

Wingus

Service manual



Table of contents

1	Introduction	4
1.1	Foreword	4
1.2	Support	4
1.3	Product Overview	5
2	Safety.....	6
2.1	Explanation of warning symbols	6
2.2	General safety instructions	6
2.3	Safety instructions for the use of tools and appliances	6
2.4	Safety instructions for service and maintenance tasks	7
3	Transport and storage	8
3.1	Transport	8
3.2	Storage	9
4	Service Work	9
4.1	General Information	9
4.2	Instructions for assembly and adjustment.....	9
4.3	Maintenance Schedule	9
4.4	Required tools	10
4.5	Basic work	10
4.5.1	Jacking up the wheelchair	10
4.5.2	Working in the de-energised state	11
4.6	Batteries	11
4.6.1	Replacing the battery cover	11
4.6.2	Replacing the battery straps	12
4.6.3	Replacing the fuse cable	12
4.6.4	Replacing the battery cable	13
4.6.5	Replacing the batteries	14
4.6.6	Charging the batteries	14
4.7	Control unit	14
4.7.1	Replacing the controller	14
4.7.2	Replacing the control panel	15
4.7.3	Replacing the control panel holder	16
4.7.4	Replacing the holder for attendant control	17
4.8	Caster wheels	18
4.8.1	Replacing the caster wheel	18
4.8.2	Replacing the caster fork	19
4.8.3	Replacing the bearing plug	19
4.9	Drive unit	20
4.9.1	Replacing the drive wheel	20
4.9.2	Replacing the splash guard	20
4.9.3	Replacing the drive motor	21
4.9.4	Replacing the brake lever cover	21
4.10	Leg support.....	22
4.10.1	Replacing the foot plate	22
4.10.2	Replacing the foot plate holder	22
4.10.3	Replacing the positioning belt.....	23
4.11	Arm support	23
4.11.1	Replacing the clamping pins (clamps)	23
4.11.2	Replacing the arm pads	24
4.11.3	Replacing the arm support	24
4.11.4	Replacing the arm support tube	25
4.12	Positioning belt (lap belt)	25
4.12.1	Replacing the lap belt	25
4.13	Chest and shoulder support	26
4.13.1	Replacing the sternum harness.....	26

4.14	Seat	27
4.14.1	Replacing the seat plate.....	27
4.14.2	Replacing the hook-and-loop closure.....	27
4.15	Back.....	28
4.15.1	Replacing the clamping pins (clamps)	28
4.15.2	Replacing the back support.....	28
4.15.3	Replacing the back support upholstery	29
4.15.4	Replacing the bearing plate.....	29
4.16	Base frame.....	30
4.16.1	Replacing the battery carrier.....	30
4.16.2	Replacing the anti-tipper wheels	30
4.16.3	Replacing the earth contact.....	31
4.16.4	Replacing the reflectors	31
4.17	Lighting	32
4.17.1	Replacing the lighting for road traffic	32
4.17.2	Replacing the footpath lighting	35
4.18	Additional options	35
4.18.1	Replacing the crutch holder	35
4.18.2	Replacing the storage bag	36
4.18.3	Replacing the adapter for the head support mounting kit.....	37
4.18.4	Replacing options with hook-and-loop fasteners	37
5	Troubleshooting nVR2.....	38
5.1	Diagnostic steps	38
5.2	Visual displays	38
5.3	Error messages/error codes	40
5.4	Other errors	41
6	nVR2 wheelchair control device – installation and programming	42
6.1	Installation and wiring.....	42
6.2	Programming tools	45
6.2.1	Handheld programming device	45
6.2.2	PC programming software	45
6.3	Programmable parameters	46
6.3.1	General parameters.....	46
6.3.2	Speed parameters.....	47
6.3.3	Report functions	49
7	Technical data	49
8	Appendices	49
8.1	Torque values of the screw connections.....	49
8.2	Battery circuit diagram.....	49
8.3	Record of delivery	50
8.4	Maintenance Schedule	51

1 Introduction

INFORMATION

Date of last update: 2021-10-19

INFORMATION

- ▶ New information regarding product safety and product recalls as well as the declaration of conformity can be obtained at ccc@ottobock.com or from the manufacturer's service department (see inside or outside of back cover for addresses).
- ▶ You can request this document as a PDF file at ccc@ottobock.com or from the manufacturer's service department (see inside or outside of back cover for addresses). The PDF file can also be displayed in a larger size.

1.1 Foreword

- Regular maintenance is important. It increases safety and ensures the the product reaches its intended lifetime.
- This product should be inspected and serviced once a year.
- The manufacturer recommends inspecting, readjusting, and if necessary servicing the product every **6 months** if the product is used frequently, by growing children or by users with changing clinical conditions.
- The assembly tasks described here relate to the use of spare parts. The service personnel bear sole responsibility for retrofitting or converting the product.
- Only use original spare parts for all service and maintenance work. The service and maintenance tasks described here should only be completed by trained, qualified personnel and not by the user of the device.
- Use the maintenance schedule (checklist) as a template for making copies. Retain completed maintenance schedules and provide the customer with a copy.
- This service manual refers to the respective spare parts catalogues and the instructions for use of the described products.

	Instructions for use (qualified personnel)	Instructions for use (user)
Wingus	647G1657=*	647H1657=*

1.2 Support

Your national Ottobock team will be happy to answer any technical questions. The contact addresses and telephone numbers can be found on the back inside cover of the service manual.




1.3 Product Overview




- | | | | |
|---|-----------------------------|----|--------------------------------------|
| 1 | Back support | 8 | Leg support with foot plate |
| 2 | Arm support (flip-up) | 9 | Caster wheel |
| 3 | Control panel with joystick | 10 | Drive wheel |
| 4 | Seat cushion | 11 | Anti-tipper with anti-tipper rollers |
| 5 | Positioning belt (lap belt) | 12 | Motors with brake release |
| 6 | Cantilever frame | 13 | Back support angle adjustment |
| 7 | Battery cover | 14 | Push bar |


2 Safety


2.1 Explanation of warning symbols

 WARNING	Warning regarding possible serious risks of accident or injury.
 CAUTION	Warning regarding possible risks of accident or injury.
 NOTICE	Warning regarding possible technical damage.


2.2 General safety instructions


 **WARNING**
Risk of suffocation
 ► Packaging materials must be kept out of the reach of children.


 **WARNING**
Use of the wheelchair during service work
 Severe injuries if the wheelchair tips over due to loosened components
 ► No person is permitted to be in or on the wheelchair during any service work.
 ► Support the product so it cannot tip over during all service work.

 **WARNING**
Overloading
 Severe injuries if the product tips over due to overloading, damage to the product
 ► Do not exceed the maximum load (see the nameplate and section "Technical data").
 ► Please note that certain accessories and add-on components will reduce the remaining load capacity.
 ► We assume no liability if the maximum permissible user weight is exceeded.
 ► Refitting and retrofitting accessories changes the weight of the wheelchair. This can lead to changes in driving characteristics and increased loads on the drives, the suspensions and other components of the wheelchair. Before refitting or retrofitting any accessories, check whether the selected configuration and the overall weight of the wheelchair are permitted. Please contact your national Ottobock team for further information.

2.3 Safety instructions for the use of tools and appliances

 **CAUTION**
Use of unsuitable tools
 Pinching, crushing or damaging the product due to use of unsuitable 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.
 ► Observe the specifications in the section "Required Tools".

 **CAUTION**
Wearing of unsuitable work clothing
 Chemical burns due to insufficient protection
 ► Wear suitable work clothing (for example, gloves and protective eyewear) when working on the batteries.

 **CAUTION**
Improper lifting
 Crushing, pinching, blows due to failure to observe safety notices
 ► Some parts of the power wheelchair, such as the batteries, frame, seat, and motors, are very heavy. Ensure ergonomically correct lifting of these parts. Use sufficiently large hoisting devices or perform this work with the aid of a helper for support. In this case, you and the helper grasp the frame tubes underneath the seat with both hands on either side of the product.
 ► If it is necessary to work underneath raised parts or equipment, make sure these are secured by suitable means so that they cannot come loose, shift or fall down.
 ► When using lifting platforms, ensure that the power wheelchair is centred on the platform and that no parts protrude into the danger zone.

2.4 Safety instructions for service and maintenance tasks

WARNING

Uncontrolled movement of components following loosening of plug and screw connections

Pinching, crushing and shearing of body parts

- ▶ Ensure that body parts, such as hands and feet, are never in the danger zone.
- ▶ Ensure that no interfering objects, such as clothing or other obstacles, are in the danger area.
- ▶ Perform the work with the aid of a helper for support.

WARNING

Incorrect cable routing

Tipping over, falling out, burns due to assembly errors during cable installation

- ▶ Improper cable installation can lead to a loss of cable insulation and consequently to short circuits and even fires. Always install the cables so the cable insulation cannot chafe.
- ▶ Severing cables or unintentionally disconnecting plug connections while driving can cause an emergency stop of the wheelchair. This can lead to dangerous situations in road traffic. Always install the cables and plug connections so they cannot be damaged and cannot disconnect.

CAUTION

Failure to observe installation instructions

Pinching, crushing due to installation errors

- ▶ Do not reach between force-actuated surfaces during installation work (e.g. when tightening screw connections).

CAUTION

Improper use of self-locking nuts

Tipping, falling over of the user due to screw connections coming loose

- ▶ Always replace self-locking nuts with new self-locking nuts after disassembly.

CAUTION

Unsecured screw connections

Pinching, crushing, tipping over, falling of user due to assembly errors

- ▶ Always firmly re-tighten the mounting screws and nuts after changing settings. Observe the specified torques in doing so.
- ▶ Any time you loosen a screw connection with thread lock, replace it with a new screw connection with thread lock or secure the old screw connection with medium strength thread locker (e.g. Loctite 241).
- ▶ Always replace self-locking screws and nuts with new self-locking screws and nuts after disassembly.

CAUTION

Lack of or improper cleaning

Health hazard due to infections, damage to the product due to user error

- ▶ Clean the product at regular intervals.
- ▶ Water must not come into direct contact with the electronics, motor or batteries under any circumstances during cleaning. Never use a water jet or high-pressure cleaning apparatus to clean the product.
- ▶ To avoid contamination with germs, clean seat cushions and back support upholstery whenever they get soiled.
- ▶ Check the driving behaviour of the product after cleaning it.

NOTICE

Incorrect cable routing

Plug connections coming loose or damage to the cables due to assembly errors

- ▶ Take note of the cables attached to the product with cable ties during all assembly work.
- ▶ Carefully cut the cable ties with suitable side-cutting pliers if necessary. Ensure that you do not damage the cables during this process.
- ▶ Install the cables in such a way that they cannot be damaged. Leave an appropriate cable loop on moveable components so they can move without tension.
- ▶ Only use suitable fasteners (such as cable ties). Also use cable ties to secure the plug connections to the product so they cannot be disconnected unintentionally.

NOTICE

Worn or loose bushings

Damage to product due to incorrect assembly

- ▶ Verify that the pressed-in bushings fit firmly during all assembly work.
- ▶ If bushings are worn or loose, the entire component in question has to be replaced. Replacing individual bushings is not permitted.

NOTICE

Tipping or falling of the product

Damage to product due to lack of attachment

- ▶ When you work on the product, secure it so that it cannot tip over or fall over.
- ▶ Use a clamping fixture to secure the product whenever you work on it at a workbench.

3 Transport and storage

3.1 Transport

NOTICE

Improper transport

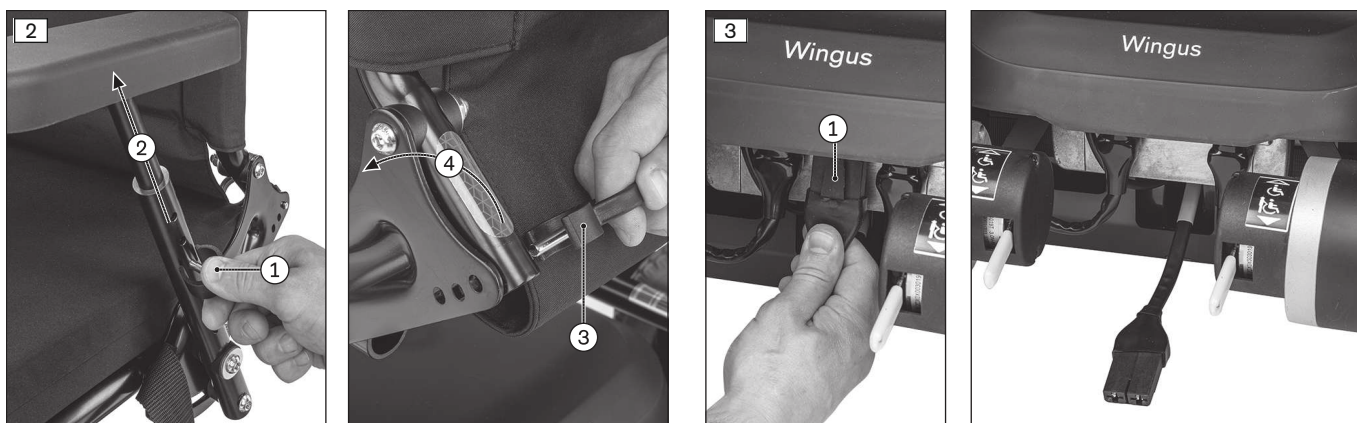
Damage to the product due to collision and falling down

- ▶ Only use hoisting devices that have a sufficient capacity and the designated carry handles.
- ▶ The power wheelchair must be secured in accordance with the regulations for the transport device.
- ▶ During transportation on lifting platforms or in lifts, the control unit of the power wheelchair must be turned off. Engage the brake.
- ▶ Ensure that the power wheelchair is centred on the lifting platform. None of the power wheelchair's components, such as its anti-tippers or other components, may be in the danger area.

The size of the wheelchair can be reduced for transport. To do so, set the forearm supports to the lowest position or remove them (see fig. 2, item 1/2) and fold the back support down onto the seat (see fig. 2, item 3/4). The foot plate on the leg support can also be folded up, and the seat cushion can be stowed separately (not illustrated).

The battery cable has to be disconnected prior to transport (see fig. 3). To release the plug, push the snap-fit (see fig. 3, item 1).

All instructions for reducing the transportation size are included in the instructions for use (user).



3.2 Storage

Switch off the wheelchair control device and disconnect the battery cable prior to prolonged storage (see fig. 3). Store the product in a dry, enclosed room with sufficient air circulation and protection from external influences. Maintain an ambient temperature from **-15 °C to +40 °C [5 °F to 104 °F]** and relative humidity of **45% to 85%**.

4 Service Work

4.1 General Information

INFORMATION

Read the service manual before starting work. Familiarise yourself with the functions of the product prior to inspection and use. In order to do so, you can request this service manual and other documentation from the manufacturer (see the overview of national Ottobock branches on the inside of the back cover).

INFORMATION

Clean and disinfect the product before commencing service work.
Observe all product care and product-specific inspection instructions in the instructions for use.

INFORMATION

Many screw connections utilise screws and nuts equipped with a thread lock. If you loosen screw connections, be sure to replace the respective nut or screw with one equipped with a new thread lock. If new screws or nuts with thread lock are not available, use a medium strength liquid thread locking compound (e.g. Loctite® 241 or Euro Lock A24.20).

4.2 Instructions for assembly and adjustment

⚠ WARNING

Lack of stability against tipping

User may fall or tip over due to lack of inspection

- ▶ Changing the settings can lead to instability of the system as a whole. Verify tipping resistance after any changes to the settings.

The sections that follow describe the replacement of standard and optional parts on the product shown on the cover.

All information regarding the initial assembly of available options is contained in the instructions for use since all options for this wheelchair type are included on delivery. See the section "Foreword" for the order number of the instructions for use.

The information concerning the adjustment of the installed parts is also included in these instructions for use.

4.3 Maintenance Schedule

The maintenance schedule as a copy template is found in the appendix: see page 51.

4.4 Required tools

The following tools are required in order to perform the service work:

INFORMATION

Please note: Always use insulated tools for work on current-carrying components.

- Set of screwdrivers
- Phillips head screwdriver (size: 2)
- Allen keys in sizes 2 – 8 mm
- Ring and open-end wrenches in sizes 8, 10, 13, 19 and 24
- For work on the battery: Insulated ring and open-ended wrench, size 10
- Reversible ratchet handle wrench and sockets (size: 8 – 24)
- Torque wrench (measuring range 5 – 50 Nm)
- Hammer (approx. 300 g); soft-faced hammer
- Side cutting pliers
- Knives
- Assembly lever
- Water pump pliers
- Bubble level
- Liquid thread lock, "medium" and "strong"
- Cyamet quick-drying adhesive
- Heat gun
- Assembly stand (rectangular supporting surface corresponding to the footprint of the product; load capacity at least equal to the overall weight of the wheelchair; see technical data)

4.5 Basic work

4.5.1 Jacking up the wheelchair

⚠ CAUTION

Improper lifting

Crushing, pinching, blows due to failure to observe safety notices

- ▶ Some parts of the power wheelchair, such as the batteries, frame, seat, and motors, are very heavy. Ensure ergonomically correct lifting of these parts. Use sufficiently large hoisting devices or perform this work with the aid of a helper for support. In this case, you and a helper grasp the frame tube underneath the seat with both hands on either side of the product.
- ▶ If it is necessary to work underneath raised parts or equipment, make sure these are secured by suitable means so that they cannot come loose, shift or fall down.
- ▶ Always use an assembly stand with a load capacity that is at least equal to the overall weight of the wheelchair.
- ▶ When using lifting platforms, ensure that the power wheelchair is centred on the platform and that no parts protrude into the danger zone.

NOTICE

Incorrect lifting

Damage to the product, tearing off of side panels due to user error

- ▶ Do not use the side panels to lift the wheelchair.

Jacking up is required for work on the following components:

- Drive wheels
- Caster wheels
- Working on the frame
- Drive motors

Jacking up with an assembly stand

- 1) Activate (lock) the brakes on both drive motors.

- 2) Tip the wheelchair back onto the anti-tipper rollers with the active support of a helper.
INFORMATION: Grasp the base frame when tipping. Do not use the arm supports or forearm supports to lift the wheelchair. Do not pull or push on the arm supports or forearm supports.
- 3) Set an assembly stand of sufficient load capacity and size in the centre under the wheelchair's battery carrier.
- 4) Slowly tip the wheelchair forward, carefully lowering the wheelchair's battery carrier and centring it on the assembly stand. The battery carrier has to lie evenly on the supporting surface of the assembly stand.
- 5) Check that the wheelchair is securely positioned on the assembly stand.

