



GB

SERVICE MANUAL

OPTIMUS 2, MODEL 2.322

TOURING 928, MODEL 9.928

MEYRA
ORTOPEDIA
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Table of contents

Foreword	6
Requirements	6
Vehicle identification	6
Overview	6
Optimus 2 – Model 2.322 (2)	6
Touring 928 – Model 9.928 (3)	6
Drive unit	7
Carbon brushes	7
Removal	7
Fitting	8
Collector	8
Replacing the drive unit	9
Preparations	9
Removal	10
Mounting	12
Functional checks	12
Brakes	13
Motor brake	13
Functionality	13
Drum Brakes	14
Adjusting	14
Replacing the bowden cable	15
Magnetic brake	16
Removal	16
Mounting	16
Adjusting the aeration unit of the magnetic brake and steering gear disengage	17
Functional checks	17
Replacing the bowden cable	18
Vehicle suspension	19
Suspension of the chassis	19
Adjusting the seat suspension	19
Revetment	20
Attaching the insurance license plate	20
Removing the front panel	20
Removing the side panel	20
Removing the rear panel	20
Attaching the revetment panels	21
Steering	22
Replacement	22
Removal	22
Mounting	23
Track and straight course	24
Checking the alignment	24
Adjusting the track and straight course	25
Replacing the return sensor	26
Wheels	28
Wheel change	28
Disassembly of the wheels	28
Assembly of the wheels	28
Changing the tyres	29
Disassembly of the tyres	29
Assembly of the tyres	29

CAN-Bus Control	30
CAN-Bus hardware	31
Operating module	31
Plug assignment	33
Power module	33
Adjustment module	34
Plug assignment	34
CAN-Bus software	35
Service program	35
Notes for loading new software into MEYRA-CAN modules:	39
Setting and changing the wheelchair type	41
Driving programs	43
Programming with the operating module	46
Adjustment modus	46
Programming foil	46
Switching to the adjustment modus	47
Functions	47
Adjusting the joystick priority	48
Adjustment of the parameters	49
Concluding the adjustment modus	50
Quick reset to standard values	50
Locking the drive program selection	51
Unlocking the drive program selection	51
Turning special mode F H on	52
Turning special mode off	52
Switching the wheel diameter on	53
Setting the speed factor	54
Horn signal phase	55
CAN-Bus error list	56
Further symbols	60
Replacing the CAN-Bus modules	61
Replacement of the power- and adjustment module	61
Replacement of the operating module	62
Remove the operating module	62
Fitting of the operating module	62
Checking the cable layout	62
Lighting	63
Replacing a lightbulb	63
Adjusting the headlights	64
Batteries	66
Charge	66
Battery chargers	66
Types of batteries	67
Maintenance of liquid batteries	68
Replacement	68
Removal	68
Mounting	68

Fuses	69
Main fuse	69
Electronic security	69
Maintenance/Serviceing	70
Maintenance checklist	71
Electrical system	71
Mechanic	72
DIN norms and guidelines	73
Notes	74

FOREWORD

This service manual is designated for the authorized dealer.

☞ It is complemented with the according users manual and the spare parts list. – A users manual is supplied with each scooter.

Spare parts lists are sent out to you upon enquiry. All documents can also be downloaded from the following site in the internet:
< www.meyra.de >.

REQUIREMENTS

Special knowledge is required to carry out the maintenance work described in this service manual and may therefore only be carried out by educated qualified personnel.

VEHICLE IDENTIFICATION


For a definite vehicle identification in case you have questions, or for spare parts orders, the following data can be read off of the type plate, as sample (1):

1. The model description (in the field type).
2. The vehicle identification-no. (Fz-I-Nr).

OVERVIEW

OPTIMUS 2 – MODEL 2.322 (2)

TOURING 928 – MODEL 9.928 (3)

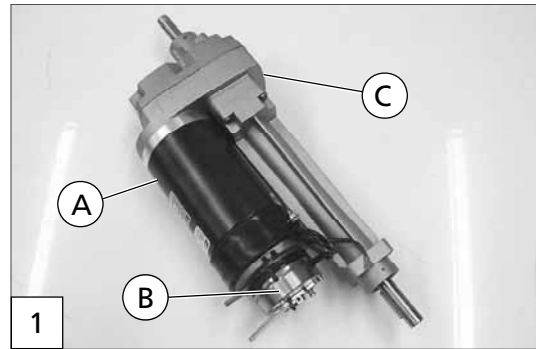
			CE
Typ	Modell	Baujahr	Fz-I-Nr.
1.234	LP 9123456789012	97/12	5678901
zGG	zul.AL 1/2	z.Nutzergew.	Höchstgeschw. 10 km/h
789 kg	123/345 kg	123 kg	z.Steig. u.Gefälle 10 %
1	 (01)0401234500016(10)0011234567		



DRIVE UNIT

The drive unit (1) consists of:

- the motor, 24V-permanent magnet-direct current motor (A),
- the magnetic brake, electro magnetic spring pressure brake (B) and
- the maintenance free differential gear (C).

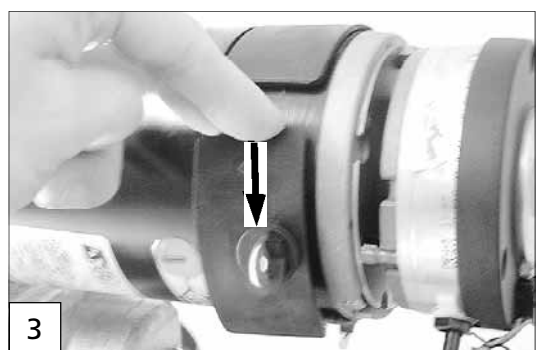
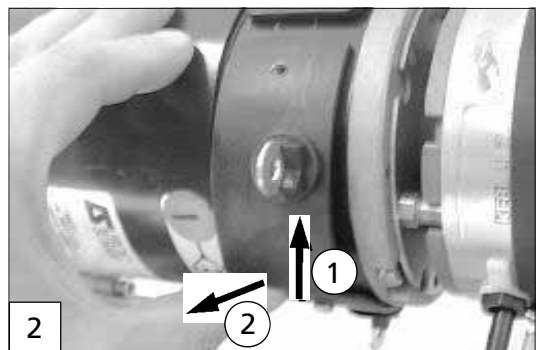
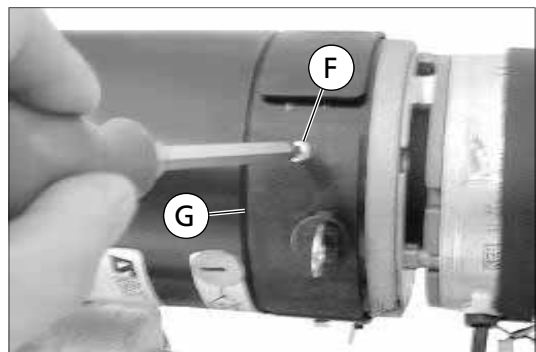
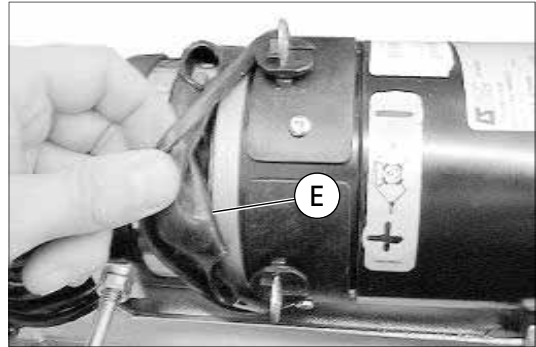


CARBON BRUSHES

When the motor is not running flawless and defects in the incoming lines can be excluded the four carbon brushes have to be checked one after the other.

REMOVAL

- Switch the vehicle off and remove the main fuse.
- Remove the front panel.
- 🔧 Hereto observe chapter < *revetment* >.
- Remove the plus cable and the minus cable from the motor.
- Pull back the rubber buffer (E) from the motor.
- Remove the fixing screw (F) from the carbon brushes (G).
- Push the carbon brush retainer in the direction of the screw hole (2).
- Slightly pull the carbon brush retainer back form the motor opposite of the screw holder.
- Press the carbon brush retainer in the opposite direction of the screw hole (3).



- Slightly pull out the carbon brush retainer (4).

Note:

Two opposite carbon brushes each are connected with each other through a cable (H) that runs over the motor.

- Unscrew the phillips head screw (I) of the connection cable.
- Completely remove the carbon brush retainer.

