

Invacare® Storm®4 Series

Storm⁴, Storm⁴ X-plore

en **Power Wheelchair
Service Manual**



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



Yes, you can.®

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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 4).

Personal Safety Equipment

Safety Shoes

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

- Wear standardized safety shoes during all work.

Eye Protection

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

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

Safety Gloves

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

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

General Safety Information and Information About Fitting / Removal



DANGER!

Risk of Death, Serious Injury, or Damage

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

- DO NOT smoke while using this power wheelchair.



WARNING!

Risk of Serious Injury or Damage

Storing or using the power wheelchair near open flame or combustible products can result in serious injury or damage.

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



CAUTION!

Risk of Crushing

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

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



CAUTION!

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

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



CAUTION!

Fire and Burn Hazard due to Electrical Short-circuit

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



CAUTION!

Risk of Burns from Hot Surfaces on the Motor

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

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

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

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

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

**CAUTION!****Risk of Injury**

Adaptions to the power wheelchair can influence the performance.

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



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

3 Hygiene

3.1 Handling of Returned Used Products

When reconditioning or repairing returned power wheelchairs:

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

Before Transport (According to Biological Agents Ordinance)

Treat product according to following process steps:

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

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

Disinfection Tools

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

Further Information



For more information contact your Invacare service department.

4 Setup

4.1 General Information on Setup

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

4.2 Adjusting Seating Position

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

1. Adjusting seat height, see *4.3 Adjusting Seat Height, page 9*.
2. Adjusting lower leg length, see *4.4 Adjusting Lower Leg Length, page 11*.
3. Adjusting the seat width and seat depth, see Modulite service manual and Storm⁴ user manual.
4. Adjusting center of gravity of seat, see *4.5 Adjusting Centre of Gravity of Seat, page 12*.
5. Adjusting seat tilt, see *4.6.1 Adjusting Seat Tilt on a Seat with a Manual Tilt Module (till Dec. 2010), page 14* and *4.6.2 Adjusting Seat Tilt on a Seat With Manual Tilt Module, page 14*.
6. Checking that swivel castors can move freely.
7. Repetition of steps 2 to 6, 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.

4.3 Adjusting Seat Height

The seat height is adjusted via seat column.

For an overview of different types of seat columns, see *14.9.1 Column Types Overview*, page 96.

4.3.1 Adjusting Seat Height With Seat Column Installed



CAUTION!

Risk of Crushing

The seat is very heavy. Risk of injury to hands and feet.

- Use proper lifting techniques.



CAUTION!

Risk of Crushing

Risk of injury caused by uncontrolled movement of power wheelchair.

- Switch off power supply (power button).
- Engage drive.



- 4 mm Allen key
- TX40 Torx key
- Oblique pliers
- Cable ties

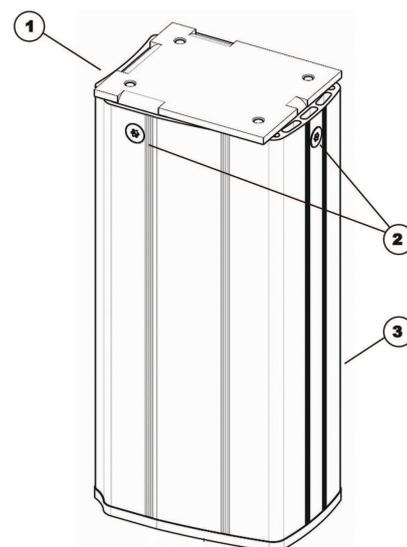
Manual Seat Height Adjustment

1. Remove seat, see *14.7 Replacing Seat Support*, page 94.
2. Loosen and remove four screws (2) on the upper side of column (3).
3. Lift off shroud plate (1).

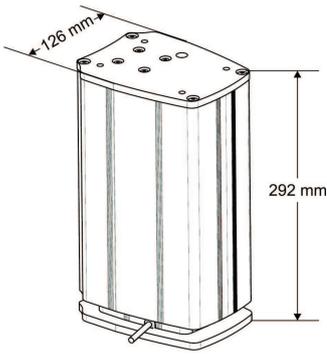


The shroud plate has four flaps pointing downward. There are two tapped holes on each flap for screws (2). By selecting upper or lower holes, seat can be adjusted to two different heights.

4. Attach shroud plate (1).
5. Install screws (2) in such a way that shroud plate is flush fitted or is somewhat elevated depending on desired seat height.
6. Install parts in reverse order.
7. Check all power wheelchair functions.



4.3.2 Adjusting Seat Height on Type A Electrical Lifter Column with Adapter



CAUTION!

Risk of Crushing

The seat is very heavy. Risk of injury to hands and feet.
— Use proper lifting techniques.



CAUTION!

Risk of Crushing

Risk of injury caused by uncontrolled movement of power wheelchair.
— Switch off power supply (power button).
— Engage drive.



- 4 mm Allen key
- 5 mm Allen key
- TX 40 torx wrench
- Oblique pliers
- Cable ties
- Torque wrench 5 – 30 Nm (or similar)
- Medium-strength thread-locking fluid, e.g. Loctite 243

Adjusting Seat Height Manually with an Adapter

1. Remove seat. See 4.6.1 *Adjusting Seat Tilt on a Seat with a Manual Tilt Module (till Dec. 2010)*, page 14 or “Replacing seat support with electric tilt module”).
2. Place adapter (4) in seat support (3) from below.
3. Fix adapter with two screws (1).
4. Replace seat support on lifter pillar (5).

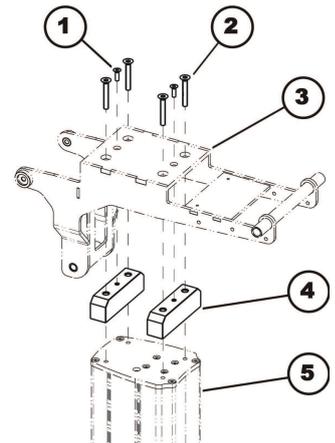


CAUTION!

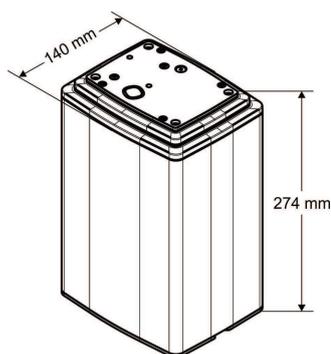
Risk of Damage to Lifter Pillar

Lifter pillar can be damaged if screws are too long. The screws used may protrude by a maximum of 8.5 mm from the adapters.
— Only use screws supplied.
— Check screw length precisely if you do use other screws.

5. Apply medium-strength screw blocker system to four screws (2).
6. Insert four screws (2) and tighten them to a torque of 25 Nm.
7. Install parts in reverse order.
8. Test all functions.



4.3.3 Adjusting Seat Height on Type B Powered Lifter Column with Adapter


CAUTION!
Risk of Crushing

The seat is very heavy. Risk of injury to hands and feet.

- Use proper lifting techniques.


CAUTION!
Risk of Crushing

Risk of injury caused by uncontrolled movement of power wheelchair.

- Turn off power supply (power button).
- Engage drive.



- 4 mm Allen key
- 5 mm Allen key
- TX40 torx wrench
- Oblique pliers
- cable ties
- Torque wrench 5 – 30 Nm (or similar)
- Medium-strength thread-locking fluid, e.g. Loctite 243

Adjusting Seat Height Manually with Adapter

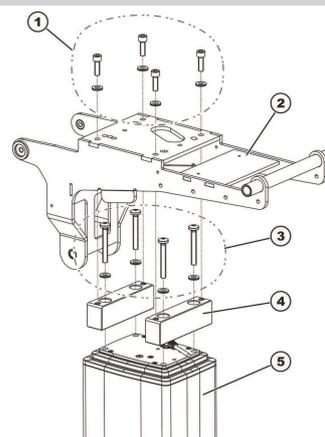
1. Remove seat. See 4.6.1 *Adjusting Seat Tilt on a Seat with a Manual Tilt Module (till Dec. 2010)*, page 14 or “Replacing seat support with electric tilt module”.


CAUTION!
Risk of Damage to Lifter Column

Using incorrect screws or inserting and tightening screws incorrectly will damage lifter column. The lifter column is supplied with self-tapping screws. The screws are used on underside as well as on upper side.

- Use only screws provided.
- If screws were already screwed in: When reinstalling screws, make sure that they are screwed carefully into existing thread.
- Tighten screws to a torque of 15-17 Nm.

2. Position adapter (4) on top of lifter column (5).
3. Secure adapter with self-tapping screws and washers (3).
4. Position seat frame (2) on lifter column and adapter.
5. Apply medium strength thread locking adhesive to four screws (1).
6. Insert four screws and tighten them to torque of 25 Nm.
7. Install parts in reverse order.
8. Install cables. See 14.9.4 *Replacing Lifter Column Type B*, page 98.
9. Check all power wheelchair functions.



4.4 Adjusting Lower Leg Length

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

4.5 Adjusting Centre of Gravity of Seat

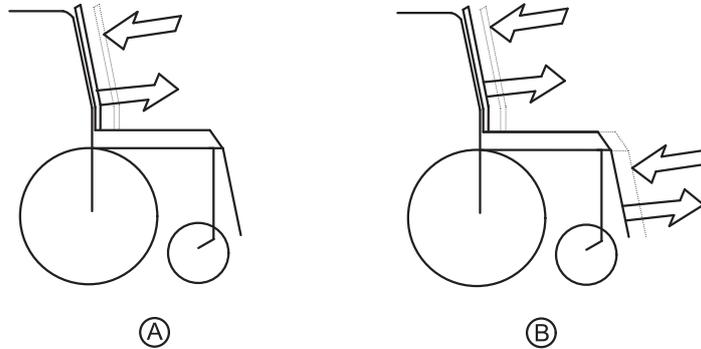
The centre of gravity of the seat can be adjusted by mounting the seat frame farther towards the front or the rear of the seat.



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.

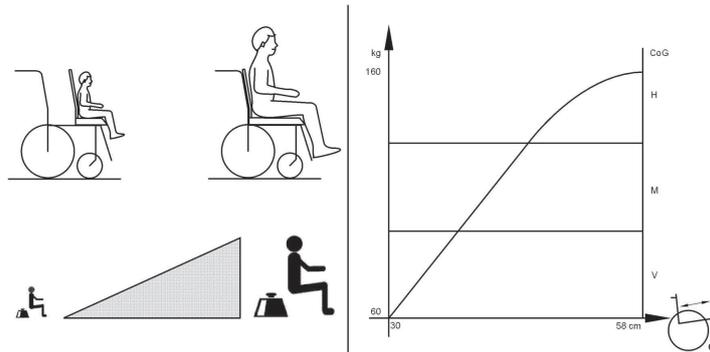


A: Seat depth

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 Easy Adapt seat or Recaro seat, refer to revision 12 of this service manual, available from Invacare.

Modulite Seat

The Modulite seat is available in two versions:

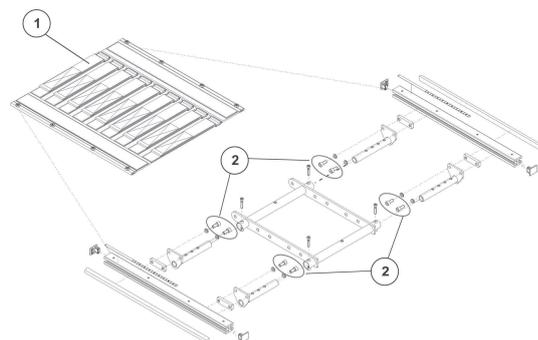
- Adjustment of the center of gravity via the lateral profiles telescopic seat frame (plate and strap), as described in 4.5.1 *Telescopic Seat Frame*, page 13.
- Adjustment of the center of gravity via the oblong holes of the seat adapter one piece seat plate, as described in 4.5.2 *One-Piece Seat Plate*, page 13.

4.5.1 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.



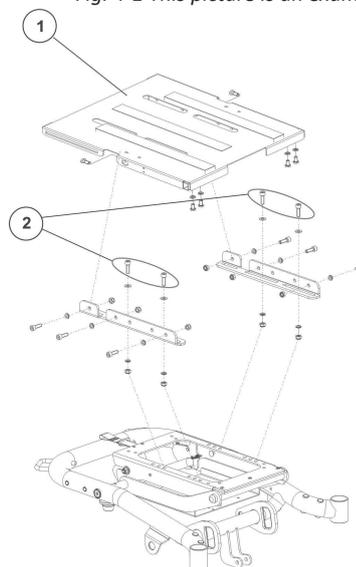
4.5.2 One-Piece Seat Plate



- 6 mm Allen key

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.

Fig. 4-1 This picture is an example.



4.6 Adjusting Seat Tilt

4.6.1 Adjusting Seat Tilt on a Seat with a Manual Tilt Module (till Dec. 2010)



WARNING!

Risk of Crushing

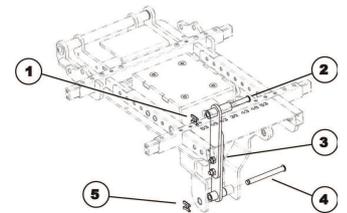
The seat / seat support is very heavy. Injury hazard to hands and feet.

- Use proper lifting techniques.



- 6 mm Allen key

1. Please take into account that the seat is very heavy. Be sure not to crush your fingers or other parts of the body. Use proper lifting techniques.
2. Loosen and remove two Allen screws (3) with a 6 mm Allen key.
3. Tilt seat to the desired gradient.
4. Place two parts of strut on top of each other.
5. Refit Allen screws and tighten them.
6. Check all power wheelchair functions.



4.6.2 Adjusting Seat Tilt on a Seat With Manual Tilt Module



CAUTION!

Risk of Crushing

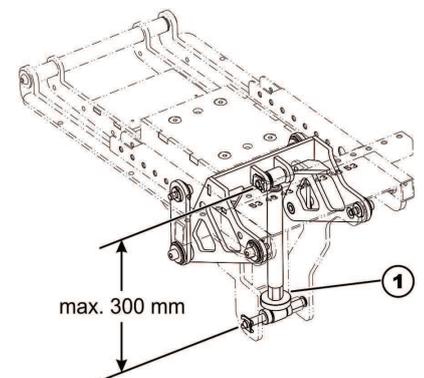
Seat and frame are very heavy and can fall down without warning if seat tilt adjustment assembly is screwed apart too far. Risk of injury to hands and feet.

- Only change adjustments when nobody is seated in chair.
- Only change tilt adjustment to where distance between axles is a maximum of 300 mm.



- 19 mm wrench
- Measuring tape

1. Apply wrench to bolt (1) of tilt adjustment.
2. Turn tilt adjustment till desired angle is attained or distance between bolts is a maximum of 300 mm.



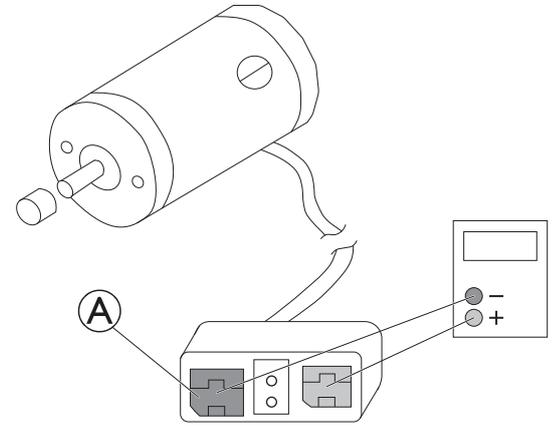
5 Testing

5.1 Testing Motor

 The testing procedure does not apply to True Track® Plus motors. In the case of the True Track® Plus motor, the cable plug is connected directly to the motor.

-  • Digital multimeter with resistance measurement

1. Remove rear shroud, see *10.1 Replacing Rear Shroud, page 62*.
2. Pull the motor plug out of power module.
3. Connect the digital multimeter to the motor plug contacts **A** 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!

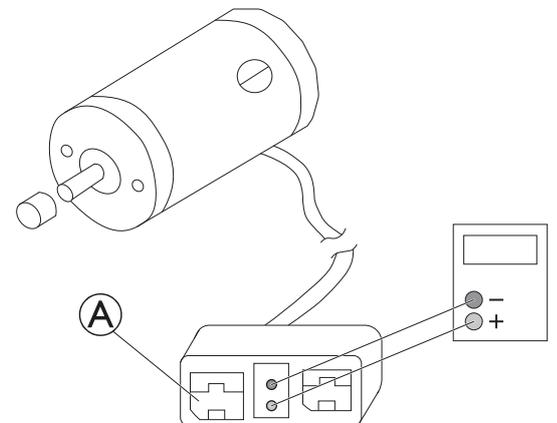
Risk of Damage to Power Module due to Shorts in Motor Brake

- 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 *10.1 Replacing Rear Shroud, page 62*.
2. Pull motor plug out of the power module.
3. Connect the digital multimeter to the adjacent central motor plug contacts **A** 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 lose their ability to store and release power due to increased internal resistance. In this procedure, batteries are tested under load using a digital voltmeter to check battery charge level at the charger connector. The charger connector is located on the remote. When voltage at the output drops 1.0 volts under load (2.0 volts for a pair), replace the batteries.

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

 • Voltmeter



WARNING!

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

1. Switch electronics OFF on remote.
2. Make sure battery is fully charged. An extremely discharged battery will exhibit the same symptoms as a bad battery.
3. Remove footboard / legrests from power wheelchair.
4. Connect voltmeter leads to charger connector **A** on power wheelchair. Most digital voltmeters **B** are not affected by polarity. However, analog meters (meters with swinging needles) can be and should be used carefully.

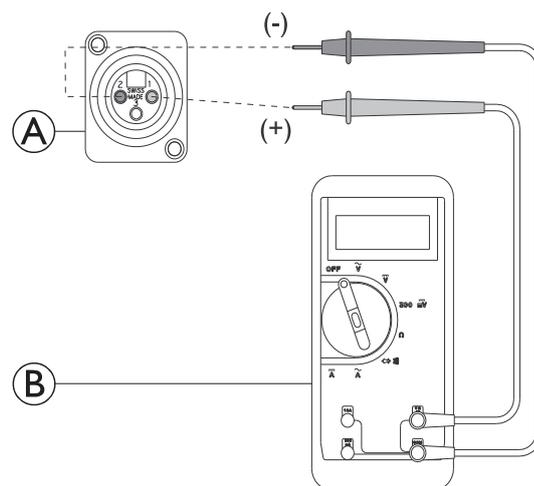
 A good meter reading should be 25.5 VDC to 26.0 VDC with the chair in neutral.

5. Switch electronics ON on remote.
6. Ensure that your feet are clear from casters and wall.
7. Run power wheelchair in neutral for at least 2 minutes.
8. Sit in power wheelchair and place your feet against a door jam, workbench or other stationary object.
9. Carefully give forward command, trying to drive the power wheelchair through the stationary object. The load should draw between 30 amps to 40 amps from the batteries for 0.3 seconds.

 Performing this step puts a heavy load on the batteries as they try to push through the stationary object. If the wheels spin, have two individuals (one on each arm) apply as much downward pressure as possible on the arms of the power wheelchair.

10. Read meter while motors are straining to determine voltage under load.

 If the voltage drops more than 2.0 volts from a pair of fully charged batteries during the 0.3 seconds, they should be replaced regardless of the unloaded voltages.



5.5 Checking Actuator



- Digital multimeter with resistance measurement

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



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

5.6 Checking Battery Charge Level

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

DON'T

Don't perform any installation or maintenance without first reading this manual.

Don't perform installation or maintenance of batteries in an area that could be damaged by battery spills.

Don't make it a habit to discharge batteries to the lowest level.

Don't use chargers or batteries that are not appropriate for the chair.

Don't put new batteries into service before charging.

Don't tip or tilt batteries.

Don't tap on clamps and terminals with tools.

DO

Read and understand this manual and any service information that accompanies a battery and charger before operating the personal transporter.

Move the personal transporter to a work area before cleaning terminals, or opening battery box.

Recharge as frequently as possible to maintain a high charge level and extend battery life.

Follow recommendations in this manual when selecting a battery or charger.

Fully charge a new battery before using.

Use a carrying strap to remove, move or install a battery.

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.

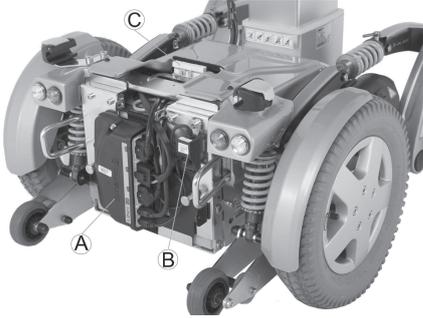
The tightening torques stated in the following list are based on the thread diameter for the nuts and bolts for which no specific values have been determined. All values assume dry and de-greased threads.

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

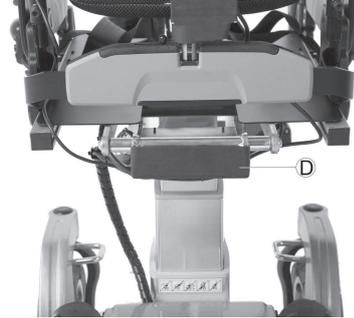
6.3 Overview Power Wheelchair

With SSD Motor

Only LiNX electronics shown in the picture. DX2 electronics mounted the same way.

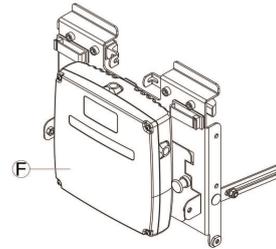
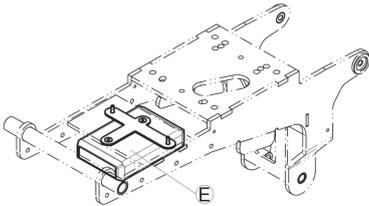


Only LiNX electronics shown in the picture. DX2 electronics mounted the same way.



- Ⓐ Power module It is located at the rear of the battery box.
- Ⓑ G-Trac sensor It is located in the rear on the right, next to the battery box.
- Ⓒ Light board (optional) It is only available if the power wheelchair is fitted with lighting.
- Ⓓ Actuator module (optional) It controls powered legrests and powered recline.

With True Track Plus Motor



- Ⓔ CLAM module (optional) It controls powered adjustment options. The CLAM module is mounted under the seat frame.
- Ⓕ True Track Plus power module (optional) It is at the rear of the battery box.

