LEVO
THE EXPERTS IN STANDING

Service Manual

LEVO Summit EL

CE

Please read these Instructions carefully before servicing a customer wheelchair. Failure to follow these instructions could result in injury to the customer and/or damage to the wheelchair.

If you have questions or difficulties, please contact LEVO AG.

LEVO AG	Anglikerstrasse 20	Tel +41 (0)56 618 44 11	office@levo.ch
Switzerland	CH-5610 Wohlen	Fax +41 (0)56 618 44 10	www.levo.ch

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1. Introduction

Aside from the regular charging of the battery and normal cleaning, the **LEVO Summit** is generally maintenance-free. To insure the safety and proper function of the wheelchair, it should be checked at least once a year by trained service personnel.

This service manual is to be used as a reference as the authorized **LEVO** dealer to carry out safety checks, service and repair on the **LEVO Summit EL**.

It is best to refer to both this service manual as well as the user manual.

1.1. Accident prevention & Safety

To help prevent accidents, please follow the instructions in both this and the user manual. Be aware there are possible dangers as tests and modifications are carried out. Take suitable preventive measures to insure the safety of yourself and others.

1.2. Adjustments – General Advice

Upon initial delivery, the safety check and adjustments should be made by the authorized **LEVO** dealer. Some of the more simple adjustments might possibly be made by the user depending on the capability of the user, family and friends. However, the following must be done only by the **LEVO** dealer. This manual will instruct you on how to proceed.

1.3. Repairs and fitting – General Advice

Service, fitting and repair works on the LEVO Summit should only be carried out by a LEVO dealer.

- Repairs: For advice on all repairs, please contact your importer or **LEVO** directly (contact information located on the front page of the User and Service Manuals).
- Major repairs: For all major repairs (e.g. bent or damaged frame) always replace complete components. Never try to repair damaged components.
- Replacement parts: Factory replacement components should be used in all repairs; these are available through your importer or **LEVO** directly. Parts list drawings can be viewed at www.levo.ch.

CAUTION:

- **Never attempt repair or maintenance work on any components of the standing mechanism in the seated position. Always stand the chair up! Not doing so presents a risk of accident!**
- **Always follow the instructions detailed in important sections of this service manual!**

1.4. Tools & Torque values

Following metric tools and torques are required to carry out maintenance work:

Screw size	Screw Type	Allen wrench	Max. Torque
M4	Cylinder head screw	3 mm	2.5 Nm
	Socket Set Screw	2 mm	
M5	Cylinder head screw	4 mm	5 Nm
	Oval-head screw	3 mm	
	Socket Set Screw	2.5 mm	
M6	Socket Head screw	5 mm	9 Nm
	Oval-head screw	4 mm	
	Socket Set Screw	3 mm	
M8	Socket Head screw	6 mm	21 Nm

Table 1: Torque

- Allen Wrench - Do not use imperial (US standard) Allen wrenches as they may damage screws
- Torque wrench 0 to 25 Nm
- Different standard tools.

Please note that the chair is delivered with a metric tool set.

1.5. Important Notes

- Lock-nuts which are removed should be replaced with new lock-nuts.
- It is preferred that thread locker (like blue LocTite) is utilized on screws/nuts.
- For replacement parts, use recommended components and spare parts supplied from **LEVO**.

- Always replace main components like frames, seat rails, armrests, backrests and legrest parts. They are **never** to be modified or repaired.
- Be sure to follow the safety advice for any repairs on gas springs, actuators and electronic parts.

2. Safety Checks

At least once a year, the following safety checks should be carried out by the authorized dealer. If any defect occurs, the user should immediately stop using the wheelchair until it is repaired, checked and all safety rules assured.

