

*Otto Bock*<sup>®</sup>

QUALITY FOR LIFE



Front-wheel drive

Rear-wheel drive

# **C2000**

## **Service Instructions**



## C2000 Service Instructions

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# 1 General Information

## 1.1 Preface

These service instructions describe all regular maintenance tasks as well as repair and replacement tasks for the C2000 power wheelchair from Otto Bock. They include all information required by authorised personnel to correct functional and mechanical defects on components of the power wheelchair.

The information in these service instructions is essential in order to work on the power wheelchair correctly and safely. This is why this document, in particular the section "Safety Instructions", must be read carefully by all persons working on the power wheelchair. This will ensure that all features of the power wheelchair can be utilised to their full advantage.

The service instructions were prepared based on the DIN EN 62079 standard "Preparation of Instructions - Structuring, Content, and Presentation". They are divided into 9 sections



The service instructions also contain cross references that make them easier to use, e.g. "see Section 6.2".

## 1.2 Support



Your national Otto Bock team will be pleased to answer your technical questions. Contact addresses and telephone numbers are listed on the last two pages of this manual.

# 2 Safety

## 2.1 Symbol Legend

 <b>WARNING</b>	Warnings regarding possible risks of severe accident or injury.
 <b>CAUTION</b>	Warnings regarding possible risks of accident or injury.
<b>NOTICE</b>	Warnings regarding possible technical damage.
<b>INFORMATION</b>	Information regarding operation. Information for service personnel.

## 2.2 General Safety Instructions

<b>INFORMATION</b>	Regular maintenance is important. It increases safety and prolongs the service life of the product.
 <b>WARNING</b>	<b>Risk of suffocation.</b> Packaging materials must be kept out of reach of children.
 <b>CAUTION</b>	<b>Risk of accidents and injury because of failure to observe or comply with the safety instructions.</b> All safety instructions contained in these service instructions and all other applicable documents must be observed and complied with. The instructions must be available to personnel entrusted with service work at all times.

**NOTICE**

**Risk of damage due to unauthorised service.** Service and maintenance tasks may only be completed by properly trained authorised personnel. Use only original spare parts and the original options from the manufacturer for all service and maintenance tasks.

**NOTICE**

**Risk of damage caused by failure to comply with maintenance intervals.** Otto Bock recommends having the power wheelchair inspected and maintained for functionality and operational safety by authorised personnel at least once a year. In case of frequent user changes (growing children or youths) or users with changing clinical pictures, the wheelchair should be inspected, adjusted and maintained twice a year.

**NOTICE**

**Risk of damage caused by failure to comply with the service documentation.** Knowledge of the service instructions and the instructions for use is essential for proper service. The service and maintenance instructions must be read carefully before commencing work. The service instructions apply in conjunction with the instructions for use and the spare parts catalogue. All documents must be used together.

**NOTICE**

**Risk of damage due to excessive heat or cold.** The power wheelchair may only be operated in the temperature range from -25 °C to +50 °C. It must not be operated at temperatures outside this range.

**NOTICE**

**Risk of damage caused by overloading.** The maximum load capacity for the power wheelchair is 160 kg or 200 kg depending on the standard version. As an option, the power wheelchair can be retrofitted to a maximum load capacity of 260 kg.

**INFORMATION**

Only use original options supplied by the manufacturer. The optional components may only be mounted as described here. Failure to comply will void the warranty.

**INFORMATION**

Familiarize yourself with the functions of the product. If you are not familiar with the product, read the instructions for use prior to inspection. The instructions for use are available from the manufacturer (see overview of all Otto Bock subsidiaries under "Otto Bock Worldwide"). Additional documentation can be downloaded from the Otto Bock homepage at [www.ottobock.de](http://www.ottobock.de) or [www.ottobock.com](http://www.ottobock.com).

## 2.3 Safety Requirements for the Use of Tools and Aids

**⚠ CAUTION**

**Risk of health impairment due to the use of incorrect tools.** When completing the tasks, only use tools that are suitable for the conditions at the place of work and for which safety and the protection of health are assured with proper use.

Verify proper functionality before use. In the use of tools and supplies, also consider the ergonomic relationships between the place of work, tools and supplies, workplace organisation, workflow and tasks; this is particularly important in regards to posture during the use of tools and supplies.

**⚠ CAUTION**

**Risk of health impairment due to the use of improper work clothing.** Ensure legally prescribed protective work clothing is worn.

**⚠ CAUTION**

**Risk of injury during tasks that involve lifting.** When repair and maintenance tasks must be completed under raised parts or equipment, ensure suitable precautions are taken to secure the applicable components against falling. Equipment used to raise loads must prevent the load from accidentally shifting in a dangerous manner, dropping in free fall or being accidentally released.

When using lifting platforms, ensure that the power wheelchair is centred on the platform and no parts project into the danger area.

**⚠ CAUTION**

**Risk due to hazardous materials.** Hazardous materials may only be kept at the place of work in the quantities required for ongoing tasks. Regularly and safely remove waste and residue. Clean up spilled substances immediately.

## 2.4 Safety Requirements for Service and Maintenance Tasks

**⚠ WARNING**

**Risk of pinching or crushing in the electric seat adjustment range.** When activating the fixture to adjust the seat height, back angle and seat tilt, there are pinch and shear points in the area between the seat frame and wheelchair frame due to the construction. Inform all attendants about this. In order to prevent injuries, ensure that body parts such as the hands and feet are always kept out of the danger zone, that no interfering objects such as clothing or obstacles are in the danger zone and that no unauthorised persons are present there.

**⚠ WARNING**

**Risk of accidents and injury due to loosening plug and screw connections.** Screw and plug connections must be loosened for all adjustment work and when folding the back rest for transportation. This can cause uncontrolled movements of wheelchair components. Especially the backrest can fold to the front or rear when removing the cotter pin (double spring cotter) from the backrest. To avoid injuries at pinch and shear points, carry out such tasks with the support of another person. Make sure to always keep parts of the body (e. g. hands or head) out of the danger zone.

**⚠ WARNING**

**Risk of accidents and injury due to improper use of the seat height adjustment function.**

- The seat height adjustment function may only be used on a level surface.
- When using the seat height adjustment function, no unauthorised persons may be present in the danger zone.
- There must not be any interfering objects or obstacles in the adjustment range.
- All attendants must be informed that there are pinch points caused by the construction in the area between the seat frame and wheelchair frame.
- Users and attendants must not reach into the danger area.



**⚠ WARNING**

**Hazards while working on the brake system.** All repairs and adjustments to the wheel lock may only be made by personnel that has been authorised by Otto Bock. Incorrect settings can lead to a loss of brake functionality, and therefore to serious bodily injuries and even death.

Note that there is no braking functionality when the wheel lock is unlocked. The wheel lock must only be unlocked in hazardous situations and for maintenance or repairs. The corresponding force required for acceleration and deceleration must come solely from the person pushing.

Once push mode is no longer needed, the wheel lock release lever must be locked immediately.

**⚠ CAUTION**

**Risk of pinching or crushing in the pivot range of the footplate(s).** Ensure limbs are not in the danger area when flipping the footplates up or down.

**⚠ CAUTION**

**Risk of accidents due to unsecured screw connections.** When screw connections with thread locks are loosened, they must be equipped with new thread locks or secured with a medium-strength liquid thread lock compound (e.g. Loctite 241®).

After the power wheelchair has been set and adjusted, the attachment screws and/or nuts must be firmly retightened. Observe the applicable torque specifications.

**NOTICE**

**Risk of damage due to improper preparation of maintenance tasks.**

- The power wheelchair must be turned off and the fuse must be removed for all maintenance tasks. This does not apply to functional tests of the electrical components.
- Secure the product to prevent it from tipping over or falling.
- Some components of the power wheelchair, e. g. the batteries, frame, seat and motors, are very heavy. Ensure lifting is done in an ergonomically correct manner or use hoisting devices of sufficient capacity.
- Clean / disinfect the product before you start the inspection. Consult the instructions for use regarding product care or product-specific inspection information.

**NOTICE**

**Risk of damage due to improper use of the seat adjustment functions.** The power wheelchair can be equipped with a seat height adjustment fixture, electric back angle adjustment and electric seat tilt function. The following particularities must be observed during operation:

- The seat function actuators are not intended for continuous use, but only for short-term limited operation (10 % use, 90 % idle time). At maximum load capacity, 10 seconds of operation should be followed by 90 seconds of idle time. The electric seat functions are considered independently of the driving function for this purpose.
- The maximum load capacity of the seat with seat height adjustment function is 130 or 200 kg.
- The seat height adjustment function may not be operated in case of errors or malfunctions.
- If creep speed is not automatically activated when the seat height adjustment function is operated, an error has occurred. This problem must be corrected promptly by personnel authorised and trained by Otto Bock. The power wheelchair may only be used with the seat height adjustment in its lowest position until the fault is repaired.

**NOTICE**

**Risk of damage due to uncontrolled movements.** When raising the power wheelchair, e.g. with a jack, secure it against slipping and tipping sideways by using a suitable block under the drive unit sustainer.

**NOTICE**

**Risk of damage to the padding.** During any work on the seat, the padding must be adequately protected against mechanical and chemical damage. The seat and backrest cushions are flame retardant but nevertheless flammable. They must not come into contact with open flame or embers.

**NOTICE**

**Risk of damage due to improper cleaning after the completion of maintenance tasks.** The power wheelchair may not be cleaned with a jet of water or a pressure washer under any circumstances. A cloth or sponge may be used for cleaning. Water must not come into direct contact with the motors under any circumstances. Check the operating performance of the power wheelchair after cleaning.

**INFORMATION**

Prior to using the power wheelchair, all the necessary mechanical adaptations (e. g. mounting special controls) and software settings (e. g. programming the control unit) must be made to comply with the individual requirements and abilities of the user. Settings may only be made by personnel that has been authorised and trained by Otto Bock.

**INFORMATION**

The tyres of the power wheelchair contain chemical substances that can react with other chemical substances (such as cleaning agents, acids, etc.).

**INFORMATION**

Piston rods do not require lubrication. They are maintenance-free.

## 2.5 Safety Requirements for Maintenance Tasks on Electrical Components

**⚠ WARNING**

**Risk of injury due to explosive gases.** Explosive gases can develop while the batteries are charging. The following safety instructions must be followed under all circumstances:

- Ensure sufficient ventilation when charging the batteries in an enclosed room.
- Smoking and open flames are not permitted.
- Sparks must be avoided.
- The air vents in the trim must not be covered.

**⚠ CAUTION**

**Risk of injury while working on the battery.**

- Only use a battery charger supplied by Otto Bock which has been tested and approved for the respective batteries used by Otto Bock (observe information on the charger). Failure to do so can result in a battery explosion and possible impairment of health due to contact with battery acid.
- Smoking and open flame are prohibited while working on the battery. Sparks must be avoided.
- Explosive gases can develop while the batteries are charging. Observe the safety instructions provided by the battery manufacturer. Wear protective goggles. Ensure sufficient ventilation when charging the batteries in an enclosed room.
- The air vents in the trim must not be covered.
- Drive batteries can supply very large amounts of energy and may arc if they are short-circuited. Therefore, always disconnect the batteries when working on the motor control or wiring.

**⚠ CAUTION**

**Risk of injury due to uncontrolled movements.** The fuse must always be removed for any maintenance work where the battery cover is open.

**⚠ CAUTION**

**Risk of injury during tasks that involve lifting.** The weight of a battery is approximately **40 kg**. When removing or installing the batteries, use hoisting devices of sufficient capacity or complete these tasks with the support of a helper.

**NOTICE**

**Risk of damage due to improper preparation of maintenance tasks.**

- If the driving function is not required, turn off the control unit or jack up the drive wheels in order to prevent uncontrolled operation through accidental joystick activation.
- Water must not come into direct contact with the electronics or battery during maintenance tasks.
- When attaching plug connections on the controller, ensure the contacts are assigned correctly.

**NOTICE**

**Risk of battery damage due to falling.** Hoisting devices used for transportation must have a sufficient capacity. Secure the batteries against falling.

**NOTICE**

**Risk of battery damage.**

- Always remove the main fuse before doing any work on the batteries. In order to prevent short circuits, always use insulated tools.
- Prevent deep discharge of the batteries in order to avoid loss of functionality and permanent battery damage.
- Ensure correct polarity is used when connecting the batteries. The black cable must be connected to the negative pole and the red cable to the positive pole.

**NOTICE**

**Risk of damage to the battery charger.** Prevent overheating of the charger during the charging process. Ensure that the cooling ribs on the back of the device are not covered.

**INFORMATION**

For the purpose of shipping or when the C2000 power wheelchair is not being used for an extended period of time, remove the fuse from the battery case in order to prevent deep discharge of the batteries due to standby current.

**INFORMATION**

The power wheelchair has been tested according to EMC regulations. The following particularities must be observed when using the wheelchair:

- The driving characteristics of the power wheelchair can be affected by electromagnetic fields (mobile phones or other radiating devices). Therefore all mobile devices must be turned off when driving.
- The power wheelchair can generate electromagnetic fields that can cause interference with other devices. Therefore, turn off the control unit whenever you do not need it.

## 2.6 Safety functions

### INFORMATION

In dangerous situations, the power wheelchair can be turned off at any time using the on/off button. When the button is pressed, the power wheelchair brakes immediately and the electric functions will be stopped.

Malfunctions such as an insufficient supply of power to the wheel lock are recognised by the software, triggering the emergency stop brake or reducing the speed of the power wheelchair. At the same time, a warning signal will be emitted.

## 2.7 Safety Instructions for Controller Configuration

### ⚠ WARNING

**Risk of accidents and injury due to incorrect configuration settings.** Modified parameter settings in the configuration can lead to changes in driving characteristics. In particular, changes to the speed, acceleration, braking or joystick settings can lead to unexpected and therefore uncontrollable operating performance with a risk of accidents. Always test the driving characteristics of the power wheelchair after configuration / programming is complete. Programming must only be completed by authorised personnel. Neither Otto Bock nor the control unit manufacturer are liable for damages (especially in combination with special controls) caused by programming that was not properly / professionally adapted to the abilities of the wheelchair user.

## 2.8 Safety Requirements for Disposal

### INFORMATION

If the power wheelchair is no longer in use, it must be disposed of properly in accordance with national regulations.

If a wheelchair is to be disposed of, all components and materials of the power wheelchair must be recycled or disposed of properly.

### 3 Transportation and Storage

The following environmental conditions apply to transportation and storage:

Ambient temperature -40 °C to +65 °C

#### 3.1 Transportation

##### **⚠ CAUTION**

**Risk of injury due to insufficient restraints.** Secure the power wheelchair during transportation in another vehicle by tightening the tensioning straps properly. Only attach the tensioning straps to the corresponding eyebolts and mounting points.

##### **⚠ CAUTION**

**Risk of pinching or crushing in the pivot range of the footplate(s).** Ensure limbs are not in the danger area when flipping the footplates up or down.

##### **NOTICE**

**Risk of damage due to falling.** The maximum net weight of the power wheelchair is **185 kg**. Hoisting and transportation devices used for transportation must have a sufficient capacity.

The eyebolts on the drive and steering ends of the power wheelchair serve as mounting points for tensioning straps. Attachment to the spokes on the rims is not permitted! Before transporting the power wheelchair, switch off the control unit and engage the wheel lock.



Figure 1 Eyebolts, drive end (1) / steering end (2)

### 3.1.1 Folding for Transportation

1. Flip up the footrests.
2. Remove the side panels (see Section 6.13.10).
3. Fold down the back rest (see Section 3.1.2).



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Figure 2 Flipping up the footrests

### 3.1.2 Folding the back rest

1. Remove the side panels (see Section 6.13.10).
2. Pull the release strap to the rear.
3. Fold the back rest forward by hand and lay it down onto the seat bottom.



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Figure 3 Folding the back rest

### 3.1.3 Folding the back rest with electric back angle adjustment

1. Remove the side panels (see Section 6.13.10).
2. Push up the lever and release the cross bolt at the lower end of the drive unit.
3. Remove the cross bolt from the holder.
4. Fold the back rest forward and lay it down onto the seat bottom.



---

Figure 4 Removing the cross bolt



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Figure 5 C2000 power wheelchair folded for transportation

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### 3.2 Storage

**INFORMATION**

If the power wheelchair is not moved for several days, permanent colour changes may occur where the wheelchair comes into contact with the surface it is standing on. A suitable mat should be used when parking the wheelchair for extended periods of time.

**INFORMATION**

Tyres contain chemical substances that can react to other chemical substances (such as cleaning agents, acids, etc.).

Black tyres contain soot particles. They can leave black traces on the ground. For this reason, Otto Bock recommends choosing grey tyres when using the power wheelchair mainly indoors.

**INFORMATION**

Direct sunlight/UV light causes the tyres to age prematurely. As a result, the tread surface hardens and corner pieces break out of the tread.

**INFORMATION**

Avoid parking the wheelchair outdoors whenever possible. Regardless of wear and tear, replace the tyres every **2 years**.

**INFORMATION**

Remove the fuse for shipping or when the power wheelchair is not being used for an extended period of time.

The power wheelchair must be stored in an enclosed area. Remove the main fuse; otherwise, there is a risk of deep discharge.

The storage location must be dry and have sufficient air circulation. There must not be any build-up of humidity. The power wheelchair must not be subjected to any damaging exterior influences, e.g. rain, snow, or strong solar radiation during storage.

Otto Bock recommends storing the power wheelchair with slightly elevated tyre pressure and using assembly stands or wooden blocks in order to raise the tyres (completely) off the ground in order to protect them from frost. Regularly rotating the wheels helps to prevent flat spots.



## 4 Required Tools and Accessories

Suitable tools and aids for the completion of service tasks are listed below:

- Flat screwdrivers, blade widths: 2.5/3.5/5.5 mm
- Phillips head screwdriver, size 2 mm
- Reversible ratchet handle wrench and sockets, sizes 8 – 20 mm
- Ring or open-end wrenches, size 8 – 24 mm
- Allen wrenches, sizes 2 – 8 mm
- Torque wrench
- Socket, size 19 mm
- Puller
- Pin punch, Ø 3 mm
- Plastic hammer
- Hand drill
- 4 mm drill bit
- Tyre lever
- Plastic tyre mounting lever
- Inner tube repair kit
- Side cutting pliers
- Circlip pliers
- Water pump pliers, gripping width up to 32 mm
- Liquid thread lock “medium strength”
- Handheld Programming Device
- Battery charger
- Hoisting devices of sufficient capacity
- Jack



Figure 6 Tools

---













Figure 7 Handheld programming device

## 5 Information Display

### INFORMATION

For information on the display of errors with the help of the control panel display / LCD monitor or with the help of the handheld programming device / PC software, please see Section 7 and 8.

Messages are shown on the control panel display or LCD monitor:

Display Symbol(s)	LCD Monitor Display	Function
		Driving menu with speed level and battery capacity
		Low battery capacity
		Charging process with drive stop
		Electric back adjustment
		Electric seat tilt













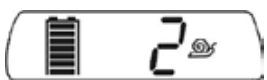


	-	Coupled electric seat adjustment (back rest and seat tilt)
-		Special functions, e.g. coupled electric seat adjustment (back adjustment and seat tilt)
		Seat height adjustment
		Electric footrests, coupled
		Electric footrest, left
		Electric footrest, right
		Drive-away lock
		Creep speed
		Attendant control

Table 1 Information Display on the Control Panel / LCD Monitor

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## 6 Service Tasks

### 6.1 Inspecting the General Condition

- Check all safety-related components for corrosion, repair if required and reapply corrosion protection.
- Check weld seams.
- Check tightness of screw connections; replace thread-locking compound if required; observe any defined torque specifications; replace defective screws (e. g. in case of corrosion).
- Check cables for ruptures, signs of wear and proper attachment; replace defective components.
- Check cable connections and plug connections.

### 6.2 Fuse Replacement

The 100 A fuse is located in a fuse housing on the side of the drive unit sustainer next to the charging receptacle.

#### Preparation:

- Turn the control unit off.

#### Steps:

1. Open the hinged cover of the fuse housing.
2. Pull out the fuse and replace if required.

Properly reassemble all components upon completion of the work.



Figure 8 Fuse housing with inserted fuse

- 1 Fuse housing with open cover
- 2 Fuse

## 6.3 Batteries

### ⚠ CAUTION

#### Risk of injury while working on the battery.

- Smoking and open flame are prohibited while working on the battery. Sparks must be avoided.
- Explosive gases can develop while the batteries are charging. Observe the safety instructions provided by the battery manufacturer. Wear protective goggles. Ensure sufficient ventilation when charging the batteries in an enclosed room.
- Drive batteries can supply very large amounts of energy. They may arc if they are short-circuited. Therefore, always disconnect the batteries when working on the motor control or wiring.

