Invacare® TDX® SP2 Series

en **Power Wheelchair**
Service Manual

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

INVACARE®
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 authorised service technicians for initial setup. They are not intended to be performed by the user.

4.1.1 About This Manual

- This manual refers to configurations with Modulite seat system. Older specifications have been described in revision 11 of this service manual.
- For seat systems, refer to the corresponding manual.
- For Shark, DX, DX2, refer to revision 11 of this service manual.
- For LiNX controls, refer to LiNX Service Manual.

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.

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.

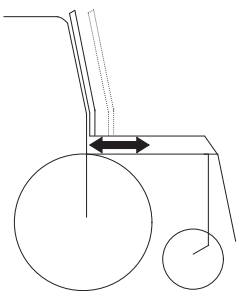
4.2.1 Adjusting Lower Leg Length

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.



Other Seats:

For details on:

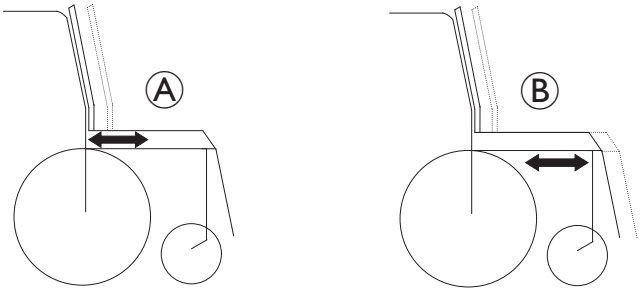
- Standard seat
- Flex seat
- Contour seat
- Max seat

refer to revision 11 of this manual.

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.

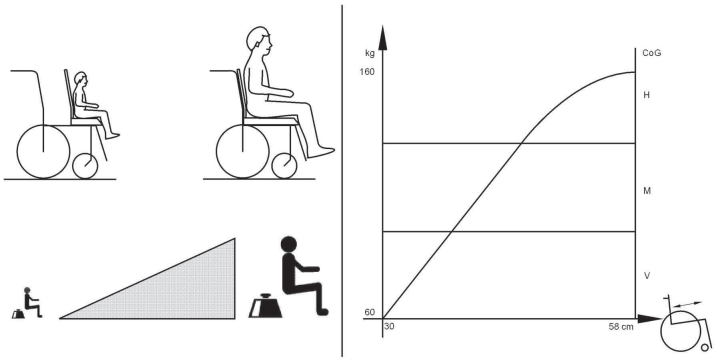
CAUTION!
The seating system of the power wheelchair is delivered ex works with an optimally adjusted centre of gravity (CoG). Any change in this adjustment setting can negatively influence the stability of the power wheelchair.
— You must perform an individual risk analysis every time you change the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



A: Seat depth

B: 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:

- Standard seat
- Flex seat
- Contour seat
- Max seat

refer to revision 11 of this service manual. For details on Modulite seat, see *4.3 Modulite Seat, page 9*.

4.3 Modulite Seat

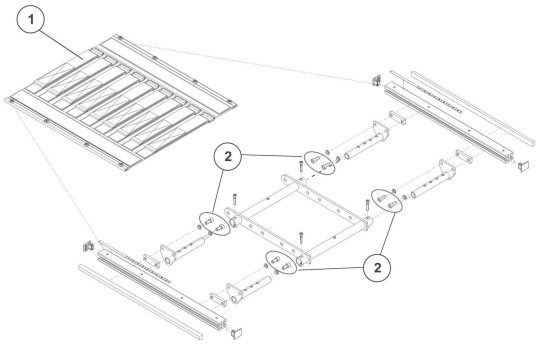
The Modulite seat is available in two versions:

- Telescopic seat frame (plate and strap): Adjustment of center of gravity via the lateral profiles, as described in *4.3.1 Telescopic Seat Frame, page 9*.
- One piece seat plate: Adjustment of center of gravity via the oblong holes of the seat adapter as described in *4.3.2 One-Piece Seat Plate, page 9*.

4.3.1 Telescopic Seat Frame

- 6 mm Allen key

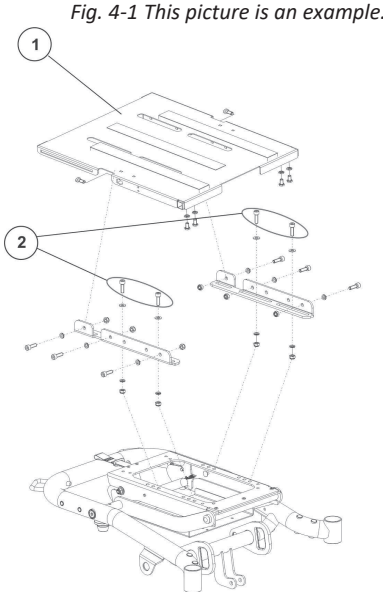
1. Remove seat plate or sling seat (1). See Modulite service manual, “Adjusting seat width/backrest width” chapter.
2. Loosen screws (2) in front and rear, left and right – DO NOT remove.
3. Shift position of seat.
4. Re-tighten screws.
5. Install seat plate or sling seat.



4.3.2 One-Piece Seat Plate

- 6 mm Allen key

Fig. 4-1 This picture is an example.



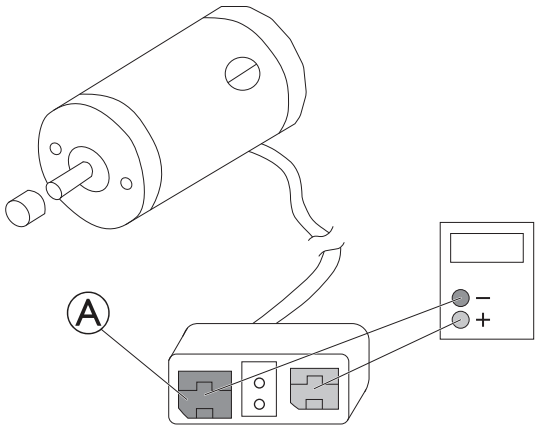
1. Remove seat plate.
2. Loosen screws (2) left and right – DO NOT remove.
3. Shift position of seat frame.
4. Tighten screws.
5. Install seat plate.

5 Testing

5.1 Testing Motor

- Digital multimeter with resistance measurement

1. Remove rear shroud, see *10.2 Replacing Rear Shroud (Without Operating Hour Counter), page 50* or *10.3 Replacing Rear Shroud (With Operating Hour Counter), page 51*.
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

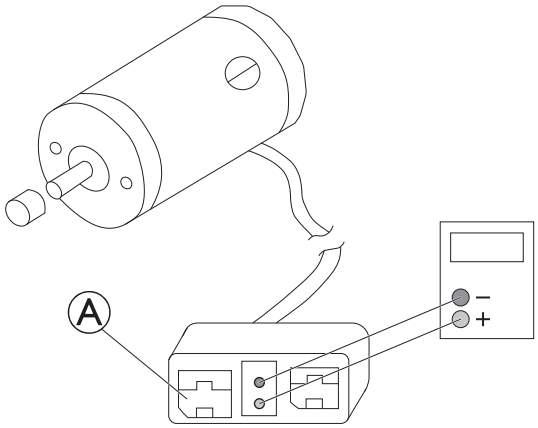
This test should only be carried out on power wheelchairs with conventional motor/gearbox units.

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 rear shroud, see *10.2 Replacing Rear Shroud (Without Operating Hour Counter), page 50* or *10.3 Replacing Rear Shroud (With Operating Hour Counter), page 51*.
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 castors 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.

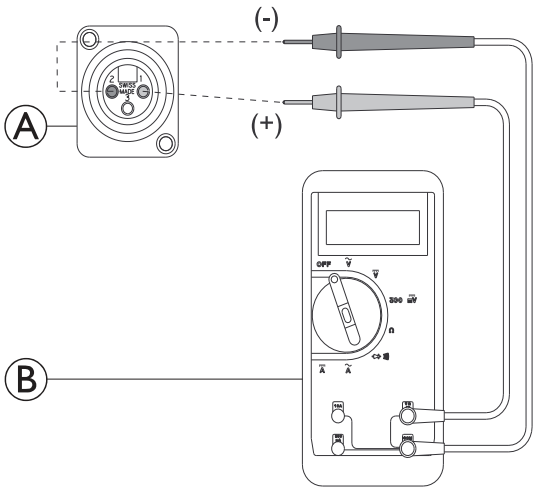
   A good meter reading should be 25.5 VDC to 26.0 VDC with the chair in neutral.

5. Switch electronics ON on remote.
6. Ensue that your feet are clear from castors 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.

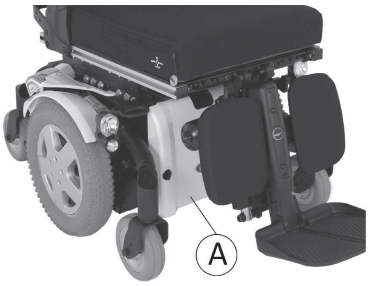
The tightening torques stated in the following list are based on the thread diameter for the nuts and bolts for which no specific values have been determined. All values assume dry and de-greased threads.

Thread	Tightening Torque in Nm ±10 %	UNC Thread	Tightening Torque in Nm ±10 %
M4	3 Nm	1/4”-20	11–7 Nm
M5	6 Nm	5/16”-20	22–14 Nm
M6	10 Nm	3/8”-16	41–25 Nm
M8	25 Nm	7/16”-14	67–40 Nm
M10	49 Nm	1/2”-13	100–67 Nm
M12	80 Nm	9/16”-12	150–90 Nm
M14	120 Nm	5/8”-11	210–130 Nm
M16	180 Nm	3/4”-1	370–230 Nm
		7/6”-9	600–370 Nm
		1”-8	900–550 Nm

6.3 Overview Power Wheelchair

This overview applies for TDX SP2 power wheelchair with Modulite seat.

Underneath Seat

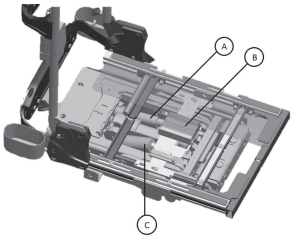


Ⓐ Batteries behind front shroud

Ⓐ Power module behind rear shroud

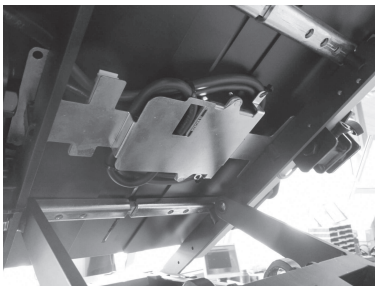
Actuator Modules

ⒶTilt actuator (optional)
ⒷActuator module (optional)
ⒸLifter actuator (optional)

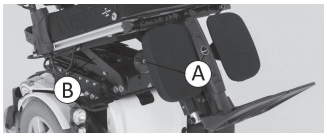


Lifter

ACT with Lifter



Center Mount Powered Legrest and Tilt Module



G-Trac Sensor

The optional G-Trac sensor is located behind the rear shroud.

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 user manual
	Remote status display does not illuminate	Batteries defective	Replace batteries	See *12.6 Replacing Batteries (50 Ah), page 60* or *12.5 Replacing Batteries (60 Ah / 73 Ah), page 59*
		Completely discharged battery	Pre-charge batteries	See corresponding user manual
		Power supply to remote interrupted	Check main fuse	See *12.7 Checking and Replacing Main Fuse, page 61*
			Check cables between modules for loose connections or damage	See *11.5 Checking Cables, page 56*
		Remote defective	Replace remote	See corresponding remote service manual
	Remote status display flashing	Various causes	Assess error code	See corresponding remote user manual
Power wheelchair judders in drive mode	None	Batteries defective (unstable voltage)	Replace batteries	See *12.6 Replacing Batteries (50 Ah), page 60* or *12.5 Replacing Batteries (60 Ah / 73 Ah), page 59*
		Drive motor(s) defective	Replace motor(s)	See *7.1 Drive Components (before 03_2023), page 23* or *7.2 Drive Components (after 03_2023), page 28*
			Replace carbon brushes	See *7.1.4 Checking and / or Replacing Carbon Brushes, page 27*
Power wheelchair pulls to left or right	None	Drive motors running asymmetrically	Change programming to synchronise motors	See corresponding remote service manual
	Tyre visibly dented	Not enough air in tyre	Check air pressure, replace inner tube and / or valve if necessary.	See *9.7 Replacing Tyres, page 45*

Problem	Other symptoms	Possible cause	Solution	Documentation
Error message does not clear	None	Bad connections	Check all connecting cables.	See *11.5 Checking Cables, page 56*
		Motor brake defective	Measure internal resistance of brakes, replace motor if defective.	See *5.2 Testing Motor Brake, page 10* and *7.1 Drive Components (before 03_2023), page 23* or *7.2 Drive Components (after 03_2023), page 28*
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.	
		Fuse burnt out	Check cabling and replace fuse	See *11.5 Checking Cables, page 56* and *12.7 Checking and Replacing Main Fuse, page 61*
		Motor defective	Check carbon brushes and replace if necessary	See *7.1.4 Checking and / or Replacing Carbon Brushes, page 27*
			Measure internal resistance of motor, replace motor if defective.	See *5.1 Testing Motor, page 10* and *7.1.4 Checking and / or Replacing Carbon Brushes, page 27*
		Power module defective	Replace power module	See *11.1 Replacing Power Module, page 53*
Motors lose power while driving	None	Bad connections	Switch power wheelchair off, wait 10 seconds, switch power wheelchair on again. Check all cabling.	See *11.5 Checking Cables, page 56*

Problem	Other symptoms	Possible cause	Solution	Documentation
Motor judders or runs irregularly, or only one motor runs	None	Carbon brushes worn	Check carbon brushes and replace if necessary	See *7.1.4 Checking and / or Replacing Carbon Brushes, page 27*
		Bearing defective	Replacing motor	See *7.1.4 Checking and / or Replacing Carbon Brushes, page 27*
		Collector defective	Measure internal resistance of motor, replace motor if defective	See *5.1 Testing Motor, page 10* and *7.1.4 Checking and / or Replacing Carbon Brushes, page 27*
Motors do not run	None	Bad connections	Check all cabling	See *11.5 Checking Cables, page 56*
		Fuse burnt out	Check cabling and replace fuse	See *11.5 Checking Cables, page 56* and *12.7 Checking and Replacing Main Fuse, page 61*
		Batteries defective	Replace batteries	See *12.5 Replacing Batteries (60 Ah / 73 Ah), page 59*
		Cabling to power module or remote defective	Check cabling	See *11.5 Checking Cables, page 56*
		Power module defective	Replace power module	See *11.1 Replacing Power Module, page 53*
	Corroded contacts	Water, salt or urine has penetrated	Check cabling, replace if necessary	See *11.5 Checking Cables, page 56*
Motor makes clicking noise	None	Bearing defective	Replacing motor	See *7.1.4 Checking and / or Replacing Carbon Brushes, page 27*
		Collector defective	Measure internal resistance of motor, replace motor if defective	See *7.1.4 Checking and / or Replacing Carbon Brushes, page 27*

Problem	Other symptoms	Possible cause	Solution	Documentation
Scraping noise or motor blocked	None	Bearing defective	Replacing motor	See *7.1.1 Replacing Motor-Gearbox Unit, page 23*
		Gearbox defective	Replace gearbox	See *7.1.1 Replacing Motor-Gearbox Unit, page 23*
Gearbox makes clicking noise	None	Gearbox defective	Replace gearbox	See *7.1.1 Replacing Motor-Gearbox Unit, page 23*
		Drive wheel loose	Tighten drive wheel, secure bolts with thread locking adhesive, if necessary	See*9.5 Replacing Drive Wheel (5–Screw Installation), page 43* or *9.6 Replacing Drive Wheel (1–Bolt Installation), page 44*
Gearbox losing oil	None	Sealing ring on drive shaft defective	Replace gearbox if sealing ring defective	See *7.1.1 Replacing Motor-Gearbox Unit, page 23*
			Check carbon brushes for oil wetting, replace motor if brushes wet	See *7.1.4 Checking and / or Replacing Carbon Brushes, page 27*
Irregular running	None	Drive shaft movable or bent	Check drive shaft, replace gearbox if defective	See *7.1.1 Replacing Motor-Gearbox Unit, page 23*
Batteries not being charged	None	Fuse burnt out, cable defective	Check cabling and replace fuse	See *11.5 Checking Cables, page 56* and *12.7 Checking and Replacing Main Fuse, page 61*
		Batteries defective	Replace batteries	See *12.6 Replacing Batteries (50 Ah), page 60* or *12.5 Replacing Batteries (60 Ah / 73 Ah), page 59*
	LEDs blinking on charger	Charger defective	Replace charger	See corresponding charger user manual
Short charging period	None	One of the batteries could be defective	Replace batteries	See *12.6 Replacing Batteries (50 Ah), page 60* or *12.5 Replacing Batteries (60 Ah / 73 Ah), page 59*

Problem	Other symptoms	Possible cause	Solution	Documentation
Power wheelchair runs too slowly	None	Remote defective	Replace remote	See corresponding remote service manual
		Batteries defective	Replace batteries	See *12.6 Replacing Batteries (50 Ah), page 60* or *12.5 Replacing Batteries (60 Ah / 73 Ah), page 59*
Parts lost	None	Parts lost	Re-attach parts once found	See corresponding chapters of depending parts

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	Fuse on power wheelchair has burnt out.	Check power wheelchair fuses, see *12.7 Checking and Replacing Main Fuse, page 61*.
	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 battery charger 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 *12.6 Replacing Batteries (50 Ah), page 60* or *12.5 Replacing Batteries (60 Ah / 73 Ah), 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 *14.2 Mounting Dahl Docking System, page 69*	

