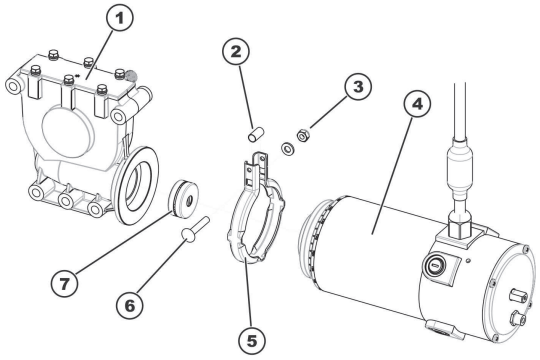
7.1.3 Replacing Motor / Gearbox Clutch

CAUTION!
Risk of Crushing
Motor / gearbox unit is very heavy. Risk of injury to hands.
— Pay attention to heavy weight.

- 5/8" (16 mm) Allen key
- 7/8" (22 mm) Allen key
- 5/16" (8 mm) Allen key
- 6 mm Allen key
- Phillips screwdriver size 2
- 10 mm wrench
- 1/2" (13 mm) wrench
- 1/4" (6 mm) wrench
- 5/16" (8 mm) wrench
- Torque wrench 0 - 20 Nm (or similar)
- Torque wrench 5 - 25 Nm (or similar)
- Torque wrench 10 - 80 Nm (or similar)
- Jacking device 2x

Removing Motor / Gearbox Clutch

1. Removing motor / gearbox unit, see *7.1.1 Replacing Motor-Gearbox Unit, page 26* .
2. Loosen and remove self-securing nut (3).
3. Remove carriage screw (6), which secures sealing ring (5).
4. Carefully bend sealing ring apart and remove it.



NOTICE!
Risk of Material Damage if Clutch is Improperly Handled
— Proceed carefully so that you do not damage motor / gearbox clutch.

5. Pull motor (4) and gearbox unit (1) carefully apart.
6. Remove clutch individual parts (7).
7. Replace clutch, if necessary.

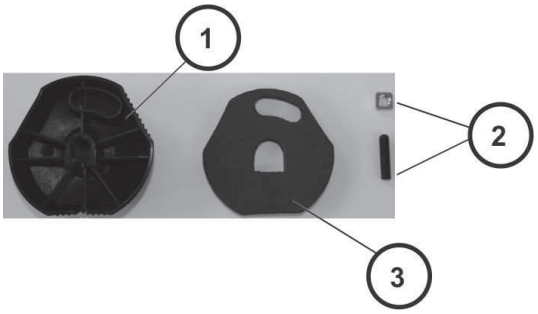
Installing Motor / Gearbox Clutch

1. Install new clutch (7) on motor axle. Pay attention to position of groove.
2. Position locking ring (5) on motor (4) or gearbox (1).
3. Carefully insert motor into gearbox. Pay attention to position of groove in axle of gearbox. If necessary, rotate motor and gearbox to correct position.
4. Insert carriage bolt through locking ring. Do not forget spacer sleeve (2).
5. Install washer and self-locking nut.
6. Do not tighten self-locking nut completely, as motor orientation must be adjusted during installation.
7. Install motor / gearbox unit, see *7.1.1 Replacing Motor-Gearbox Unit, page 26* .
8. Test all functions.

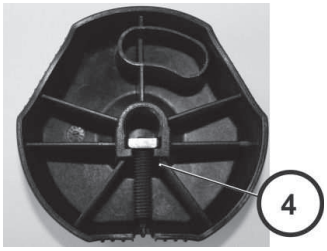
7.1.4 Replacing Engaging Turn Knob

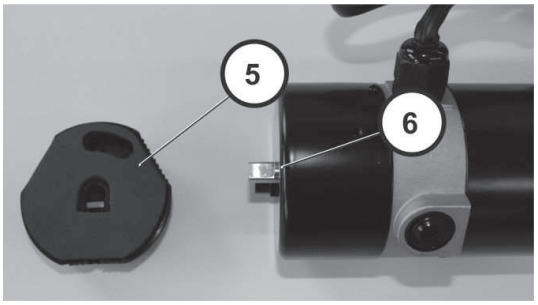
When replacing the engaging turn knob, you must ensure that the correct fitting position is used during assembly.

- 3 mm Allen key

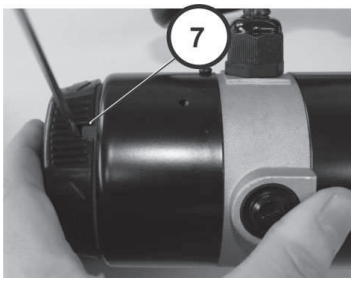


1. Screw shim onto grub screw.
2. Place screw joint in engaging turn knob (rear side (1)).
3. Check that screw joint (4) is positioned precisely in engaging turn knob.
4. Place nonwoven fabric (3) in engaging turn knob (rear side (1)).

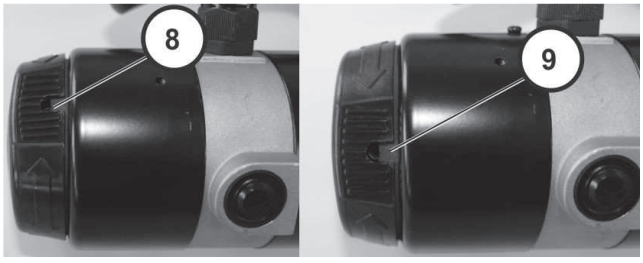




5. When installing engaging turn knob (5) make sure that position (6) is correct.



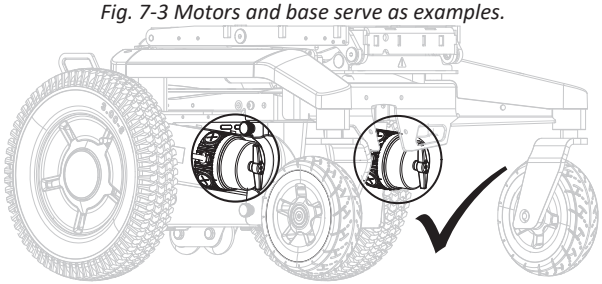
6. Tighten bolt (7).



7. Check that engaging turn knob can be turned to "push" position (clockwise) and "drive" position (counterclockwise).

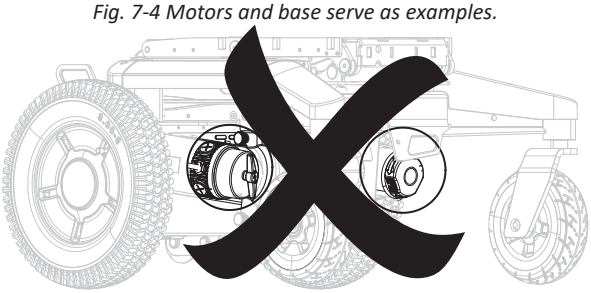
7.2 Drive Components (after 03_2023)

Fig. 7-3 Motors and base serve as examples.



Always combine motors of the same type.

Fig. 7-4 Motors and base serve as examples.

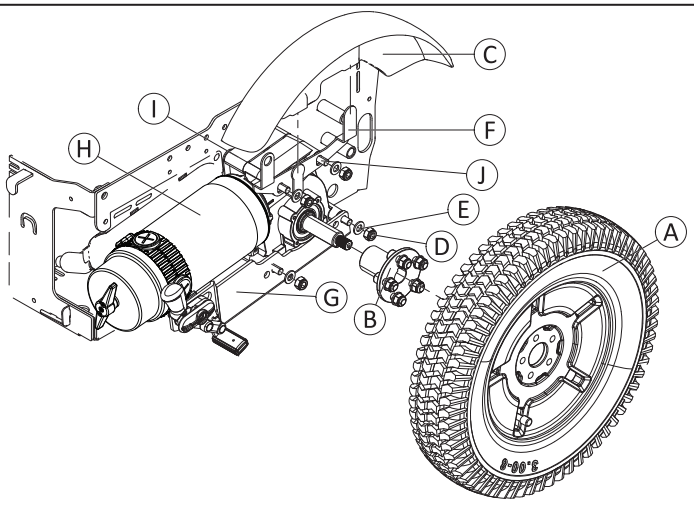


Do not combine motors of different types.

CAUTION!
Risk of Injury or Damage if Different Motor Types are Combined or if Motors are not Configured Correctly!
If different motor types are combined, the wheelchair turns on the spot and the user may fall out of the wheelchair. If the motors are not configured correctly, the wheelchair may not react correctly to control inputs. This may cause unintended movement of the wheelchair and the user may fall out of the wheelchair.
— Do not combine different motor types. Always ensure they are a matching pair.
— Conduct adaptive load compensation fast learn after changing the motors and writing new chair configuration.

7.2.1 Replacing Motor-Gearbox Unit

- 13 mm wrench
- 19 mm wrench
- Jacking device



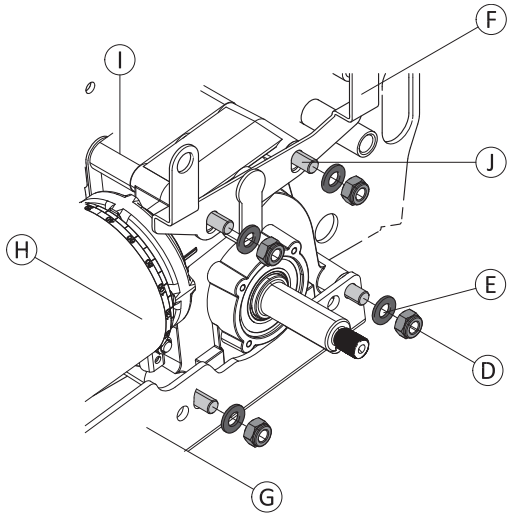
Ⓐ	Wheel
Ⓑ	Wheel hub
Ⓒ	Fender
Ⓓ	Nut
Ⓔ	Washer
Ⓕ	Fender mount
Ⓖ	Wheel lock mount
Ⓗ	Motor-gearbox unit
Ⓘ	Width adapter[1]
Ⓙ	Bolts[2]

1 Optional component.

2 Available in two different lengths. If a width adapter is retrofitted, the bolts must be replaced.

Removing Unit

1. Turn off electronics.
2. Unplug motor cable at power module.
3. Remove drive wheel (see *9.4 Replacing Drive Wheel (1–Bolt Installation), page 39*) including wheel hub (see *9.10 Replacing Drive Wheel Hub (before 10_2022), page 44*.
4. Remove fender, see *10.6 Replacing Fender on Drive Wheel, page 50*.
5. Loosen and remove nuts Ⓓ and washers Ⓔ.
6. If fitted, remove mounts for wheel lock Ⓖ and fender Ⓕ.
7. Pull off unit Ⓗ of bolts Ⓙ.
8. If fitted, remove adapter Ⓘ.

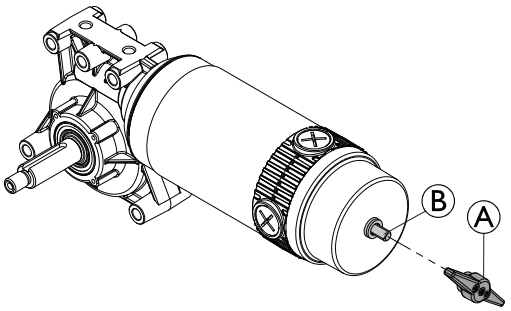


Installing Unit

1. Check that sealing ring and unit are correctly mounted. Nut must be located on the outside and rotation of motors must follow the specifications.
2. Install parts in reverse order.
3. Plug in motor cable to power module.
4. Perform calibration process. See in LiNX service manual.
5. Test all functions.

Replacing Engaging Lever

1. Pull engaging lever Ⓐ from pin Ⓑ.



7.2.2 Checking and / or Replacing Carbon Brushes

If carbon brushes are checked but not replaced, you must know their exact fitting position. Used carbon brushes need to be refitted exactly in the same position from which they were taken to guarantee optimum contact to collector.

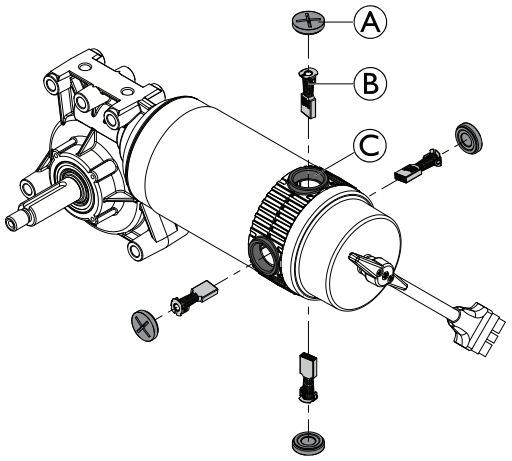
In case of replacing carbon brushes, always replace all carbon brushes on both motors.