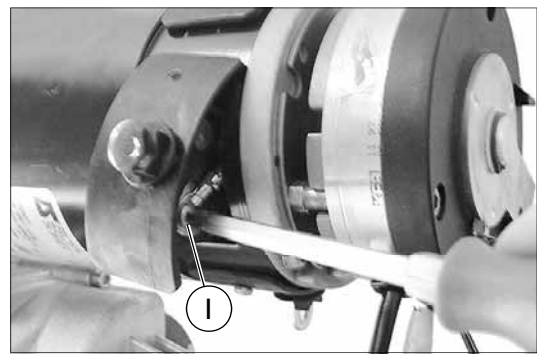
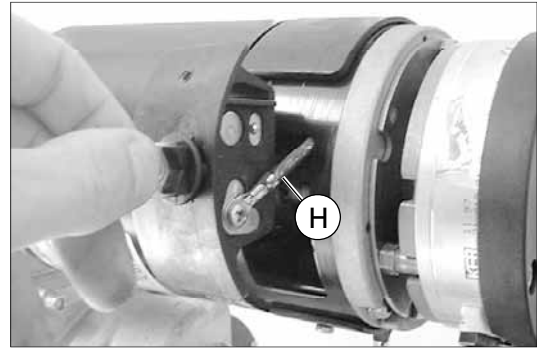
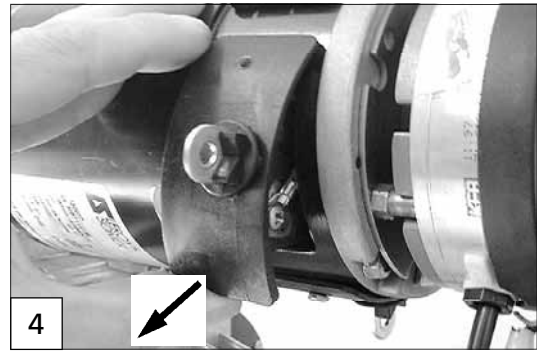
Note:

The carbon brush retainers cannot be pulled straight out of the opening. – Slightly turn the carbon brush retainer sideways while pulling it out.

- ☞ The carbon brushes are worn when the pressure springs come to rest on the retainer without the carbon brushes reaching over their guide way. They are also to be replaced when the contacts (K) appear black and dull. – On intact carbon brushes the contacts are anthracite coloured and shining.

- ☞ When one or more carbon brushes are extremely or totally worn, all carbon brushes are to be exchanged. – As a spare part the carbon brushes are supplied in a set completely assembled in the retainer.

- If the carbon brush is completely intact reassemble the carbon brush retainer and check the next one.



FITTING

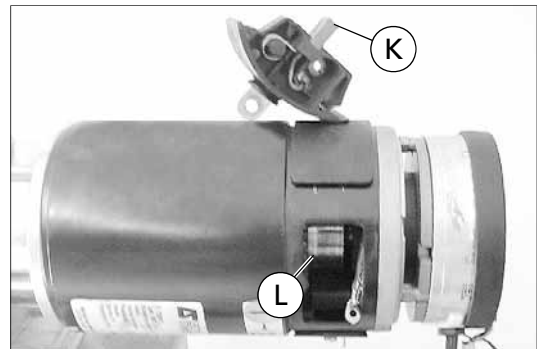
The fitting is done analogue in reverse order.

COLLECTOR

The collector (L) located between the carbon brushes is also to be checked for damages. – To check them remove a carbon brush retainer.

Note:

The slight grinding marks caused by the carbon brushes correspond to their normal wear and have no influence on the performance of the motor. Extreme recesses have to be smoothed out. If partial segments have been broken out or are extremely burnt the drive unit has to be replaced.

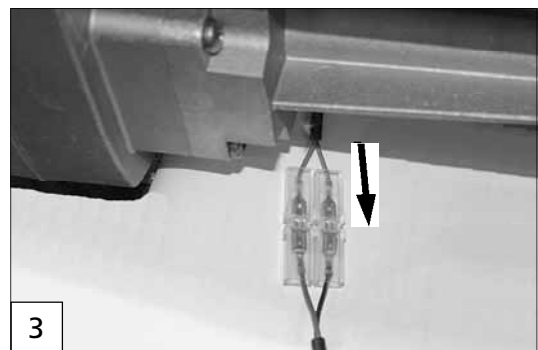
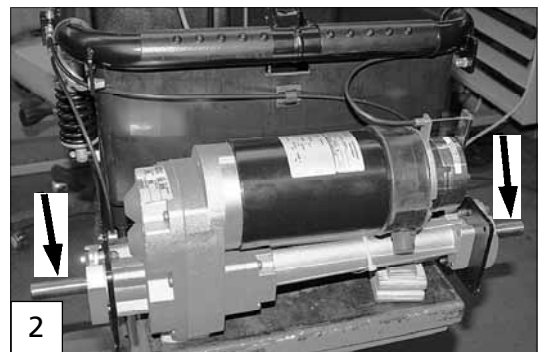
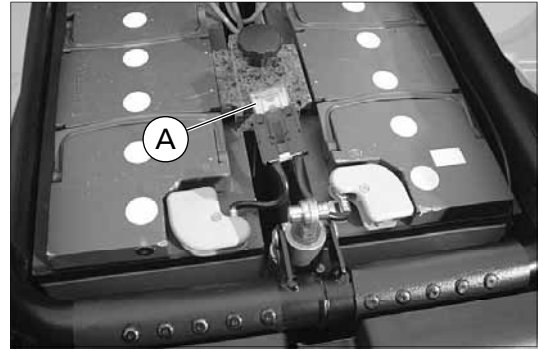
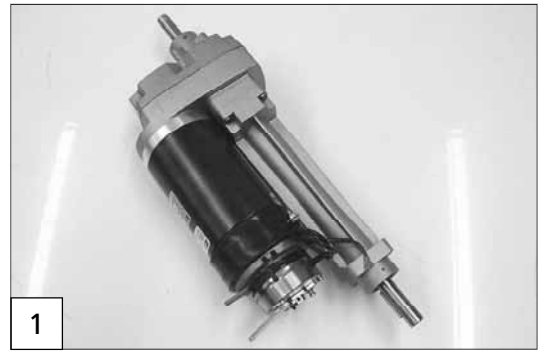


REPLACING THE DRIVE UNIT

The drive unit (1) can only be replaced as a complete driving unit (with the exception of the magnetic brakes).

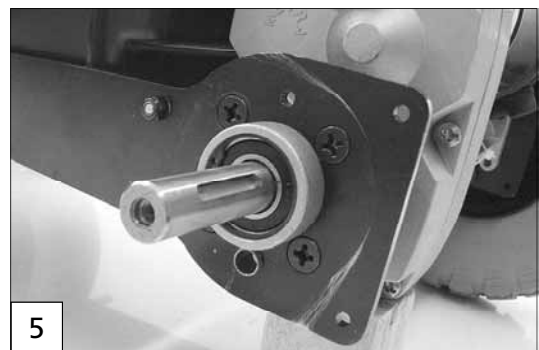
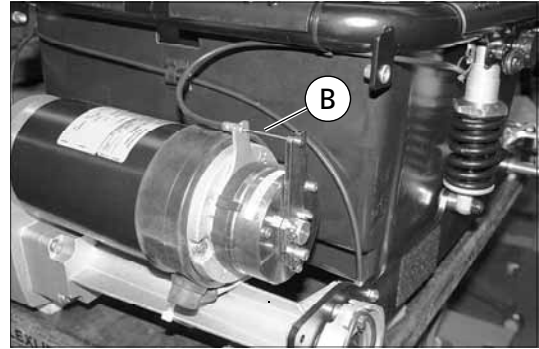
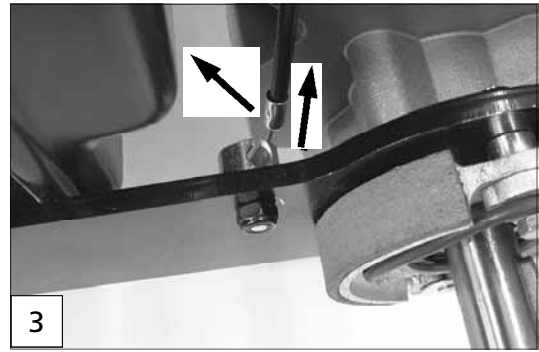
PREPARATIONS

- Jack up the vehicle under the battery case so that the front wheels move freely.
- ☞ Put the drive-/push mode selection lever to < *Drive mode* > and set the brake lever for the drum brake to < *released* >.
- Pull the main fuse (A) out of the fuse holder.
- Dismantle the drive wheels (2).
- ☞ Hereto observe chapter < *Wheels* >.
- Remove the revetment panel.
- ☞ Hereto observe chapter < *revetment* >.
- Disconnect the plugs of the magnetic brakes in the front area of the cable channel. – Carefully pull them out of the cable channel (3).

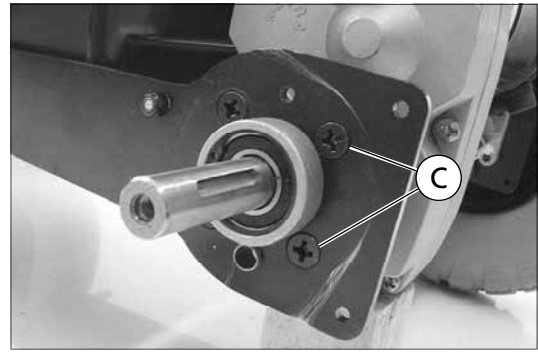


REMOVAL

- Unhook the bowden cable of the drum brake on both sides (3).
 - Unhook the bowden cable of the magnetic brakes (B) (4).
 - Dismantle the drum brake pads (5).
- ☞ Hereto observe chapter < *Drum brake* >.