6.4 Troubleshooting

6.4.1 Operational Faults

Proceed as follows if you have any problems:

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

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

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

6.4.2 Drive Fault Diagnosis

Problem	Other symptoms	Possible cause	Solution	Documentation
Power wheelchair will not start	The remote status display illuminates normally and shows an error code.	Drive motors disengaged	Engage drive motors	See corresponding remote manual
	Remote status display does not illuminate	Batteries defective	Replace batteries	See 12.5 Removing Batteries, page 82
		Completely discharged battery	Pre-charge batteries	See user manual
		Power supply to remote interrupted	Check main fuse	See 11.14 Main Fuse, page 74
			Check cables between modules for loose connections or damage	See 11.15 Cables, page 76
	Remote defective	Replace remote	See corresponding remote manual	
Remote status display flashing	Various causes	Assess error code	See corresponding remote manual	
Power wheelchair judders in drive mode	None	Batteries defective (unstable voltage)	Replace batteries	See 12.5 Removing Batteries, page 82
		Drive motor(s) defective	Replace motor(s)	See 7.2.1 Replacing Motor-Gearbox Unit, page 35, 7.3.1 Replacing Motor-Gearbox Unit, page 43 or 7.2.4 Replacing Motor-Gearbox Unit (Storm4 X-plore), page 38
			Replace carbon brushes	See 7.2.5 Replacing Carbon Brushes, page 40 or 7.3.2 Checking and / or Replacing Carbon Brushes, page 45
Power wheelchair pulls to left or right	None	Drive motors running asymmetrically	Change programming to synchronise motors	See 11.13 Updating Software, page 74
	Tyre visibly dented	Not enough air in tyre	Check air pressure, replace inner tube and/or valve if necessary.	See 11.12 Drive Program Selection after Component Replacement (ACS2 Electronic), page 73
Error message does not clear	None	Bad connections	Check all connecting cables.	See 11.15 Cables, page 76
		Motor brake defective	Measure internal resistance of brakes, replace motor if defective.	

Problem	Other symptoms	Possible cause	Solution	Documentation
Motors stop and start again	None	Voltage decline	Stop driving and allow controls to cool down.	
Motor runs but loses power	None	High motor load allows power module to lower voltage	Stop driving and allow controls to cool down.	
Motors stop and do not start again	None	High motor load allows power module to lower voltage	Leave power wheelchair switched on and let power module operate. Charge batteries overnight with power wheelchair switched on.	
		Fuse burnt out	Check cabling and replace fuse	See 11.15 Cables, page 76 and 11.14 Main Fuse, page 74
		Motor defective	Check carbon brushes and replace if necessary	See 7.2.5 Replacing Carbon Brushes, page 40 or 7.3.2 Checking and / or Replacing Carbon Brushes, page 45
			Measure internal resistance of motor, replace motor if defective.	
Power module defective	Replace power module	See 11.2 Replacing LiNX Power Module Bracket, page 67 or 11.3 Replacing True Trac Plus Power Module, page 68		
Motors lose power while driving	None	Bad connections	Switch power wheelchair off, wait 10 seconds, switch power wheelchair on again. Check all cabling.	See 11.15 Cables, page 76

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 7.2.5 <i>Replacing Carbon Brushes</i> , page 40 or 7.3.2 <i>Checking and / or Replacing Carbon Brushes</i> , page 45
		Bearing defective	Replacing motor	See 7.2.1 <i>Replacing Motor-Gearbox Unit</i> , page 35, 7.3.1 <i>Replacing Motor-Gearbox Unit</i> , page 43 or 7.2.4 <i>Replacing Motor-Gearbox Unit (Storm4 X-plore)</i> , page 38
		Collector defective	Measure internal resistance of motor, replace motor if defective	See 7.2.1 <i>Replacing Motor-Gearbox Unit</i> , page 35, 7.3.1 <i>Replacing Motor-Gearbox Unit</i> , page 43 or 7.2.4 <i>Replacing Motor-Gearbox Unit (Storm4 X-plore)</i> , page 38
Motors do not run	None	Bad connections	Check all cabling	See 11.15 <i>Cables</i> , page 76
		Fuse burnt out	Check cabling and replace fuse	See 11.15 <i>Cables</i> , page 76 and 11.14 <i>Main Fuse</i> , page 74
		Batteries defective	Replace batteries	See 12.5 <i>Removing Batteries</i> , page 82
		Cabling to power module or remote defective	Check cabling	See 11.15 <i>Cables</i> , page 76
	Power module defective	Replace power module	See 11.2 <i>Replacing LiNX Power Module Bracket</i> , page 67 or 11.3 <i>Replacing True Trac Plus Power Module</i> , page 68	
	Corroded contacts	Water, salt or urine has penetrated	Check cabling, replace if necessary	See 11.15 <i>Cables</i> , page 76

Problem	Other symptoms	Possible cause	Solution	Documentation
Motor makes clicking noise	None	Bearing defective	Replacing motor	See 7.2.1 Replacing Motor-Gearbox Unit, page 35, 7.3.1 Replacing Motor-Gearbox Unit, page 43 or 7.2.4 Replacing Motor-Gearbox Unit (Storm4 X-plore), page 38
		Collector defective	Measure internal resistance of motor, replace motor if defective	See 7.2.1 Replacing Motor-Gearbox Unit, page 35, 7.3.1 Replacing Motor-Gearbox Unit, page 43 or 7.2.4 Replacing Motor-Gearbox Unit (Storm4 X-plore), page 38
Scraping noise or motor blocked	None	Bearing defective	Replacing motor	See 7.2.1 Replacing Motor-Gearbox Unit, page 35, 7.3.1 Replacing Motor-Gearbox Unit, page 43 or 7.2.4 Replacing Motor-Gearbox Unit (Storm4 X-plore), page 38
		Gearbox defective	Replace gearbox	See 7.2.1 Replacing Motor-Gearbox Unit, page 35, 7.3.1 Replacing Motor-Gearbox Unit, page 43 or 7.2.4 Replacing Motor-Gearbox Unit (Storm4 X-plore), page 38
Gearbox makes clicking noise	None	Gearbox defective	Replace gearbox	See 7.2.1 Replacing Motor-Gearbox Unit, page 35, 7.3.1 Replacing Motor-Gearbox Unit, page 43 or 7.2.4 Replacing Motor-Gearbox Unit (Storm4 X-plore), page 38
		Drive wheel loose	Tighten drive wheel, secure bolts with thread locking adhesive, if necessary	See 9.4 Replacing Drive Wheel (5-Screw Installation), page 56

Problem	Other symptoms	Possible cause	Solution	Documentation
Gearbox losing oil	None	Sealing ring on drive shaft defective	Replace gearbox if sealing ring defective	See 7.2.3 <i>Replacing or Rotating Motor-Gearbox Unit Sealing Ring (SSD Motor)</i> , page 38
			Check carbon brushes for oil wetting, replace motor if brushes wet	See 7.2.5 <i>Replacing Carbon Brushes</i> , page 40 or 7.3.2 <i>Checking and / or Replacing Carbon Brushes</i> , page 45
Irregular running	None	Drive shaft movable or bent	Check drive shaft, replace gearbox if defective	See 7.2.1 <i>Replacing Motor-Gearbox Unit</i> , page 35, 7.3.1 <i>Replacing Motor-Gearbox Unit</i> , page 43 or 7.2.4 <i>Replacing Motor-Gearbox Unit (Storm4 X-plore)</i> , page 38
Parts lost	None	Parts lost	Re-attach parts once found	
Batteries not being charged	None	Fuse burnt out, cable defective	Check cabling and replace fuse	See 11.15 <i>Cables</i> , page 76 and 11.14 <i>Main Fuse</i> , page 74
		Batteries defective	Replace batteries	See 12.5 <i>Removing Batteries</i> , page 82
	LEDs blinking on charging unit	Charging unit defective	Replace charging unit	See charging unit, user manual
Short charging period	None	One of the batteries could be defective	Replace batteries	See 12.5 <i>Removing Batteries</i> , page 82
Power wheelchair runs too slowly	None	Remote defective	Replace remote	See corresponding remote manual
		Batteries defective	Replace batteries	See 12.5 <i>Removing Batteries</i> , page 82

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 <i>11.14 Main Fuse, page 74</i> .
	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 <i>12.5 Removing Batteries, page 82</i> .

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	<input checked="" type="checkbox"/>
Posture belt	Damage to postural belt	Replace belt if damaged	See Modulite service manual	
	Belt lock function	Replace belt if damaged	See Modulite service manual	
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	Tighten screws		
	Fixing	Replace motor cable if necessary		
	Check cable			
	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		

Component	Check	Remedy	Notes	✓
Wheel suspension and wheels	Check drive wheels for tight fit and side play	Adjust, replace wheel hubs	See 9.4 Replacing Drive Wheel (5-Screw Installation), page 56 and 9.9 Replacing Drive Wheel Hub, page 59	
	Check castors for tight fit, float and side play	Replace wheels, wheel fork or wheel bearings	See 9.7 Replacing Castor Fork, page 58	
	Tyres	Repair or replace if damaged	See 9.3 Replacing Tyres, page 53	
	Check suspension	Repair or replace if damaged	See 8.2 Replacing Suspension Strut, page 47	
	Check straight running	Replace wheels, wheel fork or wheel bearings	See 9.7 Replacing Castor Fork, page 58	
Drive units, clutch mechanism	Motors	Check motors		
	Check functions in drive and push modes	Check carbon brushes, replace if necessary		
	Check clutch mechanism	Replace motor if necessary. Tighten screws/nuts, adjust or replace if necessary	See 7.2.1 Replacing Motor-Gearbox Unit, page 35, 7.3.1 Replacing Motor-Gearbox Unit, page 43 or 7.2.4 Replacing Motor-Gearbox Unit (Storm4 X-plore), page 38	
Brakes	Inspect motor brake	Check motor brake		
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 13.2.1 Replacing Headlight, page 86	
	Check function			
Battery mounting	Check battery support and mounting belts for damage	Replace if necessary		

Component	Check	Remedy	Notes	✓
Batteries	Check batteries for damage	Replace batteries if necessary	See 12.5 Removing Batteries, page 82, 12.3 Handling Damaged Batteries Correctly, page 81 and 12.6 Disposing of Dead or Damaged Batteries Correctly, page 83	
	Check battery voltage	Charge batteries	See user manual	
	Check contacts and terminals	Clean contacts and terminals	See safety information under 12.5 Removing Batteries, page 82 and 12.3 Handling Damaged Batteries Correctly, page 81	
Remote / Power modules	Remote, status display blinking	Evaluate error/blink code	See remote manual and controls manual.	
	Fixings	Tighten fixings, replace if necessary		
	Cables and connecting plugs	Tighten cables and connecting plugs, replace if necessary		
	Joystick function	Replace joystick knob if necessary		
		Replace remote if necessary		
Power supply	Tighten cables and connecting plugs, replace if necessary			
Drive program	Check Chair configuration file	Update software if newer version available.	See 11.13 Updating Software, page 74	
Screws	Check screws for tight fit	Tighten screws if necessary		

7 Drive Components

7.1 Replacing and Calibrating True Track Plus Motor

 We recommend to read this instruction before you begin to work.

 **First check whether power wheelchair is equipped with puncture-proof tyres or pneumatic tyres.** Depending on whether power wheelchair is equipped with puncture-proof tyres or pneumatic tyres, process of removing and installing will be different. You can recognise puncture-proof tyres by the fact that they do not have a valve.

Replacing Motor



WARNING!

Risk of Crushing

Power wheelchair is very heavy. Risk of injury to hands and feet.
 — Use proper lifting techniques.



CAUTION!

Risk of Injuries Caused by Uncontrolled Movement of Power Wheelchair

- Turn off power supply (power button).
- Engage drive.
- Before raising power wheelchair, secure wheels by blocking them with wedges.



CAUTION!

Risk of Explosion

If power wheelchair is fitted with pneumatic tyres, wheel can explode if air is not released from tyre before removing wheel.

- Always release air from wheel before you remove it. Depress small tappet in center of valve.



WARNING!

Loss of Wheel

If bolts which secure wheel are not tightened firmly enough, or if threaded holes in casing are damaged by being tightened too much, wheel can come loose during travel.

- Always position nuts manually in their holes when fitting drive wheels.
- Never use electrical or pneumatic screwdrivers.
- Tighten Allen screws with a torque of 25 Nm.
- Nordlock washers must be fitted exactly as they were before removal.

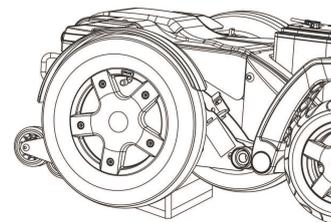
 **Warranty on True Track Plus motors:** If motors become defective within their warranty period, they will either be replaced or repaired on Invacare decision. This warranty does not cover pay for working hours. We also accept no liability for physical injuries or unauthorised repairs. Invacare sole obligation and its exclusive remedy during this is limited to such repair and/or replacement measures.



- Jacking device
- 2.5 mm Allen key
- 3 mm, 4 mm, 6 mm Allen keys
- Small flat screwdriver
- Circlip pliers
- Loctite 243
- 13 mm combination wrenches (2x)
- Hammer
- Chisel
- Torque wrench
- New hexagonal dome headed bolt, M8, 20 mm long, 5 mm key size
- **Additional parts and tools for working on puncture-proof tyres:**
 - Tyre lubrication (soap-based)
 - 3 screws M8 x 20 mm (for preliminary positioning of rim during assembly)

 When disassembling, take care of small parts such as screws and washers. Put all small parts down so that they can be reassembled in right sequence.

1. Jack up power wheelchair by lifting it up on that side that you want to work on.



2. Loosen and remove cable covering caps on motors.
3. Loosen ring terminal ends on motors.



Removing Tyre and Rim on Power Wheelchair with Pneumatic Tyres



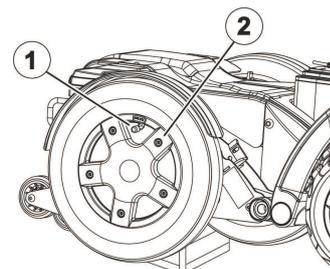
CAUTION!

Risk of Explosion

If power wheelchair is fitted with pneumatic tyres, wheel can explode if air is not released from tyre before removing wheel.

- Always release air from wheel before you remove it. Depress small tappet in center of valve.

1. Loosen and remove valve cap.
2. Depressurise tyre by pressing pin in valve (1).
3. Loosen and remove 5 screws (2).
4. Remove wheel rim half with inner tube.



Removing Tyre and Rim on Power Wheelchair with Puncture-Proof Tyres



WARNING!

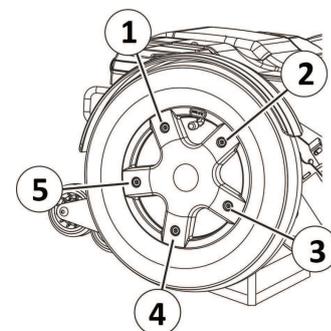
Risk of Damage to Motor if Screws are not Loosened and Removed in Correct Sequence

- Make sure you loosen and remove screws in correct sequence.



Screws 1 to 5 must be loosened and removed in particular sequence in relation to each other. There is no pre-defined numbering for screws. There is, for example, no screw with pre-defined number "1". For this reason, you can start with any screw as "Number 1". "Number 2" is then screw next to it in clockwise direction, "3" is next and so on.

1. Loosen and remove screws 1 and 3.
2. Loosen screws 2, 4 and 5 a single turn each, one after other, going from screw to screw in a clockwise direction, until they have all been completely loosened and removed.
3. Remove rim-half and puncture-proof inlay from wheel.



Removing Motor

1. Remove batteries as described in 12.4 *Making Batteries Accessible, page 82* and 12.5 *Removing Batteries, page 82*.



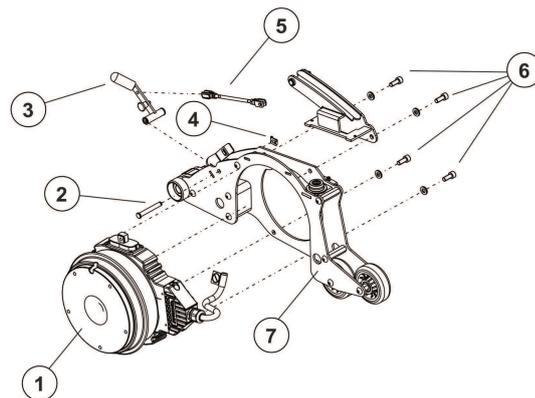
CAUTION!

Risk of Crushing

True Track Plus motor unit is extremely heavy. Risk of injury to hands.

- When disassembling, note that True Track Plus motor is extremely heavy.

2. Loosen and remove four screws (1) of motor.
3. Remove motor swing arm (7).
4. Remove brake lever (3) and threaded rod for brake lever (5).
5. Remove motor.
6. Install drive unit in reverse order.
7. Tighten wheel screws to 25 Nm.



Installing Rim and Tyre on Power Wheelchair with Pneumatic Tyres



NOTICE!

Risk of Damage

Screwing screws in too deep or tightening them severely can cause damage to the inside.

- Pay attention to correct length of screws. Only use screws no longer than 20 mm.
- Only use original Invacare screws and washers.
- Tighten screws with the prescribed tightening torque.

1. Position inner-tube in tyre.
2. Install rim-half.
3. Position screws and tighten them a little.
4. Fill inner-tube with a little air.
5. Tighten screws that hold rim.
6. Check to make sure tyre is fitted snugly to rim.
7. Pump up tyre to prescribed air pressure.
8. Check again to make sure tyre fits rim correctly.
9. Screw on valve cap.

Installing Rim and Tyre on Power Wheelchair with Puncture-Proof Tyres

! **NOTICE!**
Risk of Damage

Screwing screws in too deep or tightening them severely can cause damage to the inside.

- Pay attention to correct length of screws. Only use screws no longer than 20 mm.
- Only use original Invacare screws and washers.
- Tighten screws with the prescribed tightening torque.

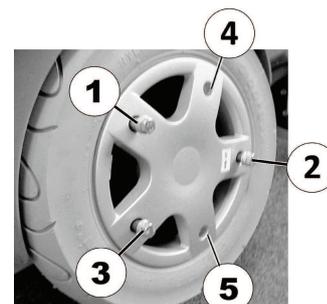
1. To install a tyre with a puncture-proof core, coat inner and outer edges of tyre (1 and 3) and inner surface of puncture-proof inlay (2) with tyre lubrication.



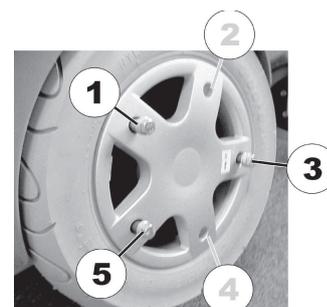
2. Push tyre with puncture-proof inlay onto motor (rotor casing).



3. Position rim-half in tyre. The holes for screws in rim-half and ones in rotor casing need to be aligned with each other. It can be helpful to align the notch in rim-half and one in rotor casing where valve would usually be, using them as a positioning guide.
4. Insert five M8 x 20 mm screws and washers at positions (1), (2), (3), (4) and (5) and tighten them hand-tight gradually by hand according to scheme.



5. Tighten all screws to 25 Nm according to scheme.



Calibrating True Track Plus Motor

The following section explains the calibration process with a handheld programming device.



WARNING!

Risk of Accidents

Risks to workers, surroundings and power wheelchair.

- Do not leave power wheelchair unattended during following procedure.
- Make sure that both drive wheels are raised and can not touch ground.
- Secure area.



- Dynamic DX HHP" handheld programming device

1. Jack up power wheelchair. Drive wheels must not be touching floor or work surface.
2. Connect programming device.

The programming device shows the following	You should enter this
DX HHP V1.20 Select a language... GB D NL S	"GB"
View or edit System? YES ? DIAG TECH	"TECH"
Technician mode Enter Password 000 EXIT D1 D2 D3	Enter code "592" with keys D1 to D3, then select "EXIT".
Technician mode Master JS Module JOYSTICK CALIBRATION EXIT YES NEXT	"NEXT"
** MAIN MENU ** View or edit GB Power Module ? NEXT YES	"YES"
GB Controller Torque XX % EXIT NEXT DOWN UP	"NEXT"
GB Controller Tremor Damping XX % EXIT NEXT DOWN UP	"NEXT"
GB Controller Speed Progression XX % EXIT NEXT DOWN UP	"NEXT"
GB Controller Turn Progression XX % EXIT NEXT DOWN UP	"NEXT"
GB Controller Calibrate Motors? EXIT NEXT YES	"YES"
GB MOTOR CALIBRATION Wheels will move! Drive wheels raised? EXIT YES	"YES" (if drive wheels have been raised)
GB MOTOR CALIBRATION Chair will drive! Are wheels raised? EXIT YES	"YES" (if drive wheels have been raised)
GB MOTOR CALIBRATION -BEGIN- to start. Wheels will drive! EXIT BEGIN	"BEGIN" (if drive wheels have been raised)
GB MOTOR CALIBRATION in progress Please wait.	No entry required. Wait till end of calibration.
GB MOTOR CALIBRATION Successful! EXIT	"EXIT"

3. Separate programming device from power wheelchair. Calibration is complete.

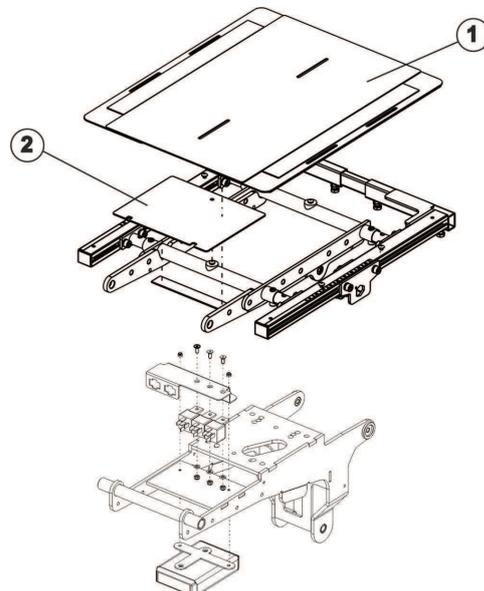
Replacing Relay



- Phillips screwdriver size 2
- 3 mm Allen key
- 4 mm Allen key
- 8 mm socket wrench

Before replacing the relay, make it accessible.

1. If possible, use lifter to move seat to uppermost position.
2. Turn off controls on remote.
3. Remove seat plate or sling seat (1). See Modulite manual *Adjusting seat width (Modulite seat)*.
4. Remove shroud (2).

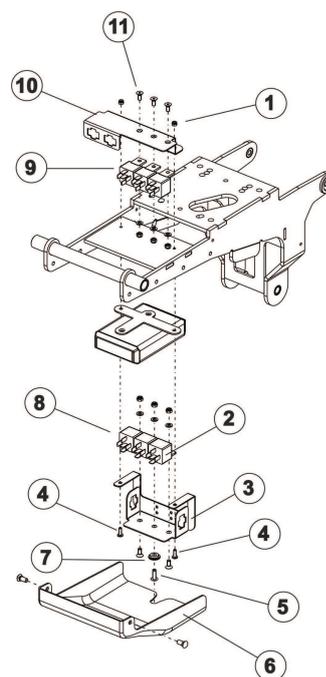


Removing Relay

1. Loosen fixation screw (5).
2. Flip shroud (6) down.
3. Loosen and remove both fixation screws.
4. Remove relay (8)(9) including mountings (3)(10).
5. Loosen five Allen screws (11) and remove screws including washers and nuts form mountings.
6. Replace relay.



When disassembling, take care of small parts such as screws and washers. Put all small parts down so that they can be reassembled in right sequence.