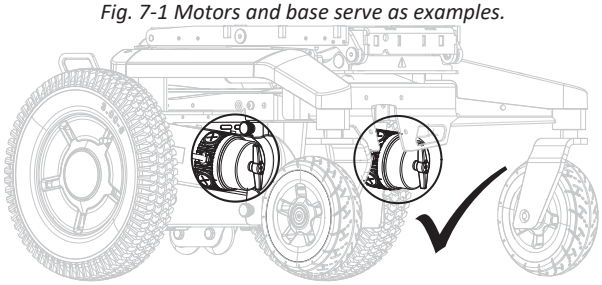
Component	Check	Remedy	Notes	✓
Wheel suspension and wheels	Check drive wheels for tight fit and side play	Adjust, replace wheel hubs	See *9.8 Replacing Drive Wheel Hub (before 10_2022), page 47* or *9.9 Replacing Drive Wheel Hub (after 10_2022), page 47*	
	Check castors for tight fit, float and side play	Replace wheels, wheel fork or wheel bearings	See *9 Wheels, page 42*	
	Tyres	Repair or replace if damaged	See *9.7 Replacing Tyres, page 45*	
	Check wheel suspension	Repair or replace if damaged	See *8.7 Replacing Rear Suspension, page 37*	
	Check straight running	Replace wheels, wheel fork or wheel bearings	See *9.7 Replacing Tyres, page 45*	
Drive units, clutch mechanism	Motors	Check motors	See *5.1 Testing Motor, page 10*	
	Check functions in drive and push modes	Check carbon brushes, replace if necessary	See *7.2.2 Checking and / or Replacing Carbon Brushes, page 30* or *7.2.2 Checking and / or Replacing Carbon Brushes, page 30*	
	Check clutch mechanism	Replace motor if necessary.	See *7.1 Drive Components (before 03_2023), page 23* or *7.2 Drive Components (after 03_2023), page 28*	
		Tighten screws/nuts, adjust or replace if necessary		
Brakes	Inspect motor brake	Check motor brake	See *5.2 Testing Motor Brake, page 10*	
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 63*	
	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 *12.6 Replacing Batteries (50 Ah), page 60*,*12.5 Replacing Batteries (60 Ah / 73 Ah), page 59* and *12.8 Disposing of Dead or Damaged Batteries Correctly, page 62*	
	Check battery voltage	Charge batteries	See corresponding user manual	
	Check contacts and terminals	Clean contacts and terminals	See *12 Batteries, page 57*	
Remote / Power modules	Remote, status display blinking	Evaluate error/blink code	See corresponding 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 corresponding remote service manual	
Screws (every six months)	Check screws for tight fit	Tighten screws if necessary		

7 Drive Components

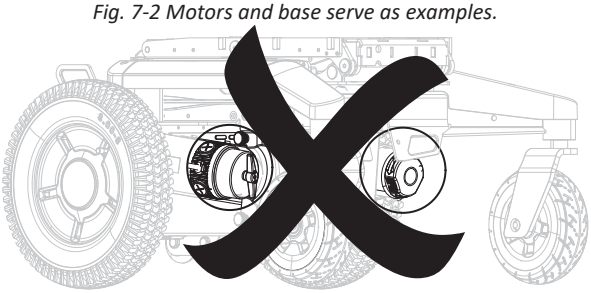
7.1 Drive Components (before 03_2023)

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.
For LiNX control system:
— Write new Chair configuration file to the chair.
— Conduct “Adaptive Load Compensation (ALC)” calibration after changing the motors and writing new chair configuration.
For ACS control system:
— Change parameter “Load Compensation” to 32 mOhm.

Find the following topics in this chapter:

7.1.1 Replacing Motor-Gearbox Unit

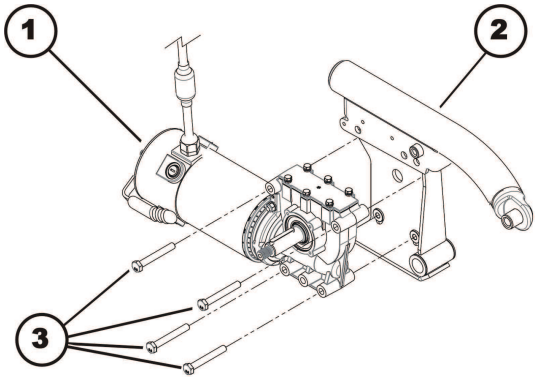
CAUTION!
Risk of Injury due to Uncontrolled Movement of the Power Wheelchair
— Turn off power wheelchair (power button on the remote).
— Engage drive motors.
— Secure power wheelchair against rolling away by placing wedges under wheels.

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

DuraWatt motors are maintenance-free, due to lifetime brushes.

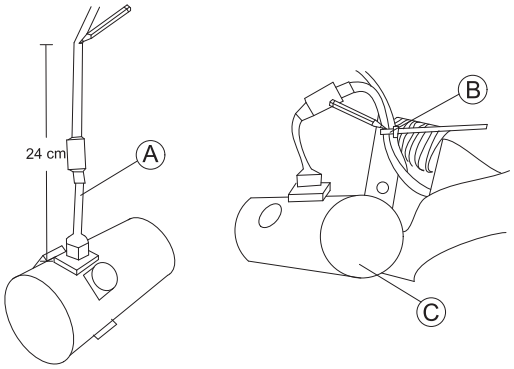
- 5/8" (16 mm) Allen key
- 7/8" (22 mm) Allen key
- 5/16" (8 mm) Allen key
- 6 mm Allen key
- Phillips screwdriver size 2
- 13 mm wrench
- 1/2" (13 mm) wrench
- 1/4" (6 mm) wrench
- 5/16" (8 mm) Allen key
- Torque wrench 5 - 25 Nm (or similar)
- Torque wrench 10 - 80 Nm (or similar)
- Jacking device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

Removing Unit

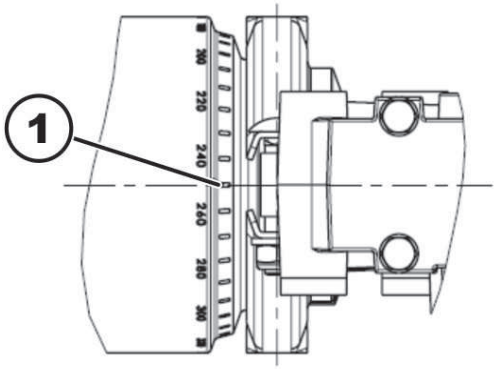


1. Turn off power wheelchair.
2. Remove rear battery shroud, see *10.2 Replacing Rear Shroud (Without Operating Hour Counter), page 50* or *10.3 Replacing Rear Shroud (With Operating Hour Counter), page 51*.
3. Unplug motor cable at power module.
4. Cut cable ties to freely access motor cable.
5. Remove drive wheel, see *9.5 Replacing Drive Wheel (5–Screw Installation), page 43* or *9.6 Replacing Drive Wheel (1–Bolt Installation), page 44*.
6. Remove drive wheel hub, see *9.8 Replacing Drive Wheel Hub (before 10_2022), page 47* or *9.9 Replacing Drive Wheel Hub (after 10_2022), page 47*.
7. Remove screws (3).
8. Remove motor-gearbox unit (1) from walking beam (2).

Installing Unit



1. Replace defective components.
2. Before installing a new motor-gearbox unit, make sure that sealing ring is correctly mounted. The sealing ring securely attaches motor and gear box. The ring must be installed such that self-locking nut is located on outside.
3. If the sealing ring is incorrectly installed, rotate it around as described in *7.1.2 Replacing or Rotating Motor-Gearbox Unit Sealing Ring, page 25*.
4. Install motor 7 gearbox unit in reverse order.
5. Install all cable ties. Make sure to tie motor cable Ⓐ to frame at 24 cm Ⓑ.



6. Use scale to align motor to centre axis (1), 2-pole motors and 4-ploe motors
   - Left: 0°
     Right: 0°
7. Make sure that motor cable cannot be pinched or bent, and that it is not exposed to chafing in any place.
8. If LiNX system is used, perform calibration process. See *Suggested Programming Procedure* in LiNX service manual.
9. Test all functions.

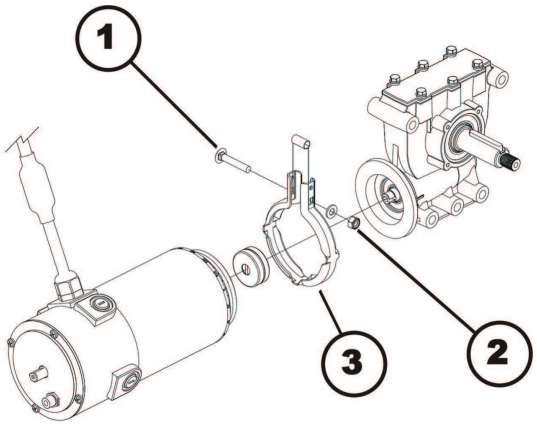
7.1.2 Replacing or Rotating Motor-Gearbox Unit Sealing Ring

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) Allen key
- 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 23*.
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.

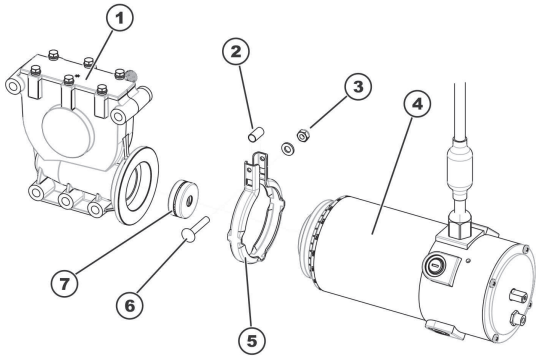
7.1.3 Replacing Motor-Gearbox Clutch

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 23* .
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 23* .
8. Test all functions.

7.1.4 Checking and / or Replacing Carbon Brushes

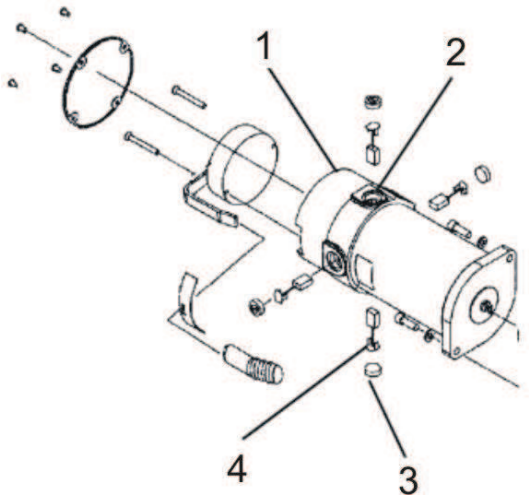
If carbon brushes are checked but not replaced, you must know their exact fitting position. Used carbon brushes need to be refitted exactly in the same position from which they were taken to guarantee optimum contact to collector.

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

DuraWatt motors are maintenance-free, due to lifetime brushes.

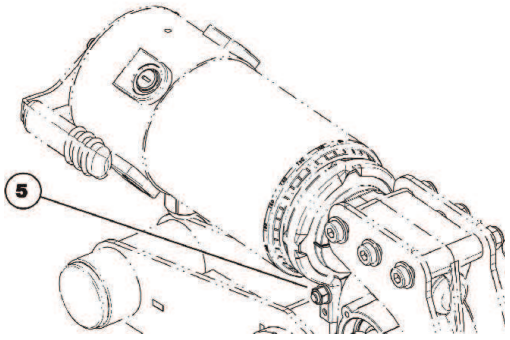
CAUTION!
Risk of Crushing
Motor / gearbox unit is very heavy. Risk of injury to hands.
— Pay attention to heavy weight.

- 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 Carbon Brushes

1. Turn off power wheelchair.
2. Remove drive wheels, see *9.5 Replacing Drive Wheel (5–Screw Installation), page 43* or *9.6 Replacing Drive Wheel (1–Bolt Installation), page 44*.
3. Disengage motor (1) by setting engaging lever to "push".
4. Remove all plastic caps (3).
5. Pull carbon brushes (4) a little bit out of brush holder. Note fixing position and location of carbon brushes.
   To access rear carbon brushes easier, loosen nut (5), then turn motor around.
6. Make a marking on motor and carbon brushes to guarantee correct installation.
7. Remove carbon brushes completely from mounting (2).
8. Test carbon brushes and springs for level of wear, broken components or discoloration.
   If carbon brushes were checked but not replaced, they need to be refitted exactly in the same position from which they were taken to guarantee optimum contact to collector.



Installing Carbon Brushes

1. Depending on condition of brushes and spring:
   - either re-insert brushes in exactly same position from which they were taken or
   - fit new brushes

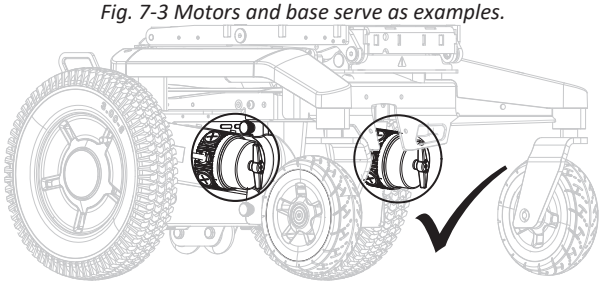
   Always replace all carbon brushes on both motors.
2. Replace plastic caps and tighten them.
3. Install drive wheels, see *9.5 Replacing Drive Wheel (5–Screw Installation), page 43* or *9.6 Replacing Drive Wheel (1–Bolt Installation), page 44*.
4. To guarantee maximum performance after replacement, treat carbon brushes according to following procedure:

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

   a. Lift power wheelchair up on one side and place a jacking device underneath it, so that drive wheel is suspended freely. Use proper lifting techniques.
   b. Repeat same procedure on other side of power wheelchair.
   c. Allow motors to run in forward direction for an hour.
   d. Allow motors to cool down for 30 minutes.
   e. Allow motors to run in reverse direction for an hour.
   f. Lift power wheelchair off jacking device.

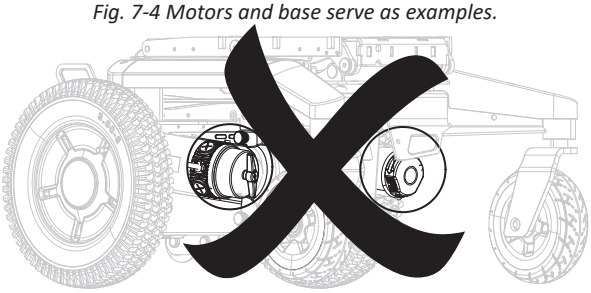
7.2 Drive Components (after 03_2023)

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.

Find the following topics in this chapter:

7.2.1 Replacing Motor-Gearbox Unit

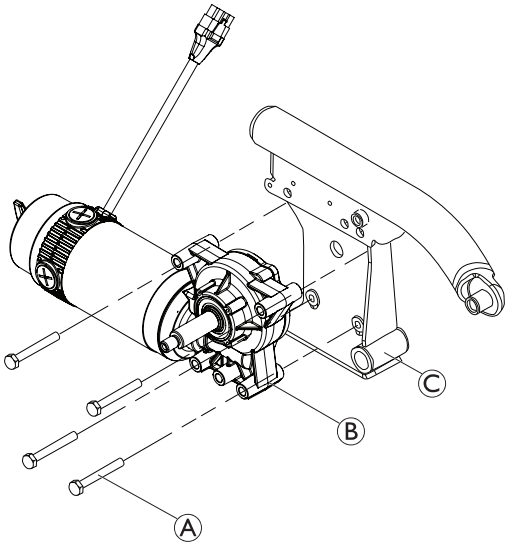
CAUTION!
Risk of Injury due to Uncontrolled Movement of the Power Wheelchair
- Turn off power wheelchair (power button on the remote).
- Engage drive motors.
- Secure power wheelchair against rolling away by placing wedges under wheels.

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

- 13 mm socket wrench
- Torque wrench 5-25 Nm (or similar)
- Jacking device (2x)

Removing Unit

1. Turn off power wheelchair.
2. Remove rear battery box shroud, see *10.2 Replacing Rear Shroud (Without Operating Hour Counter), page 50* or *10.3 Replacing Rear Shroud (With Operating Hour Counter), page 51*.
3. Disconnect motor cable from power module.
4. Open cable ties so motor cable can be accessed freely.
5. Remove drive wheels, see *9.5 Replacing Drive Wheel (5–Screw Installation), page 43* or *9.6 Replacing Drive Wheel (1–Bolt Installation), page 44*.
6. Remove wheel hub, see *9.9 Replacing Drive Wheel Hub (after 10_2022), page 47*
7. Remove screws Ⓐ.
8. Remove motor-gearbox unit Ⓑ from walking beam Ⓒ.

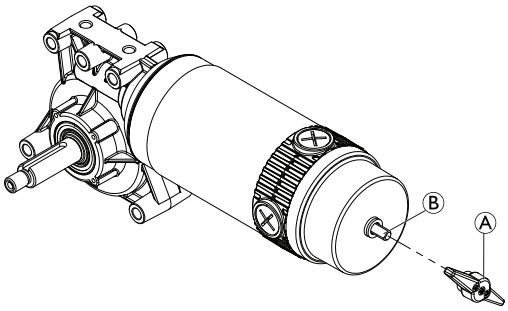


Installing Unit

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 *Suggested Programming Procedure* in LiNX service manual.
5. Test all functions.

Replacing Engaging Lever

1. Pull engaging lever Ⓐ from pin Ⓑ.



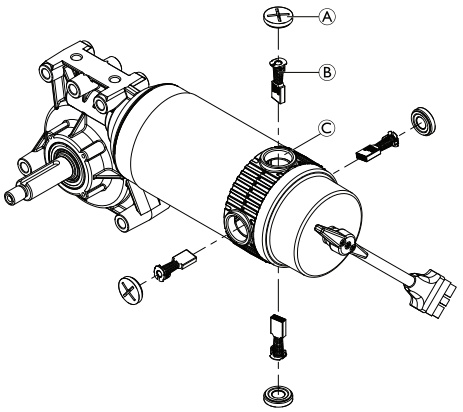
7.2.2 Checking and / or Replacing Carbon Brushes

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

- Screwdriver
- Jacking device (2x)

Removing Carbon Brushes

1. Turn off power wheelchair.
2. Remove drive wheel, see *9.5 Replacing Drive Wheel (5–Screw Installation), page 43* or *9.6 Replacing Drive Wheel (1–Bolt Installation), page 44*.
3. Remove all four plastic caps Ⓐ.
4. Pull carbon brushes Ⓑ a little out of brush holder. Note fixing position and location of carbon brushes.
   To access rear carbon brushes easier, remove the motor, see *7.2.1 Replacing Motor-Gearbox Unit, page 29*.
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.
   If carbon brushes are checked but not replaced, they need to be refitted exactly in the same position from which they were taken to guarantee optimum contact to collector.