CAUTION!
Risk of Crushing
Power wheelchair is very heavy. Risk of Injury to hands and feet.
— Use proper lifting techniques.

- Screwdriver
- Jacking device

Removing Carbon Brushes

1. Turn off power wheelchair.
2. Remove drive wheel, see *9.4 Replacing Drive Wheel (1–Bolt Installation), page 39*.
   To access rear carbon brushes easier, remove the motor, see *7.2.1 Replacing Motor-Gearbox Unit, page 30*.
3. Remove all four plastic caps Ⓐ.
4. Pull carbon brushes Ⓑ a little out of brush holder. Note fixing position and location of carbon brushes.
   If carbon brushes are checked but not replaced, you must know their exact fitting position.
5. Make a marking on motor and carbon brushes to guarantee correct installation.
6. Remove carbon brushes completely from mounting Ⓒ.
7. Test carbon brushes and springs of wear, broken components or discoloration.



Installing Carbon Brushes

1. Depending on condition of brushes and springs:
   - either re-insert brushes in exactly same position from which they were taken or
   - fit new brushes.
     Always replace all carbon brushes on both motors.
2. Replace plastic caps and tighten them.
3. Install drive wheel, see *9.4 Replacing Drive Wheel (1–Bolt Installation), page 39*.

To guarantee maximum performance after replacement treat carbon brushes according to following procedure.

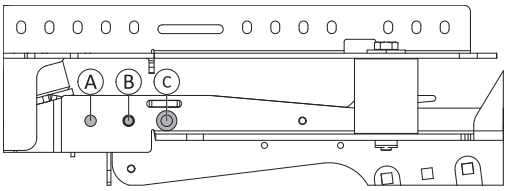
CAUTION!
Risk of Accidents
Risk of injury to workers, surroundings and power wheelchair.
— Do not leave power wheelchair unattended during following procedure.
— Make sure both drive wheels are off ground before calibrating.
— Secure area.

4. Jack up power wheelchair so that drive wheel is suspended freely. Use proper lifting techniques.
5. Allow motors to run in forward direction for an hour.
6. Allow motors to cool down for 30 minutes.
7. Allow motors to run in reverse direction for an hour.
8. Lift power wheelchair off jacking device.

8 Chassis

8.1 Changing Wheelbase

Changing the wheelbase influences the seat depth and the centre of gravity of the power wheelchair, see *4.2.3 Adjusting Centre of Gravity of Seat, page 8*. You may need to adjust seat depth or position of modules to meet requirements of the user.



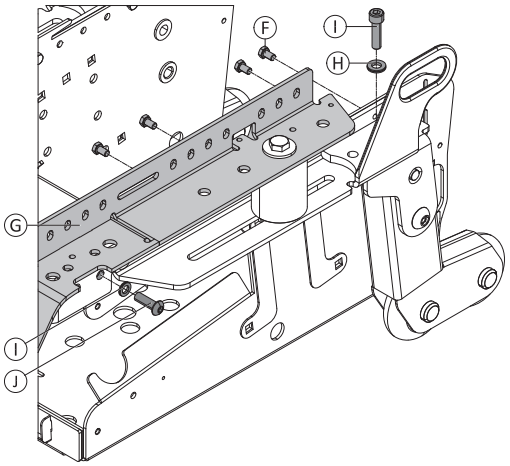
Wheelbase	Recommended Seat Depth[1]	Narrow Base	Wide Base
460 mm	405 mm - 455 mm	Ⓐ	N/A
490 mm	455 mm - 480 mm	Ⓑ	Ⓐ
520 mm	480 mm - 505 mm	Ⓒ	Ⓑ
550 mm	505 mm - 580 mm	N/A	Ⓒ

1 Standard values. Individual values depend on configuration of seating system.

If the wheelbase length is changed to or from its longest variant, the folded sheet on anti-tipper unit must be replaced (see spare parts catalogue).

- 5 mm Allen key
- 6 mm Allen key
- Jacking device

1. Place jacking device underneath power wheelchair next to power module and prop up power wheelchair.
2. Remove batteries, see *12.5 Replacing Batteries, page 59*.
3. Loosen and remove screws Ⓘ and wedge lock washers Ⓗ on both sides.
4. Loosen and remove all screws Ⓕ on both sides.
5. Loosen and remove screw Ⓓ and washer Ⓔ on both sides.
6. Move main frame Ⓖ to desired position (Ⓐ, Ⓑ or Ⓒ).
7. If necessary, replace folded sheet, see *9.12 Replacing Anti-Tipper Unit, page 45*.
8. Install parts in reverse order.
9. Adjust seat depth to meet requirements of user. See user manual.
10. Test all functions.



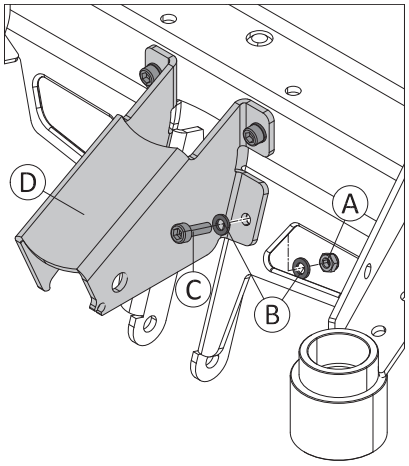
8.2 Replacing Kerb Climber

CAUTION!
Risk of Crushing
Injury hazard to hands. The gas spring is under pressure.
— Be careful with your hands.
— Use suitable tools.

- 5 mm Allen key
- 10 mm wrench

When removing, take care of small parts such as screws and washers. Put all small parts down so that they can be installed in correct sequence.

Fig. 8-1 For better view only the bracket is shown.

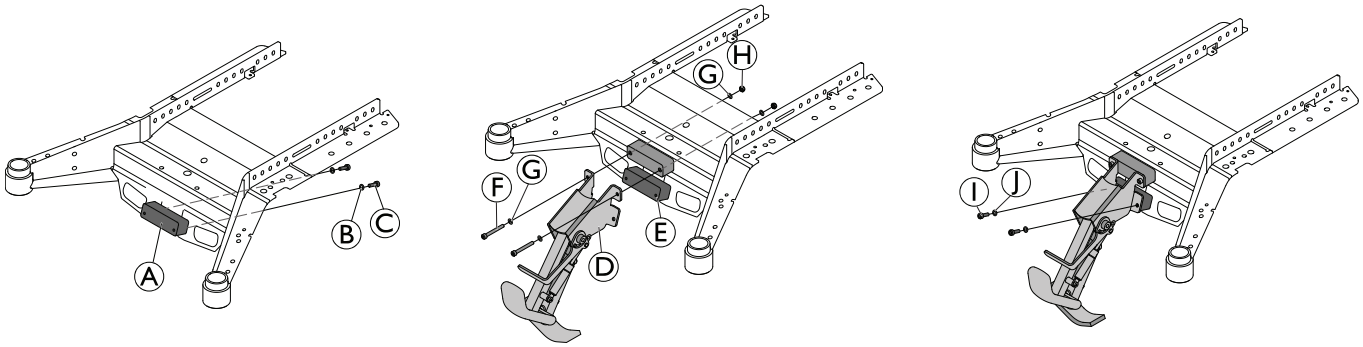


1. Hold in place nut Ⓐ on rear side of main frame. Loosen and remove bolt Ⓒ, washers Ⓑ and nut Ⓐ.
2. Repeat previous step for remaining screwed connections.
3. Remove bracket Ⓓ including kerb climber.
4. Install parts in reverse order.
5. Test all functions.

Installing Kerb Climber for Wide Base

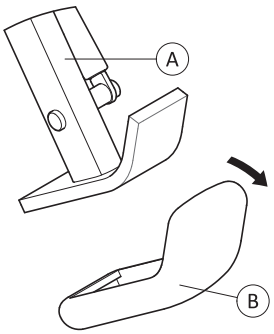
- 5 mm Allen key
- 10 mm wrench

When removing, take care of small parts such as screws and washers. Put all small parts down so that they can be installed in correct sequence.



1. Install adapter 2 Ⓐ with washers Ⓑ and screws Ⓒ.
2. Install kerb climber Ⓓ and adapter 1 Ⓔ with screws Ⓕ, washers Ⓖ and nuts Ⓗ.
3. Fix kerb climber to adapter 2 with washers Ⓘ and screws Ⓙ.

8.3 Replacing Rubber Foot

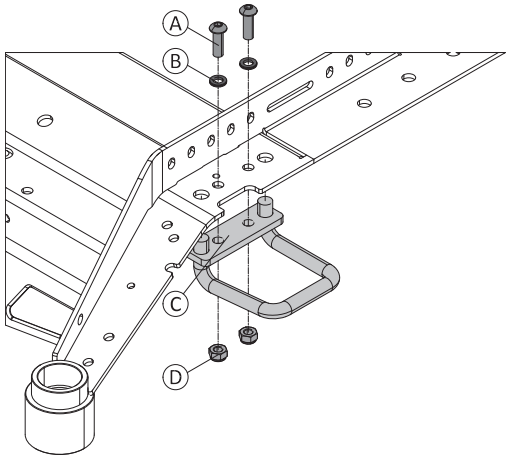


1. Pull front part of old rubber foot Ⓑ off kerb climber Ⓐ in forward direction.
2. Place rear part of new rubber foot over kerb climber.
3. Push front part of new rubber foot over kerb climber.

8.4 Replacing Tie-Down Points

The power wheelchair can be fitted with two additional tie-down points for easier access. If these points are retrofitted, the existing tie-down points on the front of the main frame must not be used anymore.

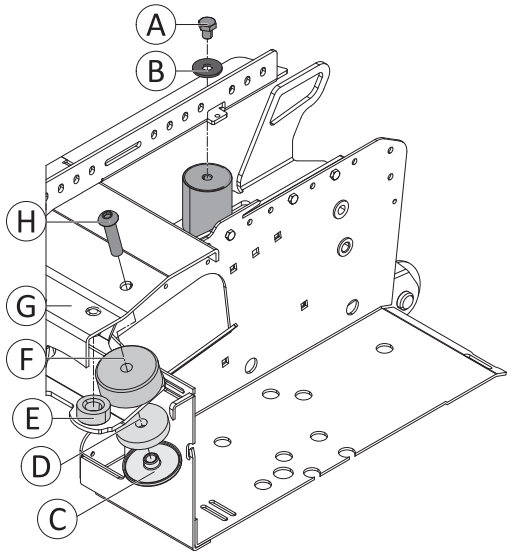
- 5 mm Allen key
- 13 mm wrench



1. Remove main frame shrouds, see *10.3 Main Frame Shrouds, page 48*.
2. Loosen and remove nuts Ⓓ.
3. Remove tie-down point Ⓒ.
4. Remove bolts Ⓐ and washers Ⓑ.
5. Install parts in reverse order.
6. Test all functions.

8.5 Replacing C.T.C. Suspension

- 8 mm Allen key
- 17 mm wrench
- 19 mm open-ended wrench
- Jacking device



Removing Main Frame

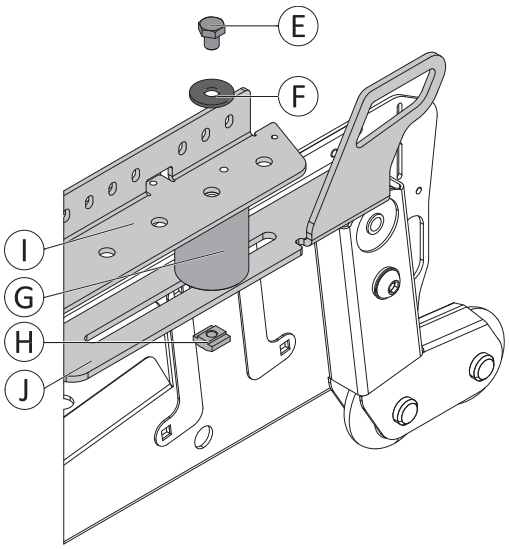
1. Place jacking device underneath power wheelchair and prop up power wheelchair.
2. Remove seat.
3. Remove main frame shrouds, see *10.3 Main Frame Shrouds, page 48*.
4. Loosen and remove screws Ⓐ and washers Ⓑ of rear suspension on both sides.
5. Loosen and remove screw Ⓗ, rebound Ⓓ and washer Ⓒ of C.T.C. suspension.
6. Remove main frame Ⓖ upwards.