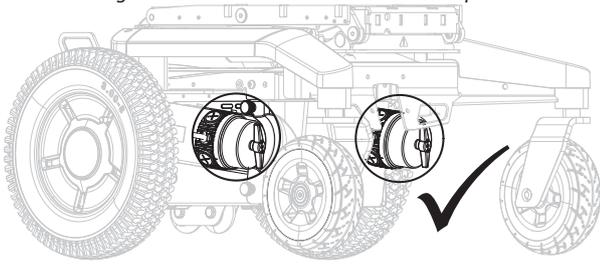


Refitting Relay

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

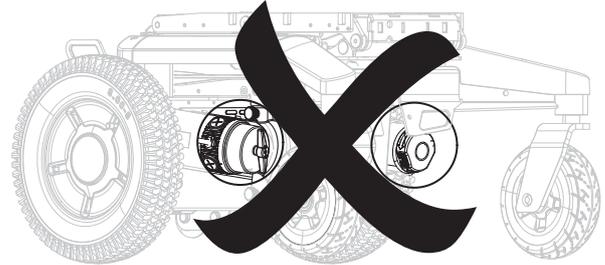
7.2 Drive Components (before 02_2024)

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.

7.2.1 Replacing Motor-Gearbox Unit



CAUTION!

Risk of Crushing

Power wheelchair is very heavy. Risk of injury to hands and feet.

- Use proper lifting techniques.



CAUTION!

Risk of Injury Caused 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.



CAUTION!

Risk of Crushing

The motor-gearbox unit is extremely heavy. Risk of injury to hands.

- Note high weight.

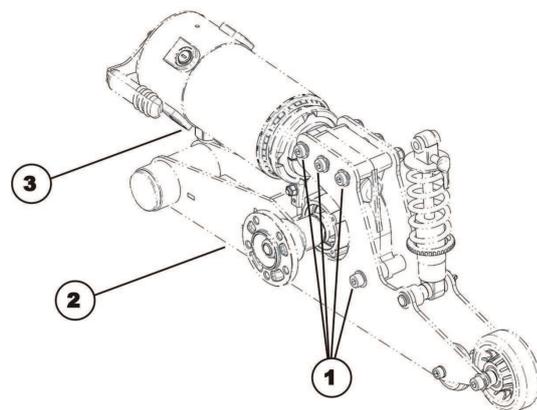


- 6 mm Allen key
- 13 mm wrench
- Jacking device

Removing Unit

1. Remove rear and center shroud, see *10.1 Replacing Rear Shroud, page 62* and *10.2 Replacing Centre Shroud, page 62*.
2. Pull motor plug out of power module.
3. Open the cable clamps and expose motor cable.
4. Remove drive wheel, see *9.4 Replacing Drive Wheel (5-Screw Installation), page 56*.
5. Remove wheel hub, see *9.9 Replacing Drive Wheel Hub, page 59*.
6. Remove fender, see *10.7 Replacing Rear Fender, page 65*.

7. Loosen bolts (1).
8. Remove bolts together with nuts and washers.
9. Pull motor-gearbox unit (3) out of motor swing arm (2) in a forward direction. In doing so, observe high weight of unit.



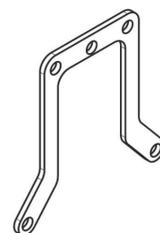
Installing Unit

1. Replace defective parts.
2. Check serial number of gearbox housing.

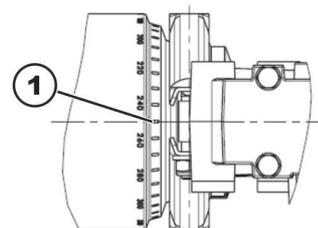


Up to serial number 20110400xx, gearbox housing is 44.5 mm wide: The compensation sheet (see above) must be installed.

As of serial number 20110400xx, gearbox housing is 49.5 mm wide: The compensation sheet is not necessary.



3. Install parts in reverse order.
4. Use scale to align motor to centre axis (1).
 - Left motor: 185°
 - Right motor: 5°
5. Make sure that motor cable cannot be pinched or bent, and that it is not exposed to chafing in any place.
6. Depending on the control system, perform the following:
 - a. For ACS control system: Please set parameter "Load Compensation (mOhm)" in section "Power Module - Motors" to 32
 - b. For LiNX control system: Write matching chair configuration if new motors have been installed. Perform the calibration process in any case, see LiNX Service manual for details.
7. Test all functions.



7.2.2 Replacing Motor-Gearbox Coupling (SSD Motor)



CAUTION!

Risk of Crushing

The motor-gearbox unit is very heavy. Risk of injury to hands.
 — Pay attention to the heavy weight.



- 10 mm socket wrench

Removing Motor-Gearbox Coupling

1. Remove motor-gearbox unit, see 7.2.1 *Replacing Motor-Gearbox Unit*, page 35 or 7.2.4 *Replacing Motor-Gearbox Unit (Storm4 X-plore)*, page 38.
2. Loosen and remove self-securing nut (4).
3. Remove carriage bolt, which secures the sealing ring (2).
4. Carefully bend sealing ring apart and remove it.

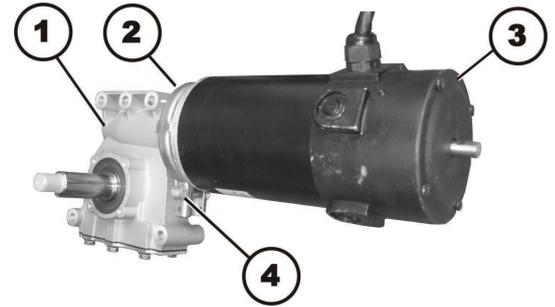


WARNING!

Risk of Damage to the Power Wheelchair if the Coupling is not Serviced Correctly.

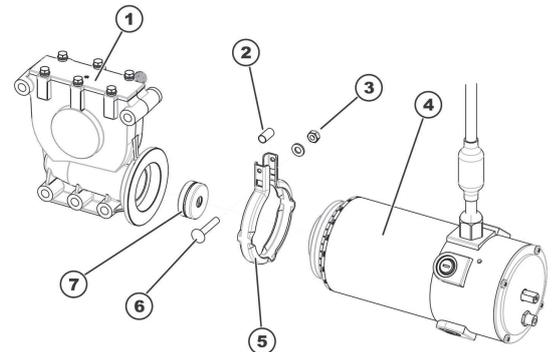
— Be careful not to damage the coupling mechanism during maintenance work.

5. Carefully pull motor (3) and gearbox (1) apart.
6. Remove component parts of the coupling.
7. If necessary replace the coupling.



Installing Motor-Gearbox Coupling

1. Place new clutch (7) on the motor axle. Pay attention to the position of the groove.
2. Position locking ring (5) on motor (4) or gearbox (1).
3. Carefully insert motor into gearbox. Pay attention to the position of the groove in the axle of the 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 the motor orientation must be adjusted during installation.
7. Install motor-gearbox unit, see 7.2.1 *Replacing Motor-Gearbox Unit*, page 35 or 7.2.4 *Replacing Motor-Gearbox Unit (Storm4 X-plore)*, page 38.



7.2.3 Replacing or Rotating Motor-Gearbox Unit Sealing Ring (SSD Motor)



CAUTION!

Risk of Crushing

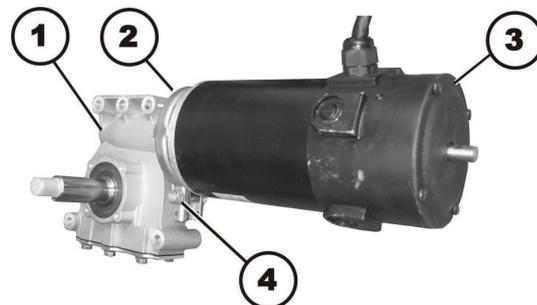
The motor / gearbox unit is very heavy. Risk of injury to hands.
— Pay attention to the heavy weight.



- 10 mm socket wrench

Removing Sealing Ring

1. Remove motor-gearbox unit, see 7.2.1 *Replacing Motor-Gearbox Unit*, page 35 or 7.2.4 *Replacing Motor-Gearbox Unit (Storm⁴ X-plore)*, page 38.
2. Loosen and remove self-securing nuts (4) including washers.
3. Remove carriage bolt, which secures the sealing ring (2).
4. Carefully bend the sealing ring apart and remove it.



Installing Sealing Ring

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

7.2.4 Replacing Motor-Gearbox Unit (Storm⁴ X-plore)



CAUTION!

Risk of Crushing

Power wheelchair is very heavy. Risk of injury to hands and feet.
— Use proper lifting techniques.



CAUTION!

Risk of Injury Caused 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.



CAUTION!

Risk of Crushing

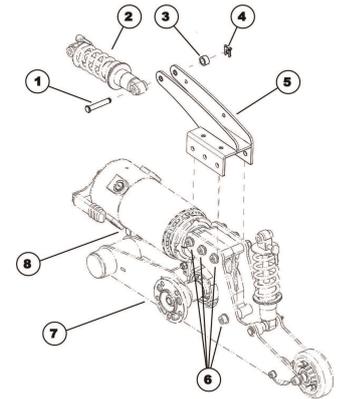
The motor-gearbox unit is extremely heavy. Risk of injury to hands.
— Note high weight.



- 5 mm Allen key
- 6 mm Allen key
- 13 mm wrench
- 19 mm wrench
- Jacking device

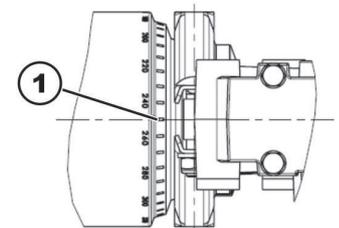
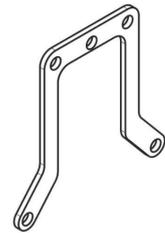
Removing Unit

1. Remove rear and center shroud, see 10.1 Replacing Rear Shroud, page 62 and 10.2 Replacing Centre Shroud, page 62.
2. Pull motor plug out of power module.
3. Open cable clamps and expose motor cable.
4. Remove drive wheel, see 9.4 Replacing Drive Wheel (5–Screw Installation), page 56.
5. Remove wheel hub, see 9.9 Replacing Drive Wheel Hub, page 59.
6. Remove fender, see 10.7 Replacing Rear Fender, page 65.
7. Remove SL retainer clip (4).
8. Remove spacer (3).
9. Carefully remove bolt (1) which connects suspension strut (2) to rear bracket of upper suspension (5).
10. Loosen bolts (6).
11. Remove bolts together with nuts and washers.



Installing Unit

1. Replace defective parts.
2. Check serial number of gearbox housing.
 - Up to serial number 20110400xx, gearbox housing is 44.5 mm wide: The compensation sheet (see above) must be installed.
 - As of serial number 20110400xx, gearbox housing is 49.5 mm wide: The compensation sheet is not necessary.
3. Use scale to align motor to the centre axis (1).
 - Left motor: 185°
 - Right motor: 5°
4. Make sure that motor cable cannot be pinched or bent, and that it is not exposed to chafing in any place.
5. Install parts in reverse order.
6. If LiNX system is used, perform calibration process. See *Suggested programing procedure* in LiNX service manual.
7. Test all functions.



7.2.5 Replacing Carbon Brushes

 This chapter refers to Storm⁴, Storm⁴ X-plore and Storm⁴ Max.

 Always replace all carbon brushes on both motors.

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



CAUTION!

Risk of Crushing

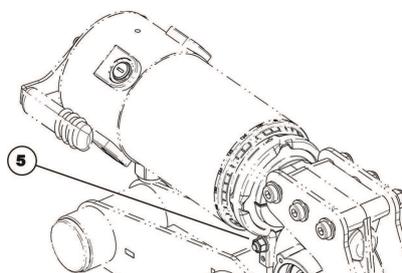
Power wheelchair is very heavy. Risk of injury to hands and feet.

- Use proper lifting techniques.



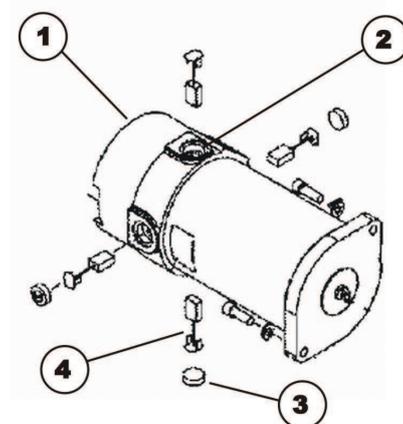
- 5 mm Allen key
- 6 mm Allen key
- 10 mm wrench (SSD motors only)
- 19 mm wrench
- Flat screwdriver (large)
- Jacking device

Removing Carbon Brushes



 SSD motors allow you to access the rear carbon brushes more easily by turning the motor around after loosening nut (5).
Make sure to turn the motor back into its original position after replacing the carbon brushes!

1. Switch OFF power wheelchair.
2. Remove drive wheel, see *9.4 Replacing Drive Wheel (5-Screw Installation)*, page 56
3. Disengage motor.
4. Loosen and remove all plastic caps (3).
5.  To guarantee optimum contact to the collector used carbon brushes need to be refitted exactly in same position from which they were taken.
Make marking on motor and carbon brushes to guarantee correct re-installing.
6. Remove carbon brushes completely from mounting (2).
7. Check carbon brush and spring for level of wear, broken components or discolouration.



Installing Carbon Brushes

1. Depending on condition of brush and spring:
 - either replace brushes in exactly the same position from which they were taken or
 - fit new brushes.
2. Refit plastic caps and tighten firmly.
3. If necessary, turn motor into original position and tighten nut (5) fingertight.
4. Install drive wheel, see *9.4 Replacing Drive Wheel (5–Screw Installation)*, page 56
5. Run in new carbon brushes.

Run In New Carbon Brushes

 The following procedure is necessary to run carbon brushes in after replacement and thus guarantee maximum performance.



CAUTION!

Risk of Accidents

Risk to workers, surroundings and power wheelchair.

- Do not leave power wheelchair unattended during following procedure.
- Secure area.

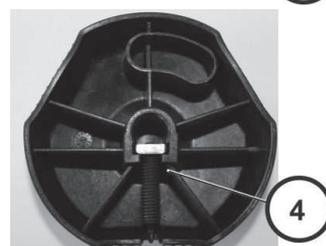
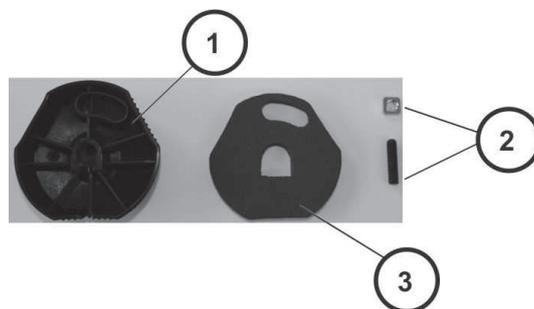
1. Jack up power wheelchair so that drive wheels are off ground and can rotate freely. Use proper lifting techniques.
2. Run motors for an hour in forward direction.
3. Allow motors to cool down for 30 minutes.
4. Run motors for an hour in reverse direction.
5. Lift power wheelchair off jacking device.

7.2.6 Replacing Engaging Turn Knob

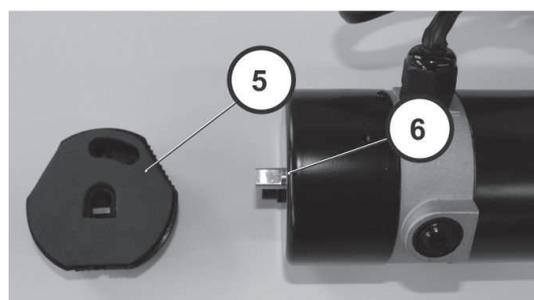
 When replacing the engaging turn knob, you must ensure that the correct fitting position is used during assembly.

-  • 3 mm Allen key

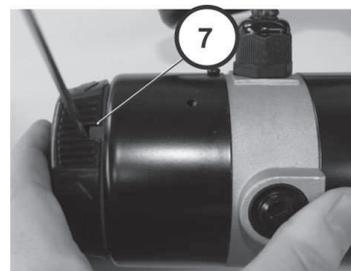
1. Screw shim onto grub screw.
2. Place screw joint in engaging turn knob (rear side (1)).
3. Check that screw joint (4) is positioned precisely in engaging turn knob.
4. Place nonwoven fabric (3) in engaging turn knob (rear side (1)).



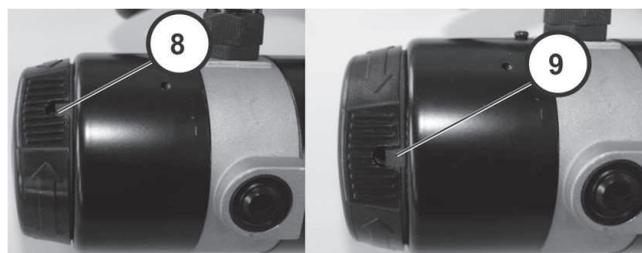
5. When installing engaging turn knob (5) make sure that position (6) is correct.



6. Tighten bolt (7).

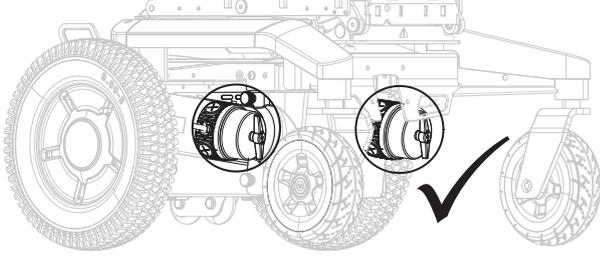


7. Check that engaging turn knob can be turned to "push" position (clockwise) and "drive" position (counterclockwise).



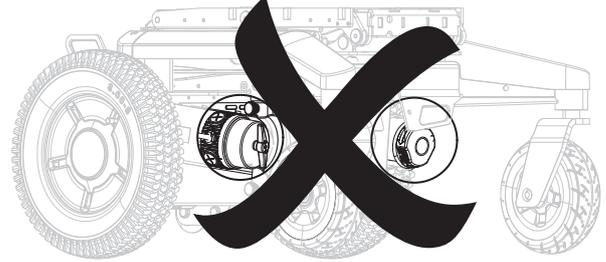
7.3 Drive Components (after 02_2024)

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



Always combine motors of the same type.

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



Do not combine motors of different types.



CAUTION!

Risk of Injury or Damage if Different Motor Types are Combined or if Motors are not Configured Correctly!

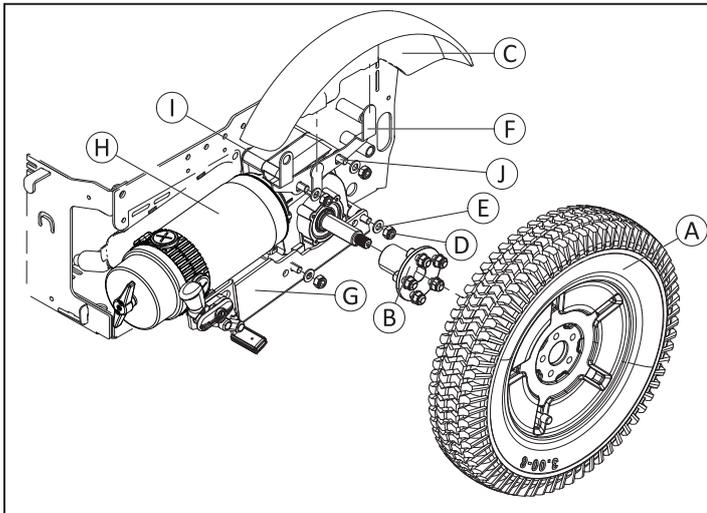
If different motor types are combined, the wheelchair turns on the spot and the user may fall out of the wheelchair. If the motors are not configured correctly, the wheelchair may not react correctly to control inputs. This may cause unintended movement of the wheelchair and the user may fall out of the wheelchair.

- Do not combine different motor types. Always ensure they are a matching pair.
- Conduct adaptive load compensation fast learn after changing the motors and writing new chair configuration.

7.3.1 Replacing Motor-Gearbox Unit



- 13 mm wrench
- 19 mm wrench
- Jacking device



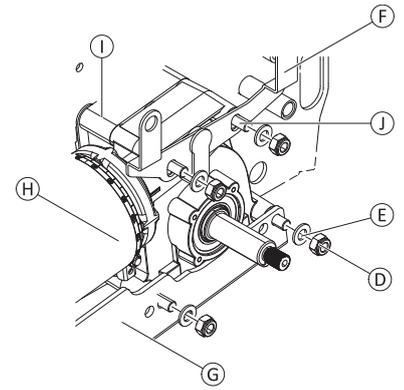
(A)	Wheel
(B)	Wheel hub
(C)	Fender
(D)	Nut
(E)	Washer
(F)	Fender mount
(G)	Wheel lock mount
(H)	Motor-gearbox unit
(I)	Width adapter ¹
(J)	Bolts ²

1 Optional component.

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

Removing Unit

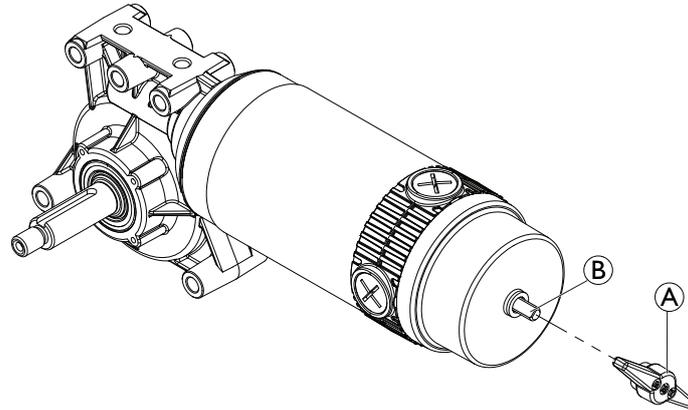
1. Turn off electronics.
2. Remove rear and center shroud, see *10.1 Replacing Rear Shroud, page 62* and *10.2 Replacing Centre Shroud, page 62*.
3. Unplug motor cable at power module.
4. Remove drive wheel, see *9.4 Replacing Drive Wheel (5-Screw Installation), page 56*.
5. Remove wheel hub, see *9.9 Replacing Drive Wheel Hub, page 59*.
6. Remove fender, see *10.7 Replacing Rear Fender, page 65*.
7. Loosen and remove nuts **D** and washers **E**.
8. If fitted, remove mounts for wheel lock **C** and fender **F**.
9. Pull off unit **H** of bolts **I**.
10. If fitted, remove adapter **G**.



Installing Unit

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

Replacing Engaging Lever



1. Pull engaging lever **A** from pin **B**.

7.3.2 Checking and / or Replacing Carbon Brushes

-  If carbon brushes are checked but not replaced, you must know their exact fitting position. Used carbon brushes need to be refitted exactly in the same position from which they were taken to guarantee optimum contact to collector.
-  In case of replacing carbon brushes, always replace all carbon brushes on both motors.



CAUTION!