### ⚠ CAUTION

**Risk of injury due to electric current.** Always remove the main fuse before doing any work on the batteries.

### ⚠ CAUTION

**Risk of injury during tasks that involve lifting.** The weight of a battery is approximately **40 kg**. When removing or installing the batteries, use hoisting devices of sufficient capacity or complete these tasks with the support of a helper.

### NOTICE

**Risk of battery damage due to falling.** Hoisting devices used for transportation must have a sufficient capacity. Secure the batteries against falling.

### NOTICE

#### Risk of battery damage.

- In order to prevent short circuits, always use insulated tools when working on the batteries.
  - Prevent deep discharge of the batteries in order to avoid loss of functionality and permanent battery damage.
  - Ensure correct polarity is used when connecting the batteries and battery capacity meter.
- The standard version of the C2000 power wheelchair includes two low-maintenance 12 V gel batteries. The batteries are located under the seat of the power wheelchair.

### 6.3.1 Charging the Batteries

### ⚠ WARNING

**Risk of injury due to explosive gases.** Explosive gases can develop while the batteries are charging. The following safety instructions must be followed under all circumstances:

- Ensure sufficient ventilation when charging the batteries in an enclosed room.
- Smoking and fire are not permitted.
- Sparks must be avoided.
- Do not cover the air vents in the trim.

### ⚠ WARNING

**Explosion hazard due to sparks.** Always switch off the battery charger and remove the mains plug before disconnecting the battery.

**NOTICE**

**Risk of damage due to incorrect battery handling.** Please note the following when handling the batteries:

- Charge the batteries immediately if the bar at the bottom of the battery indicator is flashing.
- Do not charge in the green range.
- During extended periods of disuse, charge the batteries of the power wheelchair weekly.
- Otto Bock assumes no liability for damage caused by deep discharge.

**NOTICE**

**Risk of damage to the battery charger / risk of damage caused by the battery charger.** Please note the following when using the charger:

- Only use a battery charger supplied by Otto Bock which has been tested and approved by Otto Bock for the respective batteries (observe information on the charger). Failure to do so can result in a battery explosion and possible impairment of health due to contact with battery acid.
- The information on the nameplate of the charger must match the country-specific voltage of the respective power supply network.
- Only use the battery charger within the specified ranges of temperature and humidity.
- Place the rubber feet of the battery charger on a level surface.
- When setting the charger up close to a window, protect it against direct sunlight.
- Keep the charger from overheating. The vent openings on the back of the charger must not be covered.
- Turn off the control unit during the charging process so that the entire charging current flows to the battery.
- Avoid dust and dirt. Only clean with a dry cloth.

The remaining battery capacity determines the range of the power wheelchair. The following factors affect the battery capacity:

- Ambient temperature
- Age of the batteries
- Amount of use
- Charging process

Driving for an extended period of time in the lower range of the battery indicator will result in deep discharge and therefore battery damage. The control unit of the power wheelchair switches to power-saving creep speed when driving once the battery capacity is low.

**Tools:**

- Charger intended for use by Otto Bock.

**Steps:**

1. Turn off the control unit on the power wheelchair.
2. Remove the metal pin on the plug of the charger.
3. Insert the plug into the charging receptacle.
4. Connect the charger to the power supply network and switch it on. Charging starts automatically.
5. When the charging process is complete, turn off the battery charger.
6. Disconnect the mains plug.

7. Disconnect the charging plug.
8. Switch on the control unit. The power wheelchair is now ready for operation.



**Figure 9** Connecting the charger to the charging receptacle

- 1 Charging receptacle
- 2 Metal pin



**Figure 10** Otto Bock battery charger

The battery charger features a programmed recharging phase. Once a discharged battery is completely charged (**after approximately 8 hours**), the battery charger can remain connected with no risk of overcharging or damaging the battery.

The battery charger indicates the following states:

Display	Function
Yellow LED is illuminated	Battery is charging
Yellow LED flashes	Battery is charged to 90 %
Green LED is illuminated	Battery is fully charged
Red LED is illuminated	Incorrect polarity (unplug the battery charger from the wall socket)
Red LED flashes	Battery is defective, or charging time has been exceeded

**Table 2** Battery capacity indicator on the battery charger

If none of the LEDs are lit, there is no power supply.

The battery capacity is indicated by the "Battery Capacity" LEDs in 7 segments. Each segment represents approximately 14 % of the total capacity.

### 6.3.2 Battery Replacement

#### NOTICE

**Risk of battery damage.** Ensure correct polarity is used when connecting the batteries. The black cable must be connected to the negative pole and the red cable to the positive pole.

#### Preparation:

- Turn the control unit off.
- Remove the fuse (see Section 6.2).
- Remove the seat including seat frame (see Section 6.13.1 and 6.13.5).

#### Tools:

- Allen wrench, size 3
- Open-end or combination wrench, size 11

#### Steps:

1. Loosen and remove the four Allen head screws on the cover plate.
2. Remove the cover plate.
3. Disconnect all battery cables.
4. Lift out the batteries by the handles and replace if required.

Properly reassemble all components upon completion of the work.



Figure 11 Removing the cover plate from the battery case



## 6.4 Reinstalling the Battery Cable

### Preparation:

- Remove the seat including seat frame (see Section 6.13.1 and 6.13.5).
- Remove the batteries (see Section 6.3.2).

### Tools:

- Flat screwdriver
- Ring or open-end wrench, size 8
- Side cutting pliers

### Steps:

1. Remove the controller cover.
2. Disconnect the battery cable from the controller.
3. Open the cable ties.
4. Remove the battery cable and replace if required.

Properly reassemble all components upon completion of the work.



---

Figure 12 Battery cable

## 6.5 Replacing the Charging Receptacle

### INFORMATION

When connecting the cables, ensure correct assignment.

#### Preparation:

- Turn the control unit off.
- Remove the fuse (see Section 6.2).
- Remove the seat including seat frame (see Section 6.13.1 and 6.13.5).
- Remove the batteries (see Section 6.3.2).

#### Tools:

- Allen wrench, size 3
- Small Phillips screwdriver

#### Steps:

1. Loosen the charging receptacle connection cable on the controller.
2. Disconnect all cable ties on the connection cable between the charging receptacle and the controller.
3. Loosen two slotted head screws on the front of the charging receptacle.
4. Pull out the charging receptacle including connection cable and replace if required.

Properly reassemble all components upon completion of the work.

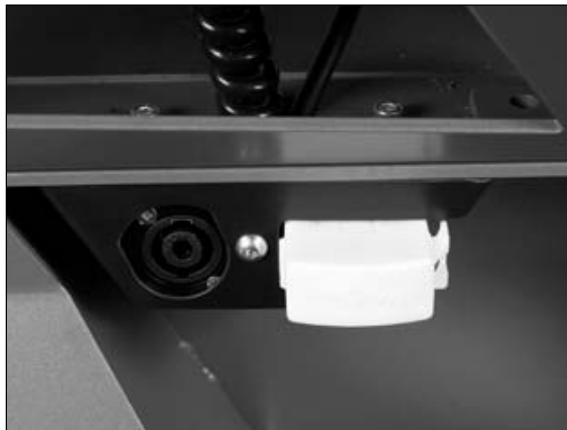


Figure 13 Removing the charging receptacle

## 6.6 Replacing the Controller

The controller on the C2000 is attached above the drive axle (on the outside of the battery case).

### INFORMATION

When connecting the cables, ensure correct assignment.

#### Preparation:

- Remove the fuse (see Section 6.2).

#### Tools:

- Flat screwdriver
- Ring or open-end wrench, size 8

#### Steps:

1. Remove the cover over the connectors; in order to do so, remove two black cover caps and loosen and remove two nuts on set screws.
2. Loosen the controller mount; in order to do so, loosen and remove two nuts on set screws.
3. Loosen all connection cables on the controller.
4. Remove the controller and replace if required.

Properly reassemble all components upon completion of the work.



Figure 14 Removing the cover, removing the controller

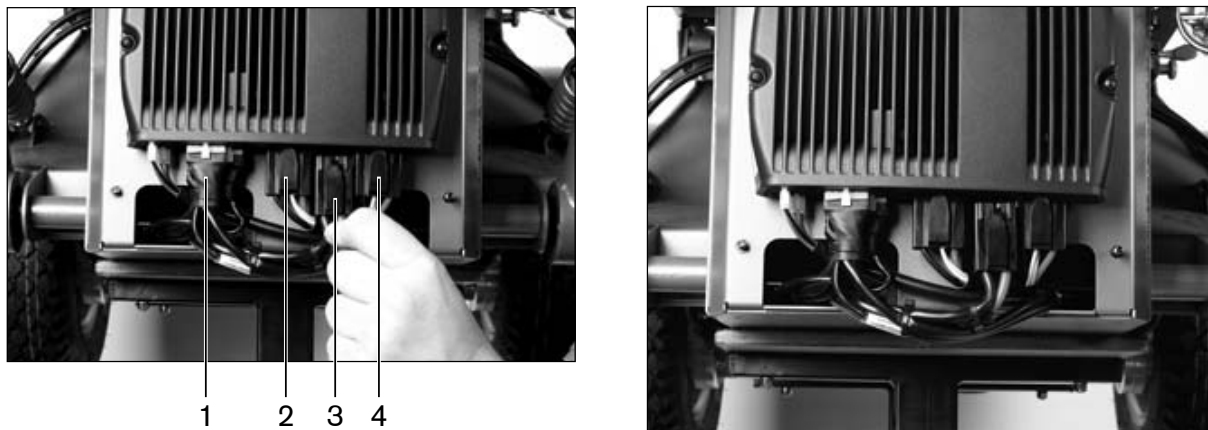


Figure 15 Connections on the controller, disconnecting

- 1 Actuator, steering motor, steering potentiometer connector
- 2 Left motor connector (493E62=LK00x)
- 3 Battery cable connector
- 4 Right motor connector (493E62=RK00x)

## 6.7 Replacing the Seat Module

The seat module is attached on the seat frame underneath the seat.

### INFORMATION

When connecting the cables, ensure correct assignment.

#### Preparation:

- Make the seat module freely accessible via electric seat functions or remove the seat (see Section 6.13.1).
- Remove the fuse (see Section 6.2).

#### Tools:

- Open-end or combination wrench, size 8

#### Steps:

1. Loosen all connection cables on the seat module.
2. Loosen and remove two nuts on set screws.
3. Remove the seat module and replace if required.

Properly reassemble all components upon completion of the work.



Figure 16 Removing the seat module

## 6.8 Wheels

### **⚠ CAUTION**

**Risk of accidents due to worn or defective tyres.** Replace wheels with PU tyres if the material is cracking or damaged, or when the tread becomes worn down to such an extent that there is only 5 mm of radius left on the outer edges of the tyre.  
Replace the casing of pneumatic tyres if it is bald or shows signs of cracking or other damage.

The power wheelchair is propelled by two 16" drive wheels and steered by means of two 14" steering casters.

### 6.8.1 Inspecting the General Condition

- Verify the tyre condition in regards to tread, porosity and cracking.

### **INFORMATION**

Direct sunlight (UV light) causes the tyres to age prematurely. As a result, the tread surface hardens and corner pieces break out of the tread.

### **INFORMATION**

Avoid parking the wheelchair outdoors whenever possible. Regardless of wear and tear, the tyres should be replaced every 2 years.

If the wheelchair is parked for an extended period of time or the tyres overheat (e.g. in the vicinity of radiators or in case of exposure to strong sunlight behind glass), the tyres may become permanently deformed. Therefore, sufficient clearance should always be maintained from sources of heat, and the power wheelchair should be moved frequently or placed on blocks for storage.

## 6.8.2 Removing the Drive Wheel

### NOTICE

**Risk of damage due to uncontrolled movements.** When raising the power wheelchair, e.g. with a jack, secure it against slipping and tipping sideways by using a suitable block under the drive unit sustainer.

### Preparation:

- Turn off the control unit.
- Use a jack to raise the power wheelchair so that the wheel being replaced can rotate freely.

### Tools:

- Allen wrench, size 5
- Torque wrench
- Jack

### Steps:

1. Loosen and remove the five Allen head screws.
2. Pull the drive wheel forward off the threaded bolts and replace if required.

Properly reassemble all components upon completion of the work.

### INFORMATION

When reassembling the wheel, tighten the screws to a torque of **25 Nm**.



Figure 17 Removing the drive wheel

### 6.8.3 Removing the Steering Caster

**NOTICE**

**Risk of damage due to uncontrolled movements.** When raising the power wheelchair, e.g. with a jack, secure it against slipping and tipping sideways by using a suitable block under the drive unit sustainer.

**Preparation:**

- Turn off the control unit.
- Use a jack to raise the power wheelchair so that the wheel being replaced can rotate freely.

**Tools:**

- Allen wrench, size 5
- Torque wrench
- Jack

**Steps:**

1. Loosen the four Allen head screws around the wheel hub.
2. Pull the steering caster forward off the wheel hub and replace if required.

Properly reassemble all components upon completion of the work.

**INFORMATION**

When reassembling the steering caster, tighten the screws to a torque of **25 Nm**.



Figure 18 Removing the steering caster

The wheels on the drive and steering end have rims consisting of 2 sections. Therefore, this step is not possible / required.

#### 6.8.4 Replacing the Casing and / or Inner Tube

The wheel rims are in two parts and can be separated by removing the Allen head screws.

##### Preparation:

- Remove the wheel (see Section 6.8.2 or 6.8.3).

##### Tools:

- Plastic tyre mounting lever
- Inner tube repair kit
- Allen wrench, size 6

##### Steps:

1. For pneumatic tyres: Bleed all air from the tyre.
2. Loosen and remove five Allen head screws that connect the two parts of the rim to each other.
3. Pry back the casing from the edges of the rim.
4. For pneumatic tyres: Push the valve fully into the rim.
5. For pneumatic tyres: Remove the inner tube.
6. For pneumatic tyres: Repair or replace the inner tube.
7. Replace the casing if defective and mount it on the rim.
8. Join the two parts of the rim with the screws.
9. For pneumatic tyres: Inflate the tyre, observing the allowable tyre pressure.
10. Install the wheel.



Figure 19 Removing the casing



### 6.8.5 Removing the Drive Wheel Splash Guard

**Preparation:**

- Remove the drive wheel (see Section 6.8.2).

**Tools:**

- Allen wrench, size 4
- Open-end or combination wrench, size 10

**Steps:**

1. Loosen and remove the six Allen head screws.
2. Remove the splash guard and replace if required.

Properly reassemble all components upon completion of the work.



---

Figure 20 Removing the drive wheel splash guard

### 6.8.6 Removing the Steering Caster Splash Guard

**Preparation:**

- Remove the steering caster (see Section 6.8.3).

**Tools:**

- Allen wrench, size 3

**Steps:**

1. Loosen and remove the three Allen head screws.
2. Remove the splash guard and replace if required.

Properly reassemble all components upon completion of the work.



Figure 21 Removing the steering caster splash guard

### 6.8.7 Caster Fork

**CAUTION**

**Risk of accidents and injury due to improper completion of work on the steering system.** In order to avoid damage or incorrect settings on the chain steering system, the removal and installation of the caster forks may only be completed at the plant of Otto Bock Manufacturing Königsee GmbH.

## 6.9 Removing Springs, Changing the Spring Tension

**NOTICE**

**Risk of damage due to improper preparation of maintenance tasks.** Use suitable objects such as wooden blocks to secure the power wheelchair against sliding or tipping. The drive wheels must rotate freely.

### 6.9.1 Removing the Drive Axle Spring

The springs on the drive axles are mounted at two points and connect the drive unit sustainer to the drive motor mounts.

**Preparation:**

- Remove the drive wheel (see Section 6.8.2).
- Remove the splash guard (see Section 6.8.6).

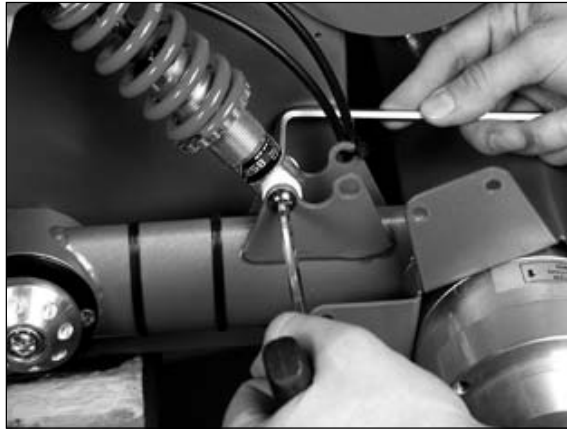
**Tools:**

- 2 x Allen wrench, size 5

**Steps:**

1. Loosen both Allen head screws that attach the spring to the drive axle.
2. Remove the drive axle spring and replace if required.

Properly reassemble all components upon completion of the work.



---

Figure 22 Removing the drive axle spring

### 6.9.2 Removing the Steering Axle Spring

The springs on the steering axle are attached to the drive unit sustainer at two points.

#### Preparation:

- Remove the steering caster (see Section 6.8.3).
- Remove the splash guard (see Section 6.8.7).

#### Tools:

- 2 x Allen wrench, size 5

#### Steps:

1. Loosen both Allen head screws holding the steering caster spring.
2. Remove the drive wheel spring and replace if required.

Properly reassemble all components upon completion of the work.



---

Figure 23 Removing the steering axle spring

## Adjusting the Spring Tension

Follow the same process to adjust the spring tension on the drive axle and steering axle:

1. Turn the plate up or down by hand or with a suitable tool.

### INFORMATION

Ensure that both drive axle springs and both steering axle springs, respectively, are adjusted equally! The factory setting is **60 mm** with no load on the corresponding drive axle or steering axle. Please use a medium-strength thread lock compound (e.g. Loctite) to prevent unintentional loosening or adjustment.

Properly reassemble all components upon completion of the work.

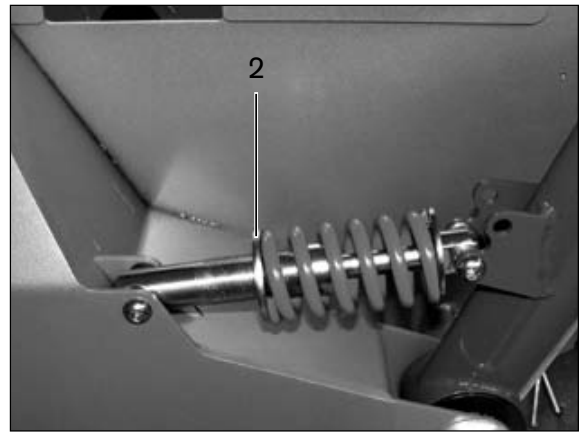
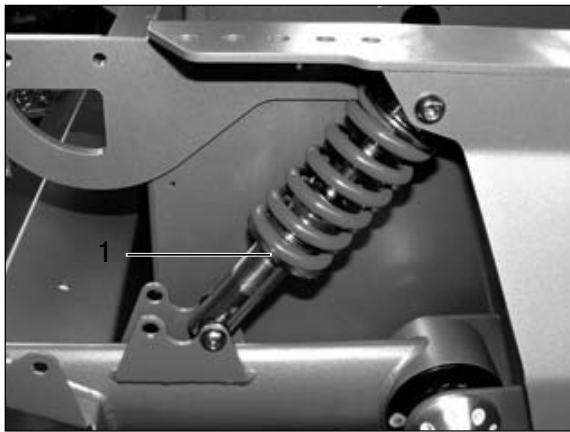


Figure 24 Adjusting the spring tension

- 1 Drive axle spring plate
- 2 Steering axle spring plate

## 6.10 Steering

### 6.10.1 Adjusting the Chain Tension

#### ⚠ CAUTION

**Risk of accidents or injury due to incorrect chain settings.** An improperly adjusted chain can lead to steering system malfunctions. Ensure that the steering casters and drive wheels are parallel and in line with each other after tightening the chain, so that the steering direction corresponds to the programming of the power wheelchair.

#### NOTICE

**Risk of damage due to the improper completion of maintenance tasks.** The removal and installation of the chain may only be completed at the plant of Otto Bock Manufacturing Königsee GmbH.

#### NOTICE

**Risk of tyre damage.** Incorrect chain settings may lead to uneven tyre wear, which can have a negative impact on the driving characteristics of the power wheelchair.

The chain tension is adjusted using two adjustment screws on the side opposite the steering motor.

**Preparation:**

- Align the steering casters and drive wheels: They must be parallel and in line with each other.

