# *Permolock Ch1*

## *Owner´s Manual*

permobil

CE

UK

# Where to find Permobil

Permobil BV is responsible for the servicing and sales carried out by its importers and local dealers throughout large parts of Europe. So contact us if you have any questions regarding servicing or sales in the area where you live.

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### Guarantee

All wheelchairs are supplied with a two-year product guarantee.

**NB!** Only carry out servicing and maintenance tasks which the user manual indicates are suitable for carrying out by the user. All other servicing tasks must be carried out by persons with the necessary knowledge for achieving a professional result.

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# *Permolock Ch1*

## *User manual*

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# Contents

# General introduction

## General

In order for you to get the greatest possible benefit from your Permolock, we ask that you read through this manual carefully, and note the safety instructions in particular. Keep the manual with your Permolock, for example in the glove compartment of your vehicle.

The first thing to be done is to install the Permolock – see the installation instructions on page 14.

The Permolock is available in two versions, a manual version and a version that is electrically operated. The manual version is operated using a lever, while its electric counterpart is operated using a push button placed where the user desires.

## Function

The Permolock is first and foremost designed to secure the user's Chairman, Entra and Max90 electric wheelchair while in transit, whether the user is the driver or a passenger.

There is also a seat frame for the Permolock that allows an ordinary car seat to be secured using the lock.

## Specifications

All information and specifications provided in this manual were current at the time of delivery of this product. Since we are continually improving and developing our products at Permobil Autotech, we reserve the right to make changes without prior notice.

# Safety instructions

## General

The Permolock Ch1 is a locking device for securing the Chairman, Entra and Max90 electric wheelchair during transit in motor vehicles. The Permolock Ch1 is crash-tested using crash test dummies and loaded with 20 G. See the test report on pages 30-34.

Incorrect usage may risk injury to the user or passenger, or damage to the chair, the Permolock and the vehicle.

Any inappropriate change to the Permolock may involve an increased risk of accident. Follow the recommendations in the Operation section carefully to avoid the risk of accidents while using the device.

**NB!** *All changes and interference to the function and fitting of the Permolock in the vehicle must be undertaken by authorised personnel. Always contact your dealer for this service.*

### Check that your wheelchair is compatible with the Permolock

Before you use your wheelchair with the Permolock, you must ensure that it is adapted for this function. Contact your dealer for more information.

### Check before driving with the manual Permolock

Ensure that the safety catches have fastened and are in the locking position.

### Check before driving with the electric Permolock

Ensure that you have received the ready signal from the Permolock before you start driving.

# Design and function

## General

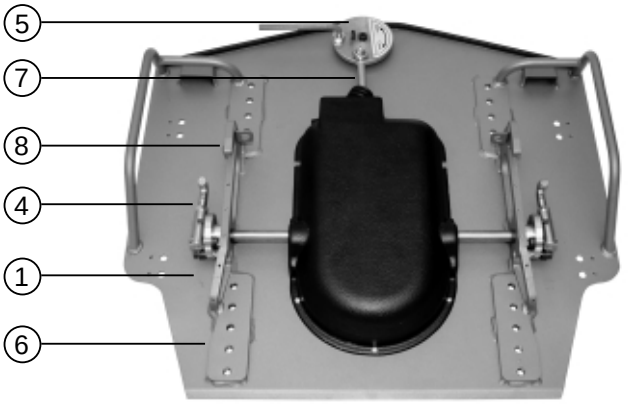



Fig.1 Manual Permolock

**1.** Baseplate
**2.** Limit switch
**3.** Actuator, electric control
**4.** Safety catches
**5.** Manual locking lever
**6.** Anchor points (4)
**7.** Link rod
**8.** Steering pivots

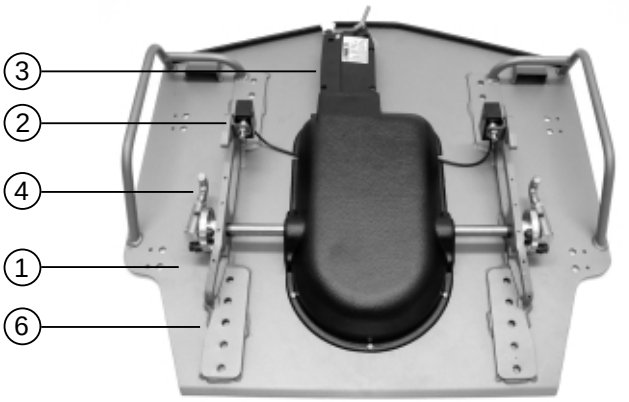



Fig.2 Electric Permolock

# Operation

**General**
The Permolock Ch1 is built to ensure that, in the event of a collision or some other sudden vehicle movement, the wheelchair will remain secure and thus avoid personal injury or material damage.

The Permolock may only be used together with Permobil's Chairman, Entra and Max90 electric wheelchair and the seat frame that is available as an accessory.

Your wheelchair may require some adaptation to be compatible with the Permolock. After installation, a test lock must always be undertaken by the fitter of the chair lock.

**Manual Permolock**
Drive the chair into the Permolock so that the steering pivots go into the drop arms of the wheelchair.

Then turn the lock handle 180° clockwise so that the safety catches fasten and pull the chair downward/forward.

***NB!*** *Ensure that the lock handle is turned 180° and that the link rod rests against the stop pin.*

Turn the lock handle 180° anti-clockwise to release the chair.

***NB!*** *Ensure you always turn the handle to the final position.*

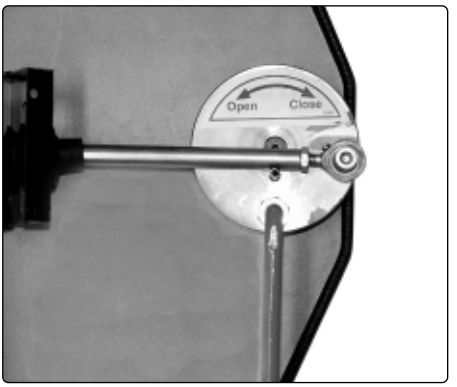



Figure 3. Manual lock handle in locked position.

# Electric Permolock

### Anchoring the wheelchair

**1.** Run the wheelchair into the Permolock so that the control spindles on the lock connect with the turning arms on the wheelchair and it stops mechanically.

When the wheelchair is correctly placed in the lock, both limit switches will be activated, so that it is possible to anchor the wheelchair.

**2.** To anchor the wheelchair, ***press*** and ***instantly release*** the manoeuvring button – which is installed in the vehicle together with the lock. If both limit switches are activated, locking will begin (the locking motor must run audibly).

If both limit switches are not activated, the lock will give a slowly pulsing alarm signal ( — — — ) and a red flashing light will show in the manoeuvring button.

**3.** When the locking motor reaches the locked position, this will be indicated by a rapidly pulsing sound signal ( - - - - - - ). The green indicator will show on the manoeuvring button, and it is now safe to drive off.

### Error and warning signals

- If the ignition is turned on ***with the lock open*** a slowly pulsing sound alarm will be given, and a constant red indicator will show on the manoeuvring button.

  **NB!** Make it a habit to run the chair into the Permolock and lock it before turning on the vehicle ignition.

- If contact with the limit switches is broken during the locking process, the lock will reverse and give a constant sound signal while a constant red indicator light shows on the manoeuvring button.

- If the lock meets an obstruction, the lock will reverse and give a slowly pulsing sound signal while a flashing red indicator light shows on the manoeuvring button.