4.5.2 Working in the de-energised state

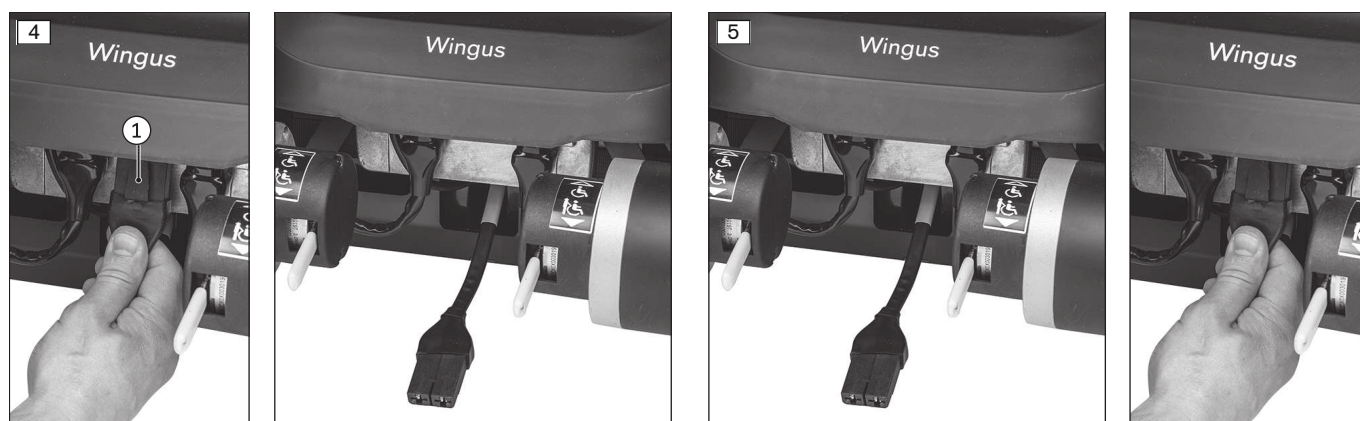
Turn the control device off and disconnect the battery cable before starting any work on current-carrying components.

Turning off the control device, disconnecting the battery cable

- 1) Press the [On/Off] button to turn the control device off.
- 2) Disconnect the plug of the battery cable from the controller. To release the plug, push the snap-fit (see fig. 4, item 1). Let the battery cable hang down loosely (see fig. 4, right).
- 3) Perform the required work on current-carrying components.

Connecting the battery cable, turning the control device on

- 1) **After completing the work:** Reconnect the plug to the plug connection on the controller (see fig. 5, right).
- 2) Press the [On/Off] button to turn the control device on.



4.6 Batteries

⚠ CAUTION

Short circuit of the battery

Burns, injuries; damage to electrical/electronic components due to improper battery handling

- ▶ Disconnect the battery cable from the controller before performing any work on the battery.
- ▶ Only use insulated tools to perform maintenance work on the batteries.
- ▶ Never connect the two poles of a battery with metal conductors or tools.
- ▶ Ensure correct polarity when connecting the battery cable. Please refer to the battery circuit diagram on the inside of the battery cover.

4.6.1 Replacing the battery cover

▶ Prerequisites:

Turn the control device off and disconnect the battery cable (see page 11).

▶ Tools: Allen key, size 3

- 1) Loosen the four Allen head screws on the battery cover (see fig. 6).
- 2) Remove the battery cover and replace it (see fig. 7).

INFORMATION: The battery cover can be removed in different directions depending on the equipment (lighting, storage bag) and adjustment of the wheelchair (leg support). It can always be removed by first moving it up and then back. If lighting for use in road traffic is installed, the rear retaining plates have to be rotated out of the way to the outside (for loosening the retaining plates: see page 32). The seat plate does not have to be removed.

- 3) Install the battery cover and firmly tighten the Allen head screws.



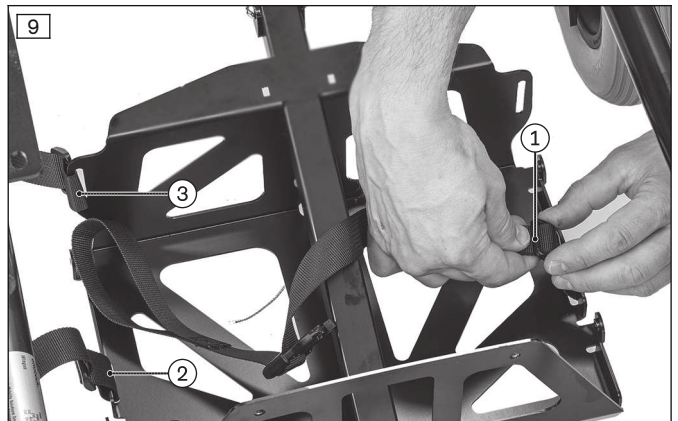
4.6.2 Replacing the battery straps

► **Prerequisites:**

Turn the control device off and disconnect the battery cable (see page 11).

► **Tools:** Allen key, size 3

- 1) Remove the battery cover (see page 11).
- 2) Open the upper fastening strap on the battery carrier (see fig. 8).
- 3) Open the side fastening strap on the battery carrier (not illustrated).
- 4) Position the buckle at a right angle and open the strap (see fig. 9, item 1).
- 5) Loosen the battery straps from the battery carrier and replace them (horizontal battery strap: see fig. 9, item 2; vertical battery strap: see fig. 9, item 3).
- 6) Reattach the battery straps to the battery carrier.
- 7) Loosely pre-adjust the fastening straps, then fasten the closures (see fig. 15) and tighten the straps on the loop (see 647G1657=* instructions for use).
- 8) Attach the battery cover (see page 11).



4.6.3 Replacing the fuse cable

► **Prerequisites:**

Turn the control device off and disconnect the battery cable (see page 11).

► **Tools:** Insulated open-ended or ring wrench, size 10; Allen key, size 3

- 1) Remove the battery cover (see page 11).
- 2) Loosen the hexagon head screws on the fuse cable (see fig. 10).
- 3) Replace the fuse cable (see fig. 11).
- 4) Put on the fuse cable and firmly tighten the hexagon head screws (see fig. 10).
- 5) Attach the battery cover (see page 11).



4.6.4 Replacing the battery cable

► Prerequisites:

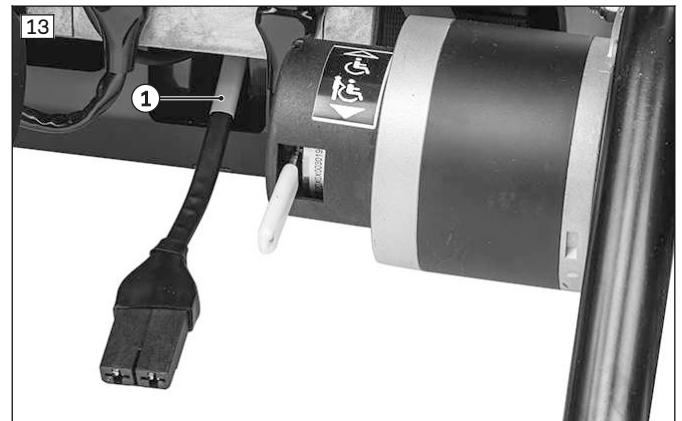
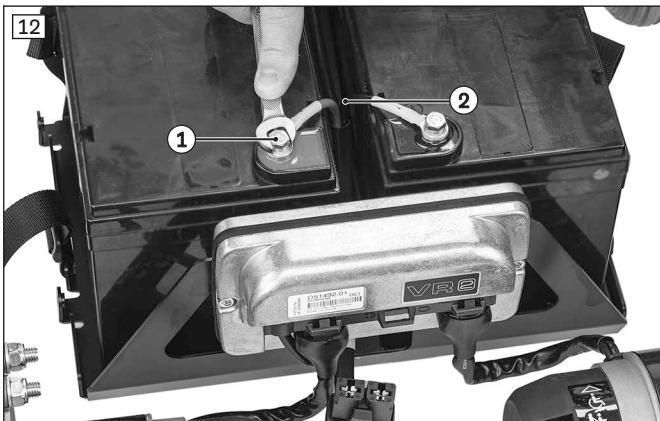
Turn the control device off and disconnect the battery cable (see page 11).

► Tools: Insulated open-ended or ring wrench, size 10; Allen key, size 3

- 1) Remove the battery cover (see page 11).
- 2) Loosen the hexagonal head screws on the battery cable (see fig. 12, item 1).

INFORMATION: Note the installation situation before taking the battery cable off. The battery cable has to be reinstalled in the original position, with the battery cable going down between the batteries (see fig. 12, item 2). The plug of the battery cable faces forward through the opening in the plate of the battery carrier (see fig. 13 item 1).

- 3) Replace the battery cable (see fig. 14).
- 4) Reinstall the battery cable. The battery cable goes down between the batteries (see fig. 12, item 2). The plug of the battery cable faces forward through the opening in the plate of the battery carrier (see fig. 13 item 1).
- 5) Firmly tighten the hexagonal head screws (see fig. 12, item 1).
- 6) Attach the battery cover (see page 11).



4.6.5 Replacing the batteries

NOTICE

Installation of untested batteries

Damage to the batteries or limited driving distance range due to different charge levels

- ▶ If batteries with different charge levels are connected in series, or if a defective battery is installed, the battery set may fail prematurely or the wheelchair's driving distance range may be limited.
- ▶ Therefore, test new batteries with a suitable voltmeter before installation to check if both batteries have the same voltage (same charge level).

▶ **Prerequisites:**

Turn the control device off and disconnect the battery cable (see page 11).

▶ **Tools:** Insulated open-ended or ring wrench, size 10; Allen key, size 3

- 1) Remove the battery cover (see page 11).
 - 2) Open the upper and side fastening strap on the battery carrier (see fig. 15).
 - 3) Loosen the fuse cable and the battery cable (see fig. 10; see fig. 12, item 1). Unscrew the terminal screws to do so.
 - 4) Lift out the batteries (see fig. 16).
 - 5) Set the replacement batteries on the battery carrier in the same manner (not illustrated).
- NOTICE! Screw in the terminal screws only after inserting the battery. There is an increased risk of short-circuit, for example, if both screws come into contact with the frame.**
- 6) Connect the fuse cable and the battery cable in the original positions (see fig. 10; see fig. 12, item 1). Refer to the battery circuit diagram on the inside of the battery cover.
 - 7) Loosely pre-adjust the fastening straps, then fasten them (see fig. 15) and tighten them at the loop (see 647G1657=* instructions for use).
 - 8) Reinstall the battery cover and tighten the Allen screws firmly (3596281, item 2).



4.6.6 Charging the batteries

All instructions for charging the batteries are included in the instructions for use.

4.7 Control unit

4.7.1 Replacing the controller

INFORMATION

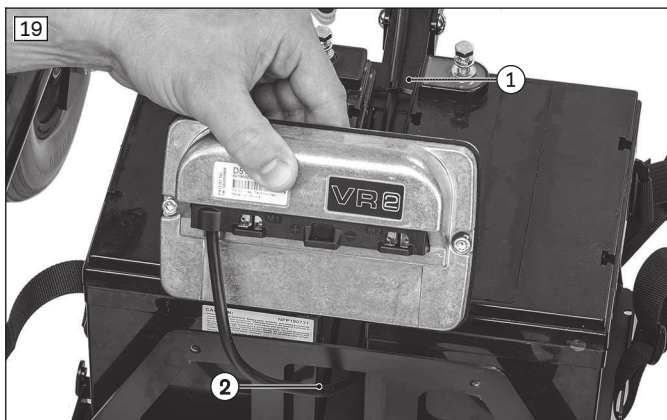
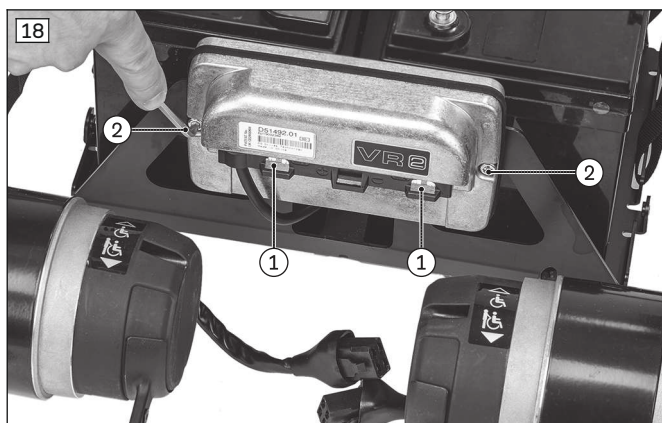
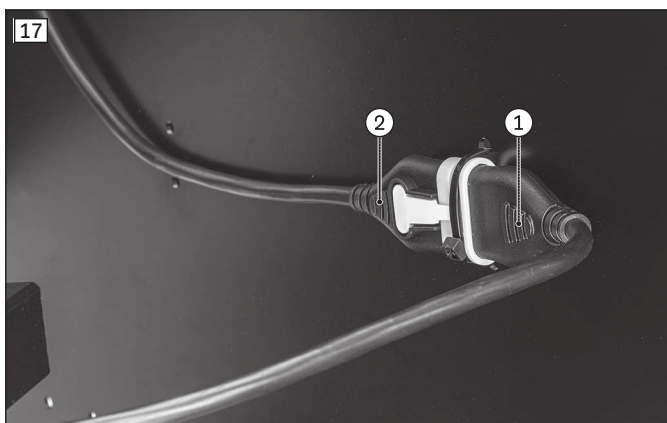
- ▶ The wheelchair's serial number has to be specified when ordering the spare part. The controller is then configured prior to delivery to the qualified personnel.
- ▶ The parameter settings of the control device may be changed only by qualified personnel instructed by the manufacturer. The manufacturer of the product and the control device manufacturer are not liable in case of damage caused by parameter settings that were incorrectly configured or not adjusted properly according to the user's abilities. Further information: see page 42 ff.
- ▶ **Only if needed:** The prepared control device parameter set provided by Ottobock may be requested from ccc@ottobock.com only by trained, qualified personnel.

▶ **Prerequisites:**

Turn the control device off and disconnect the battery cable (see page 11).

► **Tools:** Open-ended or ring wrench, size 10; Allen key, size 4

- 1) Remove the battery cover (see page 11).
- 2) Disconnect the connection plug of the controller cable under the seat plate (see fig. 17, item 1). The cable tie may have to be opened in order to disconnect the connection plug.
- 3) Disconnect the motor cables from the controller (see fig. 18, item 1).
- 4) Loosen the Allen screws on the controller (see fig. 18, item 2).
- 5) Cut the cable ties of the controller cable on the holder of the battery carrier (see fig. 19, item 1).
- 6) Remove and replace the controller (see fig. 20).
- 7) Set the controller onto the battery carrier and tighten the Allen screws (see fig. 18, item 2) firmly.
- 8) Thread the controller cable through the opening in the battery carrier plate underneath the controller (see fig. 19, item 2) and route it to the front between the batteries.
- 9) Attach the controller cable to the holder of the battery carrier with a cable tie (see fig. 19, item 1).
- 10) Connect the motor cables to the controller (see fig. 18, item 1).
- 11) **If necessary:** Attach the seat plate (see page 27).
- 12) Connect the connection plug of the controller to the control panel cable underneath the seat plate. Attach the connection plug to the seat plate with a cable tie (see fig. 17, item 1).
- 13) Reinstall the battery cover and tighten the Allen screws firmly (see page 11).



4.7.2 Replacing the control panel

INFORMATION

If attached to a holder for attendant control (see page 17), the control panel is replaced as described in the below steps.

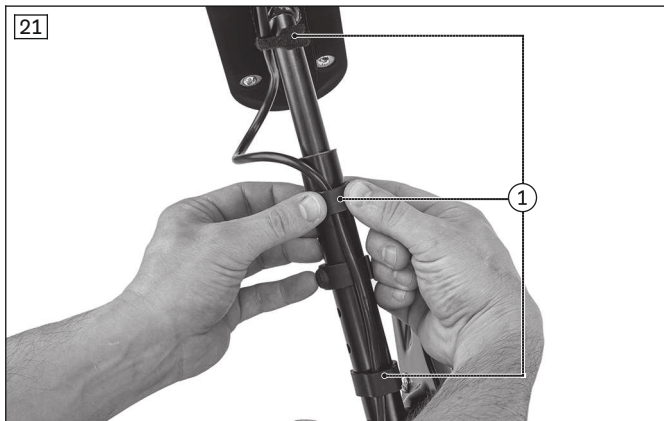
► **Prerequisites:**

Turn the control device off and disconnect the battery cable (see page 11).

► **Tools:** Allen key, size 3

- 1) Disconnect the connection plug of the control panel cable under the seat plate (see fig. 17, item 2). The cable tie may have to be opened in order to disconnect the connection plug.
- 2) Remove the cable holders on the arm support tube (see fig. 21, item 1). Also cut the cable tie on the seat plate.

- 3) Loosen the hexagon socket screws between the control panel holder and the control panel (standard control panel: see fig. 22, item 1; swing-away control panel: see fig. 23, item 1).
- 4) Remove and replace the control panel.
- 5) Reinstall the control panel on the control panel holder. To do so, insert and firmly tighten the hexagon socket screws (standard control panel: see fig. 22, item 1; swing-away control panel: see fig. 23, item 1).
- 6) Reattach the cable holders on the arm support tube (see fig. 21, item 1). Also install the cable tie on the seat plate.
- 7) Reconnect the connection plug of the control panel cable under the seat plate (see fig. 17, item 2). **If necessary:** Tightly wrap a new cable tie around the connection plug (and also the cable of the lighting set, if any) and attach it to the seat plate.
- 8) Perform a functional test (see instructions for use (user)).



4.7.3 Replacing the control panel holder

► **Prerequisites:**

Turn the control device off and disconnect the battery cable (see page 11).

If necessary: Open the cable holders on the arm support (see previous section).