**Tools:**

- Allen wrench, size 3
- Allen wrench, size 6
- Open-end or combination wrench, size 10

**Steps:**

1. Loosen and remove the four Allen head screws on the top chain cover.



Figure 25 Removing the chain cover

2. Remove the top chain cover.
3. Loosen the front and rear mounting screws (M8x40) of the toothed wheels in the slotted hole so that the chain tension can be adjusted.



Figure 26 Front mounting screw (1) / rear mounting screw (2)

- Adjust the toothed wheel position / chain tension by turning the corresponding adjustment nuts until directional stability is established.

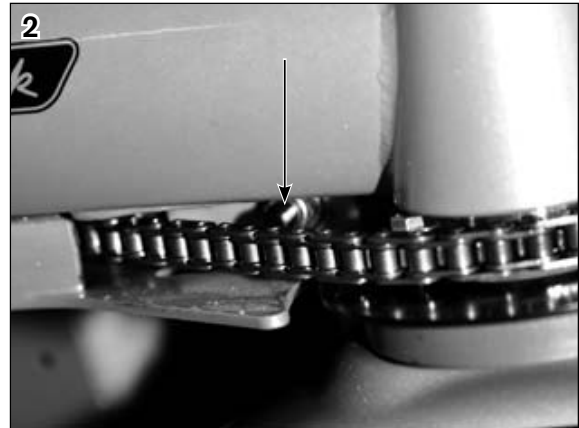


Figure 27 Front adjustment nut (1) / rear adjustment nut (2)

- Retighten the mounting screws (M8x40) for the toothed wheels. Properly reassemble all components upon completion of the work.

### 6.10.2 Steering motor

**⚠ CAUTION**

**Risk of accidents and injury due to improper completion of work on the steering motor.** An incorrectly installed and / or adjusted steering motor can lead to steering system malfunctions. The removal and installation of the steering motor, including all adjustment tasks, may only be completed at the plant of Otto Bock Manufacturing Königsee GmbH.

### 6.10.3 Steering Potentiometer

**⚠ CAUTION**

**Risk of accidents and injury due to improper completion of work on the steering potentiometer.** An incorrectly installed and / or adjusted steering potentiometer can lead to steering system malfunction. The removal and installation of the steering potentiometer, including all adjustment tasks, may only be completed at the plant of Otto Bock Manufacturing Königsee GmbH.

## 6.11 Wheel Lock and Wheel Lock Release

### **⚠ WARNING**

**Danger to life due to wheel lock malfunction.** Incorrect wheel lock settings can lead to a loss of brake functionality and therefore to serious bodily injuries and even death. Repairs and adjustments to the wheel lock may only be carried out by authorised personnel.

### **⚠ WARNING**

**Risk of accidents and injury due to lack of brake functionality.** When the wheel lock is deactivated (push mode), no brake functionality is available. When moving the power wheelchair on an incline, the person pushing must provide the appropriate brake force.

### **NOTICE**

**Risk of damage when parking the wheelchair with the wheel lock deactivated.** Deactivating the wheel lock may result in uncontrolled rolling of the power wheelchair. Therefore, ensure that the wheel lock is engaged when parking the power wheelchair.

Both drive motors of the C2000 power wheelchair are braked simultaneously by the control unit via a motor brake. In case of braking unit defects, the motor brake can only be replaced as a unit with the drive motor.

In case of control unit failure or insufficient battery capacity, the power wheelchair can be pushed. To do so, the wheel lock is unlocked with the mechanical wheel lock release. The wheel lock release is located on the opposite side of the fuse / charging receptacle on the side of the frame.

### 6.11.1 Replacing the Wheel Lock Release and Bowden Cables

### **⚠ CAUTION**

**Risk of accidents and injury due to rolling.** Before working on the wheel lock release, turn off the power wheelchair and secure it against rolling away.

### **INFORMATION**

Only mount the wheel lock release while it is unlocked. When the joystick is activated while the wheel lock is deactivated, the control unit emits an error signal on the control panel. If this is not the case, there is a malfunction that must be corrected immediately by a specialist dealer.

#### **Tools:**

- Side cutting pliers
- Open-end or combination wrench, size 7
- Allen wrench, size 3
- Allen wrench, size 4

#### **Steps:**

1. Remove the plastic cover and release the cable ties on the Bowden cables.
2. Loosen and remove two nuts per Bowden cable on both drive motors.



Figure 28 Attachment of the Bowden cables on the drive motors

3. Pull the Bowden cables on the drive motors down and out.
4. Loosen and remove two Allen head screws on the wheel lock release at the top of the drive unit sustainer.



Figure 29 Wheel lock release

5. Remove the wheel lock release including the Bowden cables and replace if required. Properly reassemble all components upon completion of the work.

### 6.11.2 Setting / Adjusting the Wheel Lock Release

**⚠ CAUTION**

**Risk of accidents and injury due to lack of brake functionality.** Incorrect wheel lock settings can lead to a loss of braking power. Repairs and settings must only be made by authorised personnel. Replace damaged Bowden cables with new ones immediately.

Correct wheel lock settings are essential for safe driving. This is why Otto Bock recommends inspecting the wheel lock **every three months**.

To avoid excessive friction, the radius of the Bowden cable must not be less than **10 cm**

Damaged Bowden cables must be replaced immediately, for example if individual wires are protruding or there is a kink in the sheath.



The Bowden cables are normally adjusted on the wheel lock release housing. If the correct setting cannot be obtained by means of the adjustment screw, the threaded rod on the other end of the Bowden cable can be moved by **approximately 5 - 8 mm** on the drive motor side. Subsequently, the wheel lock release must be completely readjusted. When making adjustments for the first time (e.g. cable replacement), the Bowden cable should have very little play before adjusting it.

**INFORMATION**

Lock the adjustment screw every time the setting is changed. Otto Bock recommends making adjustments in small increments (½ turn).

**Tools:**

- Open-end or combination wrench, size 8

**a) Adjusting an over-tightened Bowden cable**

**Steps:**

1. Loosen the M5 counter nut (SW 8) and turn the adjustment screw clockwise on the wheel lock release housing.
2. Commence functionality check from the beginning.

**b) Adjusting a slack Bowden cable**

**Steps:**

1. Loosen the M5 counter nut (SW 8) and turn the adjustment screw counter-clockwise on the wheel lock release housing.
2. Commence functionality check from the beginning.



**Figure 30** Adjustment screw on the wheel lock release housing

- 1 Adjustment screws on the wheel lock release housing
- 2 Lock release lever
- 3 Release bolt



Figure 31 Attachment of the Bowden cables on the drive motors

1 Threaded rod for readjustment

### 6.11.3 Performing a Brake Setting Function Check

During the functional test of the brake settings, please observe the following points and complete the tasks described below:

#### Steps:

1. Secure the unlocking lever in position 1 (drive mode).
2. While driving straight ahead at approximately 6 km/h, release the joystick in its front-most position.
3. If the wheelchair maintains its current direction during the delay, repeat the test on a slope of 10% unless this is limited by information on the nameplate.
4. If the wheelchair leaves the current direction, adjust the Bowden cable for the opposite side. The adjustment process is described in Section 6.11.2 under “Adjusting an over-tightened Bowden cable”.
5. If the wheelchair tracks properly in both cases, conduct the following test on an even surface:
  - a. Pull the release bolt on the wheel lock housing. The release lever automatically moves forward to position 2. It must not be possible to push the wheelchair when the lever is in this position. If the drive wheels do not lock, loosen the Bowden cable for the side with the wheel that still rotates by ½ turn (see Section 6.11.2 under “Adjusting an over-tightened Bowden cable”).
  - b. Move the release lever to position 3 (push mode). The wheelchair can be pushed easily, even when turning. If the wheelchair pulls to one side, tighten the Bowden cable on the corresponding side. The adjustment process is described in Section 6.11.2 under “Adjusting a slack Bowden cable”.
6. If no deviations are found during the tests described above, no readjustment is necessary.

## 6.12 Lighting

The C2000 power wheelchair is equipped with front and rear lighting as standard equipment. The lighting functions are activated and deactivated via the controller. The warning flashers and right / left direction indicator lights are activated using the control panel.

### 6.12.1 Front lights

#### NOTICE

**Risk of damage due to moisture.** Do not expose the lamps to moisture. When reinserting the protective pane, make sure it sits correctly in the housing and that the screws are firmly tightened.

#### a) Removing the front lights

##### Preparation:

- Remove the side panel (see Section 6.13.10).
- Remove the battery case cover (see Section 6.3.2).

##### Tools:

- Allen wrench, size 3

##### Steps:

1. Open the cable ties along the connection cable up to the connection to the controller.
2. Disconnect the connection to the controller.
3. Loosen and remove two Allen head screws on the side panel.
4. Remove the light including the light holder and replace if required.

Properly reassemble all components upon completion of the work.



Figure 32 Removing the front lights

**b) Replacing the halogen lamp, front lighting:**

1. Fold the pane forward with slight pressure on the black locking lever at the lower end of the lamp.
2. Remove the pane with the attached halogen lamp.
3. Replace the defective halogen lamp with a new one.
4. Reinstall the pane.

Properly reassemble all components upon completion of the work.



Figure 33 Replacing the halogen lamp, front lighting

**c) Replacing the lamp, front direction indicator**

1. Insert a narrow flat screwdriver into the recess on the direction indicator light housing, pry open the pane and fold it down.
2. Remove the pane.
3. Slightly rotate the defective lamp to release it from the lock on the lamp socket, pull it out and replace it.

Properly reassemble all components upon completion of the work.





Figure 34 Replacing the front direction indicator lamp

### 6.12.2 Rear lights

#### NOTICE

**Risk of damage due to moisture.** Do not expose the lamps to moisture. When reinserting the protective pane, make sure it sits correctly in the housing and that the screws are firmly tightened.

#### INFORMATION

When ordering spare parts for the rear lighting, note that the rear lighting mount differs between power wheelchairs with front and rear-wheel drive.  
Lamp housings or lamps can be ordered from a specialist dealer.

#### a) Removing the rear lights, rear-wheel drive

##### Preparation:

- Remove the battery case cover (see Section 6.3.2).

##### Tools:

- Allen wrench, size 6
- Open-end or combination wrench, size 13

##### Steps:

1. Disconnect the connection between the rear lighting and the controller in the battery case.
2. Open the cable ties along the connection cable up to the connection to the controller.
3. Loosen and remove one Allen head screw for each rear lighting element.
4. Remove the light including the light holder and replace if required.

Properly reassemble all components upon completion of the work.



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Figure 35 Removing the rear lights, rear-wheel drive

**b) Removing the rear lights, front-wheel drive**

**Preparation:**

- Remove the battery case cover (see Section 6.3.2).

**Tools:**

- Allen wrench, size 5
- Open-end or combination wrench, size 10

**Steps:**

1. Disconnect the connection between the rear lighting and the controller in the battery case.
2. Open the cable ties along the connection cable up to the connection to the controller.
3. Loosen and remove two Allen head screws per rear lighting element.
4. Remove the light including the light holder and replace if required.

Properly reassemble all components upon completion of the work.



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Figure 36 Removing the rear lights, front-wheel drive

**c) Replacing defective rear direction indicator lights and rear lights:**

1. Loosen the screws with a narrow flat screwdriver and remove the protective pane.
2. Remove the defective bulb from the socket and replace it.

Properly reassemble all components upon completion of the work.



**Figure 37** Removing the rear lights

- 1 Direction indicator bulb
- 2 Rear light bulb



**Figure 38** Replacing the direction indicator bulb

## 6.13 Seat

**⚠ WARNING**

**Risk of accidents and injury due to loosening plug and screw connections.** Screw and / or plug connections have to be loosened for all adjustment tasks. This can cause uncontrolled movements of wheelchair components. To avoid injuries at pinch and shear points, carry out such tasks with the support of another person. Make sure to always keep parts of the body (e. g. hands or head) out of the danger zone.

**⚠ CAUTION**

**Risk of accidents due to unsecured screw connections.** When screw connections with thread locks are loosened, they must be equipped with new thread locks or secured with a medium-strength thread lock compound (e.g. Loctite 241®).

**⚠ CAUTION**

**Risk of burns in the proximity of fire.** The back rest and seat bottom of the power wheelchair are flame retardant but nevertheless flammable. Therefore utmost caution is required near any sources of open flame or sparks, especially lit cigarettes.

**NOTICE**

**Risk of damage to seat padding.** During any work on the seat, the padding must be adequately protected against mechanical and chemical damage.

### 6.13.1 Standard Seat: Removing the Seat Cushion and Back Pad

With the standard seat, the seat cushion and back pad are connected to the seat plate and back upholstery using hook-and-loop fasteners, which means they can be removed by simply pulling them off.

### 6.13.2 Standard Seat: Replacing / Adjusting the Back Upholstery

1. Remove the back pad.
2. Remove the entire back upholstery.
3. Readjust the hook and loop straps according to individual user requirements or remove and replace if required.

Properly reassemble all components upon completion of the work.



Figure 39 Back upholstery, standard seat



### 6.13.3 Replacing the Bearing Plate (Standard and Contour Seat)

**Tools:**

- Allen wrench, size 5
- Open-end or combination wrench, size 13

**Steps:**

1. Loosen the three Allen head screws.
2. Remove the bearing plate and replace if required.

Properly reassemble all components upon completion of the work.

**INFORMATION**

The screw in the middle of the plate serves as stop for the back angle adjustment.



Figure 40 Removing the bearing plate

### 6.13.4 Standard and Contour Seat: Replacing the Seat Plate

**Steps:**

1. Remove the seat cushion.
2. Unlock the back rest and fold it forward.
3. Pull the seat plate up with a sharp tug and replace if required.

Properly reassemble all components upon completion of the work.



Figure 41 Standard seat: Seat plate

### 6.13.5 Standard and Contour Seat: Replacing the Seat Frame

**NOTICE**

**Risk of cable damage.** Take note of the cables attached to the seat frame with cable ties. Carefully cut the cable ties with side-cutting pliers or a knife. Ensure that you do not damage the cables during this process!

**Preparation, standard seat:**

- Remove the seat pad.
- Remove the side panels (see Section 6.13.10).
- Remove the footrests (see Section 6.13.19).

**Preparation, contour seat:**

- Remove the seat pad.
- Remove the side panels (see Section 6.13.10).
- Unscrew the back pad.
- Remove the footrests (see Section 6.13.19).

**Tools:**

- Allen wrench, size 5
- Open-end or combination wrench, size 13

**Steps:**

1. In case of a seat with electric seat adjustment: Disconnect the electric seat adjustment connection cable on the controller.
2. Loosen all cables connected to the seat frame by cable ties.
3. Remove the seat module (if present) including the mounting plate (see Section 6.14.4).
4. Loosen and remove the Allen head screw on each of the four seat brackets.
5. Remove the seat frame and replace if required.

Properly reassemble all components upon completion of the work.

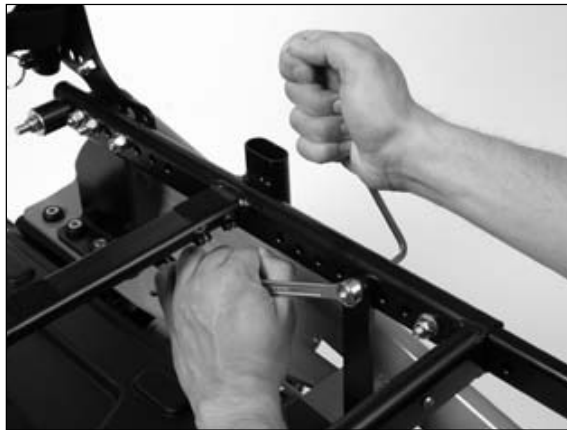


Figure 42 Removing the seat frame



Figure 43 Removing the seat frame with seat tilt

### 6.13.6 Standard seat and contour seat: Adjusting the seat depth

#### INFORMATION

The seat depth can be adjusted in increments of **20 mm**. Use both hands to move the tubes in the seat frame evenly in order to prevent them from jamming.

#### Preparation:

- Move the seat up until the corresponding screws are freely accessible.

#### Tools:

- Allen wrench, size 5
- Open-end or combination wrench, size 13

#### Steps:

1. Loosen and remove the two Allen head screws on the bearing plate.
2. Adjust the position of the bearing plate according to the mounting hole grid.
3. Reposition the footrest according to the mounting hold grid (see Section 6.13.19).

Properly reassemble all components upon completion of the work.



Figure 44 Adjusting the seat depth: Repositioning the bearing plate and footrest

### 6.13.7 Standard seat and contour seat: Adjusting the seat height

**NOTICE**

**Risk of cable damage.** Ensure the cables attached to the frame with cable ties are not damaged.

Changing the seat height requires replacement of the seat brackets.

**Preparation:**

- ❑ Remove the seat plate (see Section 6.13.4).

**Tools:**

- ❑ Allen wrench, size 5
- ❑ Open-end or combination wrench, size 13

**Steps:**

1. Remove the black plastic caps of the rear Allen head screws.
2. Loosen and remove the Allen head screws on the two rear brackets.
3. Loosen and remove the Allen head screws on the two front brackets.
4. Loosen and remove the seat brackets from the seat frame.
5. Select and install seat brackets according to Table 3 and Table 4.

Properly reassemble all components upon completion of the work.

### 6.13.8 Standard seat and contour seat: Adjusting the seat angle

**NOTICE**

**Risk of cable damage.** Ensure the cables attached to the frame with cable ties are not damaged.

The seat angle is adjusted via the screw connection on the connecting bracket.

**Preparation:**

- ❑ Remove the seat plate (see Section 6.13.4).

**Tools:**

- Allen wrench, size 5
- Open-end or combination wrench, size 13

**Steps:**

1. Loosen and remove the screw connection on the connecting bracket.
2. Select the corresponding bore in the connecting bracket according to Figure 45 and attach the connecting bracket.

Properly reassemble all components upon completion of the work.