- If locking moment fails during locking, the traversing motor will register this (e.g. if hooks are fractured). The locking motor will then reverse and open the lock. A constant sound signal will be given, while a constant red indicator light will show on the manoeuvring button.

- If the hooks of the lock engage with unsuitable objects during locking, maximum current will be generated in the locking motor. The locking process will be interrupted, and the lock will give a constant sound signal while a flashing orange indicator will show on the manoeuvring button.

  This signal indicates that a there is a serious defect in the lock. It can only be reset by holding the manoeuvring button pressed down for 30 seconds with the ignition turned on – or by releasing the white switch at the end of the locking motor for a short while so that the supply to the lock is interrupted.

  Open the lock immediately using the manual emergency release (see section below) and contact the service workshop to have the fault repaired.

**Unlocking the wheelchair**

1. Press the manoeuvring button down for at least 1 second.
2. The lock will start the unlocking phase.
3. When the locking motor reaches the unlocked position, it registers with a rapidly pulsing sound signal ( - - - - - - ). The red indicator will show on the manoeuvring button.

   If the lock is induced to open while the ignition is on, the lock will give a slowly pulsing warning signal ( — — — ).

**Time surveillance**

The locking or unlocking processes must never be active for more than 13 seconds. After this interval the lock will give a constant sound alarm and a constant orange indicator will show on the manoeuvring button. The next time the button is pressed, the lock will be activated.

**NB!** *Always check which indicator is showing in the manoeuvring button, because the sound signal will stop after several seconds.*

**IMPORTANT!** *If necessary, it is possible to "force" the unlocking process to start by holding down the manoeuvring button for at least 3 seconds. The safety hooks will then return to the starting position even though the ignition is on, and regardless of other failure indications (EER - Electric Emergency Release).*

**Manual emergency release**

If the power supply to the electric lock is cut or the vehicle has crashed, it is possible to unlock the device manually as follows:

- Unscrew the knob that fastens the actuator (Figure 4).
- Lift the actuator to release it from the bracket.
- Insert the actuator under the wheelchair.

**WARNING !**

**Wheelchair user will need assistance to operate the Manual Emergency Release.**

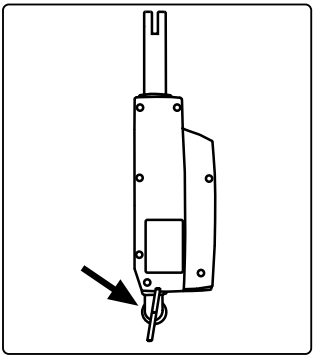


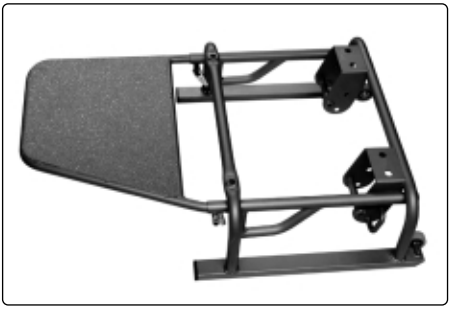
*Figure 4. Manual emergency release*

# Permolock Ch1 accessories

## Seat frame

*Item no: 309530*

This facilitates the use of an ordinary car set in the Permolock.

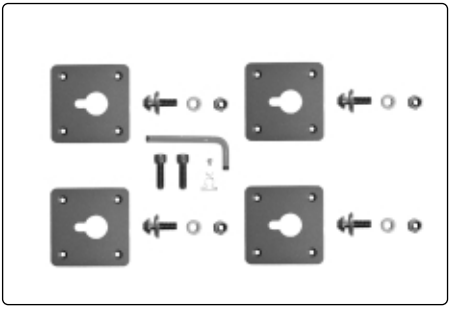


Seat frame

## Quick fastening set

*Item no: 309566*

This set is used to anchor the Permolock in the vehicle and facilitate the simple moving of the lock between differents positions in the vehicle.

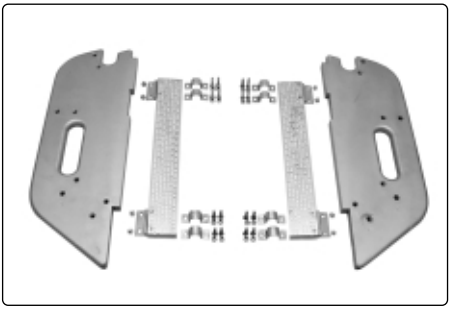


Quick fastening set

## Supplementary set for the Entra

*Item no: 311080*

This supplementary set means you can use the Entra electric wheelchair with the Permolock Ch1.



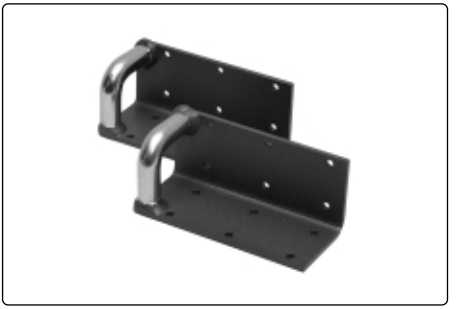
Supplementary set for the Entra

## Hook brackets

*Item no: 304401*

Required in order to be able to anchor the wheelchair in the Permolock.

**NB!** The hook brackets can in certain cases come factory-fitted.



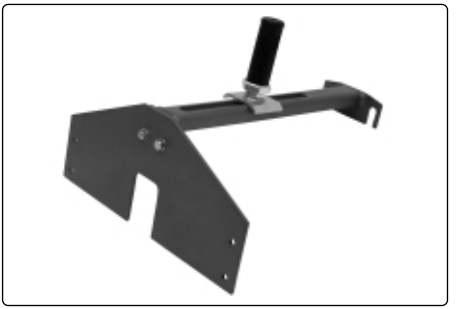
Hook brackets

## Seat support

*Item no: 312405*

Stabilizes the seat of the wheelchair when travelling in the Permolock and should always be fitted to electric wheelchairs that use the Permolock.

**NB!** The seat support can in certain cases come factory-fitted.

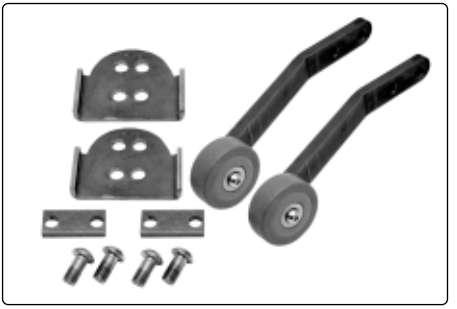


Seat support

## Support wheel set

*Item no: 312390*

Replaces the regular support wheels of the wheelchair, since these are not compatible with the Permolock.



*Support wheel set*

# Installation

## Fitting the Permolock

Read these instructions *before* starting the installation.

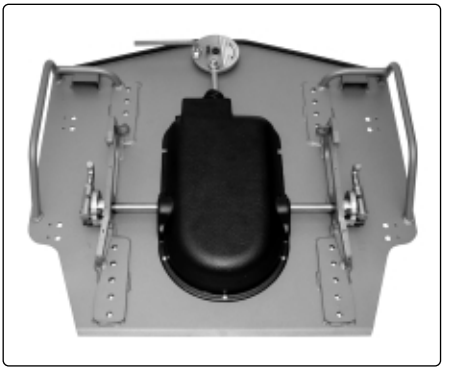
**1.**
Position the Permolock in the required position in the vehicle so the chair is facing the direction of travel.