► **Tools:** Allen key, size 3

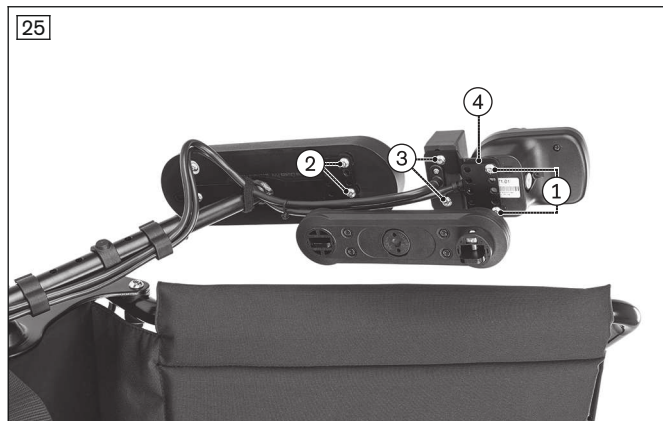
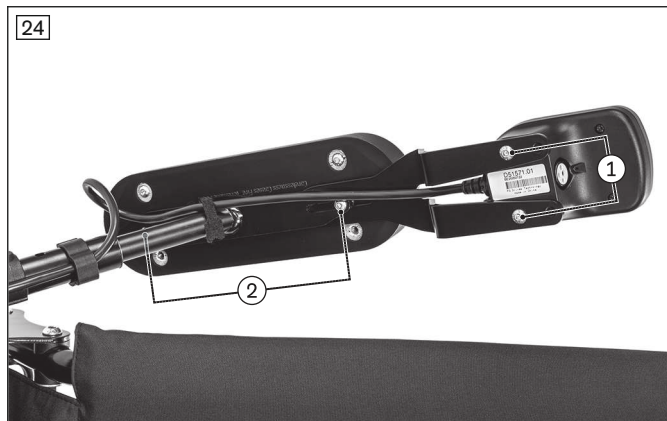
Standard control panel holder

- 1) Loosen the Allen screws between the control panel and the control panel holder (see fig. 24, item 1).
- 2) Loosen the Allen screws between the control panel holder and the arm pad (see fig. 24, item 2).
- 3) Remove and replace the control panel holder.
- 4) Reattach the control panel holder to the arm pad. To do so, insert the Allen screws (see fig. 24, item 2) and tighten them firmly.
- 5) Reinstall the control panel on the control panel holder. To do so, insert the Allen screws (see fig. 24, item 1) and tighten them firmly.

Control panel holder, swing-away

- 1) Loosen the Allen screws between the control panel and the retaining plate (see fig. 25, item 1).
- 2) Loosen the Allen screws between the retaining plate and the arm pad (see fig. 25, item 2).

- 3) **If necessary:** Loosen the Allen screws between the push-button module for lighting and the retaining plate (see fig. 25, item 3). Replace and reinstall the retaining plate.
- 4) Remove and replace the control panel holder.
- 5) Reattach the retaining plate of the control panel holder to the arm pad. To do so, insert the Allen screws (see fig. 25, item 2) and tighten them firmly.
- 6) **If necessary:** Hold the additional retaining plate of the push-button module for lighting under the control panel (swing-away control panel: see fig. 25, item 4).
- 7) Reattach the control panel to the retaining plate of the control panel holder. To do so, insert the Allen screws and tighten them firmly (swing-away control panel: see fig. 25, item 1).



4.7.4 Replacing the holder for attendant control

INFORMATION

- ▶ When needed, the attendant can independently switch the position of the control panel/push-button module between the control panel holder on the arm support and the holder for attendant control. Please instruct the attendant accordingly. The attendant must always attach the control panel/push-button module using the supplied thumb screws.
- ▶ In particular, inform the attendant that it is necessary to correctly attach the cable on the back support or arm support tube. Show the attendant how to route and attach the cable securely to ensure it is not pinched when changing the position of the control panel/push-button module.
- ▶ Inform the attendant that, due to the short cable length, the control panel/push-button module has to be temporarily removed from the holder for attendant control before folding down the back support. Further information is provided in the instructions for use (user).

▶ Prerequisites:

Turn the control device off and disconnect the battery cable (see page 11).

- ▶ **Tools:** Open-ended or ring wrench, size 10; Allen key, size 4

Disassembling the holder for attendant control

- 1) Open the hook-and-loop strap and loosen the cables of the control panel/push-button module from the back support tube (see fig. 26, item 1).
- 2) Loosen the control panel/push-button module from the holder for attendant control with the thumb screws (see fig. 26, item 2). Carefully set aside the control panel/push-button module with the cables (not illustrated).
- 3) Disassemble the holder for attendant control:
 - Disassembly from the back support tube (variant 1): Loosen the hexagon socket screws of the holder from the back support tube and remove and replace the holder and small parts (see fig. 27, item 1).
 - Disassembly from the head support mounting kit (variant 2): Loosen the head/neck support mounting kit from the adapter plate, then remove the holder and small parts from the adapter plate and replace them (see fig. 28, item 1/2). The adapter plate is now exposed (see fig. 87).

Mounting the holder for attendant control on the back support tube (variant 1)

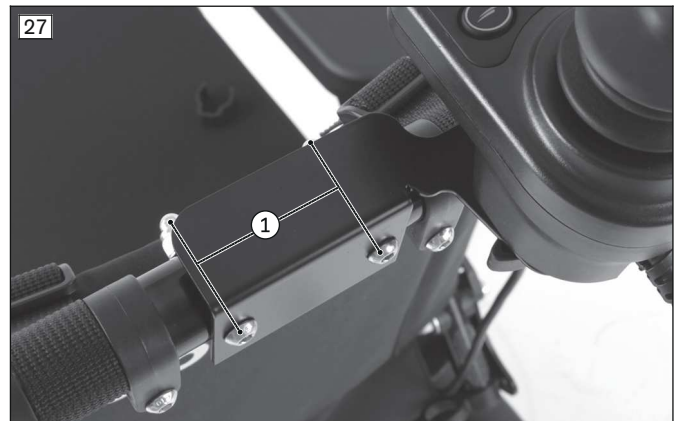
- 1) Screw the holder to the back support tube with the two supplied hexagon socket screws, washers and cap nuts (see fig. 27, item 1).
- 2) Tighten the hexagon socket screws/cap nuts.

Mounting the holder for attendant control on the head support mounting kit (variant 2)

- 1) Place the holder on the exposed adapter plate (see fig. 87; see fig. 28, item 2).
- 2) Screw the holder to the back support tube with the head support/neck support mounting kit and the hexagon socket screws, washers and cap nuts at hand (see fig. 28, item 3).
- 3) Tighten the hexagon socket screws/cap nuts.

Installing the control panel and push-button module for lighting (option)

- 1) Pick up the control panel/push-button module that was set aside and guide the cable of the control panel/push-button module up vertically behind the back support (see fig. 29, item 1).
- 2) Hold the control panel over the holder for attendant control (see fig. 26, item 3).
If required: Position the push-button module for lighting with the retaining plate on the holder for attendant control (see fig. 26, item 4).
- 3) Screw the control panel/push-button module to the holder for attendant control with the thumb screws (see fig. 26, item 2).
- 4) Use a hook-and-loop strap to secure the cable on the back support tube (see fig. 26, item 1). The cables of the control panel/push-button module run down vertically behind the back support pad (see fig. 29, item 1).



4.8 Caster wheels

4.8.1 Replacing the caster wheel

INFORMATION

When replacing the wheels, check the tyres on both sides to ensure the tread is even and sufficient. Replace both wheels when needed.

► **Prerequisites:**

Turn the control device off and disconnect the battery cable (see page 11).
 Jack up the wheelchair (see page 10).

► **Tools:** Open-ended or ring wrench, size 13; Allen key, size 5; torque wrench

- 1) Loosen and remove the Allen screw on the caster wheel (see fig. 30).
- 2) Remove and replace the caster wheel.
- 3) Insert the new caster wheel into the caster fork.

- 4) Insert the Allen screw.
- 5) Tighten the cap nut to **25 Nm**.



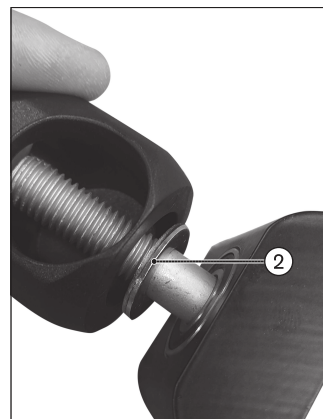
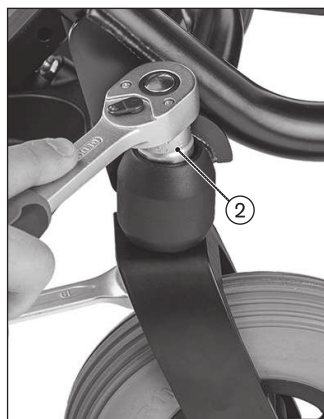
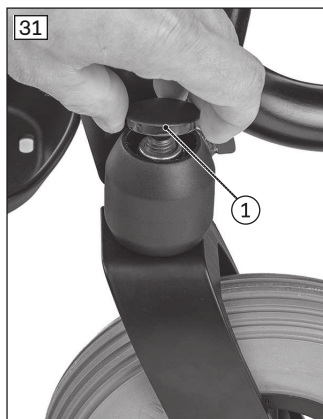
4.8.2 Replacing the caster fork

► Prerequisites:

Turn the control device off and disconnect the battery cable (see page 11).
Jack up the wheelchair (see page 10).

► Tools: Open-ended or ring wrench, size 19; socket wrench, size 19

- 1) Pry out and remove the cover cap on the caster attachment device (see fig. 31, item 1).
- 2) **CAUTION! Pinching, crushing, blows due to loosened caster fork. Actively secure the caster fork against falling. Note the installed position of the screw connection and washers.** Loosen the nut on the caster fork (see fig. 31, item 2). Carefully remove the caster fork and replace it (see fig. 32, item 1).
- 3) Carefully insert the new caster fork into the caster attachment device (see fig. 32, item 1).
- 4) Slide the supplied washer onto the threaded axle (see fig. 32, item 2).
- 5) Set the nut onto the threaded axle of the caster fork and tighten it so that the caster fork can be turned with slight resistance (see fig. 31, item 2).
- 6) Close the caster attachment device with the cover cap (see fig. 31, item 1).



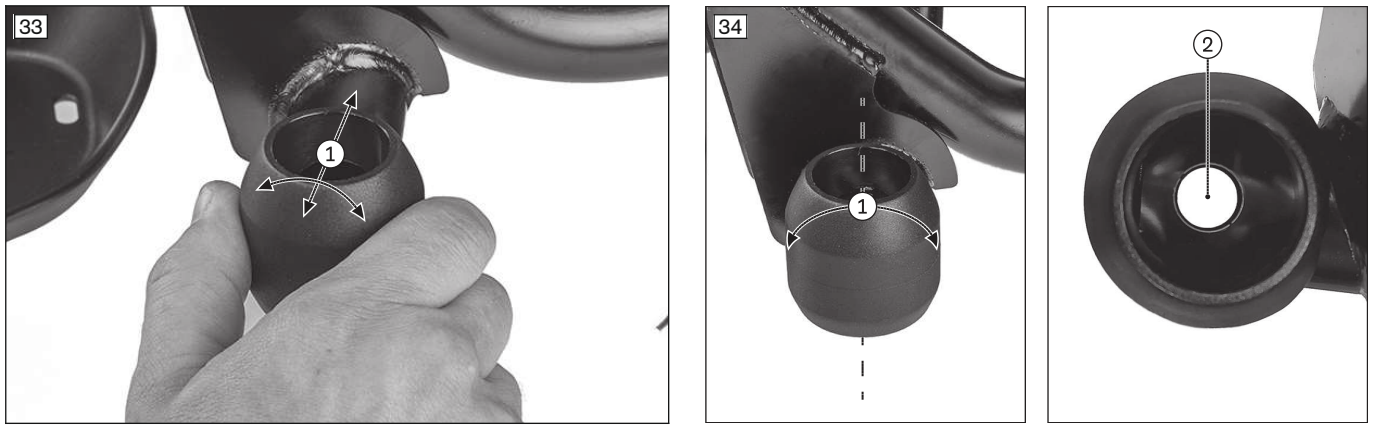
4.8.3 Replacing the bearing plug

► Prerequisites:

Turn the control device off and disconnect the battery cable (see page 11).
Jack up the wheelchair (see page 10).

► Tools: None required

- 1) Remove the caster fork (see previous section).
- 2) Loosen the bearing plug on the base frame by hand and pull it out (see fig. 33, item 1).
- 3) Replace the bearing plug and reattach it on the base frame.
- 4) Align the new bearing plug so it lines up with the bore holes in the frame tube (see fig. 34, item 1/2).
- 5) Attaching the caster fork also reattaches the bearing plug (see previous section).



4.9 Drive unit

4.9.1 Replacing the drive wheel

INFORMATION

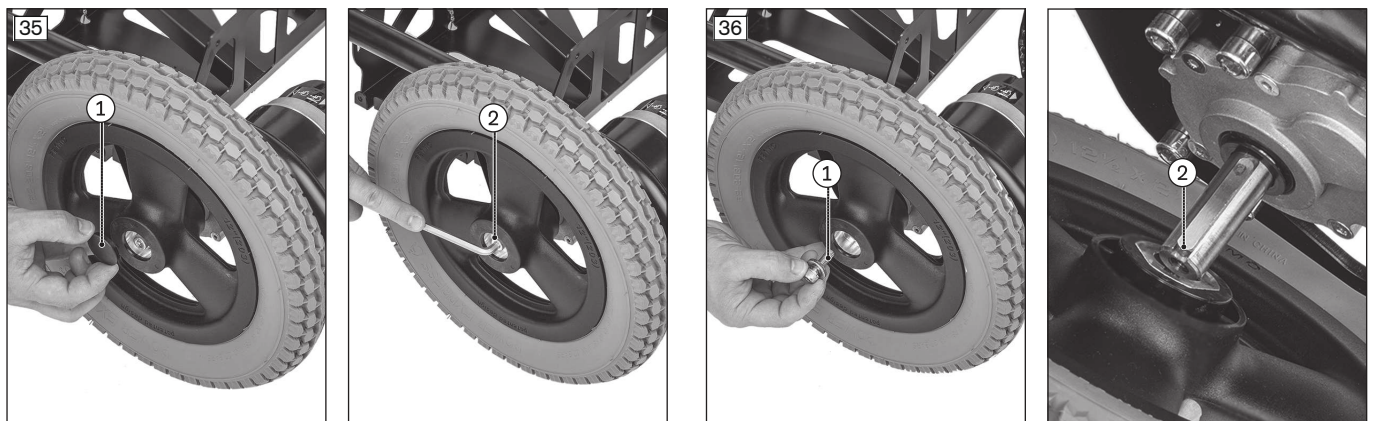
When replacing the wheels, check the tyres on both sides to ensure the tread is even and sufficient. Replace both wheels when needed.

► **Prerequisites:**

Turn the control device off and disconnect the battery cable (see page 11).
 Jack up the wheelchair (see page 10).

► **Tools:** Allen key, size 6; torque wrench

- 1) Pry out and remove the cover cap on the drive wheel (see fig. 35, item 1).
- 2) Loosen and remove the Allen head screw on the drive wheel (see fig. 35, item 2).
- 3) Remove the Allen head screw with the washer (see fig. 36, item 1).
- 4) Remove and replace the drive wheel.
- 5) Set the new drive wheel onto the drive wheel axle. Note the existing groove and the fitted key in the axle (see fig. 36, item 2).
- 6) Insert the Allen head screw with the washer and tighten it to **25 Nm** (see fig. 35, item 2).
- 7) Install the cover cap on the drive wheel (see fig. 35, item 1).



4.9.2 Replacing the splash guard

► **Prerequisites:**

Turn the control device off and disconnect the battery cable (see page 11).
 Jack up the wheelchair (see page 10).

► **Tools:** Open-ended or ring wrench, size 8; Allen key, size 3; torque wrench

- 1) **If necessary:** Remove the drive wheel (see previous section).
 Alternatively, the drive wheel rim can be rotated so that direct installation is possible.
- 2) Loosen and remove the Allen head screws on the splash guard (see fig. 37, item 1).
- 3) Remove and replace the splash guard.

- 4) Install the splash guard on the frame with the two Allen head screws (see fig. 37, item 1). The Allen head screws are inserted from the outside to the inside.
- 5) Tighten the Allen head screws to **5 Nm**.
- 6) Reinstall the drive wheel (see previous section, see fig. 38).



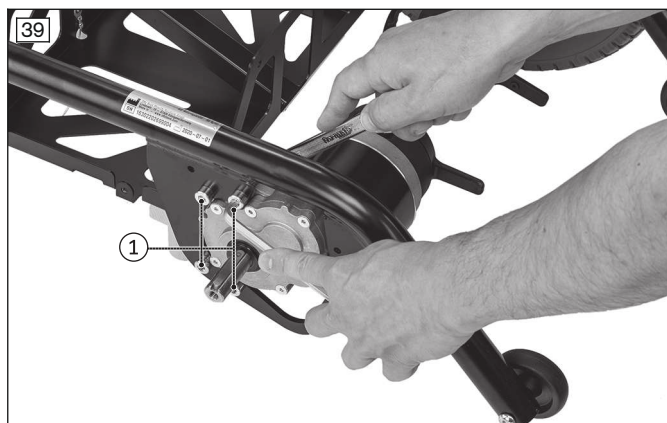
4.9.3 Replacing the drive motor

► Prerequisites:

Turn the control device off and disconnect the battery cable (see page 11).
Jack up the wheelchair (see page 10).

► Tools: Open-ended or ring wrench, size 13; Allen key, size 6; torque wrench

- 1) Disconnect the motor cable from the controller (see page 14).
- 2) Remove the drive wheel (see page 20).
- 3) Loosen the four Allen head motor mounting screws (see fig. 39, item 1).
- 4) Remove and replace the motor.
- 5) Set the new motor onto the base frame.
- 6) Tighten the four Allen head screws to **25 Nm** (see fig. 39, item 1).
- 7) Install the drive wheel (see page 20).
- 8) Connect the motor cable to the controller (see page 14).
- 9) Finally, check the directional stability of the wheelchair. In case of deviations, adjust the corresponding parameter in the control device (Steer Correct parameter: see page 46).



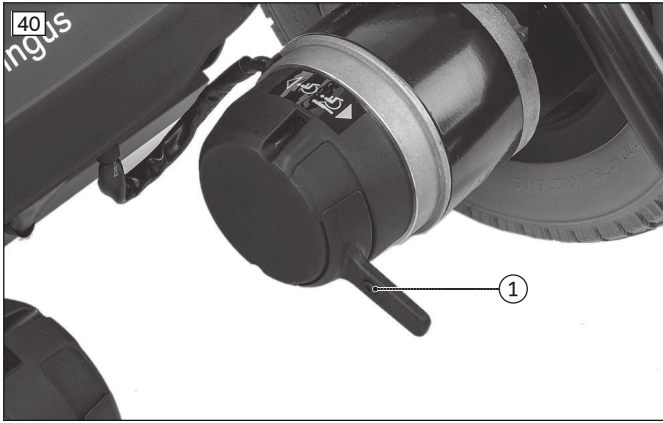
4.9.4 Replacing the brake lever cover

► Prerequisites:

Turn the control device off and disconnect the battery cable (see page 11).

► Tools: Allen key, size 2.5

- 1) Loosen the Allen head screw on the brake lever (see fig. 40).
- 2) Remove and replace the brake lever cover.
- 3) Slide the new cover onto the brake lever and secure it with the Allen head screw (see fig. 40).
- 4) Firmly tighten the Allen head screw.