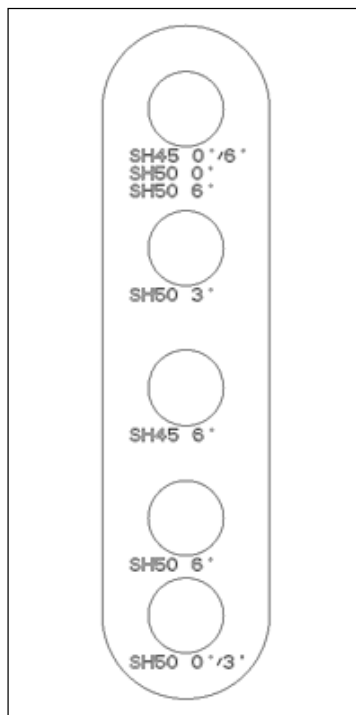


Figure 45 Connecting bracket

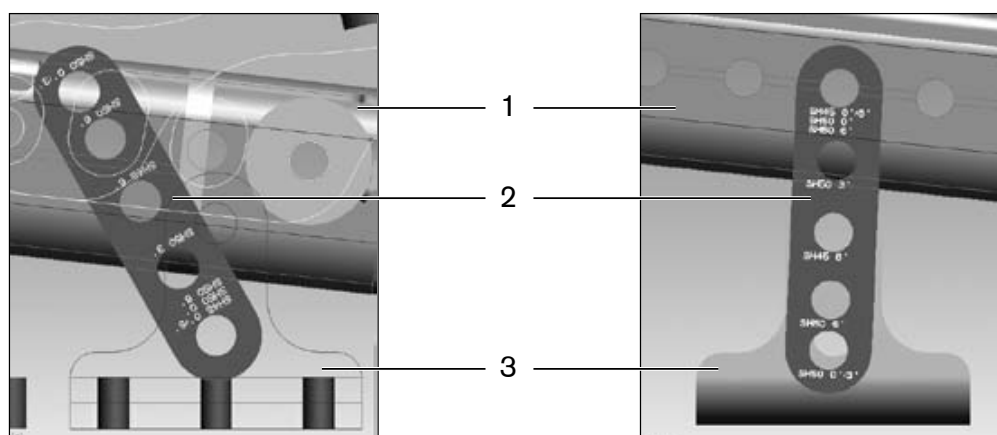


Figure 46 Installation example SH50/6° (left) and SH50/3° (right): Seat frame - connecting bracket - seat bracket

- 1 Seat frame
- 2 Connecting bracket
- 3 Seat bracket

### 6.13.9 Seat Brackets

The following seat brackets are available to adjust the seat angle and seat height:

#### a) Front-wheel drive

Reference	"Regular" Seat Setup Standard / Contour / Recaro Seat)			Electric Seat Tilt	Lift Unit with Tilt
	0°	3°	6°		
Seat inclination	0°	3°	6°	0°	0°
Bracket – front –	491C62=SS037	Not available	491C62=SS037	491C62=SS007	491C62=SS012
Connecting bracket	491C62=SS018		491C62=SS018		
Bracket – rear –	491C62=SS037		491C62=SS037	491C62=SS007	491C62=SS012
Luggage carrier	491C62=ls040* 491C62=rs040*		491C62=ls040* 491C62=rs040*	491C62=ls040* 491C62=rs040*	491C62=ls040* 491C62=rs040*
Anterior seat height standard seat	45		(49.3)**	49	55
Anterior seat height Recaro seat	From 58	(From 62.3)**	From 62	From 68	
<b>Alternative</b>					
Bracket – front –	491C62=SS038	491C62=SS038	491C62=SS038		
Bracket – rear –	491C62=SS037	491C62=SS037	491C62=SS037		
Connecting bracket	491C62=SS018	491C62=SS018	491C62=SS018		
Luggage carrier	491C62=ls040* 491C62=rs040*	491C62=ls040* 491C62=rs040*	491C62=ls040* 491C62=rs040*		
Anterior seat height standard seat	50	(50.6)**	(51)**		
Anterior seat height Recaro seat	From 63	(From 63.6)**	(From 64)**		






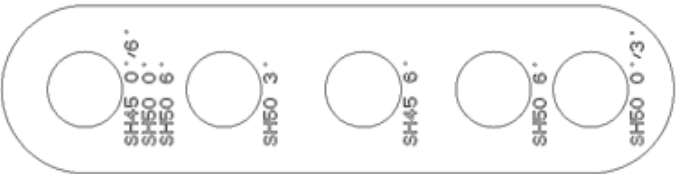
**Table 3** Seat brackets for front-wheel drive

- \* ls => Left-hand version  
rs => Right-hand version
- \*\* Data based on calculations

**b) Rear-wheel drive**

Reference	"Regular" Seat Setup Standard / Contour / Recaro Seat)			Electric Seat Tilt	Lift Unit with Tilt
	0°	3°	6°		
Seat inclination	0°	3°	6°	0°	0°
Bracket – front –	491C62=SS038	491C62=SS038	491C62=SS038	491C62=SS007	491C62=SS012
Bracket – rear –	491C62=SS037	491C62=SS037	491C62=SS037	491C62=SS007	491C62=SS012
Connecting bracket	491C62=SS018	491C62=SS018	491C62=SS018		
Anterior seat height standard seat	50	(50.6)**	(51)**	49	55
Anterior seat height Recaro seat	From 63	(From 63.6)**	(From 64)**	From 62	From 68

**Table 4** Seat brackets for rear-wheel drive

Order no.	Seat Bracket	Order no.	Seat Bracket
491C62=SS037		491C62=SS012	
491C62=SS038		491C62=SS007	
491C62=ls040 491C62=rs040			
491C62=SS018			

**Table 5** Seat brackets with order no.

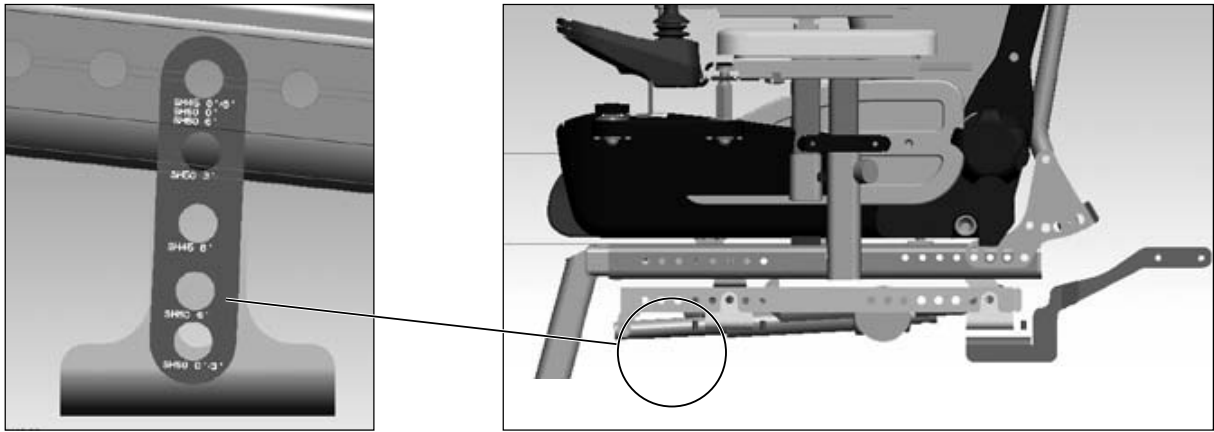


Figure 47 Installation example: SH45 – 6°

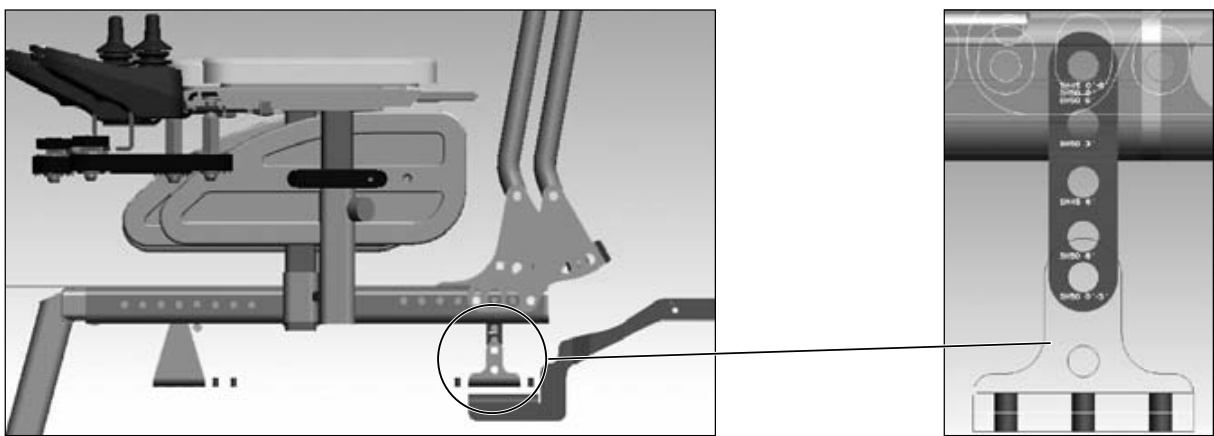


Figure 48 Installation example: SH50 – 0°

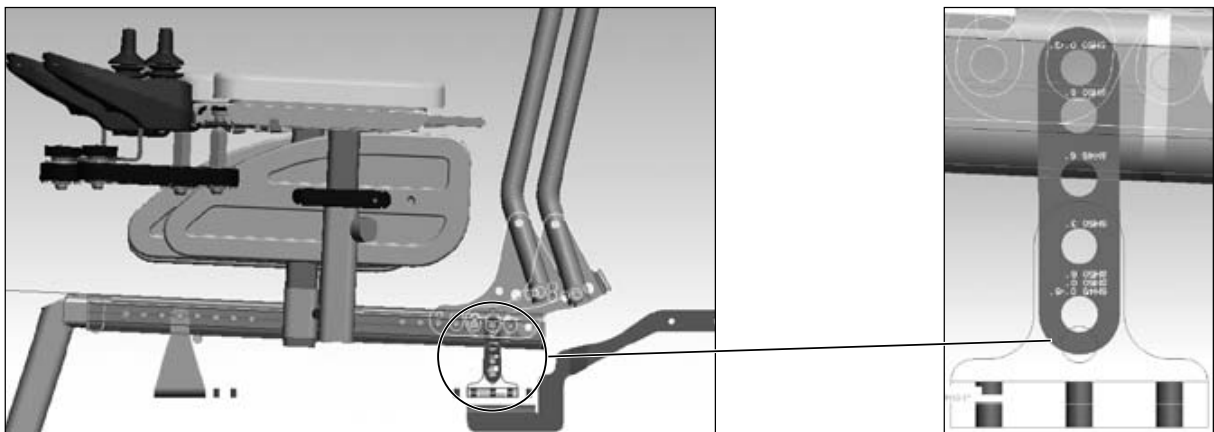


Figure 49 Installation example: SH50 – 3°



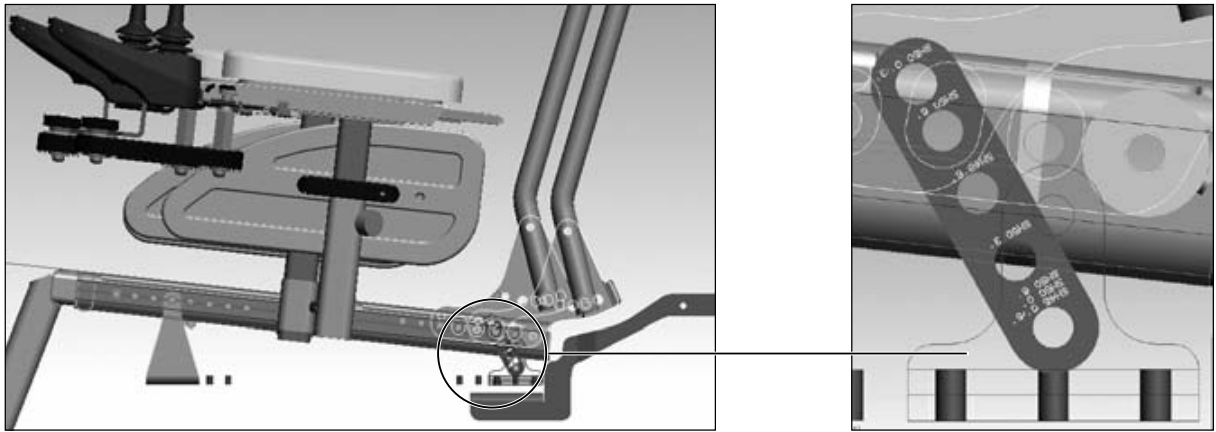


Figure 50 Installation example: SH50 – 6°

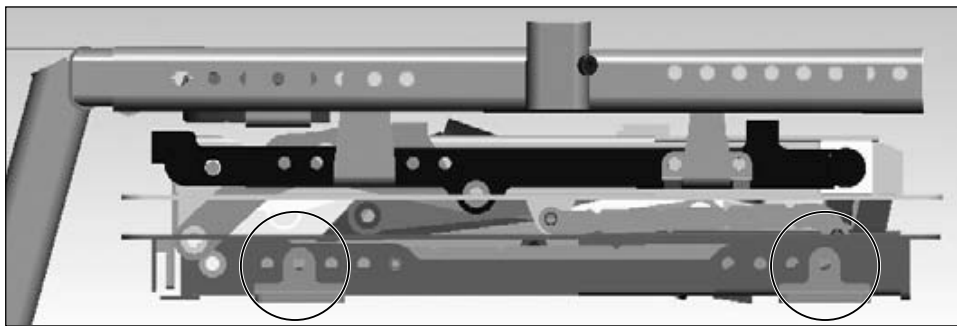


Figure 51 Installation example: Seat brackets, standard seat with seat height adjustment and seat tilt

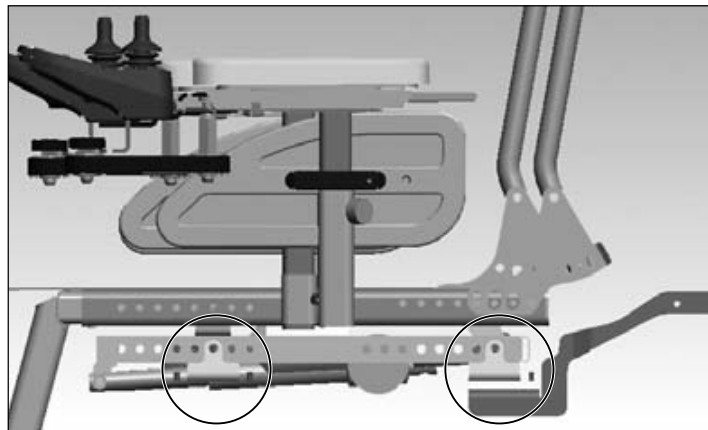


Figure 52 Installation example: Seat brackets, standard seat with seat tilt

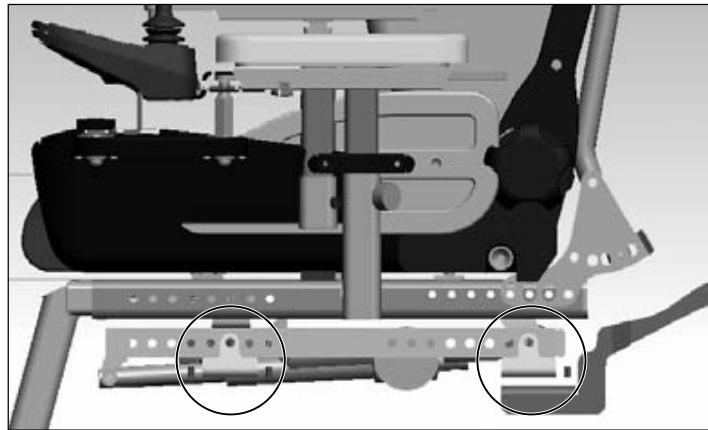


Figure 53 Seat brackets, Recaro® seat with seat tilt

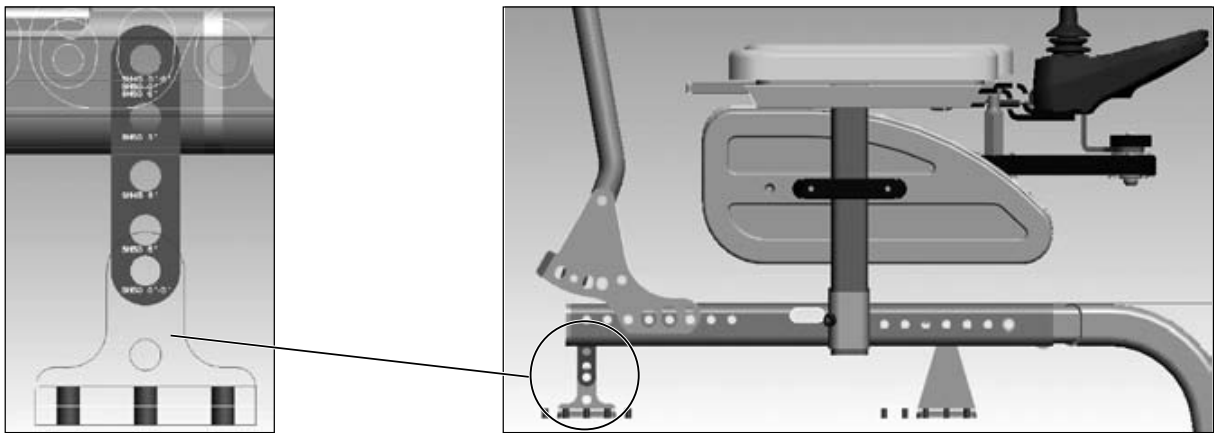


Figure 54 Installation example: Seat brackets SH50 – 0° with rear-wheel drive

### 6.13.10 Removing the Side Panel

The side panel can be removed along with the arm rest.

**Steps:**

1. Loosen the thumb screw at the lower end of the side panel holder.
2. Pull the side panel with arm rest up and out.

Properly reassemble all components upon completion of the work.



---

Figure 55 Loosening the thumb screw for removal of the side panel with arm rest

### 6.13.11 Adjusting / Replacing the Arm Rest

Adapting the arm rests to the upper arm length

**Tools:**

- Allen wrench, size 3

**Steps:**

1. Loosen the Allen head screw.
2. Move the side panel with arm rest up or down along the rail into the desired position.

Properly reassemble all components upon completion of the work.



---

Figure 56 Adapting the arm rest to the upper arm length

## Adapting the arm rests to the forearm length

### Tools:

- Allen wrench, size 3

### Steps:

1. Loosen the two set screws (three set screws on the control panel side) underneath the arm rest.
2. Move the arm rest (with the control panel holder or the replacement tube) forward or back along the attachment rail into the desired position.

Properly reassemble all components upon completion of the work.



---

Figure 57 Adapting the arm rests to the forearm length

## 6.13.12 Adjusting / Replacing the Clothing Protector

### Preparation:

- Remove the side panel (see Section 6.13.10).

### Tools:

- Allen wrench, size 3

### Steps:

1. Loosen two Allen head screws on the side panel.
2. Change the position of the clothing protector or remove and replace if required.

Properly reassemble all components upon completion of the work.

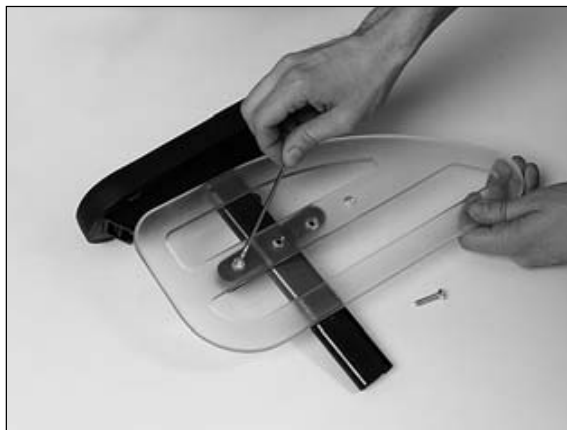


Figure 58 Adjusting the clothing protector

### 6.13.13 Standard and Contour Seat: Replacing / Adjusting the Side Panel Attachment Device

The attachment device is located on either side on the rear cross brace under the seat.

**Tools:**

- Allen wrench, size 4

**Steps:**

1. Loosen the two set screws.
2. Remove the side panel attachment device and replace or readjust as required.

Properly reassemble all components upon completion of the work.



Figure 59 Adjusting the side panel attachment device

- 1 Side panel attachment device

### 6.13.14 Retrofitting the Four-Way Chest Strap (Option for Recaro<sup>®</sup> Seat Only)

The attachment device is located on either side on the rear cross brace under the seat.

#### Tools:

- Screwdriver
- Allen wrench, size 4
- Hand drill
- 4 mm drill bit

#### Steps:

1. Screw the cross tube to the back of the seat frame.
2. Attach the single strap end to this tube:
  - a. Spread the two eyelets so they fit over the tube.
  - b. Insert the screw through the eyelets and bore hole in the centre of the tube and tighten the screw.
3. Remove the protective cap from the button.
4. Remove the back adjustment button from the back rest.
5. Press out the three small plastic nipples from the rear.
6. Remove the rest of the covering.
7. Of the two holes in the metal plate, bore out the top hole (for the strap mounting screws).
8. Attach both of the other strap ends to these bore holes.
9. Install the covering and adjustment button.



Figure 60 Installing / retrofitting the four-way chest strap

### 6.13.15 Lap Belt

The power wheelchair can be retrofitted with a lap belt as an option.

#### a) Installing the lap belt

##### Preparation:

- Move the seat up until the corresponding mounting points are freely accessible.

##### Tools:

- Allen wrench, size 5
- Open-end or combination wrench, size 13

##### Steps:

1. Install the mounting kit for the installation of the lap belt on the seat frame using Allen head screws (right and left sides respectively).

Properly reassemble all components upon completion of the work.



---

Figure 61 Installing the lap belt

### b) Adjusting the belt length

The belt length can be adjusted on both sides.

1. Position the buckle halves in the middle of the body.
2. After positioning the buckle halves at a right angle in relation to the belt, their position can be varied.

Any excessive belt length will be held in place by a plastic slide.



---

Figure 62 Adjusting the lap belt

### 6.13.16 Retrofitting the arm strap

The arm strap is anchored in the arm rest rail.

#### Tools:

- Allen wrench, size 4

#### Steps:

1. Insert lock cams into the track and position them as desired.
2. Place both strap ends with eyelets onto the set screw and secure with nuts.

Properly reassemble all components upon completion of the work.



---

Figure 63 Arm strap



---

### 6.13.17 Installing the Contour Seat (Optional)

The optional contour seat is attached to the seat plate with hook and loop straps. You can mount the contour seat on the frame of the standard seat.

#### Tools:

- ☐ Allen wrench, size 3

#### Steps:

1. Set the seat bottom with hook and loop straps onto the seat plate and press it into place.
2. Remove the back upholstery.
3. Slip three mounting clamps for the back of the contour seat onto the right and left of the frame, respectively.
4. Put the seat back in place and mount it with six Allen head screws.

Properly reassemble all components upon completion of the work.