**2.**
Ensure that the Permolock is lying flat against the floor of the vehicle. If this is not the case, spacers must be used between the floor of the vehicle and the anchor points.

**3.**
Ensure that no cables, fuel lines, brake cables etc. are being squeezed or are obstructing the bolt attachment.

**4.**
Secure the Permolock to the floor using our quick fastening set (accessories) or bolt it down so it is securely fastened.

Anchoring to the floor must be done using all four anchor points (see page 8, pos. 6).



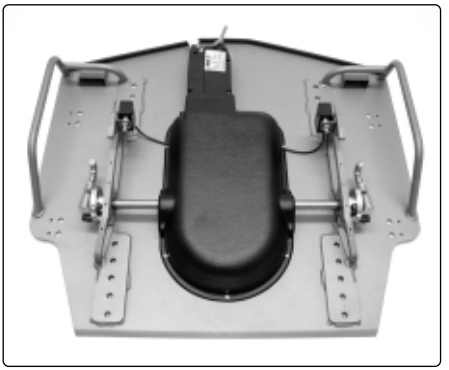
Manuel operation

**NB!** *Anchoring of the chair lock to the floor must be undertaken in a safe way for the type of vehicle in question and according to the regulations of the country concerned.*

**5.**
Mark an appropriate position and drill a 12 mm hole for the lock button.

Connect the accompanying wiring as follows:

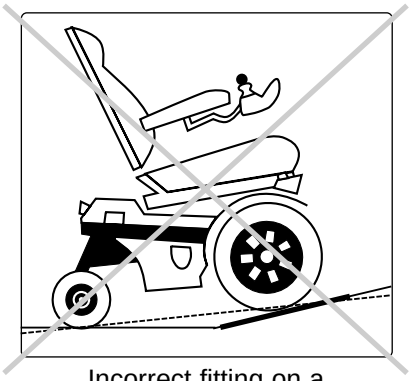
**Red** = Battery (positive)
**Orange** = Ignition (positive)
**Brown** = Earth (negative)



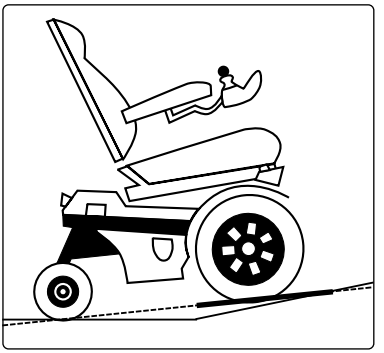
Electric operation

**IMPORTANT!**

In order that the safety catches fasten in the correct position for locking, it is important that the chair lock is fitted in a straight line in relation to the wheels of the wheelchair. When fitting the chair lock on a sloping surface, the chair lock shall correspondingly spaced using shims so that the correct axis is achieved. See the example below.



Incorrect fitting on a sloping surface



Correct fitting on a sloping surface

Surface Axis Chair lock

**NB!** *After fitting always check that the chair lock is not askew and that the lock is functioning correctly.*

*A test lock shall be undertaken with the user sitting in the wheelchair.*

*Ensure before test locking that the tyres of the wheelchair have the correct pressure: 200 kPa (2 bar). 29 psi (US).*

# Fitting the Permolock quick fastening set

## List of parts comprising the set - see Figure 1.

**1.** 4 x Keyhole bolt
**2.** 4 x Key guard
**3.** 2 x MC6S 10x35 12.9 quality screw
**4.** 4 x M10 fzb lock nut
**5.** 4 x 10.5x20x2 fzb BRB washer
**6.** 1 x 8 mm socket screw key
**7.** 1 x Tool clamp

Read these instructions before you start the installation.

**1.** Mark where the key guards are to be positioned. The guards must be fitted with the narrowed hole ends facing the direction of travel.

**2.** Ensure that the centre-to-centre distance between the keyholes is L = 350 mm and W = 368 mm, and mark the hole pattern for the guards on the floor of the vehicle. (Figure 2).

**3.** Drill 6.5 mm through holes in the floor of the vehicle, using the key guard as a drilling guide.

**4.** Mark the centre of the keyhole's large radius and drill a 60 mm hole.

**5.** Screw down the key guards using the MF6S M6 10.9 quality screw with appropriate length for the thickness of the floor. The screws must bore through and have a body washer and nut on the underside.

**6.** Attach the self-adhesive tool clamp at position A (Fig. 3).

**7.** Screw in the keyhole bolts in the hole pattern that suits the user best of the four available from the holes drilled. The standard set-up uses hole 2 (Figure 3). Use washer 10.5x20x2 and nut M10.

**8.** Screw the MC6S 10x35 12.9 screws in the available holes directly behind the posterior keyhole bolts.

**9.** Insert the chair lock and tighten the two screws that were fitted in step 8.

**NB!** *Anchoring of the chair lock to the floor must be undertaken in a safe way for the type of vehicle in question and according to the regulations of the country concerned.*

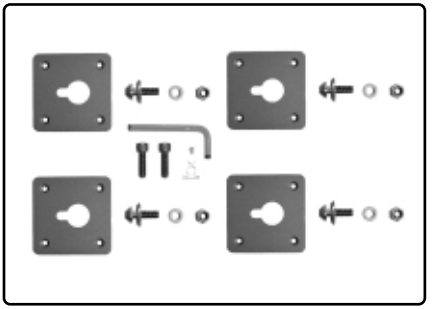


Fig. 1. Included parts

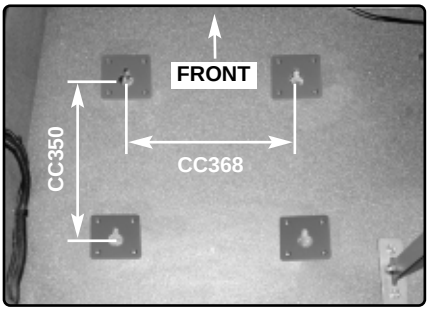



Fig. 2.

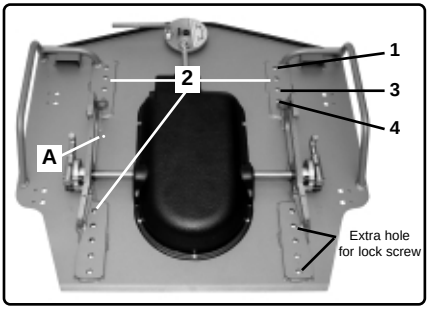



Fig. 3.

## Notched front cover, Chairman/Max 90

In order for the wheelchair to be able to drive into the chair lock, a notch shall be made on both sides of the underside of the front cover, see Fig.1.

In case of the Entra model, no notch needs to be made.