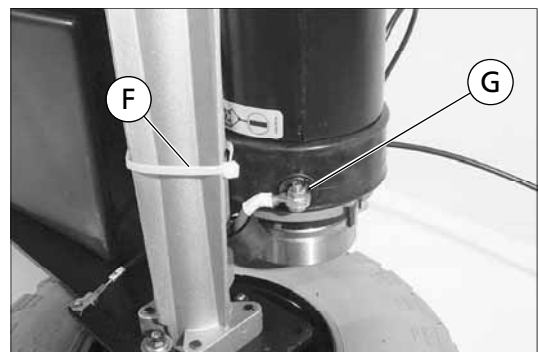
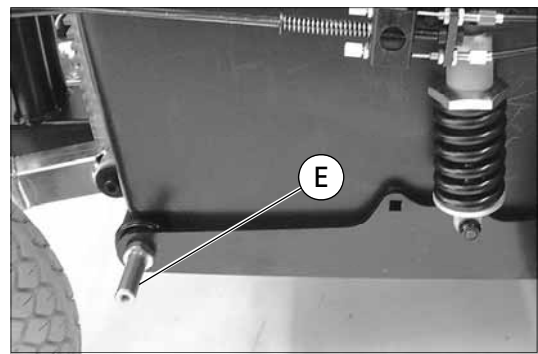
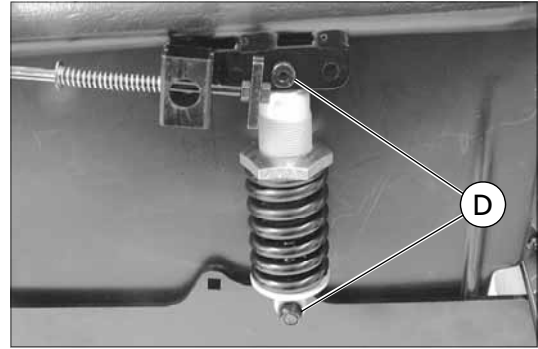
- Unscrew the 4 attachment screws (C) of the drive to the rocker on both sides.
- Dismantle the screws of the shock absorber (D) on the side from which the rocker is to be removed. Remove the shock absorber.



Note:

Before removing the screws (D) support the drive unit so that it cannot fall down.

- Unscrew the joint bolt (E) of the rocker.
- Remove the cable binder (F) that attaches the cable harness to the drive.
- Dismantle the cables (G) on the plus and minus pole of the motor.
- Remove the drive unit.



MOUNTING

The fitting is done analogue in reverse order.

Attention:

- ! Secure the jointed bolt (E) of the rocker as well as the 4 attachment screws (C) of the drive to the rocker on both sides with Loctite 243!

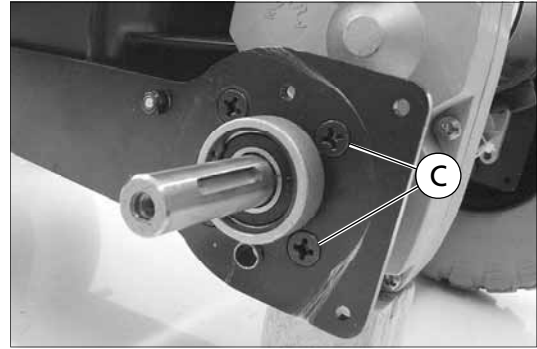
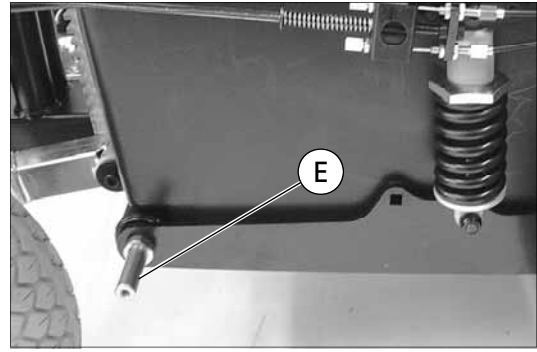
Note:

The cable harness has to be replaced carefully and attached to drive with cable binders.

Note:

After completing all assembly work, the bowden cables of the drum brake (1) have to be adjusted.

- Therefore observe chapter < *Drum brake/adjustment* >.



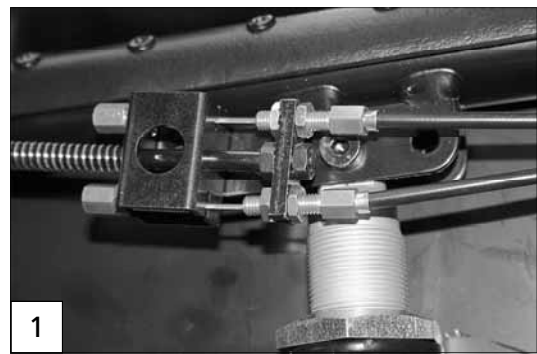
FUNCTIONAL CHECKS

Inspection during standstill

- Check all attachments and connections.
- Do a visual check of the complete vehicle.
- Switch to pushing mode, disengage the drum brake and check the smooth manoeuvrability of the wheels.
- Switch to driving mode, switch the vehicle on and check the battery voltage.
- Check all lighting components for functionality.

Test drive

- Initially drive carefully and observe if the driving behaviour of the vehicle has changed.
- Watch for unusual sounds.
- Conduct a braking test.



BRAKES

Note:

Switch the vehicle off in push mode. – This makes pushing the vehicle easier.

The vehicle is fitted with a triple security system, consisting of:

- The motor brake
- an electro-magnetic spring pressure brake (magnetic brake).
- the drum brake.

MOTOR BRAKE

The effectivity of the motor brake depends on the programming of the power module.

FUNCTIONALITY

With retracted driving lever the induced motor voltage is short circuited by a programmable tacting frequency that continuously brakes the vehicle down to almost stillstand.

With the programmable tacting frequency the braking process can be adjusted from "soft" to "full-stop".

DRUM BRAKES

The two drum brakes for the drive wheels are activated by the hand brake lever.

ADJUSTING

The drum brakes (A) are adjusted through the respective bowden cable.

- Jack up the vehicle.
- Remove the panel on the side of the handbrake lever for the drum brake.
- 🔧 Therefore observe chapter < Revetment/panels > paragraph < Removing the side panel >.
- Set the brake lever of the drum brake to < released >.
- Adjust the bowden cables (B+C). – For this loosen the counter nuts (D) of the respective adjustment screw (E) and turn it backward.
- Fine-tune the bowden cable by turning the adjustment screw (turning outward = spanning).
- For inspection carefully move the brake lever back and forth and check the braking function by turning the respective drive wheel.

🔧 Note:

The bowden cable is adjusted correctly, when the drive wheels can just merely be turned.

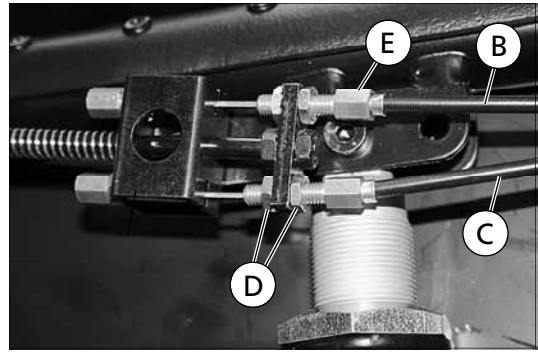
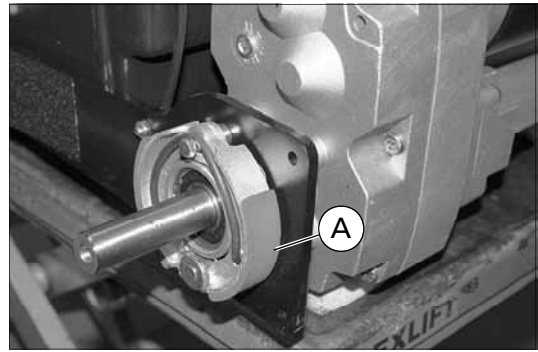
- Counter all adjustment screws again and check the braking effect again.
- Mount the side panel and jack the vehicle down.

After the adjustment the following must be checked:

- whether, with disengaged brake (push mode), the vehicle can be pushed easily,
- if, while the brake is engaged, the vehicle is not be moveable at all.

🔧 Note:

The wheelchair must be safely brakeable on the max. permitted slope and with the permitted max. user load when the electro magnetic brake is released.



REPLACING THE BOWDEN CABLE

During replacement take care that the short bowden cable cover (C) runs from the lower adjustment screw (F) to the right brake arm (G) on right side use. For left hand operation it has to run from the lower adjustment screw to the left hand brake arm.

