

## The power kit for your wheelchair

*max-e*

Operator's manual



**AAT Alber Antriebstechnik GmbH**

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Ideen bewegen mehr

**CE-Declaration of conformity**

The company AAT Alber Antriebstechnik GmbH herewith declares that the products of the powered systems max-e are developed and produced in accordance with the current regulations of the European Community 93/42/EWG.

This declaration loses all validity if an alteration of any kind not approved by AAT Alber Antriebstechnik GmbH was made at any one of the herein described devices.



Signature of the manufacturer:



Markus Alber  
Managing associate  
AAT Alber Antriebstechnik GmbH



The powered drive system max-e is being tested according to the norm DIN EN 12184-C11/99 at the Technical University Berlin, testing and certifying facility for medical products GmbH.



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max-e\_id\_06\_01

Notes:

## 9 Warranty and liability

### 9.1 Warranty

The warranty of the max-e amounts to 24 months (6 months for the batteries) from the date of purchase. It covers errors of production and in the material.

The warranty does not cover:

- parts of natural wear and tear
- damage done resulting from inappropriate use
- damage done resulting from overstraining the device
- violent damage
- unauthorized alterations done or additions made on the max-e

### 9.2 Liability

The manufacturer AAT Alber Antriebstechnik GmbH is not responsible for the safety of the max-e if:

- the max-e was handled inappropriately
- the max-e was not checked every 2 years by your dealer or AAT representatives
- the max-e was not operated in accordance with this operator's manual
- the max-e was operated without sufficient battery charge
- repairs and/or other work have been performed by persons unauthorized by AAT
- extraneous parts have been added or connected to the max-e
- parts of the max-e have been removed.

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## 1 Introduction

With the max-e you transform your manual wheelchair easily and quickly into a lightweight, fully functioning, powered wheelchair. Due to the directly powered wheels of your wheelchair the max-e accomplishes a permanent, efficient transfer of power while all advantages of a manual wheelchair remain intact.

Max-e is appropriate for the application class A according to EN 12184 (Guidelines of the European Union). In addition, it also fulfills the requirements of application class B (for indoor an outdoor use) with one restriction. The range lies at 15 km instead of the norm's 25 km; however, with an extra set of batteries the range can be increased to the required 25 km.



### 1.1 Description of the product

#### 1.1.1 General survey

- ❶ = Control unit
- ❷ = Wheel of the wheelchair including grip ring and toothed ring (20" or 24")
- ❸ = Brackets on the wheelchair
- ❹ = Battery pack plus bag
- ❺ = Anti-tilt support
- ❻ = max-e drive

## 8 Care, maintenance and recycling

As opposed to the batteries, the device itself is maintenance-free, except for cleaning (see chapter 7.3.2) once in a while.

### 8.1 Care

#### 8.1.1 Battery pack

The batteries of the max-e are airtight, maintenance-free, rechargeable and of top quality.

A total discharge of lead batteries leads to a loss of capacity and additionally it reduces their durability.

- ☞ Therefore, please avoid a total discharge by charging the lead batteries whenever possible!
- ☞ Taking good care of your lead batteries means charging them.

If fully charged batteries are empty faster than usual, then they are probably used up. In such case have your local dealer or an AAT representative check the batteries and exchange them if necessary.

#### 8.1.2 Cleaning

Please clean the control unit, drive unit, batteries and brackets merely with a mild household cleaner.

- ☞ Please always use a merely moist cloth. Make sure that water does not get into the max-e.
- ☞ For security reasons please do not use a high-pressure cleaning device!

### 8.2 Maintenance

The max-e is a low-maintenance device. To ensure the functioning and the safety of the max-e it must be checked every two years, even if there are no outer signs of damage on the device.

- ☞ In the interest of your safety the safety check or any repairs on the max-e may only be performed by AAT Alber Antriebstechnik GmbH or their authorized personnel.

### 8.3 Recycling

The max-e and its battery pack are products of long durability. However, if your max-e is old and has reached the end of its lifespan you may return its components to AAT Alber Antriebstechnik GmbH or your local dealer to be recycled.