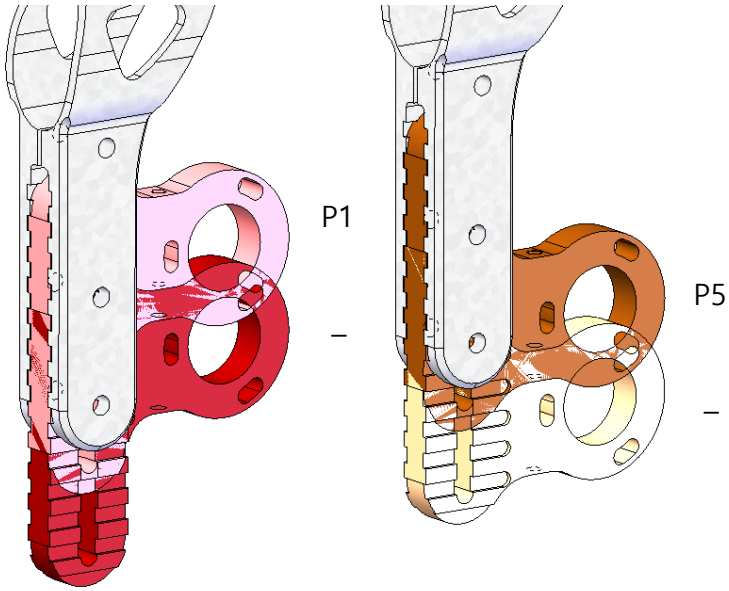
1. Fold down the backrest and return to the upright position. Confirm that the locking pins are seated and have correctly reset.
2. Inspect the frame and seating tubes for bends, cracks or breaks. Replace defective parts if in need of repair.
3. Check the seat and backrest upholstery for excessive wear. Replace if necessary.
4. Check the condition of straps, belts and catches and replace, if necessary.
5. Check that all nuts, screws, joints and plastic parts are secured and in proper operating condition.
6. Check that push handles are properly secured and the covers fit tightly.
7. Check brakes for proper holding efficiency.
8. Check that front casters and rear wheels rotate smoothly and that the axles are secure with no wobble. Check the tires for proper pressure and the thread for excessive wear.
9. Check all electrical cables for breaks or abrasions.
10. Check all electrical connections for signs of corrosion.
11. Check that the battery and battery connections are clean. Check the battery capacity and remind the customer to charge them every day. Especially if the batteries are old and in declining condition. If necessary, replace the battery before returning the wheelchair to the customer.
12. Check the standing mechanism and confirm it is operating safely.

3. Adjustments

3.1. Seat angle / Wheel axle adjustment

The seat angle can be varied by adjusting the wheel axle vertically on the frame. Table 2: Axle adapter position below shows the different front seat heights, the mount position (“P”) and the corresponding seat angle. In standard configuration the seat angle is -4° backward. By adjusting the height of the axle adapter it is possible to set the seat angle between -3° and -8° to the rear.

These seat angles are obtainable without replacing any parts. However, depending on the wheel size and the chosen seat height, it is possible that the wheel mount needs to be flipped upside down (P5-P8). P1 & P5 are the most upper positions in respective orientation, while P4 & P8 are the lowest positions.



Seat angle (at max wheelbase and at min wheelbase)								
Wheel size	22″	3.2°–4.2°	4.3°–5.7°	5.5°–7.3°	–	–	–	–	–
	24″	–	–	2.6°–3.4°	3.8°–5°	4.9°–6.5°	6.1°–8°	–	–
	26″	–	–	–	–	–	3.2°–4.2°	4.3°–5.7°	5.5°–7.3°
Seat height	SH48	P5	P4	P3	P2	P1			
	SH50	P7	P6	P5	P4	P3	P2	P1	
	SH52		P8	P7	P6	P5	P4	P3	P2
	SH54				P8	P7	P6	P5	P4

Table 2: Axle adapter position

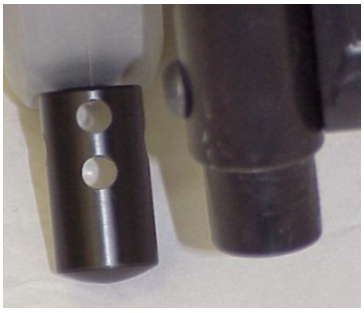
CAUTION:

- It is not recommended to have a seat angle less than 3° due to and increased risk of tipping forward in standing position.
- It is possible to increase the seat angle greater than 6.5°, but not in every configuration. This is accomplished by replacing the legrest with a different length, or longer support plugs.
- To adjust the wheel axle, begin by removing the rear wheels/quick release axles.

- Remove the socket head attaching screws and slide the axle mount out of the mounting bracket.
- Move the axle mount to the desired location making certain they are at the exact same positon on both sides of the frame.
- Replace and tighten the socket head attaching screws according to Table 1: Torque.