Installing Carbon Brushes

1. Depending on condition of brushes and spring:
   - either re-insert brushes in exactly same position from which they were taken or
   - fit new brushes

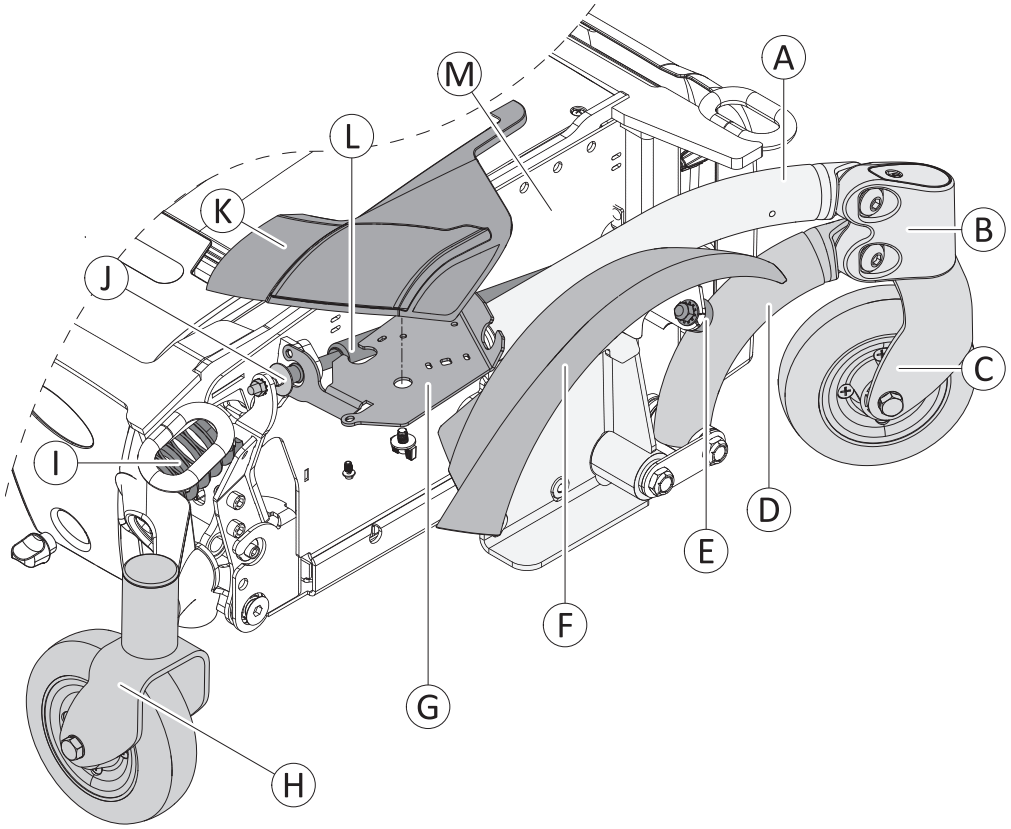
   Always replace all carbon brushes on both motors.
2. Replace plastic caps and tighten them.
3. Install drive wheels, see *9.5 Replacing Drive Wheel (5–Screw Installation), page 43* or *9.6 Replacing Drive Wheel (1–Bolt Installation), page 44*.
4. To guarantee maximum performance after replacement, treat carbon brushes according to following procedure:

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

   a. Lift power wheelchair up on one side and place a jacking device underneath it, so that drive wheel is suspended freely. Use proper lifting techniques.
   b. Repeat same procedure on other side of power wheelchair.
   c. Allow motors to run in forward direction for an hour.
   d. Allow motors to cool down for 30 minutes.
   e. Allow motors to run in reverse direction for an hour.
   f. Lift power wheelchair off jacking device.

8 Chassis

8.1 Overview of Components



Overview of the following described components and their location on the power wheelchair. For better view the propulsion unit and seat are not shown.

Ⓐ Top Walking Beam

Ⓑ Steering Head Front

Ⓒ Front Castor

Ⓓ Bottom Walking Beam

Ⓔ Rubber Stopper

Ⓕ Fender

Ⓖ Rear Light Bracket

Ⓗ Rear Castor

Ⓘ Rear Spring

Ⓙ Setting Screw

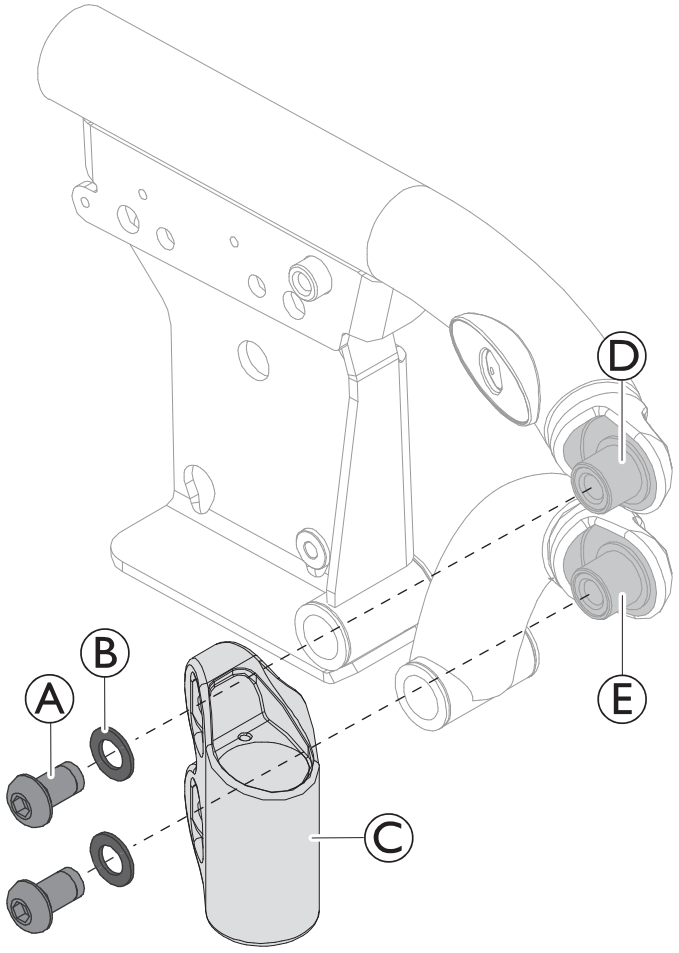
Ⓚ Rear Light

Ⓛ Gas Locking Cylinder

Ⓜ Battery Box

8.2 Replacing Front Steering Head

- 5/16" (8 mm) Allen key
- Torque wrench 5 - 25 Nm (or similar)



Removing Front Steering Head

1. Remove two Allen screws Ⓐ.
2. Remove two washers Ⓑ.
3. Remove steering head Ⓒ from top walking beam Ⓓ and bottom walking beam Ⓔ.

Installing Front Steering Head

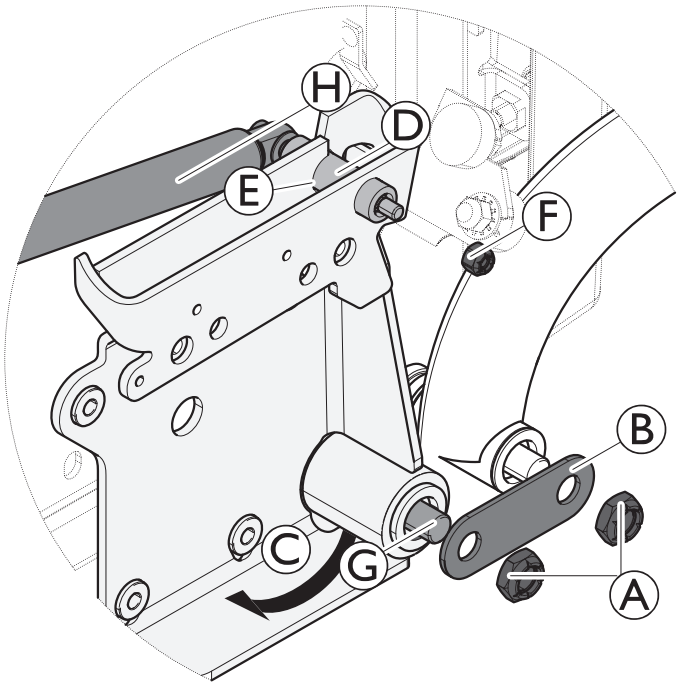
1. Install parts in reverse order.
2. Tighten screws according to following sequence:
   - Tighten all screws to 18 Nm.
   - Turn screws back by 1/8 turn.

8.3 Replacing Top Walking Beam

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

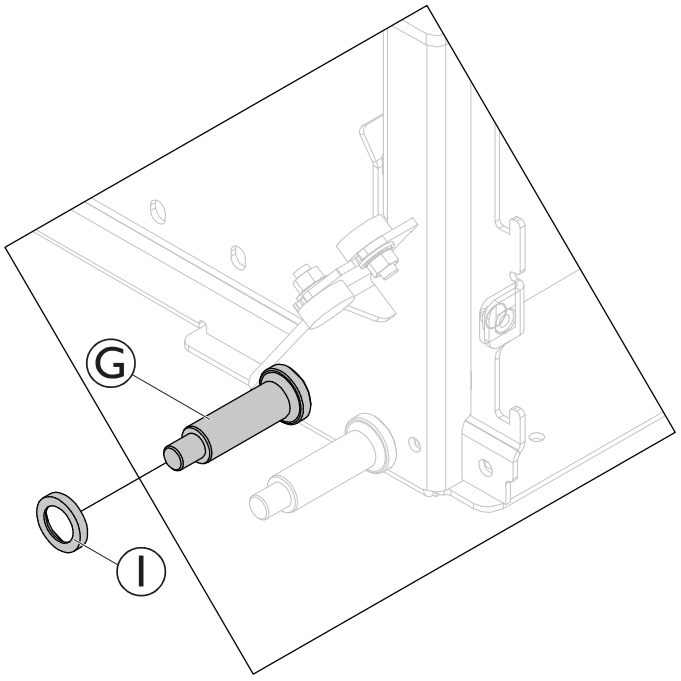
Removing Top Walking Beam

1. Remove batteries, see *12.4 Making Batteries Accessible, page 58* and *12.5 Replacing Batteries (60 Ah / 73 Ah), page 59* or *12.6 Replacing Batteries (50 Ah), page 60*.
2. Ensure you note the cable routing carefully. If necessary, take photos with a digital camera.
3. Remove drive wheel, see *9.5 Replacing Drive Wheel (5–Screw Installation), page 43* or *9.6 Replacing Drive Wheel (1–Bolt Installation), page 44*.
4. Remove front steering head, see *8.2 Replacing Front Steering Head, page 32*.
5. Remove rubber stopper, see *8.5 Replacing Rubber Stopper, page 34*.
6. Pull motor cable off power module.
7. Note carefully how motor cable is routed.
8. If necessary, remove any existing cable ties which are fixing motor cable.
9. Remove nuts Ⓐ and washer Ⓑ.
10. Rotate top walking beam Ⓒ until bolt Ⓓ is in line with opening Ⓔ in top walking beam.
11. Remove nut Ⓕ, which secures bolt Ⓓ.
12. Remove top walking beam including motor-gearbox unit from bolt Ⓓ and axle Ⓖ.
13. Push bolt Ⓓ towards battery case until gas cylinder is free of top walking beam.
14. Fix gas cylinder Ⓗ in place with a cable tie or suitable adhesive tape.
15. Remove washer Ⓘ from axle Ⓖ.



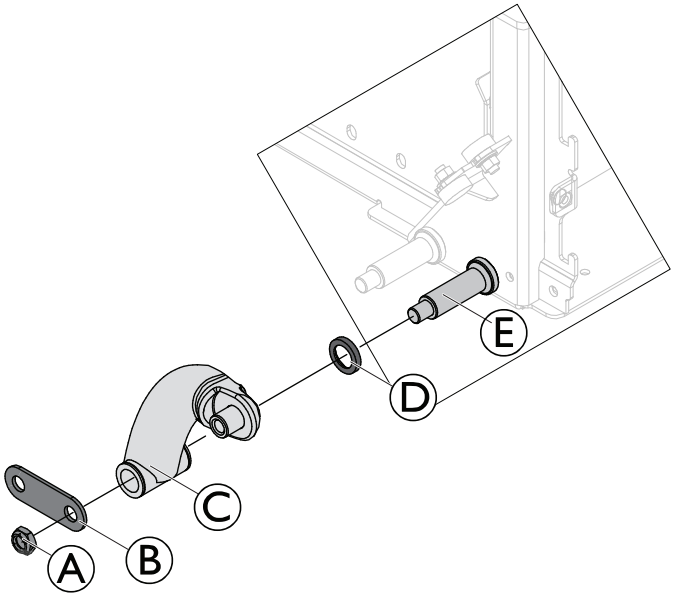
Installing Top Walking Beam

1. Place washer Ⓘ on axle Ⓖ.
2. Push top walking beam Ⓒ including motor-gearbox unit onto axle.
3. Install washer Ⓑ and nut Ⓐ.
4. Tighten nut Ⓐ to 18 Nm.
5. Rotate nut Ⓐ back by 1/4 turn.
6. Raise rear wheel suspension to free gas cylinder Ⓗ.
7. Position gas cylinder so that bolt Ⓓ is in line with opening Ⓔ in top walking beam.
8. Push bolt Ⓓ through gas cylinder and top walking beam.
9. Install nut Ⓕ on bolt Ⓓ and tighten to 8.5 Nm.
10. Install rubber stopper, see *8.5 Replacing Rubber Stopper, page 34*.
11. Install front steering head, see*8.2 Replacing Front Steering Head, page 32*.
12. Install batteries, see *12.5 Replacing Batteries (60 Ah / 73 Ah), page 59* or *12.6 Replacing Batteries (50 Ah), page 60*
13. Install drive wheel, see *9.5 Replacing Drive Wheel (5–Screw Installation), page 43* or *9.6 Replacing Drive Wheel (1–Bolt Installation), page 44*.



8.4 Replacing Bottom Walking Beam

- 5/8" (16 mm) Allen key
- 5/16 " (8 mm) Allen key
- Phillips screwdriver size 2
- 1/2" (13 mm) wrench
- Torque wrench 5 - 25 Nm (or similar)
- Jacking device(2x)



Removing Bottom Walking Beam

1. Remove drive wheel, see *9.5 Replacing Drive Wheel (5–Screw Installation), page 43* or *9.6 Replacing Drive Wheel (1–Bolt Installation), page 44*.
2. Remove front steering head, see *8.2 Replacing Front Steering Head, page 32*.
3. Remove nut Ⓐ.
4. Remove washer Ⓑ.
5. Remove bottom walking beam Ⓒ from axle Ⓔ.
6. Remove spacer Ⓓ from axle.

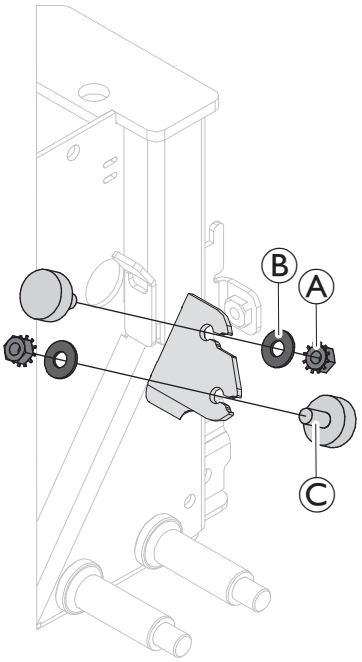
Installing Bottom Walking Beam

1. Install parts in reverse order.
2. Tighten nut Ⓐ to 18 Nm.

8.5 Replacing Rubber Stopper

Invacare recommends that you replace all rubber stoppers as soon as one needs replacing.

- 5/16" (8 mm) wrench
- 7/8" (22 mm) Allen key
- Jacking device (2x)
- Torque wrench 5 - 25 Nm (or similar)



Removing Rubber Stopper

1. Remove drive wheel, see *9.5 Replacing Drive Wheel (5–Screw Installation), page 43* or *9.6 Replacing Drive Wheel (1–Bolt Installation), page 44*.
2. Loosen and remove nut Ⓐ.
3. Remove washer Ⓑ.
4. Remove rubber stopper Ⓒ.

Installing Rubber Stopper

1. Install parts in reverse order.

8.6 Stability Lock

8.6.1 Replacing Locking Gas Cylinder

CAUTION!
Risk of Strain from Lifting Heavy Parts!
— Use proper lifting techniques.

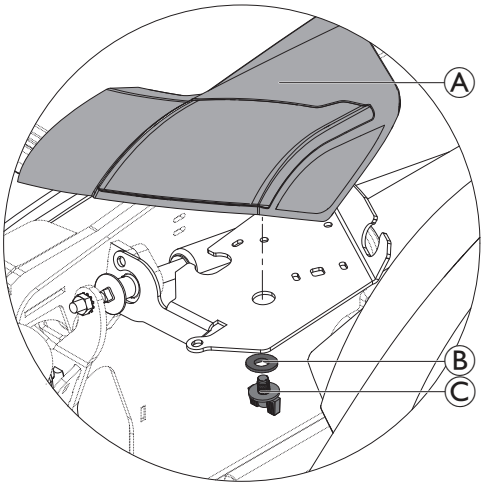
CAUTION!
Risk of Injury by Uncontrolled Movement of Power Wheelchair
— Switch power supply off (power button).
— Engage drive.
— Before raising power wheelchair, secure wheels by blocking them with wedges.

- 3/16" (5 mm) Allen key
- 5/16" (8 mm) wrench with extension
- 3/4" (19 mm) wrench
- 5/32" (4 mm) Allen key
- 7/16" (11 mm) socket wrench
- Phillips screwdriver, size 2
- Torque wrench 5 - 25 Nm (or similar)
- Jacking device(2x)
- Medium-strength thread locking adhesive (Loctite 242 or similar)

For better view the following illustrations does not show the seat system.