A new law concerning electric and electronic devices (ElektroG) has been passed on March 24, 2005 regulating the taking back and recycling of old electric and electronic devices.

According to the Federal Office of Environment Protection (German BDU) the max-e is considered a means of transportation and does not fall under this law concerning the recycling of old electric or electronic devices (ElektroG, §2 paragraph 1 sentence 1 (cross reference, Guideline of the European Parliament 2002/96/EG).



**7.2.2 Manual emergency unlocking key**

Should you not be able to solve a problem you might have, please first turn off the control unit. If the power shafts do not run in automatically, press the yellow emergency unlocking key ❶ on the side of the drive unit. The power shafts drive in automatically and you can drive your wheelchair again manually.



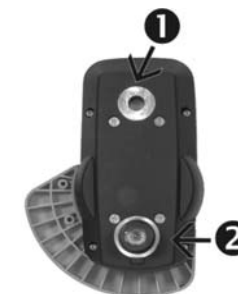
**1.1.2 Control unit**

- ❶ = Display
- ❷ = Horn
- ❸ = Preset speed control (fast)
- ❹ = Hand rest
- ❺ = Joystick
- ❻ = Preset speed control (slow)
- ❼ = On/Off



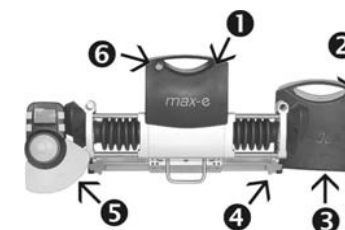
**1.1.3 Back side of the control unit**

- ❶ = Connection to wheelchair
- ❷ = Socket for the charging cable



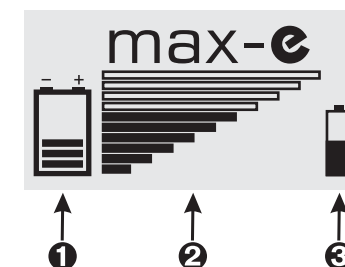
**1.1.4 Drive unit**

- ❶ = Drive
- ❷ = Exit of the power line and socket for the charging cable
- ❸ = Battery pack
- ❹ = Connection to the wheelchair
- ❺ = Control unit
- ❻ = Entry of the power cable at the max-e



**1.1.5 Display (main screen)**

- ❶ = Display of the battery pack
- ❷ = Speed
- ❸ = Battery display of the control unit



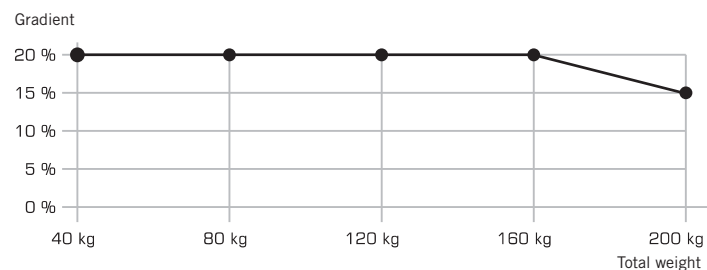
**1.2 Technical data**

Measurements	height = 28 cm width = 34,5 cm depth = 14,5 cm
Weight	drive = 8,8 kg battery pack = 8,6 kg control unit = 0,6 kg bag for the batteries including straps = 180 g charger = 0,5 kg power cable = 220 g
Limits concerning the attachment to wheelchairs	possible at a seat width of 28 cm
Maximum total weight admitted	200 kg (person, wheelchair, max-e) *
Speed	continuously adjustable 6 km / hours forward 3 km / hours backward
Capacity with one battery charge	up to 15 km **
Maximum slope	up to 20 % **
Battery Pack	2 x 12 V / 12 Ah
Batteries for the control unit	2 x 1,2 V / min. 2100 mAh
Direct current motor electronically commutated	24 V

\* Please always observe the limits stipulated by the wheelchair manufacturer.

\*\* The range applies to a person weighing 70 kg that drives on even ground.

Diagram concerning weight and climbing capacity:



In the name of progress we reserve the right for technical and optical changes.