Replacing Shock Absorber / Bearing

1. Replace shock absorber Ⓕ and bearing Ⓔ.

Replacing Rear Suspension

- 8 mm Allen key
- 17 mm wrench
- 19 mm wrench
- Torque wrench
- Water pump pliers
- Jacking device 2x

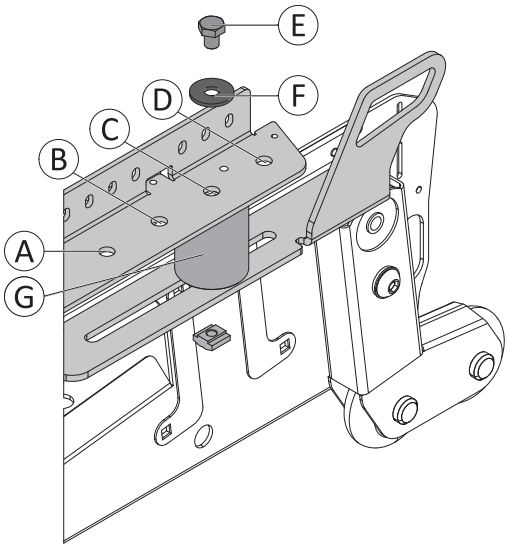


1. Remove main frame shrouds, see *10.3 Main Frame Shrouds, page 48*.
2. Loosen screw of C.T.C. suspension. Do not remove screw.
3. Loosen and remove screw Ⓔ and washer Ⓕ on both sides.
4. Tilt seat including main frame Ⓘ forwards. Place jacking devices between carrier Ⓙ and main frame Ⓘ on both sides.
5. Loosen and remove suspension Ⓖ and T-nut Ⓗ.
6. Replace suspension.
7. Adjust position of suspension. See below.
8. Install screws Ⓔ and washers Ⓕ. Tighten screw to 17 Nm.
9. Tighten screw of C.T.C. suspension to 20 Nm.
10. Test all functions.

8.6 Adjusting C.T.C. Suspension

- 17 mm wrench
- Torque wrench
- Water pump pliers or length of strap approx. 100 - 150 cm
- Jacking device 2x

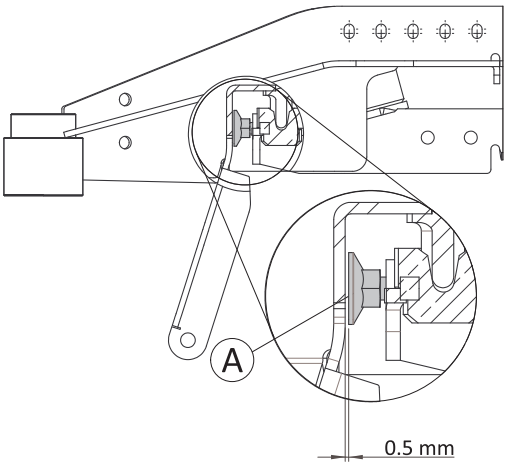
Suspension	Recommended User Weight	Position
Soft	up to 70 kg	Ⓐ
Medium	up to 90 kg	Ⓑ
Firm	up to 110 kg	Ⓒ
Very firm	up to 136 kg	Ⓓ
HD	up to 160 kg	Ⓐ and Ⓓ



1. Remove main frame shrouds. See *10.3 Main Frame Shrouds, page 48*.
2. Loosen and remove screw Ⓔ and washer Ⓕ.
3. Loosen suspension Ⓖ with water pump pliers or length of strap.
4. Move suspension to desired position Ⓐ, Ⓑ, Ⓒ or Ⓓ according to table. If required, install additional suspension springs.
5. Re-tighten suspension.
6. Install screw and washer. Tighten screw to 17 Nm.
7. Repeat previous steps for second suspension.
8. Test all functions.

Adjusting Limit Stopper

- 13 mm wrench
- Torque wrench
- Feeler gauge with 0.5 mm



1. Ensure that power wheelchair is contacting floor with all its wheels and casters.
2. Loosen nut (not shown).
3. Rotate stopper Ⓐ until there is a space of 0.5 mm between it and main frame.
4. Tighten nut to 10 Nm.
5. Repeat for other stopper.

9 Wheels

9.1 Repair Instructions

CAUTION!
Risk of Crushing to Hands and Feet by Weight of Power Wheelchair
- Pay attention to hand and feet.
- Use proper lifting techniques.

CAUTION!
Risk of Uncontrolled Movement of Power Wheelchair
- Turn off power supply (power button).
- Engage drive.
- Before raising power wheelchair, secure wheels by blocking them with wedges.
- Prevent the power wheelchair from tipping, by propping it upon a jacking device which is long and wide enough under the battery case. It the jacking device is too short or too high, the power wheelchair can still tip.

9.2 Tyre Pressure

CAUTION!
Risk of Damage to Rim and Tyre when Tyre Pressure is Exceeded
- Observe recommended tyre pressure.

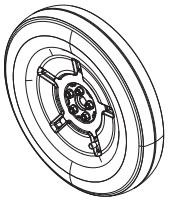
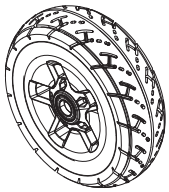
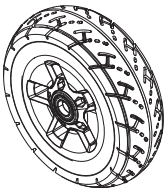
For recommended tyre pressure see inscription on tyre, rim, or contact Invacare. Compare table below for conversion.

psi	bar	psi	bar	psi	bar	psi	bar
22	1.5	28	1.9	33	2.3	39	2.7
23	1.6	29	2.0	35	2.4	41	2.8
25	1.7	30	2.1	36	2.5	42	2.9
26	1.8	32	2.2	38	2.6	44	3.0

9.3 Overview of Wheel Types and Specif Tightening Torques

There are three different types of tyres or inner tubes, and specific points must be observed for the replacement of each type. The individual types of tyres can be easily distinguished:

pneumatic = black valve cap	puncture-protected = red valve cap	puncture-proof = no valve

Drive Wheel		Castor Wheels	
 Solid Rim (1-Bolt Installation)		 8" for single sided / double sided fork	 9" for single sided / double sided fork
Type			
Specific Tightening Torques			
Wheel Fixation	18 Nm	25 Nm	25 Nm
Rim Halves	18 Nm	5 Nm	25 Nm

9.4 Replacing Drive Wheel (1–Bolt Installation)

This chapter deals with drive wheels that are installed with one central bolt.

CAUTION!
Risk of Crushing to Hands and Feet by Weight of Power Wheelchair
- — Pay attention to hand and feet.
- — Use proper lifting techniques.

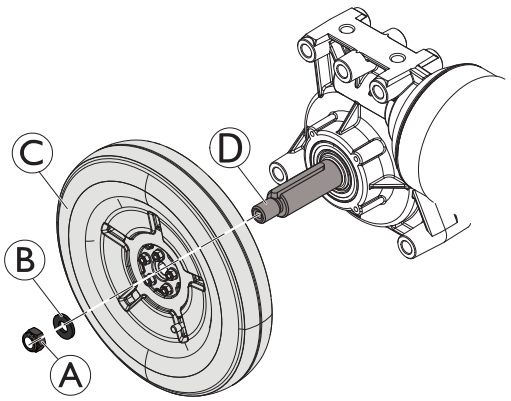
CAUTION!
Risk of Uncontrolled Movement of Power Wheelchair
- — Turn off power supply (power button).
- — Engage drive.
- — Before raising power wheelchair, secure wheels by blocking them with wedges.
- — Prevent the power wheelchair from tipping, by propping it upon a jacking device which is long and wide enough under the battery case. It the jacking device is too short or too high, the power wheelchair can still tip.

- 19 mm wrench
- Torque wrench
- Jacking device

When removing, take care of small parts such as screws and washers. Put all small parts down so that they can be installed in correct sequence.

1. Remove legrests, see user manual.
2. Place jacking device under frame to prevent power wheelchair from rolling away.
3. Remove rim cap, see *10.9 Replacing Rim Cap and Insert (Drive Wheel), page 52*.
4. Loosen and remove nut Ⓐ and washer Ⓑ which secure wheel Ⓒ.
5. Remove wheel from hub Ⓓ.
6. **Risk of Injury if Wheels Come Off**
   If drive wheels are insufficiently tightened during assembly, they can come off during driving.
   - — Always use new screws with undamaged coating.
   - — Tighten screws to prescribed torque when mounting drive wheels.

   Install parts in reverse order.
7. When installing wheel, pay attention to correct direction of rotation.
8. Tighten nut to prescribed torque, see *9.3 Overview of Wheel Types and Specif Tightening Torques, page 38*.

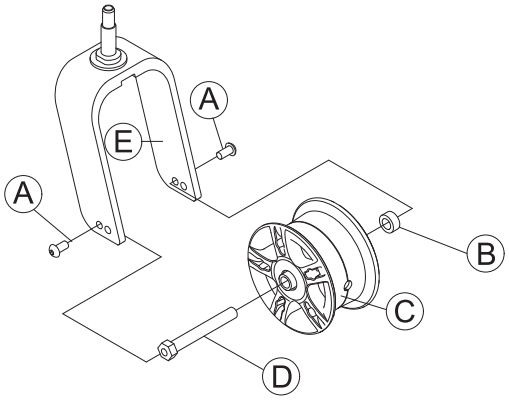


9.5 Replacing Castor Wheel on Double-Sided Fork

- 5 mm Allen key (up to August 2016)
- TX40 Torx key (starting August 2016)
- Jacking device

Removing Wheel

1. Loosen and remove bolts Ⓐ.
2. Pull wheel Ⓒ including axle Ⓓ and bushing Ⓑ out of fork Ⓔ.



Installing Wheel

CAUTION!
Risk of Injury from Wheels Coming Loose
If wheels are insufficiently secured during mounting, it can come loose when driving.
- When mounting wheels tighten bolts with prescribed torque.
- Secure all bolts using a suitable blocker.
- Never use normal nuts instead of self-locking nuts.
- Always use new nuts and bolts with an undamaged coating.

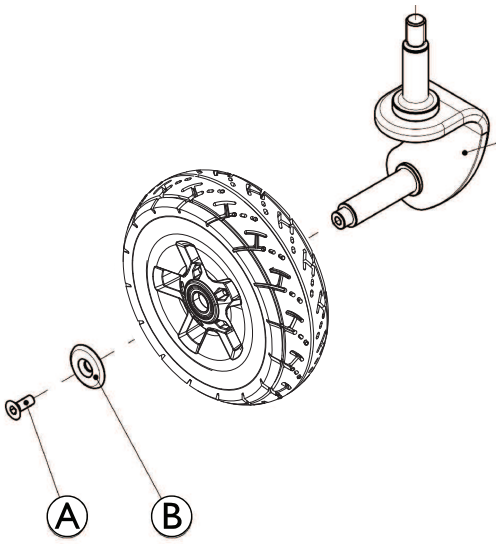
1. Install parts in reverse order. Pay attention to correct direction of rotation when installing wheels.
2. Test all functions.

9.6 Replacing Castor Wheels on Single-Sided Fork

- TX40 Torx key
- Jacking device

Removing Wheel

1. Jack up power wheelchair.
2. Remove end-caps from bolt and nut, see *10.10 Replacing Rim Cap (Castor Wheel), page 53*.
3. Remove bolt Ⓐ and washer Ⓑ from bolt.
4. Remove wheel from fork.



Installing Wheel

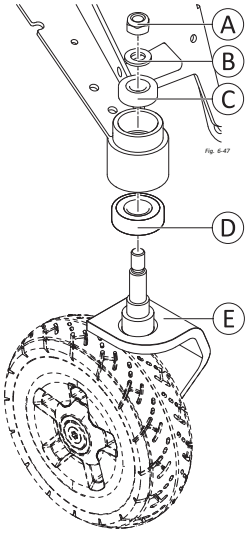
1. Install parts in reverse order.
2. When installing wheel, pay attention to correct direction of rotation.
3. Tighten bolt to prescribed torque, see *9.3 Overview of Wheel Types and Specif Tightening Torques, page 38*.

9.7 Replacing Castor Fork

Various forks can be installed to the power wheelchair. The following instructions show a single-sided fork as an example. The course of action is the same for other variants.

- 19 mm wrench
- Torque wrench
- Jacking device
- Parallel pin punches (6/8)
- Hammer (300 g - 500 g)

Removing:



1. Place jacking device underneath power wheelchair and prop up power wheelchair.
2. Remove front part of main frame shrouds, see *10.3 Main Frame Shrouds, page 48*.
3. Loosen and remove nut Ⓐ including washer Ⓑ.
4. Remove fork Ⓔ downwards.
5. If necessary, remove ball-bearings Ⓒ and Ⓓ.
   If needed, use hammer and parallel pin punch to drive bearing out of housing. Hit outer ring of bearing.

Installing:

CAUTION!
Incorrect Reassembly can Damage Bearings and Cause Castors to Come Off
Single-row angular ball bearing rings are not identical on both sides. There is only one correct way to insert them.
- Bearings must always be installed so that narrow borders of the ball bearings are facing each other (inside).
- Steering head bolts and nuts must always be pressing against wide (outside) border of ball bearings. Otherwise, bearings will be pressed apart and damaged by bolts.