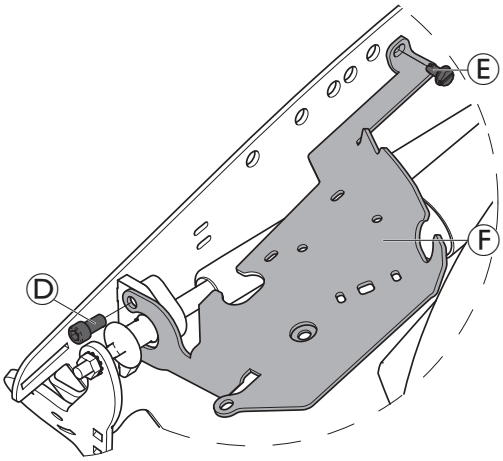
Removing Cylinder

1. Lift power wheelchair up on one side and place a jacking device under battery box so that wheels are off the ground and can rotate freely. Use proper lifting techniques.
2. Repeat same procedure on other side of power wheelchair.
3. Remove hand screw Ⓒ and washer Ⓑ of bezel shroud Ⓐ.
4. If LED light is installed, unplug all plugs on rear side and remove bezel shroud and cable ties.
   When installing, make sure to replace cable ties.



Detail view of bezel shroud

5. Loosen and remove screws Ⓓ and Ⓔ.
6. Remove rear light bracket Ⓕ.
7. Remove drive wheel, see *9.5 Replacing Drive Wheel (5–Screw Installation), page 43* or *9.6 Replacing Drive Wheel (1–Bolt Installation), page 44*.
8. Remove fender, see *10.6 Replacing Fender, page 52*.
9. Remove batteries, see *12.5 Replacing Batteries (60 Ah / 73 Ah), page 59* or *12.6 Replacing Batteries (50 Ah), page 60*.

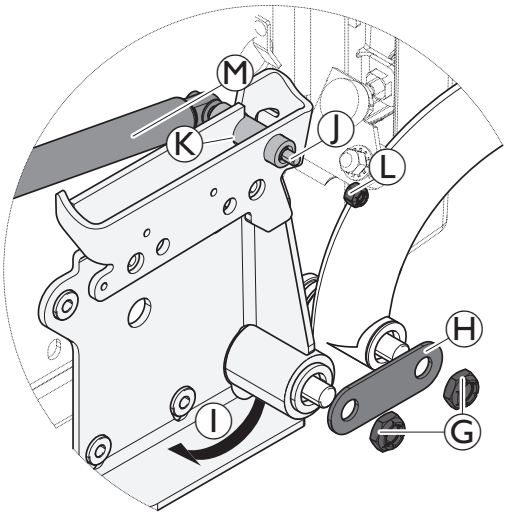


10. Loosen nuts Ⓖ and washer Ⓗ that fix lower walking beam to chassis.
11. Rotate top walking beam Ⓘ so that bolt Ⓙ and opening Ⓚ are in line.
12. Loosen and remove nut Ⓛ on upper walking beam. Hold bolt Ⓙ in place.
13. Push bolt Ⓙ towards battery box so that gas cylinder Ⓜ is separated from walking beam.
14. Push gas cylinder against battery box.
15. Raise rear axle so that gas cylinder is activated and then retract cylinder.
16. Push gas cylinder to the rear and pull it off battery box.

Installing Cylinder

When installing nuts to lower and upper walking beam, use thread locking adhesive.

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



Detail view of right walking beam assembly. For better view top walking beam, fender and motor/gearbox unit are not shown.

8.6.2 Replacing and Adjusting Setting Screw

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

CAUTION!
Risk of Injury Caused by Uncontrolled Movement of the Power Wheelchair
— Switch the power supply off (power button).
— Engage drive.
— Before raising the power wheelchair, secure the wheels by blocking them with wedges.

Invacare recommends always replacing both setting screws simultaneously to ensure that the power wheelchair works perfectly.

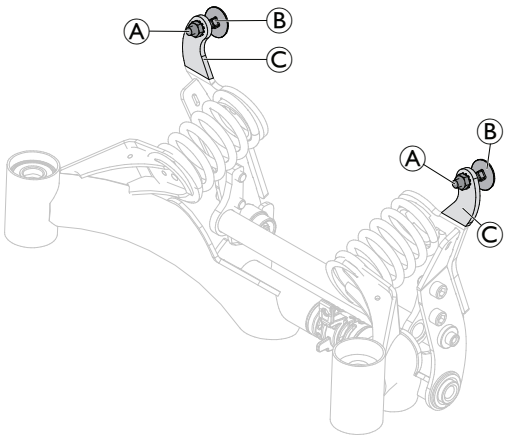
Removing Setting Screw

- 1/4" (6 mm) torque wrench 5 Nm -25 Nm (or similar)
- Jacking device (2x)
- Feeler gauge with 2.0 mm

1. Lift the power wheelchair up on one side and place a jacking device under the battery case so that the wheels are off the ground and can rotate freely. Use proper lifting techniques.
2. Repeat same procedure on other side of power wheelchair.
3. Remove lock nut Ⓐ of setting screw Ⓑ.
4. Rotate setting screw Ⓑ towards battery case until you can remove it from its holder Ⓒ.

Installing Setting Screw

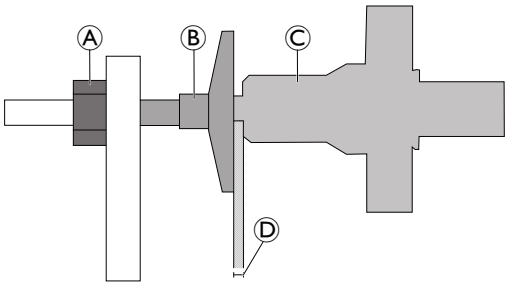
1. Screw new setting screw Ⓑ into holder Ⓒ.
2. Tighten lock nut Ⓐ
3. Remove jacking devices from under power wheelchair, so that all castors are in contact with floor.



Battery box and locking gas cylinder not shown for better view.

Adjusting Setting Screw

1. Remove lock nut Ⓐ.
2. Rotate setting screw Ⓑ until there is a space of 2.0 mm Ⓓ between it and gas cylinder Ⓒ.
3. Install lock nut Ⓐ. Tighten to 8 Nm.
4. Test all functions.



8.7 Replacing Rear Suspension

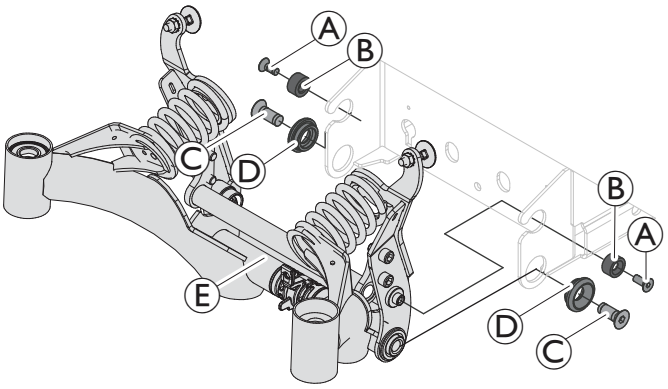
CAUTION!
Risk of Crushing
The power wheelchair is very heavy. Risk of injury hazard to hands and feet.
— Use proper lifting techniques.

CAUTION!
Risk of Injury by Uncontrolled Movement of Power Wheelchair
— Switch power supply off (power button).
— Engage drive.
— Before raising power wheelchair, secure wheels by blocking them with wedges.

- 5/16" (8 mm) Allen key
- 5/32 " (4 mm) Allen key
- Phillips screwdriver size 2
- Torque wrench 0 - 20 Nm (or similar)
- Torque wrench 20 - 80 Nm (or similar)
- Oblique pliers
- Tie wraps
- Jacking device (2x)
- Joiner's clamp (2x)

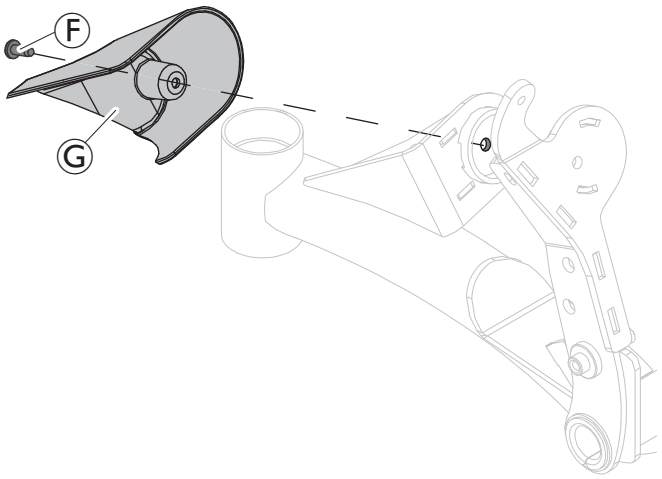
Removing Rear Suspension

1. Lift power wheelchair up on one side and place a jacking device under battery case so that wheels are off the ground and can rotate freely. Use proper lifting techniques.
2. Repeat same procedure on the other side of power wheelchair.
3. Remove rear shroud, see *10.2 Replacing Rear Shroud (Without Operating Hour Counter), page 50* or *10.3 Replacing Rear Shroud (With Operating Hour Counter), page 51*.
4. Make sure you note cable routing carefully. If necessary, take photos with a digital camera.
5. Remove all cables and tie wraps which are fixed to wheel suspension or which could get in the way during work.
6. Loosen two screws Ⓐ and remove screws including nylon spacer Ⓑ.
7. Loosen two screws Ⓒ and remove screws including bushings Ⓓ.
8. Take complete rear wheel suspension off.
9. See *8.7.2 Replacing Individual Parts of Rear Suspension, page 40* to replace components.



Installing Rear Suspension

1. Position complete rear wheel suspension between two mounting points.
2. Fit two bushings Ⓓ and two screws Ⓒ.
3. Tighten screws to 60 Nm.
4. Make sure that rear springs are compressed:
   a. Block method
      - Lift suspension arm and place Jacking device or similar underneath it until springs are pressed together and nylon spacer Ⓑ can be fitted into recesses provided in suspension.
   b. Clamp method
      - Remove screw Ⓕ and rear cap Ⓖ on both swing arms.
      - Press springs together with a joiner's clamp or similar suitable clamp until nylon spacer Ⓑ can be fitted into recesses provided in suspension.
5. Fit two screws Ⓐ.
6. Tighten screws to 8.5 Nm.
7. Install rear caps Ⓖ and screws Ⓕ.
8. Install all necessary plugs and fix cables with cable ties as previously.
9. Install rear shroud, see *10.2 Replacing Rear Shroud (Without Operating Hour Counter), page 50* or *10.3 Replacing Rear Shroud (With Operating Hour Counter), page 51*.
10. Lift power wheelchair off jacking devices.
11. Test all functions.
12. If necessary, carry out adjustments to setting screw on stability lock system, see *8.6.2 Replacing and Adjusting Setting Screw, page 36*.



8.7.1 Replacing Rear Springs

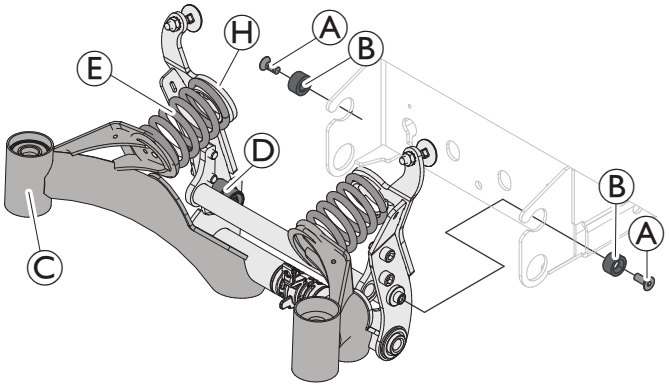
Invacare recommends always replacing both springs simultaneously to ensure that the power wheelchair works perfectly.

CAUTION!
Risk of Crushing
Mobility device is very heavy. Risk of injury to hands and feet.
— Use proper lifting techniques.

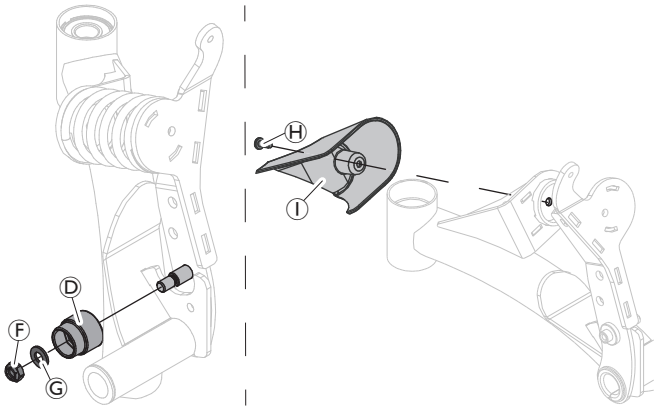
CAUTION!
Risk of Injury by Uncontrolled Movement of Power Wheelchair
— Switch power supply off (power button).
— Engage drive.
— Before raising power wheelchair, secure wheels by blocking them with wedges.

- 5/16" (8 mm) Allen key
- 5/32" (4 mm) Allen key
- Phillips screwdriver size 2
- Flat screwdriver
- 1/4" (6 mm) wrench
- 5/16" (8 mm) wrench
- Torque wrench 0 - 20 Nm (or similar)
- Oblique pliers
- Cable ties
- M8 washer
- Jacking device(2x)
- Joiner's clamp (2x)

Removing Rear Springs



1. Lift power wheelchair up on one side and place a jacking device under battery case so that wheels are off the ground and can rotate freely. Use proper lifting techniques.
2. Repeat same procedure on other side of power wheelchair.
3. Remove rear shroud, see *10.2 Replacing Rear Shroud (Without Operating Hour Counter), page 50* or *10.3 Replacing Rear Shroud (With Operating Hour Counter), page 51*.
4. Make sure you note cable routing carefully. If necessary, take photos with a digital camera.
5. Remove all cables and cable ties which are fixed to wheel suspension or which could get in the way during work.
6. Make sure that rear springs Ⓔ are compressed:
   a. Block method
      - Raise suspension arms Ⓒ and place jacking device underneath.
      - Remove nut Ⓕ and washer Ⓖ to remove stopper Ⓓ on both suspension arms.
   b. Clamp method
      - Remove both screws Ⓐ and spacers Ⓑ.
      - Make sure suspension arms Ⓒ are lowered as much as possible.
      - Remove screw Ⓗ and rear cap Ⓘ on both suspension arms.
      - Compress springs with joiner's clamp.
      - Remove nut Ⓕ and washer Ⓖ to remove stopper Ⓓ on both suspension arms.



7. Remove Jacking device or joiner's clamps to release springs.
8. Remove springs.

Installing Rear Springs

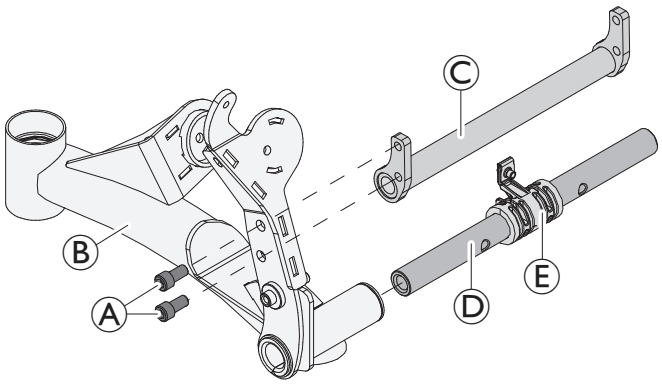
1. Put springs Ⓖ into position between suspension arm Ⓕ and stop Ⓗ.
2. Make sure that rear springs Ⓔ are compressed:
   a. Block method
      - Raise suspension arms Ⓒ and place jacking device underneath.
      - Remove nut Ⓕ and washer Ⓖ to remove stopper Ⓓ on both suspension arms.
   b. Clamp method
      - Remove both screws Ⓐ and spacers Ⓑ.
      - Make sure suspension arms Ⓒ are lowered as much as possible.
      - Remove screw Ⓗ and rear cap Ⓘ on both suspension arms.
      - Compress springs with joiner's clamp.
      - Remove nut Ⓕ and washer Ⓖ to remove stopper Ⓓ on both suspension arms.
3. Install stopper Ⓓ with nut Ⓕ and washer Ⓖ on both suspension arms.
4. Tighten nuts to 8.5 Nm.
5. Remove jacking device or joiner's clamps carefully so that springs are released.
6. Reinsert all necessary plugs and fix cables with cable ties as previously.
7. Install rear shroud, see *10.2 Replacing Rear Shroud (Without Operating Hour Counter), page 50* or *10.3 Replacing Rear Shroud (With Operating Hour Counter), page 51*.
8. Lift power wheelchair off jacking device.
9. Check all functions.
10. If necessary, carry out adjustments to setting screw on stability lock system, see *8.6.2 Replacing and Adjusting Setting Screw, page 36*.

8.7.2 Replacing Individual Parts of Rear Suspension

- 5/8" (4 mm) Allen key

Removing Individual Parts of Rear Suspension

1. Remove rear suspension, see *8.7 Replacing Rear Suspension, page 37*.
2. Remove rear springs, see *8.7.1 Replacing Rear Springs , page 38*.
3. Remove screws Ⓐ on both rear swing arms Ⓑ to remove cross strut Ⓒ.
4. Pull rear swing arms off pivot bar Ⓓ.
5. Pull bushing assembly Ⓔ off pivot bar.



Installing Individual Parts of Rear Suspension

1. Install parts in reverse order.
2. Install rear springs, see *8.7.1 Replacing Rear Springs , page 38*.
3. Install rear suspension, see *8.7 Replacing Rear Suspension, page 37*.
4. Test all functions.