Malfunction of the drive unit - Processor -	Explanation
Motor controller 1 Motor controller 2	The respective motor controller recognized an error
Brake 1 Brake 2	The respective brake recognized an error
Electronic system 1 Electronic system 2	The respective electronic system recognized an error
Parameter control	The parameters of the control processors in EEPROM are faulty
Pump is failing	Pump is damaged
Valve is defective	Valve is damaged
Pressure is not reached	Required pressure could not be reached
Software control	Error in the software of the control processor

Malfunction of the drive unit - Communication processors -	Explanation
Under voltage	Batteries in the drive unit are under voltage
Over voltage	Batteries in the drive unit are over voltage
Parameter	Parameters of the communication processors in EEPROM are faulty
Radio transmitter	Error in the transmitter of the radio module
Radio receiver	Error in the receiver of the radio module
Control – communication	Communication between the communication processor and the control processor of the drive unit is interrupted
Software – communication	Error when running the software of the communication processor

**7.2.1 Possible indication of malfunction**

☞ All indicated malfunctions can be confirmed by the + key.

## 7 Troubleshooting -- indication of malfunction


### 7.1 Troubleshooting

If you have problems operating your max-e, see whether you can remove them with the help of the following instructions.

Problem	Check and potential problem solving
max-e cannot be turned on	Is the charger connected to the max-e? If so, disconnect the charging cable and plug in the power cable
	Is the battery pack or the control unit empty? If so, charge the batteries and the control unit.
	Are the fuses damaged? If so, exchange the fuses.
	If there is still a problem turning on the max-e, please contact your dealer.
Batteries don't charge	Please contact your dealer
Power shafts do not emerge on one or both sides.	Loosen set screw of the horizontal adjustment (located directly on the housing) and screw it tight again (check the mounting width).

### 7.2 Indication of malfunction

The display indicates malfunction as follows.

**Error!**   
**Drive Pressure not reached**  
**Acknowledge with +**

Malfunction of the control unit	Explanation
Low voltage	Batteries of the control unit are under voltage
Parameter	Parameter in EEPROM are false
Radio transmitter	Error in the transmitter of the radio module
Radio receiver	Error in the receiver of the radio module
Software	Error when running the control unit's software
Unidentified	Invalid error code (error of software)

### 1.3 Delivery package

The standard delivery package contains:

- ❶ = wheelchair wheels including grip ring and toothed ring (20" or 24")
- ❷ = battery pack
- ❸ = charger
- ❹ = control unit
- ❺ = max-e power unit

...well as a power cable, battery bag, holding device for the control unit??and an operator's manual (no picture).

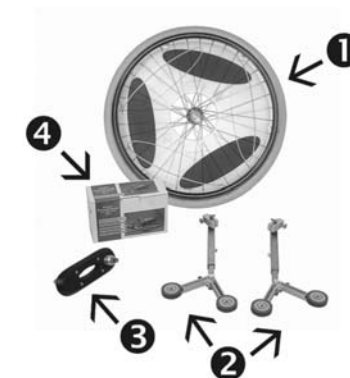
In addition, you need brackets which must be fixed to your wheelchair.



### 1.4 Optional accessories

- ❶ = spokes' protection (available for 20" or 24" wheels)
- ❷ = anti-tilt support
- ❸ = swivel arm
- ❹ = voltage transformer for the car

Joystick options and steering for the attendant (no picture)



## 2 Mounting and initial operation

Max-e may only be operated in connection with a special holding device, which must be fixed to the wheelchair.

These brackets (holding devices) must be mounted to the wheelchair exclusively by AAT Alber Antriebstechnik or their authorized dealers.



### 2.1 Brackets

The holding devices or brackets are specially developed and adjusted to each particular type of wheelchair. The brackets in this picture, 1 right and 2 left may look different from the ones on your wheelchair.

☞ Please make sure that the brackets are tightly secured on the chair before each use. Do not use the max-e if the screws are loose. In such case contact your dealer immediately.



### 2.2 Battery pack

Underneath your wheelchair's seat there is a bag attached for the battery pack. You slip the battery pack into the bag...



...and secure it with a Velcro strap.