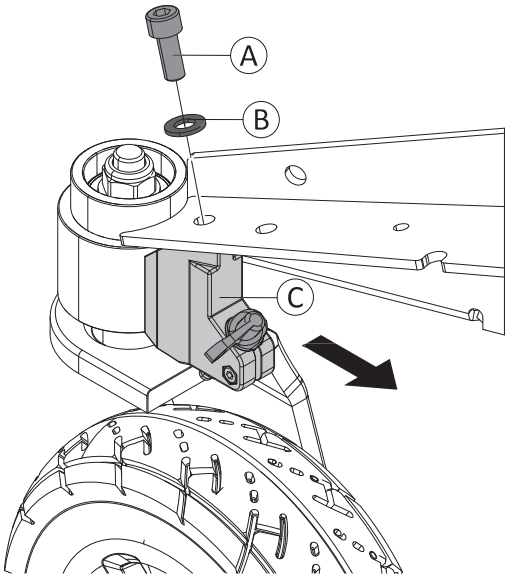
The illustrations show the wide border of the ball bearing on the outside of the ball race Ⓕ and the narrow ball bearing edge on the inside Ⓖ.

1. Install parts in reverse order. Tighten nut Ⓐ to 14±1 Nm.
2. Check all moveable parts for ease of movement.
   After installation, castor should rotate freely but bearings should have no play.
3. Re-install shroud.
4. Test all functions.

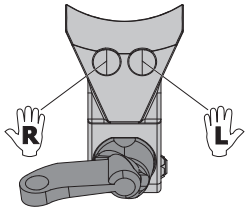
9.8 Replacing Castor Lock

Replacing Locking Device

- 6 mm Allen key



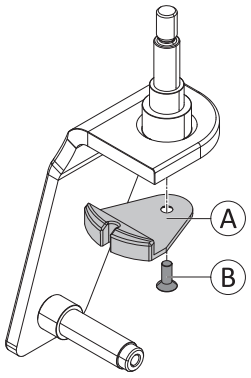
1. Unlock castor lock Ⓒ.
2. Remove front part of main frame shrouds, see *10.3 Main Frame Shrouds, page 48*.
3. Loosen and remove screw Ⓐ, washer Ⓑ and locking device Ⓒ.



4. Install parts in reverse order. Make sure to install screw including washer to correct mounting hole of locking device.
5. Test all functions.

Replacing Locking Plate on Single-Sided Forks

- 4 mm Allen key
- 5 mm Allen key



1. Place jacking device underneath power wheelchair and prop up power wheelchair.
2. Remove wheel, see *9.6 Replacing Castor Wheels on Single-Sided Fork, page 40*.
3. Loosen and remove screw Ⓑ and locking plate Ⓐ.
4. Install parts reverse order.
5. Test all functions.

Replacing Locking Plate on Double-Sided Forks

This component is not serviceable. Replace the fork instead.

9.9 Replacing Tyres

Repairing Pneumatic and Puncture-Protected Tyres

WARNING!
Risk of Injury
If tyre with one or more damaged rim threads is inflated, rim could burst and cause serious injury.
— Do not inflate tyre if one or more rim threads are damaged.
— Immediately replace rim with damaged threads.

WARNING!
Risk of Explosion
There is considerable pressure in the tyre. Risk of injury. Parts can be thrown out and injure you if you do not secure rim halves.
— Secure rim halves with joiner's clamps.

CAUTION!
Risk of Damage by Gel When Repairing Puncture-Protected Tyres With Red Valve Caps
Valve can become blocked by the puncture protection gel and get unusable.
— During following work you should always hold up valve so that puncture protection gel cannot enter valve.

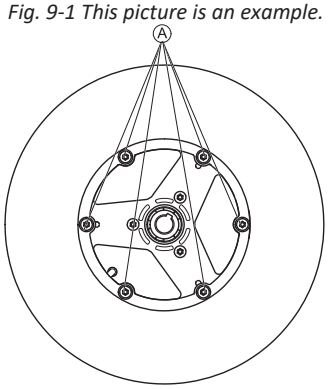
NOTICE!
Risk of Damage to Rim Threads
Incorrectly tightened screws can cause damage to rim threads.
— Tighten rim screws with prescribed tightening torque.

- 6 mm Allen key
- Tightening kit
- Jacking device
- Repair kit for tyre repair or a new inner tube
- Talcum powder
- Tyre pump or compressor

1. Remove drive wheel, see *9.4 Replacing Drive Wheel (1–Bolt Installation), page 39*.
2. Remove valve cap.
3. Let air escape completely out of tyre by firmly pressing in pin in the centre of valve.

CAUTION!
Risk of Explosion
The wheel explodes if air pressure has not been released from wheel before wheel rim is removed.
— Always let all air out of tyre before removing rim.

Fig. 9-1 This picture is an example.



4. Remove screws Ⓐ on inside of wheel.
5. Remove rim halves from wheel.
6. Remove inner tube from tyre.
7. Repair inner tube and re-fit it, or replace it with a new one.

If old inner tube has been repaired and is to be used again, and became wet during repair, it is easier to replace it if it is lightly dusted with talcum powder beforehand.

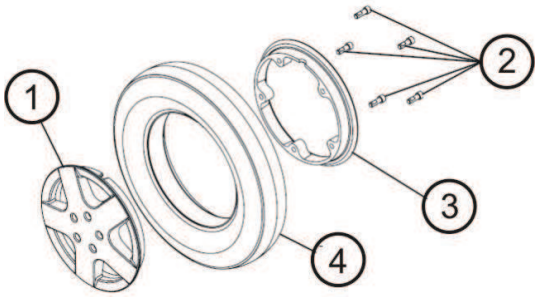
8. Install tyre in reverse order.
9. Apply rim halves to wheel.
10. Inflate tyre a little.
11. Place screws in wheel rim and tighten screws with prescribed torque. Make sure that inner tube is not clamped between wheel rim halves.
12. Make sure that tyre is contacting wheel rim directly.
13. Inflate tyre to prescribed pressure.
14. Make sure that tyre is still closely contacting wheel rim.
15. Screw valve cap on.
16. Install drive wheel, see *9.4 Replacing Drive Wheel (1–Bolt Installation), page 39*.

Repairing Solid Tyre

- 6 mm Allen key
- 3 joiner's clamps with plastic caps

NOTICE!
Risk of Damage to Rim Threads
Incorrectly tightened screws can cause damage to rim threads.
— Tighten rim screws with prescribed tightening torque.

1. Remove drive wheel, see *9.4 Replacing Drive Wheel (1–Bolt Installation), page 39*.
2. Secure rim halves against unexpected discharge with three joiner's clamps. When doing so, make sure that you do not scratch rims.
3. Loosen and remove screws (2) on inside of wheel.
4. Loosen joiner's clamps carefully and alternately until you can remove rim halves without risk.
5. Remove inner (3) and outer (1) half of rim from tyre (4).
6. Replace any defective or worn parts.
7. Install tyre in reverse order.



8. When fitting rim halves together, make sure that drill holes and threads for screws are placed exactly on top of each other.
9. Place joiner's clamps in position.
10. Tighten joiner's clamps alternately in small stages until rim halves are precisely aligned.
11. Install and tighten screws.
12. Remove joiner’s clamps.
13. Installdrive wheel, see *9.4 Replacing Drive Wheel (1–Bolt Installation), page 39*.

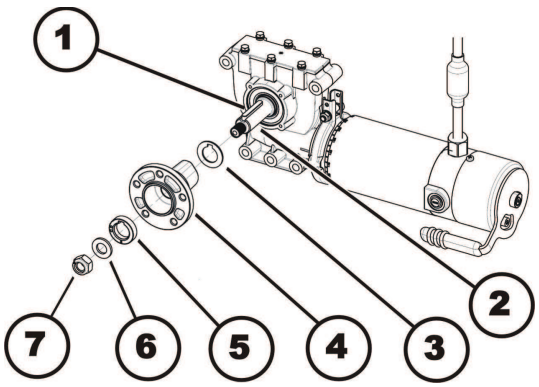
9.10 Replacing Drive Wheel Hub (before 10_2022)

NOTICE!
Risk of Damage
Collisions can be caused if the adjusting washers are removed during fitting work to drive wheels. Adjusting washers are often fitted between drive shaft and wheel hub to even out tolerances. If these adjusting washers are removed and not replaced again, this can cause collisions.
— Always replace adjusting washers exactly as they were before you started dismantling.

- 19 mm wrench

Removing Drive Wheel Hub

1. Loosen and remove nut (7).
2. Remove washer (6).
3. Remove distance ring (5).
4. Remove wheel hub (4) from axle (2).
5. Remove shim rings (3).
6. Remove feather key (1) from axle.

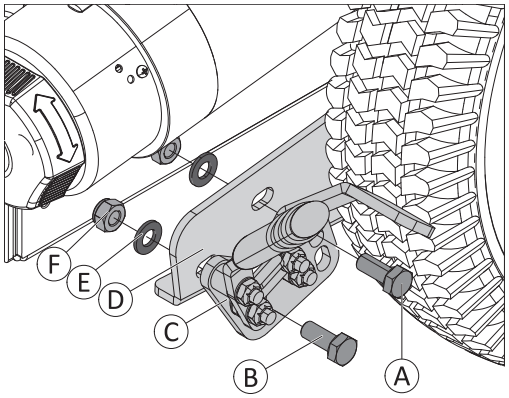


Installing Drive Wheel Hub

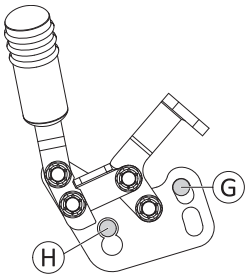
1. Install drive wheel hub parts in reverse order.
2. Use thin film of lubricant to easier install wheel hub on axle.
3. Tighten nuts (7) to 60 Nm.

9.11 Replacing Manual Wheel Lock

- 13 mm open-ended wrench
- 13 mm wrench



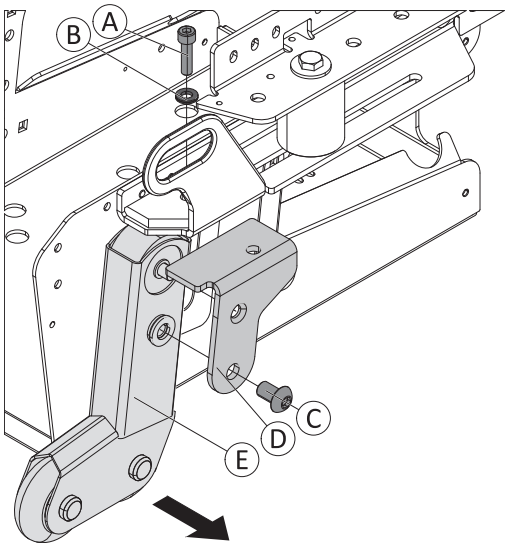
1. Hold nuts Ⓕ and washers Ⓔ in place. Loosen and bolts Ⓐ and Ⓑ including wheel lock Ⓒ.
2. Remove nuts and washers.
3. If necessary, replace wheel lock mount Ⓓ, see *7.1 Drive Components (before 03_2023), page 26* or *7.2 Drive Components (after 03_2023), page 30*.



4. Install bolts to corresponding holes Ⓖ and Ⓗ on wheel lock.
5. Install assembly to wheel lock mount.
6. Install washers and nuts.
7. Tighten bolt Ⓑ.
8. Rotate wheel lock clockwise. Tighten bolt Ⓐ.
9. Test all functions.

9.12 Replacing Anti-Tipper Unit

- 6 mm Allen key
- 8 mm Allen key



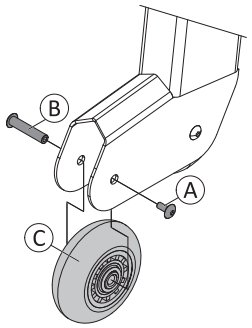
1. Loosen and remove screw Ⓐ and wedge lock washer Ⓑ.
2. Loosen and remove screw Ⓒ.
3. Remove folded sheet Ⓓ.
4. Pull off anti-tipper unit Ⓔ from stay bolts (not shown).
5. Install parts in reverse order.
6. Test all functions.

9.13 Replacing Anti-Tipper Wheel

Versions of this component up to October 2020 are equipped with Starlock washers instead of screws. These versions are not serviceable, but can be converted to the version with screws.

- 3 mm Allen key (2x)
- Flat screwdriver (versions with Starlock washer only)

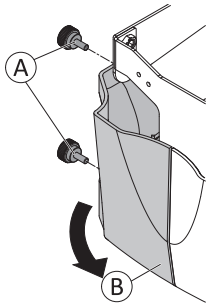
1. Loosen and remove bolt / starlock washer Ⓐ.
2. Remove (sleeve) bolt Ⓑ. Pay attention to wheel Ⓒ.
3. Replace wheel, sleeve bolt and bolt.
4. Install parts in reverse order. Tighten bolt Ⓐ to 3 Nm.
5. Test all functions.