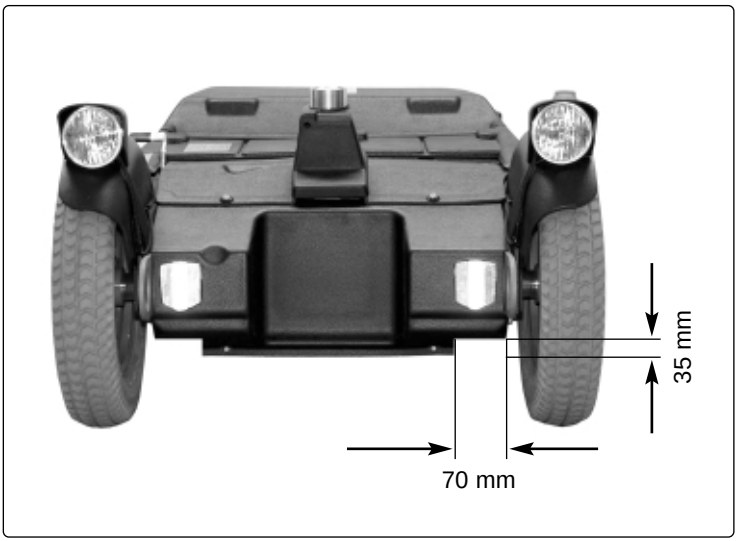



*Fig. 1. Cut a notch on each side of the front cover*

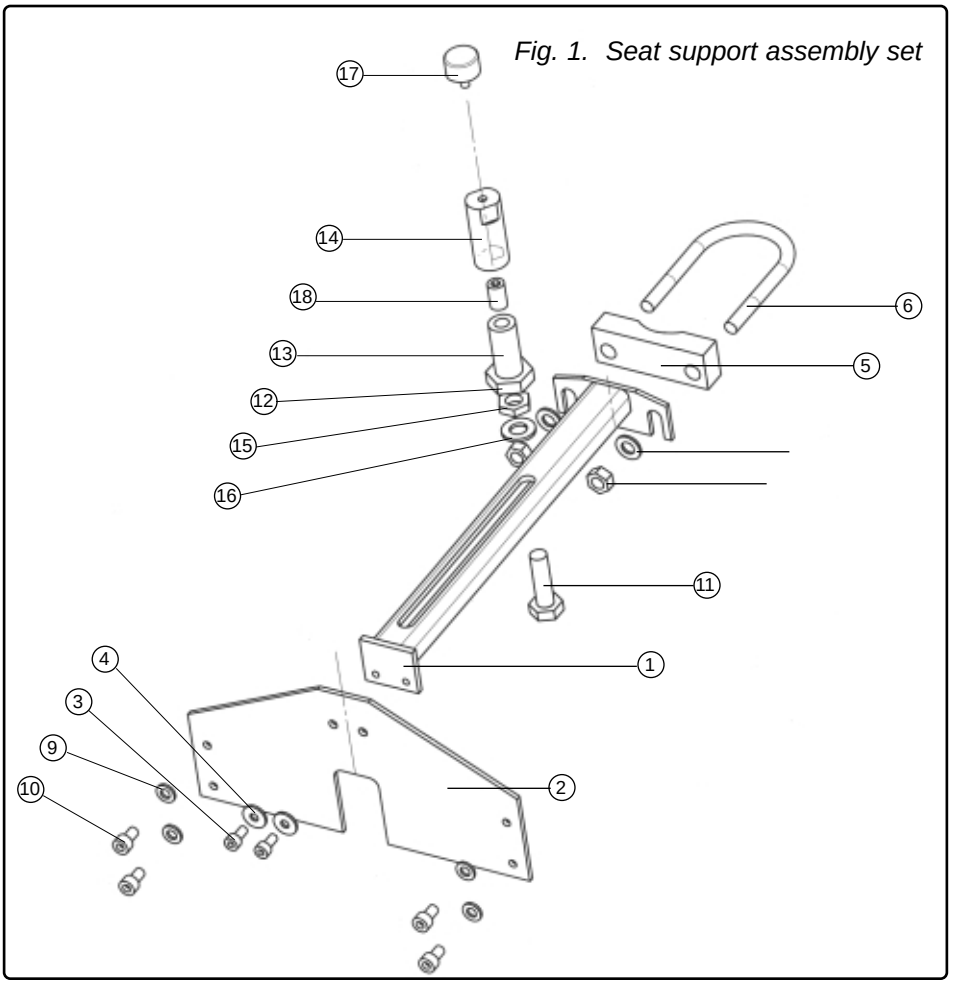
# Fitting of chairman seat support set

## List of set parts, see Fig. 1.

**1.** 1x Seat support rail
**2.** 1x Front fixing plate
**3.** 2x MC6S 5x10 fzb screw
**4.** 2x BRB 5,3x15x1,6 fzb washer
**5.** 1x Bracket
**6.** 1x M8 bracket
**7.** 2x BRB 8,4x16x1,6 fzb washer
**8.** 2x M6M 8 fzb nut
**9.** 4x BRB 6,4x12x1,6 fzb washer
**10.** 4x MC6S 6x10 fzb screw
**11.** 1x M6S 10x35 fzb screw
**12.** 1x ML6M 16fzb nut
**13.** 1x Socket
**14.** 1x Socket
**15.** 1x ML6M 10 fzb nut
**16.** 1x BRB 10,5x 20x2 fzb washer
**17.** 1x Impact bumper
**18.** 1x SK6SS 10x16 screw

Read these instructions *before* you start the installation.

*Fig. 1. Seat support assembly set*



**1.** Remove the chassis cover, see the ser vice manual of the chassis for detailed instructions.

**2.** On older models there is a cable strip fitted with a cable tie, remove this, see Fig. 2.

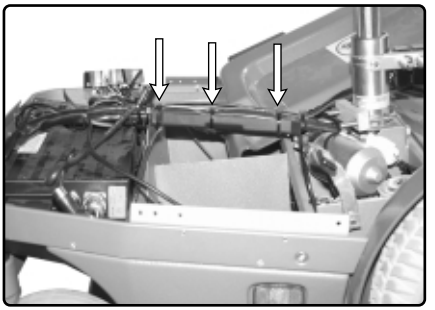


*Fig. 2. On older models there is a cable strip fitted with a cable tie*

**3.** Disassemble the electronics that are fitted with two screws at the back of the underside of the chassis, see Fig. 3.

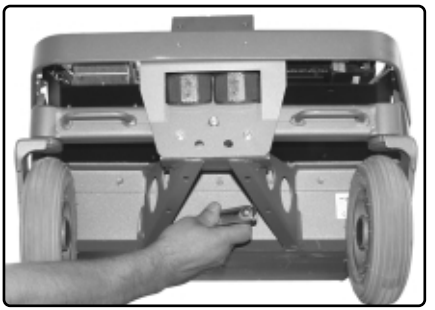


*Fig. 3. The electronics are fitted with two screws underneath*

**4.** Fit the fixing plate on the rear end of the battery drawer, see Fig. 4.

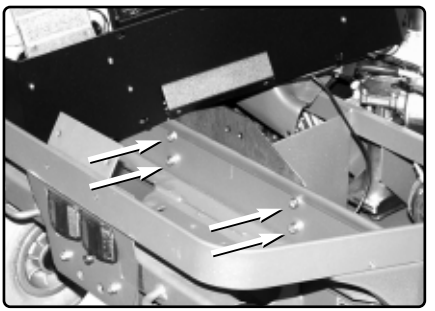


*Fig. 4. The plate is held in place with four screws*

**5.** The strut of the seat support is attached with two screws to the fixing plate, as well as with a bracket round the seat lift, the bracket is fitted so that the holes are closest to the bottom edge, see Figs. 1, 5 and 6.