8.8 Replacing Battery Box

- 5/16" (8 mm) Allen key
- 5/32" (4 mm) Allen key
- Phillips screwdriver size 2
- Flat screwdriver
- 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 20 - 80 Nm (or similar)
- Oblique pliers
- Cable ties
- M8 washer
- Jacking device(2x)

Removing Battery Box

1. Remove seat including seat support, see service manual of depending seat system.
2. Remove shrouds, see *10 Shrouds, page 50*.
3. Remove battery tray and batteries , see *12.4 Making Batteries Accessible, page 58* and *12.5 Replacing Batteries (60 Ah / 73 Ah), page 59* or *12.6 Replacing Batteries (50 Ah), page 60*.
4. Remove headlights, rear lights and holders (depending on version), see *13 Lighting Unit, page 63*.
5. Remove power module, see *11.1 Replacing Power Module, page 53*.
   See corresponding service manual:
   - For LinX, see LiNX service manual.
   - For DX2, see revision 11 of TDX SP2 service manual.
6. Remove front steering head, see *8.2 Replacing Front Steering Head, page 32*.
7. Remove bottom walking beam, see *8.4 Replacing Bottom Walking Beam, page 34*.
8. Remove top walking beam, see *8.3 Replacing Top Walking Beam, page 33*.
9. Remove gas cylinder, see *8.6.1 Replacing Locking Gas Cylinder, page 35*.
10. Remove rubber stopper, see *8.5 Replacing Rubber Stopper, page 34*.
11. Remove rear wheel suspension, see *8.7 Replacing Rear Suspension, page 37*.
12. Remove battery box.

Installing Battery Box

1. Install rear wheel suspension, see *8.7 Replacing Rear Suspension, page 37*.
2. Install rubber stopper, see *8.5 Replacing Rubber Stopper, page 34*.
3. Install gas cylinder, see *8.6.1 Replacing Locking Gas Cylinder, page 35*.
4. Install top walking beam, see *8.3 Replacing Top Walking Beam, page 33*.
5. Install bottom walking beam, see *8.4 Replacing Bottom Walking Beam, page 34*.
6. Install front steering head, see *8.2 Replacing Front Steering Head, page 32*.
7. Install power module, see *11.1 Replacing Power Module, page 53*.
8. Install headlights, rear lights and holders (depending on version), see *13 Lighting Unit, page 63*.
9. Install batteries and battery tray, see *12.5 Replacing Batteries (60 Ah / 73 Ah), page 59* or *12.6 Replacing Batteries (50 Ah), page 60* and *12.4 Making Batteries Accessible, page 58*.
10. Install shrouds, see *10 Shrouds, page 50*.
11. Install seat including seat support, see service manual of depending seat system.
12. Adjust setting screw, see *8.6.2 Replacing and Adjusting Setting Screw, page 36*.
13. Test all functions.

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.

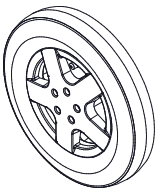
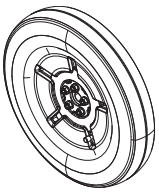
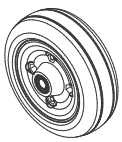
For recommended tyre pressure see inscription on tyre, rim, or contact Invacare. Compare table below for conversion.

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 Wheels		Castor Wheel
	 5-Spoke Rim (5-Screw Installation)	 Solid Rim (1-bolt installation)	
Type			
Specific Tightening Torques			
Wheel Fixation	60 Nm	18 Nm	18 Nm
Rim Halves	25 Nm	18 Nm	10 Nm

9.4 Replacing Rim Inserts in Drive Wheels

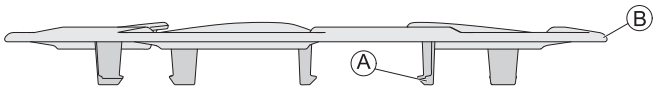
- Slotted screwdriver

Removing Rim Insert

1. Insert tip of screwdriver between rim and rim insert.
2. Remove rim insert.

Installing Rim Insert

1. Hold insert over rim.
2. Carefully push to fasten rim insert, until foot of rim insert Ⓐ snaps and rim insert Ⓑ clings to rim.



9.5 Replacing Drive Wheel (5–Screw Installation)

This chapter deals with drive wheels that are installed with four or five screws.

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

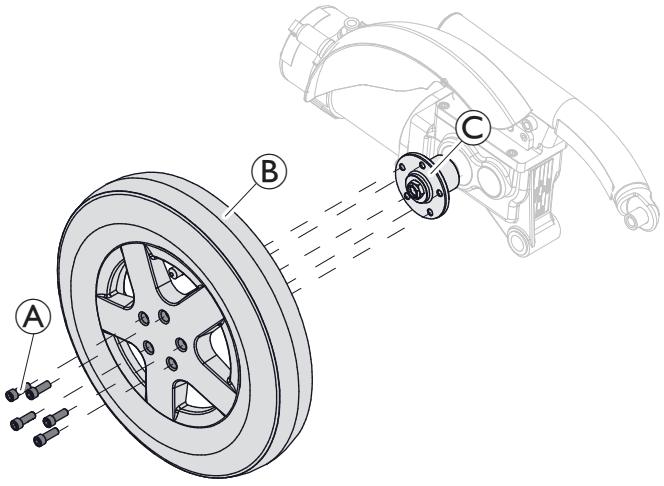
CAUTION!
Risk of Uncontrolled Movement of Power Wheelchair
— Turn off power supply (power button).
— Engage drive.
— Before raising power wheelchair, secure wheels by blocking them with wedges.

- 6 mm Allen key
- Torque wrench
- Jacking device
- Medium-strength thread locking adhesive (Loctite 243 or similar)

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.
2. Jack up under frame to prevent power wheelchair from rolling away.
3. Remove screws Ⓐ.
4. Remove wheel Ⓑ from hub Ⓒ.
5. **CAUTION!**
   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.
6. When installing wheel, pay attention to correct direction of rotation.
7. Tighten screws Ⓐ to specific tightening torque, see *9.3 Overview of Wheel Types and Specif Tightening Torques, page 42*.



9.6 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.

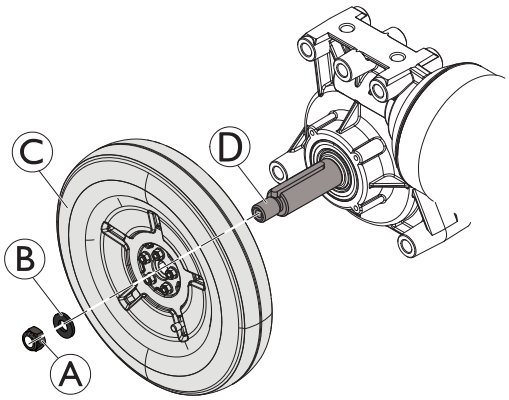
CAUTION!
Risk of Uncontrolled Movement of Power Wheelchair
- Turn off power supply (power button).
- Engage drive.
- Before raising power wheelchair, secure wheels by blocking them with wedges.
- Prevent the power wheelchair from tipping, by propping it upon a jacking device which is long and wide enough 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 *9.4 Replacing Rim Inserts in Drive Wheels, page 43*.
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 specific torque, see *9.3 Overview of Wheel Types and Specif Tightening Torques, page 42*.



9.7 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.

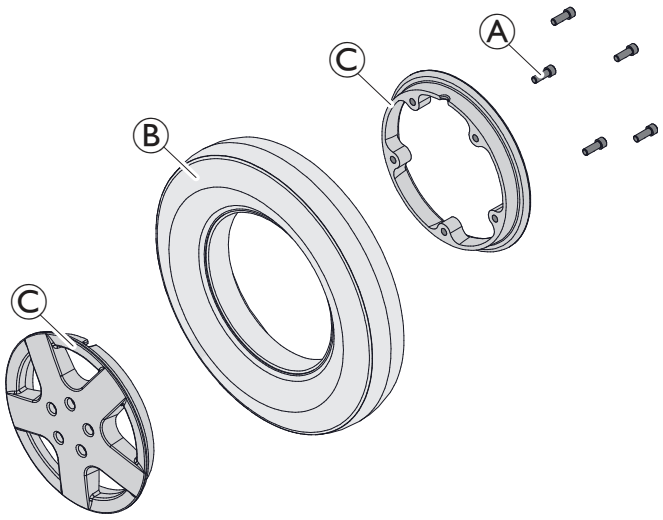
NOTICE!
Risk of Damage to Rim Threads
Incorrectly tightened screws can cause damage to rim threads.
— Tighten rim screws with prescribed tightening torque.

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.

- 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 *9.5 Replacing Drive Wheel (5–Screw Installation), page 43* or *9.6 Replacing Drive Wheel (1–Bolt Installation), page 44*.
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.



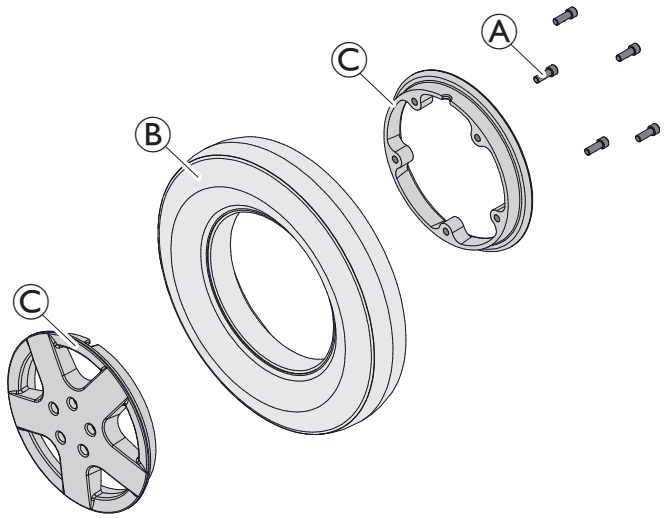
4. Remove screws Ⓐ on inside of wheel Ⓑ.
5. Remove rim halves Ⓒ from wheel.
6. Remove inner tube from tyre.
7. Repair inner tube and re-fit it, or replace it with a new one.

   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 specific tightening torque, see *9.3 Overview of Wheel Types and Specif Tightening Torques, page 42*. 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 *9.5 Replacing Drive Wheel (5–Screw Installation), page 43* or *9.6 Replacing Drive Wheel (1–Bolt Installation), page 44*.

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 *9.5 Replacing Drive Wheel (5–Screw Installation), page 43* or *9.6 Replacing Drive Wheel (1–Bolt Installation), page 44*.
2. Secure rim halves against unexpected discharge with three joiner's clamps. When doing so, make sure that you do not scratch rims.
3. Remove screws Ⓐ on inside of wheel Ⓑ.
4. Loosen joiner's clamps carefully and alternately until you can remove rim halves without risk.
5. Remove rim halves Ⓒ from wheel.
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 to specific tightening torque, see *9.3 Overview of Wheel Types and Specif Tightening Torques, page 42*.
12. Remove joiner’s clamps.
13. Installdrive wheel, see *9.5 Replacing Drive Wheel (5–Screw Installation), page 43* or *9.6 Replacing Drive Wheel (1–Bolt Installation), page 44*.

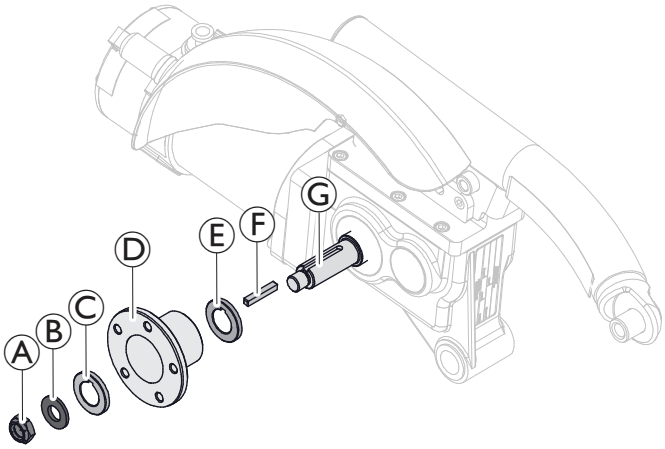
9.8 Replacing Drive Wheel Hub (before 10_2022)

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. Remove drive wheel, see *9.5 Replacing Drive Wheel (5–Screw Installation), page 43*.
2. Remove nut Ⓐ.
3. Remove washer Ⓑ.
4. Remove washer with feather nut Ⓒ.
5. Remove wheel hub Ⓓ from axle Ⓖ.
6. Remove spacer Ⓔ.
7. Remove feather key Ⓕ 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 nut Ⓐ to 60 Nm.

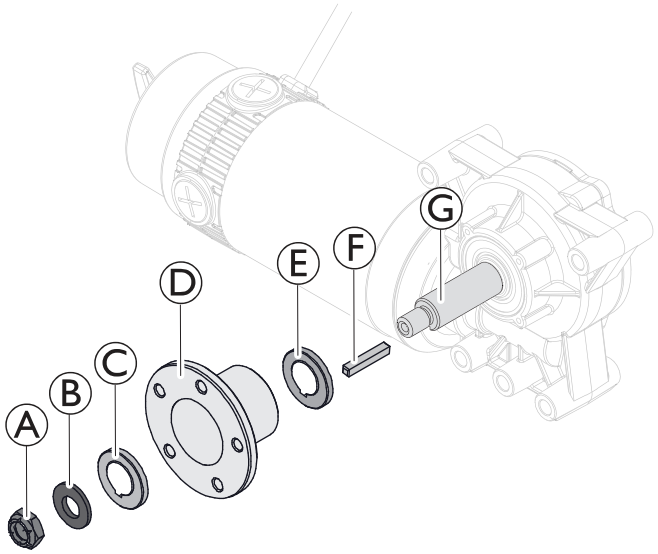
9.9 Replacing Drive Wheel Hub (after 10_2022)

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. Remove drive wheel, see *9.5 Replacing Drive Wheel (5–Screw Installation), page 43* or *9.6 Replacing Drive Wheel (1–Bolt Installation), page 44*.
2. Remove nut Ⓐ.
3. Remove washer Ⓑ.
4. Remove washer with feather nut Ⓒ.
5. Remove wheel hub Ⓓ from axle Ⓖ.
6. Remove spacer Ⓔ.
7. Remove feather key Ⓕ 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 nut Ⓐ to 60 Nm.

9.10 Replacing Castor Wheel on Double-Sided Fork

- 7/16" (11 mm) wrench (2x)
- Jacking device

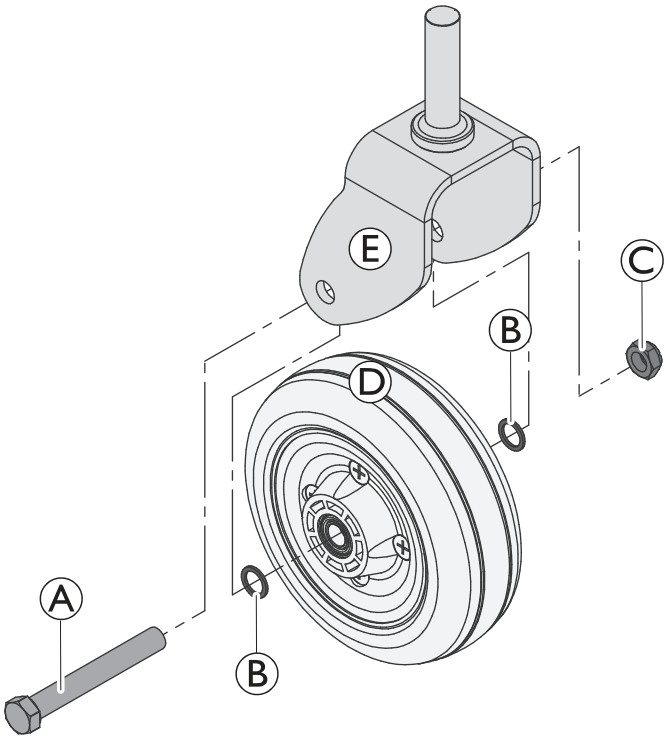
Removing Wheel

1. Remove bolt Ⓐ, washers Ⓑ and nut Ⓒ.
2. Pull wheel Ⓓ 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. Tighten bolt Ⓐ and nut Ⓒ to specific torque, see *9.3 Overview of Wheel Types and Specif Tightening Torques, page 42*.
3. Test all functions.



9.11 Replacing Castor Wheels on Single-Sided Fork

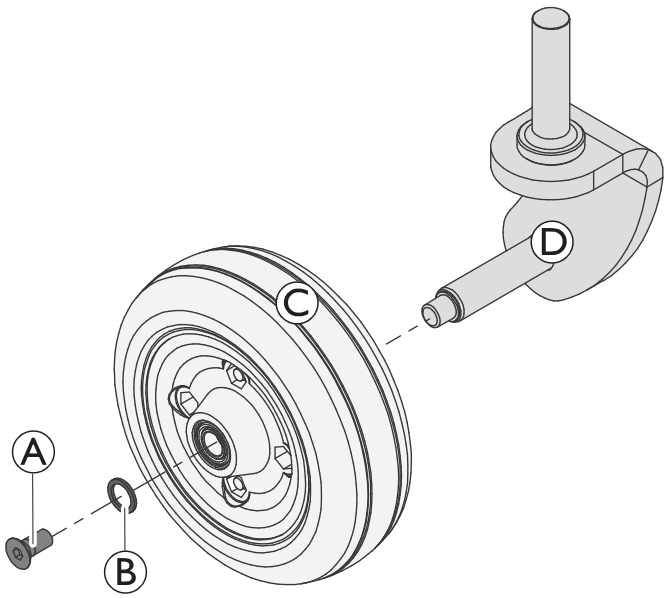
- TX30 Torx key
- Jacking device

Removing Wheel

1. Jack up power wheelchair.
2. Remove end-caps from bolt and nut (if applicable).
3. Remove screw Ⓐ and washer Ⓑ.
4. Remove wheel Ⓒ from fork Ⓓ.