10 Shrouds

10.1 Power Module Shrouds

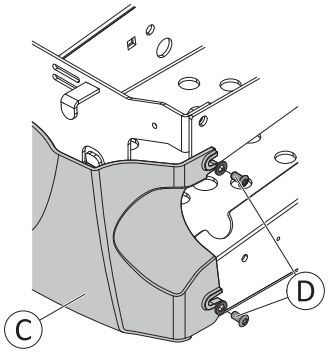
Removing Right-Hand Shroud



1. Loosen hand screws Ⓐ on right-hand side.
2. Swivel shroud Ⓑ forwards. Remove shroud sidewards.

Removing Left-Hand Shroud

- 4 mm Allen key



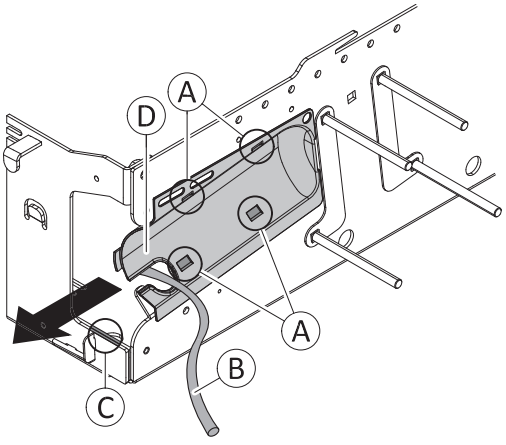
1. Remove right-hand shroud.
2. Loosen screws Ⓓ on left-hand side.
3. Remove shroud Ⓒ forwards.

Installing Shrouds

1. Install parts in reverse order. Tighten screws to 3 Nm.
2. Test all functions.

10.2 Water Protection Shroud

- 4 mm Allen key
- 13 mm wrench
- 19 mm wrench
- Jacking device

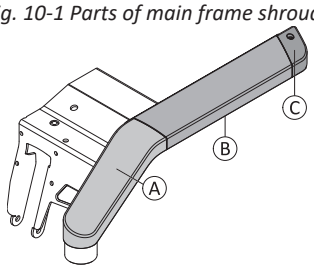


1. Place jacking device underneath power wheelchair and prop up power wheelchair.
2. Remove both power module shrouds, see *10.1 Power Module Shrouds, page 47*.
3. Unplug motor cable.
4. Remove drive wheel, see *9.4 Replacing Drive Wheel (1–Bolt Installation), page 39*.
5. Remove motor-gearbox unit, see *7.1 Drive Components (before 03_2023), page 26* or *7.2 Drive Components (after 03_2023), page 30*.
6. Remove motor cable Ⓑ forwards from cutout.
7. Position motor cable at point Ⓒ.
8. Move shroud Ⓓ carefully forwards. Pay attention that snap hooks Ⓐ at top and bottom do not break.
9. Replace shroud.
10. Install parts in reverse order.
11. Test all functions.

10.3 Main Frame Shrouds

- 4 mm Allen key

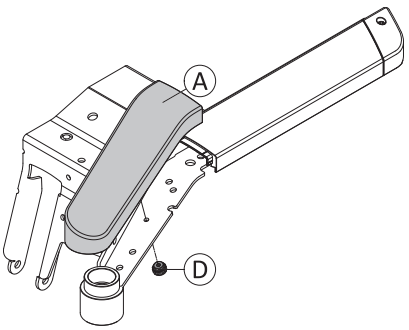
Fig. 10-1 Parts of main frame shrouds



Ⓐ Front main frame shroud

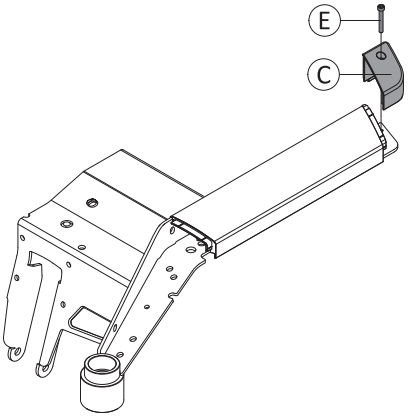
Ⓑ Middle main frame shroud

Ⓒ Rear main frame Shroud



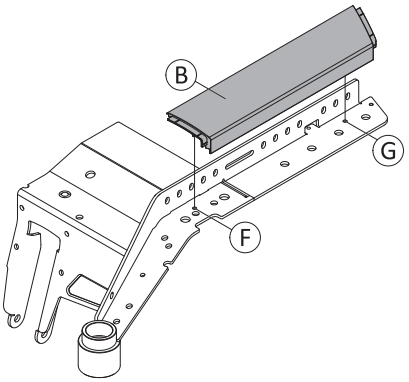
Removing Front Main Frame Shroud

1. Loosen and remove hand screw Ⓓ on bottom side of frame.
2. Pull shroud Ⓐ upwards. Remove shroud.



Removing Rear Main Frame Shroud

1. Loosen and remove screw Ⓔ.
2. Remove shroud Ⓒ.



Removing Middle Main Frame Shroud

1. Remove front main frame shroud Ⓐ and rear main frame shroud Ⓒ.
2. Remove shroud Ⓑ.

Installing Shrouds

1. Install middle main frame shroud. Make sure to install pins on rear side within corresponding holes Ⓕ and Ⓖ.
2. Install remaining parts in reverse order.
3. Test all functions.

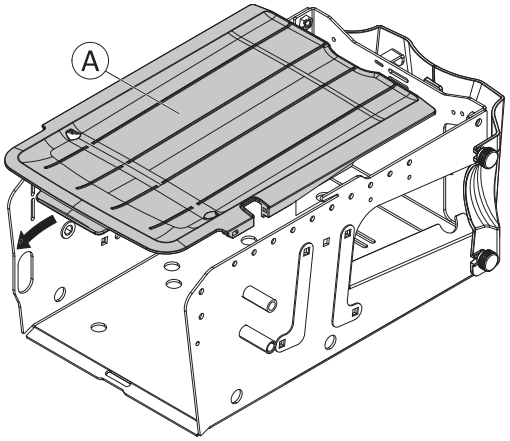
10.4 Battery Shroud

- 4 mm Allen key
- Tie wrap
- Oblique pliers

1. Remove rear shroud, see *10.5 Rear Shroud, page 50*.
2. Take note of positions of cables and sockets. Mark plugs and sockets or take a photo with digital camera.

   Unplug all cables between chassis and seating system.
3. Secure all cables using tie wrap.
4. Pull shroud Ⓐ slightly backwards.
5. Swivel shroud slightly to the left.
6. Place cables on top of battery box.
7. Remove shroud backwards.
8. In some cases it may be necessary to remove tie wrap before installing cables to notch.

   Install parts in reverse order. Make sure that cables are correctly installed to notch of shroud.
9. Remove tie wrap.
10. Plug in all cables.
11. Test all functions.

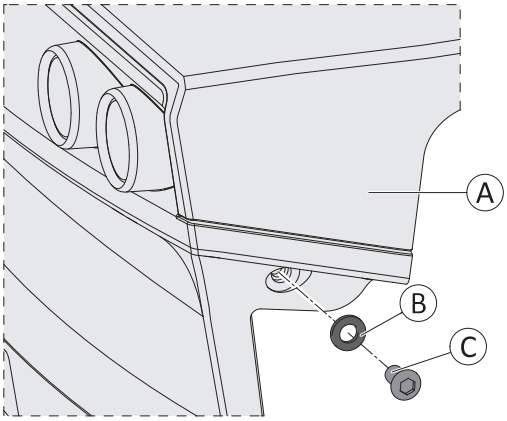


10.5 Rear Shroud

It is not possible to retrofit options such as light or operation hour counter to an existing shroud. Replace the shroud instead.

Removing Shroud

- 4 mm Allen key

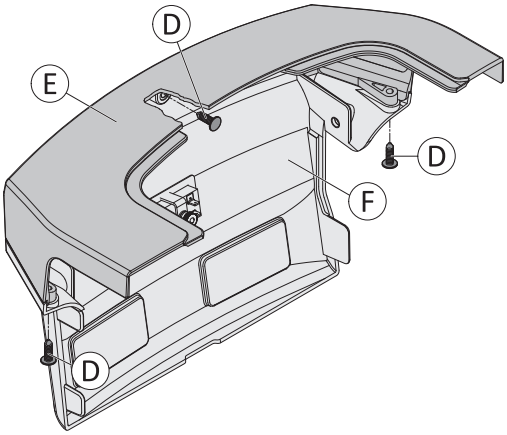


1. Loosen and remove screws Ⓒ including washers Ⓑ on both sides.
2. Loosen shroud Ⓐ carefully.
3. If fitted, unplug all cables.
4. Take note of positions of labels. Take a photo with digital camera.

   Remove shroud.

Separating Parts

- Plastic fastener removing tool (or similar)

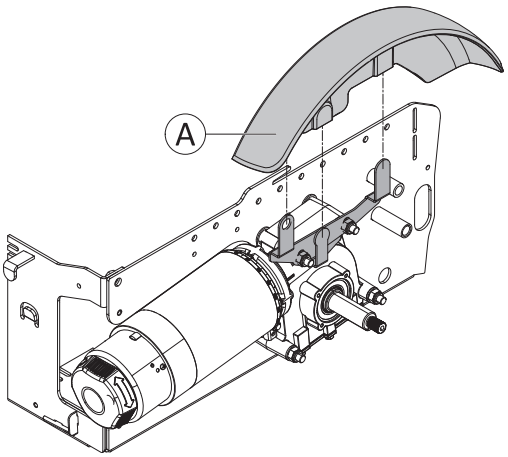


1. Loosen and remove clips Ⓓ on both sides.
2. Swivel top shroud Ⓔ and separate it from bottom shroud Ⓕ.

Installing Shroud

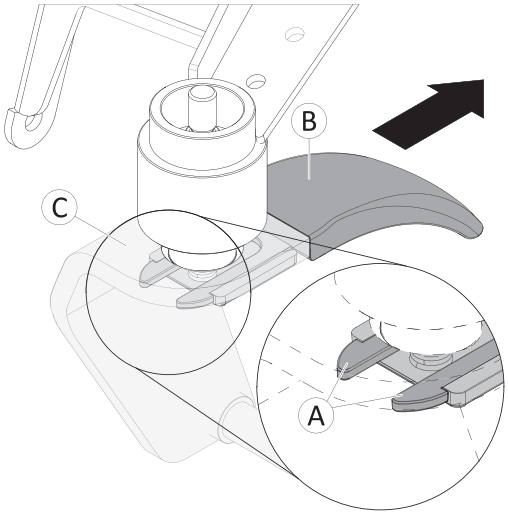
1. Install parts in reverse order.
2. Install labels.
3. Test all functions.

10.6 Replacing Fender on Drive Wheel



1. Press in snap-in element on inner side of fender Ⓐ and pull fender upwards. Remove fender.
2. Replace fender mount, if necessary, see *7.1 Drive Components (before 03_2023), page 26* or *7.2 Drive Components (after 03_2023), page 30*
3. Install parts in reverse order. Push fender downwards, until fender snaps to fender mount.
4. Test all functions.

10.7 Replacing Front Fender on Single-Sided Fork



Removing Fender

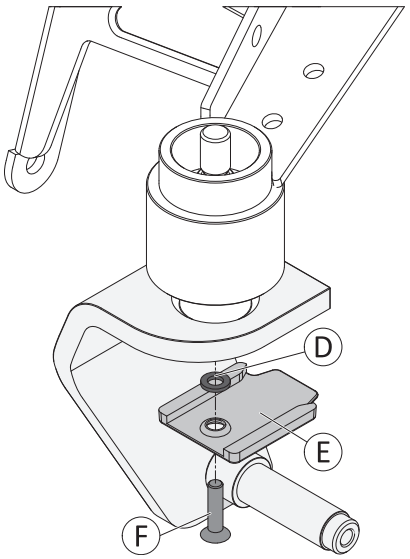
1. Slightly press both hooks Ⓐ of fender Ⓑ together.
   The hooks are located beneath the upper edge of fork Ⓒ.
2. Remove fender backwards out of fork.

Replacing Bracket

CAUTION!
Risk of Crushing to Hands and Feet by Weight of Power Wheelchair
- Pay attention to hand and feet.
- Use proper lifting techniques.

CAUTION!
Risk of Uncontrolled Movement of Power Wheelchair
- Turn off power supply (power button).
- Engage drive.
- Before raising power wheelchair, secure wheels by blocking them with wedges.
- Prevent the power wheelchair from tipping, by propping it upon a jacking device which is long and wide enough under the battery case. It the jacking device is too short or too high, the power wheelchair can still tip.

- TX30 Torx key
- Jacking device



1. Remove fender.
2. Place jacking device underneath power wheelchair and prop up power wheelchair.
3. Remove castor wheel, see *9.6 Replacing Castor Wheels on Single-Sided Fork, page 40*.
4. Loosen and remove screw Ⓕ, washer Ⓓ and bracket Ⓔ.