**6.** Refit the electronics and fasten with the two screws underneath, see Fig. 3, previous page.

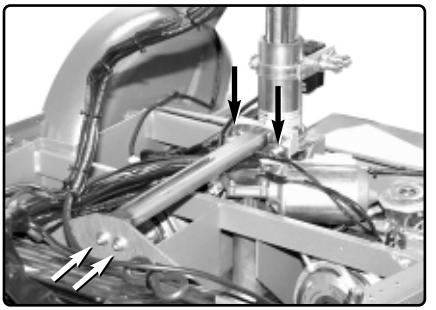


*Fig. 5. The strut of the seat support is fastened with four screws*

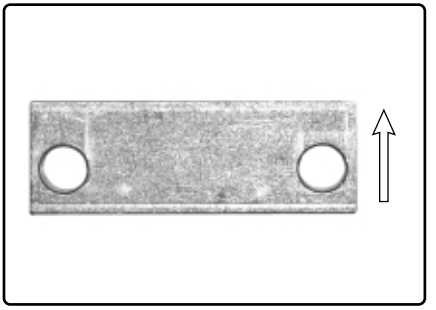


*Fig. 6. The bracket is fitted with the holes closest to the bottom edge*

**7.** Fit the seat support on the rail. The seat support is fitted so it provides support for the rear of the seat frame, see Fig. 7.

**NB!** Depending on the seat model and the adjustments of the seat, the position ont he rail of the seat support can vary.

**8.** Use an appropriate pen to mark out the position of the seat support on the rail.

**9.** Remove the seat support from the rail.

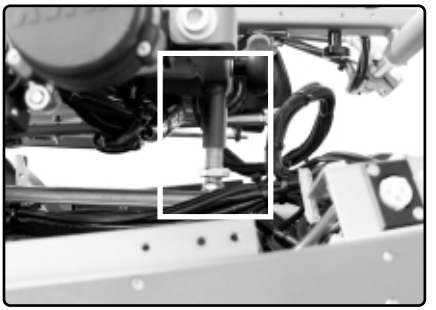


*Fig. 7. The seat support is fitted so it provides support for the rear of the seat frame*

**10.** Fit the tapered screw in the space for the seat support, use the nut and washer of the seat support, see Fig. 8.

**NB!** Be precise in the positioning of the screw, it must be in exactly the same spot as the seat support.

**11.** Refit the chassis cover that covers the screw.

**12.** Trough a light blow of the hammer on the upper side of the cover, mark the postion of the screw on the inside of the cover.

**13.** Remove the cover.

**14.** Drill a hole in the cover on the mark that is indicated on the inside. Use a step drill bit at ø30 mm.

**15.** Remove the tapered screw.

**16.** Fit the seat support, start by tightening the fixing screw with the nut and washer, and be precise in the positioning of the screw.

**17.** Adjust the seat support height so that it exactly makes contact with the seat frame when the seat is in its lowest position. Adjustments can be made both between the screw and the threaded socket, as well as between the socket and the seat support. Secure the height adjustment by tightening the lock screw of the socket and the lock nut, see Fig. 9-10.

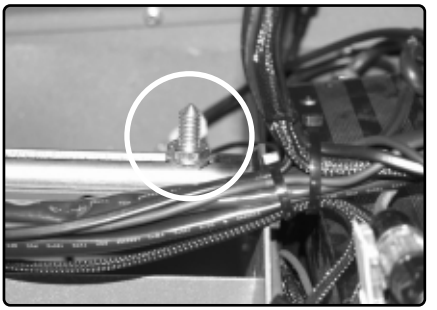


*Fig. 8. A tapered screw is fitted to mark the position of the hole on the cover*

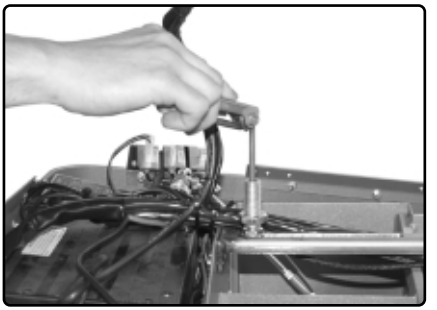


*Fig. 9.The height adjustment of the threaded socket is secured using the lock screw*

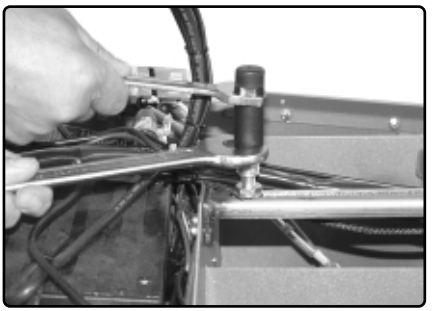


*Fig.10. The height of the seat support is secured using the lock nut*

# Fitting the hook brackets on the Chairman and Entra

## List of set parts

**1.** 2x Hook brackets
**2.** 24 x Steel pop rivets

Read these instructions *before* you start the installation.

## Fitting on the Chairman

**1.** Chock under the chassis and remove the front wheels (for detailed instructions, refer to the chassis service manual).

**2.** Remove the shields, see Fig. 1.

**3.** Remove the batteries (for detailed instructions, refer to the chassis service manual).

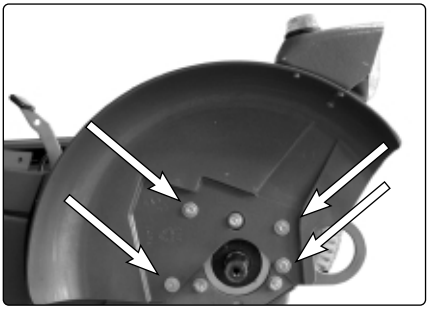


*Fig.1. The shield is held in place with four screws*

**4.** Measure and make a mark 30 mm from the corner, see Fig. 2.

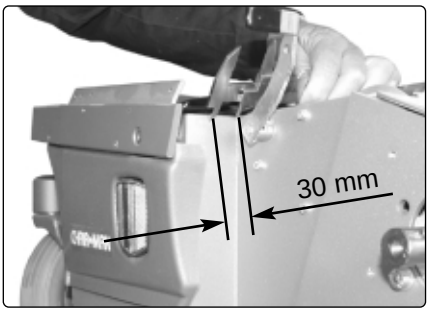



*Fig. 2. Measure and mark 30 mm from the corner*

**5.** Measure based on the mark and position the hook bracket at the right height, see Fig. 3.

**6.** Drill holes (ø4 mm) in the chassis for the pop rivets, drill according to the hole pattern of the hook bracket.

**7.** Fit the hook bracket using the accompanying steel pop rivets.

**8.** Refit the batteries, shiels and the wheels.

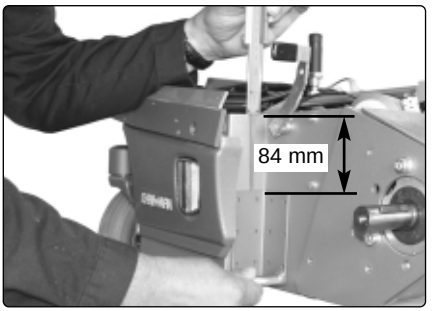



*Fig. 3. Measure based on the mark and position the hook bracket at the right height*

## Fitting on the Entra

1. Chock under the chassis and remove the front wheels (for detailed instructions, refer to the chassis service manual).
2. Remove the chassis cover (for detailed instructions, refer to the chassis service manual).
3. Remove the batteries (for detailed instructions, refer to the chassis service manual).
4. Remove the shroud wich is held in place with three screws, see Fig. 4.