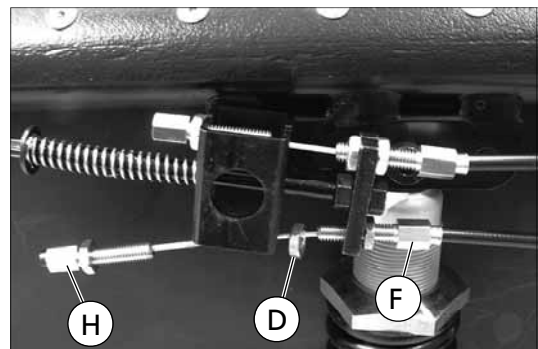
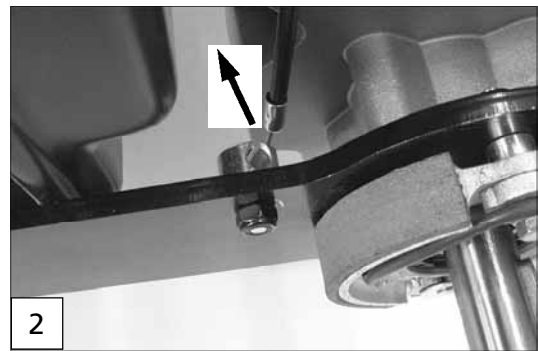
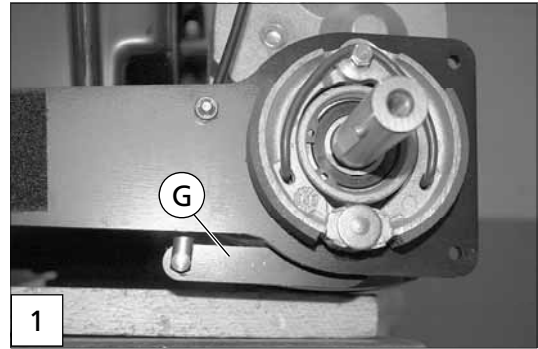
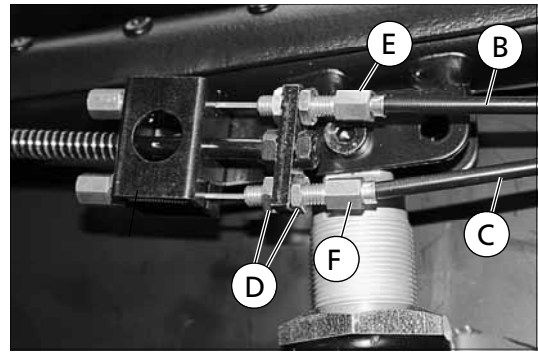
After a bowden cable replacement the drum brake must be adjusted again.

Removal

- Jack up the vehicle and remove the drive wheel of the side with the defective bowden cable (1).
- Remove the panel on the side of the handbrake lever for the drum brake.
- ☞ Therefore observe chapter < Revetment/panels > paragraph < Removing the side panel >.
- Set the selection lever to push mode.
- Set the brake lever of the drum brake to < released >.
- Lift the bowden cable sleeve from the guide nipple of the rocker and unhook it (2).
- Dismantle the bowden cable from the brake arm. – For this remove the splint first and the bolt.
- Unhook the bowden cable.
 - For this pull the spanning screw (H) toward the back out of the bracket.
 - Unscrew the counter nut (D) of the adjustment screw (F).
 - Pull the adjustment screw (F) forward out of the bracket and unhook the bowden cable.

Mounting

- ☞ Assembly of the bowden cable is done accordingly in reverse order to the removal.



MAGNETIC BRAKE

The magnetic brake (A) is flanged to the motor (B).

Note:

Should the electro magnetic brake no longer hold the max. permitted total weight safely on a slope of 28% / 15°, the brake must be replaced.

REMOVAL

Disconnect the connector cable to remove the defective electro magnetic brake. Afterward the three attachment screws (C) must be dismantled.

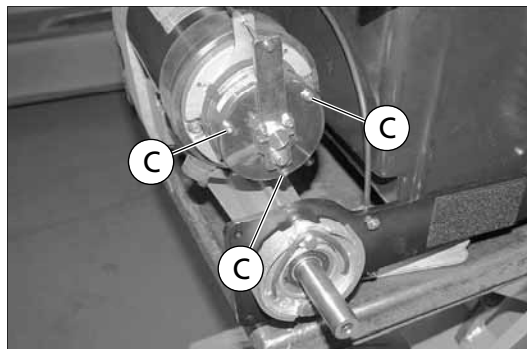
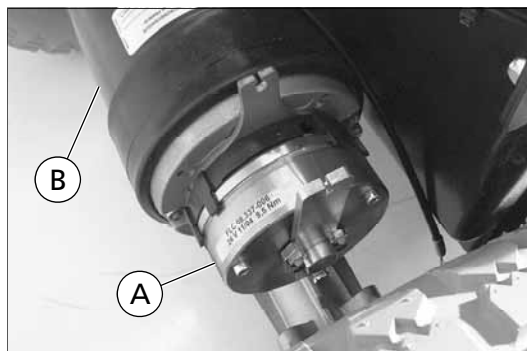
- Therefore observe chapter < *Replacement of the drive unit* >.

MOUNTING

Assembly of the electro magnetic brake is done analogue in reverse order to the assembly.

Attention:

- ! After assembly of the electro magnetic brake the function of the drive/push operation must be adjusted again, hereto view chapter < *Adjustment drive/push mode* >.



ADJUSTING THE AERATION UNIT OF THE MAGNETIC BRAKE AND STEERING GEAR DISENGAGE

The adjustment is achieved through the bowden cable of the selection lever drive/push mode.

1. Jack up the vehicle.
2. Remove the side panel on the side of the selection lever drive/push mode.
☞ Hereto observe chapter < *revetment* >.
3. Switch the selection lever drive- / push mode to drive mode.

Adjustment:

- The magnetic brake aeration is done with the adjustment screws (A)+(B). - For this turn back the corresponding counter nut (C) of the adjustment screw.
- Fine-tune the bowden cable by turning the adjustment screw (turning outward = spanning).

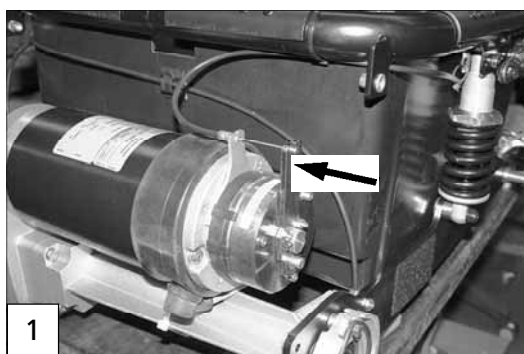
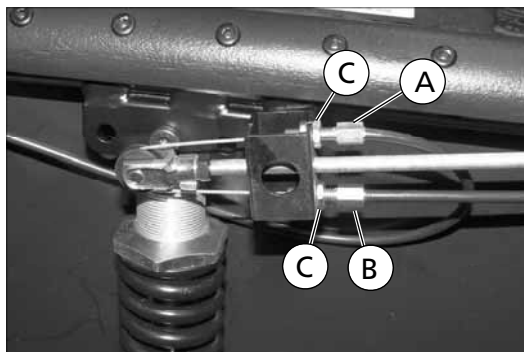
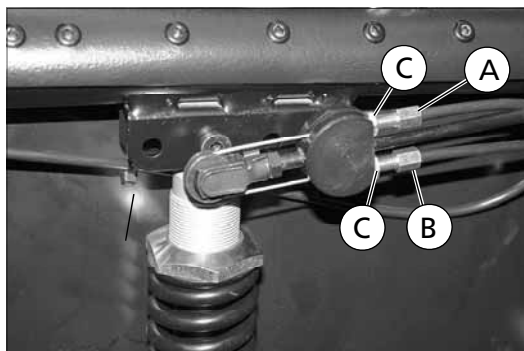
☞ **Note:**

The bowden cable is adjusted correctly when the aeration lever of the magnetic brake (1) is barely held in the original position by the reset spring resp. when in push mode the steering as well as the brake are completely released.

4. If necessary correct the adjustment.
5. Recounter all adjustment screws.
6. Mount the side panel and jack the vehicle down.

FUNCTIONAL CHECKS

- Switch to push mode and check the free movement of the wheelchair.
- Do a driving test.
- Watch for unusual sounds.
- Check whether the vehicle, with permitted overall weight, can be safely held on the maximum permitted slope (type plate).



REPLACING THE BOWDEN CABLE

- Jack up the vehicle.
 - Remove the side panel on the side of the selection lever drive/push mode as well as the front and rear revetment.
- 👉 Hereto observe chapter < *revetment* >.
- Switch the selection lever drive- / push mode to drive mode.