Risk of Crushing

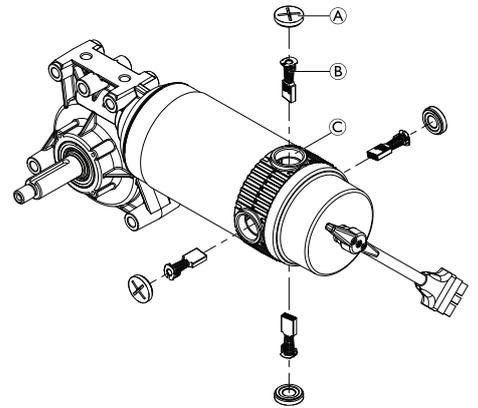
- Power wheelchair is very heavy. Risk of Injury to hands and feet.
- Use proper lifting techniques.



- Screwdriver
- Jacking device

Removing Carbon Brushes

1. Turn off power wheelchair.
2. Remove drive wheel, see *9.4 Replacing Drive Wheel (5-Screw Installation)*, page 56.
 -  To access rear carbon brushes easier, remove the motor, see *7.3.1 Replacing Motor-Gearbox Unit*, page 43.
3. Remove all four plastic caps **A**.
4. Pull carbon brushes **B** a little out of brush holder. Note fixing position and location of carbon brushes.
 -  If carbon brushes are checked but not replaced, you must know their exact fitting position.
5. Make a marking on motor and carbon brushes to guarantee correct installation.
6. Remove carbon brushes completely from mounting **C**.
7. Test carbon brushes and springs of wear, broken components or discoloration.



Installing Carbon Brushes

1. Depending on condition of brushes and springs:
 - either re-insert brushes in exactly same position from which they were taken or
 - fit new brushes.
 -  Always replace all carbon brushes on both motors.
2. Replace plastic caps and tighten them.
3. Install drive wheel, see *9.4 Replacing Drive Wheel (5-Screw Installation)*, page 56.
 -  To guarantee maximum performance after replacement treat carbon brushes according to following procedure.



CAUTION!

Risk of Accidents

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

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

8 Chassis

8.1 Replacing Motor Swing Arm

This chapter refers to Storm⁴ and Storm⁴ X-plore



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

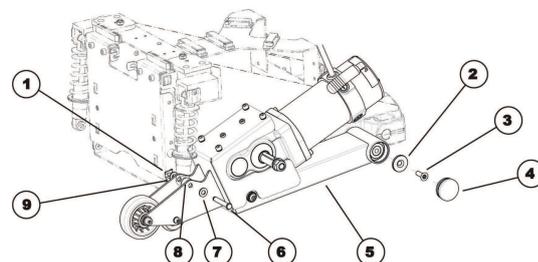
- Turn off power supply (power button).
- Engage drive.
- Before raising power wheelchair, secure wheels by blocking them with wedges.



- 5 mm Allen key
- 6 mm Allen key
- TX40 Torx key
- 13 mm wrench
- 19 mm wrench
- Flat screwdriver
- Jacking device

Removing Motor Swing Arm

1. Remove drive wheel, see 9.4 *Replacing Drive Wheel (5-Screw Installation)*, page 56.
2. Remove motor-gearbox unit, see 7.2.1 *Replacing Motor-Gearbox Unit*, page 35, 7.3.1 *Replacing Motor-Gearbox Unit*, page 43 or 7.2.4 *Replacing Motor-Gearbox Unit (Storm4 X-plore)*, page 38
3. Loosen and remove nut (1).
4. Remove washer (9).
5. Remove bolt (6). Pay attention to washer (7) and spacer (8).
6. Remove plastic cap (4).
7. Loosen and remove screw (3) including washer (2).
8. Remove motor swing arm (5) from axle.



Installing Motor Swing Arm

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

8.2 Replacing Suspension Strut

 Invacare always recommends replacing both suspension struts to make sure that power wheelchair works perfectly.

 Standard Storm⁴: The springs of the wheel suspension can be chosen from three weight classes according to the user's weight. The different weight classes are marked by dots on springs.

1 dot 0 ... 70 kg user weight

2 dots 71 ... 110 kg user weight

3 dots 111 ... 150 kg user weight



CAUTION!

Risk of Crushing

Power wheelchair is very heavy. Risk of injury to hands and feet.

- Use proper lifting techniques.



CAUTION!

Risk of Crushing

Risk of injury caused by uncontrolled movement of power wheelchair.

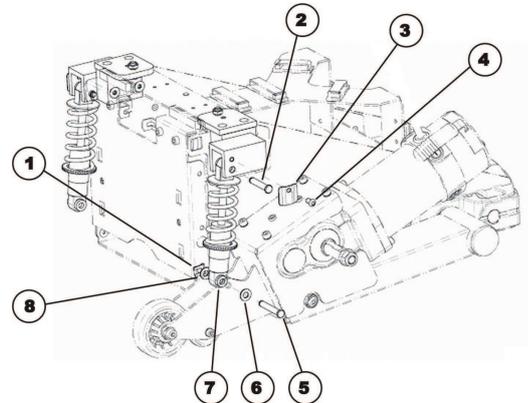
- Switch off power supply (power button).
- Engage drive.
- Before raising power wheelchair, secure wheels by blocking them with wedges.



- 4 mm Allen key
- 6 mm Allen key
- 13 mm socket spanner
- Jacking device

Removing Suspension Strut

1. Remove rear and center shroud, see 10.1 *Replacing Rear Shroud*, page 62 and 10.2 *Replacing Centre Shroud*, page 62.
2. Remove drive wheel, see 9.4 *Replacing Drive Wheel (5–Screw Installation)*, page 56.
3. Loosen and remove nut (1) from bolt (5) on spring.
4. Remove spacer (8).
5. Remove bolt. Pay attention to washer (7) and spacer (6).
6. Loosen and remove Allen screw (4) together with cover plate (3).
7. Remove pin (2). Pay attention to washers and spacers.
8. Remove suspension strut.



Installing Suspension Strut

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

8.3 Replacing Upper Suspension Strut (only Storm⁴ X-plore)

 Invacare always recommends replacing both suspension struts to make sure the power wheelchair works perfectly. The springs of the wheel suspension can be chosen from two weight classes according to user's weight. Different weight classes are labelled using colored dots on the spring.

 1 dot up to 100 kg user weight
4 dots over 100 kg user weight



CAUTION!

Risk of Crushing

Power wheelchair is very heavy. Risk of injury to hands and feet.

- Use proper lifting techniques.



CAUTION!

Risk of Injury Caused by Uncontrolled Movement of Power Wheelchair

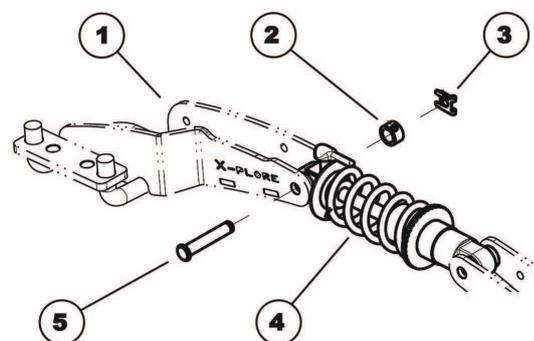
- Switch off power supply (power button).
- Engage drive.
- Before raising power wheelchair, secure wheels by blocking them with wedges.



- Jacking device

Removing Suspension Strut

1. Jack up power wheelchair. Use proper lifting techniques.
2. Remove SL retainer clip (3).
3. Remove spacer (2).
4. Carefully remove bolt (5) which connects suspension strut (4) to suspension bracket (1).
5. Repeat procedure for rear bolt.
6. Remove suspension strut.



Installing Suspension Strut

1. Install parts in reverse order.
2. Always make sure the suspension strut has been located correctly. Spring plates for setting spring preload must be at rear. Lever for setting shock absorption must be at top.
3. Test all functions.

8.4 Replacing Rear Compression Spring (True Track Plus Motor)

 Invacare always recommends replacing both spring elements to make sure the power wheelchair works perfectly.

 The springs of the wheel suspension can be chosen from three weight classes according to user's weight. In the case of True Track Plus motors, the compression springs are combined with elastomer springs which are placed inside compression springs. The following combinations are available:

Storm⁴

less than 80 kg spring 625 N (2 dots) with red elastomer spring
 70 kg to 100 kg spring 625 N (2 dots) with dark blue elastomer spring
 90 to 150 kg spring 715 N (1 dot) with yellow elastomer spring

Storm⁴ X-plore

up to 100 kg spring 625 N (2 dots) with red elastomer spring



CAUTION!

Risk of Crushing

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



CAUTION!

Risk of Crushing

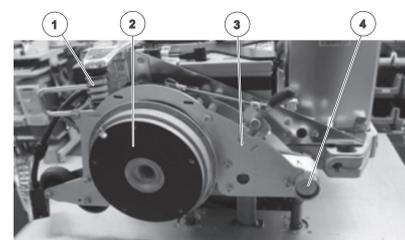
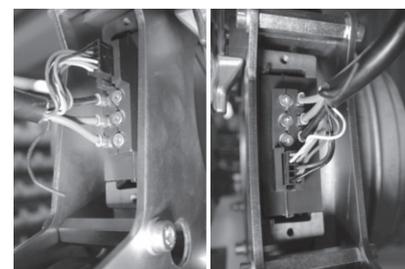
Risk of injuries caused by uncontrolled movement of power wheelchair.
 — Switch off power supply (power button).
 — Engage drive.
 — Before raising power wheelchair, secure wheels by blocking them with wedges.



- 2.5 mm Allen key
- 3 mm Allen key
- TX40 wench
- Jacking device

Removing Spring Elements

1. Remove drive wheel, see *9.4 Replacing Drive Wheel (5-Screw Installation)*, page 56.
2. Remove cable on motor: Loosen screws on shroud. Loosen and remove terminal ends. Remove plug connection.
3. Loosen and remove screw (4). Pull motor swing arm (3) away from chassis until spring element comprising compression spring and elastomer spring (1) can be removed. When doing so, lift motor swing arm so that rubber stopper is not loaded. This prevents damage.
4. Replace spring element (1).



Installing Spring Elements

1. Install parts in reverse order.
2. Grease bearing bolt of motor swing arm and replace motor swing arm (3).
3. Place spring element (1) on top, lift motor swing arm and push them further on until rubber stopper is contacting stop.
4. Retighten motor swing arm.
5. Reconnect motor cable with motor. Note torques.
6. When refitting cable shroud and tension relief, make sure that they are seated correctly. The union is eccentric, narrow side is facing inwards.
7. Install drive wheel, see 9.4 *Replacing Drive Wheel (5-Screw Installation)*, page 56.
8. Test all functions.

8.5 Replacing Trim on Suspension Brackets (Storm⁴ X-plore)



- 4 mm Allen key



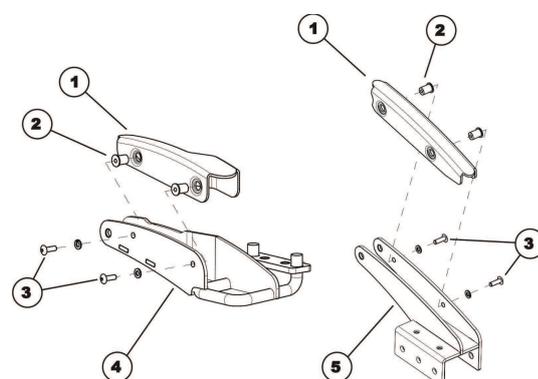
The procedure is identical for the front bracket (4) and the rear bracket of the upper suspension (5).

Removing Trim

1. Loosen two screws (3).
2. Remove screws (3) together with washers.
3. Press trim (1) out of front bracket (4) or rear bracket (5) from below. When doing so, take care with insert nuts (2).

Installing Trim

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



8.6 Replacing Front Bracket of Upper Suspension (Storm⁴ X-plore)



CAUTION!

Risk of Injury Caused by Uncontrolled Movement of Power Wheelchair

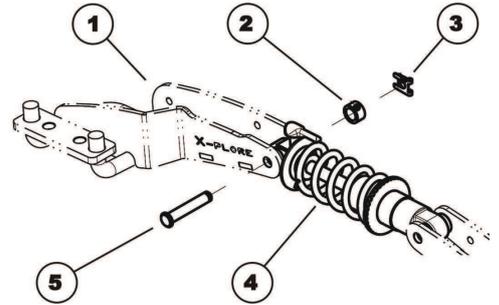
- Switch off power supply (power button).
- Engage drive.
- Before raising power wheelchair, secure wheels by blocking them with wedges.



- Flat screwdriver

Removing Front Suspension Bracket

1. Remove trim if necessary, see 8.5 *Replacing Trim on Suspension Brackets (Storm4 X-plore)*, page 50.
2. Remove SL retainer clip (3).
3. Remove spacer (2).
4. Carefully remove bolt (5) which connects shock absorber (4) to swing arm (1).
5. Remove front swing arm, see 9.11 *Replacing Front Swing Arm (Storm4 X-plore)*, page 61.



Installing Front Suspension Bracket

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

8.7 Replacing Rear Bracket of Upper Suspension (Storm⁴ X-plore)



CAUTION!

Risk of Crushing

The power wheelchair is very heavy. Risk of injury to hands and feet.

- Use proper lifting techniques.



CAUTION!

Risk of Injury Caused by Uncontrolled Movement of Power Wheelchair

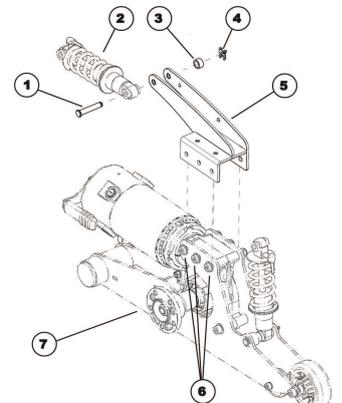
- Switch off power supply (power button).
- Engage drive.
- Before raising power wheelchair, secure wheels by blocking them with wedges.



- 5 mm Allen key
- 6 mm Allen key
- 13 mm wrench
- Flat screwdriver
- Jacking device

Removing Rear Suspension Bracket

1. Remove drive wheel, see 9.4 *Replacing Drive Wheel (5-Screw Installation)*, page 56.
2. Remove fender, see 10.7 *Replacing Rear Fender*, page 65.
3. Remove trim if necessary, see 8.5 *Replacing Trim on Suspension Brackets (Storm4 X-plore)*, page 50.
4. Remove SL retainer clip (4).
5. Remove spacer (3).
6. Carefully remove bolt (1) which connects suspension strut (2) to suspension bracket (5).
7. Loosen three screws (6).
8. Pull suspension bracket (5) out of motor swing arm (7) and replace it.



Installing Rear Suspension Bracket

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

9 Wheels

9.1 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

9.2 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 Wheels
			
	5-Spoke Rim (5-Screw Installation)	5-Spoke Rim for True Track	Single Sided Fork
Type			
Specific Tightening Torques			
Wheel Fixation	60 Nm	25 Nm	100 Nm
Rim Halves	25 Nm	25 Nm	25 Nm

9.3 Replacing Tyres

Repairing Pneumatic and Puncture-Protected Tyres



WARNING!

Risk of Injury

If tyre with one or more damaged rim threads is inflated, rim could burst and cause serious injury.

- Do not inflate tyre if one or more rim threads are damaged.
- Immediately replace rim with damaged threads.



WARNING!

Risk of Explosion

There is considerable pressure in the tyre. Risk of injury. Parts can be thrown out and injure you if you do not secure rim halves.

- Secure rim halves with joiner's clamps.



CAUTION!

Risk of Damage by Gel When Repairing Puncture-Protected Tyres With Red Valve Caps

Valve can become blocked by the puncture protection gel and get unusable.

- During following work you should always hold up valve so that puncture protection gel cannot enter valve.



NOTICE!

Risk of Damage to Rim Threads

Incorrectly tightened screws can cause damage to rim threads.

- Tighten rim screws with prescribed tightening torque.

- | | |
|---|--|
|  <ul style="list-style-type: none"> • 6 mm Allen key • Tightening kit • Jacking device | <ul style="list-style-type: none"> • Repair kit for tyre repair or a new inner tube • Talcum powder • Tyre pump or compressor |
|---|--|

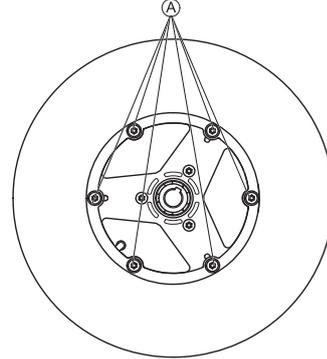
1. Remove drive wheel, see 9.4 *Replacing Drive Wheel (5–Screw Installation)*, page 56.
2. Remove valve cap.
3. Let air escape completely out of tyre by firmly pressing in pin in the centre of valve.



CAUTION!
Risk of Explosion

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

Fig. 9-1 This picture is an example.



4. Remove screws (A) on inside of wheel.
5. Remove rim halves from wheel.
6. Remove inner tube from tyre.

7. Repair inner tube and re-fit it, or replace it with a new one.

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

8. Install tyre in reverse order.
9. Apply rim halves to wheel.
10. Inflate tyre a little.
11. Place screws in wheel rim and tighten screws with prescribed torque. Make sure that inner tube is not clamped between wheel rim halves.
12. Make sure that tyre is contacting wheel rim directly.
13. Inflate tyre to prescribed pressure.
14. Make sure that tyre is still closely contacting wheel rim.
15. Screw valve cap on.
16. Install drive wheel, see 9.4 *Replacing Drive Wheel (5–Screw Installation)*, page 56.

Repairing Solid Tyre



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



NOTICE!

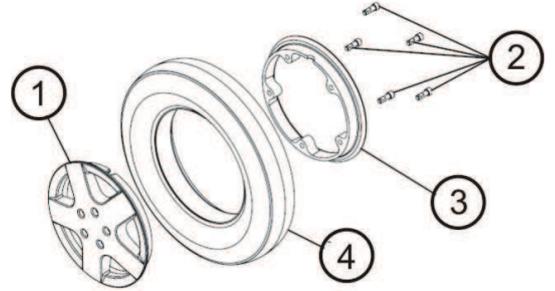
Risk of Damage to Rim Threads

Incorrectly tightened screws can cause damage to rim threads.

- Tighten rim screws with prescribed tightening torque.

1. Remove drive wheel, see *9.4 Replacing Drive Wheel (5-Screw Installation)*, page 56.
2. Secure rim halves against unexpected discharge with three joiner's clamps. When doing so, make sure that you do not scratch rims.

3. Loosen and remove screws (2) on inside of wheel.
4. Loosen joiner's clamps carefully and alternately until you can remove rim halves without risk.
5. Remove inner (3) and outer (1) half of rim from tyre (4).
6. Replace any defective or worn parts.
7. Install tyre in reverse order.



8. When fitting rim halves together, make sure that drill holes and threads for screws are placed exactly on top of each other.
9. Place joiner's clamps in position.
10. Tighten joiner's clamps alternately in small stages until rim halves are precisely aligned.
11. Install and tighten screws.
12. Remove joiner's clamps.
13. Install drive wheel, see *9.4 Replacing Drive Wheel (5-Screw Installation)*, page 56.

9.4 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.



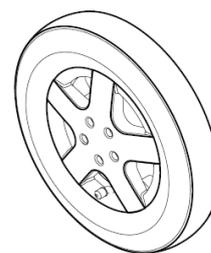
CAUTION!

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. Loosen and remove screws which secure wheel.
4. Remove wheel from hub.
5. Install parts in reverse order.



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.

6. When installing wheel, pay attention to correct direction of rotation.

9.5 Replacing Drive Wheel (with True Track Plus motor)



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.



NOTICE!

Risk of Damage

Only use screws no longer than 20 mm.

- Pay attention to correct length of screws.
- Use original Invacare screws and washers.



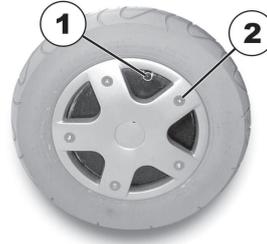
- 6 mm wrench
- Torque wrench
- Jacking device
- Medium-strength thread locking adhesive (Loctite 243 or similar)



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.

Removing Wheel

1. Jack up power wheelchair.
2. Loosen and remove valve cap.
3. Depressurise tyre by pressing in pin in valve (1).
4. Loosen and remove screws (2) which secure wheel.
5. Remove wheel rim halves.
6. Remove inner tube from tyre.
7. Install parts in reverse order.



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.

8. When installing wheel, pay attention to correct direction of rotation.

9.6 Replacing Castor Wheels on Single-Sided Fork



- 24 mm wrench
- Jacking device

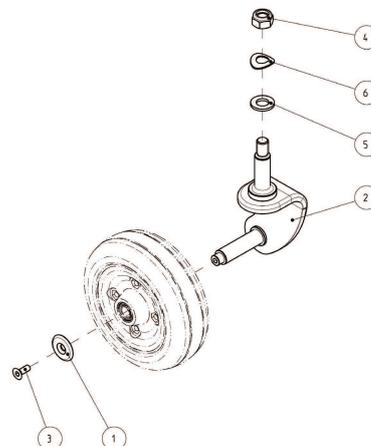


Removing Wheel

1. Jack up power wheelchair.
2. Remove end-caps from bolt and nut (if applicable).
3. Remove nut and washer from bolt.
4. Remove bolt and 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 prescribed torque, see 6.2 *Tightening Torques*, page 18.



9.7 Replacing Castor Fork



CAUTION!

Risk of Crushing to Hands and Feet by Weight of Power Wheelchair

- Pay attention to hand and feet.
- Use proper lifting techniques.



CAUTION!

Risk of Uncontrolled Movement of Power Wheelchair

- Turn off power supply (power button).
- Engage drive.
- Before raising power wheelchair, secure wheels by blocking them with wedges.



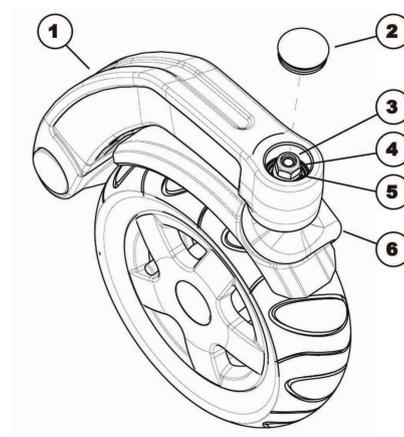
- 19 mm wrench
- Flat screwdriver
- Jacking device

Removing Fork

1. Jack up power wheelchair.
2. Remove plastic cap (2).
3. Loosen and remove nut (3).
4. Pull castor fork (6) from front swing arm (1) in a downward direction. Pay attention to washers (4), spacers (5) and separable ball bearings (not visible in the illustration).

Installing Fork

1. Install parts in reverse order.
2. When installing ball bearings, make sure that wide inner ring faces outward in each case.
3. Adjust castor fork, see 9.8 *Adjusting Castor Fork*, page 59.
4. Test all functions.



9.8 Adjusting Castor Fork



CAUTION!