4.10 Leg support

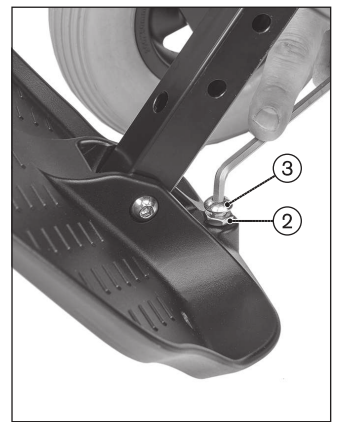
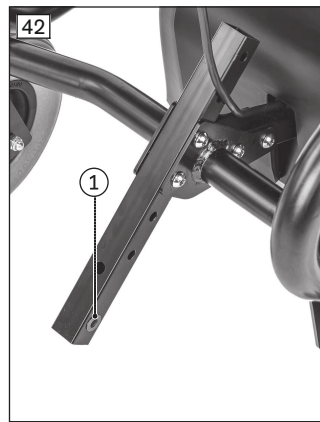
4.10.1 Replacing the foot plate

► **Prerequisites:**

Turn the control device off and disconnect the battery cable (see page 11).

► **Tools:** 2x Allen key, size 5; screwdriver; torque wrench

- 1) Loosen the Allen head screw and the sleeve bolt in the mounting holes of the foot plate (see fig. 41).
- 2) Remove and replace the foot plate.
- 3) **If necessary:** Remove and replace the bushings on both sides of the foot plate holder (see fig. 42, item 1).
- 4) Set the lock nut onto the foot plate and preinstall the adjustment screw (see fig. 42, item 2/3).
- 5) Attach the foot plate. To do so, tighten the Allen head screw and the sleeve bolt in the mounting holes of the foot plate (see fig. 41).
- 6) Adjust the length of the adjustment screw according to the desired foot plate angle. Tighten the lock nut to **10 Nm** (see fig. 42, item 2).



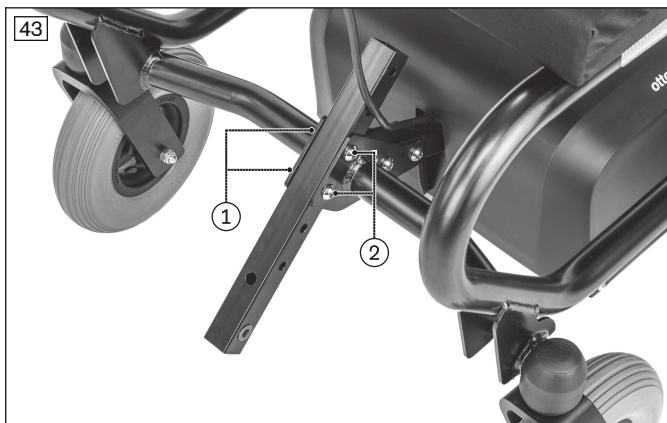
4.10.2 Replacing the foot plate holder

► **Prerequisites:**

Turn the control device off and disconnect the battery cable (see page 11).

► **Tools:** 2x Allen key, size 5; torque wrench

- 1) Remove the foot plate (see previous section).
- 2) Loosen the two Allen head screws and two sleeve bolts on the foot plate holder (see fig. 43, item 1/2).
- 3) Remove and replace the foot plate holder.
- 4) Install the foot plate holder on the base frame using the two Allen head screws and two sleeve bolts. Tighten the Allen head screws to **10 Nm** (see fig. 43).
- 5) **If necessary:** Insert the bushings on both sides of the foot plate holder (see fig. 42, item 1).



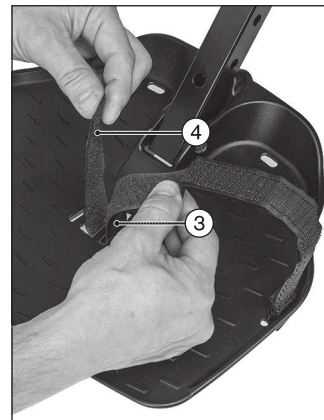
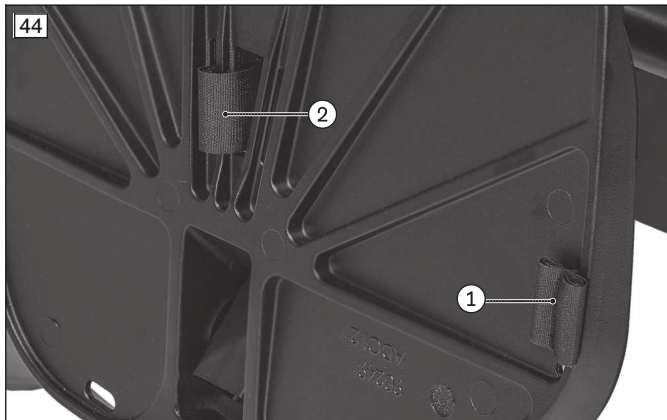
4.10.3 Replacing the positioning belt

► **Prerequisites:**

Turn the control device off (see page 11).

► **Tools:** None required

- 1) Rotate the threading device of the positioning belt and pull the positioning belt out of the outer slot in the foot plate (see fig. 44, item 1).
- 2) Pull the positioning belt out of the inner slot in the foot plate (see fig. 44, item 2).
- 3) Replace the positioning belt.
- 4) Pass the threading device of the positioning belt (see fig. 45, item 1) through the outer slot of the foot plate from above (see fig. 45, item 2). The end below the foot plate turns crosswise so it cannot slide back out of the slot (not illustrated).
- 5) Pass the free end of the positioning belt through the inner slot of the foot plate from above (see fig. 45, item 3).
- 6) Pass the free end of the positioning belt around the bar and back up again, and fasten the hook-and-loop closure (see fig. 45, item 4).



4.11 Arm support

4.11.1 Replacing the clamping pins (clamps)

► **Prerequisites:**

Turn the control device off (see page 11).

► **Tools:** None required

- 1) Pull out the clamping pins by hand (see fig. 46).
- 2) Replace the clamping pins.
- 3) Reinsert the clamping pins (see fig. 46).



4.11.2 Replacing the arm pads

► **Prerequisites:**

Turn the control device off and disconnect the battery cable (see page 11).

If necessary: Remove the control panel holder (see page 16).

► **Tools:** Allen key, size 3

- 1) Loosen the clamping pin (see previous section) and pull the arm support up and out.
- 2) Loosen the Allen head screws and replace the arm pads (see fig. 47, item 1).
- 3) Install the new arm pads in the desired position (see fig. 47, item 1/2). The curvatures on the arm supports face out on each side (see fig. 47, item 3).

INFORMATION: Please note that only the marked bore holes may be used for adjustment (see fig. 47, item 1).

- 4) Firmly tighten the Allen head screws.



4.11.3 Replacing the arm support

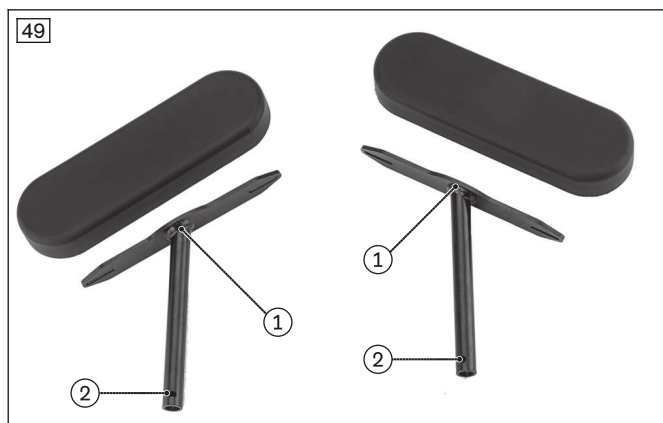
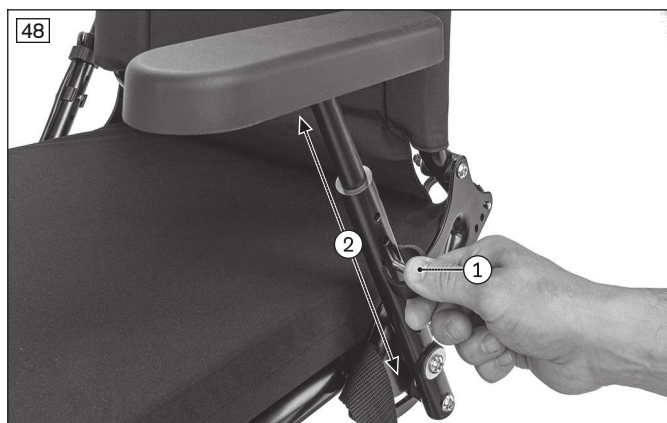
► **Prerequisites:**

Turn the control device off and disconnect the battery cable (see page 11).

If necessary: Remove the control panel holder (see page 16).

► **Tools:** None required

- 1) Pull out the clamping pin by hand (see fig. 48, item 1).
- 2) Pull the arm support up and out (see fig. 48, item 2).
- 3) Remove the arm pad (see previous section).
- 4) Replace the arm support (see fig. 49, item 1/2).
- 5) Insert the arm support into the arm support tube (see fig. 48, item 2). The curvature on the plate faces out on the respective side (see fig. 49, item 1).
- 6) Line up the bore hole in the arm support with the appropriate bore hole in the arm support tube so they are at the same level and reattach the arm support using the clamping pin (see fig. 49, item 2; see fig. 48, item 1).
- 7) Install the arm pad (see previous section).



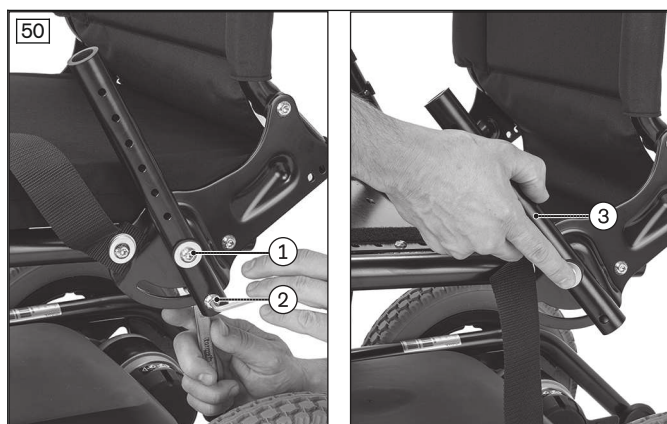
4.11.4 Replacing the arm support tube

► Prerequisites:

Turn the control device off and disconnect the battery cable (see page 11).

► Tools: Open-ended or ring wrench, size 13; Allen key, size 5; torque wrench

- 1) Remove the arm support (see previous section).
- 2) **Only on the control panel side:** Remove the cable ties on the arm support tube (see fig. 21, item 1).
- 3) Loosen the two Allen head screws on the arm support tube (see fig. 50, item 1/2).
- 4) Remove and replace the arm support tube (see fig. 50, item 3).
- 5) Reinstall the arm support tube using the two Allen head screws and the mounting materials (see fig. 51). Note the order of the bushings and washers in doing so.
- 6) Tighten the Allen head screws (see fig. 50, item 1: **25 Nm**; see fig. 50, item 2: This Allen head screw is used to adjust the resistance when folding up as needed).
- 7) **Only on the control panel side:** Reattach the cable ties on the arm support tube (see fig. 21, item 1).



4.12 Positioning belt (lap belt)

4.12.1 Replacing the lap belt

► Prerequisites:

Turn the control device off and disconnect the battery cable (see page 11).

► Tools: Open-ended or ring wrench, size 13; Allen key, size 5; torque wrench

- 1) Loosen the respective Allen head screw between the lap belt and bearing plate/base frame on both sides (see fig. 52, item 1).
- 2) Remove and replace the two parts of the lap belt (see fig. 53).
- 3) Reinstall the lap belt on the bearing plate/base frame, with correct alignment, using the Allen head screws (see fig. 52, item 1).
- 4) Tighten the Allen head screws to **25 Nm**.



4.13 Chest and shoulder support

4.13.1 Replacing the sternum harness

► **Prerequisites:**

Turn the control device off and disconnect the battery cable (see page 11).

► **Tools:** Open-ended or ring wrench, size 13; Allen key, size 4, 6; torque wrench

Removing/installing the sternum harness on the lower back support tube

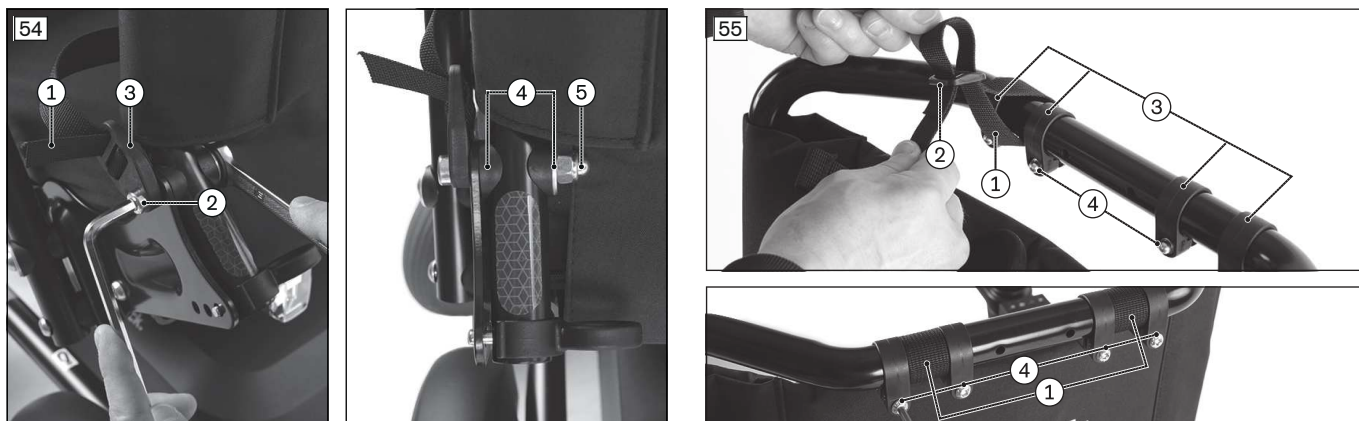
- 1) Unthread the ends of the lower belt straps from the three-slot mounting brackets (see fig. 54, item 1).
- 2) **If necessary:** Replace the three-slot mounting bracket.
 - Loosen and remove the respective Allen screw between the back support tube and bearing plate on both sides (see fig. 54, item 2).
 - Remove the three-slot mounting bracket and replace it (see fig. 54, item 3).
 - Hold the three-slot mounting bracket against the bearing plate from the outside and align it, angled to the front (see fig. 54, item 3).
 - Insert the respective Allen screws (see fig. 54, item 2). Note the order of the bushings and washers in doing so (see fig. 54, item 4).
 - Firmly tighten the Allen screw with the cap nuts to **25 Nm** (see fig. 54, item 2/5).
- 3) Thread the ends of the lower belt straps into the three-slot mounting brackets and tighten them (see fig. 54, item 1/3).

INFORMATION: For belt placement, note the information in the instructions for use included with the belt system.
- 4) Lay the sternum harness onto the seat cushion in the direction for use (not illustrated).

Removing/installing the sternum harness on the upper back support tube

- 1) Unthread the belt straps from the slide buckles on the back support tube (see fig. 55, item 1/2).
- 2) **If necessary:** Replace the tube clamps.
 - Remove the respective tube clamps (see fig. 55, item 3) from the back support tube and replace them (see fig. 55, item 4).
 - Pre-install two tube clamps each at a distance approximately equal to the width of the belt straps on the back support tube (see fig. 55, item 3/4).
 - Pass the upper belt straps of the sternum harness around the back support tube between the tube clamps (see fig. 55, item 1).
 - Attach the belt straps to the back support tube with the slide buckles (see fig. 55, item 2). The belt straps have to be tight against the back support tube.
 - Push the tube clamps on the back support tube tight against the belt straps from the left and right (see fig. 55, item 3/1). Tighten the Allen screws and cap nuts of the tube clamps to **5 Nm** (see fig. 55, item 4).
- 3) To adjust, note the information in the instructions for use of the sternum harness.
- 4) Information on the correct positioning of the user in the seat and on adjusting and properly applying the belt system are found in the instructions for use (user) for this power wheelchair.

INFORMATION: See also the assembly and adjustment information and the safety notices in the instructions for use included with the belt system.



4.14 Seat

4.14.1 Replacing the seat plate

NOTICE

Incorrect cable routing

Damage to cables due to pinching

- ▶ When positioning the cables make sure that they cannot be pinched.

▶ Prerequisites:

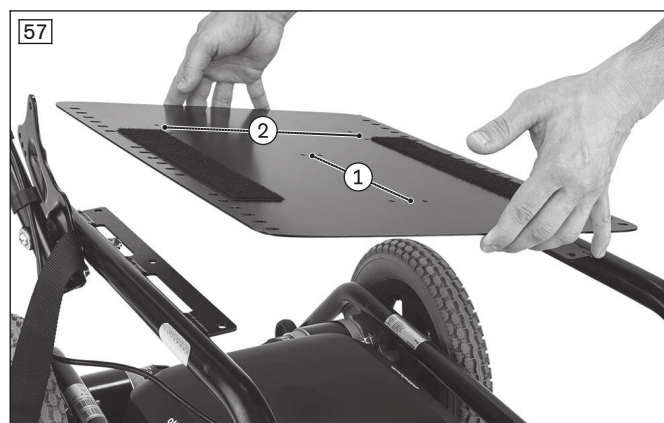
Turn the control device off and disconnect the battery cable (see page 11).

Only if lighting for road traffic is installed: Remove the lighting from the seat plate (see page 32).

Only if a storage bag is installed: Remove the storage bag from the seat plate (see page 36).

▶ Tools: Open-ended or ring wrench, size 10; Allen key, size 4; torque wrench

- 1) Remove the seat cushion.
 - 2) Cut all cable ties on the seat plate (not illustrated).
- INFORMATION: Take note of the cable routing.**
- 3) Loosen the six Allen head seat plate mounting screws (see fig. 56).
 - 4) Remove and replace the seat plate.
 - 5) Put on the seat plate so it is correctly aligned. The centre bore holes for the cable ties are at the front (see fig. 57, item 1). The side bore holes for the cable ties are at the rear (see fig. 57, item 2).
 - 6) Install the seat plate on the base frame using the six Allen head screws. Tighten the Allen head screws to **10 Nm** (see fig. 56).
 - 7) Reattach the cables under the seat plate using new cable ties (not illustrated).