### 6.2 Exchange the fuses of the battery pack

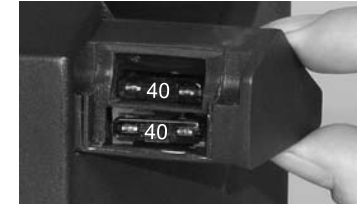
On the battery pack there is a drawer containing 1 2 fuses of 40 A each.

If the lower fuse 2 is burnt out, exchange it with the extra upper fuse 3 aus.

If you need to exchange a fuse, put a pen into the opening 4 on the side of the battery pack. This unlocks the drawer so it can be pulled out.

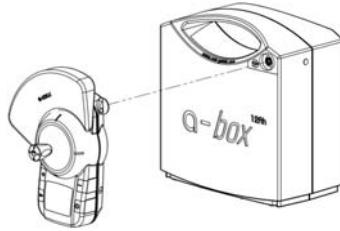
On curbs etc. a maximum current of almost 30 A is reached.

☞ Only use fuses of 40 A.



**6.1.2 Charge the control unit with the battery pack**

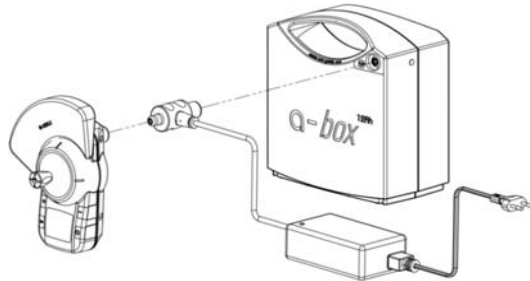
Generally the control unit's batteries are longer lasting than those in the battery pack. Nevertheless, if the control unit's batteries run out during operation, you may charge them directly with the battery pack. Please note that during the charging process the max-e cannot be used. However, you may drive the wheelchair manually.



**6.1.3 Charge the battery pack and the control unit together**

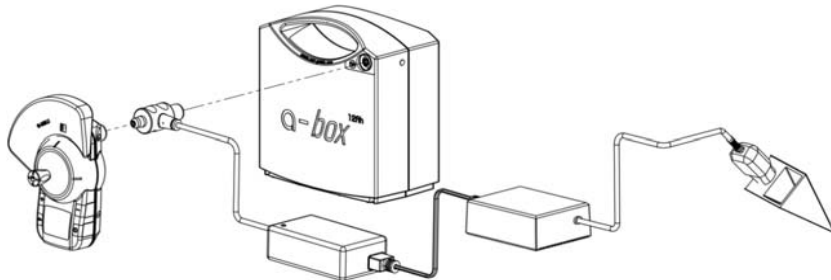
You should charge the battery pack and the control unit together.

☞ Should you not use the control unit and the battery pack over a longer period of time, please make sure that they are constantly connected to the charger, to avoid a total discharge.



**6.1.4 Charge the battery pack and the control unit in your vehicle**

With a voltage transformer you may charge your battery pack and your control unit even while driving in your car. The battery charge then reaches a capacity of 80%.



**2.3 Hook in the max-e**

Carefully insert the max-e ① into the bracket ② on both sides.

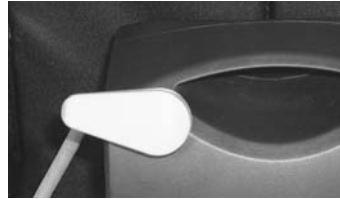
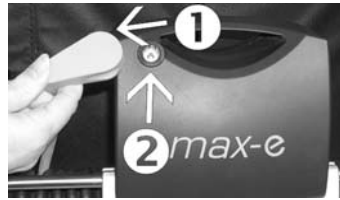


☞ Please insert the max-e with its wheelchair connections ① in a straight line in reference to the brackets ②.

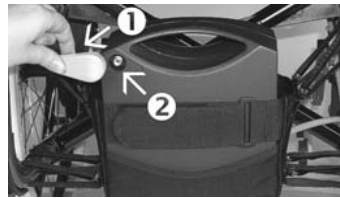
The device easily slides ③ into the brackets by itself.