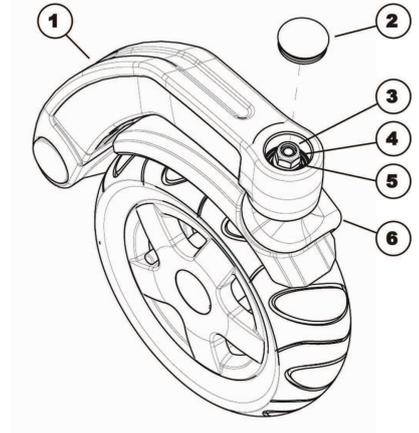
Risk of Crushing

Power wheelchair is very heavy. Risk of injury to hands and feet.
 — Use proper lifting techniques.



- 19 mm socket wrench
- Blade screwdriver

1. Remove cover cap (2).
2. Tilt power wheelchair to rear. Use proper lifting techniques.
3. Rotate castor forks (5) upwards.
4. Let go of castor forks so that they can swing downwards again.
5. Adjust nut (3) so that castor forks are not too loose but can still rotate freely. The castor forks should reach opposite side once (maximum), then come to rest facing downwards.
6. Place power wheelchair on four wheels.
7. Test power wheelchair's manoeuvrability.
8. Repeat adjustment steps if necessary until castors are correctly adjusted.
9. Refit cap (2).



9.9 Replacing Drive Wheel Hub



CAUTION!

Risk of Damage to Power Wheelchair

Collisions can be caused if 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 adjusting washers are removed and not replaced again, collisions can be caused.

— Always replace adjusting washers exactly as they were before you started dismantling.



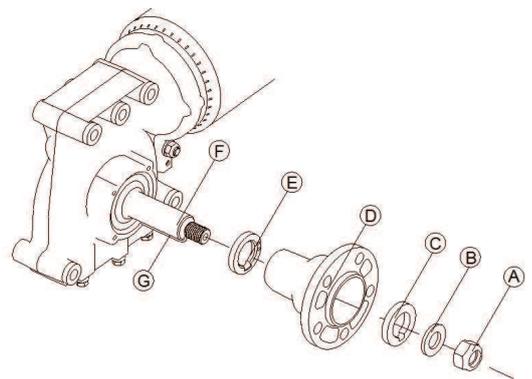
- 19 mm socket wrench

Removing Drive Wheel Hub

1. Loosen and remove nut (A).
2. Remove washer (B).
3. Remove shim ring (C).
4. Remove wheel hub (D) from axle (F).
5. Remove shim ring (E).
6. Remove feather key (G) from axle.

Installing Drive Wheel Hub

1. Install drive wheel hub parts in reverse order.
2. Use thin film of lubricant to make pushing wheel hub onto axle easier.
3. Test all functions.



9.10 Replacing Front Swing Arm



CAUTION!

Risk of Crushing

Power wheelchair is very heavy. Risk of injury to hands and feet.

- Use proper lifting techniques. Risk of injury caused by uncontrolled movement of power wheelchair.
- Switch off power supply (power button).
- Engage drive.
- Before raising power wheelchair, secure wheels by blocking them with wedges.

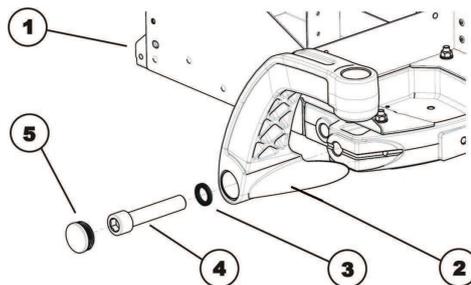


- 5 mm Allen key
- 17 mm Allen key
- Flat screwdriver

- 25 Nm torque wrench
- 200 Nm torque wrench
- Jacking device

Removing Front Swing Arm

1. Jack up power wheelchair.
2. Use screwdriver to remove plastic cap (5).
3. Loosen and remove Allen screw (4) with 17 mm Allen key.
4. Remove two Nord-Lock lock washers (3).
5. Remove and replace front swing arm (2).



Installing Front Swing Arm

1. Install parts in reverse order.
2. Tighten Allen screw (4) to 200 -180 Nm.
3. Test all functions.

9.11 Replacing Front Swing Arm (Storm⁴ X-plore)



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

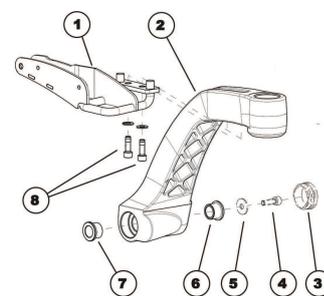
- Turn off power supply (power button).
- Engage drive.
- Before raising power wheelchair, secure wheels by blocking them with wedges.



- 4 mm Allen key
- 5 mm Allen key
- 6 mm Allen key
- 17 mm Allen key
- Blade screwdriver
- 25 Nm torque wrench
- 200 Nm torque wrench
- Jacking device

Removing Front Swing Arm

1. Loosen and remove two screws (8). Take care of washers.
2. Use screwdriver to remove plastic cap (3).
3. Remove front bracket of upper suspension (1), see 8.6 *Replacing Front Bracket of Upper Suspension (Storm4 X-plore)*, page 51.
4. Loosen and remove screw (4).
5. Remove washer (5).
6. Remove sliding bearing (6).
7. Remove and replace front swing arm (2). Take care with sliding bearing (7).



Installing Front Swing Arm

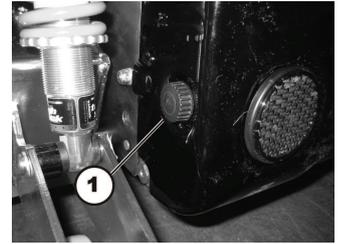
1. Install parts in reverse order.
2. Test all functions.

10 Shrouds

10.1 Replacing Rear Shroud

Removing Rear Shroud

1. Loosen and remove two knurled thumb screws (1) on left and right side of rear shroud.
2. Carefully raise rear shroud.
3. Front part of shroud is held at top by hook-and-loop strip.
4. You must also release this.



Installing Rear Shroud

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

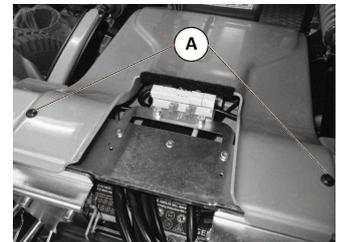
10.2 Replacing Centre Shroud



- 4 mm Allen key

Removing Centre Shroud

1. Remove rear shroud, see *10.1 Replacing Rear Shroud, page 62*.
2. If possible, use lifter to move seat to uppermost position.
3. Loosen two screws (A).
4. Lift rear part of shroud carefully and remove two spacers underneath shroud.
5. Lift off shroud. If power wheelchair does not have lifter, shroud must be bent apart carefully.



Installing Centre Shroud

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

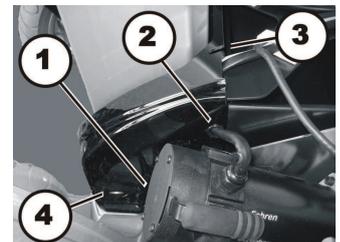
10.3 Replacing Front Shroud



- 4 mm Allen key

Removing Front Shroud

1. Use lifter to move seat to uppermost position. If no lifter is installed, remove seat as described in the user manual.
2. Remove rear and center shroud, see *10.1 Replacing Rear Shroud, page 62* and *10.2 Replacing Centre Shroud, page 62*.
3. Loosen two screws (1) – concealed by motor in picture.
4. Pull motor cable and guide bushes (2) out of lateral recesses.
5. Pull connecting cable to seat out of recess (3).
6. Lift front shroud up so that retaining clips (4) are exposed.
7. Pull shroud off towards front.



Installing Front Shroud

1. Install parts in reverse order.
2. Make sure that retaining clips (4) snap securely into openings of shroud.
3. Tighten all screws finger-tight.

10.4 Replacing Module Shroud

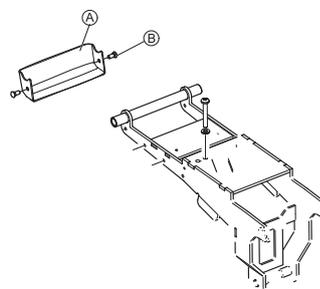


- Installation kit
- Needlenose pliers
- Flat screwdriver



Module shroud protects cables.

1. Remove both rivets ②.
2. Remove module shroud ①.
3. Install parts in reverse order.



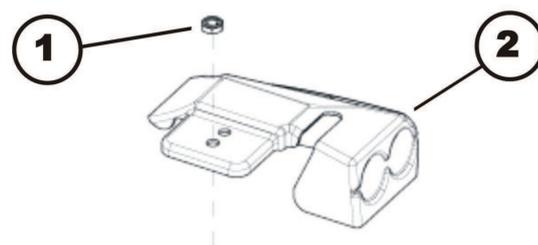
10.5 Replacing Rear Light Shroud



- 13 mm socket wrench

Removing Rear Light Shroud

1. Remove rear and center shroud, see *10.1 Replacing Rear Shroud, page 62* and *10.2 Replacing Centre Shroud, page 62*.
2. Loosen nut (1).



Installing Rear Light Shroud

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

10.6 Replacing Front Fender



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.

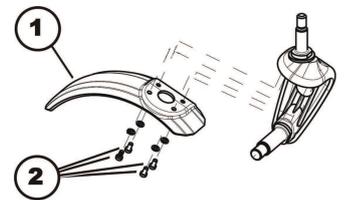


- 4 mm Allen key
- 24 mm wrench
- Flat screwdriver

- Jacking device
- Medium-strength thread locking adhesive (Loctite 243 or similar)
- Heat gun

Removing Front Fender

1. Jack up power wheelchair so that castor wheel is off ground and can rotate freely.
2. Remove castor wheel, see *9.6 Replacing Castor Wheels on Single-Sided Fork, page 58*.
3. Loosen and remove the four screws (2) together with washers.
4. Replace fender (1).



Installing Front Fender

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

10.7 Replacing Rear Fender



- 5 mm Allen key



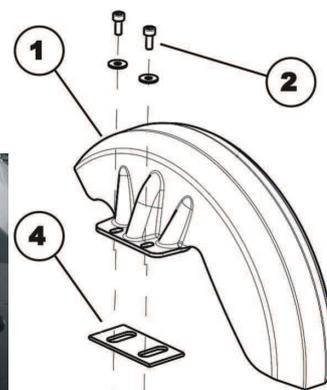
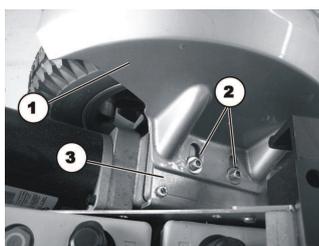
Use table to determine which fenders have to be used and whether fenders possibly have to be replaced. Different fenders have to be fitted depending on depth of seat, width of seat and seat support plates used.

Seat support	Seat depth in cm	Seat width in cm	Fender long RH	Fender long LH	Fender short RH	Fender short LH
Short	D=43	W=38	yes	yes	x	x
	D=43	W=43	yes	yes	x	x
	D=43	W=48	yes	yes	x	x
	D=43	W=53	yes	yes	x	x
	D=41	W=38	yes	yes	x	x
	D=41	W=43	yes	yes	x	x
	D=41	W=48	yes	yes	x	x
	D=41	W=53	yes	yes	x	x
	D=38	W=38	yes	yes	x	x
	D=38	W=43	yes	yes	x	x
	D=38	W=48	yes	yes	x	x
	D=38	W=53	yes	yes	x	x
Medium	D=48	W=38	yes	yes	x	x
	D=48	W=43	yes	yes	x	x
	D=48	W=48	yes	yes	x	x
	D=48	W=53	x	x	yes	yes
	D=46	W=38	yes	yes	x	x
	D=46	W=43	yes	yes	x	x
	D=46	W=48	yes	yes	x	x
	D=46	W=53	x	x	yes	yes
	D=43	W=38	yes	yes	x	x
	D=43	W=43	yes	yes	x	x
	D=43	W=48	yes	yes	x	x
	D=43	W=53	x	x	yes	yes

Seat support	Seat depth in cm	Seat width in cm	Fender long RH	Fender long LH	Fender short RH	Fender short LH
Long	D=53	W=38	yes	yes	x	x
	D=53	W=43	yes	yes	x	x
	D=53	W=48	x	x	yes	yes
	D=53	W=53	x	x	yes	yes
	D=51	W=38	yes	yes	x	x
	D=51	W=43	yes	yes	x	x
	D=51	W=48	x	x	yes	yes
	D=51	W=53	x	x	yes	yes
	D=48	W=38	yes	yes	x	x
	D=48	W=43	yes	yes	x	x
	D=48	W=48	x	x	yes	yes
	D=48	W=53	x	x	yes	yes
Recaro seat			yes	yes	x	x

Removing Rear Fender

1. If possible, move seat to uppermost position.
2. Loosen and remove two Allen screws (2) and washers.
3. Remove fender (1) from gearbox mounting (3).
4. Storm⁴ X-plore: Take care of spacers (4).
5. Replace fender according to table above.



Installing Rear Fender

1. Install parts in reverse order.

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.



- 8 mm socket wrench
- To adapt the drive program: programming software or hand programming device and system installation manual, available from Invacare.

Removing Power Module

1. Remove rear shroud, see *10.1 Replacing Rear Shroud, page 62*.
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. Loosen two nuts on power module.
5. Remove power module.
6. Replace power module.

Installing Power Module

1. Install parts in reverse order.
2. Plug all plugs into their old positions.
3. Select drive program, see *11.12 Drive Program Selection after Component Replacement (ACS2 Electronic), page 73*.
4. If new software version is available, update drive program, see *11.13 Updating Software, page 74*.
5. Adapt drive program using programming software if necessary.
6. Test all functions.

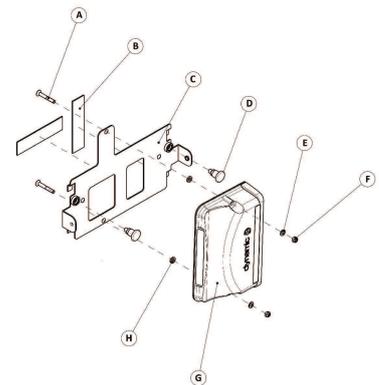
11.2 Replacing LiNX Power Module Bracket

Removing Power Module

1. Remove rear shroud, see *10.1 Replacing Rear Shroud, page 62*.
2. Remove all plugs from power module.
3. Remove pull latch **D**.
4. Loosen and remove lock nut **F** including washer.
5. Remove power module **G**.
6. Remove power module bracket **C**.

Installing Power Module

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



11.3 Replacing True Trac Plus Power Module

 When replacing True Track Plus power module in connection with remote, take the final selection of drive program into account as described in “Updating”.

Different power modules in connection with different remotes can be fitted to power wheelchair. Various power modules are described in “Power modules”. Replacement is described in following section based on example of a power wheelchair with an optional lighting PCB and an optional actuator module.



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 a warranty for safe power wheelchair driving behaviour - especially tipping stability - for unaltered standard drive programs.



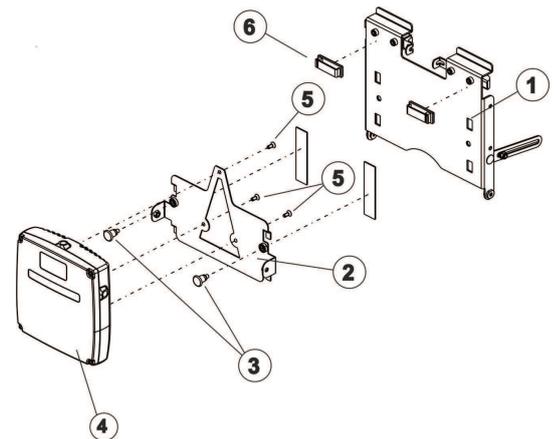
All power modules are delivered with a standard drive program. If you have made any customer-specific modifications to drive program, these must be adapted after installation of new power module.



- 2.5 mm Allen key
- 3 mm Allen key
- Torque wrench
- To adapt drive program: programming software or hand programming device and system installation manual, available from Invacare®.

Removing True Track Plus Power Module

1. Remove rear shroud, see *10.1 Replacing Rear Shroud, page 62*.
2. Carefully note location of cable and connection locations of various plugs. Either mark each plug and socket, or take a photograph with a digital camera.
3. The pictures show True Track Plus power module (1), CDI cable (2), lighting PCB cable operating hours counter (3) and both bus cables (4).
4. Remove cable from controls mountings (6).
5. Pull snap fasteners (3) next to True Track Plus power module (4) to rear.
6. Lift True Track Plus power module together with mounting (2) and remove mounting from battery flap (1).
7. Loosen and remove three screws (5).
8. Remove True Track Plus power module.
9. Loosen and remove cable cover caps on motors.
10. Loosen and remove ring terminal ends on motors using 2.5 mm Allen key.
11. Replace True Track Plus power module.



Installing True Track® Plus Power Module

1. Install parts in reverse order.
2. Plug all plugs into their old positions.
3. Fix cable in controls mountings.
4. Push motor cable terminal ends in from side and fit. Tighten bolts with 2.5 Nm.
5. Select drive program, see *11.12 Drive Program Selection after Component Replacement (ACS2 Electronic), page 73*.
6. If new software version is available, update drive program, see *11.13 Updating Software, page 74*.
7. Adapt drive program using programming software if necessary.
8. Test all functions.

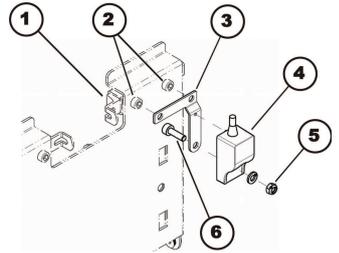
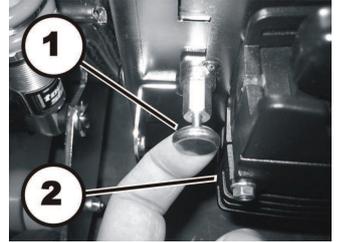
11.4 Replacing G-Trac Sensor



- 5 mm Allen key
- 10 mm socket wrench

Removing G-Trac Sensor

1. If possible, completely raise the seat with the lifter.
2. Turn off power wheelchair.
3. Remove rear shroud, see *10.1 Replacing Rear Shroud, page 62*.
4. Take note of the 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.
5. Pull locking pin (1) backwards.
6. Lift power module up, together with bracket.
7. Remove bracket from battery box shroud.
8. Place power module, together with bracket, on top of battery box or actuator module, if installed.
9. Press both catches (3) inwards and open battery box shroud.
10. Loosen and remove both screws (2).
11. Remove safety catch (1) and G-Trac bracket (3).
12. Loosen and remove self-locking nut (5).
13. Remove G-Trac sensor.
14. Disconnect cable of G-Trac sensor from power module.
15. Replace G-Trac sensor.



Installing G-Trac Sensor

1. Install parts in reverse order.
2. Connect all cable connectors to their former positions.
3. The G-Trac sensor must be installed with the cable pointing upwards. The module has a guide that must fit exactly into the G-Trac sensor holder.
4. Test all functions.

11.5 Replacing Gyro Plate



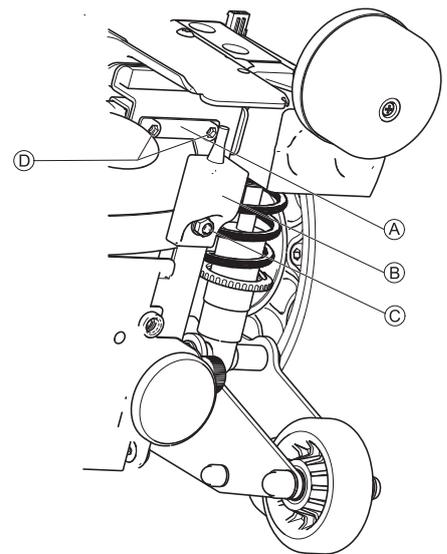
- 10 mm wrench

Removing Gyro Plate

1. Remove rear shroud, see *10.1 Replacing Rear Shroud, page 62*.
2. Loosen and remove locking nut (C) including washer.
3. Loosen and remove screws (D).
4. Remove Gyro (B) and Gyro plate (A).
5. Replace Gyro plate.

Installing Gyro plate

1. Install parts in reverse order.



11.6 Replacing Actuator Module Under Seat

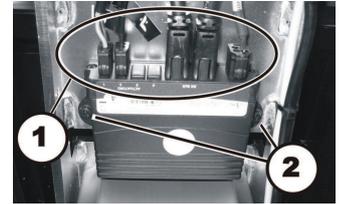
The actuator module is optional.



- 4 mm Allen key

Dismantling Tilt Module

1. If possible, use lifter to move seat to uppermost position.
2. Carefully note the location of the cable and the connection locations of the various plugs. Either mark each plug and socket, or take a photograph with a digital camera.
3. Pull plug (1) out of actuator module.
4. Remove the two Allen screws (2).
5. Replace actuator module.



Refitting Tilt Module

1. Refit parts in reverse order.
2. Plug all plugs into their old positions.
3. Check all power wheelchair functions.

11.7 Replacing Light Board

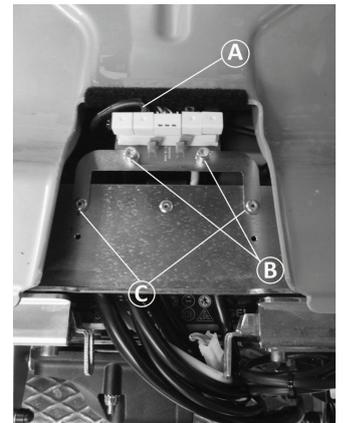
Replacement is described in the following section based on the example of a power wheelchair with an optional light board and an optional actuator module.



- 4 mm Allen key
- 8 mm socket wrench

Removing Light Board

1. If possible, use lifter to move seat to uppermost position.
2. Remove rear and center shroud, see *10.1 Replacing Rear Shroud, page 62* and *10.2 Replacing Centre Shroud, page 62*.
3. Carefully note the location of the cable and the connection locations of the various plugs. Either mark each plug and socket, or take a photograph with a digital camera.
4. Pull plug (A) out of light board.
5. Loosen and remove two screws (C).
6. Lift off light board together with retaining bracket.
7. Loosen screws (B) and the corresponding nuts on the rear.
8. Replace light board.



Installing Light Board

1. Install parts in reverse order.
2. Plug all plugs into their old positions.
3. Check all power wheelchair functions.

11.8 Replacing Lighting / Actuator Module CLAM



- Phillips screwdriver size 2
- 3 mm Allen key
- 4 mm Allen key
- 8 mm socket wrench

Removing CLAM

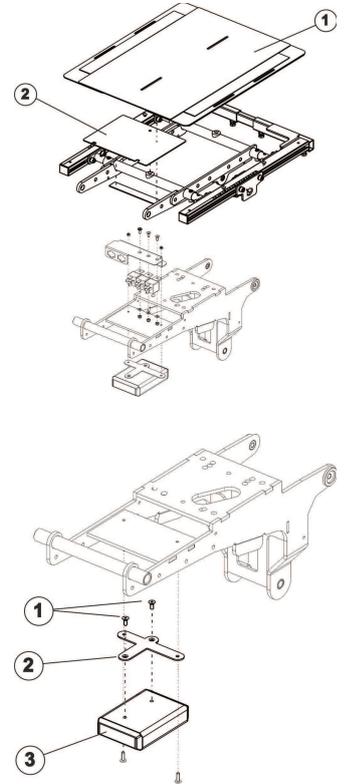
1. If possible, use lifter to move seat to uppermost position.
2. Turn off power wheelchair.
3. Remove seat plate or sling seat (1), see *14.2 Replacing Seat Support Plates, page 90*.
4. Remove cover (2).
5. Pull all plugs out of lighting / actuator module CLAM.
6. Loosen and remove relay, see *Replacing relay in 7.1 Replacing and Calibrating True Track Plus Motor, page 29*.
7. Loosen screws (1) with 3 mm Allen key and remove screws including CLAM mounting (2).
8. Replace lighting / actuator module CLAM (3).