---

Figure 64 Contour seat with clamp fittings

- 1 Frame for back rest
- 2 Contour seat back rest
- 3 Mounting clamp (6 pieces)

### 6.13.18 Installing the Recaro<sup>®</sup> Seat (Optional)



---

Figure 65 C2000 power wheelchair with Recaro<sup>®</sup> seat

### a) Replacing the mobility base

**Tools:**

- Allen wrench, size 5

**Steps:**

1. Pull the latch underneath the seat, slightly lift the seat and push it back.
2. Remove the seat.
3. Unscrew the seat brackets from the front and rear of the frame.
4. Remove both parts of the Recaro<sup>®</sup> mobility base and replace if required.

Properly reassemble all components upon completion of the work.

### b) Replacing the seat attachment device

The seat attachment device of the Recaro<sup>®</sup> seat is screwed to the underside of the seat.

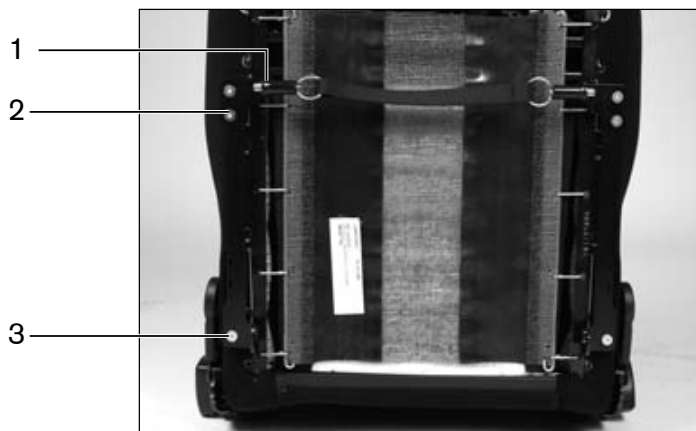
**Tools:**

- Allen wrench, size 4

**Steps:**

1. Unlock and remove the seat.
2. Lay down the seat and loosen the three Allen head screws on each side of the seat attachment device.
3. Remove the seat attachment device and replace if required.

Properly reassemble all components upon completion of the work.



---

**Figure 66** Recaro seat, view of the underside

- 1 Release mechanism pin
- 2 Seat bracket attachment, front
- 3 Seat bracket attachment, rear



Figure 67 Unlocking and mounting the Recaro<sup>®</sup> seat

**c) Retrofitting seat modules (optional)**

The seat bottom of the Recaro<sup>®</sup> seat module is attached to the seat frame and removed in the same manner as the complete Recaro<sup>®</sup> seat. The modular back rest is hooked into the seat bottom. Two corresponding adapters are found on the seat bottom.

**Tools:**

- Flat screwdriver

**Steps:**

1. Attach the safety plate to the front adapter.
2. Hook the back rest onto the seat bottom.
3. Attach the front locking mechanism to the rear adapter.

Properly reassemble all components upon completion of the work.

---

### 6.13.19 Adapting / Replacing the Footrests

**⚠ CAUTION**

**Risk of pinching!** Ensure limbs are not in the danger area when flipping the footrests up or down.

The C2000 power wheelchair can be equipped with a choice of narrow or wide continuous or segmented footrests. They are mounted to the C2000 power wheelchair with an adapter attached to rails that are already adapted in their length to the user. The C2000 power wheelchair in the rear-wheel drive version is only available with the narrow footrests. All versions of the footrests can be flipped up.

**Tools:**

- Allen wrench, size 6
- Open-end or combination wrench, size 13

**Steps:**

1. Loosen and remove the screws between the rails.
2. Move the adapter with the footrest up or down along the rail according to the mounting holes or remove and replace if required.

Properly reassemble all components upon completion of the work.



---

Figure 68 Adapting the footrest to the lower leg length

### 6.13.20 Removing the Footrest Connecting Tube

**Tools:**

- Allen wrench, size 5
- Open-end or combination wrench, size 13

**Steps:**

1. Loosen and remove the Allen head screw.
2. Move the connecting tube up or down according to the mounting holes or remove and replace if required.

Properly reassemble all components upon completion of the work.



---

Figure 69 Removing the footrest connecting tube

### 6.13.21 Removing the Footrest Including Adapter

**Tools:**

- Allen wrench, size 5
- Open-end or combination wrench, size 13

**Steps:**

1. Loosen and remove the two Allen head screws on the left and right of the anterior seat frame, respectively.
2. Pull the footrest including adapter forward and out to remove.

Properly reassemble all components upon completion of the work.



---

Figure 70 Removing the footrest including adapter

---

## 6.14 Electric Seat Functions

### INFORMATION

The installation of electric seat functions requires extensive experience. Contact Otto Bock authorised personnel directly if required.

### INFORMATION

When installing the seat tilt and seat height adjustment functions, observe the correct selection and position of the seat bracket. Consult the information / installation examples in Section 6.13.9.

### INFORMATION

The installation of a seat module is required if more than one electric seat function is installed (see Section 6.14.4). If this information is provided with the original order, the seat module is pre-assembled and delivered with the seating unit.

### INFORMATION

After new electric seat functions are installed and connected, the control unit has to be reprogrammed. Please see the EnAble50 instructions for use for more information (647G490=D/GB).

### 6.14.1 Retrofitting the Electric Seat Tilt (Optional)

The C2000 power wheelchair may be retrofitted with a seat tilt option. It is integrated into the seat frame and operated by an actuator.

The seat tilt option is delivered as a pre-assembled unit.

#### Preparation:

- Turn the control unit off.
- Remove the fuse (see Section 6.2).
- Remove the footrest (see Section 6.13.19).
- Remove the seat (see Section 6.13.1).
- Remove the seat frame (see Section 6.13.5).
- Remove the cables (open cable ties)

#### Tools:

- Allen wrench, size 5
- Open-end or combination wrench, size 13
- Circlip pliers

**Steps:**

1. Install the pre-assembled unit on the wheelchair frame with the help of the seat brackets. Observe the correct position of the four seat brackets for correct traction. Consult the information / installation examples in Section 6.13.9.
2. Connect the actuator to the controller or seat module.
3. Programme the control unit and test the seat tilt function.

Properly reassemble all components upon completion of the work.



Figure 71 Seat bracket position for the seat tilt unit (example) and actuator connection on the seat module

### 6.14.2 Retrofitting the Electric Back Angle Adjustment (Optional)

A back frame with crossbrace, new upholstery and a back rest actuator are required to install the electric back angle adjustment option.

The electric back angle adjustment option is delivered as a preassembled unit.

#### Preparation:

- Turn the control unit off.
- Remove the fuse (see Section 6.2).

#### Tools:

- Allen wrench, size 5
- Open-end or combination wrench, size 13

#### Steps:

1. Remove the back frame from the bearing plate / seat frame.
2. Install the bearing plate with the crossbrace of the electric back angle adjustment option.
3. Install the back frame on the bearing plate / seat frame.
4. Connect the actuator ratchet bolt to the locking mechanism of the crossbrace.
5. Connect the actuator to the controller or seat module.
6. Programme the control unit and test the back angle adjustment function.

Properly reassemble all components upon completion of the work.

#### NOTICE

**Risk of cable damage if cables protrude into the adjustment range.** Fasten the connection cable to the frame with cable ties to prevent it from extending into the adjustment range.



Figure 72 Retrofitting the electric back angle adjustment



### 6.14.3 Retrofitting the Seat Height Adjustment Function (Optional)

#### INFORMATION

With a patient weight >100 kg or when installing a combination unit with seat height adjustment and seat tilt, stronger springs must be installed on the drive wheel axle (see Section 6.9.1).

The C2000 power wheelchair can be retrofitted with one of two versions of the seat height adjustment function (up to **130 kg** or up to **200 kg**).

The seat frame with seat height adjustment function is delivered as a pre-assembled unit.

#### Preparation:

- Turn the control unit off.
- Remove the fuse (see Section 6.2).
- Remove the footrest (see Section 6.13.19).
- Remove the seat and seat frame (see Section 6.13.1 and 6.13.5).

#### Tools:

- Allen wrench, size 5
- Open-end or combination wrench, size 13

#### Steps:

1. Install the pre-assembled unit consisting of the seat frame, seat brackets and actuator on the wheelchair frame.
2. Connect the actuator to the controller or seat module.
3. Programme the control unit and test the seat height adjustment function.

Properly reassemble all components upon completion of the work.



Figure 73 Pre-assembled seat height adjustment unit

#### 6.14.4 Retrofitting the Seat Module

##### INFORMATION

For information on connecting the seat module, please see Section 6.2.  
After new electric seat functions are installed and connected, the control unit has to be reprogrammed.  
Please see the EnAble50 instructions for use for more information (647G490=D/GB).

Controlling more than one electric seat function requires the installation of a seat module.  
The seat module is installed on a metal brace below the seat (included in the scope of delivery).

##### INFORMATION

When connecting the cables, ensure correct assignment.

##### Preparation:

- Turn the control unit off.
- Remove the fuse (see Section 6.2).

##### Tools:

- Allen wrench, size 3
- Allen wrench, size 5
- Open-end or combination wrench, size 8
- Open-end or combination wrench, size 13

##### Steps:

1. Install the seat module on the metal brace.
2. Remove the seat / seat plate.
3. Screw the metal brace in place using oval head screws / self-locking nuts.
4. Connect the seat module to the controller.

Properly reassemble all components upon completion of the work.



Figure 74 Retrofitting the seat module

### 6.14.5 Removing the Seat Tilt Actuator

**NOTICE**

**Risk of cable damage.** Take note of the cables attached to the seat frame with cable ties. Carefully cut the cable ties with side-cutting pliers or a knife. Ensure that you do not damage the cables during this process!

**Preparation:**

- Remove the seat cushion (see Section 6.13.1).
- Remove the seat plate (see Section 6.13.4).
- Raise or tilt the seat until the actuator mounts are freely accessible.
- Turn the control unit off.
- Remove the fuse (see Section 6.2).

**Tools:**

- Flat screwdriver

**Steps:**

1. Disconnect the seat function connection cable on the controller or seat module.
2. Loosening two retaining rings on each of the mounting points at the top and bottom of the actuator and push out the bolts.
3. Remove the actuator and replace if required.

Properly reassemble all components upon completion of the work.

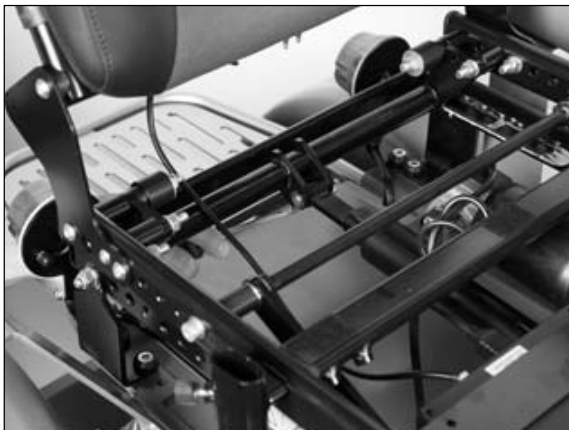


Figure 75 Replacing the seat tilt actuator

### 6.14.6 Removing the Back Angle Adjustment Actuator

**NOTICE**

**Risk of cable damage.** Take note of the cables attached to the seat frame with cable ties. Carefully cut the cable ties with side-cutting pliers or a knife. Ensure that you do not damage the cables during this process!

**Preparation:**

- Turn the control unit off.
- Remove the fuse (see Section 6.2).
- Disconnect the back angle adjustment plug connection on the controller or seat module.

**Tools:**

- Allen wrench, size 3
- Allen wrench, size 4

**Steps:**

1. Disconnect the seat function connection cable on the controller or seat module (AAM).
2. Loosening two retaining rings on each of the mounting points at the top and bottom of the actuator and push out the bolts.
3. Remove the actuator and replace if required.

Properly reassemble all components upon completion of the work.



Figure 76 Removing the back angle adjustment actuator

### 6.14.7 Removing the Seat Height Adjustment Actuator

**NOTICE**

**Risk of cable damage.** Take note of the cables attached to the seat frame with cable ties. Carefully cut the cable ties with side-cutting pliers or a knife. Ensure that you do not damage the cables during this process!

**Preparation:**

- Turn the control unit off.
- Remove the fuse (see Section 6.2).

**Tools:**

- Flat screwdriver

**Steps:**

1. Disconnect the seat height adjustment plug connection on the controller or seat module (AAM).
2. Remove the seat (see Section 6.13.1).
3. Remove the seat frame with lift unit (see Section 6.13.5).
4. Put down the seat frame so that the actuator mounting points are freely accessible.
5. Loosen a retaining ring at the mounting points at the top and bottom of the actuator, respectively.
6. Push out the bolts.
7. Remove the actuator and replace if required.

Properly reassemble all components upon completion of the work.



Figure 77 Replacing the seat height adjustment actuator

## 6.15 Replacing the Side Tube

### Tools:

- Allen wrench, size 4

### Steps:

1. Loosen and remove an Allen head screw at the front and rear of the side tube, respectively.
2. Remove the side tube and replace if required.

Properly reassemble all components upon completion of the work.



Figure 78 Removing the side tube

---

## 6.16 Removing the Drive Motor

The drive motor is permanently connected to the wheel flange and can only be replaced as a complete unit.

### **⚠ CAUTION**

**Risk of injury due to electric current.** Turn off the control unit of the power wheelchair and disconnect the plug connections on the controller before performing any work on the drive motors.

### Preparation:

- Turn the control unit off.
- Remove the fuse (see Section 6.2).
- Remove the drive wheel (see Section 6.8.2).

### Tools:

- Allen wrench, size 4
- Allen wrench, size 5
- Side cutting pliers

### Steps:

1. Loosen and remove the ten Allen head screws on the lower cover plate.
  2. Remove the cover plate.
-

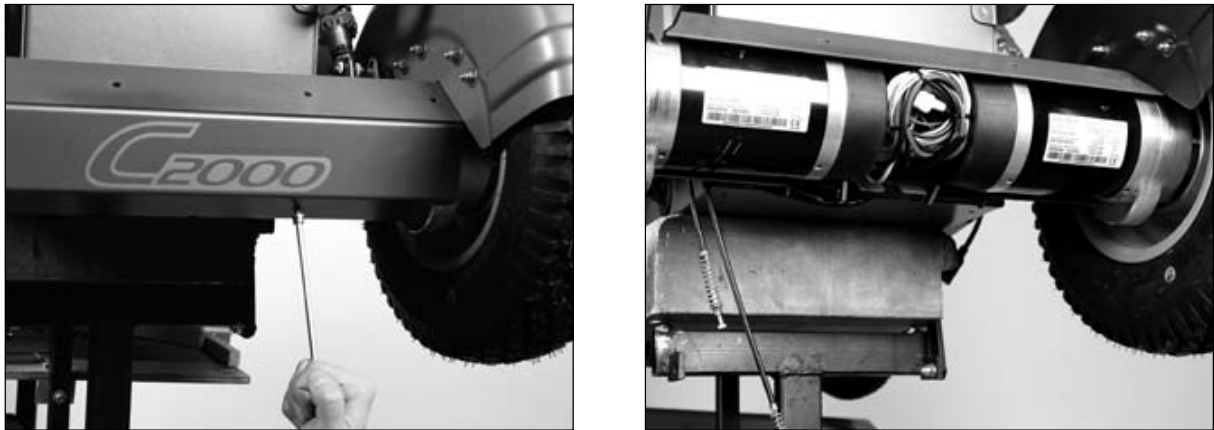


Figure 79 Removing the lower cover plate

3. Open the cable ties.
4. Disconnect the drive motor connection cable on the controller:
  - a. Right-hand plug on the controller = right-hand drive motor
  - b. Left-hand plug on the controller = left-hand drive motor
5. Loosen the Allen head screw that connects the drive motor to the top cover plate.



Figure 80 Removing the drive motor

6. Take note of the connection cable assignment on the cable bridge for later assembly:
  - a. Thick red-black cable: Controller
  - b. Thick red-blue cable: Red => red, blue => black
  - c. Yellow-white cable: Wheel lock
7. Disconnect the drive motor connection cable on the cable bridge.
8. Pull the motor down to remove and replace if required.

**⚠ CAUTION**

**Risk of accidents due to unsecured screw connections.** To install the drive motor, use new screws with TUFLOC<sup>®</sup> patch and secure them with a medium-strength thread lock compound (e.g. Loctite 241<sup>®</sup>).

Properly reassemble all components upon completion of the work.



---

Figure 81 Cable bridge

### **6.17 Removing the Drive Axle**

#### **Preparation:**

- Remove the drive motors (see Section 6.16).
- Remove the drive axle spring (see Section 6.9.1).

#### **Tools:**

- Allen wrench, size 10
- Open-end or combination wrench, size 19

#### **Steps:**

1. Loosen and remove an Allen head screw on the left and right of the motor mount, respectively.
2. Remove the drive axle and replace if required.

Properly reassemble all components upon completion of the work.



---

Figure 82 Removing the drive axle



## 6.18 Replacing the Steering Axle / Drive Axle Rubber Oscillating Crank Mount

The drive axle and steering axle both have a rubber oscillating crank mount on each end. These mounts consist of single components that can be replaced separately if required:

- Rubber mount bushing
- Rubber inserts
- Rubber mount cover
- Rubber mount bushing insert

The rubber oscillating crank mounts on the steering axle are designed for the maximum load capacity of **80–160 kg** or **160–260 kg**.

### INFORMATION

In order to assure balanced driving characteristics, Otto Bock recommends replacing the rubber oscillating crank mounts and / or their single components in pairs per axle only.



Figure 83 Rubber oscillating crank mount on the C2000

- 1 Rubber oscillating crank mount, steering axle
- 2 Rubber oscillating crank mount, drive axle

### Preparation:

- Raise the power wheelchair so that the wheels on the corresponding axle can rotate freely.

### Tools:

- Allen wrench, size 10

### Steps:

1. Unscrew the rubber oscillating crank mount on both sides of the steering axle / drive axle.



Figure 84 Unscrewing the rubber oscillating crank mounts, steering axle

2. Tilt the steering axle / drive axle up on the corresponding spring around the pivot point.
  3. Remove the rubber oscillating crank mount and replace single components if required.
- Properly reassemble all components upon completion of the work.

**NOTICE**

**Risk of damaging the rubber inserts.** When installing the new rubber inserts, note the installation position.

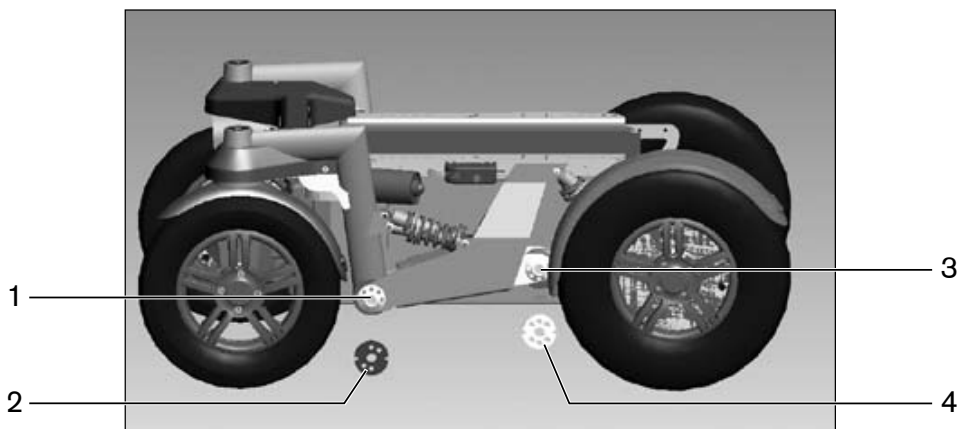


Figure 85 Installation position of the rubber oscillating crank mounts

- 1 Rubber oscillating crank mount, steering axle
- 2 Installation position of rubber insert, steering axle
- 3 Rubber oscillating crank mount, drive axle
- 4 Installation position of rubber insert, drive axle

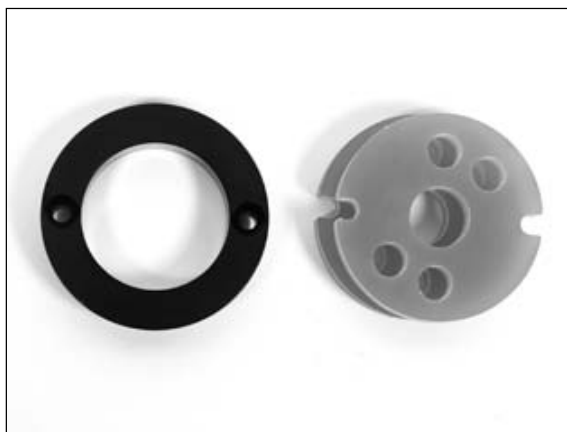


Figure 86 Installation position of rubber inserts, steering axle

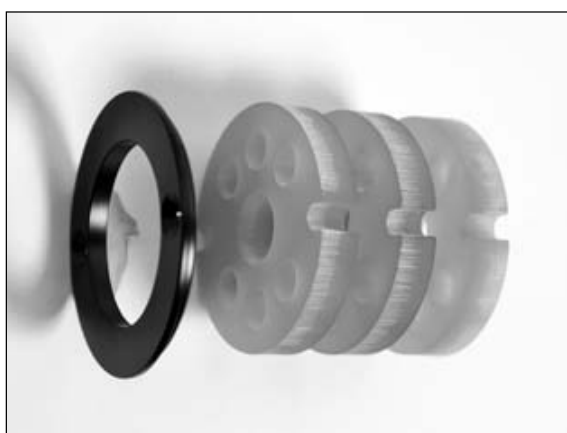


Figure 87 Rubber cover and rubber inserts for drive axle

## **6.19 Replacing / Retrofitting Control Elements**

### **6.19.1 Mounting an LCD Monitor**

#### **INFORMATION**

For more information and operating instructions for the LCD monitor, please consult the enAble50 control unit instructions for use (647G490=D/GB).