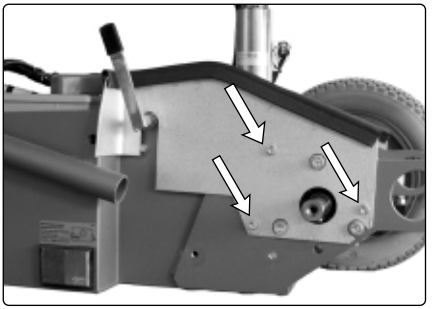


*Bild 4. The shroud is held in place with three screws*

5. Measure and make a mark 30 mm from the corner, see Fig. 5.

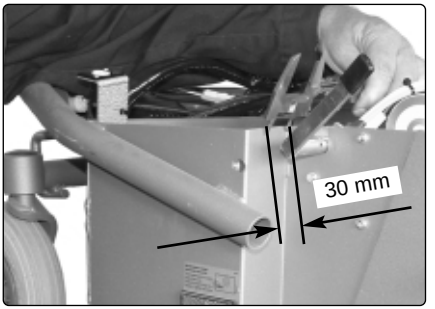



*Fig. 5. Measure and mark 30 mm from the corner*

6. Measure based on the mark and position the hook bracket at the right height, see Fig. 6.
7. Drill holes (ø4 mm) in the chassis for the pop rivets, drill according to the hole pattern of the hook bracket.
8. Fit the hook bracket using the accompanying steel pop rivets..
9. Refit the batteries, chassis and the wheels.

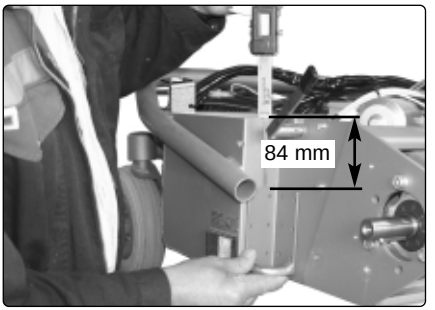



*Fig. 6. Measure based on the mark and position the hook bracket at the right height*

# Fitting of Entra supplementary set

### List of set parts, see Fig. 1.

| | | | |
|---|---|---|---|
| **1.** 2x | Inserts | **4.** 16x | MF65 4x20 fzb screw |
| **2.** 2x | Side plates | **5.** 16x | M4 fzb lock nut |
| **3.** 8x | MRT-TT M4x6H fzb screw | **6.** 8x | Bracket |

Read these instructions *before* you start the installation.

## Fitting

**1.** Position the inserts on both sides as per Fig.2 and tighten using 8 MRT-TT M4x6H fzb screws.

**2.** Attach the side plates, see Fig. 3, using the accompanying 16 MF65 4x20 fzb screws, 16 nuts and 8 brackets.

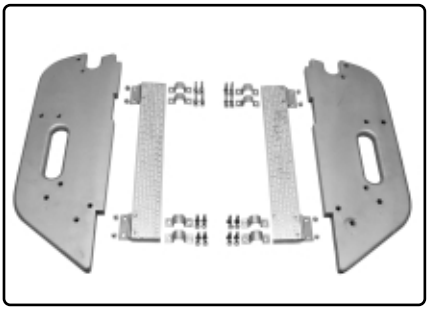


*Fig. 1. Parts used*

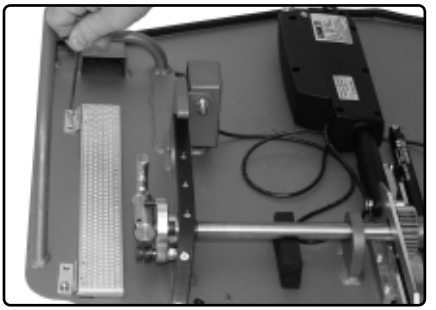


*Fig. 2. Fastening of inserts*

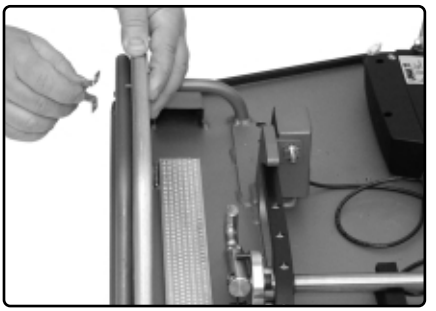


*Fig. 3. Fastening of side plates*

# Fitting the support wheel set

## List of set parts

**1.** 1x Support wheels
**2.** 1x Guide plate
**3.** 1x K6S M10x20 fzb screw
**4.** 1x Spacer plate

Read these instructions *before* you start the installation.

## Fitting

**1.** Put the two screws in the guide plate, use the front bottom and rear top holes.

**2.** Assemble the guide plate and the spacer plate as per Fig. 1.

**3.** Insert the arm of the support wheel on the outside of the fastening loop of the chassis, see Fig. 1. The space between the shield and the fastening loop is narrow and it may therefore be a little difficult to get the arm of the support wheel in place.

**4.** Fit the guide plate with the spacer plate on the inside of the fastening loop, and screw together with the arm of the support wheel, see Figs. 1 and 2.

**5.** Following assembly the support wheel shall be angled downward and outward, see Fig. 3.

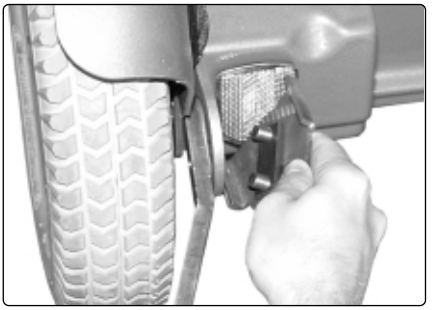


*Fig. 1. Guide plate and spacer plate*

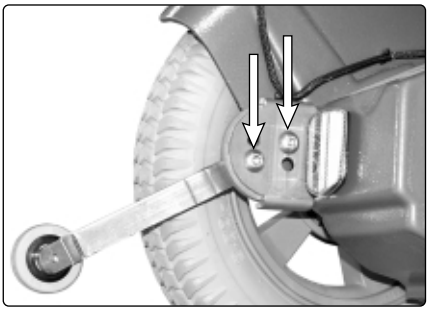


*Fig. 2. Fastening of support wheel*

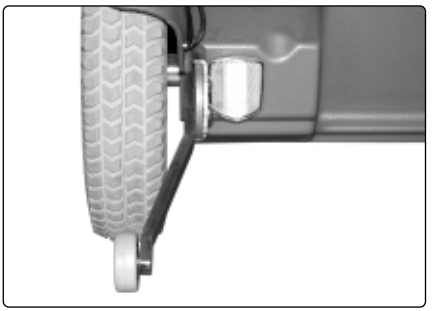


*Fig. 3. Angling of support wheel.*

# Reinstallation or replacement of electric controls

1. Position the forks of the actuator piston on either side of the left side of the gear rack, Fig. 1. Insert the peg and fit the lock ring.
2. Insert the front actuator bracket and fasten it down firmly in the small peg on the front edge of the plate, see Fig. 2.
3. Fasten the limit switches and adjust them so that they are only activated when the chair has been driven in correctly.
4. Plug the cable into the socket on the front edge of the actuator and firmly attach the self-adhesive cable holders.
5. Position the cover as per Fig. 3. and tighten the six screws.
6. Fit the lock button, see p. 14.