Removal

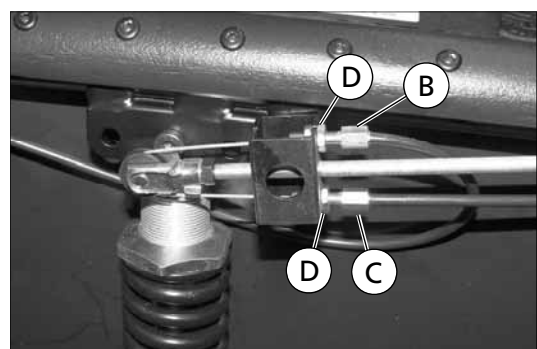
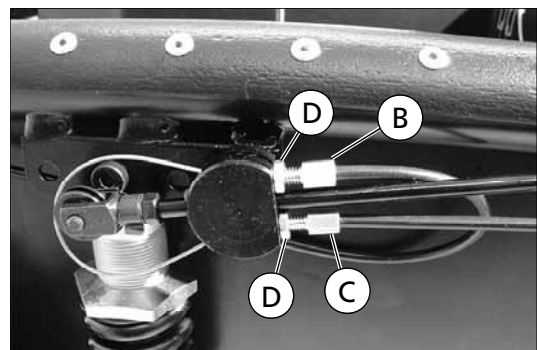
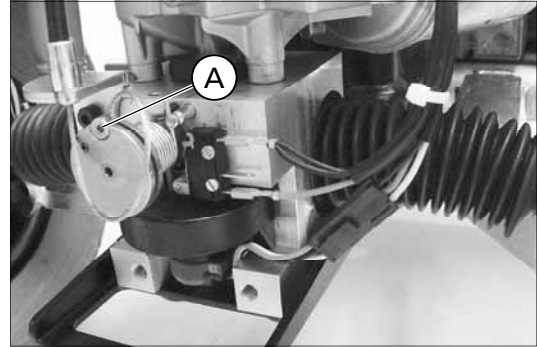
1. Unhook the bowden cable on the steering gear. – For this first lift the bowden cable sleeve out of the centring device (1). The guide the bowden cable counter-clockwise around the eccentric shaft and thus loosen it out of the groove. Afterwards guide the end of the cable upward and push the press nipple (A) axially out of the groove.
2. Unhook the bowden cable on the magnetic brake (2).
3. Unscrew the adjustment screws (B+C) from the counter bracket and lift the bowden cable through the respective slot.
4. Loosen the counter nuts (D) of the adjustment screws and turn them back.

Mounting

Assembly of the bowden cable is done accordingly in reverse order to the removal.

👉 **Note:**

- 👉 The bowden cable may not be bent or jammed when being placed or with the cable binders. – Prevent unnecessarily tight arches.
- 👉 After fitting the bowden cable must be adjusted again.
- 👉 Therefore observe chapter < *Adjusting the aeration device of the magnetic brake and steering gear release* >.



VEHICLE SUSPENSION

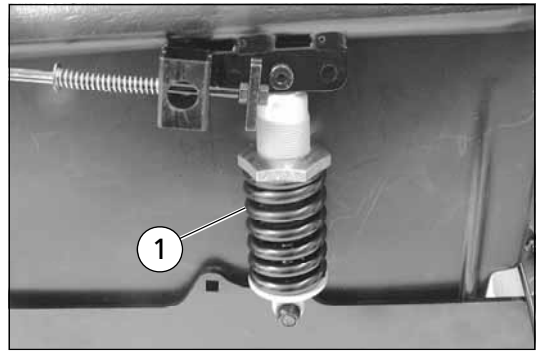
SUSPENSION OF THE CHASSIS

For optimal sitting comfort the suspension (1) can be adjusted according to the desire of the user.

Attention:

- ! Make sure that the adjustment ring sits securely before starting to drive.

– Screw a loose adjustment ring tight enough, until the pressure of the spring prevents further loosening.



ADJUSTING THE SEAT SUSPENSION

For adjustment of the suspension the adjustment ring (2) is screwed forward or backward accordingly.

In doing so the following indications are valid:

Adjustment ring slightly screwed

a – up to 80 kg

☞ Soft suspension/low user weight.

Adjustment ring medium pre-attached

b – up to 100 kg

☞ Medium suspension/ medium user weight.

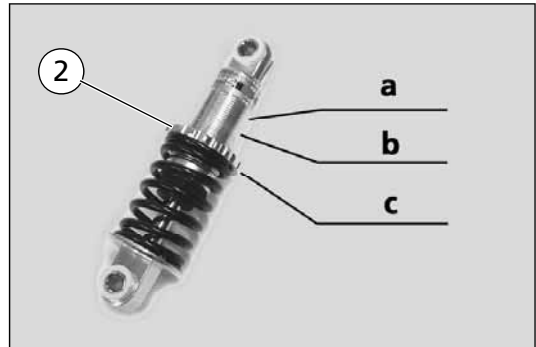
Adjustment ring extremely screwed

c – up to 150 kg

☞ Hard suspension/high user weight.

Attention:

- ! The adjustment of the suspension may only be done by a specialist workshop. – The spring might be under extreme pressure.
- In Position “a” and “c” at least three screw threads must be visible!

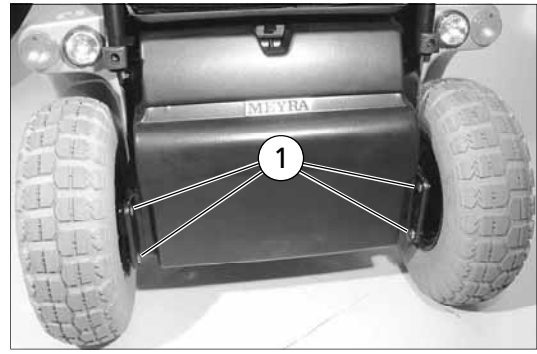


REVETMENT

ATTACHING THE INSURANCE LICENSE PLATE

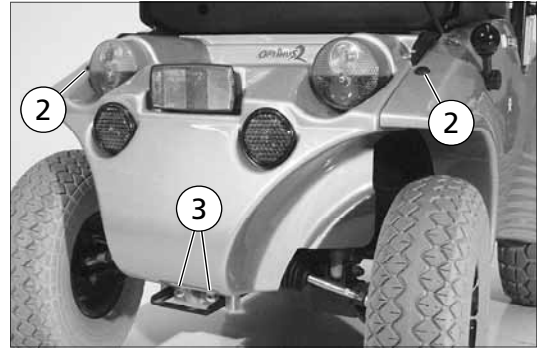
- Position the insurance licence plate on the rear panel and use it as a drilling tableau in order to attach it. Then fasten the insurance license plate with suitable attachment material (e. g. self-tapping screws B 4.2 x 9.5 mm or fillister head screws M 4 x 12 mm with self securing nuts) (A).

☞ Carefully drill through the rear revetment in order to prevent damage to cables and other parts.



REMOVING THE FRONT PANEL

- Remove the attachment screws (1) in order to remove the front panel.



REMOVING THE SIDE PANEL

– Model 9.928:

Unscrew the ball of the selection lever drive/push mode resp. the drum brake lever (4).

☞ During assembly of the selection lever drive/push mode resp. the drum brake lever (4) remember to insert the pressure spring.

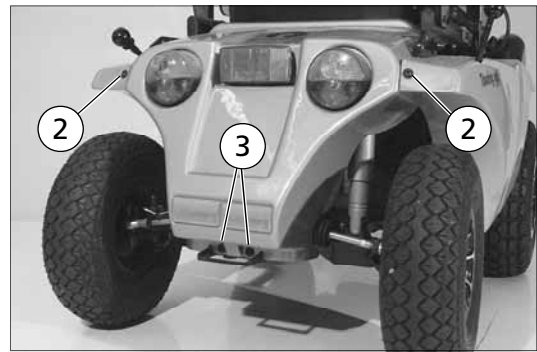
– Model 2.322:

Pull out the drive-/push mode selection lever resp. drum brake lever (4).

– For this remove the corresponding safety ring (6).

- Remove the corresponding rear attachment screws (2) and (5) in order to take the side panel off.

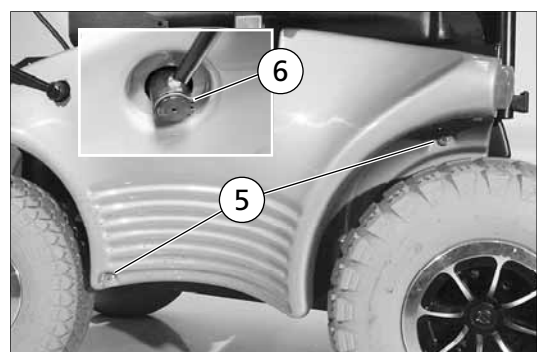
- Loosen the plugged connection of the cables for the front lighting on the power module. – For this push the plug locking device then pull the plug out.



REMOVING THE REAR PANEL

- Remove the lateral attachment screws (2) and lower attachment screws (3) in order to take the rear panel off.

- Loosen the plugged connection of the cables for the rear lighting on the power module. – For this push the plug locking device then pull the plug out.



ATTACHING THE REVETMENT PANELS

Attaching the panel is achieved correspondingly in reverse order to the removal.

Note to rear panel:

Check that the holding angle (7) is mounted underneath the rear panel (A), with which the rear panel is attached to the steering gear. – This bracket serves to protect the potentiometer on the release director.

On older vehicles this bracket is missing and therefore needs to be added on (7).