4.14.2 Replacing the hook-and-loop closure

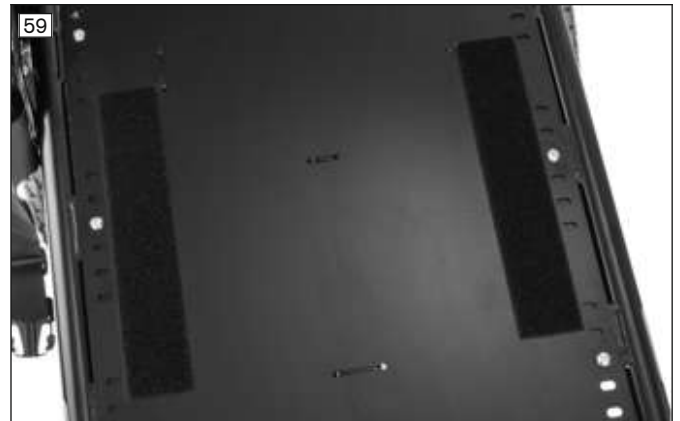
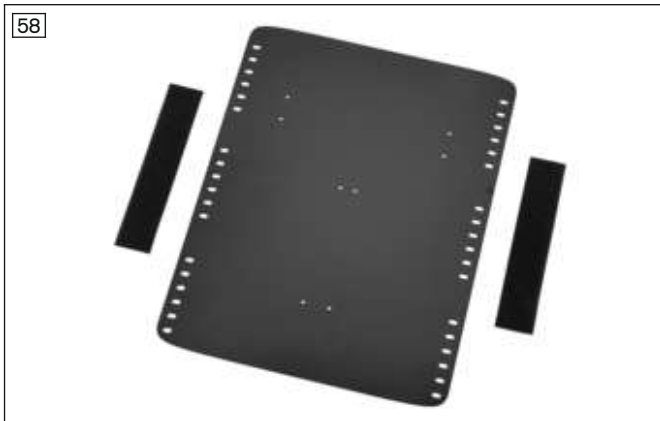
▶ Prerequisites:

Turn the control device off and disconnect the battery cable (see page 11).

▶ Tools: Knife

- 1) Remove the seat cushion.

- 2) Carefully pull the loop strap of the hook-and-loop closure off the seat plate (see fig. 58). Replace the loop strap.
- 3) Slowly affix the new loop strap in the original position, close to the punched holes (see fig. 59).



4.15 Back

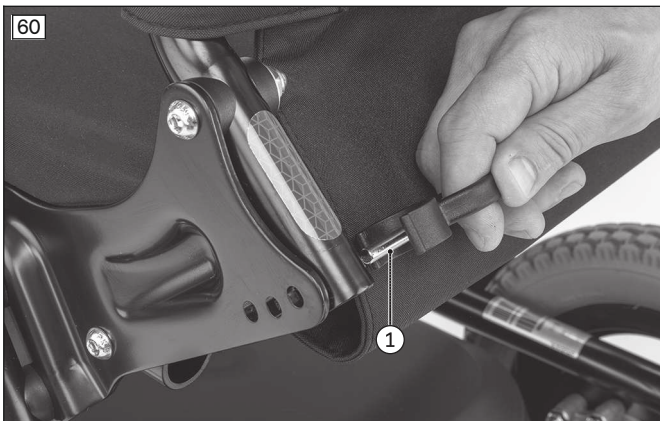
4.15.1 Replacing the clamping pins (clamps)

► **Prerequisites:**

Turn the control device off (see page 11).

► **Tools:** None required

- 1) Pull the clamping pins out of the back support tube by hand (see fig. 60, item 1).
- 2) Replace the clamping pins.
- 3) Reinsert the clamping pins (see fig. 60, item 1).



4.15.2 Replacing the back support

► **Prerequisites:**

Turn the control device off and disconnect the battery cable (see page 11).

► **Tools:** Open-ended or ring wrench, size 13; Allen key, size 5; torque wrench

- 1) Pull the clamping pins out of the back support tube by hand (replacing clamping pins, back support).
- 2) Loosen the respective Allen head screw between the back support tube and bearing plate on both sides (see fig. 61, item 1).
- 3) Remove and replace the back support.
- 4) Reinstall the back support on the bearing plate using the Allen head screws (see fig. 61, item 1). Note the order of the bushings and washers in doing so (see fig. 62, item 1/2).
- 5) Tighten the Allen head screws to **25 Nm**.



4.15.3 Replacing the back support upholstery

► **Prerequisites:**

Turn the control device off and disconnect the battery cable (see page 11).

► **Tools:** Phillips head screwdriver

- 1) Remove the back support (see previous section).
- 2) Prepare the back support with the illustrated alignment (see fig. 63).
- 3) Loosen the Phillips head screws (see fig. 63, item 1).
- 4) Pull the back support upholstery down and off, and replace it (see fig. 63, item 2).
- 5) Slide the new back support upholstery onto the back support tubes. In doing so, line up the mounting holes in the back support upholstery with the bore holes in the back support tubes (see fig. 63, item 1).
- 6) Insert and firmly tighten the Phillips head screws (see fig. 63, item 1).
- 7) Reinstall the back support (see previous section).



4.15.4 Replacing the bearing plate

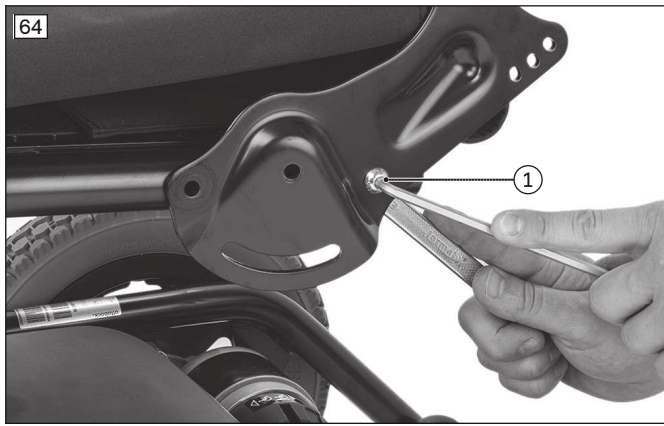
► **Prerequisites:**

Turn the control device off and disconnect the battery cable (see page 11).

Remove the arm support tube (see page 25), positioning belt (lap belt) (see page 25) and back support (see page 28).

► **Tools:** Open-ended or ring wrench, size 13; Allen key, size 5; torque wrench

- 1) Remove the parts listed under "Prerequisites".
- 2) Loosen the last remaining Allen head screw on the bearing plate from the tube of the base frame (see fig. 64, item 1).
- 3) Remove and replace the bearing plate (see fig. 65).
- 4) Loosely screw the new bearing plate to the tube of the base frame (see fig. 64, item 1).
- 5) Reinstall all other parts on the bearing plate: install the arm support tube (see page 25), the positioning belt (lap belt) (see page 25) and back support (see page 28).
- 6) Tighten the Allen head screw to **25 Nm** (see fig. 64, item 1).
- 7) Reinsert/reinstall the parts listed under "Prerequisites".



4.16 Base frame

4.16.1 Replacing the battery carrier

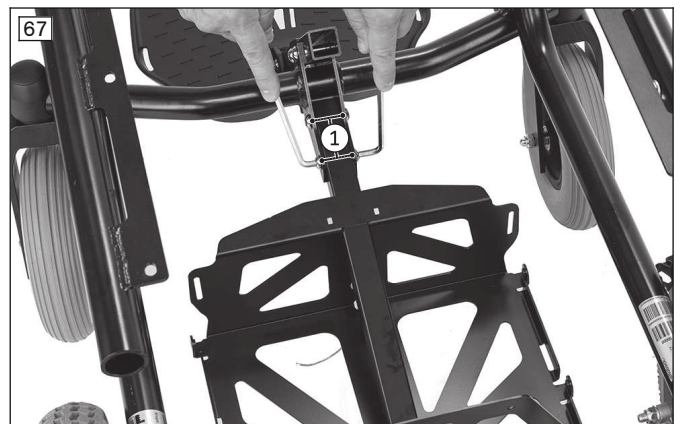
► **Prerequisites:**

Turn the control device off and disconnect the battery cable (see page 11).

Remove the battery cover (see page 11), take off the battery straps (see page 12), unscrew the battery terminal screws and remove the batteries (see page 14; see fig. 66).

► **Tools:** two Allen keys, size 5; torque wrench

- 1) Remove the parts listed under “Prerequisites”.
- 2) Loosen the two Allen screws and two sleeve bolts on the battery carrier (see fig. 67).
- 3) Remove and replace the battery carrier.
- 4) Reinstall the battery carrier on the base frame using the two Allen screws and two sleeve bolts.
- 5) Remove the earth contact from the old battery carrier and install it on the new battery carrier (see page 31).
- 6) Tighten the Allen screws to **10 Nm** (see fig. 67).
- 7) Reinsert/reinstall the parts listed under “Prerequisites”.



4.16.2 Replacing the anti-tipper wheels

► **Prerequisites:**

Turn the control device off and disconnect the battery cable (see page 11).

► **Tools:** Open-ended or ring wrench, size 13; Allen key, size 5

- 1) Loosen the Allen head screws/cap nuts on the anti-tipper rollers (see fig. 68, item 1).
- 2) Remove and replace the anti-tipper rollers.
- 3) Reinstall the anti-tipper rollers on the outside of the frame tube (see fig. 68, item 1).
- 4) Tighten the Allen head screws/cap nuts so the anti-tipper rollers are tight but still turn.



4.16.3 Replacing the earth contact

► **Prerequisites:**

Turn the control device off and disconnect the battery cable (see page 11).
Remove the battery cover (see page 11) and batteries (see page 14).

► **Tools:** Open-ended or ring wrench, size 8; Allen key, size 3

- 1) Remove the parts listed under "Prerequisites".
- 2) Loosen the Allen head screw on the earth contact (see fig. 69).
- 3) Remove and replace the earth contact.
- 4) Reinstall the earth contact (see fig. 69).
- 5) Tighten the Allen head screw.
- 6) Reinsert/reinstall the parts listed under "Prerequisites".



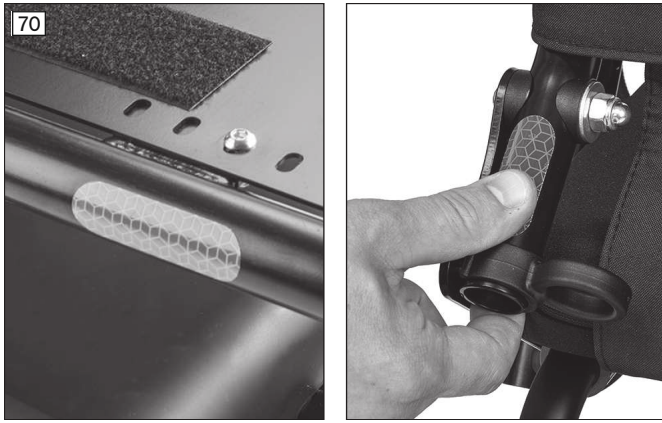
4.16.4 Replacing the reflectors

► **Prerequisites:**

Turn the control device off (see page 11).

► **Tools:** Hot air gun, knife

- 1) **Only when replacing the yellow reflectors:** Remove the seat cushion (see fig. 70, left).
- 2) Carefully heat the middle of the reflectors on the frame tubes using a hot air gun. Ensure that the frame coating in the vicinity is not excessively heated.
- 3) Carefully lift off the reflectors using a knife.
- 4) Align the new reflectors and affix them in the original positions (see fig. 70, right).



4.17 Lighting

4.17.1 Replacing the lighting for road traffic

INFORMATION

- ▶ Leave the lighting set assembled as delivered for the installation described below. The lamps are already installed on the supplied cable of the lighting set. The cable is labelled with information that makes it easier to position the lamps: Front left; Front right; Back left; Back right.
- ▶ You can temporarily disconnect the lamps from the cable of the lighting set for easier assembly. Prior to installation on the seat plate, note that the lamps are not identical. They are identified by the embossed manufacturer article numbers: Front lights = 140033C. Rear lights = 140033B.
- ▶ Each lamp has to be screwed to the product in the correct position (direction indicator top, headlight bottom). For easier orientation, the embossed lettering on the lamp's transparent cover has to be at the top (upside down) before screwing on the lamp.

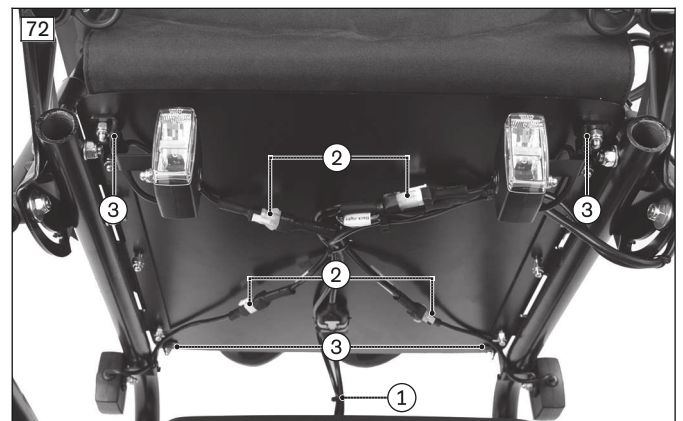
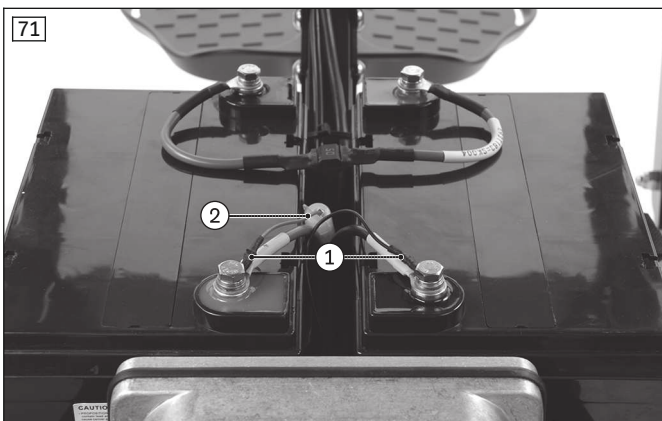
▶ Prerequisites:

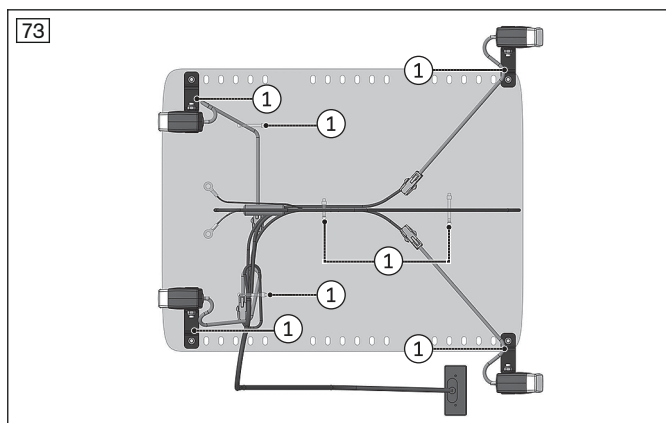
Turn the control device off and disconnect the battery cable (see page 11).

▶ Tools: Knife

Removing the cable of the lighting set and lamps

- 1) Remove the battery cover (see page 11).
- 2) Loosen the two cable ends from the battery contacts (see fig. 71, item 1). Pull away the cable of the lighting set to the front between the batteries (see fig. 71, item 2).
- 3) Disconnect the cable of the lighting set from the control cable. Cut the cable ties to do so (see fig. 72, item 1).
- 4) **If necessary:** Disconnect all lamp cables from the cable of the lighting set (see fig. 72, item 2).
- 5) Carefully cut all cable ties between the seat plate and the cable of the lighting set (see fig. 73, item 1; see fig. 72, item 3).
- 6) **If necessary:** Unscrew the individual lamps from the respective retaining plate. Also unscrew the lamp retaining plates if necessary (see fig. 78, item 1–5).
- 7) Remove the cable clamps and hook-and-loop strap on the arm support (see fig. 74, item 1–3).
- 8) Remove the push-button module for lighting (see next section).





Removing/installing the push-button module for lighting

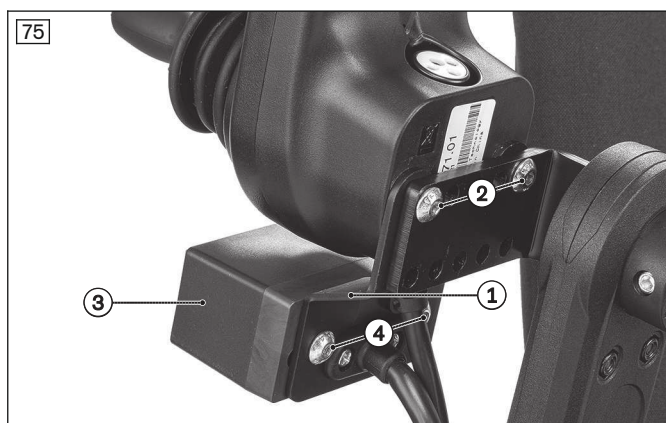
- 1) Loosen the retaining plate of the push-button module (see fig. 75, item 1) from the retaining plate of the control panel (see fig. 75, item 2).
- 2) Remove the push-button module (see fig. 75, item 3) from the push-button module retaining plate (see fig. 75, item 4).
- 3) Replace the push-button module. If the retaining plate has to be replaced: Replace the retaining plate.
- 4) Install the push-button module (see fig. 75, item 3) on the new retaining plate so it is correctly aligned (see fig. 75, item 4).

INFORMATION: The indicator lights point towards the control panel (not illustrated).

- 5) Firmly screw the retaining plate of the push-button module for lighting (see fig. 75, item 1) to the retaining plate of the control panel (see fig. 75, item 2).

Routing the cable of the lighting set to the seat plate

- 1) Route the cable of the lighting set underneath the arm support pad. Attach with a hook-and-loop strap at the first mounting point (see fig. 76, item 1).
- 2) Route the cable further along the arm support tube. Secure the cable with two cable clamps (see fig. 76, item 2).
- 3) Route the cable so it runs underneath the seat plate. Attach the cable to the control panel cable with a cable tie (see fig. 76, item 3).