When disassembling, take care of small parts such as screws and washers. Put all small parts down so that they can be reassembled in the right sequence.

Installing CLAM

1. Refit parts in reverse order.
2. Plug all the plugs into their old positions.
3. Check all power wheelchair functions.



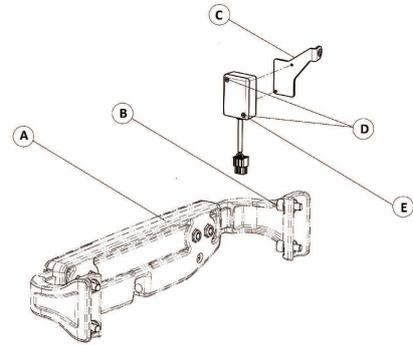
11.9 Replacing Solid Angle Sensor Bracket



- Philips screwdriver

Removing Solid Angle Sensor Bracket

1. Loosen and remove screw ② on stabilization bracket ①.
2. Pull out solid angle sensor bracket ③ from under stabilization bracket.
3. Loosen and remove screws ④.
4. Take off solid angle sensor box ⑤ from solid angle sensor bracket.
5. Replace solid angle sensor bracket.



Installing Solid Angle Sensor Bracket

1. Install parts in reverse order.

11.10 Replacing USB Charger



- 4 mm Allen wrench

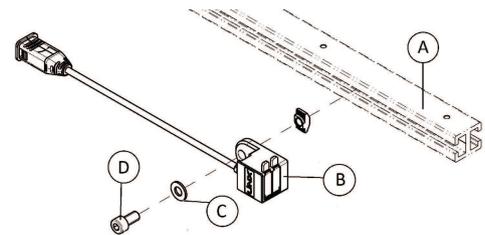


When charger overheats, it stops working. Rail under the seat serves to dissipate heat.

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

Removing USB Charger

1. Loosen and remove screw ④ including washer ③.
2. Take off USB charger ② from rail of telescopic seat frame ①.
3. Replace USB charger.



Installing USB charger

1. Install parts in reverse order.

11.11 Replacing 4-Way Bus Socket



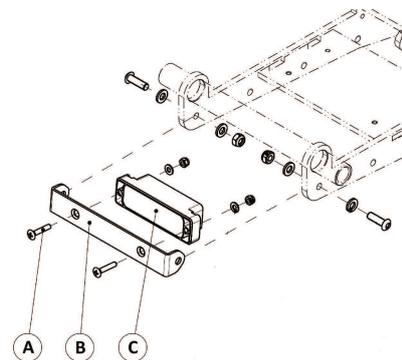
- Philips screwdriver

Removing 4-Way Bus Socket

1. Remove all cables from 4-way-bus socket.
2. Loosen and remove screws ①.
3. Take out 4-way bus socket ② and replace.

Installing 4-Way Bus Socket

1. Install parts in reverse order.



11.12 Drive Program Selection after Component Replacement (ACS2 Electronic)

The drive program is saved in the remote and in the power module. If one of these two components is replaced, the system must be told which of the components has not been replaced so that it knows which contains the current controller profile.

 The system allows normal usage of the mobility aid after component replacement only if the profile is selected afterwards.

Profile Selection with Remote REM A or REM B

1. Insert the plug into the remote or into the power module respectively.
2. Switch the remote on.
3. LEDs (1) and (4) blink.
4. Use the bottom rocker switch (5) to select where the required controller profile is saved.
LED 1 = power module
LED 4 = remote
Only LED (1) or (4) blinks now depending on the selection.
5. Press the "Horn" (2) and "+" (3) buttons on the speed selection and hold them down for 3 seconds to confirm the selection. The system will switch itself off and restart automatically. In the process, the selected profile is saved in the remote and in the power module.



Profile Selection with Remote REM 550

1. Insert the plug into the remote or into the power module respectively.
2. Switch the remote on. The display (2) shows that you need to select a profile.
3. Use the bottom rocker switch (3) to select where the required controller profile is saved.
I = remote II = power module
The display shows which profile you have selected.
4. Press the "Horn" (4) and "+" (1) buttons on the speed selection and hold them down for 3 seconds to confirm the selection. The system will switch itself off and restart automatically. In the process, the selected profile is saved in the remote and in the power module.



11.13 Updating Software

The drive programs for power wheelchairs are continually being further developed and improved by Invacare. For this reason, you should always check whether the drive program version number is up-to-date when carrying out any repairs or regular maintenance.

If a newer version is available, the drive program should be updated. The procedure for updating the drive program are described either in the Wizard software user manual or the LiNX service manual.



WARNING!

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

ACS2, Shark, R-Net, and VR2 Electronics



The power wheelchair is supplied with a standard drive program. If the drive program has been customised, you have to perform this customisation again, after installing the new drive program. This also applies to the customer-specific options of the seat setting for ACS2 remotes, which are activated ex works.



When a powered adjustment option is retrofitted, such as powered legrests, then this option needs to be activated in the driving program as well if you have an ACS2 remote. For more information, refer to the user manual of the Wizard software and the installation instructions for the electronic modules.



- Dynamic® Wizard software
- Wizard software user manual
- Further requirements, such as a minimum system configuration for the PC used for programming, required programming cables etc., can be taken from the Wizard software user manual.

LiNX Electronics

Programming parameters and further information about updating can be taken from the LiNX service manual, available from Invacare.

11.14 Main Fuse



CAUTION!

Risk of Fire

A short circuit can cause extremely high currents which can result in spark formation and fire.

- Always use an original strip fuse with the approved amperage.
- If the main fuse has blown, first rectify the cause before fitting new one.



CAUTION!

Risk of Fire and Burns

Fitting incorrect strip fuse causes fire hazard.

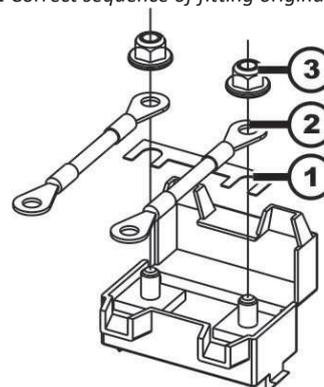
- Only fix strip fuses in sequence shown in image below.
- Tighten nuts with 3.3 or 3.5 Nm.

Fig. 11-1 Correct sequence of fitting original strip fuse

(1) Strip fuse

(2) Ring terminal

(3) DIN 6923 nut





- 8 mm socket wrench
- Strip fuse
- Flat screwdriver
- Torque wrench 0–20 Nm (or similar)



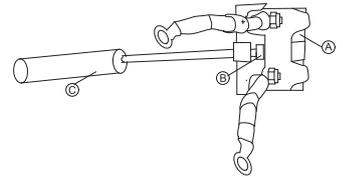
If the fuseholder is damaged, you can replace it completely with the battery cables.

Removing Main Fuse

1. Turn off power wheelchair.
2. Remove battery shroud, disconnect battery plugs and pull batteries out of battery box, see 12.4 *Making Batteries Accessible*, page 82.
3. Fuse holder (1) is located on top of batteries.

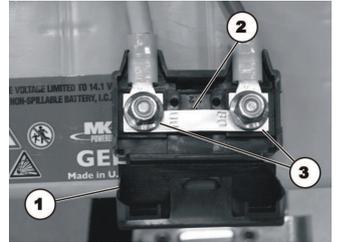


4. Pry open snap hook (B) with flat screwdriver (C). Fuse holder shroud (A) is open.



Older fuse holder versions may be locked with tie wrap. If so, cut open tie wrap to access fuse strip.

5. You see strip fuse (2) once fuse holder (1) is open.
6. If strip fuse has blown, you must first ascertain and rectify the cause of the fault.
7. Main fuse may only be replaced once fault has been rectified.
8. Remove strip fuse nuts (3).
9. Remove strip fuse.



Installing Main Fuse

1. Replace strip fuse.
2. Install parts in reverse order.



Make sure to press two parts of fuse holder shroud together until it snaps.



If older fuse holder version is used, lock fuse holder with UL94V0 tie wrap.

3. Test all functions.

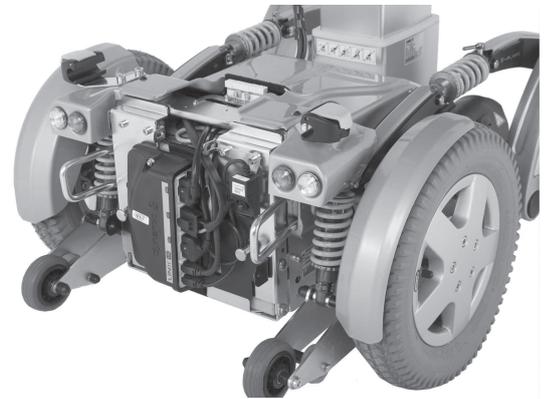
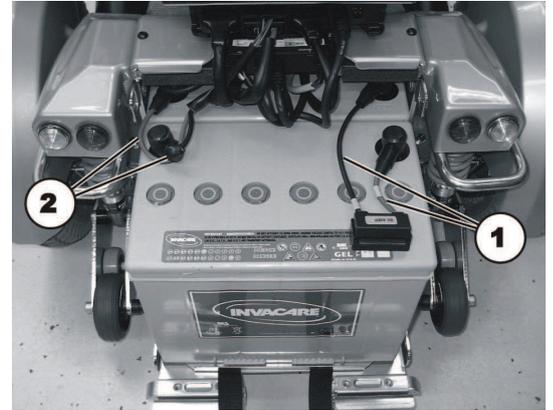
11.15 Cables

Checking Cables



- 4 mm Allen key
- Oblique pliers
- Cable ties

1. Remove rear and center shroud, see *10.1 Replacing Rear Shroud, page 62* and *10.2 Replacing Centre Shroud, page 62*
2. Pull batteries out of battery box, see *12.4 Making Batteries Accessible, page 82*.
3. Check fuse cable (1) and battery cable (2) for visible damage and Crushing points.
4. Replace any damaged cables.
5. Check all other cables for visible damage and Crushing points. Replace any damaged cables.
6. Pull each plug coming out of power module carefully. The plug should not come out of socket.
7. If one of plugs is loose, press it back into socket with light pressure. Plug must engage.
8. Make sure that plug is now firmly in socket. If not, repeat previous operation.
9. Refit parts in reverse order.
10. Test all functions.



Installing Lifter Column Cables



If a type B lifter column is installed, see *Installing on Lifter Column Type B*.

Fig. 11-2 Lifter Column Type A

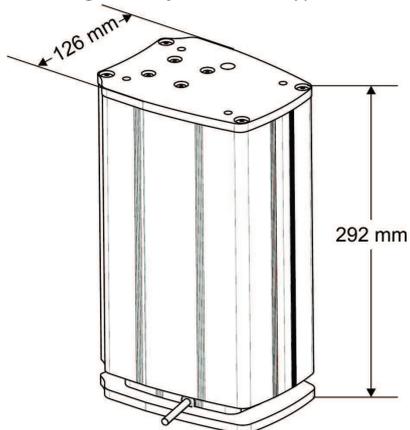
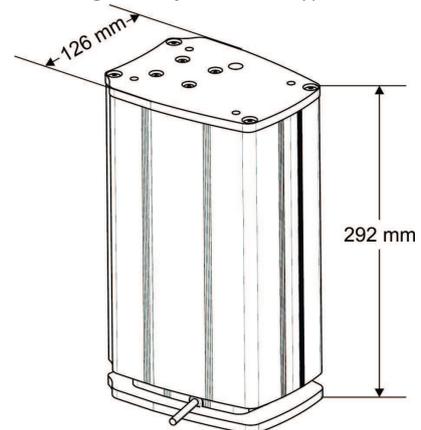


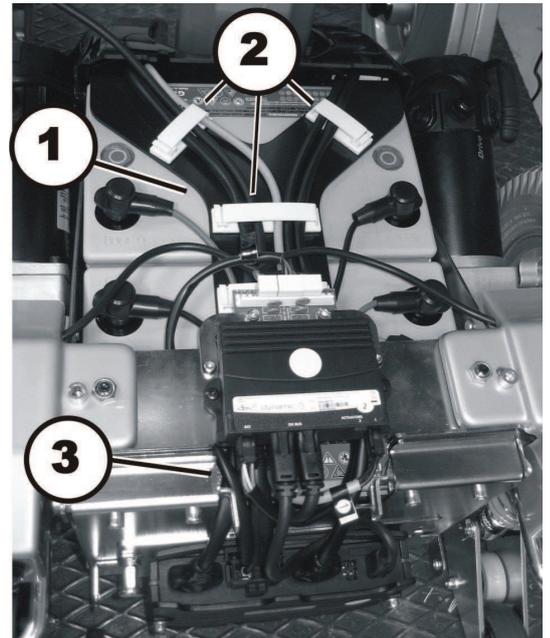
Fig. 11-3 Lifter Column Type B



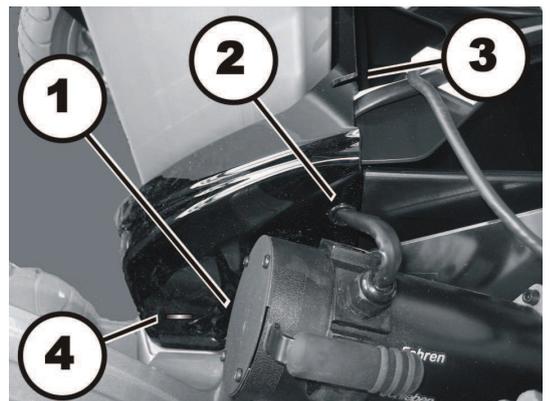


- 4 mm Allen key
- Oblique pliers
- Cable ties

1. Remove rear and center shroud, see *10.1 Replacing Rear Shroud, page 62* and *10.2 Replacing Centre Shroud, page 62*.
2. In case of lifter cabling, also remove front shroud, see *10.3 Replacing Front Shroud, page 62*.
3. Lead cables on power module and actuator module fitted at rear through recess in battery flap under actuator module to cable bridge (1).

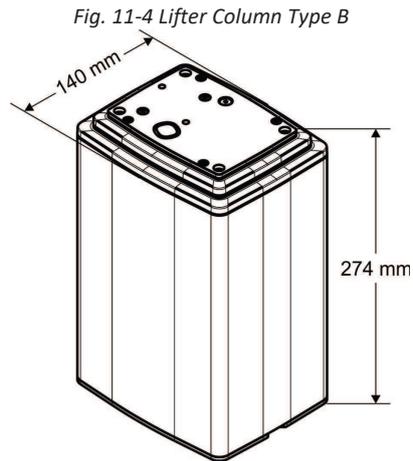


4. Lead cables inside shrouds over cable bridge (1).
5. Fasten cables with cable clamps (2). Cable clamps on front side of battery box for lifter cables (optional) are not seen in picture.
6. Motor cables fitted with protection shrouds (2) are guided out of front shroud through recesses on side.
7. Cables that lead to seat (upper actuator module, remote, headlight) are guided out of front shroud through an upper left recess (3).
8. Make sure cable has enough play so that all movable parts can move freely without stretching, clamping or abrading cable.
9. Lay cables in same way under seat and to remote. Fasten cables with prescribed cable clamps or cable ties respectively.



Installing on Lifter Column Type B

If a type B lifter column is already installed, see 11.15 Cables, page 76.

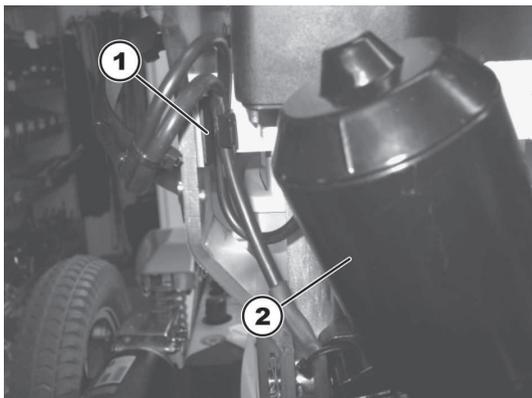


Installing on Lifter Column Type B - Part 1

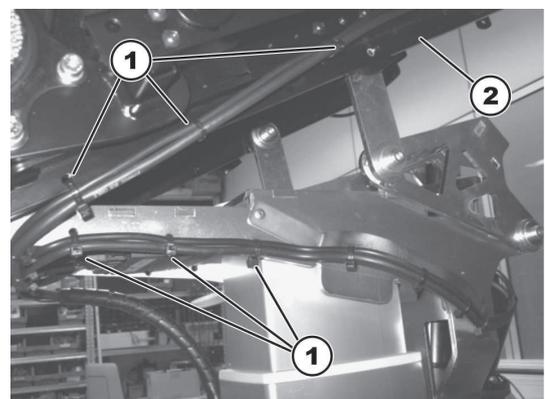
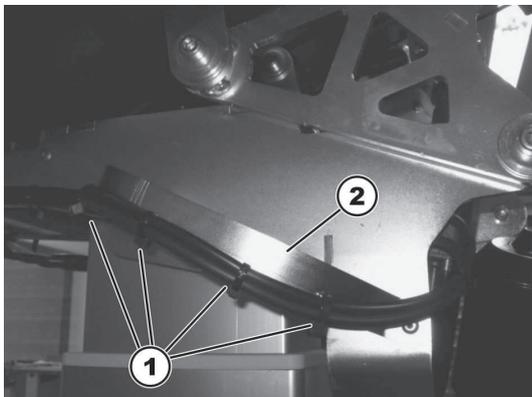


- 4 mm Allen wrench
- Side cutting pliers
- Cable ties

The cables leading from battery box to seat must be installed so they do not get crimped, stretched or sheared when raising or lowering seat.

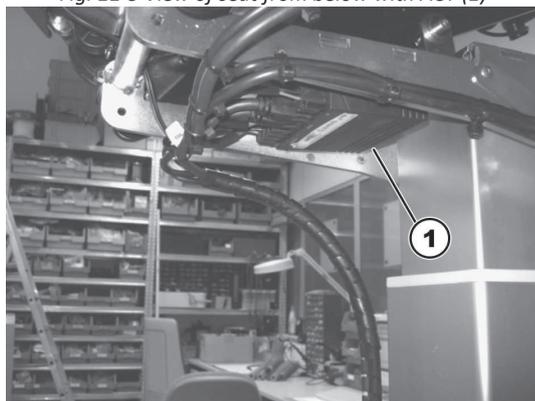


1. Run cables from actuator (2) of seat tilt to cable holder (1).
2. Secure cables with tie wrap.
3. Run cables further to lateral bar.



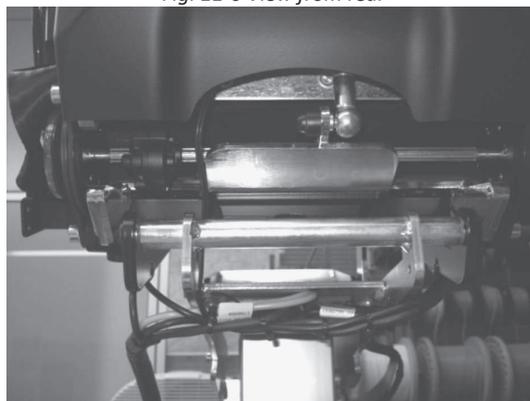
4. Secure cables with cable ties (1) under outer side of bar (2).

Fig. 11-5 View of seat from below with ACT (1)

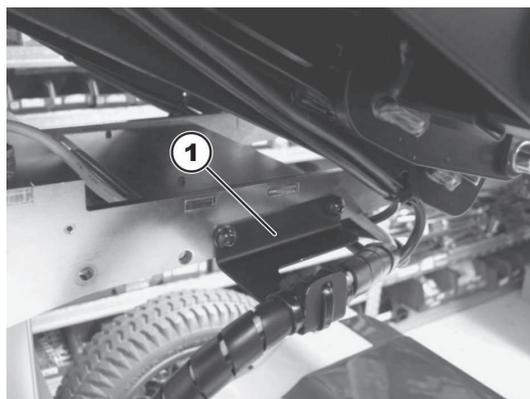


5. Attach cable guide for lifter (1) using two screws on left underneath seat.

Fig. 11-6 View from rear



6. Position protective tube for cables completely from outer side.



7. Secure protective tube with a tie wrap (1) on cable guide.
8. Proceed with *Installing on Lifter Column Type B - Part 2*.



Installing on Lifter Column Type B - Part 2

1. Run cable bundle, including protective tube for cables, through opening in front shroud (2).
2. Secure cable bundle with tie wrap under shroud.

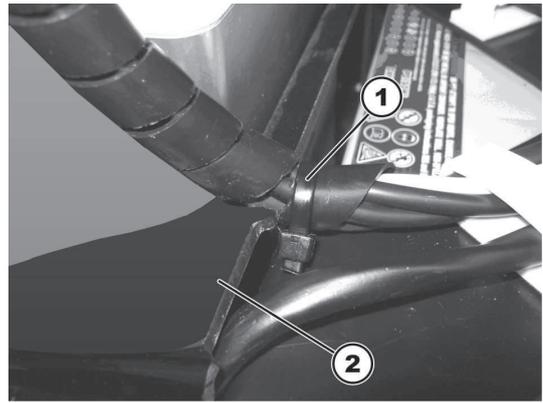


Fig. 11-7 Lifter column completely extended



Fig. 11-8 Lifter column completely retracted



3. Raise and lower seat several times while closely watching cable bundle. The cable bundle must not get trapped, stretched or crushed. The cable bundle must move sideways, as shown in the following illustrations. The drive motor must not be touched by cable bundle.



Pay attention to areas where cable bundle might get crushed or touch motor.

12 Batteries

12.1 Safety Information



CAUTION!

Injury Hazard and Possible Material Damages if Batteries are Handled Improperly

The installation of new batteries may only be carried out by authorised specialists.

- Observe the warning information on the batteries.
- Only use battery versions stated in the specifications.



CAUTION!

Fire and Burns Hazard if Battery Terminal is Bypassed

- Take great care to ensure that the battery terminals are never short-circuited with tools or mechanical power wheelchair parts.
- Ensure that the battery terminal caps have been replaced if you are not working on the battery terminals.



CAUTION!

Risk of Crushing

Batteries can be extremely heavy. This results in injury hazards to your hands.

- Handle the batteries with care.
- Ensure that batteries do not fall to the ground when removed from chassis.
- Pay attention to hands.
- Use proper lifting techniques.



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

12.2 General Instructions on Handling Batteries

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

12.3 Handling Damaged Batteries Correctly



WARNING!