Installing Wheel

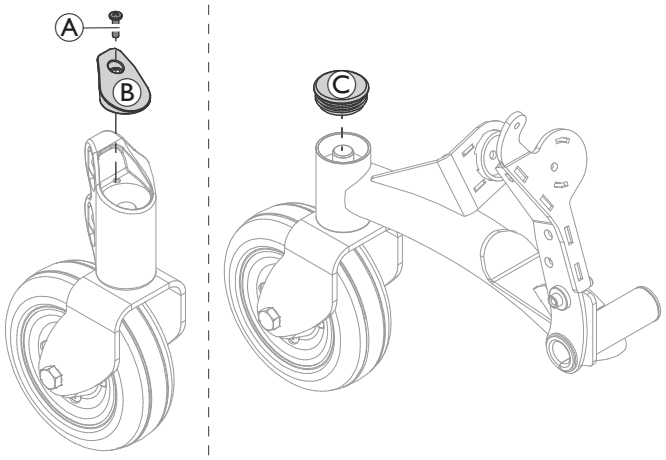
1. Install parts in reverse order.
2. When installing wheel, pay attention to correct direction of rotation.
3. Tighten nut to specific tightening torque, see *9.3 Overview of Wheel Types and Specif Tightening Torques, page 42*.



9.12 Replacing Castor Fork

- Size 2 Phillips screwdriver
- 5/8" (16 mm) socket wrench
- Jacking device

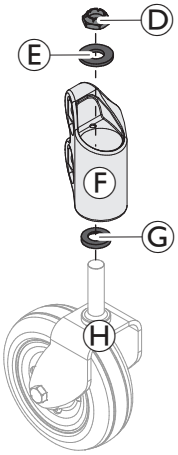
The following procedure is the same for double-sided and single-sided forks.



Removing Castor Fork

1. Jack up power wheelchair.
2. Remove cover cap from steering head.
   a. Front steering head: Remove screw Ⓐ and cover cap Ⓑ.
   b. Rear steering head: Remove cover cap Ⓒ.
3. The following procedure is the same for front and rear castor forks.

   Remove nut Ⓓ and washer Ⓔ.
4. Remove castor fork Ⓗ and spacer Ⓖ downwards from front or rear steering head Ⓕ.

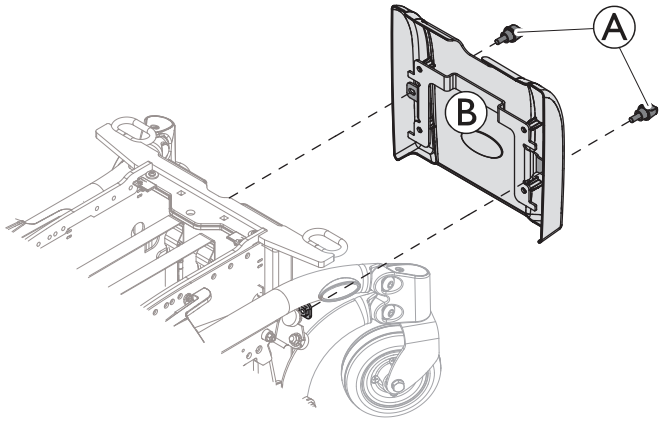


Installing Castor Fork

1. Install parts in reverse order.
2. Fit nut Ⓓ and tighten it loosely so that castor forks can just turn.
3. Rotate castor fork upwards.
4. Let go of castor fork so that they can swing downwards again.
5. Adjust nut D so that the castor forks are not too loose but can still rotate freely. The castor forks should oscillate to the opposite side a maximum of once and then come to rest facing downwards.
6. Place power wheelchair on the ground and check manoeuvrability of castors.
7. If necessary, repeat steps 4 and 5 until castor forks are adjusted correctly.
8. Place cover cap on steering head.
   a. Front steering head: Insert cover cap Ⓑ and screw Ⓐ.
   b. Rear steering head: Insert cover cap Ⓒ.

10 Shrouds

10.1 Removing Front Shroud



Removing Front Shroud

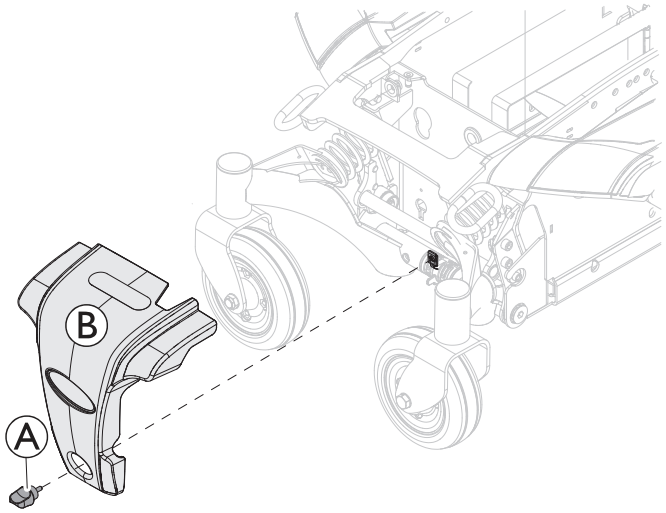
1. Remove legrests.
2. Remove hand screws Ⓐ on front shroud Ⓑ.
3. Pull front shroud upwards and remove it.

Installing Front Shroud

1. Install parts in reverse order.
2. Tighten all screws finger-tight.

10.2 Replacing Rear Shroud (Without Operating Hour Counter)

TDX SP2 Low-Rider is equipped with a water protection flap under the rear shroud. The graphic below does not show it.



Removing Rear Shroud

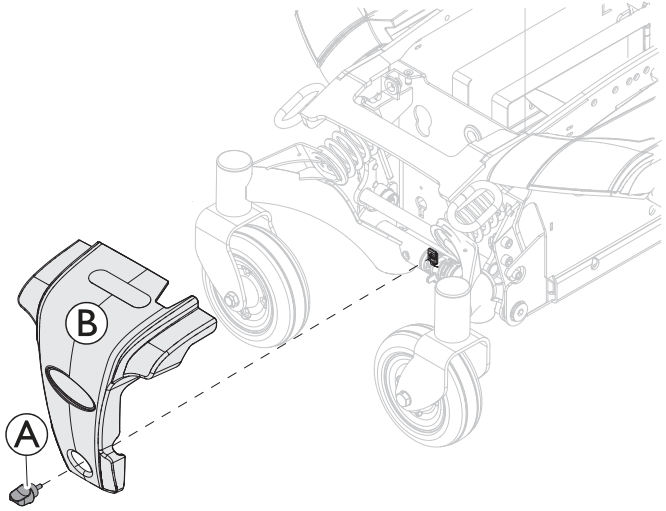
1. Remove hand screw Ⓐ on rear shroud Ⓑ.
2. Remove rear shroud.
3. If installed, remove water protection flap.

Installing Rear Shroud

1. Install parts in reverse order.
2. Tighten all screws finger-tight.

10.3 Replacing Rear Shroud (With Operating Hour Counter)

TDX SP2 Low-Rider is equipped with a water protection flap under the rear shroud. The graphic below does not show it.



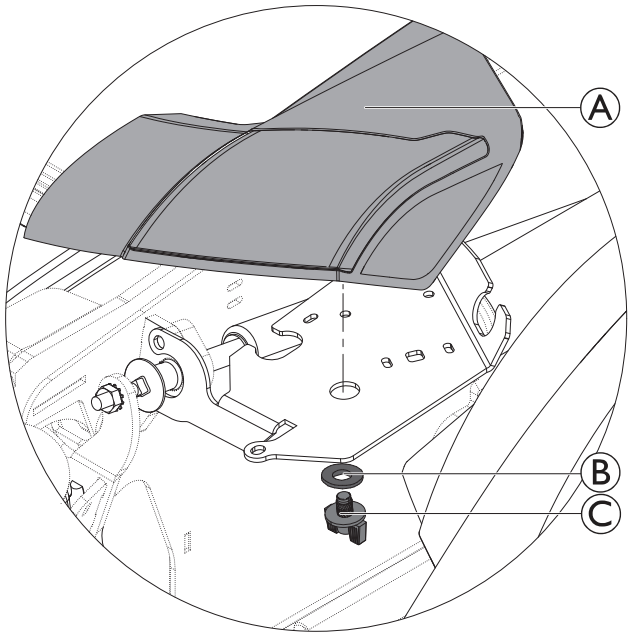
Removing Rear Shroud

1. Remove hand screw Ⓐ on rear shroud Ⓑ.
2. Carefully loosen rear shroud. Pay attention to cable of operating hour counter.
3. Take note of positions of cables and sockets. Mark plugs and sockets or take a photo with digital camera.
4. Remove cable of operating hour counter from drive motor.
5. Remove rear shroud.
6. If installed, remove water protection flap.

Installing Rear Shroud

1. Install parts in reverse order.
2. Tighten all screws finger-tight.

10.4 Replacing Bezel Shroud



Removing Bezel Shroud

1. Remove hand screw Ⓒ and washer Ⓑ of bezel shroud Ⓐ.
2. If LED light is installed, unplug all plugs on rear side and remove bezel shroud and cable ties.

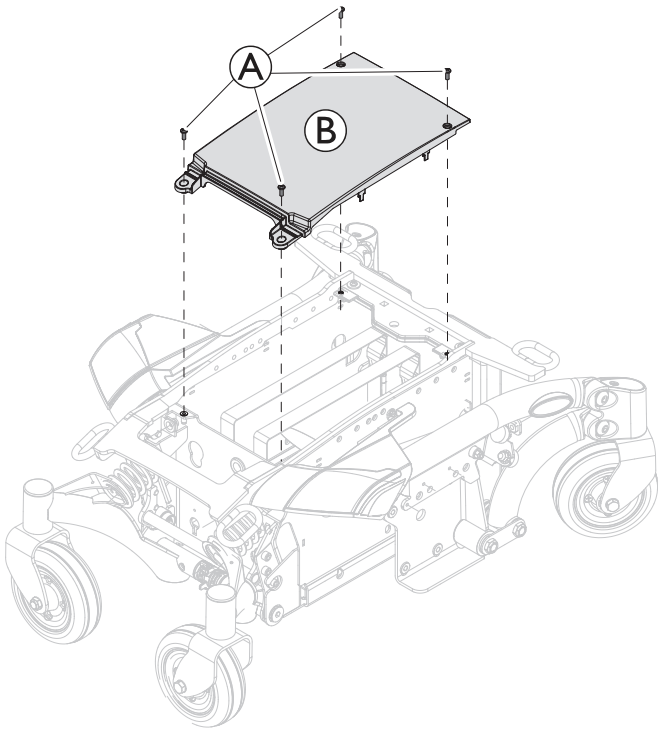
   When installing, make sure to replace cable ties.

Installing Bezel Shroud

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

10.5 Removing Top Shroud

- Size 2 Phillips screwdriver



Removing Top Shroud

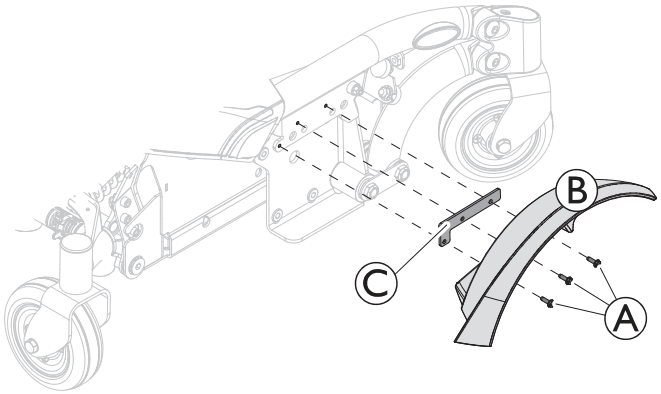
1. Remove seat.
2. Remove screws Ⓐ on the top shroud Ⓑ.
3. Remove top shroud.

Installing Top Shroud

1. Install parts in reverse order.
2. Tighten all screws finger-tight.

10.6 Replacing Fender

- Slotted screwdriver
- Jacking device(2x)
- Torque wrench 0 - 20 Nm (or similar)
- Torque wrench 5 - 25 Nm (or similar)



Removing Fender

1. Remove drive wheel, see *9.5 Replacing Drive Wheel (5–Screw Installation), page 43* or *9.6 Replacing Drive Wheel (1–Bolt Installation), page 44*.
2. Remove screws Ⓐ.
3. Remove spacer Ⓑ and fender Ⓒ from walking beam.

Installing Fender

1. Install parts in reverse order.
2. Tighten screws to 4.5 Nm.

11 Controls

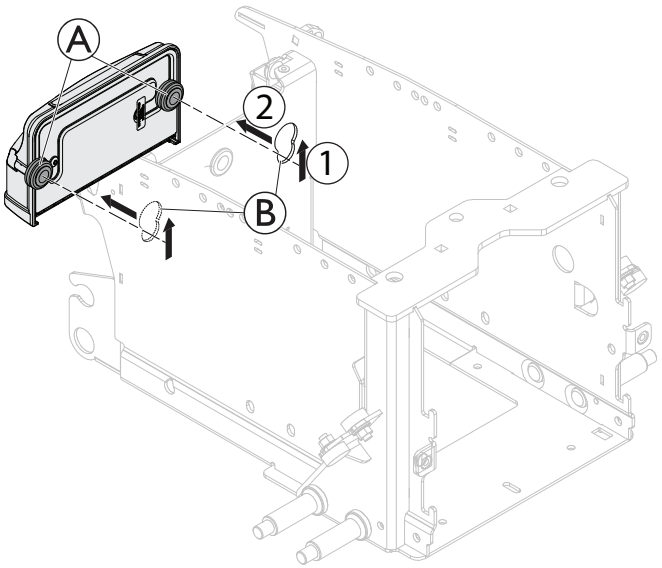
11.1 Replacing Power Module

When replacing power module in connection with remote, take into account final selection of drive program as described in “Drive program selection after component replacement”.

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 providers.
- Invacare can only give warranty for safe power wheelchair driving behavior - especially tipping stability - for unaltered standard drive programs.

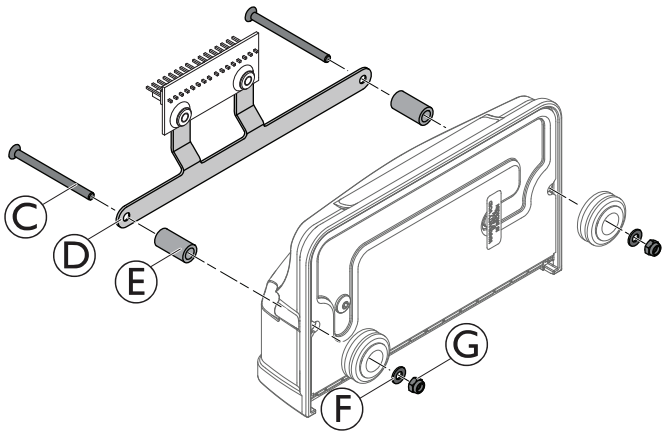
All power modules are delivered with standard drive program. If you have made any customer-specific modifications to drive program, they must be adapted after installation of new power module.

- 7 mm socket wrench
- 3 mm Allen key
- To adapt the drive program: programming software or refer to the system installation manual, available from Invacare.



Removing Power Module

1. Remove rear shroud, see *10.3 Replacing Rear Shroud (With Operating Hour Counter), page 51* or *10.2 Replacing Rear Shroud (Without Operating Hour Counter), page 50*.
2. Carefully note location of cable and connection locations of various plugs. Either mark each plug and socket, or take a photograph with digital camera.
3. Pull all plugs out of power module.
4. Remove power module carefully by lifting rubber stoppers Ⓐ from openings Ⓑ.
5. Replace power module.



6. If a light system is installed, remove screws Ⓒ, spacers Ⓔ, washers Ⓕ and nuts Ⓖ to disassemble mounting hardware Ⓒ from power module.

Installing Power Module

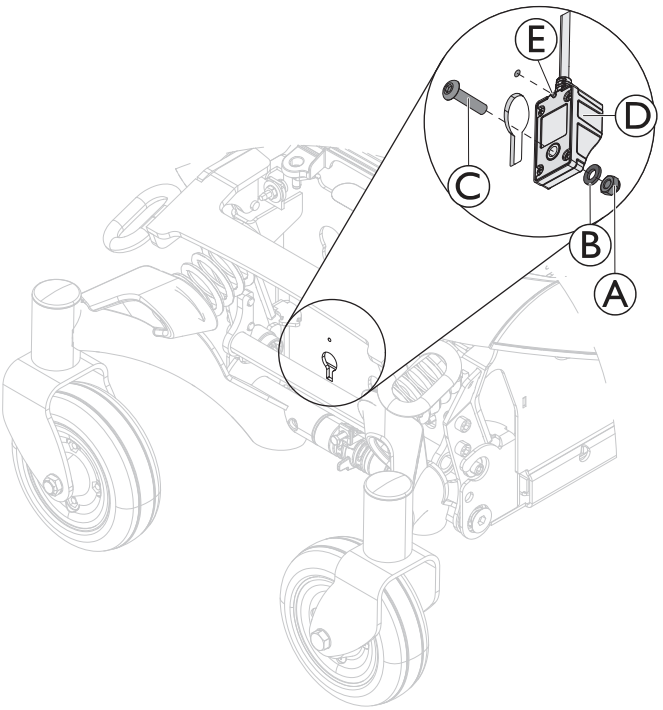
1. Install parts in reverse order.
2. Plug all plugs into their old positions.
3. Select drive program, see corresponding LiNX service manual.
4. If new software version is available, update drive program, see *11.6 Updating Software, page 56*.
5. Adapt drive program using programming software if necessary.
6. Test all functions.

11.2 Replacing G-Trac Sensor

- 10 mm socket wrench

Removing Sensor

1. Turn OFF electronics.
2. Remove rear shroud, see *10.2 Replacing Rear Shroud (Without Operating Hour Counter), page 50* or *10.3 Replacing Rear Shroud (With Operating Hour Counter), page 51*.
3. Take note of positions of all cables and the sockets that they are connected to. Mark the connectors and sockets or take a photograph with a digital camera.
4. Unplug sensor cable from power module.
5. Remove self-locking nut Ⓐ, washer Ⓑ and screw Ⓒ.
6. Replace sensor Ⓓ.



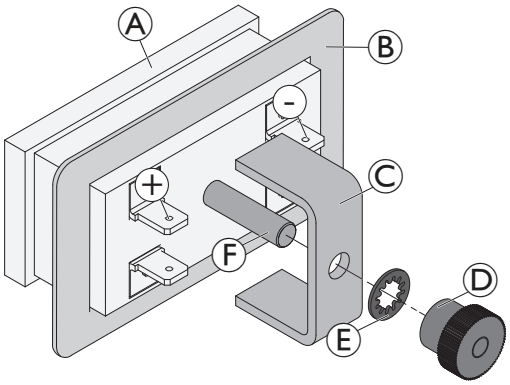
Installing Sensor

CAUTION!
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 upwards.
- Ensure that notch 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 upwards and correctly engaged notch Ⓔ on backside.
3. Plug in sensor cable to power module.
4. Test all functions.