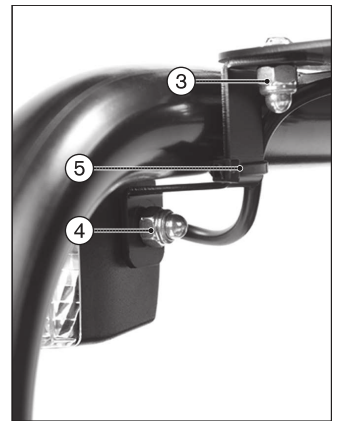
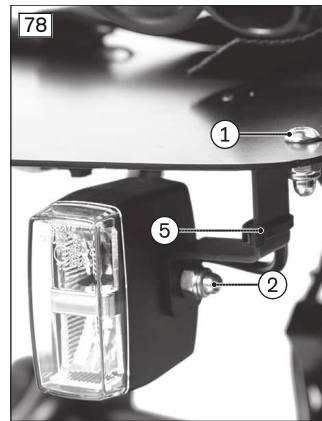
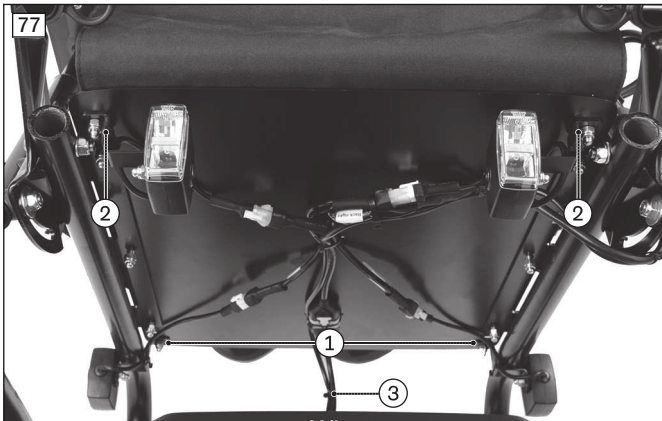


Installing the lamps

INFORMATION

- Prior to installing the lamps, please note the following:
 - When the seat plate is adjusted to the smallest seat depth (seat plate all the way back), the front bore hole of the seat plate has a dual function: The mounting screw serves both as the mounting screw for the seat plate on the frame and simultaneously as the mounting screw for the retaining plate of the lamp.
 - When the seat plate is adjusted to the largest seat depth (seat plate all the way forward), the rear bore hole of the seat plate has a dual function: The mounting screw serves both as the mounting screw for the seat plate on the frame and simultaneously as the mounting screw for the retaining plate of the lamp.

- 1) Set the cable of the lighting set with the connected lamps onto the battery cover under the seat, aligning them correctly.
INFORMATION: You can disconnect the lamps from the cable of the lighting set for easier assembly. Be sure to observe the corresponding information at the start of this section.
- 2) Installing the rear lamps:
 - Screw the respective retaining plates of the lamps firmly into place on the back end under the seat plate (see fig. 77, item 1; see fig. 78, item 1).
 - Screw the lamps to the respective retaining plates, aligning them correctly (see fig. 78, item 2).
- 3) Installing the front lamps under the seat plate:
 - Screw the respective retaining plates firmly into place on the front end under the seat plate (see fig. 77, item 2; see fig. 78, item 3).
 - Screw the lamps to the respective retaining plates, aligning them correctly (see fig. 78, item 4).

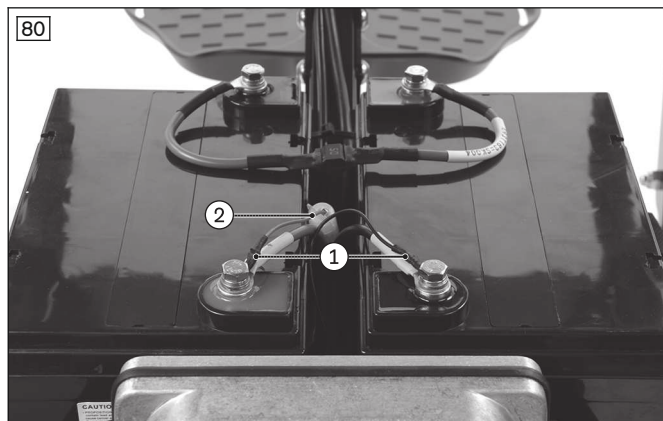
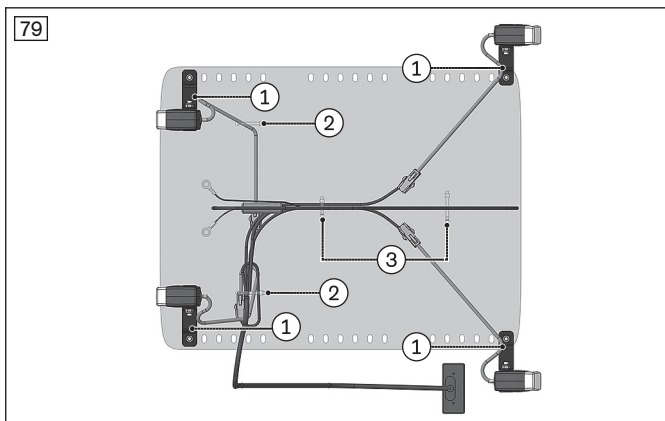


Attaching and connecting the cables

- 1) Attach the cable of the lighting set under the seat plate:
 - Attach the respective cables of the lamps to the retaining plates with cable ties (see fig. 79, item 1, right side of the image = front in the direction of travel; see fig. 78, item 5).
 - Use cable ties to also attach the respective cables of the rear lamps on the seat plate (see fig. 79, item 2).
 - Attach the main cable of the lighting set to the seat plate with two cable ties (see fig. 79, item 3).
- 2) Pull the end of the cable with the two battery contacts to the front. Attach the cable to the control cable with cable ties (see fig. 77, item 3).
 Make sure the length is sufficient so the cable end can be connected to the battery contacts.

Connecting the push-button module for lighting and performing a functional test

- 1) Screw the two cable ends to the battery contacts. Connect the red cable to the red contact (see fig. 80, item 1).
- 2) Turn the cable end with the fuse so that the fuse can be positioned between the batteries (see fig. 80, item 2). This prevents the fuse from rattling against the battery cover.
- 3) Reconnect the plug of the battery cable to the controller (see page 11).
- 4) Perform a functional test (see instructions for use (user), section "Lighting"):
 - Assembly was successful if the light on/off, direction indicator left/right and warning flashers work correctly.
 - Make sure that the direction indicators are at the top and the headlights at the bottom for each lamp.



4.17.2 Replacing the footpath lighting

► **Prerequisites:**

Turn the control device off (see page 11).

► **Tools:** None required

- 1) Open the rubber band.
- 2) Remove the lamp from the frame tube and replace it.
- 3) Hold the new lamp against the frame tube.
- 4) Pass the rubber band around the frame tube and push it onto the retaining pin.



4.18 Additional options

4.18.1 Replacing the crutch holder

► **Prerequisites:**

Turn the control device off and disconnect the battery cable (see page 11).

► **Tools:** Phillips screwdriver; open-ended or ring wrenches, size 8 and 13; Allen keys, size 3 and 5

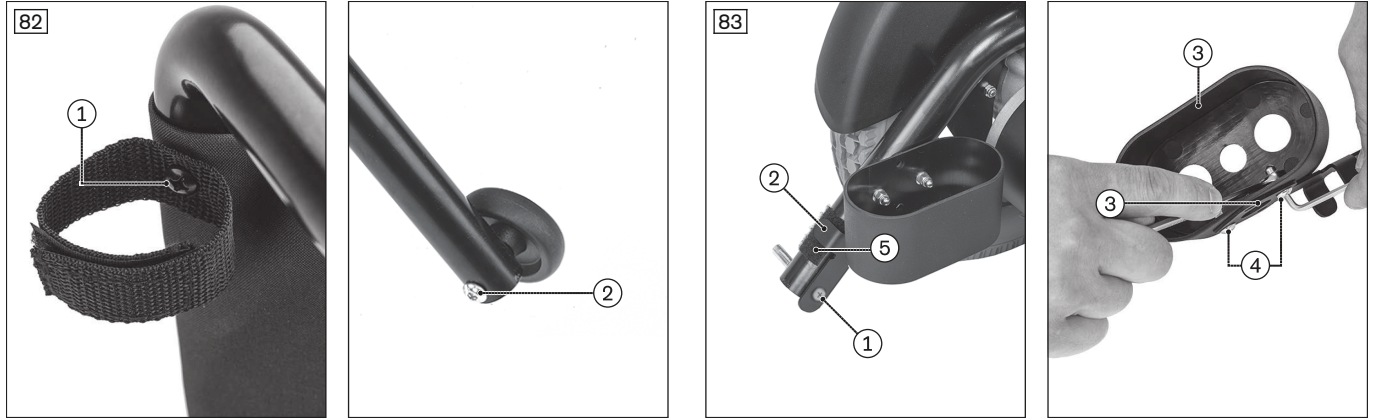
Removing/installing the loop

- 1) Loosen the Phillips head screw and remove the loop of the crutch holder from the back support tube (see fig. 82, item 1).
- 2) Replace the loop of the crutch holder. Install the new loop on the back support tube using the Phillips head screw (see fig. 82, item 1).
- 3) Firmly tighten the Phillips head screw.

Removing/installing the crutch holder component group

- 1) Remove the anti-tipper roller (see fig. 82, item 2).
- 2) Remove the Allen head screw (see fig. 83, item 1).
- 3) Remove the crutch holder component group from the anti-tipper tube (see fig. 83, item 2).
- 4) Prepare the new component group. To do so, connect the retaining plate and the crutch holder (see fig. 83, item 3). Firmly tighten the supplied Allen head screws with the cap nuts (see fig. 83, item 4).

- 5) **If necessary:** Remove the glued hook strap. Affix the supplied loop strap to prevent rattling (see fig. 83, item 5).
- 6) Slide the crutch holder component group onto the anti-tipper tube (see fig. 83, item 2).
- 7) Insert the screw of the anti-tipper roller from the inside through the retaining plate of the crutch holder and through the anti-tipper tube (see fig. 83, item 1).
- 8) Reinstall the anti-tipper roller on the outside (see fig. 82, item 2).
- 9) Tighten the Allen head screw/cap nut so the anti-tipper roller is tight but still turns.



4.18.2 Replacing the storage bag

CAUTION

Product contains magnets

Crushing due to incorrect handling

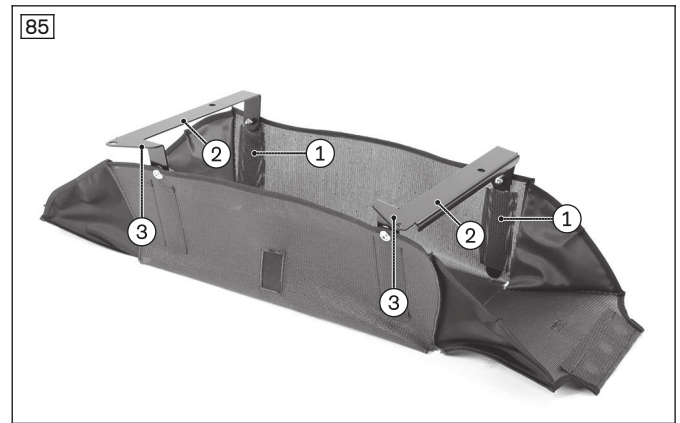
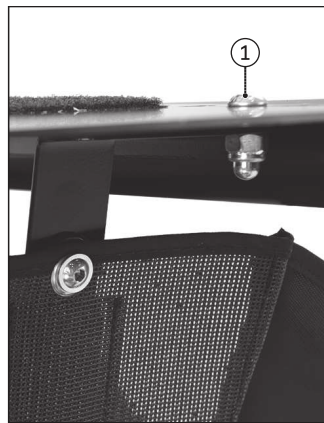
► Magnets have a powerful attractive force and can cause crushing if handled without due care. Watch out for fingers or skin in the closure area.

► **Prerequisites:**

Turn the control device off and disconnect the battery cable (see page 11).

► **Tools:** Open-ended or ring wrench, size 10; ring wrench, size 10; Allen key, size 3 and 4; torque wrench

- 1) Remove the seat cushion.
- 2) Loosen the screw connection of the storage bag on the seat plate (see fig. 84, front: item 1; rear: item 2).
- 3) Remove and replace the storage bag.
- 4) Prepare the storage bag for assembly:
 - Insert the small plates into the side pockets of the storage bag. The slotted hole faces up on each side (see fig. 85, item 1).
 - Install the retaining plates on the small plates using the supplied mounting materials (see fig. 85, item 2). The pointed sides of the retaining plates face forward in the direction of travel during subsequent assembly (see fig. 85, item 3).
- 5) Determine the appropriate mounting points under the seat plate (see fig. 84, front: item 1; rear: item 2).
- 6) Attach the retaining plates of the storage bag on the chosen mounting points of the seat plate. Tighten the screw connection to **10 Nm** (see fig. 84, item 1/2).
- 7) Check the correct assembly of the storage bag:
 - The front edge of the storage bag is approximately in line with the front edge of the battery cover (see fig. 86, item 1).
 - The magnetic closures can be readily applied to the frame tube.
- 8) Reinstall the seat cushion.



4.18.3 Replacing the adapter for the head support mounting kit

► Prerequisites:

Turn off the control device.

► Tools: Open-ended or ring wrench, size 13; Allen key, size 5; torque wrench

- 1) Loosen the screw connection of the adapter plate on the back support tube (see fig. 87).
- 2) Remove and replace the adapter plate (see fig. 87, item 1).
- 3) Mount the new adapter plate using the two supplied Allen head screws.
- 4) Tighten the Allen head screws to **10 Nm**.
- 5) Now a head support mounting kit can be installed (not included in the scope of delivery).



4.18.4 Replacing options with hook-and-loop fasteners

Replacing the mobile phone bag

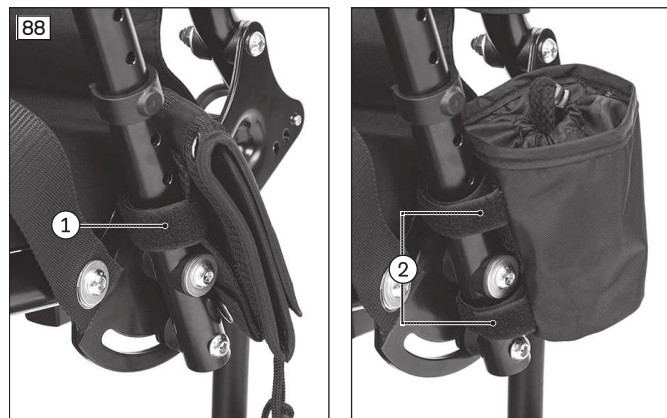
- 1) Loosen the hook-and-loop strap on the arm support tube (see fig. 88, item 1).
- 2) Attach the bag to the side of the arm support tube with the hook-and-loop strap.

Replacing the beverage holder

- 1) Loosen the hook-and-loop strap on the arm support tube (see fig. 88, item 2).
- 2) Attach the holder to the side of the arm support tube with the hook-and-loop strap.

Replacing the seat cushion; attaching alternative seat cushions

- 1) Pull the existing seat cushion off the hook-and-loop closure on the seat plate (not illustrated).
- 2) Attach the new seat cushion to the seat plate with the hook-and-loop closure.



5 Troubleshooting nVR2

NOTICE

Damages due to unauthorised service

Unsafe operation of the power wheelchair

- ▶ Troubleshooting may thus only be carried out by authorised specialist dealers possessing solid knowledge of electronic controllers from Ottobock.
- ▶ Ottobock assumes no liability for any damages originating from improper or poorly performed repairs.

INFORMATION

Experience has shown that electrical problems are frequently associated with errors and defects in the plug connectors and cabling. These areas should therefore always be examined first.

Faults that occur are displayed on the control panel or a connected handheld programming device.

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

5.1 Diagnostic steps

To ensure efficient and successful troubleshooting, proceed as follows:

- Ascertain whether there is a concrete error trigger or a sporadic error message.
- Note the error type on the control panel (battery LED flashing).
- Look up the potential cause in the following error tables and carry out the recommended inspections and corrective actions.

5.2 Visual displays

Error messages on the control panel

As a rule, error messages are displayed via the flashing signals of the “rated battery capacity” LED display on the control panel, as follows:


LED display	Meaning	Measure
Fast flashing, all five LEDs	The control system detects an error.	Interpret the flashing signals, connect the handheld programming device, determine the error code and take the recommended actions.
Slow flashing	The control system has detected that the battery needs to be charged.	Charge the batteries.








LED display	Meaning	Measure
	INFORMATION: The fewer LEDs are flashing, the less battery capacity remains.	
Display continuously illuminated	The control system does not register an error trigger, but an error was possibly triggered before.	Read the diagnostics report from the control system, determine the error code and take the recommended actions.
Display not illuminated	Problem with the power supply to the control system or defective controller.	Check battery charge level. Check all connections between the battery and the control system. Check and replace controller.




The speed display can also display an error.

Meaning of flashing signals – battery indicator

All five LEDs on the battery indicator flash. A defined number of rapid flashes denotes a different error in each case:

Error display	Information
	Example: All five LEDs flash seven times – longer pause – all LEDs flash seven times ... = See table, line 7

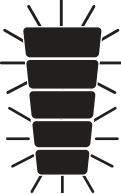
Flashing LED	Error/warning	Cause	Possible measure
 1x flashing	Battery undervoltage	Battery deep discharge Battery cable malfunctioning or faulty connection to the battery	Charge as soon as possible Check the connection to the battery (charge the battery if the connection is good)
 2x flashing	Left motor not connected	E.g. defective plug connection, cable break	Check plug connections and cable to left motor
 3x flashing	Defective cabling on the left motor	E.g. short circuit in the controller	Check cable connections to left motor and replace controller if necessary
 4x flashing	Right motor not connected	E.g. defective plug connection, cable break	Check plug connections and cable to right motor
 5x flashing	Defective cabling on the right motor	E.g. short circuit in the controller	Check cable connections to right motor and replace controller if necessary
 6x flashing	Driving function blocked due to external factors	Battery charger may be connected	Disconnect the battery charger
 7x flashing	Joystick fault	Joystick not in neutral position when the unit is turned on	Move the joystick to the neutral position before switching the unit on If the error recurs after restarting: Check the connection to the controller If the connection is OK: Replace the control panel

Flashing LED	Error/warning	Cause	Possible measure
 8x flashing	Controller/motor error	Defective plug connection/defective controller/defective motor	Check all plug connections Read error code and proceed according to the following section 5.3 If the error code is not on the list, replace the controller
 9x flashing*	Brake release	Brake disabled	Check motor brakes Check connections to the controller
 10x flashing	Battery overvoltage	Voltage too high (> 35 V) Loose battery contacts	Continue driving slowly Check cabling/plug contacts Check battery voltage with a measuring device If the error recurs and the measured voltage is < 35 V: Replace the controller

* A warning signal will also sound.

Meaning of flashing signals – speed display

All five LEDs on the speed display flash. This indicates the following:

Flashing LED	Error/warning	Cause	Check plug connections and cables on controller Possible measure
	Communication error	E.g. defective plug connection, cable break Defective controller	Check cabling/plug contacts on controller Replace the controller

5.3 Error messages/error codes

Error codes indicating the cause of warnings or errors that occur are output via a connected handheld programming device. The PP1 or DTT handheld programming devices can be connected for diagnosis (see page 45).