Now put the plug ❶ of the power cable into its socket ❷ on the max-e.



Afterwards you put the plug ❶ of the power cable into the corresponding socket ❷ on the battery pack.



## 6 Battery pack / control unit

Both the battery pack and the control unit of the max-e are maintenance-free and rechargeable. Their durability directly depends on the number of charging/discharging cycles.

### 6.1 General information

If you regularly charge the batteries and the control unit their durability increases. Electronics integrated in the max-e continuously check the batteries' charging state thus avoiding a total discharge, if handled appropriately.

- ☞ Avoid a total discharge; recharge the batteries of the max-e after each partial discharge and after each use.
- ☞ If the battery pack is totally discharged, it takes a maximum of approximately 6 hours to recharge it.

The battery pack as well as the control unit are subject to a so-called self-discharge. Therefore, you should keep the batteries, whenever possible, connected to the charger. The automatic battery charger changes from charging mode to retaining the charge whenever the batteries are fully charged so they cannot be overcharged.

With new batteries it is possible that it takes several charging/discharging cycles before their full capacity emerges. This applies to both the battery pack and the control unit.

The batteries may be charged in any kind of position. They are considered as safe as dry cells and admitted to air freight by IATA and DOT.

If fully charged batteries discharge more quickly than usual they are probably old. Please have them checked by your local dealer and exchanged if necessary.

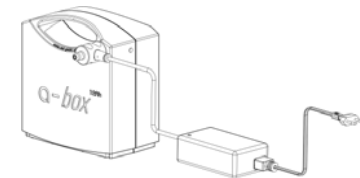
- ☞ To charge the battery pack and the control unit, please only use the AAT charger included with the max-e. This automatic battery charger turns itself off when the batteries are fully charged thus avoiding an overcharge.

#### 6.1.1 Charging the battery pack without removing it from the wheelchair

The battery pack can be left in its bag on the wheelchair when it needs charging. First unplug the power cable from the battery pack and plug in the charging cable. At the end you plug the charger into the wall outlet.


- ☞ During the charging process the LED display on the charger shows a constant red light.
- ☞ Once the charging process is completed, the LED display shows a constant green light.

Afterwards you first unplug the charger from the wall outlet and then you pull the plug from the battery pack.



Malfunction

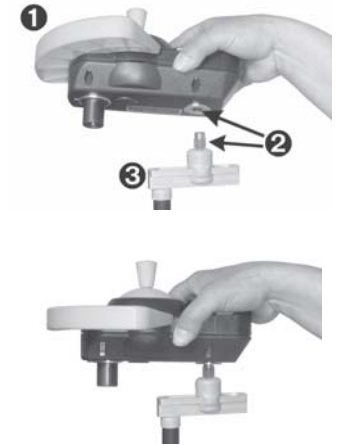
A summary of all indications of malfunction you find in chapter 7.2 Potential malfunction.

**Error!**   
**Drive**  
**Pressure not reached**  
**Acknowledge with +**

2.4 Attach the control unit

The wheelchair driver controls all functions of the max-e with the control unit ①. With a special holding device ③ the control unit can be mounted on either the right or the left side of the wheelchair thus making it equally convenient for left and right-handed people.

A special identification ② allows for the attachment of the control unit in individual positions particularly convenient for the user.



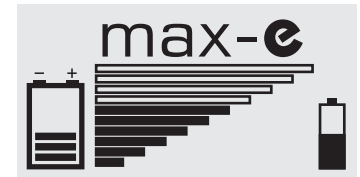
2.5 Driving with the max-e

When you turn on the max-e the drive unit's axles emerge automatically. At this point the motor shaft turns radially back and forth for a few seconds until the toothed wheel and the toothed ring grip fully. At this point the wheelchair cannot be pushed manually any more.

2.5.1 Starter protection

Please make sure that the joystick of the max-e is in neutral position before you start driving.

☞ start using the joystick only after the major screen appears on the display.



2.5.2 Overload

Should the max-e be overloaded, e.g. on slopes or when the wheels block, the electro-magnetic brakes become activated after 2 seconds and the device stops. You hear a signal tone and the display shows "overload". After another 3 seconds the picture on the display returns to the main screen.