Parts required for adding on the bracket:

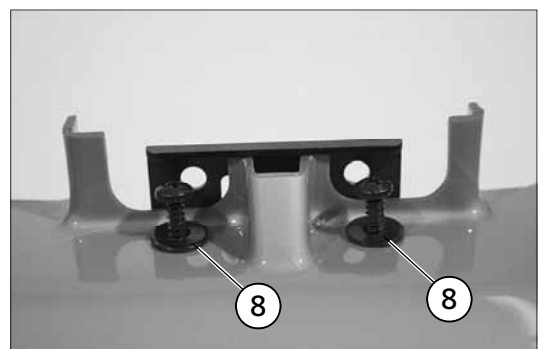
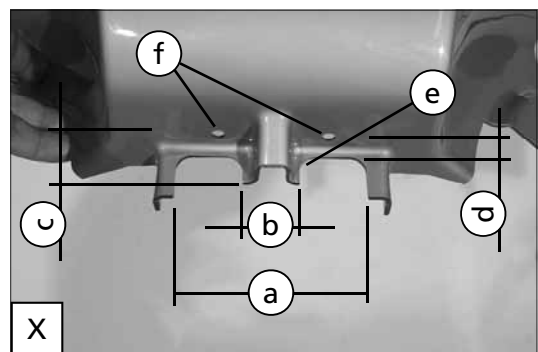
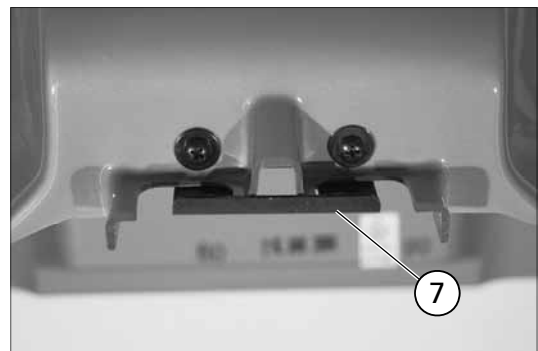
1x 8 109 796 bracket for the rear panel
2x 207 319 400 self-tapping screw with washer DIN 7981 4.8 x 19

1. Rework the rear panel according to the sketch (X).

a = 86 mm
b = 25 mm
c = 20 mm (measured from the inside)
d = 7 mm (measured from the inside)
e = R8 mm
f = $\varnothing 6$ mm (acc. to bracket)

2. Position the bracket and centre it, mark the position of the holes and drill $\varnothing 6$ mm.

3. Screw on the bracket (8).



STEERING

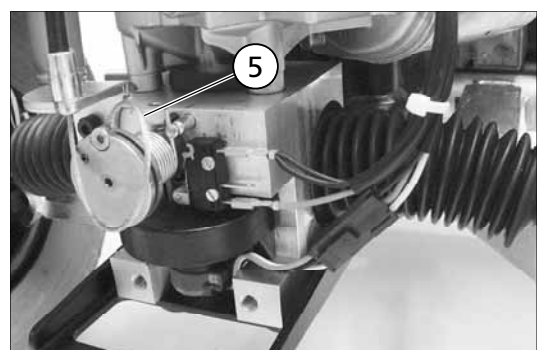
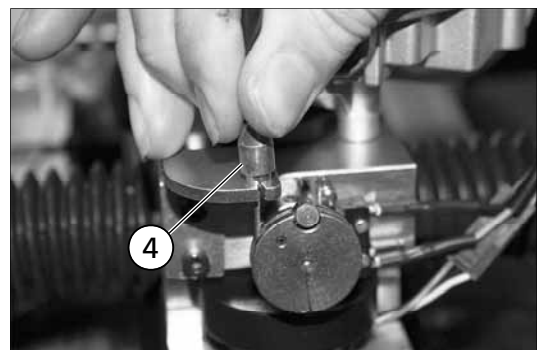
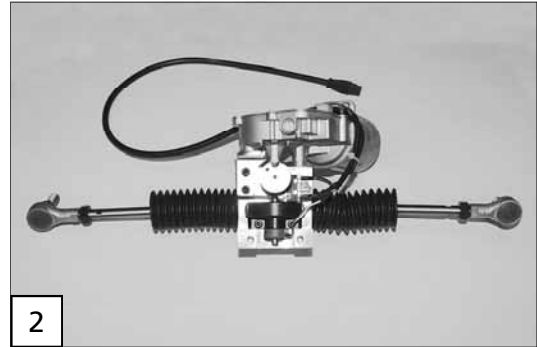
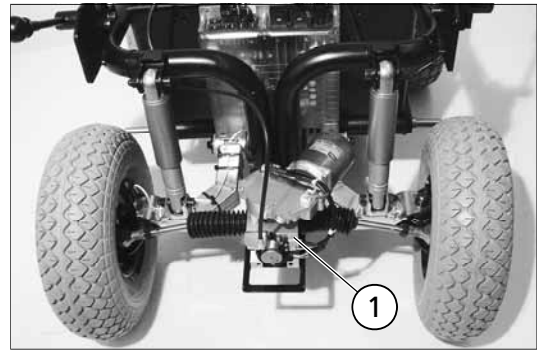
As a standard the wheelchair is fit with electrical steering (1) (completely mechanically operating steering optional).

REPLACEMENT

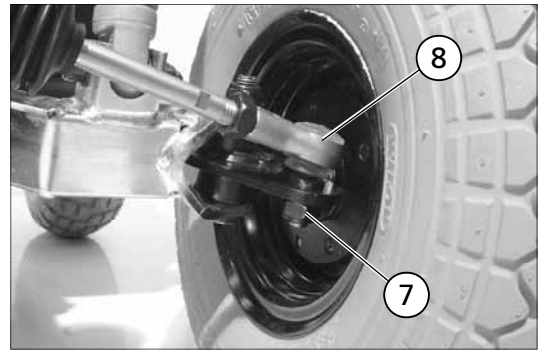
The steering unit (2) can be supplied completely as exchange.

REMOVAL

- Set the steering lever (3) to drive mode.
- Remove the rear panel.
- Unhook the bowden cable. – For this first lift the bowden cable sleeve out of the centring device (4). The guide the bowden cable counter-clockwise around the eccentric shaft and thus loosen it out of the groove (5). Afterwards guide the end of the cable upward and push the press nipple (A) axially out of the round groove.
- Unlock the plug connections for the cables leading to the steering gear on the power module and pull the plug. – For this push the plug locking device then pull the plug out.



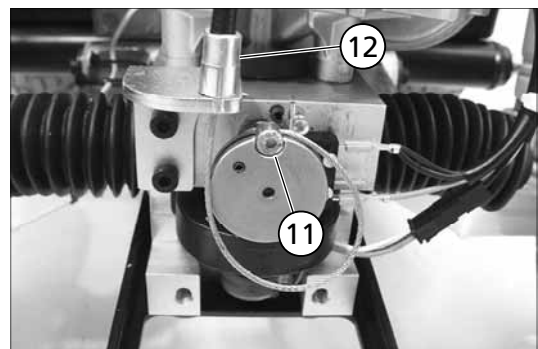
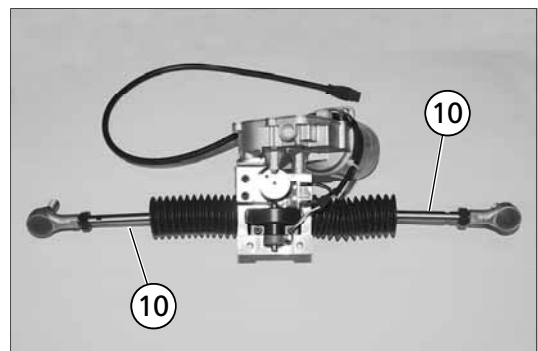
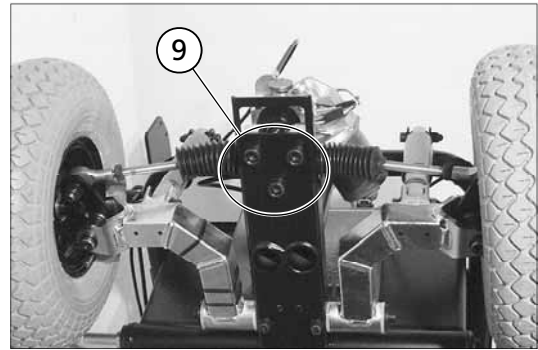
- Dismantle the nuts (7) of the angle joints (8).
- Disconnect the steering gear from the frame. – Therefor unscrew the three attachment screws (9).



MOUNTING

Note:

- ☞ In the delivery condition the steering gear is tuned so that in the zero-position of the release director the gear rack is centred to the steering gear housing.
- ☞ The adjustment of the straight course is achieved by turning the tie-rods (10).
- Mount the steering gear with the attachment screws (9) to the frame.
- Mount the angle joints (8) to the steering knuckle.
- Insert the plug on the power module. – The locking device must lock into place.
- Hook the bowden cable back into place. – For this push the press nipple axially into the round groove (11). Insert the bowden cable clockwise into the groove of the eccentric shaft, lift the bowden cable sleeve and lower it into the centring device (12).
- Check the alignment and adjust if necessary, view chapter < *alignment and track trueness* >.
- Safely lay the cables and attach them with cable binders.
- Re-establish the plugged connections of the taillights to the power module (A). – The locking device must lock into place.
- ☞ Hereto observe subchapter < *Plug assignment* >.