CAUTION:

- **To insure stability in the standing position, the leg-rest support plugs must be adjusted appropriately. These adjustments should only be performed by a LEVO dealer.**



3.2. Rear wheel adjustment / Centre of Gravity

The standard position of the rear wheel on the **LEVO Summit** depends on the seat depth and your chosen wheelbase.

By adjusting the rear wheel axle tube, either further forwards or further backwards, you are able to increase or decrease the loading of the front caster.

Moving the axle tube forward moves the centre of gravity back, and makes the front end lighter (more likely to tip backwards). Moving the axle tube back moves the centre of gravity forward, and makes the front end more stable (less likely to tip backwards).

To avoid any potential of accident where the user tips over backwards, we recommend installing anti-tippers.

- Loosen the three socket head screws to move the height adapter forward or backward. Make sure that the actuator does not touch the rear axle after re-setting the mounting bracket.
- Make sure that all three socket head screws are tighten according to Table 1: Torque.
- Make sure that the seating tubes always fit in the damper consistent above the mounting bracket.

CAUTION:

- **To ensure safety in the standing position, the leg-rest support plugs must be adjusted appropriately. These adjustments should only be performed by a LEVO dealer.**

3.3. Seat height / Front wheel diameter

The seat height is given by the front fork and the diameter of the front wheel. There are suitable front wheel forks for each seat height available. To ensure the right standing position, it is crucial to use the wheel position as follows:

- 6″: Top hole
- 5″: Middle hole
- 4″: Bottom hole

- To change the seat height, the front fork has to be replaced by a **LEVO** dealer.

3.4. Leg-rest support plug adjustment

In the fully standing position, the leg-rest support plugs must be in contact with the ground.

- Stand the chair up to the fully standing position.
- Remove the retaining screw from the legrest tube and support plug. Adjust the support plug into/out of the tube to the proper setting (note that it may be necessary to rotate the plug 90°) and replace the retaining screw.

3.5. Seat depth adjustment

The seat depth is adjustable to be set properly fit to the client's upper leg length. This is important for a straight, comfortable and correct standing position.

- Raise the chair up to a comfortable working position.
- Remove the seat upholstery.
- Remove the four screws using a 4 mm hex key inside the adjusting levers as well as the four screws at the inside of the seat supports.
- Adjust the seat to the required depth by telescoping the upper and lower seat rails in or out. Make sure to adjust both sides equally.
- After adjustment, replace and retighten all eight screws according to the Torque Table above.

CAUTION:

An incorrect seat depth can cause pain, pressure sores and/or poor posture and positioning. The seat depth adjustment should be done only by an authorised LEVO dealer!

3.6. Backrest angle adjustment

The following steps must be made simultaneously and on both sides of the wheelchair.

CAUTION: Return the seat to the down position so the seating tubes are resting on the main frame bumpers. It must not pull too hard into the bumpers to prevent damage **(marked purple)**.

1. Raise the seating system just slightly by pushing the control switch up. This will allow adjustment of the back assembly.

2. Loosen the backrest angle set screw on both sides (marked **red**).

3. Choose the desired backrest angle by turning the eccentric screw (inside of the nut marked **blue**). DO NOT TURN the nut, just the eccentric screw inside the nut! This must be done on both sides. On the backrest joint, there is regimentation showing the angle of the back. Make sure to set up the backrest identical on both sides. Then, tighten the screws (marked **red**).

4. Turn the set screws (marked **orange**) several times counter-clockwise to increase the distance between the seating tubes and the bumpers (marked **purple**).