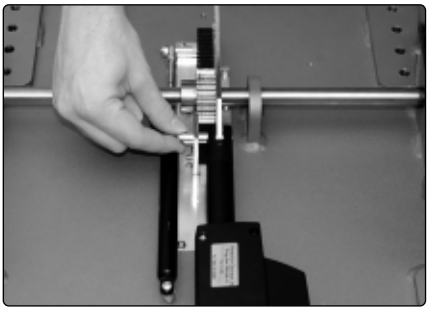


*Fig. 1. Actuator attachment*

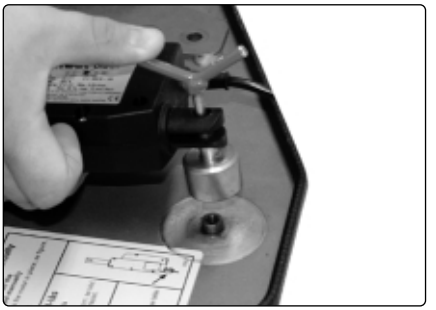


*Fig. 2. Frontal attachment of the actuator*

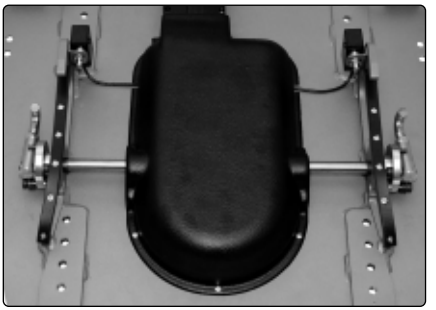


*Fig. 3. Fitting of the cover for electric locking.*

# Reinstallation or replacement of manual controls

1. Position the plate frame for the gaiter in the opening in the cover. Mark the holes, two upwards and one to the left. Drill upwards with a 5 mm drill bit.
2. Position the link rod between the sides of the gear rack and insert the peg and fit the lock ring, Fig. 1.
3. Position the rotating disc above the small peg on the front edge of the plate frame. Screw in the fitting bolt, see Fig. 2.
4. Push the gaiter into the plate frame. Position the cover as per Fig. 3. Adjust the gaiter and plate frame for the opening of the cover. Tighten the three screws that hold the gaiter in place. Tighten the remaining six screws.

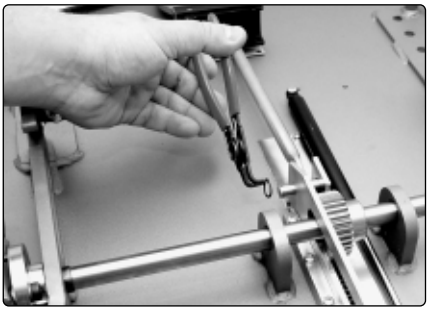


*Fig. 1. Attachment of link rod*

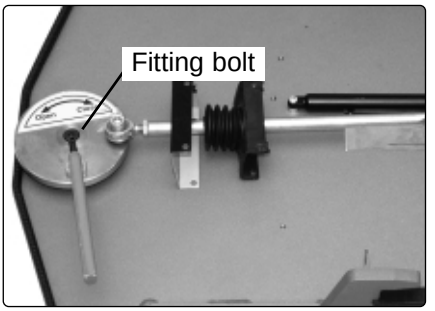



*Fig. 2. Manual locking*

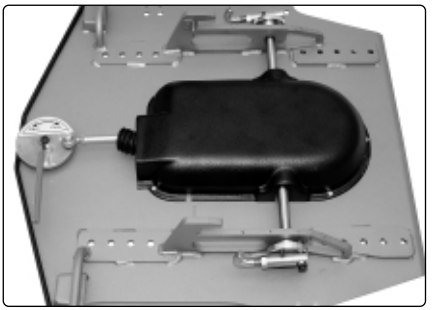
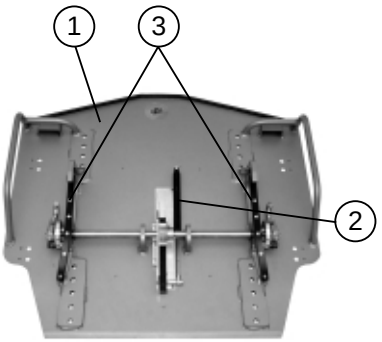


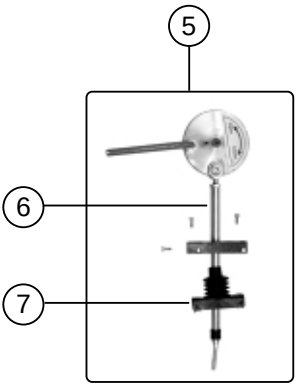
*Fig. 3. Cover fitting for manual locking*

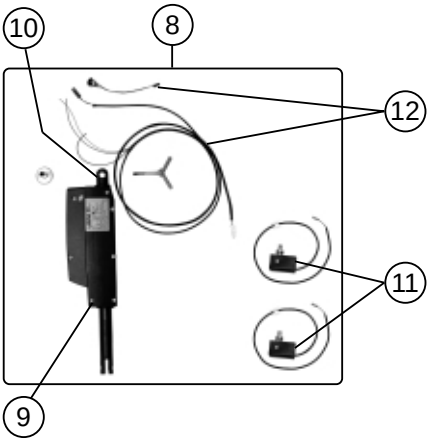
# Spare parts for Permolock Ch1

| POS | NO. | ITEM NO. | DESCRIPTION |
|---|---|---|---|
| 01 | 1 | 311007 | Base plate |
| 03 | 2 | 311009 | - Glide rail |
| 04 | 1 | 311025 | - Cover |
| | | 311028 | - Return spring set |
| 05 | 1 | 309565 | Manual control |
| 06 | 1 | 309518 | - Link rod, manual control |
| 07 | 1 | 308712 | - Gaiter, manual control |
| 08 | 1 | 311030 | Electric control |
| 02 | 1 | 309563 | - Pneumatic control |
| 09 | 1 | 603105 | - Actuator |
| 11 | 2 | 310169 | - Limit switch |
| 12 | 1 | 310124 | - Cable |
| 10 | 1 | 603154 | - Actuator bracket LA12 |







# Technical specifications

**General**
Name ..... Permolock Ch1

**Dimensions and weight**
Length..... 60,5 cm
Width..... 69 cm
Height ..... 17,5 cm
Weight..... 15 kg (man.) 16,5 kg (elec.)

## Electrical system

Voltage.....12V
Fuse.....10A

SP REPORT

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Box 120
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Handläggare, enhet / *Handled by, department*
Mikael Bynander, Mechanics
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Datum / *Date*
January 30 2002

Beteckning / *Reference*
MKp P200256A

Sida / *Page*
1 (2)

## Crash test of locking devices for electrical wheelchairs

(One appendix)

### Assignment

Crash testing of locking device for electrical wheelchairs according to ISO-10542 and ISO-7176-19.

### Test object

| | |
|---|---|
| Electrical wheelchair | Permobil Chairman |
| Locking device | Permolock, CH 1. |
| Seat | Vertical Combi |
| Dummy | TNO-10 dummy, mass 75.5 kg |
| Belt | Three point safety belt with a buckle bracket consisting of a flat bar iron bolted to the left side of the floor dummy. The other seat belt anchorages were mounted in the crash sled. |

### Date of arrival

A representative of the client arrived at SP on January 30 2002, with the test objects. The test objects have been selected by the client without SP's assistance. The test results showed in this report refer only to the tested objects.

### Date of testing

The test was performed on January 30, 2002.

### Measuring

The deceleration was measured by two accelerometers mounted on the trolley. The test was filmed with a high-velocity camera (1000 frames a second). The measurement uncertainty when determining the deceleration was better than ± 5% ($g = 9.81$ m/s²).