A separate LCD monitor with infrared and Bluetooth (optional) is available to operate special controls and for environment control functions. It is mounted on the arm rest on the opposite side from the control panel.



Figure 88 LCD monitor

**Tools:**

- Allen wrench, size 2

**Steps:**

1. Slide the square tube for the holder adapter onto the attachment rail below the arm rest and secure it with two set screws (applies to standard holder, height and / or laterally adjustable holder, swan neck holder).
2. Slide the holder onto the square tube and secure it with set screws.
3. Attach the LCD monitor to the holder.
4. Connect the LCD monitor to the controller.
5. Function Test



Figure 89 LCD monitor with standard holder

---

### 6.19.2 Replacing the Control Panel

The standard configuration has the control panel mounted on the right side. Depending on whether the wheelchair user is a right hander or left hander, it can be mounted to either arm rest.

#### NOTICE

**Risk of cable damage.** Positioning the cables incorrectly can lead to pinching and therefore damage to the cables. The cables must not be attached too tightly or too loosely. Avoid bending or squeezing the cables.

#### INFORMATION

Should the connection plug come loose during driving, e. g. due to vibrations, the connection to the control panel will be lost and the power wheelchair will trigger an emergency stop. When connecting the plugs, ensure that they are firmly connected to each other.

#### Tools:

- Allen wrench, size 3

#### Steps:

1. Loosen the plug connection on the controller.
2. Loosen all cable ties attaching the connection cable to arm rest.
3. Pull the control panel with control panel holder forward out of the rail.
4. Detach the rail from the arm rest.

Properly reassemble all components on the respective other arm rest upon completion of the work.

### 6.19.3 Replacing the Control Panel Holder

#### Preparation:

- Remove the control panel with control panel holder.

#### Tools:

- Phillips screwdriver

#### Steps:

1. Separate the control panel and control panel holder by loosening the four Phillips head screws on the underside of the control panel holder.
2. Replace the control panel holder.

Properly reassemble all components upon completion of the work.



Figure 90 Removing the control panel holder

#### 6.19.4 Retrofitting the Detachable and Swing-Away Control Panel

The power wheelchair can be equipped with a removable control panel on a swing-away control panel holder. For this purpose, the control panel is equipped with a spring steel sheet as a holder.

**⚠ CAUTION**

**Risk of injury due to uncontrolled driving characteristics.** If the control panel is not fully inserted, uncontrolled driving characteristics may result. During insertion, ensure that the holder is pushed into the adapter up to the stop.

**Preparation:**

- Remove the control panel with control panel holder.

**Tools:**

- Phillips screwdriver
- Allen wrench, size 3

**Steps:**

1. Disconnect the control panel plug connection on the controller.
2. Separate the control panel and control panel holder by loosening the four Phillips head screws on the underside of the control panel holder.
3. Attach the swing-away control panel holder to the underside of the arm rest with three set screws.
4. Attach the holding plate for the detachable control panel to the underside of the control panel using four Phillips head screws.
5. Plug on the detachable control panel.
6. Reconnect the plug connection on the controller.

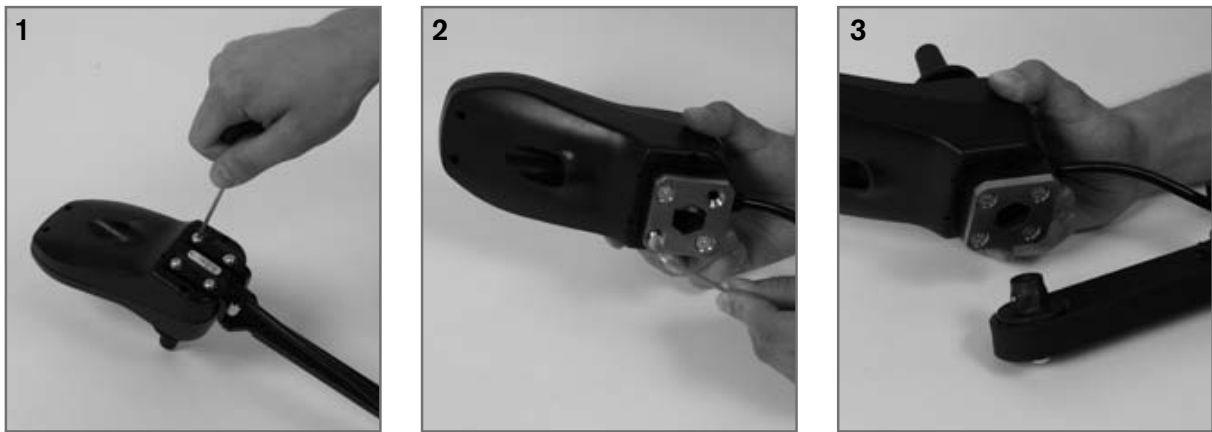


Figure 91 Installing the detachable control panel holder

### 6.19.5 Retrofitting the Height-Adjustable Control Panel Holder

An optional special control panel holder can be mounted on the power wheelchair, allowing the height of the control panel to be adjusted.

**Tools:**

- Allen wrench, size 3
- Allen wrench, size 5

**Steps:**

1. Attach the height-adjustable control panel holder to the underside of the arm rest with three set screws.
2. Loosen two mounting screws and adjust the height of the control panel.



Figure 92 Height-adjustable control panel holder

### 6.19.6 Retrofitting Attendant Controls



Figure 93 Attendant controls

#### a) Installation on the standard or contour seat

Attendant controls are delivered as an installation kit. On the power wheelchair with the standard or contour seat, they are attached to cross tube on the back rest. Two bore holes are provided for this purpose on the left and right of the back tube, respectively.

#### Tools:

- Allen wrench, size 4

#### Steps:

1. Hold the bracket for the attendant controls against the back tube.
2. Attach with two Allen head screws.
3. Attach the control panel.



Figure 94 Mounting attendant controls on the standard / contour seat



### **Recaro<sup>®</sup> Seat**

On the power wheelchair with the Recaro<sup>®</sup> seat, the attendant controls are attached to the headrest.

#### **Tools:**

- Allen wrench, size 3
- Open-end or combination wrench, size 10

#### **Steps:**

1. Remove the headrest.
2. Guide the metal rods of the headrest through the two loops on the control panel holder.
3. Reattach the headrest to the seat.
4. Adjust the width of the holder with the two set screws.

Properly reassemble all components upon completion of the work.



---

Figure 95 Attendant controls on the Recaro<sup>®</sup> seat

### **6.19.7 Installing joystick accessories**

#### **Tools:**

- Allen wrench, size 6

#### **Steps:**

1. Slide off the top of the joystick.
2. Slide an accessory such as the fork for tetraplegics, golf ball, stick etc. onto the metal pin.
3. Mount the accessory by tightening the set screw.

Properly reassemble all components upon completion of the work.



Figure 96 Installing joystick accessories

## 6.20 Push Button Module

### 6.20.1 Installing the Push Button Module

**⚠ CAUTION**

**Risk of accidents due to uncontrolled driving characteristics.** The push button module is an option for the use of the enAble50 system. Improper adaption of the push-button control unit to a power wheelchair with components outside of the Otto Bock modular system or later modification by the user are impermissible.

The push button module can only be used in combination with a seat module.

The on-site service technician decides which functions are controlled by the push button module. The corresponding configuration of the parameter file for the enAble50 control unit **cannot be completed independently**. As a result, the service technician has to download the parameter file to the PC with the help of a PC programming station (PCPS; see the enAble50 instructions for use (647G490=D/GB)) and send it to Otto Bock by e-mail with a request for the desired configuration. Otto Bock will amend / change the configuration file accordingly.

The service technician subsequently uploads the file returned by Otto Bock to the control unit. The push button module is delivered as an installation kit.

### 6.20.2 Preparing the Push Button Module (Attaching Icons)

The service technician has to attach the corresponding icons to the push button module according to the selected configuration.

**Preparation:**

- Turn the control unit off.
- Remove the fuse (see Section 6.2).

**Steps:**

1. Select an icon from the configuration panel, remove it from the backing and attach it in the recess provided on the front of the push button module.

**INFORMATION**

Ensure that the icons are properly aligned when they are attached in the recesses of the push button module.

2. Store unused icons with the remaining wheelchair documentation.
3. Install the fuse.
4. Switch on the control unit.
5. Test the functionality of the push button module.

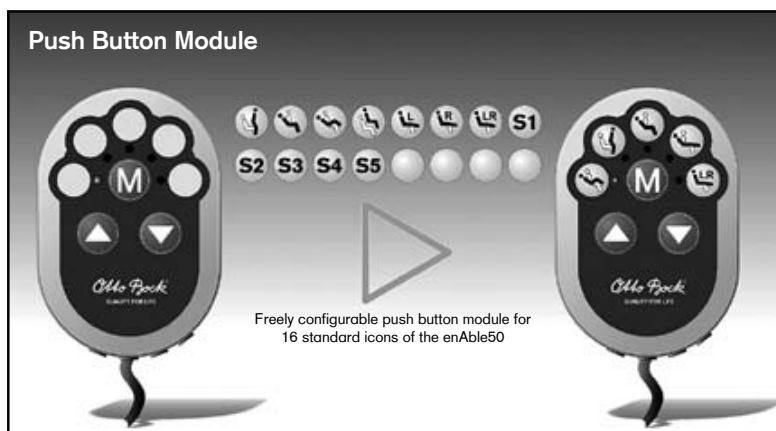


Figure 97 Icons for the push button module

### 6.20.3 Turning Switches On / Off

The push button module has 5 switches responsible for various functions, depending on the configuration.

When all 5 switches are active, the switching sequence is 1-2-3-4-5-1-2... The switches can be activated or deactivated according to the preferences of the user. For example, if switches 4 and 5 are deactivated, the new switching sequence is 1-2-3-1-2...

**Preparation:**

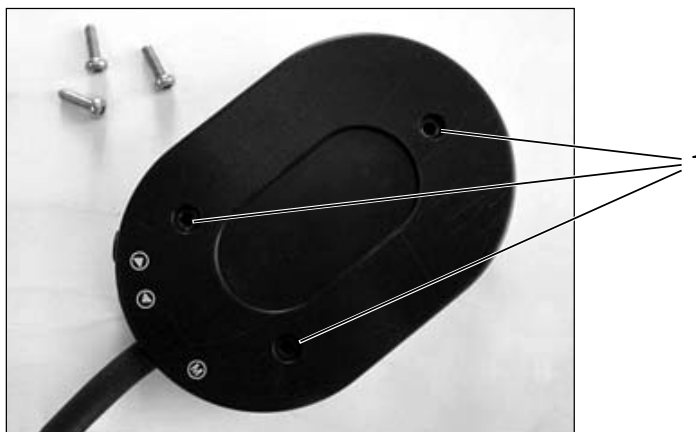
- Turn the control unit off.
- Remove the fuse (see Section 6.2).

**Tools:**

- Torx screwdriver

**Steps:**

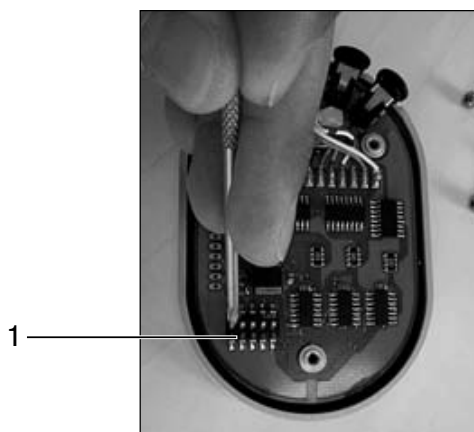
1. Remove the push button module from the holder and lay it down with the back facing up.
2. Loosen and remove three Torx screws on the back of the push button module.



**Figure 98** Back of the push button module

1 Holes for Torx screws to mount the cover

3. Remove the cover and put it aside.
4. Turn switches on or off as required. Individual functions can be deactivated with these 5 switches (Figure 107, item 1) depending on the configuration (e.g. 4 and 5 off).



**Figure 99** Push button module connections on the seat module

1 Switch

5. Install the cover
6. Attach the push button module to the holder.
7. Install the fuse.
8. Switch on the control unit.
9. Test the functionality of the push button module.

## 6.20.4 Installing the Push Button Module

### **⚠ CAUTION**

**Risk of health impairment due to a pinched cable.** Pinching the cable while operating seat functions can impair signal transmission by the push button module, resulting in uncontrolled wheelchair behaviour. Extreme care is therefore required when installing the cable.

The push button module is attached with a magnetic holder or hook-and-loop connector.

#### **Preparation:**

- Turn the control unit off.
- Remove the fuse (see Section 6.2).

#### **Tools:**

- Allen wrench, size 5

#### **Steps:**

1. Magnetic holder: Attach the holder for the push button module to the arm rest.
2. Magnetic holder: Attach the push button module to the holder. The push button module is held in place by two magnets mounted on the back of the holder.

If a magnetic holder is not used, the hook-and-loop holder is freely positioned as required.



Figure 100 Holder with attached push button module

3. Connect both plugs to the receptacles on the seat module (see Section 8.3, RSW connection).
4. Install the fuse.
5. Switch on the control unit.
6. Test the functionality of the push button module.

Properly reassemble all components upon completion of the work.

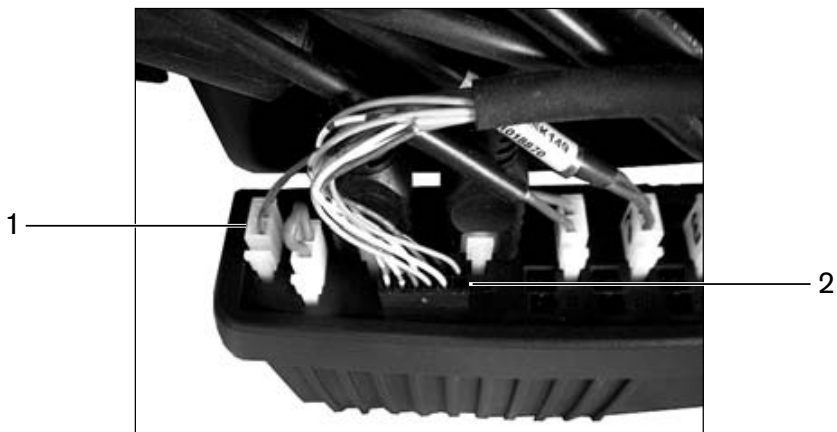


Figure 101 Push button module connections on the seat module

- 1 2-pin plug for 12 V power supply
- 2 12-pin plug for signals

### 6.20.5 Connecting External Switches

The push button module has 3 inputs on the underside for the connection of external switches, e.g. Buddy Buttons.

#### Preparation:

- Turn the control unit off.
- Remove the fuse (see Section 6.2).

#### Steps:

1. Remove the protective pin from the input on the push button module.
2. Plug the Buddy Button connection cable into the input on the push button module.
3. Install the fuse.
4. Switch on the control unit.
5. Test the Buddy Button functionality.



Figure 102 Connecting an external switch (here: Buddy Button) to the push button module

**INFORMATION**

The connection assignment for external switches is indicated by corresponding symbols on the rear of the push button module.

## 6.21 Accessories

**INFORMATION**

Only use original options supplied by the manufacturer. The optional components may only be mounted as described here. Failure to comply will void the warranty.

### 6.21.1 Retrofitting the Headrest Adapter and Installation Kit

The standard and contour can be equipped with an optional headrest. An adapter, which is mounted to the back frame, is required to attach the installation kit.

**Tools:**

- Allen wrench, size 3
- Open-end or combination wrench, size 10

**Steps:**

1. Attach the holder to the top of the back tube with two screws.

Properly reassemble all components upon completion of the work.



Figure 103 Adapter for headrest installation kit

### 6.21.2 Retrofitting the Signal Panel Installation Kit

The signal panel holder is attached to the back frame using an adapter plate.

**Tools:**

- Allen wrench, size 3
- Open-end or combination wrench, size 10

**Steps:**

1. Attach the holder to the top of the back tube with two screws.
2. Hook the signal panel in place.

Properly reassemble all components upon completion of the work.



---

Figure 104 Installation kit with signal panel

### 6.21.3 Retrofitting the Rear View Mirror

**Tools:**

- Allen wrench, size 3

**Steps:**

1. Attach the rear view mirror to the track on the control panel holder.
2. Individually adjust it to user requirements by turning it manually.

Properly reassemble all components upon completion of the work.



---

Figure 105 Retrofitting the rear view mirror



## 6.21.4 Other Optional Add-On Components

### INFORMATION

These and other optional add-on components are included on the order form and in the wheelchair accessories catalogue.

- Puncture-proof tyres
- Seating shell adapter: For the adaptation of special seating shells; control panel holders for seating shells are also available.
- Arm rest accessories: Special adapter for all arm rests from the Otto Bock accessories catalogue.
- Joystick accessories: Fork for tetraplegics. STICK S80, soft ball, golf ball, flexible control stick shaft
- Control panel guard: Metal guard for protection against impacts
- Crutch holder
- Tray
- Attachable table tray
- Pocket for mobile phone

## 7 Error Diagnosis

### NOTICE

**Risk of damage due to unauthorised service.** Improper or poorly executed repairs may result in the unsafe operation of the power wheelchair. The error diagnosis may therefore only be carried out by authorised dealers who have established knowledge of electronic controllers from Otto Bock. Otto Bock will not assume any liability for damages that are due to improperly or poorly executed repairs.

### INFORMATION

Experience has shown that problems with the wheelchair electrical system are frequently caused by errors and defects in the plug connections and cabling. They should be inspected first for this reason.

### INFORMATION

Should you encounter problems while troubleshooting or if you do not manage to completely eliminate a problem by following the measures described here, please contact Otto Bock.

Errors are either displayed on the control panel display / LCD monitor (see Section 7.2) or with the help of the handheld programming device. The handheld programming device (see Section 8.4) can capture errors more precisely with the help of error codes. The separate enAble50 instructions for use (647G490=D/GB) contain a table with error codes, causes and possible steps for resolution.

## 7.1 Troubleshooting Steps













For troubleshooting purposes, the control unit of the C2000 power wheelchair identifies the following categories depending on the effect of the malfunction on the system:

- Error
- Warning
- Defect

A warning indicates a status or malfunction of one or several individual components of the C2000 power wheelchair.

All problems that have ever occurred are saved in a list and can be retrieved, e.g. in case of a general overhaul of the C2000 power wheelchair. The saved data can be used to determine future service and maintenance intervals, for example.

The following table shows the different error messages on the control panel display or separate LCD monitor. On the LCD monitor, the error message also includes the identification number of the error that has occurred (for more detailed information see the enAble50 instructions for use (647G490=D/GB)):

Display Symbol(s)	LCD Monitor Display	Error / Warning / Defect	Cause	Corrective Action
		Controller temperature warning	Overheating due to excessive load	Cool down phase
		Motor temperature warning	Overheating due to excessive load	Cool down phase
		Motor temperature warning	Control unit has switched to creep speed due to overheating	Cool down phase
		Joystick warning	Joystick not in zero position when switching on	Bring joystick to zero position before switching on
		Hand control device fault	Defective joystick	
		Controller error	Defective controller	





















Display Symbol(s)	LCD Monitor Display	Error / Warning / Defect	Cause	Corrective Action
		Communication error (alternating flashing signal)	Faulty connection between the hand control device and controller. Defective cabling, software or hardware	Check cabling / plug connections
		Battery under voltage	Battery deep discharge	Charge as soon as possible
		Battery over voltage	Voltage too high (after full charge and driving downhill)	Continue driving slowly
		Seat tilt motor fault	Faulty cabling or plug connection, defective actuator	Check cabling / plug connections
		Back angle adjustment motor fault	Faulty cabling or plug connection, defective actuator	Check cabling / plug connections
		Seat height adjustment motor fault		
		Drive motor fault		
		Electric footrest motor fault		
		Wheel lock fault		
		Emergency stop	Severe fault caused by controller, hand control device and/or drive motor malfunction	

Table 6 Error messages

**INFORMATION**

The enAble50 instructions for use 647G490=D/GB include a list of error codes "WARNING XXX" and "ERROR XXX" on the LCD monitor as well as information on corrective actions.