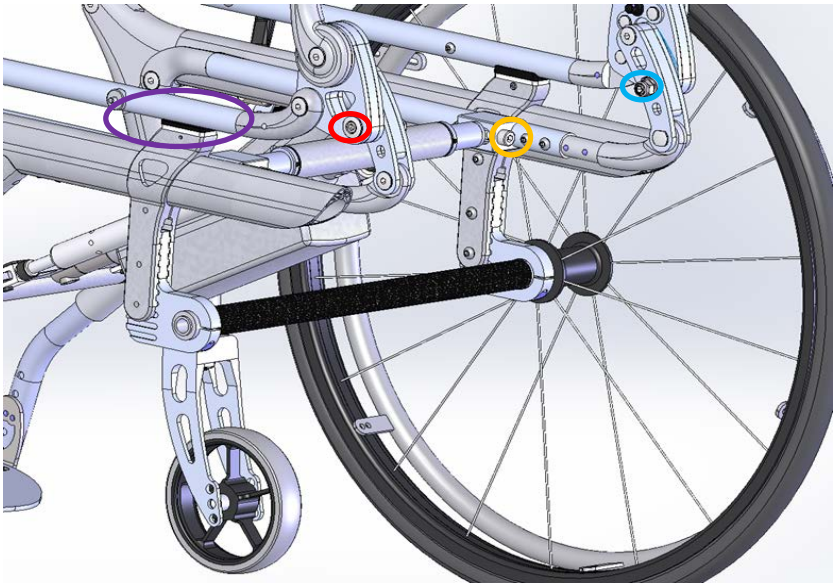
   ADVICE: This step is not necessary if the back rest angle was increased.

5. Lower the chair into seating by pressing the toggle switch down until the actuator stops automatically. It needs to stop before the seating tubes touch the bumper.

   CAUTION: Stop immediately by releasing the toggle switch, if the seating tube touches the bumper (marked **purple**) and repeat Point 4).

6. Bring down the seating tubes by turning the setscrews (marked **orange**) clockwise until both seating tubes have a distance to the bumpers from 5 to 10mm.

7. Check if both seating tubes have the same distance to the bumpers by repeated lifting and lowering of the mechanism.

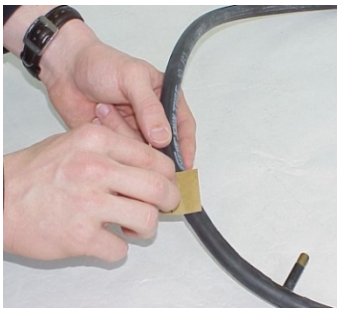
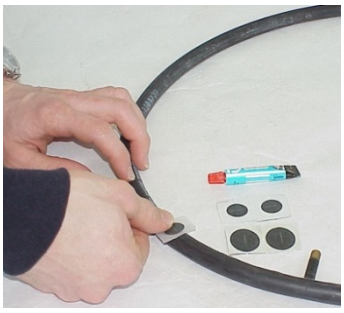


4. Replacement and Repair

4.1. Rear wheel tire/inner tube replacement


- Remove the wheel from the wheelchair and press the centrepiece in the valve to let out the air.
- Using a tire wedge, ease both sides of the tire over the wheel rim and pull the inner tube out of the tire.
- Replace the inner tube by forcing one side of the tire back over the wheel rim. Add a small amount of air back into the tire. Ease the valve through the valve port in the wheel rim. Snug the tube on the rim and in the tire with valve positioned straight through the valve port and pointing at the wheel center. Starting opposite the valve, force the other side of the tire back over the wheel rim being careful to not pinch the new tube.
- Make certain the inner tube is not caught between tire and rim before inflating to the manufacturer's recommended tire pressure.

4.2. Tire inner tube repair

- Remove inner tube and tire following the steps described above.

- Repair the hole using a puncture repair kit and follow the manufacturer's instructions like cleaning the area around the hole and roughen the tube surface before applying the vulcanized solution.
- Allow to dry, and then firmly attach the rubber patch. Again, first allow to dry, and then pump up the tube to check that the patch is airtight.
- Replace the inner tube. Once the whole tube is snug inside the tire, force the tire back over the wheel rim (starting on the side opposite the valve).
- Check least the inner tube is caught between tire and rim before pumping it up in line with the manufacturer's recommended tire pressure.

4.3. Gas Spring replacement

There are different gas spring strengths, which are matched to the body weight of the user.

CAUTION:

The gas springs are pressurized and are potentially dangerous. Always extend the actuator raising the chair into the fully standing position before disassembling. Never disassemble gas springs in seating position. The gas springs are compressed and under load and will extend rapidly if released causing possible harm to the technician.