Installing Fender

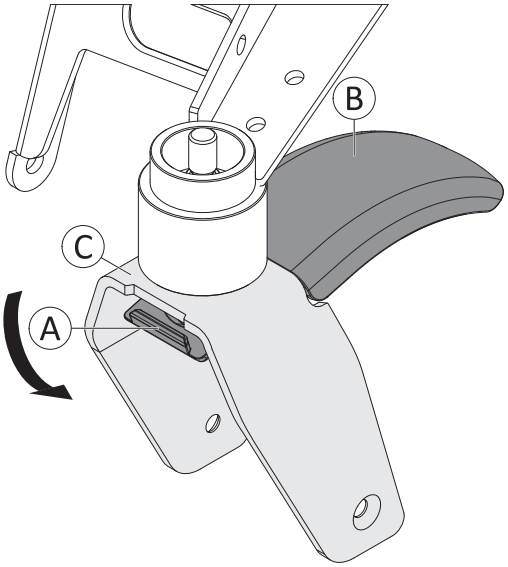
1. Install parts in reverse order.
2. Test all functions.

10.8 Replacing Front Fender on Double-Sided Fork

CAUTION!
Risk of Crushing to Hands and Feet by Weight of Power Wheelchair
- Pay attention to hand and feet.
- Use proper lifting techniques.

CAUTION!
Risk of Uncontrolled Movement of Power Wheelchair
- Turn off power supply (power button).
- Engage drive.
- Before raising power wheelchair, secure wheels by blocking them with wedges.
- Prevent the power wheelchair from tipping, by propping it upon a jacking device which is long and wide enough under the battery case. It the jacking device is too short or too high, the power wheelchair can still tip.

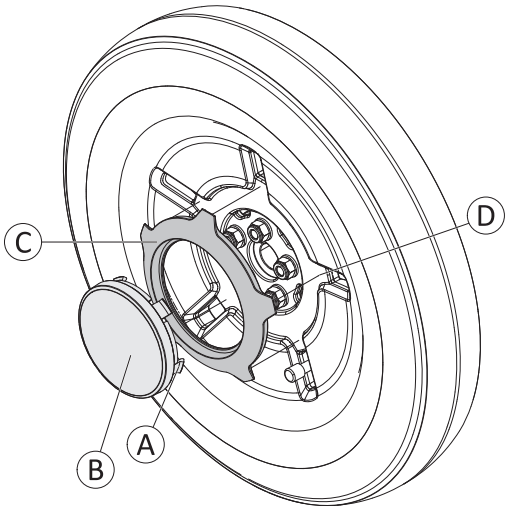
- TX40 Torx key
- Jacking device



1. Place jacking device underneath power wheelchair and prop up power wheelchair.
2. Remove castor wheel, see *9.5 Replacing Castor Wheel on Double-Sided Fork, page 40*.
3. Slightly push on fender Ⓑ at point Ⓐ and swivel fender downwards.
4. Remove fender backwards out of fork Ⓒ.
5. Install parts in reverse order.
6. Test all functions.

10.9 Replacing Rim Cap and Insert (Drive Wheel)

- Flat screwdriver

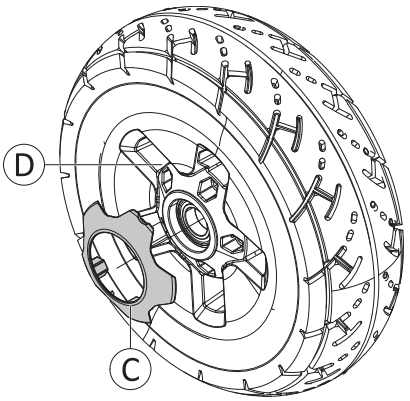


1. Insert tip of screwdriver between cap Ⓒ and insert Ⓑ.
2. Remove insert.
3. Insert tip of screwdriver between rim and cap at fulcrum Ⓓ.
4. Loosen and remove cap.
5. Replace defective parts.
6. Hold cap over rim.
7. Carefully push cap into rim.
8. Hold insert over cap.
9. Carefully push to fasten insert, until foot of insert Ⓐ snaps and insert Ⓑ clings to cap.

10.10 Replacing Rim Cap (Castor Wheel)

NOTICE!
Risk of Damage to Rim Caps.
Incorrect installation of rim cap can lead to damage on rim cap itself or loosening of rim cap.
- Install rim cap with notch positioned at valve.
- Position cap straight on rim and carefully push on outer edges for initial fixation.
- Ensure not to damage fixation pins on rear side while installing to rim.

- Flat screwdriver



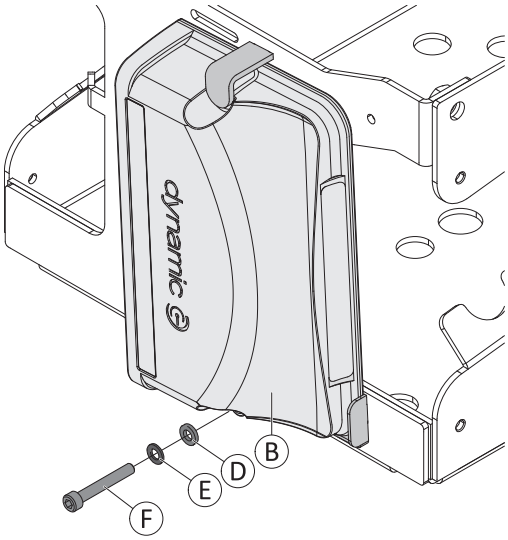
1. Remove wheel from fork.
2. Insert tip of screwdriver between rim and cap at fulcrum Ⓓ.
3. Loosen and remove cap.
4. Replace defective parts.
5. Position cap over rim.
6. Carefully push cap into rim.
7. Re-install wheel to fork.

11 Controls

11.1 Replacing Power Module

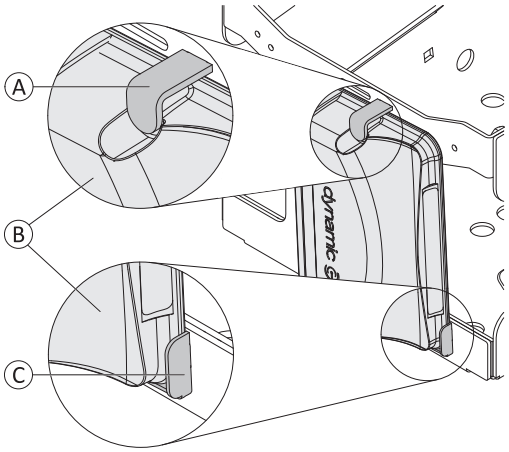
- 4 mm Allen key

Removing Module



1. Remove power module shrouds, see *10.1 Power Module Shrouds, page 47*.
2. Unplug all cables from module.
3. Loosen and remove screw Ⓕ, washer Ⓔ and lock washer Ⓓ
4. Remove module Ⓑ.

Installing Module

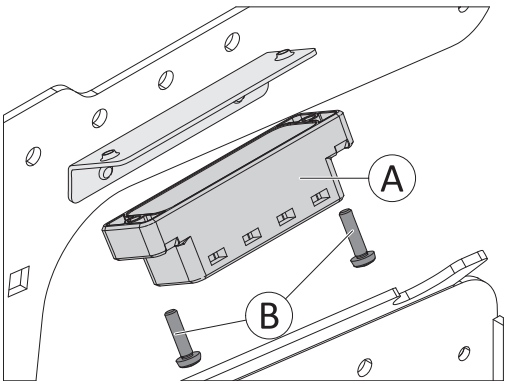


1. Install module Ⓑ to top latch Ⓐ from downwards direction.
2. Swivel module to bottom latch Ⓒ. Make sure that module is correctly installed on inner sides of latches (see figure on right side).
3. Ensure to install lock washer Ⓓ alongside to module. Lock washer must have contact to module for proper working.
   Re-install screw, washer and lock washer. Tighten screw.
4. Re-install shrouds.
5. Plug in cables.
6. Perform calibration process. See in LiNX service manual.
7. Test all functions.

11.2 Replacing Bus Expansion Block (GLM-CONX4)

The bus expansion block allows you to increase the amount of available bus sockets.

- Phillips screwdriver, size 2



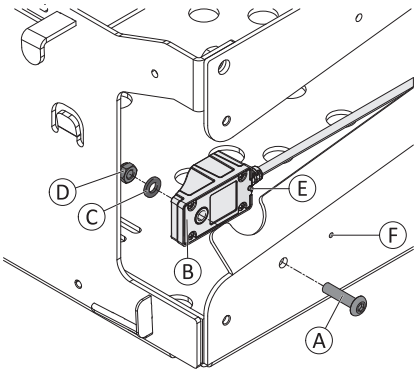
1. Unplug all bus cables.
2. Loosen and remove screws Ⓑ.
3. Replace block Ⓐ.
4. Install parts in reverse order. Tighten screws to 4 Nm.
5. Plug in all bus cables.
6. Test all functions.

11.3 Replacing G-Trac Sensor

- 4 mm Allen key
- 10 mm wrench

Removing Sensor

1. Remove batteries, see *12.5 Replacing Batteries, page 59*.
2. Unplug sensor cable from power module.
3. Loosen and remove nut Ⓓ and washer Ⓒ.
4. Remove bolt Ⓐ and sensor Ⓑ.



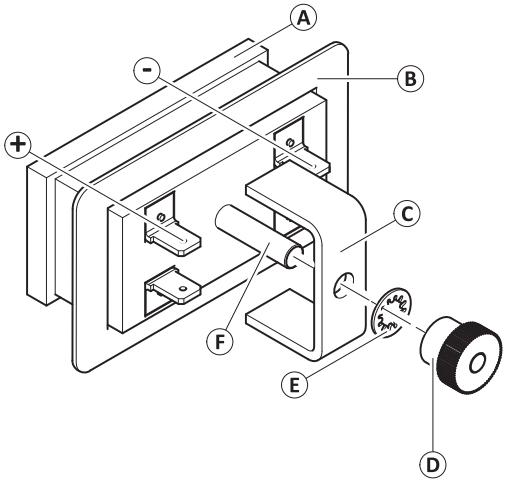
Installing Sensor

Risk of Injury and Damage due to Uncontrolled Movement of Power Wheelchair
An incorrect installed sensor sends wrong data to the power module.
— Ensure that sensor is installed with cable pointing sidewards.
— Ensure that nib on backside of sensor is engaged in its installation hole.

1. Install parts in reverse order.
2. Check that sensor is installed with cable pointing sidewards and correctly engaged nib Ⓔ in its installation hole Ⓕ.
3. Plug in sensor cable to power module.
4. Test all functions.

11.4 Replacing Operating Hour Counter/ Connecting Cable

The counter is located on rear shroud.

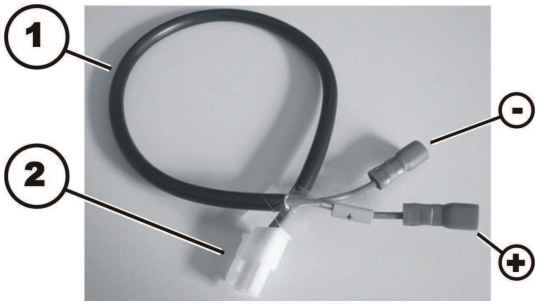


Removing Counter

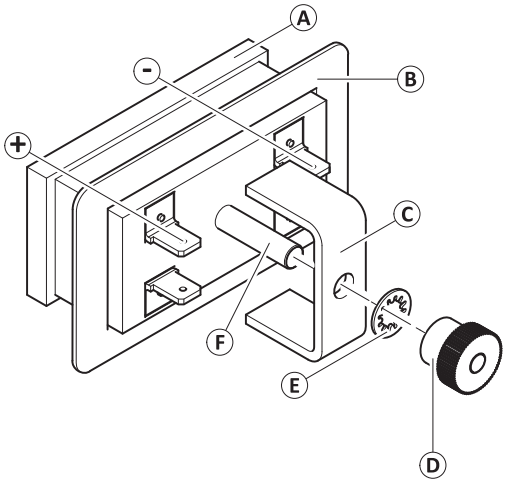
1. Switch controls system of wheelchair off.
2. Remove rear shroud, see *10.5 Rear Shroud, page 50*.
3. Loosen and remove nut Ⓓ including locking washer Ⓔ.
4. Pull mounting bracket Ⓒ off of threaded rod Ⓕ.
5. Remove retaining frame Ⓑ.
6. Pull counter Ⓐ forwards out of rear shroud.
7. Unplug cable wires (not shown in the illustration) from pins.
8. Replace counter and cable respectively.