## 8 enAble50 Wheelchair Control – Installation and Programming

**INFORMATION**

The enAble50 instructions for use 647G490=D/GB contain more detailed information about the control unit and the connection of input devices.

### 8.1 Overview

The enAble50 control unit is extremely versatile, featuring smooth operation, good responsiveness and concise colour displays. Various input devices can be used alternately in order to meet the needs of users.

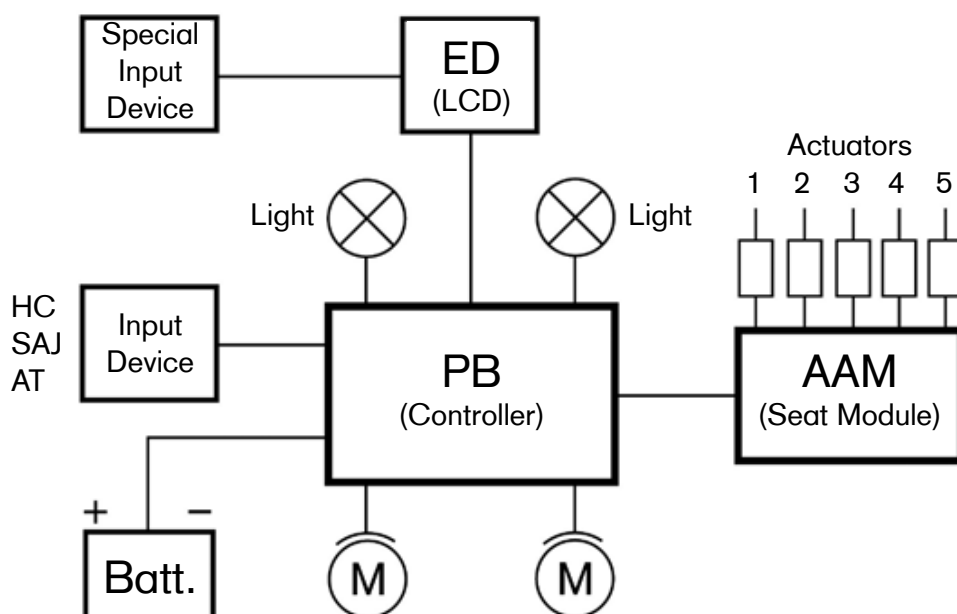


Figure 106 Control unit elements

With the enAble50 control unit, the power wheelchair can indicate the causes of error messages on the display.

Error sources in the drive section and in the electric options are indicated by flashing of the corresponding sections in the display's pictogram or a visual display on the separate LCD monitor (see Section 7.2).

The handheld programming device can be used to make parameter changes (available separately).



Figure 107 Components of the enAble50 wheelchair control

- 1 Attendant control
- 2 Hand control device
- 3 Controller
- 4 Separate LCD monitor

## 8.2 Controller

The controller is attached to the wheelchair with two screws (see Section 6.6).

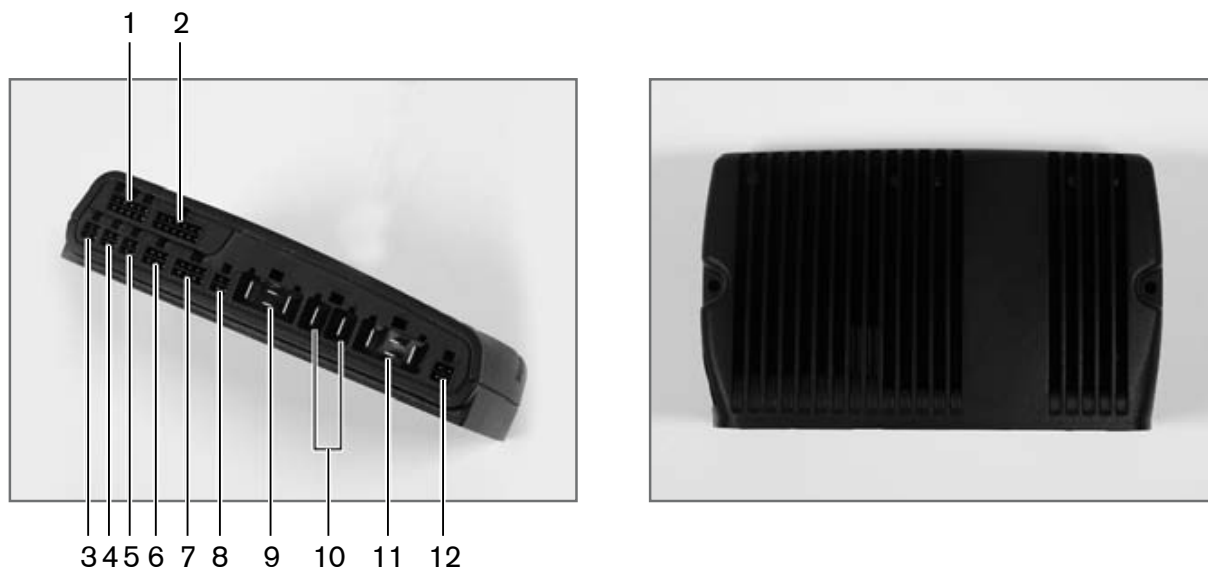


Figure 108 Controller

- 1 J8 - Actuator 1/2 and driver outputs
- 2 J9 - Lightingconnector
- 3 J1 - Analogue input connector
- 4 J2 - Analogue input connector
- 5 J3 - Analogue input connector
- 6 J4 - BUS connector
- 7 J5 - BUS and charger inhibit connector
- 8 J6 - Encoder / switch connector
- 9 M1 - Motor1 connector
- 10 BATT - Battery connector
- 11 M2 - Motor 2 connector
- 12 J7 - Encoder / switch connector

The housing heats up during high-current operation. Therefore, installing the controller on a metal surface with sufficient clearance for air circulation around the housing is recommended. This transfers heat away from the device, improving performance and increasing the lifespan of the controller.

### 8.2.1 Wiring the Controller

The illustration below shows the wiring of the enAble50 controller for a system that has drive motors equipped with encoders.

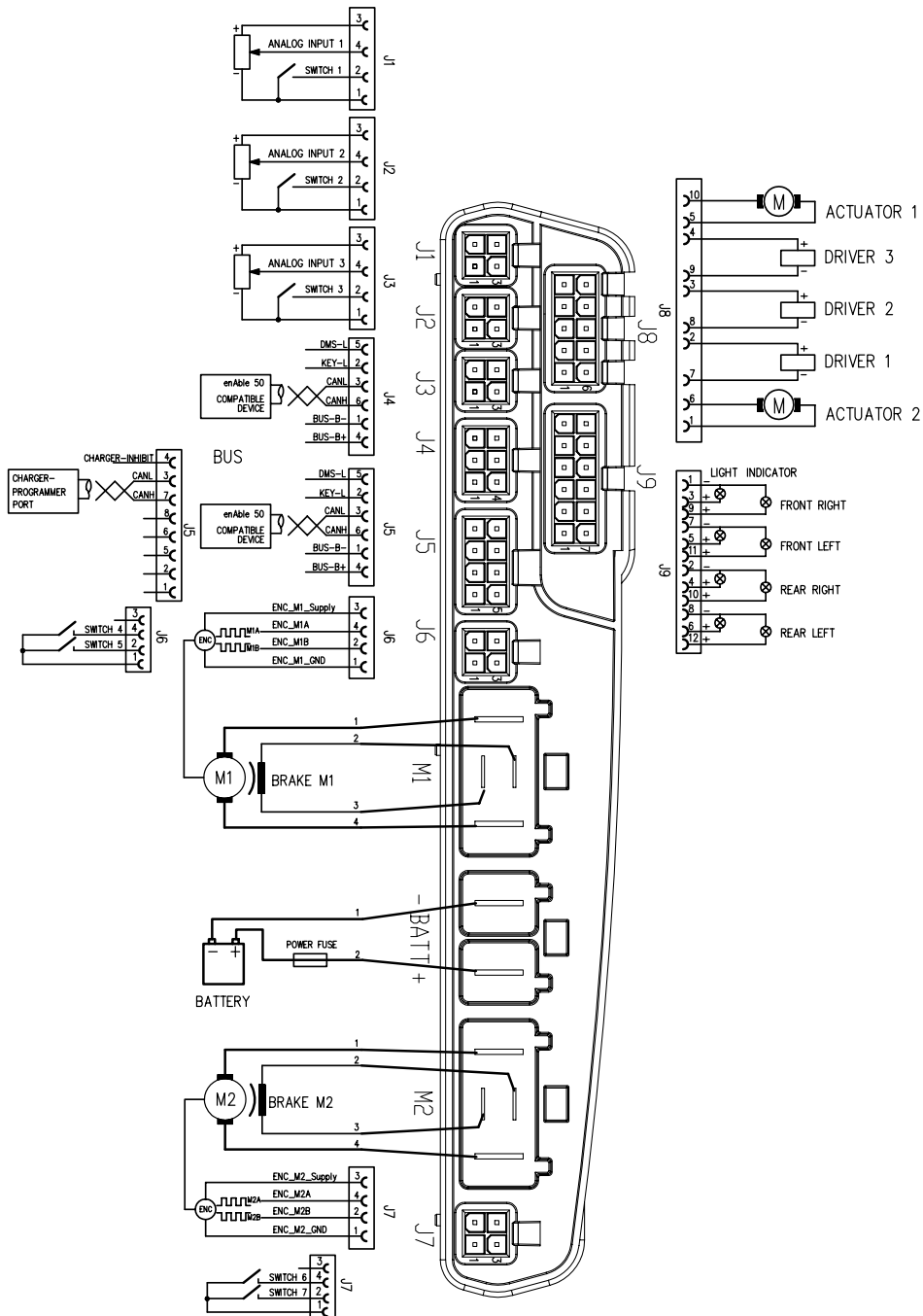


Figure 109 Controller connection schematic

### 8.2.2 Technical Data, Connections

	Wire gauge
M1, M2: Motors	2.5 – 4 mm <sup>2</sup>
M1, M2: Brakes	0.5 – 1 mm <sup>2</sup>
Battery	2.5 – 4 mm <sup>2</sup>
J4 (bus), J9 (12-pin)	0.5 – 1 mm <sup>2</sup>

### 8.2.3 Actuator Outputs

The controller has two independent actuator outputs.

Technical data for the first actuator output:

<b>Voltage</b>	0 ... 100 % $V_{Batt}$
<b>Current for 20 seconds</b>	20 A
<b>Steady current</b>	10 A

Technical data for the second actuator output:

<b>Voltage</b>	0 ... 100 % $V_{Batt}$
<b>Current for 20 seconds</b>	15 A
<b>Steady current</b>	7 A

The actuator outputs are short-circuit protected. However, short-circuiting the actuator output against the negative pole of the battery while the actuator is in operation may damage the output. The actuators have high impedance when they are not in operation.

### 8.3 Seat module

The controller is attached to the wheelchair with two screws (see Section 6.7/6.14.4).

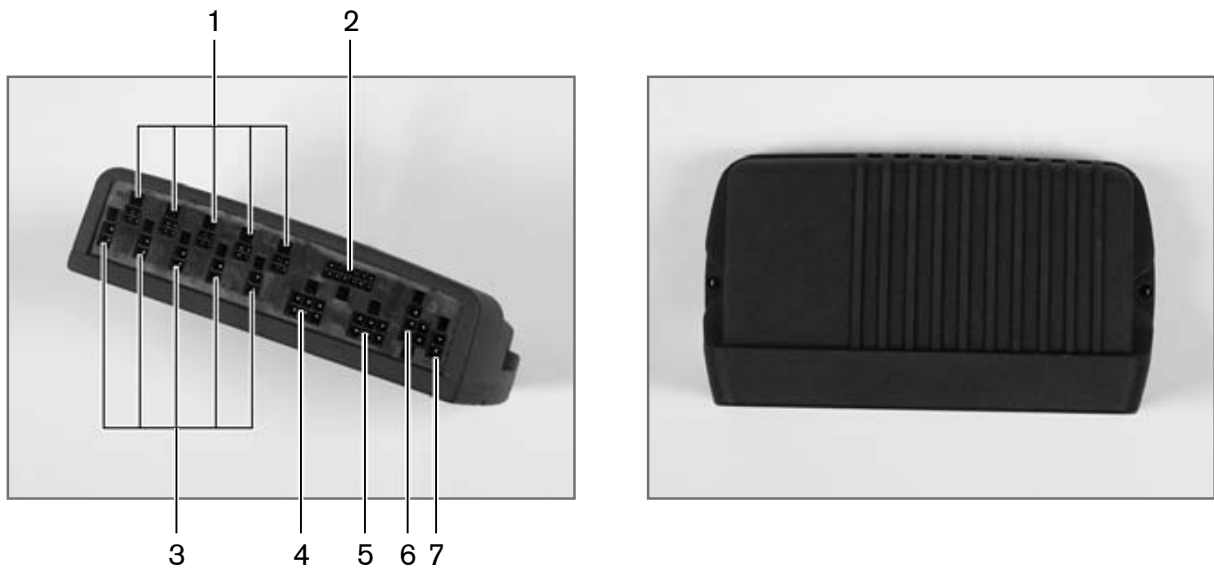


Figure 110 Seat module connection schemata

- 1 IN-A, IN-B, IN-C, IN-D, IN-E connections
- 2 RSW
- 3 A1 - A5 connections (actuators A1 - A5)
- 4 BUS connection
- 5 BUS connection
- 6 BATT bridge / external supply connection
- 7 12 V DC (connection must be activated by parameter -> On/Off!)



### 8.3.1 Wiring the Seat Module

The following figure shows how to wire the seat module. The battery connector either has to be connected to the bus (using a 2-pin bridge, see Figure 112-1) or directly to the battery (using the 4-pin plug, see Figure 112-2).

If the seat module is connected directly to the battery, you may also use the battery to supply higher loads.

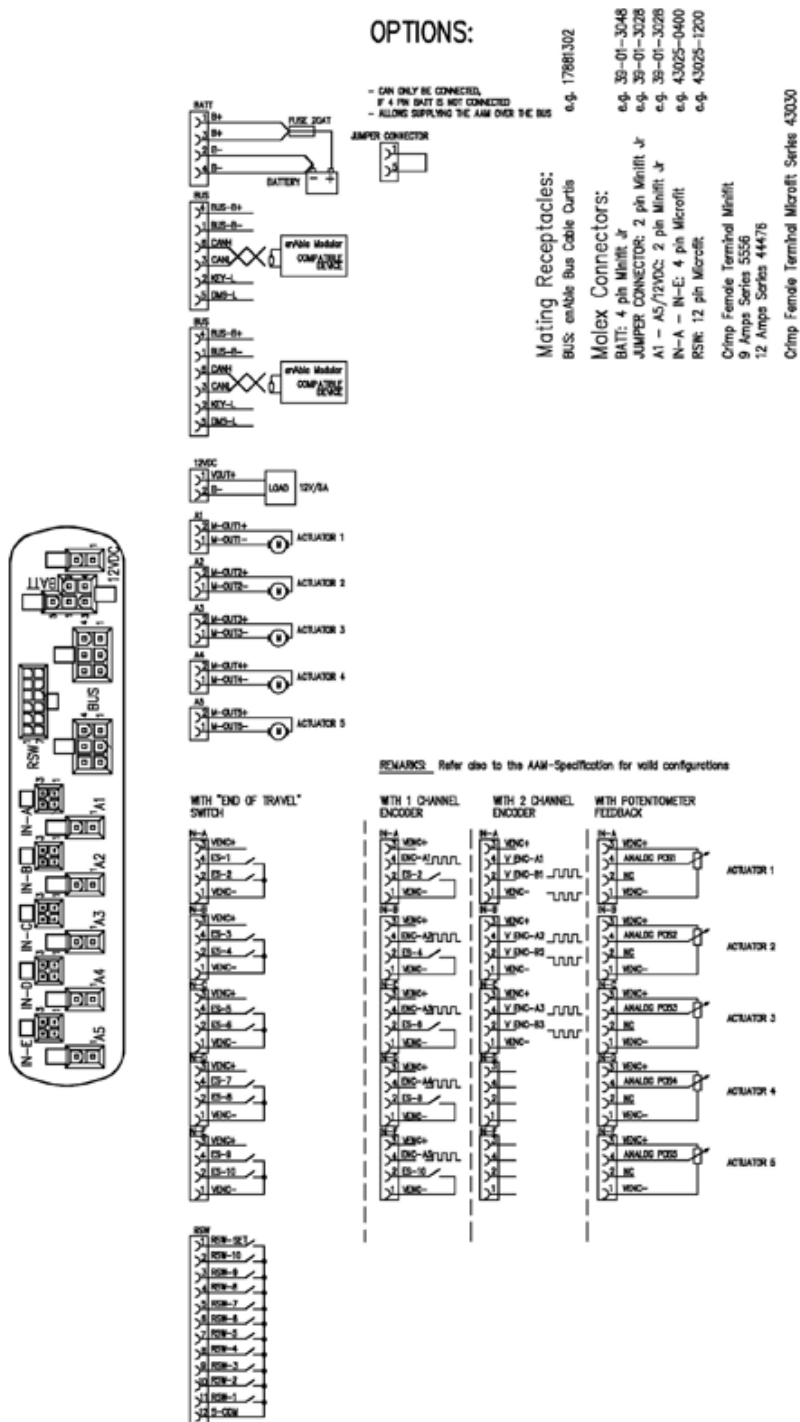


Figure 111 Seat module connection schemata



Figure 112 Battery connection for power supply

### 8.3.2 Electrical Specifications

#### Power supply:

Operating voltage	16 – 33 V
Power supply via bus	12 A
Power supply directly from the battery (continuous)	18 A
Power supply directly from the battery (3 seconds)	24 A
Standby current (typical)	4 mA

Table 7 Power supply

A 2-pin bridge between poles 1 and 5 of the battery connector is required for the power supply of the seat module via the bus. If more current is required, the seat module can be wired directly to the battery (poles 1–4). In this case a fuse must be installed as shown in the wiring diagram.

#### Actuator outputs (A1–A5):

All five actuators can operate forwards or backwards independently in a speed range from 0 to 100%.

Nominal current <sup>1)</sup>	
For 1 second	25 A
For 10 seconds	15 A
Continuous (maximum)	10 A <sup>2)</sup>

<sup>1)</sup> Data apply when only one of the actuators is in operation.

<sup>2)</sup> This nominal current depends on the seat module installation.

- Up to 5 actuators may be operated simultaneously. The total current is not permitted to exceed the maximum supply current of 18 A.
- Each actuator is short-circuit protected (M+ to M-). There is no protection against incorrect wiring between battery B+ or B- and the actuator connector, so that the module could be destroyed in this case.
- The absolute current limit of the actuators can be adjusted via a parameter. This parameter applies to all actuators.

- The actuator outputs have high impedance when they are not in operation.

#### INFORMATION

The enAble50 instructions for use 647G490=D/GB contain information on the power supply and actuator connectors.

## 8.4 Programming Devices

The enAble50 control unit is programmable, i.e. the settings for the various programmable parameters can be set using a programming device. Two programming devices are available: A handheld programming device and a PC programming station (PCPS). The PCPS has additional functions not offered by the handheld programming device. On the other hand, the handheld programming device is more portable. The PCPS is usually used to establish the initial parameter settings, while the handheld programming device is used for changes after deployment.

### 8.4.1 Handheld Programming Device

The handheld programming device (493U36=SK180) is designed for programming, inspection and debugging of the wheelchair control.



Figure 113 Handheld programming device

#### Control and display elements:

1. **LCD:** Graphic display (128 × 64 pixels) to display functions and parameters.
2. **Four-directional button:** A control element to navigate the cursor in the menu tree. Press the up / down arrow to move the cursor vertically in the menu tree. Press the right hand arrow at the branch points to open the corresponding sub-functions and press the left hand arrow to closes these sub-functions again.
3. **Rocker button:** This control element is used to increase or decrease the selected parameter values.
4. **Programmable bookmarks:** 3 user-defined bookmarks. This function enables you to jump quickly among various points in the menu tree. To set a bookmark, select an item and press the key for a longer time (at least 3 seconds). Then the cursor will jump to the predefined position by pressing the key quickly.