Risk of Burns

- Never touch or remove overheating batteries. Only unplug the charger.
- Never touch leaking batteries.



WARNING!

Burn Hazard

Injury hazard due to discharged acid.

- Always wear acid-proof protective gloves when handling batteries.
- Always wear protective goggles when handling batteries.

What to do if Acid is Discharged

- Always take clothing which has been soiled by or dipped in acid off immediately!
- Rinse any areas of your skin which has come into contact with battery acid off immediately with plenty of water!

If Contact with Eyes is Made

- You should also consult an eye specialist immediately afterwards!

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

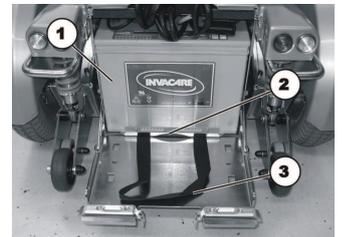
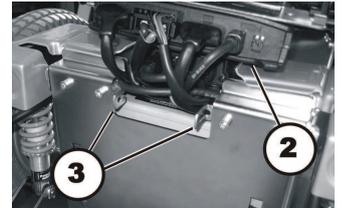
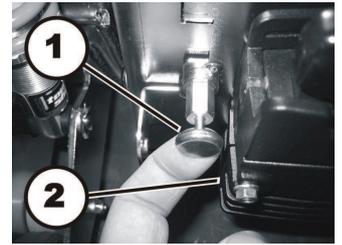
12.4 Making Batteries Accessible

Various power modules can be installed to the power wheelchair. Instructions below show Storm⁴ and ACS 2 power module as example. The course of action is the same for other power wheelchairs.

1. Remove rear shroud, see *10.1 Replacing Rear Shroud, page 62*.
2. Pull locking pin(s) (1).
3. Raise power module together with mounting and remove mounting from battery box shroud.

4. Place power module, together with bracket, on top of battery box or actuator module, if installed.
5. Press both catches (3) inwards and open battery box shroud.

6. Pull on strap (3) to move batteries (1) and battery support (2) forward.



12.5 Removing Batteries



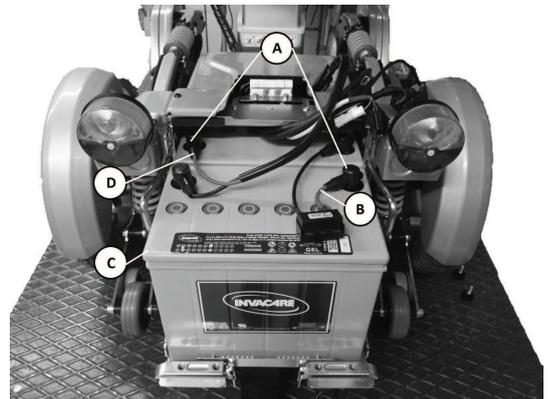
- 11 mm socket wrench

Removing Batteries

1. Make batteries accessible, see *12.4 Making Batteries Accessible, page 82*.
2. Remove pole caps (A) on battery (C).
3. Remove pole screws under pole caps.
4. Remove connecting cable (D) and fuse cable (B).
5. Lift battery from battery tray.
6. Pull on strap of second battery to move it forward.
7. Dismantle cables on second battery as well.
8. Lift second battery from battery tray.

Installing Batteries

1. Refit batteries in reverse order.
2. Make sure battery cage sockets / plugs have been correctly refitted. A polarity diagram is located in rear shroud.



12.6 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 LED Headlight System (before 01_2025)

13.1.1 Replacing Headlight

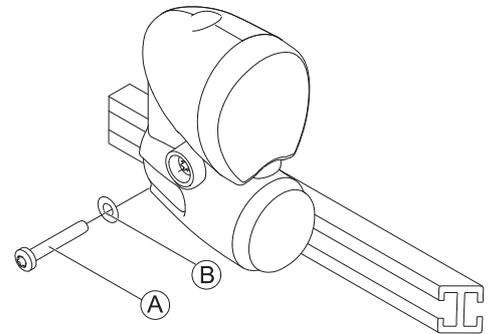
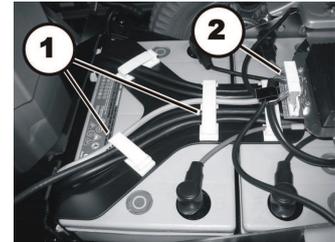
(LED Lighting System before 01_2025)



- 4 mm Allen key
- Oblique pliers
- Cable ties

Removing Headlight

1. Remove rear and center shroud, see *10.1 Replacing Rear Shroud, page 62* and *10.2 Replacing Centre Shroud, page 62*.
2. Take exact note of positions of all cables and sockets that cables are connected to. Mark connectors and sockets or take a photograph.
3. Open cable clamps (1), remove all cable ties and pull cable out of power wheelchair.
4. Disconnect cable of affected headlight from light board (2).
5. Remove screw (A) and washer (B) to remove headlight from holder.
6. Replace headlight.



Installing Headlights

1. Install parts in reverse order.
2. Install cables carefully and secure them with cable clamps and cable ties.
3. Tighten screws finger-tight.
4. Adjust headlight roughly using ratchet plate as a guide. The user can carry out final adjustment following user manual.
5. Test all functions.

13.1.2 Replacing Headlight Holder

(LED Lighting System before 01_2025)

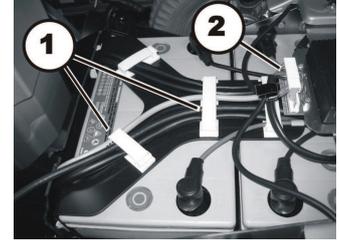


- 4 mm Allen key
- 6 mm Allen key
- 8 mm wrench

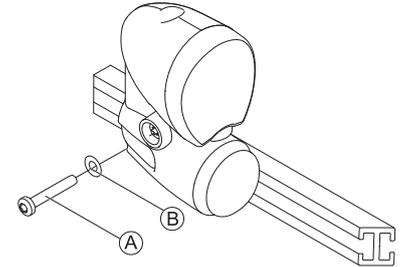
- Oblique pliers
- Cable ties

Removing Headlight Holder

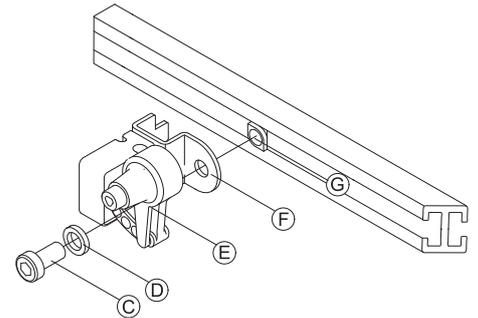
1. Remove rear and center shroud, see *10.1 Replacing Rear Shroud, page 62* and *10.2 Replacing Centre Shroud, page 62*.
2. Take exact note of positions of all cables and sockets that cables are connected to. Mark connectors and sockets or take a photograph.
3. Open cable clamps (1), remove all cable ties and pull cable out of power wheelchair.
4. Disconnect cable of affected headlight from light board (2).



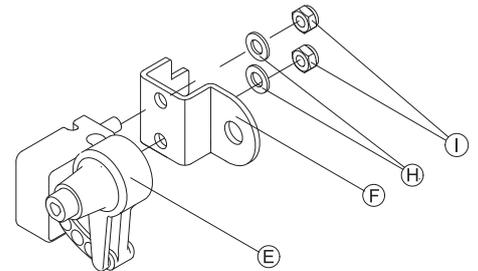
5. Remove screw (A) and washer (B) to remove headlight from holder.



6. Remove screw (C), washer (D) and holder (E) with lamp bracket (F).
7. Take care of slot nut (G) inside rail.



8. Remove nuts (I) and washers (H) to remove holder (E) from lamp bracket (F).
9. Replace holder.



Installing Headlight Holder

1. Install parts in reverse order.
2. Install cables carefully and secure them with cable clamps and cable ties.
3. Tighten screws finger-tight.
4. Adjust headlight roughly using ratchet plate as a guide. The user can carry out final adjustment following user manual.
5. Test all functions.

13.2 LED Headlight System (after 01_2025)

13.2.1 Replacing Headlight

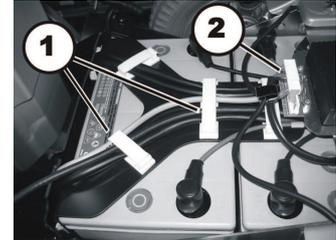
(LED Lighting System after 01_2025)



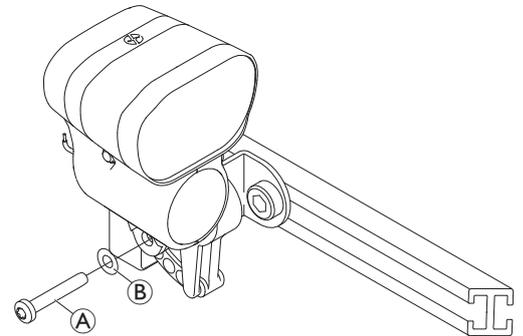
- 4 mm Allen key
- Oblique pliers
- Cable ties

Removing Headlight

1. Remove rear and center shroud, see *10.1 Replacing Rear Shroud, page 62* and *10.2 Replacing Centre Shroud, page 62*.
2. Take exact note of positions of all cables and sockets that cables are connected to. Mark connectors and sockets or take a photograph.
3. Open cable clamps (1), remove all cable ties and pull cable out of power wheelchair.
4. Disconnect cable of affected headlight from light board (2).



5. Remove screw (A) and washer (B) to remove headlight from holder.
6. Replace headlight.



Installing Headlight

1. Install parts in reverse order.
2. Install cables carefully and secure them with cable clamps and cable ties.
3. Tighten screws finger-tight.
4. Adjust headlight roughly using ratchet plate as a guide. The user can carry out final adjustment following user manual.
5. Test all functions.

13.2.2 Replacing Headlight Holder

(LED Lighting System after 01_2025)

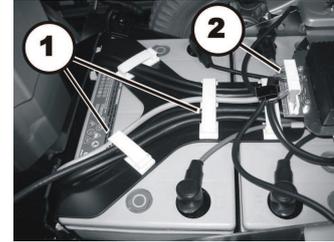


- 4 mm Allen key
- 6 mm Allen key
- 8 mm wrench

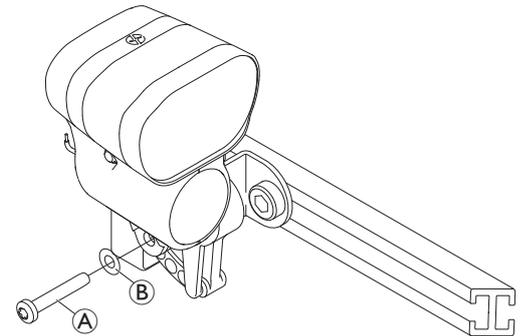
- Oblique pliers
- Cable ties

Removing Headlight Holder

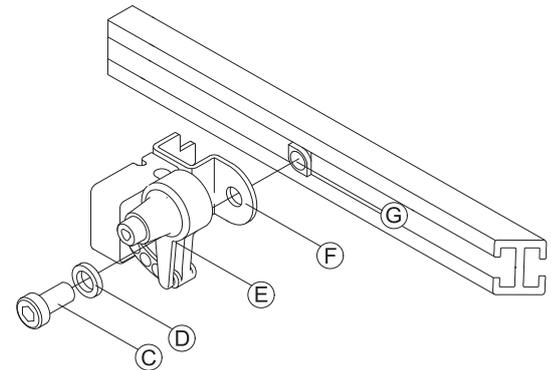
1. Remove rear and center shroud, see 10.1 *Replacing Rear Shroud, page 62* and 10.2 *Replacing Centre Shroud, page 62*.
2. Take exact note of positions of all cables and sockets that cables are connected to. Mark connectors and sockets or take a photograph.
3. Open cable clamps (1), remove all cable ties and pull cable out of power wheelchair.
4. Disconnect cable of affected headlight from light board (2).



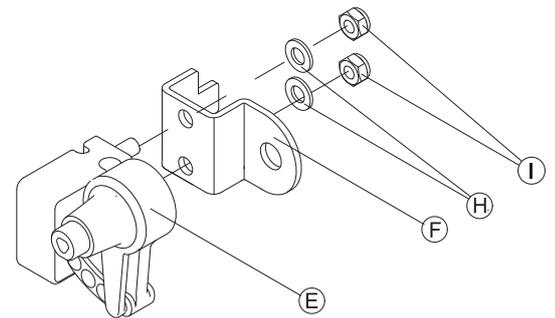
5. Remove screw (A) and washer (B) to remove headlight from holder.



6. Remove screw (C), washer (D) and holder (E) with lamp bracket (F).
7. Take care of slot nut (G) inside rail.



8. Remove nuts (I) and washers (H) to remove holder (E) from lamp bracket (F).
9. Replace holder.



Installing Headlight Holder

1. Install parts in reverse order.
2. Install cables carefully and secure them with cable clamps and cable ties.
3. Tighten screws finger-tight.
4. Adjust headlight roughly using ratchet plate as a guide. The user can carry out final adjustment following user manual.
5. Test all functions.

13.3 Rear Light System

13.3.1 Replacing Rear Bulb (Conventional)



- Size 2 Phillips screwdriver

1. Loosen and remove Phillips screw (1).
2. Remove glass.
3. Replace defective bulb.
4. Replace glass and tighten Phillips screw.



For LED light, the whole lighting unit needs to be replaced, see *13.3.4 Replacing Complete Rear Light (LED)*, page 89.

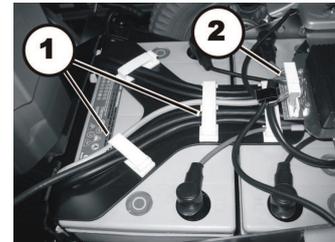
13.3.2 Replacing Rear Light (Conventional)



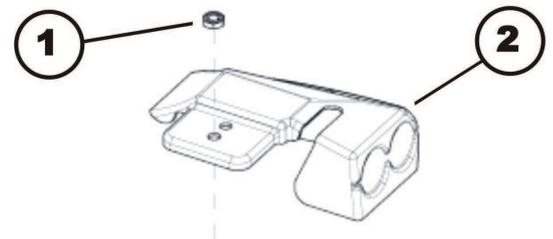
- 8 mm socket wrench
- 13 mm socket wrench
- Oblique pliers
- Cable ties

Removing Rear Light

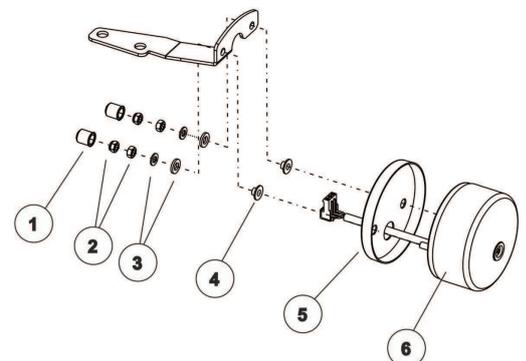
1. Remove rear and center shroud, see *10.1 Replacing Rear Shroud*, page 62 and *10.2 Replacing Centre Shroud*, page 62.
2. Take exact note of positions of all cables and sockets that cables are connected to. Mark connectors and sockets or take a photograph.
3. Open cable clamps (1), remove all cable ties and pull cable out of power wheelchair.
4. Disconnect cable of affected headlight from light board (2).



5. Loosen nut (1).
6. Lift off rear light shroud (2) carefully.



7. Remove two plastic caps (1).
8. Loosen two nuts (2).
9. Remove nut and washers (3).
10. Pull off rear light (6) to the rear and remove protect cap (5) and both bushes (4).



Installing Rear Light

1. Install parts in reverse order.
2. Install cables carefully and secure them with cable clamps and cable ties.
3. Test all functions.

13.3.3 Replacing Rear Light Holder (Conventional)



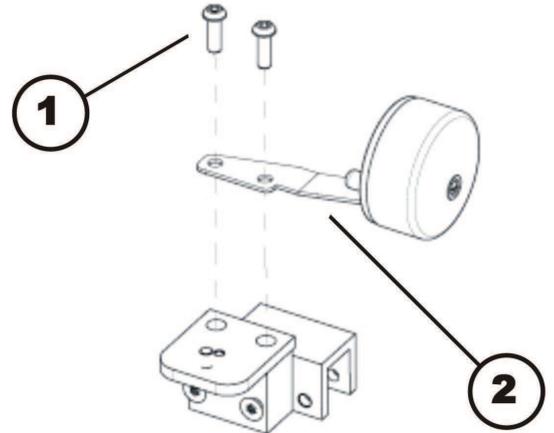
- 4 mm Allen key

Removing Rear Light Holder

1. Remove rear light, see 13.3.2 *Replacing Rear Light (Conventional)*, page 88.
2. Loosen and remove both Allen screws (1).
3. Replace rear light holder (2).

Installing Rear Light Holder

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



13.3.4 Replacing Complete Rear Light (LED)



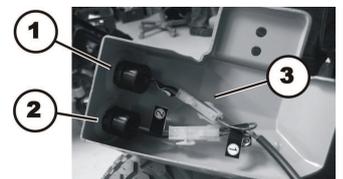
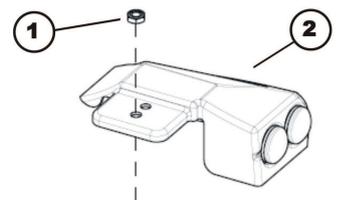
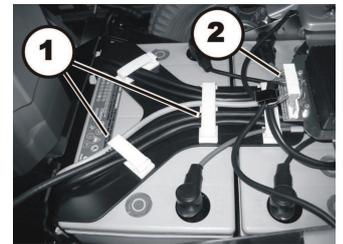
For the LED lighting unit the rear light shroud is the equivalent of a holder. To replace the rear light shroud, see 10.5 *Replacing Rear Light Shroud*, page 63.



- 13 mm socket wrench
- Oblique pliers
- Cable ties

Removing Rear Light

1. Remove rear and center shroud, see 10.1 *Replacing Rear Shroud*, page 62 and 10.2 *Replacing Centre Shroud*, page 62.
2. Take exact note of positions of all cables and sockets that cables are connected to. Mark connectors and sockets or take a photograph.
3. Open cable clamps (1), remove all cable ties and pull cable out of power wheelchair.
4. Disconnect cable of affected headlight from light board (2).
5. Loosen nut (1).
6. Lift off rear light shroud (2) carefully.
7. Open rear light plug (3) that is to be replaced.
8. The rear lights are only clamped in plastic casing. Replace red rear light (1) or indicator (2) as required. Cables are marked correspondingly.



Installing Rear Light

1. Install all parts in reverse order.
2. Install cables carefully and secure them with cable clamps and cable ties.
3. Test all functions.

14 Seat System

14.1 General Information for Seating

- This manual refers to configurations with Easy Adapt and Recaro Seat unit only.
- For seat systems, such as Modulite and Ultra Low Maxx, refer to the corresponding seat service manual.



- 4 mm Allen key

Before you get access to the seating components, you need to:

- Remove legrests and armrests.
- Easy Adapt seat only: Remove seat cushion.
- Recaro seat only: Loosen and remove four screws on bottom side of seat. Remove seat.
- Remove any existing cable ties holding cables on remote or lighting. Remove cables from stuck-on clamps.
- Loosen cap nuts of headlight mountings, see *13.2.1 Replacing Headlight, page 86*.
- Put headlight and mounting in safe place on rear part of battery box.
- Remove all cables between seat and chassis.

14.2 Replacing Seat Support Plates



- 4 mm Allen key

Easy Adapt Seat

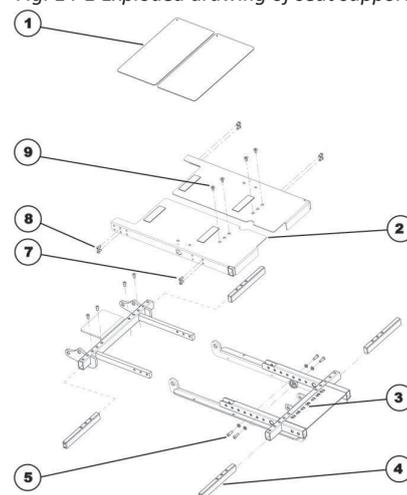
Removing Seat Support Plates

1. Remove cover plates (1).
2. Loosen and remove two Allen screws (7) which are located on side at front of seat support plate.
3. Loosen and remove two Allen screws (8) which are located on side at rear of seat support plate.
4. Loosen and remove two Allen screws (9) at front of seat support plate.
5. Remove seat support plate (2).
6. Insert and tighten Allen screws (9) to seat frame (3) and crossmember (4) so that crossmember cannot fall out of seat frame.
7. Repeat operations on other side of seat.

Installing Seat Support Plates

1. Loosen and remove two Allen screws (9) from seat frame (3) and crossmember (4).
2. Replace seat support plate (2).
3. Fit two Allen screws (9) at front of seat support plate and tighten them one after another.
4. Fit two Allen screws (7) which are located at front of seat support plate.
5. Fit two Allen screws (8) which are located at rear of seat support plate.
6. Repeat operations on other side of seat.
7. Refit all parts you have removed.
8. Test all functions.

Fig. 14-1 Exploded drawing of seat support



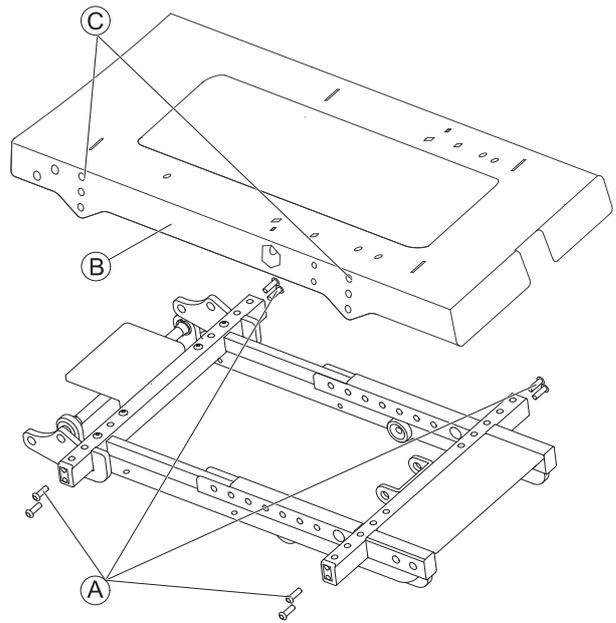
Recaro Seat

Removing Seat Support Plate

1. Loosen and remove Allen screws (A).
2. Remove seat support plate (B).

Installing Seat Support Plate

1. Replace seat support plate (B).
Use holes (C) to adjust height of seat support plate.
2. Insert and tighten Allen screws (A).
3. Refit all parts you have removed.
4. Test all functions.