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**REPORT**

| Datum/Date | Beteckning/Reference | Sida/Page |
|---|---|---|
| January 30 2002 | MKp P200256A | 2 (2) |

## Results

**Test**
Velocity: 48.6km/h
Retardation distance: 630 mm
Retardation pulse according to acceleration curves in appendix.
Locking device with electrical wheelchair and TNO-10 crash test dummy.
The locking device withstands the test without remarks. The rear part of the wheel chair raises a few centimetres above the floor. The seat back of the wheelchair was bent back 30° at the rebound of the dummy. No other fractures or apparent deformations were noted on the wheelchair or anchorage points. The electric locking system was working after the test. The system fulfils the requirements according to ISO-10542 and ISO-7176-19

**SP Swedish National Testing and Research Institute**
**Mechanics**

Lars-Göran Nilsson
Technical Manager

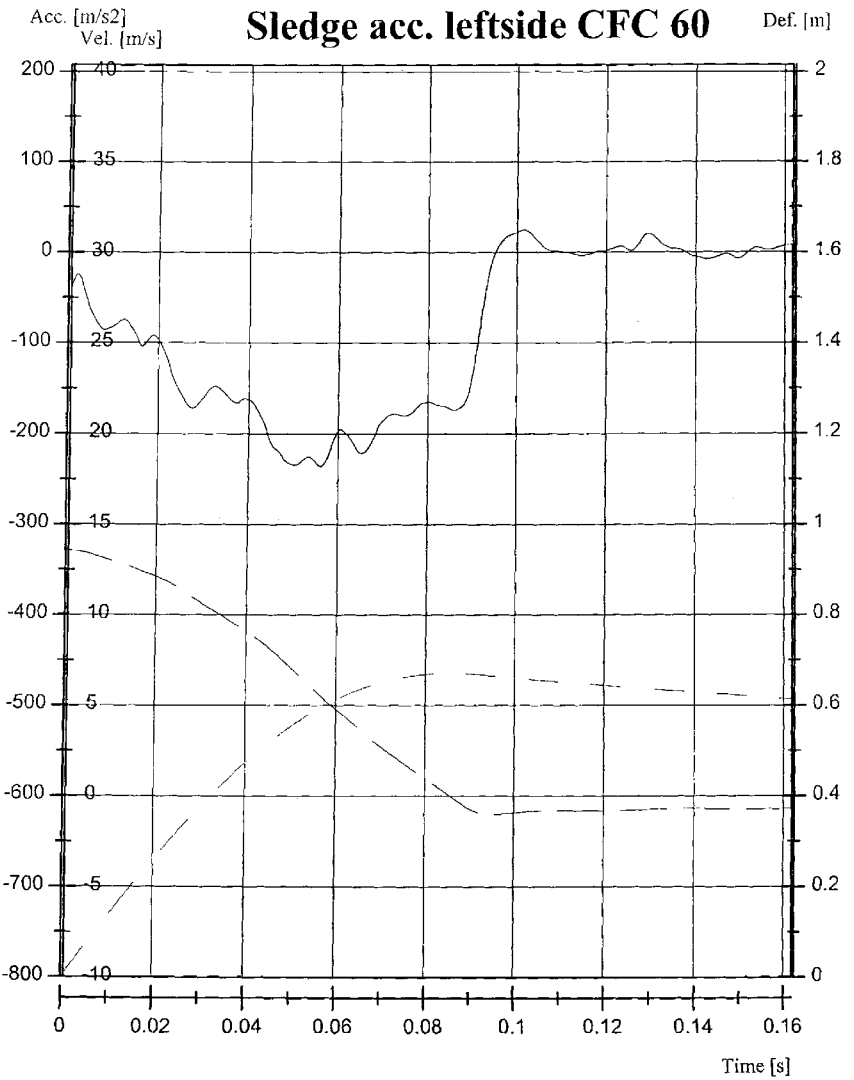
Mikael Bynander
Technical Officer

## Appendices

Appendix Retardation pulses

Permobil
020130-1

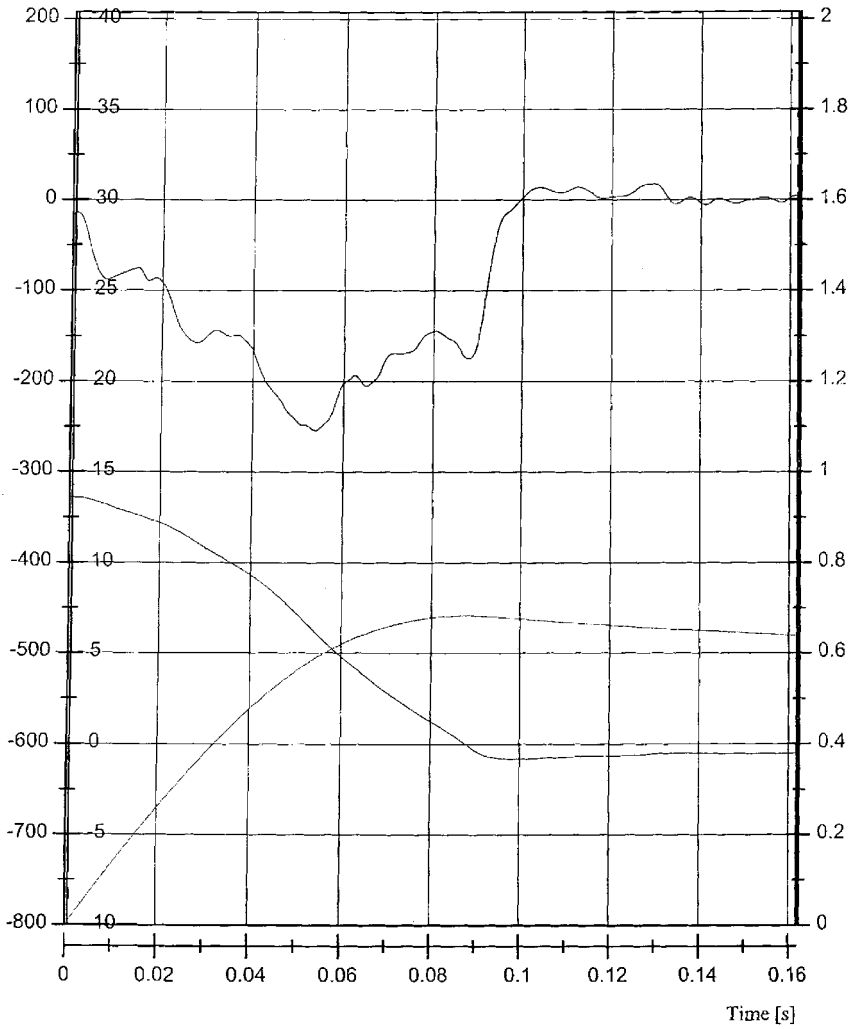
| | max | min | |
|---|---|---|---|
| Acc: | 25 | -236 | [m/s2] |
| Veloc.: | 13.6 | -1.0 | [m/s] |
| Deform. | 0.67 | -0.76 | [m] |



Permobil
020130-1

| | max | min | |
|---|---|---|---|
| Acc: | 18 | -254 | [m/s2] |
| Veloc.: | 13.6 | -0.8 | [m/s] |
| Deform. | 0.68 | 0.00 | [m] |

# Sill acc. CFC 60




permobil