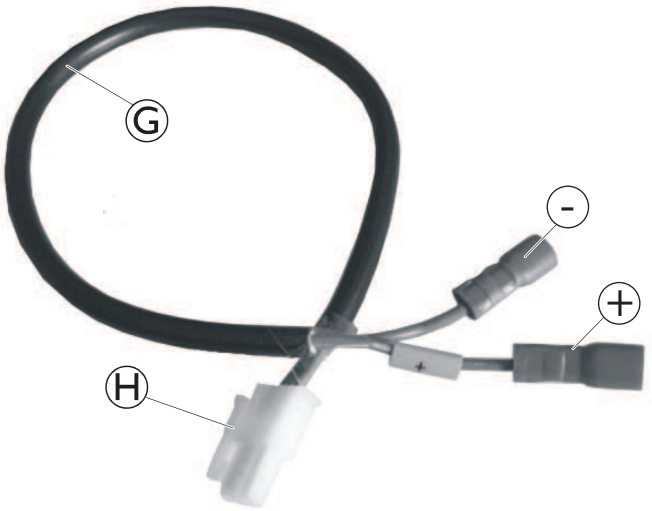
11.3 Replacing Operating Hour Counter/ Connecting Cable

The counter is located on rear shroud.



Removing Counter

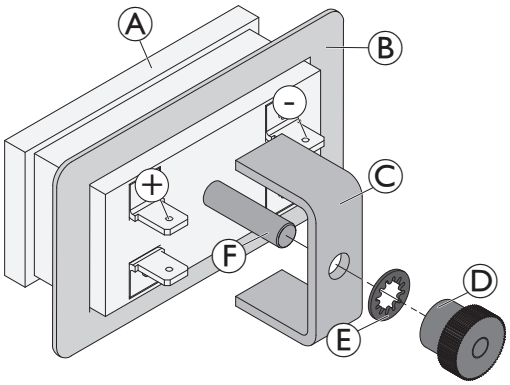
1. Switch controls system of wheelchair off.
2. Remove rear shroud, see *10.3 Replacing Rear Shroud (With Operating Hour Counter), page 51*.
3. Loosen and remove nut Ⓓ including locking washer Ⓔ.
4. Pull mounting bracket Ⓒ off of threaded rod Ⓕ.
5. Remove retaining frame Ⓑ.
6. Pull counter Ⓐ forwards 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 Ⓗ and brown wire to pin Ⓖ on counter. which is marked with a “minus” symbol.
   The brown wire is additionally marked with yellow sleeve with “plus” symbol on it.



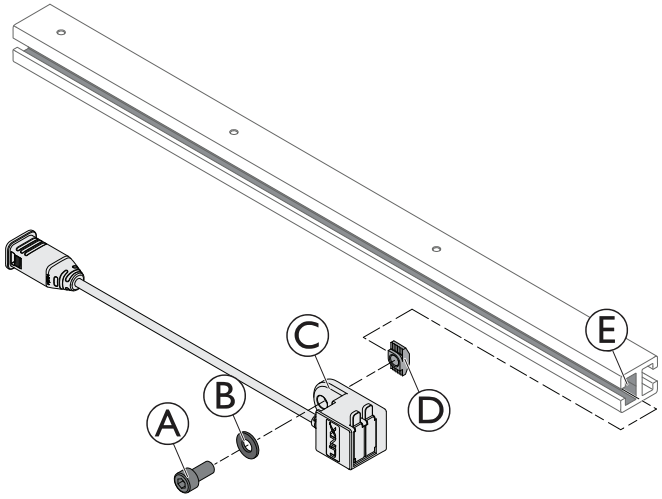
2. Insert cable from outside through cut-out for counter located in rear.
3. Position counter Ⓐ in cut-out.
4. Reposition retaining frame Ⓑ.
5. Place mounting bracket Ⓒ on threaded rod Ⓕ so that mounting bracket presses retaining frame on shroud.
6. Place locking washer Ⓔ and nut Ⓓ on threaded rod.
7.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

11.4 Replacing USB Charger

- 4 mm Allen wrench

When charger overheats, it stops working. Rail under the seat serves to dissipate heat.

- Always mount USB charger in first third of the rail of telescopic seat frame.



Removing USB Charger

1. Remove screw Ⓐand washer Ⓑ.
2. Take off USB charger Ⓒ from rail of telescopic seat frame Ⓔ.
3. Remove T-nut Ⓓ if necessary.
4. Replace USB charger.

Installing USB charger

1. Install parts in reverse order.

11.5 Checking Cables

1. Turn off electronics on remote.
2. Remove rear shroud, see *10.2 Replacing Rear Shroud (Without Operating Hour Counter), page 50* or *10.3 Replacing Rear Shroud (With Operating Hour Counter), page 51*.
3. Remove batteries, see *12.4 Making Batteries Accessible, page 58* or *12.6 Replacing Batteries (50 Ah), page 60*.
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.

11.6 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!

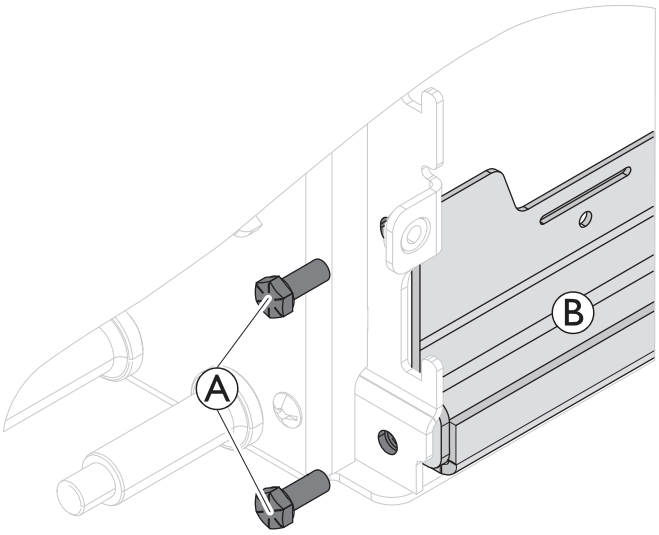
If Contact with Wyes is Made
- You should also consult an eye specialist immediately afterwards!

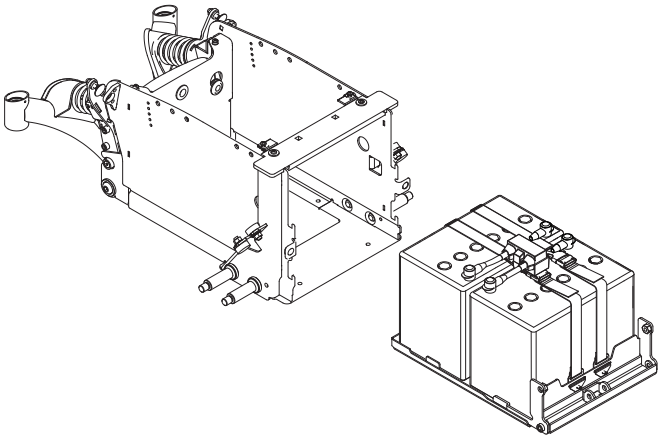
- Place damaged batteries in an acid-resistant receptacle immediately after removing them.
- Only ever transport damaged batteries in an appropriate acid-resistant receptacle.
- Wash all objects that have come into contact with acid with lots of water.

12.4 Making Batteries Accessible

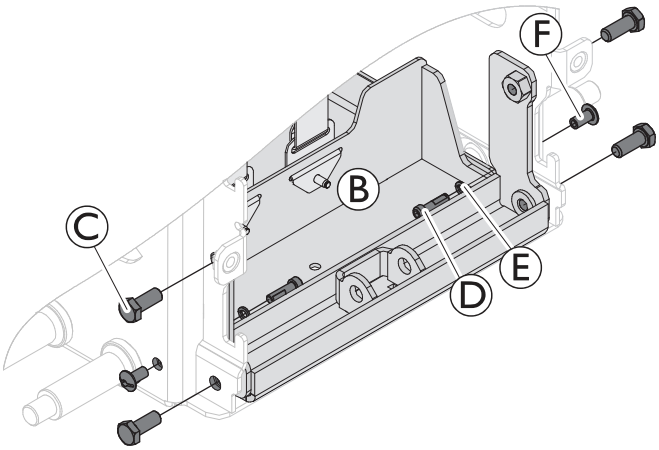
- Phillips screwdriver, size 2
- 5/32" (4 mm) Allen key
- 13 mm wrench
- Jacking device (2x)

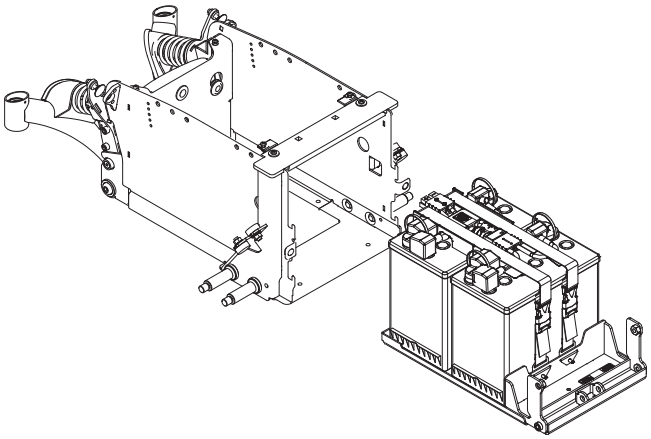
1. Remove side-mounted legrests if fitted. A centre-mounted, manually adjustable legrest should be either put in its top position by turning the spindle Ⓐ or removed. Elevate powered legrests to top position.
2. Remove rear shroud, see *10.3 Replacing Rear Shroud (With Operating Hour Counter), page 51* or *10.2 Replacing Rear Shroud (Without Operating Hour Counter), page 50*.
3. Unplug battery plugs from power module.
4. Remove front shroud, see *10.1 Removing Front Shroud, page 50*.
5. Remove tilt actuator if fitted, see *14.1 Replacing Tilt Actuator (Fixed Pivot Tilt), page 68*.
6. Do the following procedure for battery type 63 Ah / 70 Ah:
   a. Loosen screws Ⓐ on both sides of battery box. Do not remove them.
   b. Pull out battery tray Ⓑ.
   c. See *12.5 Replacing Batteries (60 Ah / 73 Ah), page 59*





7. Do the following procedure for battery type 50 Ah:
   a. Loosen screws Ⓒ on both sides of battery box. Do not remove them.
   b. Remove screws Ⓓ, washers Ⓔ and rivnuts Ⓕ on both sides.
   c. Pull out battery tray Ⓑ.
   d. See *12.6 Replacing Batteries (50 Ah), page 60*

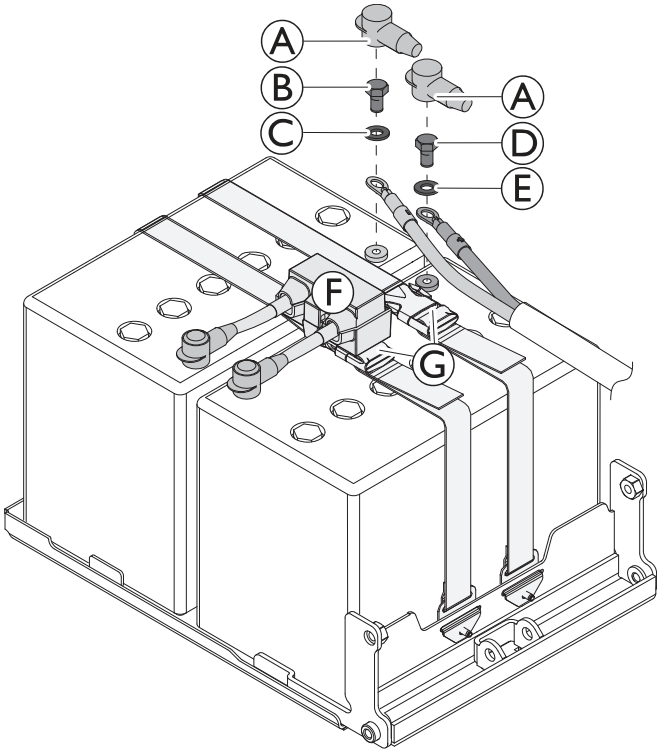




12.5 Replacing Batteries (60 Ah / 73 Ah)

- Phillips screwdriver, size 2
- 5/32" (4 mm) Allen key
- 11 mm wrench
- Jacking device

TDX SP2 Low-Rider does not have terminal caps. Take special care NOT to shorten battery terminals.



Removing Batteries

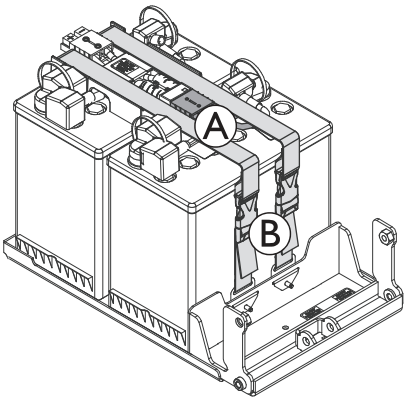
1. Make batteries accessible, see *12.4 Making Batteries Accessible, page 58*.
2. TDX SP2 Low-Rider does not have terminal caps.
   Remove terminal caps Ⓐ.
3. Remove negative terminal screw Ⓑ and washer Ⓒ.
4. Remove positive terminal screw Ⓓ and washer Ⓔ.
5. Remove connection cable with main fuse Ⓕ.
6. Open battery straps Ⓖ.
7. Remove batteries.
8. Replace battery cables or battery tray, if necessary.

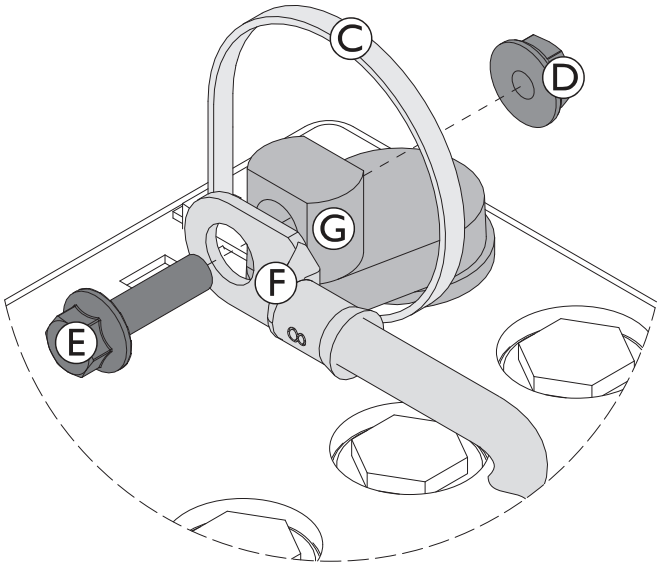
Installing Batteries

1. Install batteries in reverse order. Connect negative terminal first, then positive terminal.
2. Make sure that battery box sockets / plugs have been correctly refitted. A polarity diagram is located in battery box shroud.

12.6 Replacing Batteries (50 Ah)

- 3/8" (10 mm) wrench
- 19 mm wrench
- Torque wrench 5 - 25 Nm (or similar)
- Oblique pliers
- Jacking device





Removing Batteries

1. Make batteries accessible, see *12.4 Making Batteries Accessible, page 58*.
2. Disconnect plug Ⓐ.
3. Open battery straps Ⓑ.
4. Remove batteries from battery tray.
5. Remove cable ties Ⓒ on all terminals.
6. Remove terminal caps.
7. Remove terminal screw of negative terminal.
   a. Loosen and remove nut Ⓓ.
   b. Remove terminal screw Ⓔ together with cable lug Ⓕ from battery terminal Ⓖ.
8. Repeat previous step to remove terminal screw of positive terminal.
9. Remove cable harness.
10. Replace battery cables or battery tray, if necessary

Installing Batteries

1. Install parts in reverse order. Connect negative terminal first, then positive terminal.
2. Make sure that battery box sockets and plugs are correctly installed. A polarity diagram is located in battery box shroud.
3. Check nut Ⓓ on positive terminal for tight fit. If required, tighten to 7 Nm.
4. Carefully reposition battery terminal caps and secure them with a cable tie to prevent them from possibly slipping out of place.

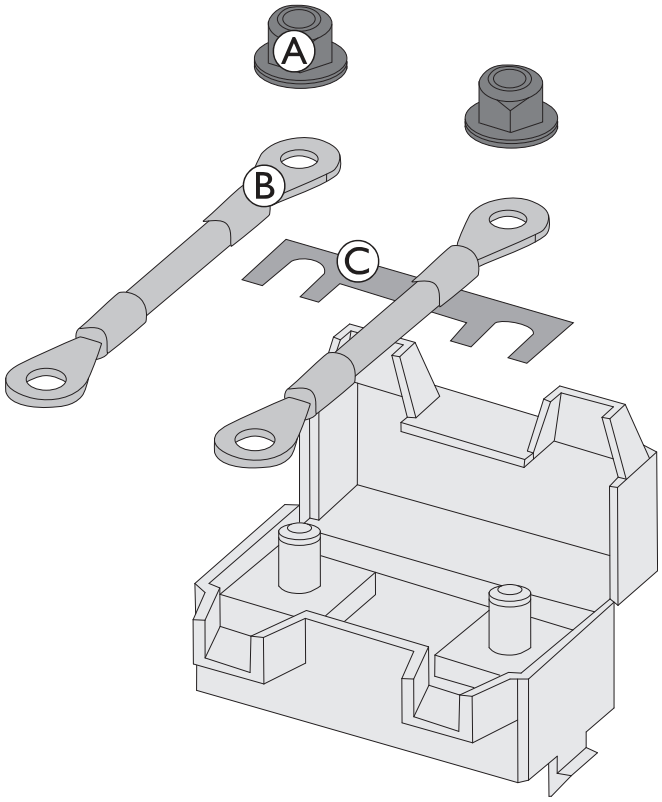
12.7 Checking and Replacing Main Fuse

CAUTION!
Risk of Fire
An electric short can cause extremely high currents which can result in spark formation and fire
— Always use an original strip fuse with the approved amperage.
— If main fuse has blown, first rectify the cause before fitting a new one.