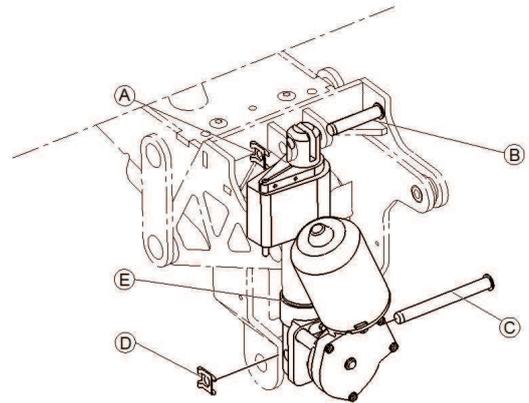
14.3 Replacing Tilt Actuator



- Oblique pliers
- Cable ties

Removing Tilt Actuator

1. Remove legrests.
2. Unplug actuator plug out of module.
3. Remove cable ties.
4. Remove cable.
5. Remove upper pin retainer clip (A).
6. Remove upper pin (B) and tip tilt actuator (E) forward.
7. Remove lower pin retainer clip (D).
8. Remove lower pin (C) and tilt actuator.
9. Replace tilt actuator.



Installing Tilt Actuator

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

14.4 Replacing Tilt Spindle



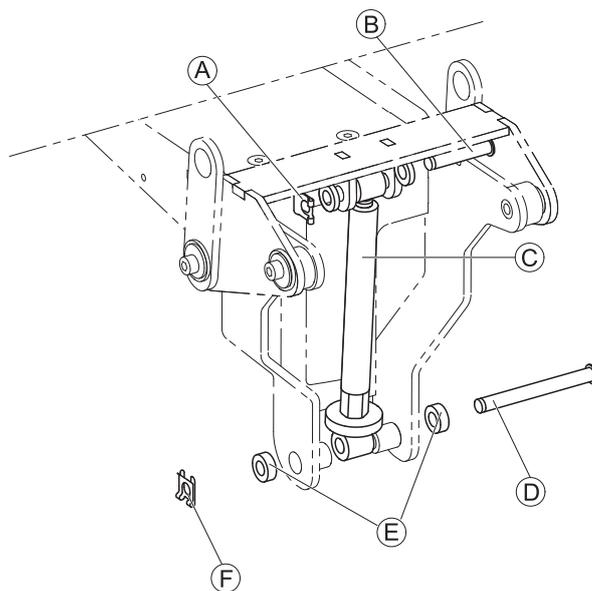
- Oblique pliers

Removing Tilt Spindle

1. Remove upper pin retainer clip **A**.
2. Remove upper pin **B** and tip tilt spindle **C** forward.
3. Remove lower pin retainer clip **F**.
4. Remove lower pin **D** and tilt spindle. Take care of spacers **E**.
5. Replace tilt spindle.

Installing Tilt Spindle

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



14.5 Replacing Tilt Bracket



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

We use different types of tilt carriers in our power wheelchairs. Due to this fact the carrier on your power wheelchair may look different to the illustrations below. The following mounting instructions are not affected by this.



- 6 mm Allen key

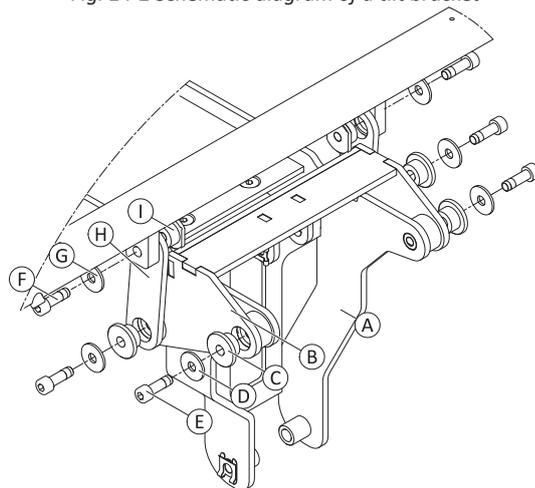
Removing Tilt Bracket

1. Remove seat frame, see *14.6 Replacing Seat Frame, page 93*.
2. Remove tilt spindle or tilt actuator, see *14.4 Replacing Tilt Spindle, page 92* (manual tilt) or *14.3 Replacing Tilt Actuator, page 91* (powered tilt).
3. Loosen and remove screw **E**, washer **D** and bushing **C** on both sides of seat support **A**.
4. Replace tilt bracket **B**.

Installing Tilt Bracket

1. Install parts in reverse order. Ensure that holes of tilt sheet **H** and seat frame are in line.
2. Test all functions.

Fig. 14-2 Schematic diagram of a tilt bracket



14.6 Replacing Seat Frame



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



- 2 x 6 mm Allen key

Removing Seat Frame

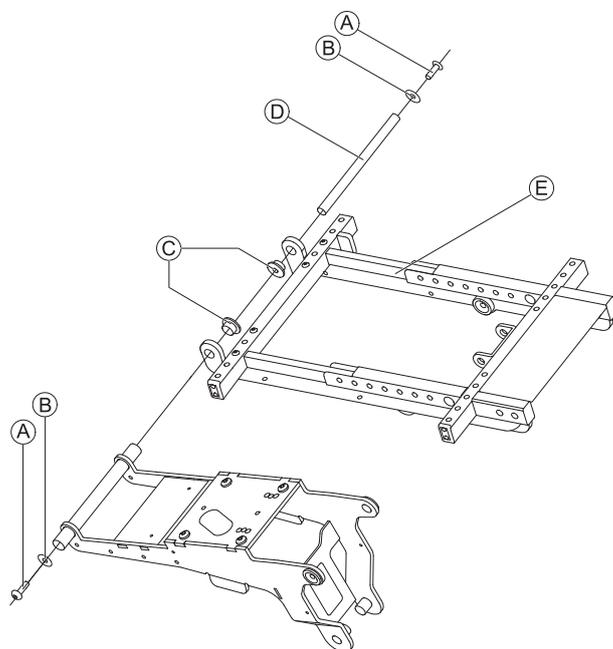
1. Loosen screws **(A)** simultaneously.
2. Remove screw that becomes loose and washer **(B)**.
 Screw and washer on other side remain inside connecting rod **(D)**.
3. Pull out connecting rod.
4. Lift off seat frame **(E)**.



Bushings **(C)** must remain in seat frame.

Installing Seat Frame

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



14.7 Replacing Seat Support



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

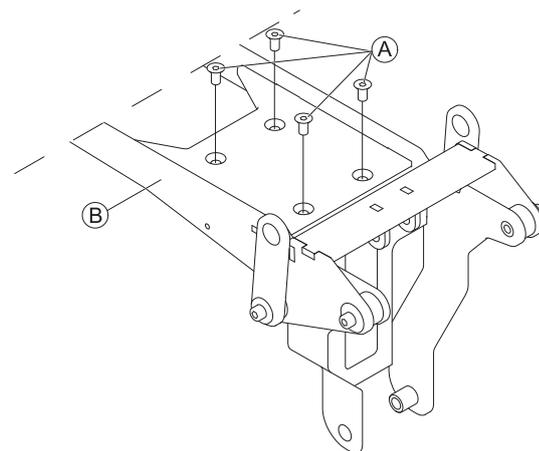


- TX40 Torx key
- Oblique pliers
- Cable ties

We use different types of seat supports in our power wheelchairs. Due to this fact the seat support and the screws on your power wheelchair may look different to the illustrations below. The mounting instructions are not affected by this.

Removing Seat Support

1. Remove seat frame, see *14.6 Replacing Seat Frame, page 93*.
2. Loosen and remove four screws **A**.
3. Lift off seat support **B** from seat / lifting column.



Installing Seat Support



CAUTION!
Damage to lifter column possible. Using incorrect screws or inserting and tightening screws incorrectly will damage lifter column.

The lifter column is supplied with self-tapping screws. The screws are used on underside as well as on upper side.

- Use only screws provided.
- If screws were already screwed in: When reinstalling screws, make sure that they are screwed carefully into existing thread.
- Tighten screws to a torque of 15 – 17 Nm.

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

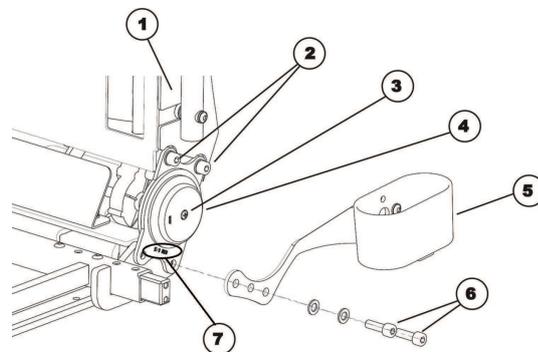
14.8 Replacing Planetary Gear



- 4 mm Allen key
- 5 mm Allen key
- 13 mm wrench (2x)
- Size 2 Phillips screwdriver
- Snap ring pliers

Removing Planetary Gear

1. Loosen and remove the four Allen screws on the plastic shroud (1).
2. Remove the plastic shroud.
3. Loosen and remove the Phillips screw (3).
4. Remove reflector (4).
5. Remove snap ring under reflector (not in the picture).
6. Undo two Allen screws (6).
7. Remove Allen screws (6) incl. the washers and cane holder (5) if necessary.
8. When replacing both planetary gears or dismantling the entire back section, also loosen and remove Allen screws (6) incl. washers on the other side of the power wheelchair.
9. Loosen and remove two Allen screws (2).
10. Remove Allen screws (2) incl. washers and nut, if necessary.
11. Pull planetary gear from axle.
12. Replace planetary gear.



Installing Planetary Gear



Make sure print on crabs (7) "04/7027 42/1.5" is always outside and below.

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

14.9 Seat Column / Lifter Column

14.9.1 Column Types Overview

The following column types can be installed:

Fig. 14-3 Seat Column

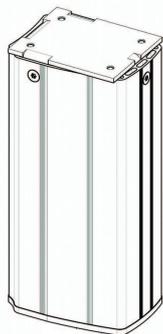


Fig. 14-4 Lifter Column Type A (Electrically Adjustable)

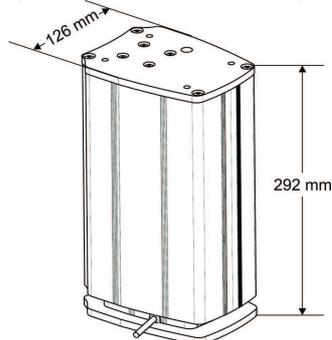
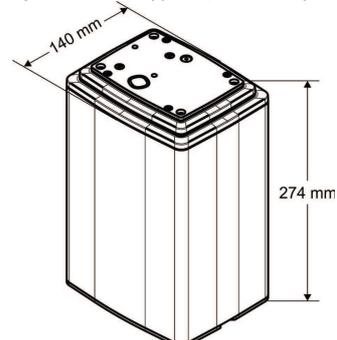


Fig. 14-5 Lifter Column Type B (Electrically Adjustable)



14.9.2 Replacing Seat Column



CAUTION!

Risk of Stains from Lifting Heavy Parts!

- Use proper lifting techniques.



CAUTION!

Risk of Injury Caused by Uncontrolled Movement of Power Wheelchair

- Switch off power supply (power button).
- Engage drive.
- Position power wheelchair on it's side and secure position so it does not turn over.



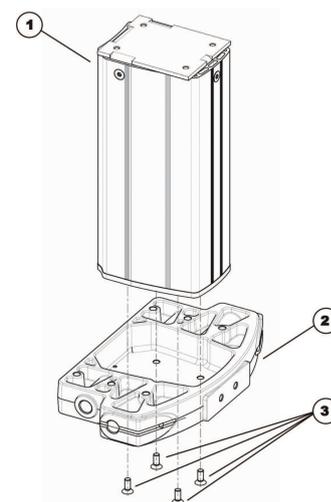
- TX40 Torx key
- Oblique pliers
- Cable ties

Removing Seat Column

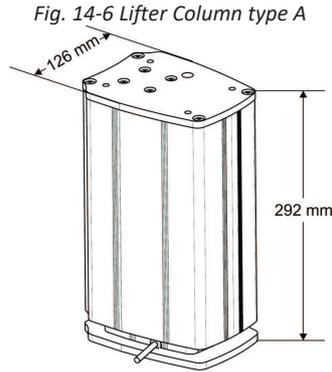
1. Remove seat, see user manual.
2. Remove rear, center and front shroud, see *10.1 Replacing Rear Shroud, page 62, 10.3 Replacing Front Shroud, page 62*
3. Place power wheelchair on side and safeguard it against overturning. Use proper lifting techniques.
4. Loosen and remove four screws (3) on underside of chassis (2).
5. Remove seat column (1).

Installing Seat Column

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



14.9.3 Replacing Lifter Column Type A



WARNING!

Risk of Crushing

The power wheelchair and its components are very heavy. Risk of injury to hands and feet.

- Use proper lifting techniques.



CAUTION!

Risk of Injury Caused by Uncontrolled Movement of Power Wheelchair

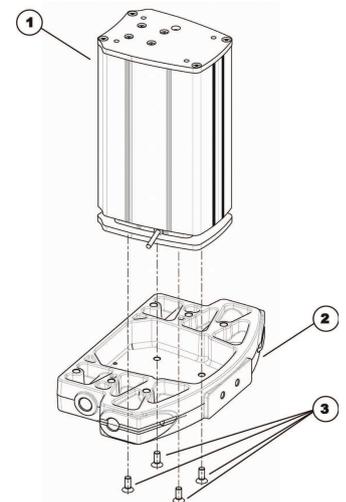
- Switch off power supply (power button).
- Engage drive.
- Position power wheelchair on it's side and secure position so it does not turn over.



- 4 mm Allen key
- TX 40 wrench
- Oblique pliers
- Cable ties

Removing Lifter Column

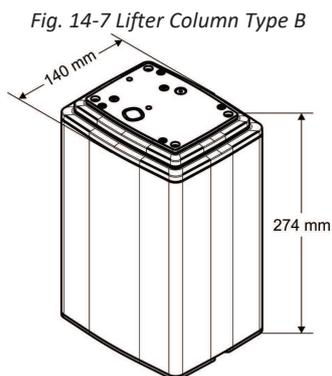
1. Remove seat, see user manual.
2. Remove rear, center and front shroud, see *10.1 Replacing Rear Shroud, page 62, 10.3 Replacing Front Shroud, page 62.*
3. Disconnect cable of lifter column from actuator module on battery box.
4. Open cable clamps and expose cable.
5. Place power wheelchair on its side and safeguard it against overturning. Use proper lifting techniques.
6. Loosen and remove four screws (3) on underside of chassis (2).
7. Remove lifter column (1).



Installing Lifter Column

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

14.9.4 Replacing Lifter Column Type B



WARNING!

Risk of Crushing

The power wheelchair and its components are very heavy. Risk of injury to hands and feet.

- Use proper lifting techniques.



CAUTION!

Risk of Injury Caused by Uncontrolled Movement of Power Wheelchair

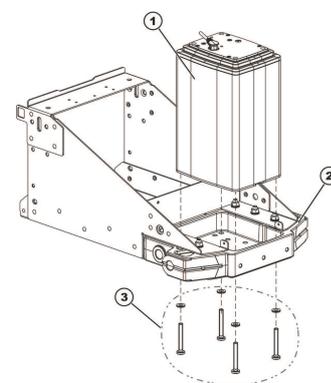
- Switch off power supply (power button).
- Engage drive.
- Position power wheelchair on it's side and secure position so it does not turn over.



- 4 mm Allen key
- T40 torx wrench
- Oblique pliers
- Cable ties
- Torque wrench 5 – 30 Nm (or similar)

Removing Lifter Column

1. Remove rear and center shroud, see 10.1 Replacing Rear Shroud, page 62 and 10.3 Replacing Front Shroud, page 62
2. Open cable clamps on battery box and expose cables.
3. Disconnect cables on actuator module on battery box and, if necessary, on lighting circuit board.
4. Disconnect plug at top of lifter column.
5. Remove seat, see user manual.
6. Place power wheelchair on its side and safeguard it against overturning. Use proper lifting techniques.
7. Loosen and remove four screws (3) on underside of chassis (2).
8. Remove lifter column (1).



Installing Lifter Column



CAUTION!

Damage to Lifter Column Possible

Using incorrect screws or inserting and tightening screws incorrectly will damage lifter column. The lifter column is supplied with self-tapping screws. The screws are used on underside as well as on upper side.

- Use only screws provided.
- If screws were already screwed in: When reinstalling screws, make sure that they are screwed carefully into existing thread.
- Tighten screws to a torque of 15-17 Nm.

1. Install parts in reverse order.
2. Install cables, see 11.15 Cables, page 76.
3. Test all functions.

14.10 Backrest

14.10.1 Replacing Ball Switch

-  • 2.5 mm Allen key
-  • Phillips screwdriver

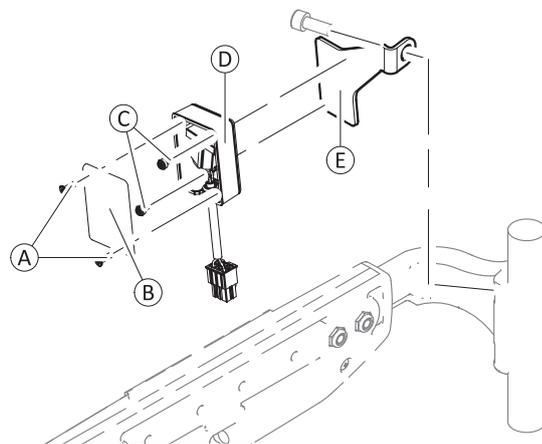
The ball switch is mounted on the backrest stabilization bracket. For more information about the backrest actuator, refer to the service manual of the Modulte.

Removing Switch

1. Unplug cable.
2. Loosen and remove screws **A** including covering plate **B**.
3. Loosen screws **C** on inner side of housing **D**. Remove housing including screws from mounting sheet **E**.
4. Replace switch.

Installing Switch

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



14.10.2 Replacing EasyAdapt Back Unit

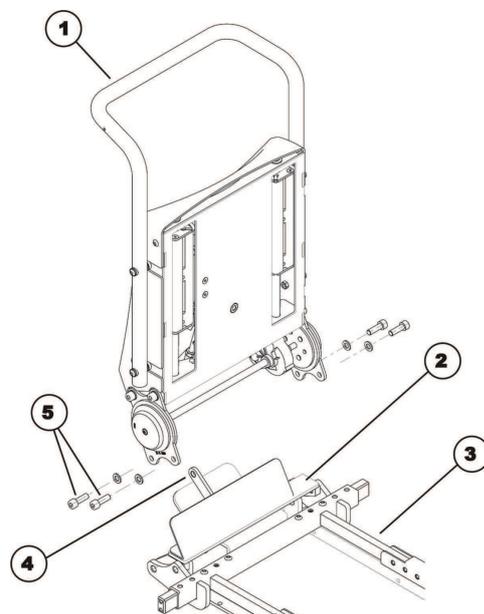
-  • 5 mm Allen key
-  • Oblique pliers
-  • Cable ties

Removing Back Unit

1. Remove back cushion.
2. Pull actuator cable out of actuator module under seat.
3. Pull cable out of power wheelchair. Remove any cable ties which are fitted.
4. Loosen and remove Allen screws (5) incl. washers on left and right side of seat.
5. Carefully remove back section (1) together with lower part (2) from seat support (3). Two parts are interconnected via the arm (4).

Installing Back Unit

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



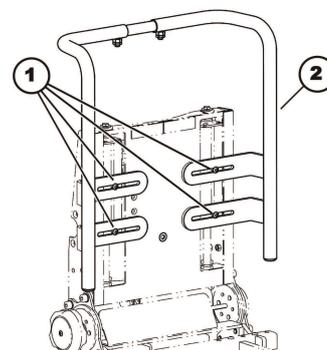
14.10.3 Replacing / Adjusting Universal Backrest Frame for EasyAdapt



- Measuring tape
- Adhesive tape
- 13 mm open-end wrench
- 4 mm Allen key
- 5 mm Allen key
- Phillips screwdriver, size 2

Removing Universal Backrest Frame

1. Remove backrest cushion.
2. Loosen and remove four Allen screws (1).
3. Remove universal backrest frame (2) from EasyAdapt backrest.



Installing and Adjusting the Universal Backrest Frame

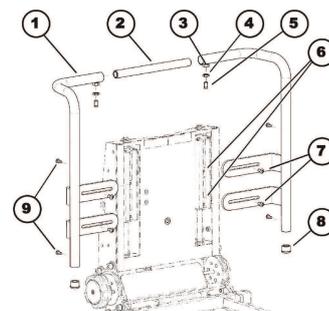


CAUTION!

The Upholstery may get Damaged.

- When adjusting the backrest frame, make sure the upholstery cannot collide with other components.

1. Position both of protective caps (8) in lower ends of lateral tubes (1).
2. Mark center of middle tube (2) with piece of adhesive tape.
3. Insert middle tube into upper ends of lateral tubes.
4. Position lateral tubes of EasyAdapt backrest so that four Allen screws (7) can be screwed into slot nuts (6) through oblong holes. Tighten Allen screws just tight enough that lateral tubes can slide and be adjusted without difficulty.
5. Adjust distance between lateral tubes to desired value using measuring tape. Make sure both lateral tubes are at an equal distance to center of seat.
6. Tighten four Allen screws (7).
7. Adjust middle tube (2) so it is well centered.
8. Screw both of threaded pins (5) into threaded holes (3).
9. Secure threaded pins additionally with counter nuts (4). Tighten counter nuts finger-tight.
10. Screw four Phillips screws (9) into drill holes provided for this purpose on backs of tubes. Screws serve as limiters and prevent backrest from sliding down too far.
11. Remove marking from middle tube.
12. Refit all parts you have removed.
13. Test all functions.



14.11 Mounting Dahl Docking System

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

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

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

1. Remove batteries, see *12.5 Removing Batteries, page 82*.
2. Place screws **A**, lock plate **B** and 8 mm spacer **C** on adapter plate **D**.

 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.

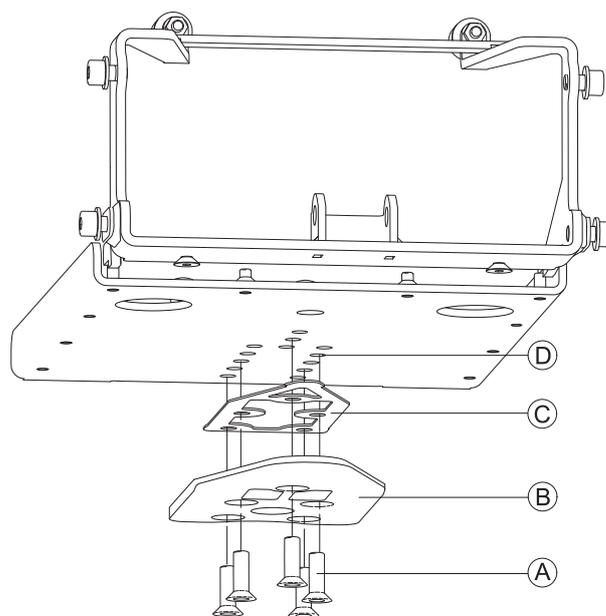
 It is very important to check correct length of screws. If screws are too short to reach through threads, screws do not have strength to carry required load. If screws are too long, batteries or other components can be damaged. If screws are cut too short, replace them with original Dahl screws only.

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.



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