**Initial operation:**

1. Turn on the wheelchair control.
2. Ensure the cable is securely connected to the handheld programming device.
3. Connect the bus plug of the handheld programming device to a free bus receptacle (e.g. on the bottom of the display module).

**Operation:**

**a) Display**

The interface is displayed using a so-called “menu tree”. The displayed menu tree range may consist of up to 7 lines. The selected function is indicated by a blinking box. The menu tree is branched into several levels, the lowest one containing individual parameters with numerical values displayed on the right edge.

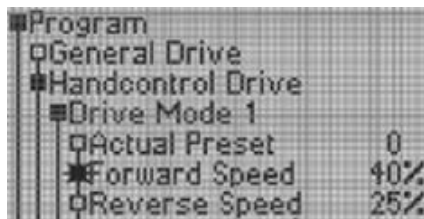


Figure 114 Menu tree

For easier navigation of the selected branch in the menu tree, the display includes nodes (rectangles). They are connected with lines to indicate the relationship between items on the same level in the vertical direction and the depth of branching in the horizontal direction.

The selected branch is indicated with a solid node, while the currently selected function is indicated by a blinking node.

**b) Main menu**

The main menu of the handheld programming device contains 5 main items.

In the “Program” menu item, the parameters of individual modules can be changed.

“Monitor” allows you to display the current module status and parameters. The status of the control elements, battery voltage and battery capacity, motor current and voltage during operation as well as other important module data can be used for system analysis.

For debugging purposes, the errors are stored in fault history for the individual modules. In addition to a brief description, the error type, error code, line number and time stamp are stored for evaluation. For the controller, error statistics are created to register the number of detected errors. The error history can be cleared after evaluation or when repairs are completed. All current errors are displayed by the system error monitor. This allows current problems to be identified quickly.

Device data for the individual modules are recorded in the “Information” submenu. This includes the model number, serial number, software and hardware version etc.

The last main menu item contains handheld programming device settings. Here you can change the language and contrast settings as well as viewing device errors that may occur.

### c) Changing values

Navigate through the menu tree by moving the blinking cursor using the four-directional button. The respective sublevel can be opened by using the right button in each node until you reach the parameter value level. Parameters can be increased or decreased by pressing the plus or minus symbol on the rocker button. By pressing the rocker button briefly, the values are changed by small increments; keeping the rocker button depressed for a longer time changes the values by larger increments.

The following list shows the programmable wheelchair parameters.

The monitor values, list of individual modules errors, sub-item Information as well as handheld programming device settings are not listed here individually. However, they are easily viewed on the handheld programming device thanks to the uniform menus.

#### INFORMATION

Ensure that the freely accessible parameter for the standard LCD contrast (default value 130) is not changed, because the value quickly leaves the defined range and the font can no longer be distinguished from the background. In that case the handheld programming device must be reset using a PC programme.

### 8.4.2 PC Programming Station (PCPS)

The enAble50 control unit can also be programmed with the PCPS 1314 programming station. In addition to the programming software, an interface is required to connect the computer and control unit. An adapter is required to programme the enAble50 wheelchair control unit. Article no. 493U32=SK185 includes the programming software, interface and adapter cable.

#### INFORMATION

For more information on using the software, please consult the enAble50 instructions for use.

## 8.5 Programmable Parameters

#### ⚠ WARNING

**Risk of accidents and injury due to incorrect configuration settings.** Modified parameter settings in the configuration can lead to changes in driving characteristics. In particular, changes to the speed, acceleration, braking or joystick settings can lead to unexpected and therefore uncontrollable operating performance with a risk of accidents.

Always test the driving characteristics of the power wheelchair after configuration / programming is complete.

Programming must only be completed by authorised personnel. Neither Otto Bock nor the control unit manufacturer are liable for damages (especially in combination with special controls) caused by programming that was not properly / professionally adapted to the abilities of the wheelchair user.

The enAble50 wheelchair control unit includes a number of parameters that can be programmed using the handheld programming device or the PCPS 1314 (see Section 8.4). These programmable parameters allow the driving characteristics and performance of the vehicle to be adapted to special user requirements. Information about the use of the handheld programming device can be found in Section 8.4.1.

### 8.5.1 Main Parameters

The menu tree is divided into the following three main parameters:

- Input devices
- System settings
- Configuration

Main Parameter	Menu	Submenu	Settings
Input devices	Hand control device settings	Basic setting	5 adaptable profiles:- Speed- Response- Mode All drive parameters refer to operation with the hand control device.
		Driving	All parameters that affect driving are listed here. More information on the individual parameters is found in Section 8.5.2.
		Entry point	When the system is powered up, it starts at the following point: – Main menu – Favourites – Most recently used operating mode – Driving (modes 1–5)
		Joystick	More information on the individual parameters is found in Section 8.5.3.
		Sound & display	– Command tone – Background light – Dim delay – Tone frequency – Horn frequency
		Miscellaneous	- On/Off switch monitor - Switch monitor mode - Switch delay mode - Receptacle mode - Navigation mode menu - Menu delay
	Joystick module	Basic setting	All parameters are equivalent to those for the hand control device. The parameters do not refer to the standard hand control device, but to the stand-alone joystick (attendant control).
		Driving	
		Joystick	
		Miscellaneous	
	Special input	Basic setting	All parameters are equivalent to those for the hand control device. The parameters do not refer to the standard hand control device, but to input devices such as the mini joystick or 1-5 button input (special input device).
		Driving	
		Settings	
		Miscellaneous	

Main Parameter	Menu	Submenu	Settings
System settings	General driving	Max speed	The maximum speed parameter forms another layer above the speed values that can be programmed under input devices. Example: Max. speed = 60%. Forward speed = 80%. In driving mode 1, $0.8 \times 60\% = 48\%$ of the normal driving speed.
		Max. RPM	Limits the maximum RPM.
		Quick stop factor forward	Factor that determines the deceleration, e.g. if the joystick is released while driving.
		Quick stop factor reverse	
		Emergency stop	Parameter that determines the deceleration in case of problems in the control unit, e.g. the wheelchair is turned off while driving.
		Forward tracking	Compensates for speed differences between the right-hand and left-hand motor. Directional stability can be improved.
		Reverse tracking	
		V steering limit	Determines speed changes in curves.
		Mode button navigation	Defines whether long or short mode signals have different meanings.
		Profile increase stop	Profile change
	Emergency operation		All driving parameters if the wheelchair is in an emergency situation (creep speed).
	Wheelchair geometry		Parameters that relate to the wheelchair base frame, e.g. wheelbase. These parameters should not be changed.
	Reverse beep		A warning signal can be emitted during reverse operation. It can be activated or deactivated in the individual profiles.
	Delays		Various delays can be programmed.
		Automatic shutoff	The wheelchair turns off after the established delay. It does not shut down if the setting is 0.
		Stop timeout	After the delay specified here, the wheelchair switches from cruise control operation to normal operation.
		Stop timeout deactivated	Specifies whether the cruise control automatically stops after the stop timeout or not.
		Drive timeout	Delay between the last driving command and automatically switching to the prior mode. No switching if the parameter is set to 0.
		Aux timeout	Delay between the last input command and automatically switching to the prior operating mode. No jump if the parameter is set to 0.
		Menu timeout	Defines the command time for menu operation.
		IR function timeout	Delay before the IR menu jumps up one level. No jump if the parameter is set to 0.
	Motor & wheels		Parameters that adapt the drive motors to the controller. The direction of rotation can be changed.

Main Parameter	Menu	Submenu	Settings
	Seat	Actuators 1 to 5	Parameters to adjust the seat actuators (speed, current). The seat module offers a separate 12 volt output. The voltage can be turned on or off under the "Miscellaneous" menu item.
	Enhanced display with Bluetooth	Sound & display	The display is needed to control external devices using infrared. Bluetooth can only be used to control a computer mouse. Bluetooth must be activated first.
		Mouse	
		Remote control	
	Wheel lock		Parameters that establish when the wheel locks engage and disengage.
	Actuators & steering	Actuators	2 actuators can be connected to the controller. For example, speed and current values can be programmed here.
		Steering motor	
	Driver outputs	J1	J1-J3 are programmable outputs. Each of them is designed for a 2 A load and set to battery +. Programmable parameters: – External horn: Output activated by horn function – Fan: Output activated when the programmed controller temperature is reached. – Overvoltage: Output activated when the programmable voltage is exceeded – Reverse motion: Output activated during reverse motion – System on: Output activated when the system is turned on
		J2	
		J3	
	Light		Parameters for light and direction indicator settings
	Battery		Parameters for battery settings, which are very time-consuming to establish. The default settings should be retained.
	Odometer reset		Daily and total odometer readings can be reset.
	Hour meter reset		Resets the hours of operation for the drive motors
	Drive-away lock		Turns the drive-away lock function on / off. The lock is activated when the mode button is pushed and held for approximately 5 seconds or the corresponding menu item is selected from the aux menu. However, the mode button cannot be used in this manner if the "smart button" parameter is activated, since the long mode command is used to shut down the system in this case. Value: On / off
Configuration	Save system configuration		Saves the system configuration with all modules and checks whether all modules are present.
	Remote control		The menu tree for the enhanced display with Bluetooth (LCD) can be set up here. The structure is customisable.
	Seat	Actuator configuration	The existing seat actuators (functions) are assigned to the outputs in the seat module. Possible limitations can be programmed via limit switches.



Main Parameter	Menu	Submenu	Settings
	Actuators & steering		<p>The controller actuators can be configured here.</p> <p>Very important setting that establishes the respective wheelchair model. The steering is defined. 2 additional standard actuators can be programmed with normal steering, e.g. for the tilt function or back rest.</p> <p>Possible limitations can be programmed via limit switches.</p>

**Table 8** Main parameter settings

## 8.5.2 "Driving" Parameter Settings

Menu Tree	Access	Min	Max	Default	Unit	Help Text
Input devices > Hand control device settings > Driving > Profile 1 P1 > Forward speed (Fwd Speed)	Service	5	100	20	%	<p>Maximum forward driving speed</p> <p>Determines the highest possible forward driving speed at full deflection when the position of the potentiometer is set to maximum.</p> <p>If the position of the potentiometer is between minimum and maximum, the highest possible forward driving speed is scaled linearly.</p> <p>Ensure the user can operate the wheelchair safely at maximum speed.</p>
Input devices > Hand control device settings > Driving > Profile 1 P1 > Reverse speed (Rev Speed)	Service	5	100	20	%	<p>Maximum reverse driving speed</p> <p>Determines the highest possible reverse driving speed at full deflection when the position of the potentiometer is set to maximum.</p> <p>If the position of the potentiometer is between minimum and maximum, the highest possible reverse driving speed is scaled linearly.</p> <p>Ensure the user can operate the wheelchair safely at maximum speed.</p>
Input devices > Hand control device settings > Driving > Profile 1 P1 > Turning speed (Turn Speed)	Service	5	100	10	%	<p>Maximum turning speed</p> <p>Determines the highest possible turning driving speed at full deflection when the position of the potentiometer is set to maximum.</p> <p>The turning speed is normally set to a much lower value than the forward driving speed.</p> <p>If the position of the potentiometer is between minimum and maximum, the highest possible turning speed is scaled linearly.</p> <p>Ensure the user can operate the wheelchair safely at the selected speed.</p>
Input devices > Hand control device settings > Driving > Profile 1 P1 > Forward acceleration (Fwd Accel)	Service	5	100	20	%	<p>Maximum forward acceleration</p> <p>Specifies the forward acceleration of the wheelchair when the position of the potentiometer is set to maximum.</p> <p>A high value represents a short acceleration time and a fast start. High acceleration values result in abrupt speed changes and should only be used in special cases.</p> <p>If the position of the potentiometer is between minimum and maximum, the forward acceleration is scaled linearly.</p> <p>Ensure the user can operate the wheelchair safely at maximum acceleration.</p>

Menu Tree	Access	Min	Max	Default	Unit	Help Text
Input devices > Hand control device settings > Driving > Profile 1 P1 > Forward deceleration (Fwd Decel)	Service	5	100	20	%	<p>Maximum forward deceleration</p> <p>Specifies the forward deceleration of the wheelchair when the position of the potentiometer is set to maximum.</p> <p>A high value represents a short deceleration time and a rapid stop. High deceleration values result in abrupt speed changes and should only be used in special cases.</p> <p>If the position of the potentiometer is between minimum and maximum, the deceleration is scaled linearly.</p> <p>Ensure the user can operate the wheelchair safely at maximum deceleration.</p>
Input devices > Hand control device settings > Driving > Profile 1 P1 > Reverse acceleration (Rev Accel)	Service	5	100	20	%	<p>Maximum reverse acceleration</p> <p>Specifies the reverse acceleration of the wheelchair when the position of the potentiometer is set to maximum.</p> <p>A high value represents a short acceleration time and a fast start. High acceleration values result in abrupt speed changes and should only be used in special cases.</p> <p>If the position of the potentiometer is between minimum and maximum, the reverse acceleration is scaled linearly.</p> <p>Ensure the user can operate the wheelchair safely at maximum acceleration.</p>
Input devices > Hand control device settings > Driving > Profile 1 P1 > Reverse deceleration (Rev Decel)	Service	5	100	20	%	<p>Maximum reverse deceleration</p> <p>Specifies the reverse deceleration of the wheelchair when the position of the potentiometer is set to maximum.</p> <p>A high value represents a short deceleration time and a rapid stop. High deceleration values result in abrupt speed changes and should only be used in special cases.</p> <p>If the position of the potentiometer is between minimum and maximum, the reverse deceleration is scaled linearly.</p> <p>Ensure the user can operate the wheelchair safely at maximum deceleration.</p>

Menu Tree	Access	Min	Max	Default	Unit	Help Text
Input devices > Hand control device settings > Driving > Profile 1 P1 > Turning acceleration (Turn Accel)	Service	5	100	10	%	<p>Maximum turning acceleration</p> <p>Specifies the turning acceleration of the wheelchair when the position of the potentiometer is set to maximum.</p> <p>A high value represents higher turning acceleration and more rapid direction changes. High turning acceleration values result in abrupt direction changes and should only be used in special cases.</p> <p>If the position of the potentiometer is between minimum and maximum, the turning acceleration is scaled linearly.</p> <p>Ensure the user can operate the wheelchair safely at maximum acceleration.</p>
Input devices > Hand control device settings > Driving > Profile 1 P1 > Turning deceleration (Turn Decel)	Service	5	100	10	%	<p>Maximum turning deceleration</p> <p>Specifies the turning deceleration of the wheelchair when the position of the potentiometer is set to maximum.</p> <p>A high value represents higher turning deceleration and more rapid direction changes. High turning deceleration values result in abrupt direction changes and should only be used in special cases.</p> <p>If the position of the potentiometer is between minimum and maximum, the turning acceleration is scaled linearly.</p> <p>Ensure the user can operate the wheelchair safely at maximum deceleration.</p>

Menu Tree	Access	Min	Max	Default	Unit	Help Text
Input devices > Hand control device settings > Driving > Profile 1 P1 > Latch Forward LatchFor	Service	0	2	0		<p>Constant speed forward / reverse</p> <p>If 'Constant speed' = cruise is selected, the wheelchair accelerates to the desired speed. If the command is reduced, the wheelchair maintains the speed. Direction changes are always possible. The wheelchair decelerates if an opposing command of 50% or less is issued. A stop is achieved via a mode button command or an opposing command of more than 50%.</p> <p>If 'Constant speed' = stepped is selected, the wheelchair accelerates by one increment with each short command (33%, 66% and 100%) up to the maximum speed. Direction changes are always possible. The wheelchair decelerates by one increment (e.g. from 66% to 33%) when a brief opposing command of 50% is issued. A stop is achieved via a mode switch or with a permanent opposing command.</p> <p><b>⚠ WARNING Risk of injury due to incorrectly installed control buttons.</b> Never select 'Constant speed' mode (cruise or stepped) unless the mode button is installed so that the user can operate it quickly at any time.</p>

Menu Tree	Access	Min	Max	Default	Unit	Help Text
Input devices > Hand control device settings > Driving > Profile 1 P1 > Latch Reverse LatchRev	Service	0	2	0		<p>Constant speed forward / reverse</p> <p>If 'Constant speed' = cruise is selected, the wheelchair accelerates to the desired speed. If the command is reduced, the wheelchair maintains the speed. Direction changes are always possible. The wheelchair decelerates if an opposing command of 50% or less is issued. A stop is achieved via a mode button command or an opposing command of more than 50%.</p> <p>If 'Constant speed' = stepped is selected, the wheelchair accelerates by one increment with each short command (33%, 66% and 100%) up to the maximum speed. Direction changes are always possible. The wheelchair decelerates by one increment (e.g. from 66% to 33%) when a brief opposing command of 50% is issued. A stop is achieved via a mode switch or with a permanent opposing command.</p> <p><b>⚠ WARNING Risk of injury due to incorrectly installed control buttons.</b> Never select 'Constant speed' mode (cruise or stepped) unless the mode button is installed so that the user can operate it quickly at any time.</p>
Input devices > Hand control device settings > Driving > Profile 1 P1 > Performance	Service	20	100	100	%	<p>Performance</p> <p>The performance parameter may be less than 100% to limit the maximum torque.</p> <p>Limiting the torque reduces the power of the wheelchair. This can prevent dangerous collisions or crossing obstacles.</p> <p>Reducing torque is usually only feasible for indoor operation.</p> <p>After reducing the torque, ensure the user is able to cross any obstacles that need to be crossed.</p>

**Table 9** "Driving" parameter settings

### 8.5.3 "Joystick" Parameter Settings

Menu Tree	Access	Min	Max	Default	Unit	Help Text
Input devices > Hand control device settings > Joystick > Centre deadband	Service	10	50	20	%	Centre deadband Centre deadband defines the joystick travel before the system recognises the command. The value corresponds to a circle around the joystick zero point. No movements or commands are executed unless the joystick is moved beyond this circle. Increasing this value is useful if the operator has a pronounced hand tremor.
Input devices > Hand control device settings > Joystick > Switch operation	Service	Off	On	Off	On/ Off	Switch function The joystick can be used like a switch. If the switch function is ON, the proportional function is replaced by a switch function. Moving the joystick from the centre by more than 50% generates a 100% command in the desired direction.
Input devices > Hand control device settings > Joystick > Tremor suppression	Service	0	100	0	%	Suppresses a tremor on the joystick. 0% -> Tremor suppression deactivated 100% -> Maximum tremor suppression <b>INFORMATION</b> If a brief command is used for system operation (e.g. if "3 direction profile" is selected), tremor suppression should not exceed 90%. If tremor suppression exceeds 90% in such a case, the brief command is ignored.

Table 10 "Joystick" parameter settings

## 9 C2000 Maintenance and Service Plan

Customer:

Re-use

Yes	No
-----	----

Year of manufacture:	Serial no.:
----------------------	-------------

### C2000 General Condition

Driving report:

### Component (group)

Carefully check all components listed here for correct function, setting, damages or deformations, and whether the screw connections are tightened!

		OK	Damage	Replacement
<b>1</b>	<b>Control unit</b>			
	Control unit holder			
	Control cable			
	LCD monitor (if present)			
<b>2</b>	<b>Batteries</b>			
	Battery cover			
	Cabling			
<b>3</b>	<b>Motors</b>			
	Wheel lock release			
<b>4</b>	<b>Tyres</b>			
	Drive wheels			
	Steering casters			
<b>5</b>	<b>Frame</b>			
	Drive unit sustainer			
<b>6</b>	<b>Seat</b>			
	Back			
	Upholstery/ cushion			



	Contour seat			
	Contoured back			
	Recaro seat			
<b>7</b>	<b>Electric seat adjustments</b>			
	Back adjustment (actuator; cables)			
	Seat tilt (actuator; cables)			
	Seat height adjustment (actuator; linkage; cables)			
	Footrests (actuator; cables)			
<b>8</b>	<b>Side panel</b>			
	Adapters			
	Clothing protector			
	Lighting adapter			
<b>9</b>	<b>Footrests</b>			
	Adapters			
	Elevating footrest			
<b>10</b>	<b>Lighting</b>			
	Front lights			
	Rear lights			
<b>11</b>	<b>Options</b>			
	Belt			
	Adapter for headrest			

Comments:

--

The maintenance service was carried out by:	Place / date:	Signature:
---------------------------------------------	---------------	------------



# Kundenservice/Customer Service

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