- Raise the **LEVO Summit** to the standing position.
- Release all attaching clips.
- Remove the existing gas springs and replace with the new. Replace the attaching clips.
- Be sure that the spacers are between the clevis joints and the mounting plate

4.4. Actuator replacement

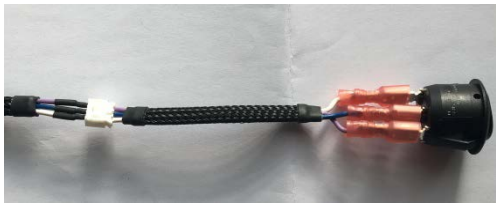
CAUTION:

The gas springs are pressurized and are potentially dangerous. Always extend the actuator raising the chair into the fully standing position before disassembling. Never disassemble gas springs in seating position. The gas springs are compressed and under load and will extend rapidly if released causing possible harm to the technician.

- Raise the **LEVO Summit** to the standing position.
- Remove the clip from the bolts at the front and rear connectors of the actuator.
  (It may be necessary to pull the seat down slightly and release the gas springs to decrease the load on the bolts.)
- Retract the disconnected actuator slowly until it can be removed completely.
- Disconnect the actuator plug and the control cable from the control box and remove the box from the old actuator to mount it on the new one.
- Mount the rear end of the new actuator first. Drive the seat down untill the shaft of the actuator aligns with the mounting plate. Assemble in reverse order.

4.5. Control Switch replacement

- Unplug the control cable at the control box
- Loosen the screw inside the front end of the armrest underneath the padding.
- Slightly pull out the control switch toward the front.



- Disconnect the switch at the connector and replace the cable harness with a new one. The sleeve can be reused.
- Assemble in reverse order.

4.6. Control box replacement

- Disconnect the actuator plug and the control cable from the control box.
- Unscrew the 4 socket head screws using a 3 mm hex key (tighten with max. 1.2 Nm).
- Take off the control box.
- Install the new control box in reverse order. (Tighten the screws with 1.2 Nm and use thread locker.)

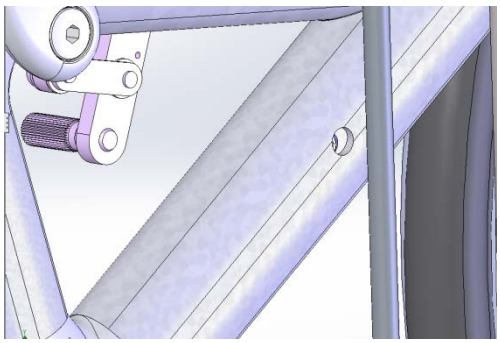
CAUTION:

Only the battery and the intact control box can be replaced. Removing the circuit board or altering its components is not allowed and will void the warranty. In case of an electronic defect, the entire control box must be replaced!

4.7. Battery – Circuit Board Housing – Control Box replacement

- Disconnect the actuator plug and the control cable from the control box.
- Unscrew the 4 socket head screws of the support using a 3 mm hex key and take off the control box.
- Unscrew the 4 remaining screws and turn the battery carefully to the side.
- Disconnect the battery plug from the circuit board.
- Confirm that the sealing of the new battery is completely intact.
- Install the battery in reverse order. (Tighten the screws with 1.2 Nm and use thread locker.)

4.8. Leg-rest tube replacement



- Remove the footrest.
- Raise the **Summit** to the standing position until access is gained to the retaining screw holes.
- Loosen and remove the retaining screws on both legrest supports using a 4 mm hex key. Remove the legrest tubes from the frame.
- Replace the legrest tubes and re-assemble in reverse order.

CAUTION:

To prevent possible damage, be sure that the retaining screws are completely reinserted into the frame.

5. Final Check

After carrying out repairs to the wheelchair, thoroughly check that all functions are operating correctly before returning the wheelchair to your customer. A wheelchair should only be returned to customer after all defects have been rectified.

6. Cleaning and Disinfection

Before the wheelchair is returned to the client, make sure it is clean and dry.

- Cleaning can be accomplished with a moist cloth, then wiping dry.
- Mild detergents and warm water can be used for heavier debris.
- Never apply furniture polish, pure spirits or solvents for cleaning as this can damage the surface finishes.
- For disinfecting the surface, we recommend an alcohol-based spray. After a thorough pre-cleaning, smaller areas can be disinfected as necessary. Please consult your dealer if you have further questions.

7. Version Management

Version Nr.	Date	Description	Release
1.0	03-03-2020	Document separated for service agents only	JC