Installing Counter

NOTICE
Risk of Damage
If counter is wrongly connected. If plus and minus wires are connected wrong way, it will damage electronic components of operating hour counter.
— Make sure cable is connected correctly.



1. Plug in blue wire (-) to pin 2 and brown wire to pin 1 on counter. which is marked with a “minus” symbol.
   The brown wire is additionally marked with yellow sleeve with “plus” symbol on it.



2. Insert cable from outside through cut-out for counter located in rear.
3. Position counter Ⓐ in cut-out.
4. Reposition retaining frame Ⓑ.
5. Place mounting bracket Ⓒ on threaded rod Ⓕ so that mounting bracket presses retaining frame on shroud.
6. Place locking washer Ⓔ and nut Ⓓ on threaded rod.
7. Tighten nut hand-tight.
8. Install shroud.

11.5 Replacing Cable Harness

According to the configuration of the power wheelchair different variants of the cable harness are used. The course of action is the same for all variants.

If you want to retrofit an option, such as light, it may require a new cable harness.

1. Remove right power module shroud, see *10.1 Power Module Shrouds, page 47*.
2. Unplug all cables on power module.
3. Remove rear shroud, see *10.5 Rear Shroud, page 50*. If fitted, unplug cables of rear lights.
4. Unplug all cables between chassis and seating system.
5. Remove battery shroud, see *10.4 Battery Shroud, page 49*.
6. Remove batteries. see *12.5 Replacing Batteries, page 59*.
7. Remove main frame shrouds, see *10.3 Main Frame Shrouds, page 48*.
8. If fitted, unplug cables of headlight.
9. Replace cable harness.
10. Install parts in reverse order.
11. Test all functions.

11.6 Checking Cables

1. Turn off electronics on remote.
2. Remove rear shroud, see *10.5 Rear Shroud, page 50*.
3. Remove batteries, see *12.5 Replacing Batteries, page 59*.
4. Check all cables for visible damage, crushing points or abrasion points.
5. Replace damaged cables.
6. Pull on each plug carefully. The plug must not come out of its socket when pulled on lightly.
7. If a plug is loose, apply slight pressure to push plug into socket. The plug must snap in place securely.
8. Check that plug is firmly attached to its socket.
9. Install parts in reverse order.
10. Test all functions.

11.7 Updating Software

See LiNX service manual.

12 Batteries

12.1 Safety Information

CAUTION!
Injury Hazard and Possible Material Damages if Batteries are Handled Improperly
The installation of new batteries may only be carried out by authorised specialists.
— Observe the warning information on the batteries.
— Only use battery versions stated in the specifications.

CAUTION!
Fire and Burns Hazard if Battery Terminal is Bypassed
— Take great care to ensure that the battery terminals are never short-circuited with tools or mechanical power wheelchair parts.
— Ensure that the battery terminal caps have been replaced if you are not working on the battery terminals.

CAUTION!
Risk of Crushing
Batteries can be extremely heavy. This results in injury hazards to your hands.
— Handle the batteries with care.
— Ensure that batteries do not fall to the ground when removed from chassis.
— Pay attention to hands.
— Use proper lifting techniques.

When removing, take care of small parts such as screws and washers. Put all small parts down so that they can be installed in correct sequence.

12.2 General Instructions on Handling Batteries

- Never mix and match different battery manufactures or technologies, or use batteries that do not have similar date codes.
- Never mix gel with AGM batteries.
- The batteries reach their end of life when the drive range is significantly smaller than usual. Contact your provider or service technician for details.
- Always have your batteries installed by a properly trained power wheelchair technician or a person with adequate knowledge. They have the necessary training and tools to do the job safely and correctly.

12.3 Handling Damaged Batteries Correctly

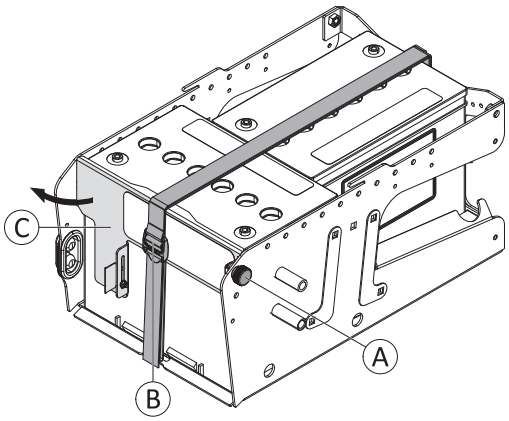
WARNING!
Risk of Burns
— Never touch or remove overheating batteries. Only unplug the charger.
— Never touch leaking batteries.

WARNING!
Burn Hazard
Injury hazard due to discharged acid.
— Always wear acid-proof protective gloves when handling batteries.
— Always wear protective goggles when handling batteries.
What to do if Acid is Discharged
— Always take clothing which has been soiled by or dipped in acid off immediately!
— Rinse any areas of your skin which has come into contact with battery acid off immediately with plenty of water!
If Contact with Eyes is Made
— You should also consult an eye specialist immediately afterwards!

- Place damaged batteries in an acid-resistant receptacle immediately after removing them.
- Only ever transport damaged batteries in an appropriate acid-resistant receptacle.
- Wash all objects that have come into contact with acid with lots of water.

12.4 Making Batteries Accessible

- 4 mm Allen key
- 11 mm wrench (60 Ah/73.5 Ah battery)
- Phillips screwdriver, size 2 (52 Ah battery)
- Flat screwdriver



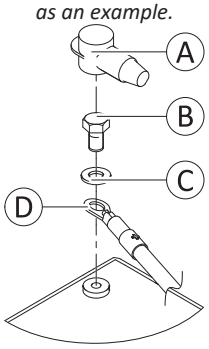
1. Remove right power module shroud and rear shroud, see *10.1 Power Module Shrouds, page 47* and *10.5 Rear Shroud, page 50*.
2. Unplug battery cable on power module.
3. Remove circuit breaker, see *Replacing Circuit Breaker, page 1*.
4. Open battery strap Ⓑ.
5. Loosen and remove hand screw Ⓐ.
6. Swivel fixation plate Ⓒ sidewards and remove.

12.5 Replacing Batteries

- 4 mm Allen key
- 11 mm wrench (60 Ah/73.5 Ah battery)
- Phillips screwdriver, size 2 (52 Ah battery)
- Flat screwdriver
- Jacking device

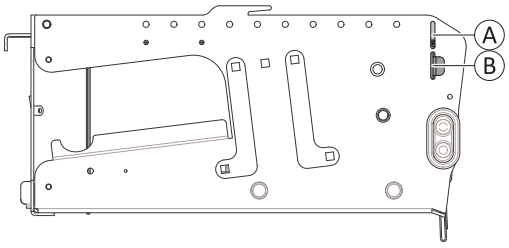
Removing Batteries

Fig. 12-1 Positive terminal serves as an example.



1. Make batteries accessible, see *12.4 Making Batteries Accessible, page 59*.
2. Remove remaining terminal cap Ⓐ and terminal screw Ⓑ together with washer Ⓒ and cable lug Ⓓ of cable harness from terminal of rear battery.
3. Remove rear battery using battery strap.
4. Pull out front battery carefully using battery strap.
5. Remove remaining terminal cap and terminal screw together with washer and cable lug of cable harness from terminal of front battery.
6. Remove front battery.
7. If necessary, replace inlays.

Installing Batteries



Ⓐ 52 Ah/60 Ah battery

Ⓑ 73.5 Ah battery

1. Install batteries in reverse order.
2. Make sure that battery box sockets / plugs have been correctly refitted. Polarity diagram is located on fixation plate.
3. Install fixation plate to corresponding mounting holes Ⓐ or Ⓑ.
4. Install remaining parts in reverse order.
5. Test all functions.

12.6 Replacing Circuit Breaker

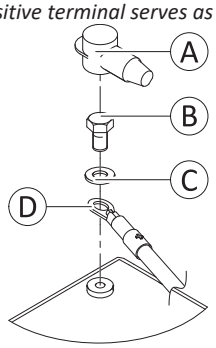
If the circuit breaker is damaged, you must replace it together with the battery cables.

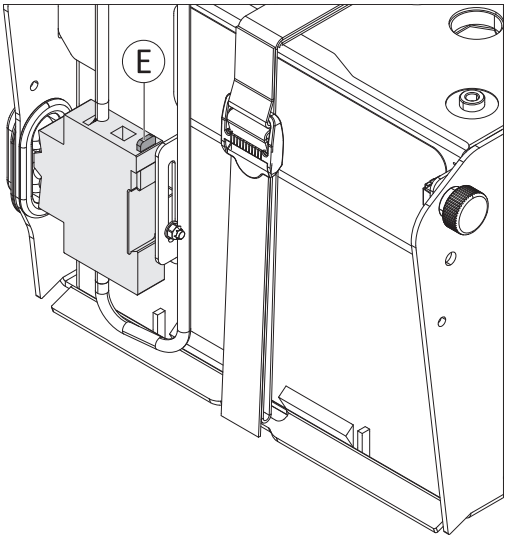
Removing Circuit Breaker

- 4 mm Allen key
- 11 mm wrench (60 Ah/73.5 Ah battery)
- Phillips screwdriver, size 2 (52 Ah battery)
- Flat screwdriver

1. Make sure the circuit breaker is in the OFF position.
2. Remove right power module shroud (see *10.1 Power Module Shrouds, page 47*) and rear shroud (see *10.5 Rear Shroud, page 50*).
3. Unplug battery cable on power module.
4. Disconnect circuit breaker cables from batteries. Disconnect negative terminal first, then positive terminal.
   a. Remove tie wraps (not shown).
   b. Remove terminal caps Ⓐ.
   c. Loosen and remove terminal screws Ⓑ together with washers Ⓒ and cable lug Ⓓ from terminal.

Fig. 12-2 Positive terminal serves as an example.



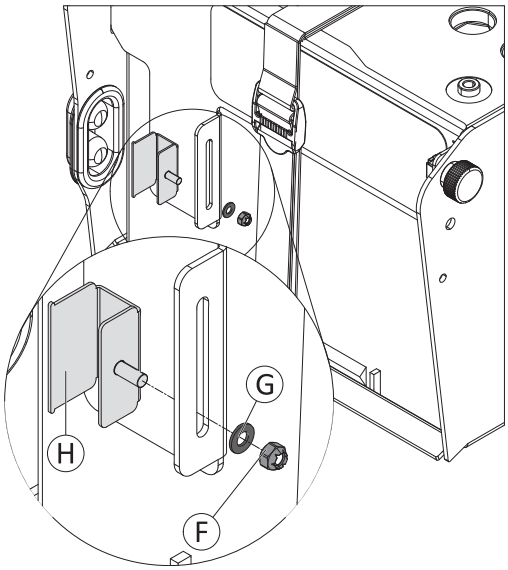


4. Loosen clip Ⓔ.
5. Remove circuit breaker together with cables.

Replacing Holder

- 7 mm wrench

1. Remove circuit breaker.
2. Loosen and remove nut Ⓕ, washer Ⓖ and holder Ⓗ.
3. Install parts in reverse order.



Installing Circuit Breaker

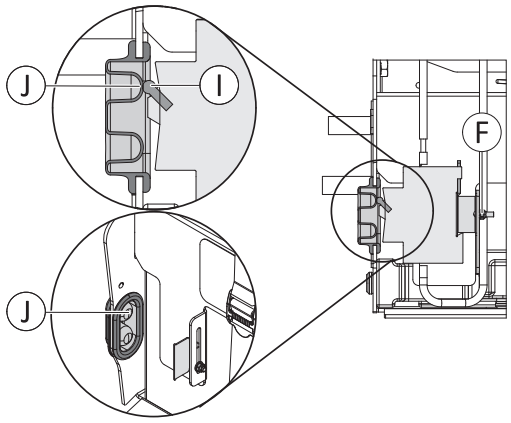
Connect negative terminal first, then positive terminal.

1. Install holder and circuit breaker in reverse order. Ensure that clip Ⓔ faces upwards. Reposition terminal caps and secure them with UL94V0 tie wraps.
2. Adjust circuit breaker and holder to correct position. See below.
3. Plug in battery cable on power module.
4. Install shrouds.
5. Test all functions.

Adjusting Mounting Position of Holder

- 7 mm wrench

1. Loosen nut Ⓕ.
2. Move holder and circuit breaker to correct mounting position. The ON / OFF switch Ⓘ needs to be aligned with the OFF position Ⓙ displayed on the covering cap .
3. Re-tighten nut.



12.7 Disposing of Dead or Damaged Batteries Correctly

WARNING!
Environmental Hazard
- DO NOT dispose of batteries in normal household waste.
- DO NOT throw batteries into a fire.
- Batteries MUST be taken to a proper disposal site. The return is required by law and free of charge.
- Only dispose of discharged batteries.
- Cover terminals of batteries prior to disposal.