TRACK AND STRAIGHT COURSE

Note:

For adjustment to and inspection of the track the wheelchair is to be positioned on a level surface and loaded with about 100 kg on the seat.

CHECKING THE ALIGNMENT

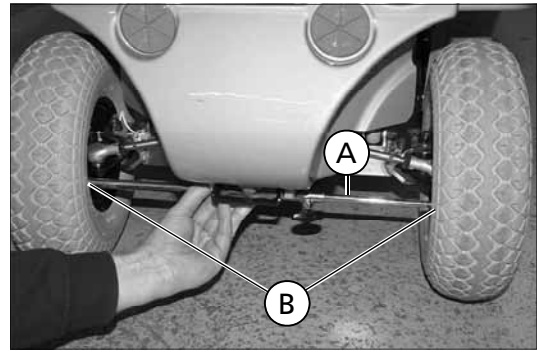
- Switch the operating module on, put the joystick into the straight forward direction and let the wheelchair drive a short distance.
- Hold the alignment measure (A) at the front, horizontally at axle height between the rim horns and adjust so that the ends barely touch the rim horns.
- Hold the alignment measure in the back, horizontally at axle height between the rim horns (B).

The alignment is adjusted correctly when the rear rim horns are 2 mm further apart than the front rim horns (2 mm toe-in).

Note:

As a replacement for the wheel alignment measure you can also use two boards of about 30 cm length:

- 1.) Hold the boards parallel beside each other so that the end of one of the boards sits on the front rim horn of the left wheel and the end of the other board on the front rim horn of the right wheel.
- 2.) Draw a continuous line above the boards.
- 3.) Hold the boards in the same fashion onto the rear rim horns. – At the correct setting the two lines must have a 2 mm displacement.



ADJUSTING THE TRACK AND STRAIGHT COURSE

- Loosen the counter nuts (1) on both tie-rods left and right.
- Switch the operating module on, put the joystick into the straight forward direction and let the wheelchair drive a short distance.
- Turn the tie rod until the correct toe-in is achieved, view chapter < *checking the alignment* >.

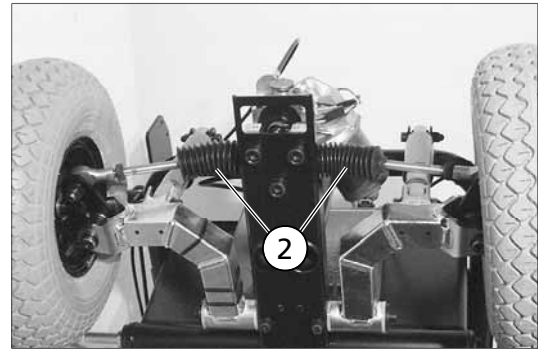
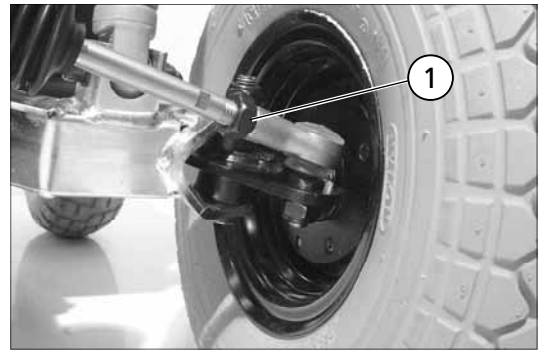
Note:

When turning the tie-rods, take care that the rubber buffers (2) are not displaced.

- Adjust the straight course by corresponding turns of both tie-rods.
- Retighten the counter nuts on both tie-rods left and right.
- Check the straight track on a short ride and if required repeat the procedure.

Note:

Let the wheelchair repeatedly start a little distance during the adjustment since the friction between the tyres and floor complicates the following of the steering wheels.



REPLACING THE RETURN SENSOR

If the steering wheels, after releasing the joystick (zero position) do not align themselves in at least almost straight direction the return sensor (1) is to be replaced.

Note:

If the return sensor is exchanged it has to be completely aligned again. View chapter < *Alignment of the return sensor* >.

Pre-condition:

The wheelchair must be safely jacked up. The drive can turn freely and the steering wheels can move freely.

- Remove the rear panel.

Replacing the return sensor:

- Disconnect the plugged connection (2) of the return sensor. – For this activate the plug locking device first.
- Dismantle the attachment screws (3).
- Screw on the new return sensor.

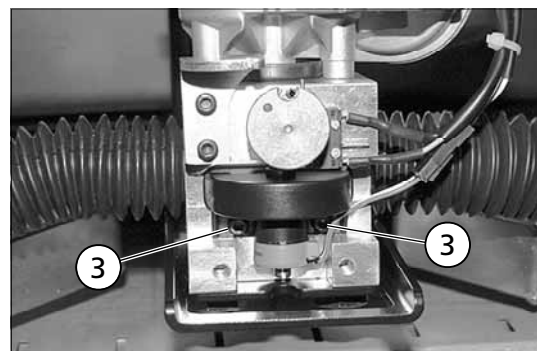
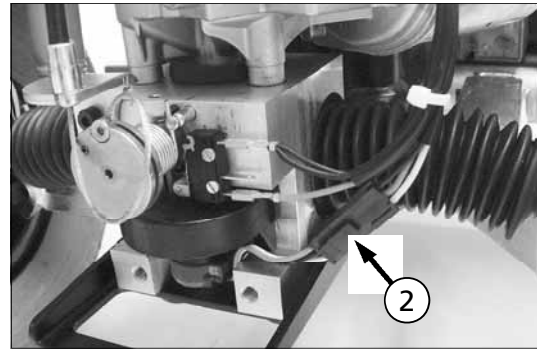
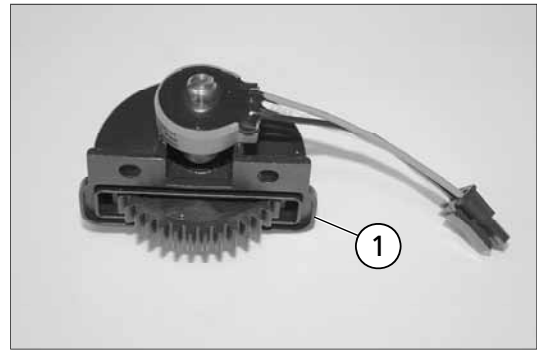
Note:

Secure the attachment screws (3) of the return sensor with Loctite 243.

Mount the rear panel:

Check whether a bracket is mounted underneath the panel.

View < *Notes to bracket* >.



Alignment of the return sensor:

The return sensor can be aligned with the help of a slotted screw driver by tuning the potentiometer axle (5).

☞ The potentiometer axle can be reached from the bottom through a hole in the frame.

☞ Note for older wheelchairs:

On older wheelchairs that do not have the hole in the frame, the screws (6) have to be removed. Afterwards pull the steering gear back until the potentiometer axle (5) can be reached through the loop.

☞ Note to the alignment:

☞ The steering motor only reacts to the adjustment of the potentiometer after it is again addressed by the operating module resp. power module.

☞ The return sensor is to be aligned so that the gear rack comes out the same distance on both sides of the steering gear.

– For this push the respective bellow outward and take the measurement $< X >$ between the nut and housing.

1. Switch the operating module on.
2. Press the joystick a short time.
3. Align the potentiometer axle with a slot screw driver from the bottom through the rigging loop.
 - ☞ The gear rack is moved to the left by turning the potentiometer axle to the right.
 - ☞ The gear rack is moved to the right by turning the potentiometer axle to the left.
4. Again give the joystick a short push and check the measurement $< X >$.

☞ Note:

☞ Repeat steps 3. and 4. until the measurement $< X >$ is the same on both sides. – The steering gear is the symmetrically aligned.

5. Remount both bellows back onto the steering gear.

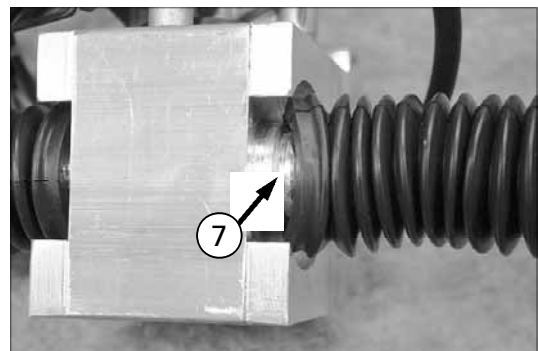
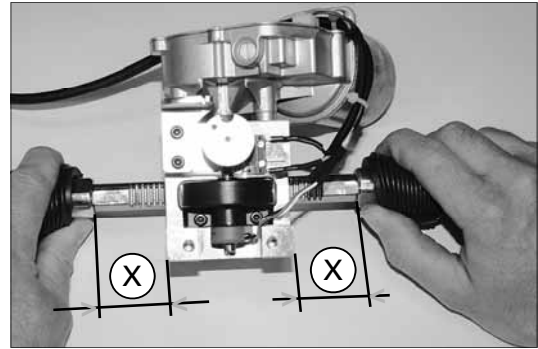
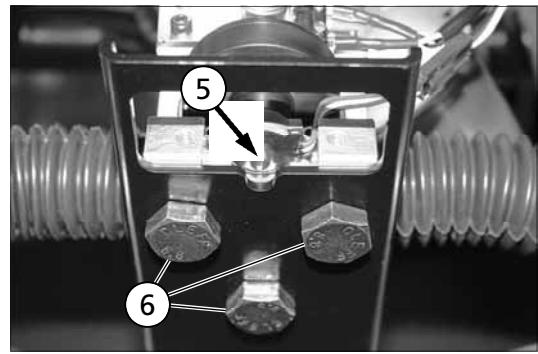
☞ In doing so ensure that the bulge of the bellow lies circumferential in the groove (7) on the steering gear.