☞ In such case, please let go of the joystick and wait until the major screen appears back on the display. Then you can continue driving while taking into consideration the reason for the overload, e.g. remove the blockage or turn around, if the slope is too steep, etc..



### 2.5.3 Radio failure

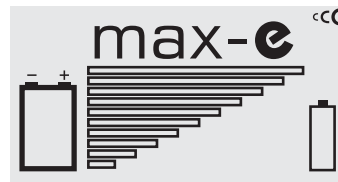
Should there be a radio failure while you are driving, the display will show the picture "radio failure", and the max-e brakes automatically. In such case, turn off the max-e and pull the power cable from the battery pack. Then wait approximately 3 seconds and plug the power cable back in. Turn the max-e on again. If the device does not function correctly after this reset, please contact your dealer.



### 2.5.4 Radio interference

Should there be a radio interference, the control system will try to use a different frequency to communicate with the drive. This search may take several seconds. During this time you cannot drive with the max-e. The joystick must be in neutral position.

Whenever there is a radio interference the search cCC appears in the top right corner of the display until the communication is reestablished. This radio search symbol appears on all pictures if there is a radio interference.



### 2.5.5 Stand-by-Modus

Should you not use the control unit for 5 minutes, there is a warning signal plus the display shows the message "stand-by in one minute".

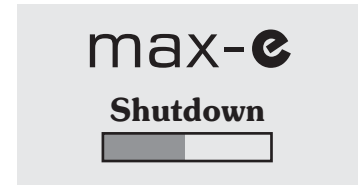
- ☞ To avoid the stand-by mode, press any key or move the joystick.
- ☞ If the device goes into stand-by mode, you must press the On/Off button to return to the previous mode. Within a few seconds you may continue driving, since the driving axles remain active in the stand-by mode.

Should there be a situation when you do not need the max-e, simply remove it and put it aside.



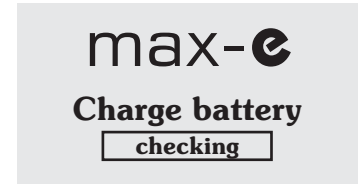
### Turn off the device

When you turn off the max-e the air in the pneumatic cylinder escapes by itself and the motor shafts run in. At this point your wheelchair is ready to drive manually once more.

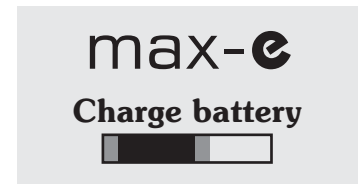


### Charge the control unit

If you connect the turned on control unit to the batteries or the charger, the charging state of the control unit is checked first.



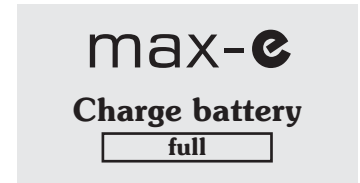
If the batteries can be charged, the display shows "charge batteries". The moving bar indicates the charging activity.



Once the batteries are fully charged, the screen shows "full".

- ☞ The control unit must be turned on while it is being charged. It cannot be turned off during the charging cycle.

After the charging cycle is completed, the control unit turns itself off automatically after 5 minutes.



### Overload

If the max-e does not remain within the diagram concerning weight and climbing capacity (see page 6), the max-e is overloaded. After 2 seconds the electro-magnetic brakes are activated and the device stops. You hear a signal tone, and the screen shows "overload". After another 3 seconds the display goes back to the main screen.

- ☞ In such case, let go of the joystick and wait until the main screen appears on the display again. Then you may continue driving taking into consideration the cause of the overload, e.g. remove blockage, turn around, if the gradient is too steep, etc..



### 5.3 Display

#### Introduction

This screen briefly appears after turning on the control unit.

#### Search for drive

After the introduction the control unit attempts to establish a connection with the drive unit.

#### Activation

Once the connection between the control unit and the drive is established, the pneumatic system builds pressure and the motor shafts emerge. Once the activation is terminated the display shows the main screen.