INFORMATION

Connect the programming device to the control system only after the LED display flashes. Should the programming device be connected before flashing occurs, the error code will not be displayed.

Error code*	Error/warning	Cause	Possible measure
1320	Current limit was exceeded	E.g. defective plug connection, cable break Defective actuator or controller	Check plug connections and cable to actuator. Verify that actuating drive can move freely. Replace actuator or controller.
1404	Deviation in connection resistance	Penetration of moisture into the motor housing, ageing motors	Check the plug connection. Store the product in a dry place for 24 hours and then push it for several minutes with the motors unlocked. Test again. Replace motors.
1505	Brake error on left motor	E.g. defective plug connection, cable break Defective brake	Check plug connections and cable to the brake. Replace motor and brake.
1506	Brake error on right motor		
1600	Battery overvoltage	Voltage too high Loose battery contacts	Drive the wheelchair only at low speed. Check cabling/plug contacts.

Error code*	Error/warning	Cause	Possible measure
			If error persists: Contact the manufacturer.
1E03	Battery charger is connected	Battery charger is connected to charging receptacle	Disconnect battery charger prior to driving.
2C00	Low battery voltage	Battery deep discharge	Charge as soon as possible.
2C02	Switch-off due to low battery voltage	Defective batteries	Check and replace batteries.
2F00	Joystick warning	Joystick not in neutral position when the unit is turned on	Move joystick to neutral position prior to switch-on.
	Defective joystick	If the message continues to be displayed even though the joystick is centred: Defective joystick	Replace the joystick/control panel.
3101	Controller fault	E.g. defective relay	Replace controller.
3B00	Left motor not connected	E.g. defective plug connection, cable break	Check plug connections and cable to left motor.
		Defective motor	Check left motor.
3C00	Right motor not connected	E.g. defective plug connection, cable break	Check plug connections and cable to right motor.
		Defective motor	Check right motor.
3D00	Error in the cabling of the left motor	E.g. short circuit in the controller	Check plug connections and cable to left motor, replace controller if necessary.
3D01			
3E00	Error in the cabling of the right motor	E.g. short circuit in the controller	Check plug connections and cable to right motor, replace controller if necessary.
3E01			
4401	Error in the control system	Non-specific problem in the control device	Contact the manufacturer.
5400 and flashing LEDs on speed display	Communication error	E.g. defective plug connection, cable break Defective controller	Check plug connections and cables on controller. Replace controller.
7100	Joystick error	Joystick communication problem	Check joystick cable, connections and associated sockets.
7101			
7102	Joystick error	Loss of power supply to the joystick	Check joystick cable, connections and associated sockets.
7103	Joystick error	Internal error trigger	Check joystick cable, connections and associated sockets. Replace the joystick/control panel.
7104		Defective joystick	
7902	The control system has overheated	Maximum allowable temperature of the controller exceeded	Turn the control device off and let the controller cool down. Replace controller. If error persists: Contact the manufacturer.
Other codes	Possible errors in control system	Problem in the control device	Contact the manufacturer.

* Note: The table also lists error messages that are not relevant for all wheelchair types due to varying wheelchair equipment.

5.4 Other errors

This category includes errors that are not shown on the control panel or handheld programming device. Reasons for this can be that the control device cannot be switched on, the error is not severe enough or the control system cannot recognise the error for other reasons.

Error	Possible cause	Measure
Control system does not switch on	No connection between the battery and the control system	Check plug connections and battery cable.
	Defective cable connection between the controller and modules	Check plug connections and cables.
	Defective controller or modules	Check and replace controller with modules.
Wheelchair not driving straight	Incorrect programming	Adjust straight compensation in the software.
	Motor or brake error	Check and replace motors with brakes.
Motor or one brake is hot	Motor or brake error	Check and replace motors with brakes.
Battery is discharging too quickly	Dead or damaged batteries	Check and replace battery.
	Defective or unsuitable battery charger	Check operation of the battery charger. Replace battery charger.
	Use of incorrect batteries	Select an appropriate battery type by referring to the instructions for use.
	Motor is blocked or a brake is jammed	Replace motor and brake.

In case of errors that are not listed in this service manual, or if the prescribed actions have no effect, disconnect the battery cable and contact the manufacturer.

6 nVR2 wheelchair control device – installation and programming

6.1 Installation and wiring

INFORMATION

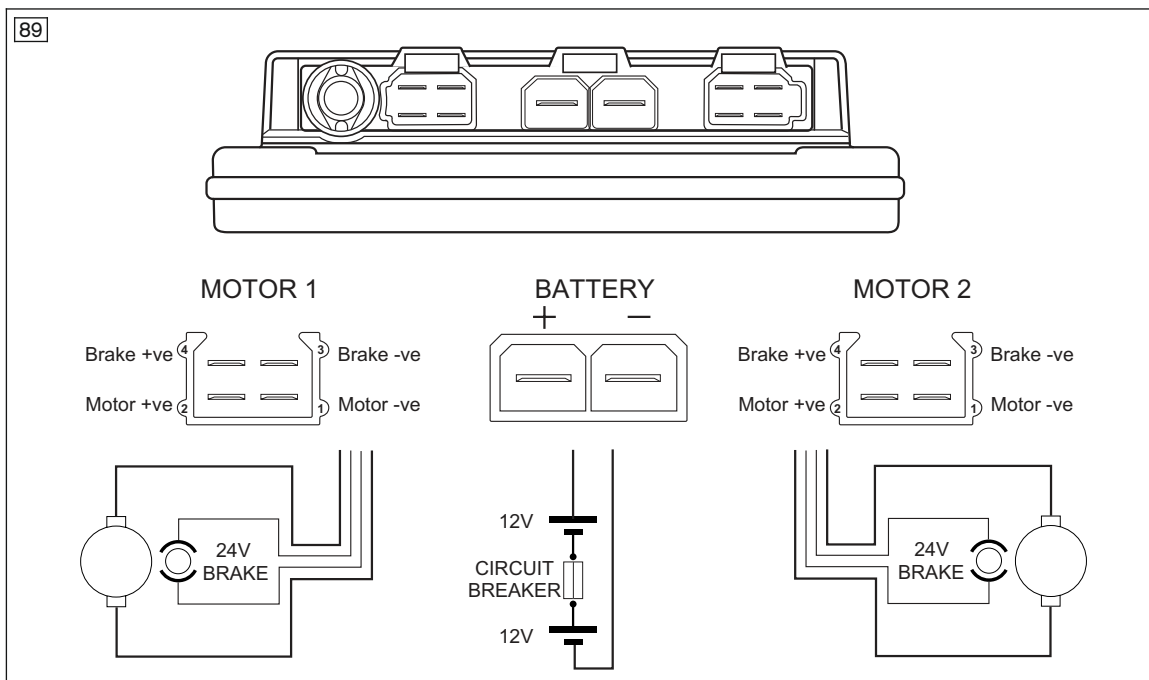
For clear assignment of the cabling, the cable ends are marked with abbreviated designations of the components being connected. The following designations apply, among others:

- ▶ PM = controller/power module/controller
- ▶ LM = push-button module for lighting
- ▶ JSM = joystick module/control panel

The Wingus power wheelchair is equipped with the following control modules:

- **Control panel:** nVR2 JSM; manufacturer part number: D51571; Ottobock order number: 493U163=SK001
- **Controller:** nVR2 PM 50; manufacturer part number: D51425; Ottobock order number: 493U163=SK002

Controller pin assignment*

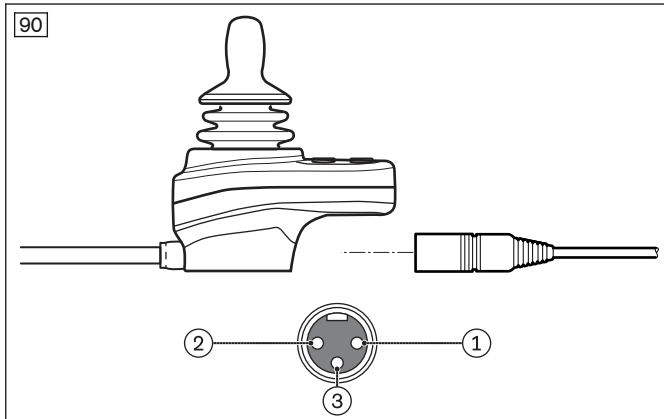


*) Preconfigured motor assignment. Can be changed by programming.

Joystick move- ment	MOTOR 1 (M1)		MOTOR 2 (M2)		Wheelchair movement
	+ve	-ve	+ve	-ve	
Forward **	+ve	-ve	+ve	-ve	Forward
Reverse **	-ve	+ve	-ve	+ve	Reverse

***) Preconfigured assignment of the joystick direction and motor direction of rotation

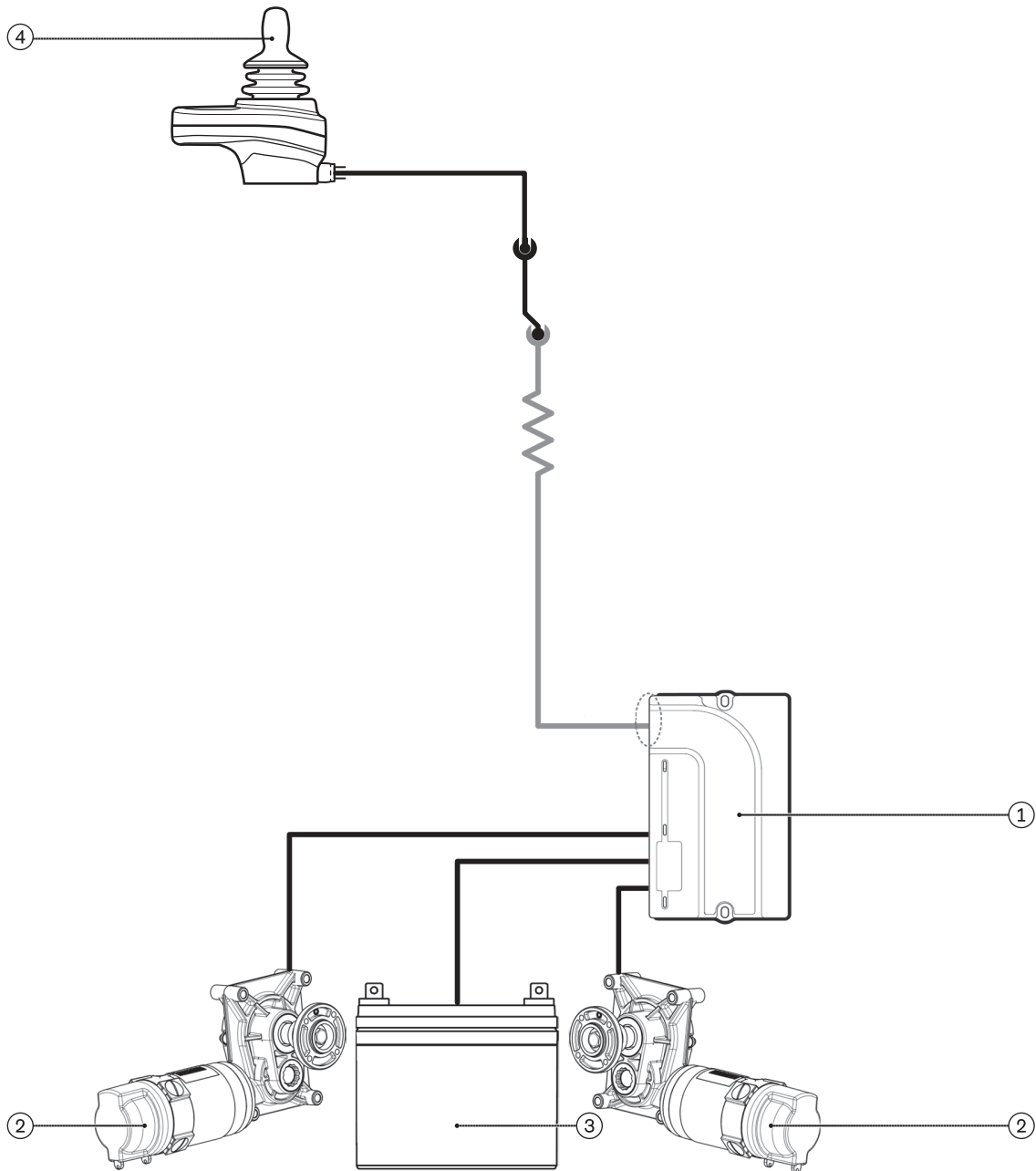
Pin assignment on the charging receptacle of the control panel



1	Battery, positive	3	Switch for drive-away lock
2	Battery, negative		

Cabling of the modules and components

91



1	Controller	3	Batteries
2	Drive motor	4	Control panel

6.2 Programming tools

INFORMATION

- ▶ Read and ensure you understand the user manual for the programming devices in full before using such a device. This also applies for the use of the PC programming software.
- ▶ If you change the parameters of the control device, make sure that you observe all restrictions described in the wheelchair instructions for use (user). Document all setting changes for reference in case future measures are required.
- ▶ **Only if needed:** The prepared control parameter set provided by Ottobock may only be requested by trained, qualified personnel from ccc@ottobock.com.
- ▶ The parameter settings of the control device may only be changed by qualified personnel instructed by the manufacturer. The manufacturer of the product and the control device manufacturer are not liable in case of damage caused by parameter settings that were incorrectly configured or not adjusted properly according to the user's abilities. Further information: see page 46.

6.2.1 Handheld programming device

The PP1 (see fig. 92) or DTT (see fig. 93) handheld programming devices can be connected to program the VR2/nVR2 control device. A handheld programming device enables access to programmable parameters for adjusting the control device settings to the individual requirements of the patient and to read error reports and timer information.

Connecting the handheld programming device

- 1) Switch the wheelchair control device off.
- 2) Optional for DTT handheld programming device: Connect the connection cable for VR2/nVR2 to the handheld programming device (see fig. 93, item 1).
- 3) Connect the connection cable to the wheelchair control panel.
- 4) Switch on the control device on the wheelchair and initialise it.

Using the handheld programming device

Further information on the installation and use of the PP1 and DTT handheld programming devices is found in the user manuals "PROGRAMMER FOR PILOT & PILOT+CONTROL SYSTEMS" (SK73747) and "DIAGNOSTIC TEST TOOL TECHNICAL MANUAL" (SK79393) from the control device manufacturer Curtiss-Wright.



6.2.2 PC programming software

The PC programming software provides access to the same control device parameter settings as a handheld programming device. Aside from the PC programming software, a connection cable with a serial to USB converter is required (included in the scope of delivery). The connection cable is connected to a USB port on the PC and the power wheelchair's control panel.

For further details on how to use these software packages with the control device, refer to the user manual supplied with the software.

6.3 Programmable parameters

⚠ WARNING

Incorrect configuration of the control device

Falling, tipping over, collision due to incorrect parameter settings

- ▶ The parameter settings of the control device may only be changed by qualified personnel instructed by the manufacturer. The manufacturer of the product and the control device manufacturer are not liable in case of damage caused by parameter settings that were incorrectly configured or not adjusted properly according to the user’s abilities.
- ▶ Note that modified parameter settings lead to changes in driving characteristics. In particular, changes to the speed, acceleration, braking or joystick settings can lead to unexpected and therefore uncontrollable driving characteristics and cause an accident.
- ▶ Parameters not described in this service manual may not be changed or only in consultation with Ottobock.
- ▶ The user must test the driving characteristics of the product under the supervision of the qualified personnel each time after parameter settings are changed.

A selection of the programmable parameters is described below. Detailed information regarding programming can be found in the document “VR2 SERIES WHEELCHAIR CONTROL SYSTEM; OPERATION, INSTALLATION & PROGRAMMING” (SK77898) from the control device manufacturer Curtiss-Wright.

Additional parameters that may be accessible with a different version of the programming software may not be changed or may only be changed following consultation with Ottobock.

6.3.1 General parameters

Parameter	Setting range	Description
Sleep Timer	1-minute increments from 0 to 30 min	Setting of time period in which wheelchair is inactive before the control system switches off. If the time is set to 0, the system never switches off.
Joystick Throw	Single steps from 0 to 100%	The program enables the maximum speed to be achieved even if the joystick is moved (deflected) slightly. This is particularly useful for wheelchair drivers with restricted hand or arm mobility.
Invert Joystick	On, Off	Setting this parameter causes the wheelchair to be moved in the opposite direction to the direction of joystick deflection. On: If the joystick is moved forward, the wheelchair moves backwards. Off: If the joystick is moved forward, the wheelchair moves forward. Function of the joystick remains unchanged when deflected left or right.
Steer Correct	Single steps from -9 to +9	Adjustment of the wheelchair’s directional stability. The parameter compensates for motor adjustment errors to ensure that the wheelchair drives straight ahead when the joystick of the control system is pushed directly forward. Baseline = 0. If the wheelchair pulls to the left when driving straight ahead: Increase the set value. If the wheelchair pulls to the right when driving straight ahead: Decrease the set value. If “Swap Motors” is set, this logic is reversed.
Soft Stop Rate	Single steps from 0 to 100	Setting of deceleration value for soft braking of the wheelchair. Soft braking of the wheelchair occurs if the nVR2 control device is switched off during travel.
Soft Reverse Deceleration	Single steps from 25 to 100%	Setting of the deceleration rate when the wheelchair is stopped whilst moving backwards. This value can be set separately via the “Deceleration” parameter to prevent the wheelchair from tipping over when being driven backwards down a slope. This value is set as a percentage of the “Deceleration” parameter. A typical value is 70%.
Reverse Driving Alarm	On, Off	Sets whether the nVR2 control device emits an audible warning signal while driving the wheelchair in reverse.

Parameter	Setting range	Description
		On: An acoustic warning signal sounds. Off: The alarm is deactivated.
Lock Function Enabled	On, Off	The locking sequence can be activated to prevent the wheelchair being driven by an unauthorised person. On: The lock function is available. Off: The lock function is deactivated.
Brake Fault Detect	On, Off	Enables detection of defective power brakes or brake connections via the nVR2 control device. On: Brake defects are detected. Off: Brake defects remain undetected.