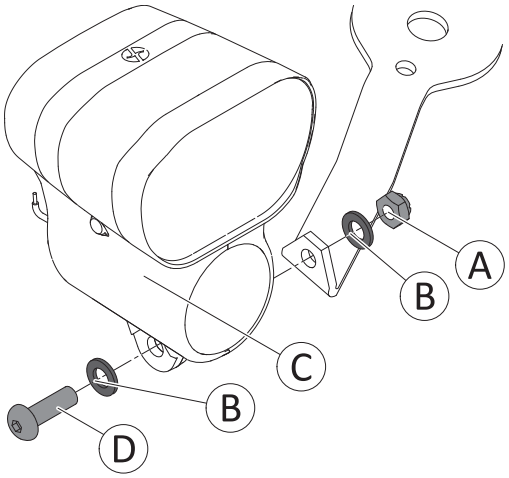
CAUTION!
Fire and Burns Hazard if Battery is not Stored Correctly
- Take great care to ensure that the battery terminals are never short-circuited by metallic parts or liquids.
- Ensure that the battery terminal caps have been installed before storing.

Batteries are following special disposal rules. Your provider has all information available to safely exchange and dispose the defect batteries.

13 Lighting Unit

13.1 Replacing Headlight

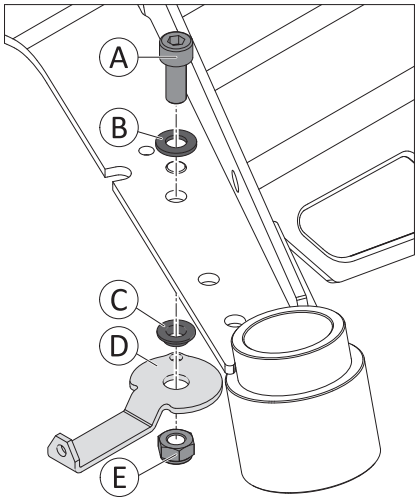
- 3 mm Allen key
- 8 mm wrench
- Oblique pliers
- Tie wraps



1. Remove front part of main frame shrouds, see *10.3 Main Frame Shrouds, page 48*.
2. Unplug cable and cut tie wraps from headlight affected.
3. Pull cable out of guidance.
4. Loosen and remove nut Ⓐ and washer Ⓑ.
5. Remove bolt Ⓓ, washer Ⓑ and headlight Ⓒ.
6. Replace headlight.
7. Install parts in reverse order.
8. Route cables carefully and fix them with cable ties.
9. Tighten nut finger-tight.
10. Test all functions.
11. Adjust headlight roughly using grid. User can carry out final adjustment according to user manual.

13.2 Replacing Headlight Holder

- 3 mm Allen key
- 6 mm Allen key
- 8 mm wrench
- 13 mm wrench
- Oblique pliers
- Tie wraps



Removing Holder

1. Remove complete headlight, see *13.1 Replacing Headlight, page 62*.
2. Loosen and remove nut Ⓔ.
3. Remove holder Ⓓ including bushing Ⓒ. Do not remove bolt Ⓐ and washer Ⓑ for correct re-installing of holder.

Installing Holder

1. Install parts in reverse order. Tighten nut Ⓔ to 6 Nm.
2. Test all functions.

13.3 Replacing Rear Light

This component is not serviceable. Replace the bottom part of the rear shroud instead.

14 Seat System

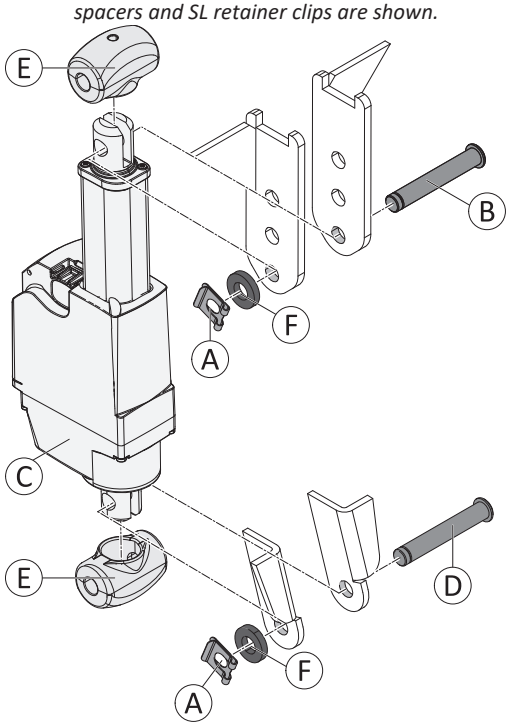
This chapter deals with the replacement of interface components between the base of the power wheelchair and the corresponding seating system.

For detailed instructions on the seating system, see the service manual of the corresponding seating system.

14.1 Replacing Actuator/Spindle — Tilt with Fixed Pivot Point

- Flat screwdriver
- Jacking device

Fig. 14-1 For better view only the actuator, pins, spacers and SL retainer clips are shown.



Removing Actuator

When removing, take care of small parts such as spacers. Put all small parts down so that they can be installed in the correct sequence.

CAUTION!
Risk of Crushing
Seat comes down when actuator is removed.
- Hold the seat in position while removing the actuator.
- Move the seat into service position and place a jacking device under the backrest, or lower it carefully to the chassis.

1. Unplug actuator cable directly on actuator.
2. Remove SL retainer clips Ⓐ and spacers Ⓕ on actuator at top and bottom.
3. Remove upper pin Ⓑ. Hold seat in position.
4. Move seat into service position. Alternatively, lower it carefully to chassis.
5. Remove lower pin Ⓓ and actuator Ⓒ with spacers Ⓔ.

Installing Actuator

1. Install parts in reverse order.
2. Test all functions.

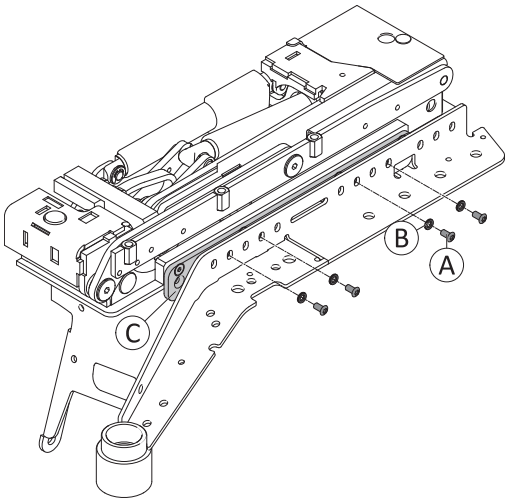
14.2 Replacing Height Adjustment Bracket — Tilt and Lifter-Tilt Modules

CAUTION!
Risk of Crushing to Hands and Feet by Weight of Power Wheelchair
- — Pay attention to hand and feet.
- — Use proper lifting techniques.

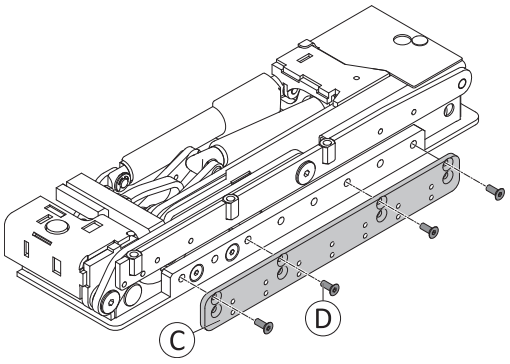
CAUTION!
Risk of Uncontrolled Movement of Power Wheelchair
- — Turn off power supply (power button).
- — Engage drive.
- — Before raising power wheelchair, secure wheels by blocking them with wedges.
- — Prevent the power wheelchair from tipping, by propping it upon a jacking device which is long and wide enough under the battery case. It the jacking device is too short or too high, the power wheelchair can still tip.

This chapter deals with replacing the height adjustment brackets for a seat with tilt or lifter-tilt module. Replacing the brackets by other variants (see spare parts catalogue) allows to retrofit another seat height to the power wheelchair.

- 4 mm Allen key
- Jacking device



1. Unplug all cables from the electronic modules which run from seat to chassis.
2. Loosen and remove screws Ⓐ and washers Ⓑ on both sides.
3. Remove seat including brackets Ⓒ from chassis.
4. Place seat on jacking devices.



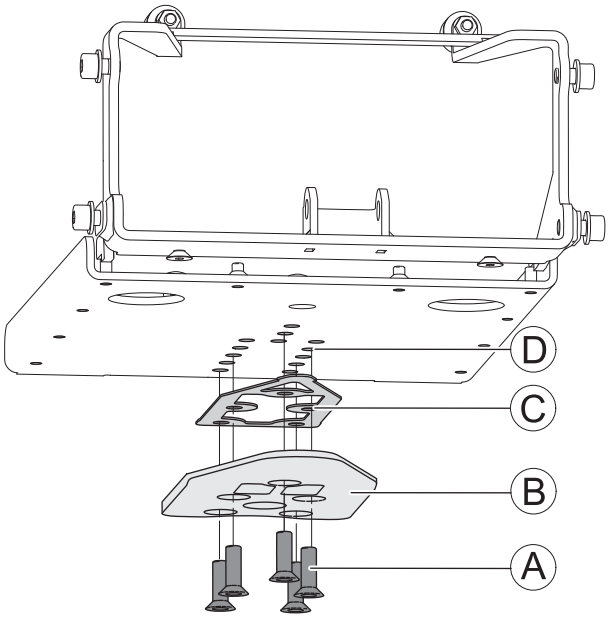
5. Loosen and remove screws Ⓓ on both sides.
6. Replace brackets Ⓒ on both sides.
7. Re-install screws. Tighten screws.
8. Place seat including brackets on chassis.
9. Change position of seat according to required seat depth, s ee *4.4 Adjusting Wheelbase Length— Ultra Low Maxx Seat, page 10*.
10. Install screws Ⓐ and washers Ⓑ. Tighten screws.
11. Plug in all cables.
12. Test all functions.

14.3 Mounting Dahl Docking System

For more information about spare parts, accessory part installation in vehicles and maintenance of the Dahl Docking system, contact Dahl Engineering www.dahlengineering.dk.

To retrofit a power wheelchair with a Dahl Docking system, it is imperative, that the power wheelchair is equipped with the correct adapter plate. This adapter plate must be threaded to fix the lock plate of the Dahl Docking system underneath the power wheelchair. The maximum kerb weight of the power wheelchair must not exceed 200 kg.

- TX27 Torx key
- Low-strength thread locking adhesive (Loctite 222 or similar)



1. Remove batteries, see *12.5 Replacing Batteries, page 59*.
2. Place screws Ⓐ, lock plate Ⓑ and 8 mm spacer Ⓒ on adapter plate Ⓓ.
   8 mm spacer is mandatory. Additional spacers can be mounted to lock plate.
3. **Do not use any other screws than those supplied from Dahl Engineering (Part No. 502800). Standard countersunk M8 screws are not strong enough in the event of a collision.**

   Tighten screws (16 - 18 Nm).
4. Mark where to cut screws.
5. Remove screws, lock plate and spacer.
6. Cut screw.
   It is very important to check correct length of screws. If screws are too short to reach through threads, screws do not have strength to carry required load. If screws are too long, batteries or other components can be damaged. If screws are cut too short, replace them with original Dahl screws only.
7. Apply thread locking adhesive on screws.
8. Tighten lock plate and spacer with screws (16 - 18 Nm).
9. Connect power wheelchair with Dahl Docking station. Make sure lock plate is securely locked and all release methods work as intended. For more information about using the Dahl Docking system, see user manual.

Installation of Dahl Docking System in Vehicles

Only professional companies in the business of converting or building power wheelchair accessible vehicles can order the Dahl Docking system from Dahl Engineering.

A qualified and experienced technician must carry out the installation. Dahl Engineering can provide vehicle specific installation instructions for a large range of vehicles.

Australia:
Invacare Australia Pty. Ltd.
Unit 18/12 Stanton Road,
Seven Hills, NSW 2147,
Australia
Phone: 1800 460 460
Fax: 1800 814 367
orders@invacare.com.au
www.invacare.com.au

Canada:
Invacare Canada L.P.
84 Citation Dr #14
Concord, ON L4K 3C1
Phone: 800 668 5324
www.pro.invacare.ca

New Zealand:
Invacare New Zealand Ltd
4 Westfield Place, Mt Wellington
1060
New Zealand
Phone: 0800 468 222
Fax: 0800 807 788
sales@invacare.co.nz
www.invacare.co.nz

United Kingdom & Ireland:
Invacare Limited
Pencoed Technology Park, Pencoed
Bridgend CF35 5AQ
Tel: (44) (0) 1656 776 200
uk@invacare.com
www.invacare.co.uk

EU Export:
Invacare Poirier SAS
Route de St Roch
F-37230 Fondettes
Tel: (33) (0)2 47 62 69 80
serviceclient_export@invacare.com
www.invacare.eu.com

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