#### Main screen

This screen appears during the entire drive with the max-e. It shows the charging state of the battery pack ❶ and the control unit ❷, as well as the level of speed ❸.

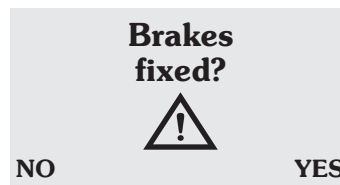
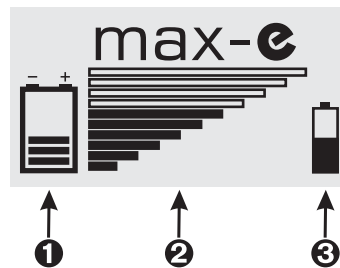
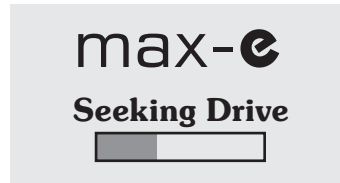
Should the display for the battery charge or for the control unit reach the lowest bar, the command "charge batteries" or "charge control unit" appears on the screen, and you hear a signal tone. At this point you merely have a limited battery capacity at your disposal.

☞ You must confirm this message by pressing the + key.

#### Lock brakes

Before the max-e automatically inserts the motor shafts when you turn off the device, you must lock the brakes manually so that your wheelchair cannot roll off.

☞ Confirm that you locked the brakes by pressing the + key.



### 2.5.6 Weather conditions

We recommend not to leave the max-e in freezing weather conditions for a longer period of time to ensure that the device functions correctly.

### 2.6 Adjustment of the hand rest

The hand rest of the control unit can be adjusted to the user.

Loosen the screws ❶ on the bottom side of the control unit. The hand rest is already equipped with several possibilities of attachment ❷ which allow you to mount the hand rest in the most comfortable position for the individual user.



### 2.7 Swivel arm

The swivel arm is an optional accessory, which makes it possible to swivel your control unit into several different positions.



## 5 Control unit

Your max-e is ready to use when you receive it. If the mounting was done correctly, you can turn on the device and start driving.

However, please acquaint yourself with the max-e's driving qualities to get a feeling for the device's various function.

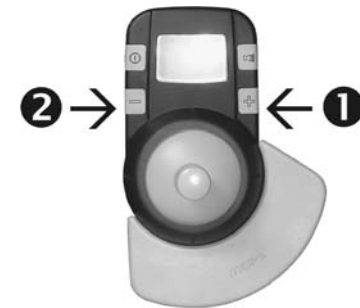
### 5.1 Control unit

All the device's functions are controlled by the control unit.

☞ If the control unit is removed from its holding device when already turned on, the joystick loses all functions. At this point you cannot drive with the max-e. This is a precaution so that nobody, except for the person sitting in the wheelchair, can operate the device.

#### 5.1.1 Preselected speed

☞ With the keys + **1** and - **2** the control unit you can select the desired speed.



### 5.2 Joystick

With the joystick you control the direction and the speed of the max-e in a continuously adjustable way.

- ☞ Use the joystick carefully since you also manipulate the driving speed.
- ☞ The joystick can be moved in all directions (360°).



## 4 Useful information

To operate the device safely, it is indispensable to know the driving qualities of the max-e thoroughly. The comfort and safety of our clients are important to us; therefore, we would like to give you some useful tips for the operation of the max-e.

- ☞ It is best to make the first few attempts using the device outside because in narrow rooms you may collide with furniture and other obstacles.
- ☞ Start with the lowest possible speed and acquaint yourself step by step with the device's driving qualities.
- ☞ Select a low speed for operation indoors.
- ☞ When you start driving, the joystick should never be pushed through all the way because this could cause jerking, uncontrollable movements (danger of accident).
- ☞ Please use the joystick carefully. In dangerous situations brake until you stand still to avoid potential powerful jerks.
- ☞ Brake the max-e carefully by letting go of the joystick, though never grip the gripping rings on the wheels while braking. You can bring about an immediate standstill by briefly pressing the joystick in the opposite direction that you are driving.
- ☞ To keep the wheelchair from tipping over sideways, you should avoid driving parallel to steep slopes. Countersteer when you cross steep sidewalk ramps.
- ☞ Cross obstacles such as ramps of sidewalks with both wheels simultaneously. If the ramps are high, always master them backwards since the steering rollers may potentially block when you drive forward. Also take into consideration the height adjustment of your anti-tilt support.
- ☞ You must observe the regular traffic rules when driving on public roads. Potentially required additional accessories must be mounted should they be stipulated by law. Please contact the appropriate facilities, should you have questions.