CAUTION!
Risk of Fire
Fitting the incorrect strip fuse causes a risk of fire
— Only fix strip fuses in the sequence shown in the graphic below.
— Tighten nuts with 3.3 or 3.5 Nm.

- 5/8" (16 mm) Allen key
- 4 mm flat screwdriver
- 8 mm wrench
- Torque wrench 0-20 Nm (or similar)

If fuseholder is damaged, you can replace it completely with battery cables.



Removing Main Fuse

1. Make batteries accessible, see *12.4 Making Batteries Accessible, page 58*.
2. Pry open snap hook with flat screwdriver.
   Older fuseholder versions may be locked with a cable tie. If so, cut open cable tie to access fuse strip.
3. If strip fuse has blown, you must first ascertain and rectify the cause of fault. The main fuse may only be replaced once fault has been rectified.
   Remove nuts Ⓐ and cable lugs Ⓑ.
4. Replace strip fuse Ⓒ.

Installing Main Fuse

1. Install parts in reverse order.
2. Test all functions.
   Make sure to press two parts of fuse holder shroud together until it snaps.
   If older fuseholder version is used, lock fuseholder with UL94V0 cable tie.

12.8 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.

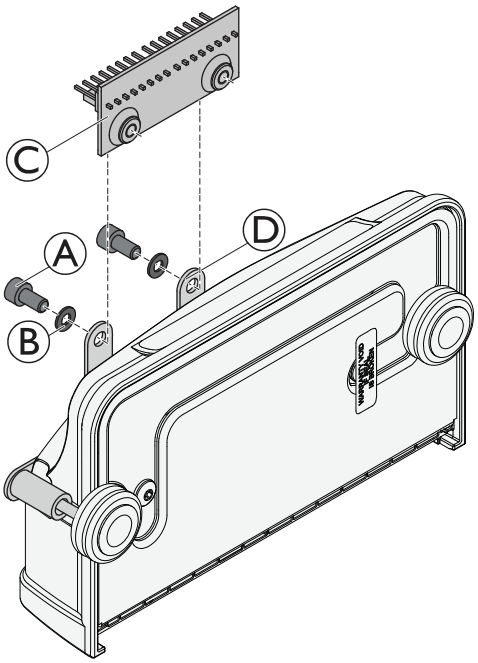
CAUTION!
Fire and Burns Hazard if Battery is not Stored Correctly
- Take great care to ensure that the battery terminals are never short-circuited by metallic parts or liquids.
- Ensure that the battery terminal caps have been installed before storing.

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 Light Board

- 4 mm Allen key



Removing Light Board

1. Remove rear shroud, see *10.3 Replacing Rear Shroud (With Operating Hour Counter), page 51* or *10.2 Replacing Rear Shroud (Without Operating Hour Counter), page 50*.
2. Remove plugs from light board Ⓒ.
3. Remove bolts Ⓐ and washers Ⓑ to disassemble light board Ⓒ from its holder Ⓓ.
4. Replace light board.

Installing Light Board

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

13.2 LED Headlight System before 01_2025

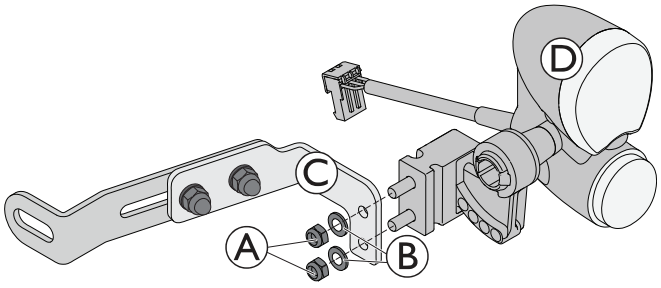
13.2.1 Replacing Headlight

(LED Lighting System before 01_2025)

- 4 mm Allen key
- Oblique pliers
- Cable ties

Removing Headlight

1. Remove rear shroud, see *10.2 Replacing Rear Shroud (Without Operating Hour Counter), page 50* or *10.3 Replacing Rear Shroud (With Operating Hour Counter), page 51*.
2. Carefully note location of cable and the connection locations of the various plugs. Either mark each plug and socket, or take a photograph with a digital camera.
3. Unplug headlight cable from light board.
4. Remove all cable ties and pull cable out of wheelchair.
5. Remove two nuts Ⓐ and washers Ⓑ to disassemble headlight Ⓓ from headlight bracket Ⓒ.
6. Replace headlight.



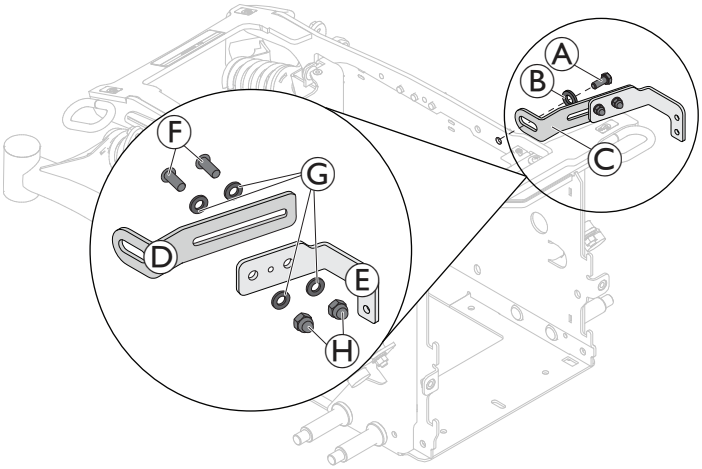
Installing Headlight

1. Install parts in reverse order.
2. Route cables carefully and fix them with cable ties.
3. Test all functions.
4. Tighten all screws finger-tight.
5. Test all functions.
6. Adjust headlight roughly using grid. User can carry out final adjustment according to user manual.

13.2.2 Replacing Headlight Bracket

(LED Lighting System before 01_2025)

- Phillips screwdriver
- 4 mm Allen key
- 6 mm Allen key
- 13 mm socket wrench
- 10 mm socket wrench



Removing Headlight Bracket

1. Remove headlight if necessary, see *13.2.1 Replacing Headlight , page 63*.
2. Remove screw Ⓐ and washer Ⓑ.
3. Remove headlight bracket Ⓒ.
4. To disassemble parts Ⓓ and Ⓔ of headlight bracket:
   a. Remove screws Ⓕ, washers Ⓖ and nuts Ⓗ.

Installing Headlight Bracket

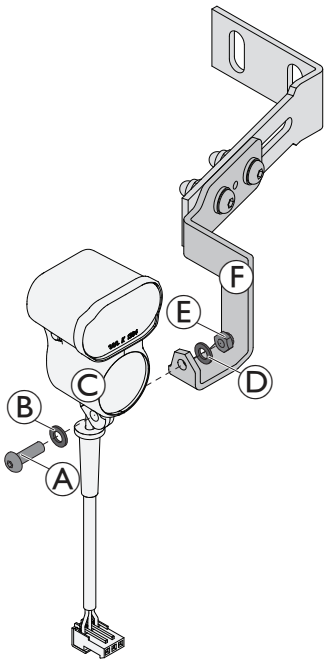
1. Install parts in reverse order.
2. Test all functions.

13.3 LED Headlight System after 01_2025

13.3.1 Replacing Headlight

(LED Lighting System after 01_2025)

- 3 mm Allen key
- 8 mm wrench
- Oblique pliers
- Cable ties



1. Unplug cable and cut cable ties from headlight affected.
2. Pull cable out of guidance.
3. Remove nut Ⓔ and washer Ⓓ.
4. Remove bolt Ⓐ, washer Ⓑ and headlight Ⓒ from headlight bracket Ⓕ.
5. Replace headlight.
6. Install parts in reverse order.
7. Route cables carefully and fix them with cable ties.
8. Tighten nut finger-tight.
9. Test all functions.
10. Adjust headlight roughly using grid. User can carry out final adjustment according to user manual.

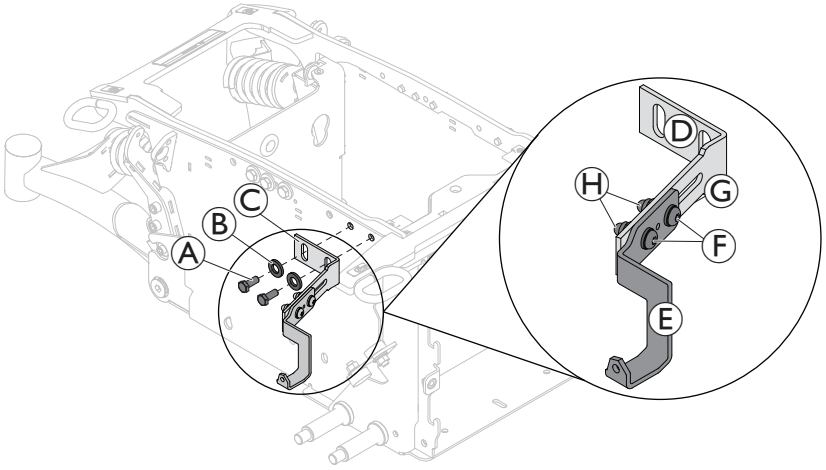
13.3.2 Replacing Headlight Bracket

(LED Lighting System after 01_2025)

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

Removing Bracket

1. Remove headlight if necessary, see *13.3.1 Replacing Headlight , page 65*.
2. Remove screws Ⓐ and washers Ⓑ.
3. Remove headlight bracket Ⓒ.
4. To disassemble parts Ⓓ and Ⓔ of headlight bracket:
   a. Remove screws Ⓕ, washers Ⓖ and nuts Ⓗ.



Installing Bracket

1. Install parts in reverse order. Tighten screws Ⓐ to 25 Nm.
2. Test all functions.

13.4 LED Rear Light System

13.4.1 Replacing Rear Light / Direction Indicator

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

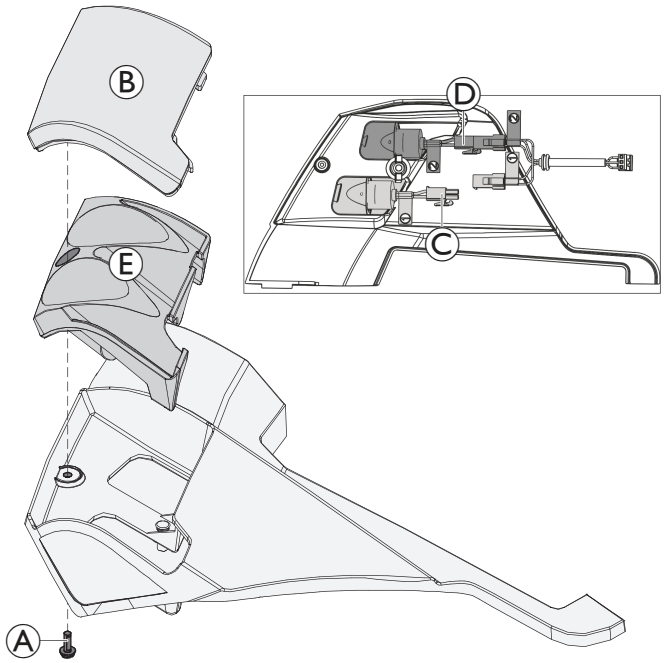
Removing Rear Light / Direction Indicator

1. Remove bezel shroud, see *10.4 Replacing Bezel Shroud, page 51*.
2. Remove screw Ⓐ to remove glass Ⓑ from bezel shroud.
3. Open connector plug Ⓒof direction indicator (1) and/or connector plug Ⓓ of rear light (2) to remove depending component.

   The rear light and direction indicator are clamped in only by the plastic housing Ⓔ.

Installing Rear Light / Direction Indicator

1. Connect direction indicator (1) and rear light (2). The cables are labeled appropriately.
2. Install parts in reverse order.
3. Test all functions.

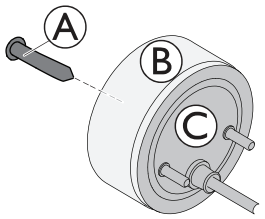


13.5 Conventional Rear Light System

13.5.1 Replacing Rear Bulb

Conventional Lighting System

- Phillips screwdriver size 2



1. Remove screw Ⓐ on rear light Ⓒ.
2. Remove glass Ⓑ.
3. Replace defective bulb.
4. Install glass and tighten screw finger-tight.

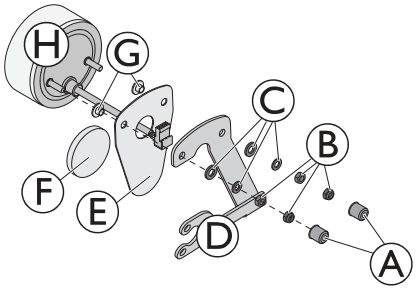
13.5.2 Replacing Rear Light

Conventional Lighting System

- 8 mm Socket wrench

Removing Rear Light

1. Remove rear shroud, see *10.2 Replacing Rear Shroud (Without Operating Hour Counter), page 50* or *10.3 Replacing Rear Shroud (With Operating Hour Counter), page 51*.
2. Carefully note location of cable and connection locations of various plugs on power module . Either mark each plug and socket, or take a photograph with a digital camera.
3. Unplug rear light cable from light board.
4. Remove all cable ties and pull cable out of power wheelchair.
5. Remove two protection caps Ⓐ.
6. Remove nuts Ⓑand washers Ⓒ to disassemble rear light Ⓗ from rear light bracket Ⓓ and reflector bracket Ⓔ.
7. Pull rear light cable through reflector bracket.
8. Replace rear light.
9. Replace reflector Ⓕ, if necessary.



Installing Rear Light

1. Install parts in reverse order. Make sure, that rubber plugs Ⓖ are plugged into reflector bracket Ⓔ.
2. Test all functions.

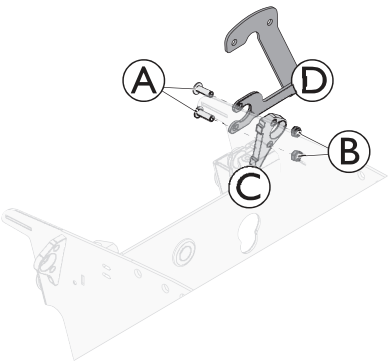
13.5.3 Replacing Rear Light Bracket

Conventional Lighting System

- 8 mm socket wrench
- 3/16" (5 mm) Allen key

Removing Rear Light Bracket

1. Remove complete rear light, see *13.5.2 Replacing Rear Light, page 67*.
2. Remove screws Ⓐ and nuts Ⓑ.
3. Replace rear light bracket Ⓓ from chassis Ⓒ.



Installing Rear Light Bracket

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

14 Seating

- For seat systems —Modulite and ULM, refer to the corresponding manual.
- Older specifications have been described in revision 11 of this service manual.

14.1 Replacing Tilt Actuator (Fixed Pivot Tilt)

- Flat screwdriver
- Jacking device

Removing Actuator

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

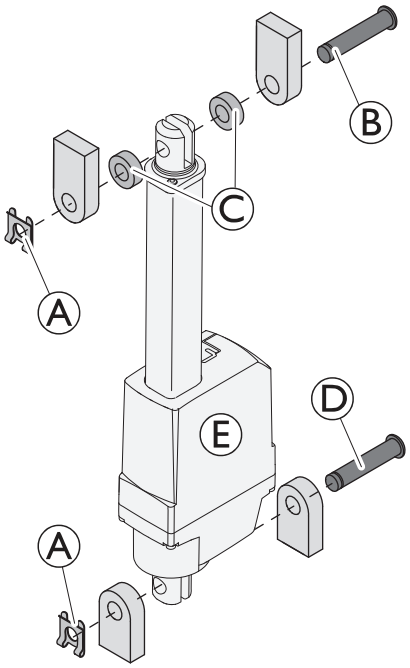
1. Remove front shroud, see *10.1 Removing Front Shroud, page 50*.
2. Unplug actuator cable directly on actuator.
3. Remove SL retainer clips Ⓐ on actuator at top and bottom.

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 wooden block under the backrest, or lower it carefully to the chassis.

4. Remove upper pin Ⓑ and spacers Ⓒ. Hold seat in position.
5. Move seat into service position. Alternatively, lower it carefully to chassis.
6. Remove lower pin Ⓓ and actuator Ⓔ.

Installing Actuator

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



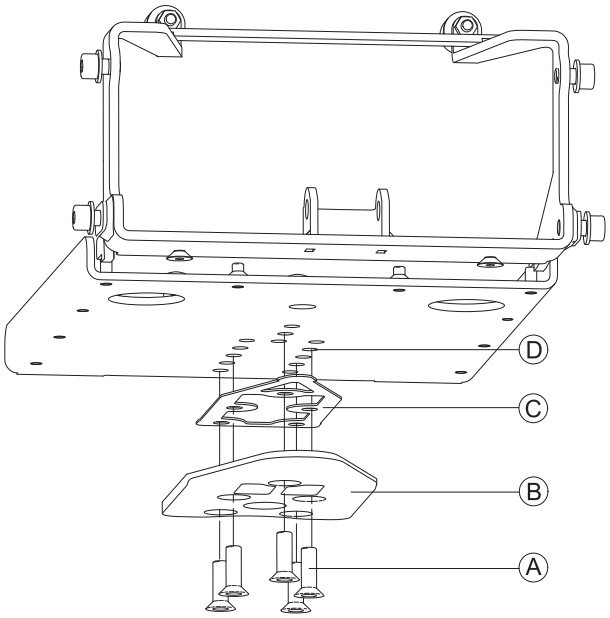
For better view only the actuator, pins, spacers and SL retainer clips are shown.

14.2 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 *12.6 Replacing Batteries (50 Ah), page 60* or *12.5 Replacing Batteries (60 Ah / 73 Ah), 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

1532486-R 2025-04-28

Making Life's Experiences Possible®

Yes, you can.