6.3.2 Speed parameters

Parameter	Setting range	Description
Acceleration	Single steps from 0 to 100	Setting of forward and backward acceleration of the wheelchair. A high value enables fast acceleration. This programmed acceleration value appears when a speed setting of 5 has been selected. Its value for other settings depends on the value of the "Minimum Acceleration" parameter.
Deceleration	Single steps from 0 to 100	Setting of the forward and backward deceleration (or brake) of the wheelchair. A high value enables rapid deceleration. This programmed deceleration value appears when a speed setting of 5 has been selected. Its value for other settings depends on the value of the "Minimum Deceleration" parameter.
Turn Acceleration	Single steps from 0 to 100	Setting of turn acceleration of the wheelchair. A high value enables fast acceleration. This programmed acceleration value appears when a speed setting of 5 has been selected. Its value for other settings depends on the value of the "Minimum Turn Acceleration" parameter.
Turn Deceleration	Single steps from 0 to 100	Setting of the turn deceleration (or brake) of the wheelchair. A high value enables rapid deceleration. This programmed deceleration value appears when a speed setting of 5 has been selected. Its value for other settings depends on the value of the "Minimum Turn Deceleration" parameter.
Forward Speed	Single steps from 0 to 100%	Setting of the minimum and maximum forward speeds of the wheelchair. A high value enables a high speed. The minimum value appears when the speed setting 1 has been selected and the maximum value appears when the speed setting 5 has been selected.
Reverse Speed	Single steps from 0 to 100%	Setting of the minimum and maximum reverse speeds of the wheelchair. A high value enables a high speed. The minimum value appears when the speed setting 1 has been selected and the maximum value appears when the speed setting 5 has been selected.
Turning Speed	Single steps from 0 to 100%	Setting of the minimum and maximum turning speeds of the wheelchair. A high value enables a high speed. If "Drive Profile 0" has been selected, the minimum value appears for speed setting 1 and the maximum value appears when speed setting 5 has been selected.
Power	Single steps from 0 to 100%	Setting of wheelchair power level. In this context, power is understood to be the ability to negotiate hills or overcome obstacles, for example. If the power is set to 100%, the wheelchair can be operated at its full power. Values below 100% will result in reduced power. Power settings are usually made to avoid damage to corridors and furniture when the wheelchair is being used indoors. The drive profiles can be set independently of each other, i.e. different profiles can be defined for inside and outside areas.

Parameter	Setting range	Description
		Programming example: <ul style="list-style-type: none"> • Maximum current = 50 ampere • Power (profile 1) = 100% • Power (profile 2) = 50% (i.e. the power of the VR2 control device is 50 A in profile 1, and the power is 50% of 50 A = 25 A in profile 2).
Number of Drive Profiles	Profiles 0–5	The nVR2 control device can be operated with a single or with multiple drive profiles. A drive profile consists of programmable parameters such as acceleration, deceleration, turn acceleration, turn deceleration, forward speed, reverse speed and turning speed. The number of drive profiles is specified via the programmable “Number of Drive Profiles” parameter. If the “Number of Drive Profiles” parameter is set to 0, there is one setting for each of the parameters listed above. The maximum speed setting of the control system can be changed using the keys for maximum speed or extension/reduction of the profiles. If the parameter setting for “Number of Drive Profiles” has a value of 2 to 5, the corresponding number of drive profiles exists and each of the listed parameters can be set separately in each profile. Then the keys for maximum speed or extension/reduction of the profiles can be used to switch between the existing profiles. INFORMATION: Although a number of drive profiles can be set to 1, the operation is the same as setting to 0 but without the ability to change maximum speed settings.
Minimum Acceleration	1% increments of “Acceleration” parameter	Setting of minimum forward and backward acceleration of the wheelchair. This percentage acceleration value appears if the speed has been set to 1. Programming example: <ul style="list-style-type: none"> • Acceleration = 80 and Minimum Acceleration = 25% • Acceleration at level 1 = 25% of 80 = 20 • Speed settings 2, 3 and 4 will interpolate linearly between 20 and 80 • Acceleration at step 2 = 35 • Acceleration at step 3 = 50 • Acceleration at step 4 = 65
Minimum Deceleration	1% increments of “Deceleration” parameter	Setting of the minimum forward and backward deceleration of the wheelchair. This percentage deceleration value appears if the speed has been set to 1. Programming example: <ul style="list-style-type: none"> • Deceleration = 80 and Minimum Deceleration = 25% • Deceleration at level 1 = 25% of 80 = 20 • Speed settings 2, 3 and 4 will interpolate linearly between 20 and 80 • Deceleration at step 2 = 35 • Deceleration at step 3 = 50 • Deceleration at step 4 = 65
Minimum Turn Acceleration	1% increments of “Turn Acceleration value” parameter	Setting of minimum turn acceleration of the wheelchair. This percentage turn acceleration value appears if the speed has been set to 1. Programming example: <ul style="list-style-type: none"> • Turn Acceleration = 80 and Minimum Turn Acceleration = 25% • Turn Acceleration at level 1 = 25% of 80 = 20

Parameter	Setting range	Description
		<ul style="list-style-type: none"> Speed settings 2, 3 and 4 will interpolate linearly between 20 and 80 Turn acceleration at step 2 = 35 Turn acceleration at step 3 = 50 Turn acceleration at step 4 = 65
Minimum Turn Deceleration	1% increments of "Turn Deceleration value" parameter	<p>Setting of the minimum turn deceleration of the wheelchair. This percentage turn deceleration value appears if the speed has been set to 1.</p> <p>Programming example:</p> <ul style="list-style-type: none"> Turn Deceleration = 80 and Minimum Turn Deceleration = 25% Turn Deceleration at level 1 = 25% of 80 = 20 Speed settings 2, 3 and 4 will interpolate linearly between 20 and 80 Turn deceleration at step 2 = 35 Turn deceleration at step 3 = 50 Turn deceleration at step 4 = 65

6.3.3 Report functions

The nVR2 control device is equipped with a timer and troubleshooting report function. The report data can be read and erased using the DTT handheld programming device or the PC programming software. The following functions are logged by the nVR2 control device and can be read with the corresponding hardware:

Function	Description
Read Timer	The nVR2 is equipped with a timer that records the hours of operation of the wheelchair. The timer starts running as soon as the joystick is deflected from the home position and stops running when the joystick returns to the home position. The timer records the number of hours for which the wheelchair is in use.
Clear Timer	This function resets the nVR2 control device timer. Only the B (OEM) and C (Manufacturing) versions/access levels of the PC programming software support this function.
Read System Log	The nVR2 is equipped with a troubleshooting report system that stores the number of occurrences of the last eight detected system problems. This allows you to view the contents.
Erase System Log	The troubleshooting report of the nVR2 control device can be erased with this function. Only the B (OEM) and C (Manufacturing) versions/access levels of the PC programming software support this function.

7 Technical data

All technical data are found in the current instructions for use. You can request the current instructions for use from the manufacturer (see the overview of national Ottobock branches on the inside of the back cover).

8 Appendices

8.1 Torque values of the screw connections

Unless otherwise specified, screw connections are tightened with the following torque values:

- Thread diameter M4: 3 Nm
- Thread diameter M5: 5 Nm
- Thread diameter M6: 10 Nm
- Thread diameter M8: 25 Nm

8.2 Battery circuit diagram

The battery circuit diagram is printed on the inside of the battery cover.

8.3 Record of delivery

INFORMATION

- ▶ On delivery, also observe the information in the section "Maintenance schedule".
- ▶ Retain the completed record of delivery. It may be requested by the manufacturer in case of complaints.
- ▶ Provide the user or attendant with a copy of the completed record of delivery.

The user or attendant has been instructed in the use of the product and was informed of the residual risks.

Customer:

Year of manufacture:

Serial number:

The product was delivered by:

Place / date:

Signature of specialist dealer:

Signature of user/attendant:

8.4 Maintenance Schedule

INFORMATION

- ▶ Also observe the information for delivery in the previous section.
- ▶ Retain the completed maintenance report. It may be requested by the manufacturer in case of complaints.
- ▶ Provide the user or attendant with a copy of the completed maintenance report.

Maintenance schedule	Type of wheelchair:	Customer:
Department	Inspection (checklist)	

Serial number:	Function/setting (depending on equipment)	In good condition	Damage	Exchange/replace
Whole product	Visual inspection			
Control device	Control unit bracket			
	Control unit cable			
	Control panel			
	Controller			
Batteries	Battery cover			
	Cabling			
Drive unit	Motors with brake release			
	Drive wheels			
Caster wheels	Caster fork			
Tyres	Drive wheels			
	Caster wheels			
Frame	Frame tube			
	Anti-tipper			
Seat	Seat plate			
	Back support			
	Upholstery/cushion			
Arm support	Forearm support			
	Arm support holder			
Leg support	Receiver			
Foot plate	Folding mechanism			
Safety accessories	Vehicle transportation kit			

Notes:	
Do the settings of the wheelchair match the user's requirements?	
Maintenance was carried out by:	on:



A series of 25 horizontal lines spanning the width of the page, providing a template for writing.



A series of horizontal lines for writing, consisting of 27 lines spaced evenly down the page.

Kundenservice/Customer Service

Europe

Otto Bock HealthCare Deutschland GmbH
Max-Näder-Str. 15 · 37115 Duderstadt · Germany
T +49 5527 848-3433 · F +49 5527 848-1460
healthcare@ottobock.de · www.ottobock.de

Otto Bock Healthcare Products GmbH
Brehmstraße 16 · 1110 Wien · Austria
F +43 1 5267985
service-admin.vienna@ottobock.com · www.ottobock.at

Otto Bock Adria d.o.o. Sarajevo
Ramiza Salčina 85
71000 Sarajevo · Bosnia-Herzegovina
T +387 33 255-405 · F +387 33 255-401
obadria@bih.net.ba · www.ottobockadria.com.ba

Otto Bock Bulgaria Ltd.
41 Tzar Boris III Blvd. · 1612 Sofia · Bulgaria
T +359 2 80 57 980 · F +359 2 80 57 982
info@ottobock.bg · www.ottobock.bg

Otto Bock Suisse AG
Luzerner Kantonsspital 10 · 6000 Luzern 16 · Suisse
T +41 41 455 61 71 · F +41 41 455 61 70
suisse@ottobock.com · www.ottobock.ch

Otto Bock ČR s.r.o.
Protetická 460 · 33008 Zruč-Senec · Czech Republic
T +420 377825044 · F +420 377825036
email@ottobock.cz · www.ottobock.cz

Otto Bock Iberica S.A.
C/Majada, 1 · 28760 Tres Cantos (Madrid) · Spain
T +34 91 8063000 · F +34 91 8060415
info@ottobock.es · www.ottobock.es

Otto Bock France SNC
4 rue de la Réunion · CS 90011
91978 Courtaboeuf Cedex · France
T +33 1 69188830 · F +33 1 69071802
information@ottobock.fr · www.ottobock.fr

Otto Bock Healthcare plc
32, Parsonage Road · Englefield Green
Egham, Surrey TW20 0LD · United Kingdom
T +44 1784 744900 · F +44 1784 744901
buckuk@ottobock.com · www.ottobock.co.uk

Otto Bock Hungária Kft.
Tatai út 74. · 1135 Budapest · Hungary
T +36 1 4511020 · F +36 1 4511021
info@ottobock.hu · www.ottobock.hu

Otto Bock Adria d.o.o.
Dr. Franje Tuđmana 14 · 10431 Sveta Nedelja · Croatia
T +385 1 3361 544 · F +385 1 3365 986
ottobockadria@ottobock.hr · www.ottobock.hr

Otto Bock Italia Srl Us
Via Filippo Turati 5/7 · 40054 Budrio (BO) · Italy
T +39 051 692-4711 · F +39 051 692-4720
info.italia@ottobock.com · www.ottobock.it

Otto Bock Benelux B.V.
Mandenmaker 14 · 5253 RC
Nieuwkuijk · The Netherlands
T +31 73 5186488 · F +31 73 5114960
info.benelux@ottobock.com · www.ottobock.nl

Industria Ortopédica Otto Bock Unip. Lda.
Av. Miguel Bombarda, 21 - 2º Esq.
1050-161 Lisboa · Portugal
T +351 21 3535587 · F +351 21 3535590
ottobockportugal@mail.telepac.pt

Otto Bock Polska Sp. z o. o.
Ulica Koralowa 3 · 61-029 Poznań · Poland
T +48 61 6538250 · F +48 61 6538031
ottobock@ottobock.pl · www.ottobock.pl

Otto Bock Romania srl
Șos de Centura Chitila - Mogoșoaia Nr. 3
077405 Chitila, Jud. Ilfov · Romania
T +40 21 4363110 · F +40 21 4363023
info@ottobock.ro · www.ottobock.ro

OOO Otto Bock Service
p/o Pultikovo, Business Park „Greenwood“,
Building 7, 69 km MKAD
143441 Moscow Region/Krasnogorskiy Rayon
Russian Federation
T +7 495 564 8360 · F +7 495 564 8363
info@ottobock.ru · www.ottobock.ru

Otto Bock Scandinavia AB
Postal: Box 4041 · 169 04 Solna · Sweden
Visiting: Barks Väg 7, Solna, Sweden
SE: T +46 11 28 06 89 · NO: T +47 23142600
FI: T +35 8 10 400 6940 · DK: T +45 70 22 32 74
To order: order@ottobock.se
Inquiries: info@ottobock.se
professionals.ottobock.se

Otto Bock Slovakia s.r.o.
Röntgenova 26 · 851 01 Bratislava 5 · Slovak Republic
T +421 2 32 78 20 70 · F +421 2 32 78 20 89
info@ottobock.sk · www.ottobock.sk

Otto Bock Sava d.o.o.
Industrijska bb · 34000 Kragujevac · Republika Srbija
T +381 34 351 671 · F +381 34 351 671
info@ottobock.rs · www.ottobock.rs

Otto Bock Ortopedi ve
Rehabilitasyon Tekniği Ltd. Şti.
Mecidiyeköy Mah. Lati Lokum Sok.
Meriç Sitesi B Blok No: 30/B
34387 Mecidiyeköy-İstanbul · Turkey
T +90 212 3565040 · F +90 212 3566688
info@ottobock.com.tr · www.ottobock.com.tr

Africa

Otto Bock Algérie E.U.R.L.
32, rue AHCÈNE Outaleb - Coopérative les Mimosas
Mackle-Ben Aknoun · Alger · DZ Algérie
T +213 21 913863 · F +213 21 913863
information@ottobock.fr · www.ottobock.fr

Otto Bock Egypt S.A.E.
28 Soliman Abaza St. Mohandessein - Giza · Egypt
T +20 2 37606818 · F +20 2 37605734
info@ottobock.com.eg · www.ottobock.com.eg

Otto Bock South Africa (Pty) Ltd
Building 3 Thornhill Office Park · 94 Bekker Road
Midrand · Johannesburg · South Africa
T +27 11 564 9360
info-southafrica@ottobock.co.za
www.ottobock.co.za

Americas

Otto Bock Argentina S.A.
Av. Belgrano 1477 · CP 1093
Ciudad Autónoma de Buenos Aires · Argentina
T +54 11 5032-8201 / 5032-8202
atencionclientes@ottobock.com.ar
www.ottobock.com.ar

Otto Bock do Brasil Tecnica Ortopédica Ltda.
Alameda Maria Tereza, 4036, Bairro Dois Córregos
CEP: 13.278-181, Valinhos-São Paulo · Brasil
T +55 19 3729 3500 · F +55 19 3269 6061
ottobock@ottobock.com.br · www.ottobock.com.br

Otto Bock HealthCare Canada
5470 Harvester Road
Burlington, Ontario, L7L 5N5, Canada
T +1 800 665 3327 · F +1 800 463 3659
CACustomerService@ottobock.com
www.ottobock.ca

Sucursal Otto Bock Cuba
Centro de Negocios Miramar
Edificio Jerusalem Oficina 112
Calle 3ra e/ 78 y 80.
Playa La Habana, Cuba
T +53 720 430 69 · +53 720 430 81
hector.corcho@ottobock.com.br
www.ottobock.com.br

Otto Bock HealthCare Andina Ltda.
Calle 138 No 53-38 · Bogotá · Colombia
T +57 1 8619988 · F +57 1 8619977
info@ottobock.com.co · www.ottobock.com.co

Otto Bock de Mexico S.A. de C.V.
Prolongación Calle 18 No. 178-A
Col. San Pedro de los Pinos
C.P. 01180 México, D.F. · Mexico
T +52 55 5575 0290 · F +52 55 5575 0234
info@ottobock.com.mx · www.ottobock.com.mx

Otto Bock HealthCare LP
11501 Alterra Parkway Suite 600
Austin, TX 78758 · USA
T +1 800 328 4058 · F +1 800 962 2549
USCustomerService@ottobock.com
www.ottobockus.com

Asia/Pacific

Otto Bock Australia Pty. Ltd.
Suite 1.01, Century Corporate Centre
62 Norwest Boulevard
Baulkham Hills NSW 2153 · Australia
T +61 2 8818 2800 · F +61 2 8814 4500
healthcare@ottobock.com.au · www.ottobock.com.au

Beijing Otto Bock Orthopaedic Industries Co., Ltd.
B12E, Universal Business Park
10 Jiuxianqiao Road, Chao Yang District
Beijing, 100015, P.R. China
T +8610 8598 6880 · F +8610 8598 0040
news-service@ottobock.com.cn
www.ottobock.com.cn

Otto Bock Asia Pacific Ltd.
Unit 1004, 10/F, Greenfield Tower, Concordia Plaza
1 Science Museum Road, Tsim Sha Tsui
Kowloon, Hong Kong · China
T +852 2598 9772 · F +852 2598 7886
info@ottobock.com.hk · www.ottobock.com

Otto Bock HealthCare India Pvt. Ltd.
20th Floor, Express Towers
Nariman Point, Mumbai 400 021 · India
T +91 22 2274 5500 / 5501 / 5502
information@indiaottobock.com · www.ottobock.in

Otto Bock Japan K. K.
Yokogawa Building 8F, 4-4-44 Shibaura
Minato-ku, Tokyo, 108-0023 · Japan
T +81 3 3798-2111 · F +81 3 3798-2112
ottobock@ottobock.co.jp · www.ottobock.co.jp

Otto Bock Korea HealthCare Inc.
4F Agaworld Building · 1357-74, Seocho-dong
Seocho-ku, 137-070 Seoul · Korea
T +82 2 577-3831 · F +82 2 577-3828
info@ottobockkorea.com · www.ottobockkorea.com

Otto Bock South East Asia Co., Ltd.
1741 Paholyothin Road
Kwaeng Chatuchark · Khet Chatuchark
Bangkok 10900 · Thailand
T +66 2 930 3030 · F +66 2 930 3311
obsea@ottobock.co.th · www.ottobock.co.th

Other countries

Ottobock SE & Co. KGaA
Max-Näder-Straße 15 · 37115 Duderstadt · Germany
T +49 5527 848-1590 · F +49 5527 848-1676
reha-export@ottobock.de · www.ottobock.com

Ihr Fachhändler | Your specialist dealer



Printed by:

Otto Bock Mobility Solutions GmbH
Lindenstraße 13 · 07426 Königsee/Germany
www.ottobock.com