## 2.8 Anti-tilt support

You may operate the max-e only with installed anti-tilt support.

If your wheelchair does not have a tilt support, which is standard with most wheelchair manufacturers, we can equip your wheelchair with the necessary tilt support as an optional accessory of the max-e.

Holding devices ❶ for our anti-tilt support are already mounted on the brackets of the max-e.

### 2.8.1 Attaching and removing of the anti-tilt support

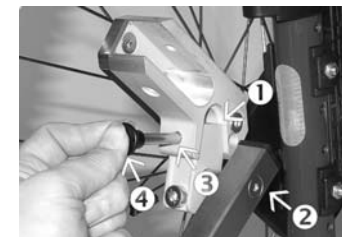
Slide the anti-tilt support ❷ entirely into the brackets of the max-e.

Then fix it with the locking pin ❸. Put the locking pin all the way into the drilling on the brackets ❹ while pressing the unlocking button on the pin. Then release the button.

- ☞ Check whether the locking pins are securely in the brackets. You are not supposed to be able to remove the locking pins without pressing the unlocking button on them.

### 2.8.2 Removing the anti-tilt support

Press the unlocking button on the locking pins and pull them out; then remove the anti-tilt support.



### 3 Safety regulations and notification of potential dangers

#### 3.1 General information

All general rules for the safe operation of a wheelchair remain valid when the max-e is used.

To guarantee a safe operation of the max-e we must ask you to observe the following directions closely.

#### 3.2 Technical requirements

The mounting of the brackets for the max-e or any alterations on them may only be performed by AAT Alber Antriebstechnik or their authorized personnel.

The max-e may only be mounted on wheelchairs of a seat width of a minimum of 28 cm. The wheelchairs must be tested and coincide with common technical rules. Finally, their operators' manuals must be observed when using the max-e

When you operate the max-e you must observe all recommended limits of the wheelchair manufacturer such as e.g. the maximum gradient or the admitted top load, as well as their general instructions for operation. Listed restrictions and limits must be observed and may not be exceeded.

☞ The maximum top load admitted is the addition of the wheelchair driver's weight, the wheelchair and the max-e.

#### 3.3 Operation

Thorough instruction to operate the max-e is part of the delivery package and takes place at a time and place of your choosing with one of AAT's dealers.

☞ Do not operate the max-e without having received extensive instructions.

☞ The max-e may only be operated by people who have been instructed thoroughly in the operation of the device, and who are physically and mentally capable to use the max-e safely in all possible situations.

☞ Should you not feel comfortable operating the max-e, please contact your local dealer or one of our representatives.

☞ Due to the potential danger of tilting a wheelchair, the powered drive max-e may only be operated with installed anti-tilt support.

#### 3.4 Environmental influences - EMV

Electro-magnetic compatibility (EMV) is understood as the capacity of an electric device to function properly within its electro-magnetic environment without inadmissably influencing said environment including other devices therein.

max-e mastered the EMV tests required by German jurisdiction successfully.

#### 3.5 Driving

It is indispensable that all restrictions and limits stipulated by the wheelchair manufacturer must be closely observed.

☞ Always start with the lowest possible speed.

Although max-e masters gradients up to 20 % you may never exceed the admitted gradient stipulated by the wheelchair manufacturer.

☞ You may not operate the max-e without anti-tilt support.

#### 3.6 Special tips for driving

If the max-e is turned off, all advantages of a manual wheelchair remain. Once you turn on the max-e the pinions of the drive couple pneumatically into the toothed rings mounted on the wheels. A manual emergency unlocking button (see 7.2.2) is located on the right side of the drive.