☞ The bellow may not be assembled when it is swivelled.

6. If necessary remount the steering gear.

7. Check the track and straight course and realign it if required.

☞ Therefore view chapter *< Adjusting the track and straight course >*.



WHEELS

- ☞ The magnet for determining the speed is located inside the inner rim half of the steering wheels. Assembly of the wheels does not depend on the side.

WHEEL CHANGE

Before starting the disassembly work, support the frame to prevent the wheelchair from tipping over and secure it to prevent an unwanted movement or tipping over.

- ☞ Always change tyres in pairs.

Attention:

- ! Never loosen the connection screws of the rim halves (B) to disassemble the wheel.
 - Danger of injury!
- ☞ The connection screws are marked with red caps.
- Never loosen the screws (B) for disassembly of the wheel before previously completely deflating the wheel!

DISASSEMBLY OF THE WHEELS

Remove the wheel by unscrewing the centre screw (A).

ASSEMBLY OF THE WHEELS

After attaching the wheel secure the screw with Loctite 243 and tighten it (A).

☞ Note:

- Tighten the screw with the specified torque (25 Nm).
View chapter < *Maintenance/DIN norms and guidelines* >.



CHANGING THE TYRES

Fully de-inflate the tyres for a tyre change.

DISASSEMBLY OF THE TYRES

1. Disassemble the wheel.
2. Completely deflate the tyre.
3. Remove the red caps of the rim-half connection screws.
4. Unscrew the rim-half connection screws (B).



ASSEMBLY OF THE TYRES

Attention:

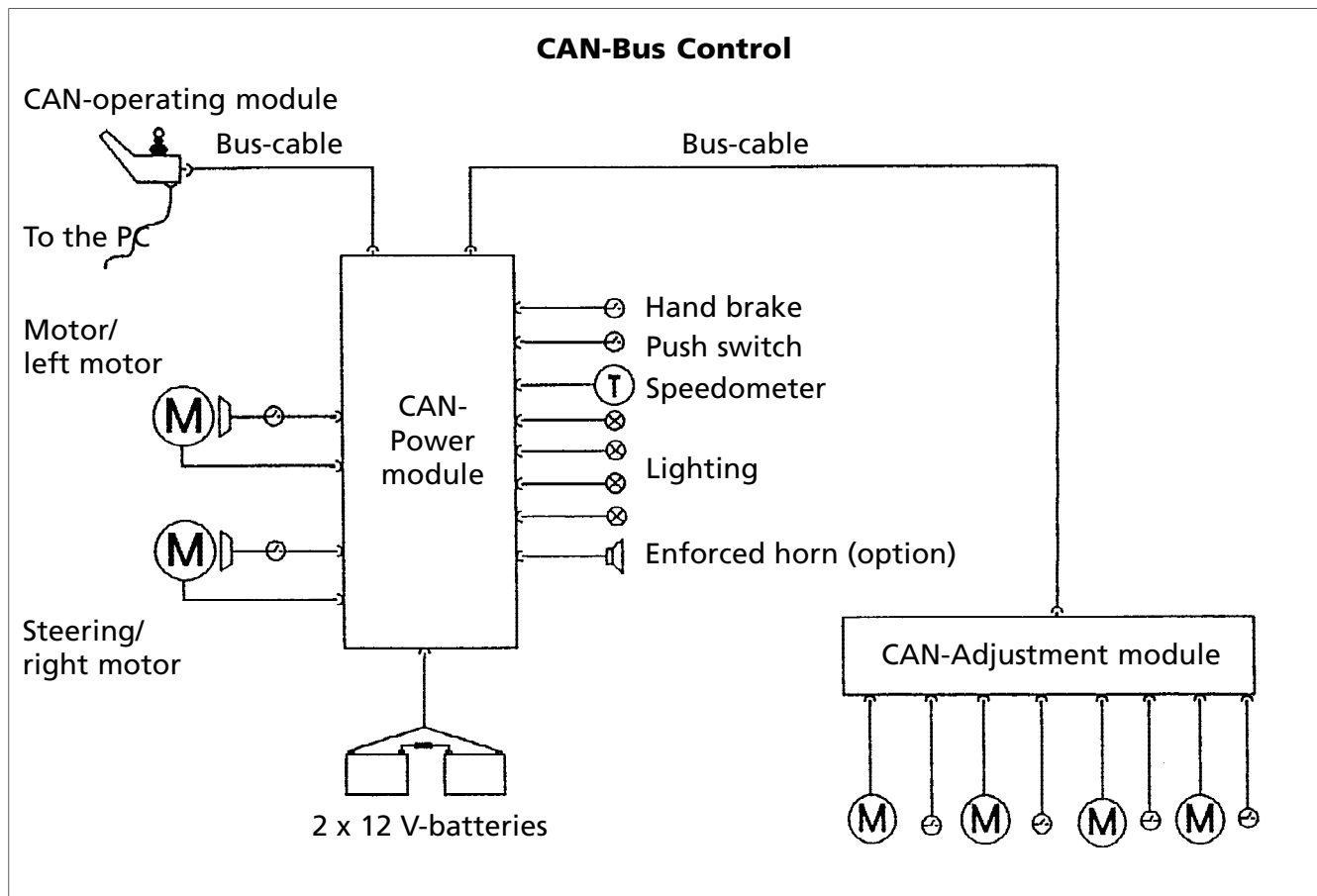
- ! During assembly the rim halves may not damage the tube or let it be jammed.
1. Place the tyre with crease free tube between the rim-halves. If necessary observe the running direction of the tyre (view arrow).
 2. Tighten the rim-half connection screws evenly.
- ☞ For this new safety nuts are to be used and tightened with the specified torque.
– View chapter < *Maintenance/DIN norms and guidelines* >.
3. Place the red caps onto the rim-half connection screws.
 4. Assemble the wheel.

CAN-BUS CONTROL

The CAN-Bus Control consists of the modules (those are the electronic hardware components) and the CAN-Bus Software.

The CAN-Bus software is installed in the modules and controls the vehicle.

Over the bus cable data is transferred between the modules of the vehicle (view diagram below). The organisation of the data is performed by the CAN-bus software.



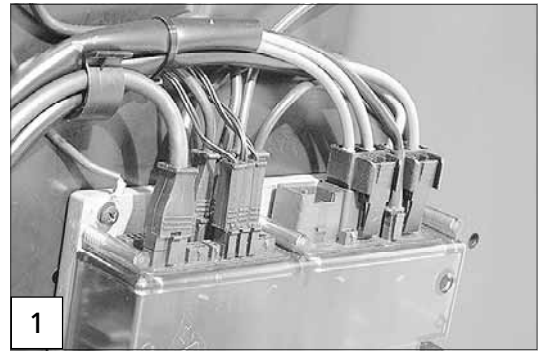
CAN-BUS HARDWARE

The hardware of the CAN-Bus control consists of

- Operating module
- Power module
- Adjustment module (option)

The modules used for the CAN-bus control have

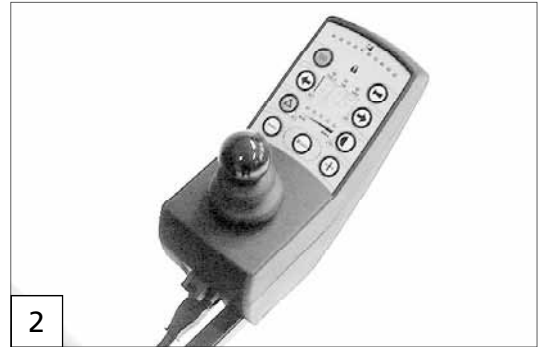
- cables that are pluggable and secured against unintentional deletion (1),
- are code secured against swapping
- and are protected against spray water (IP 54).



OPERATING MODULE

The operating module < OM > (2) has the following characteristics:

- same operating module for all vehicles with CAN-bus control
- enforced joystick with “dead-man-function”
- LED report for lighting/direction indicator/hazard warning flashers
- three-digit switchable speedometer display: optionally speed in km/h, daily km (manual reset) or total km
- protection against unauthorised use through magnetic key
- integrated charging socket and signal unit
- plug connector for special operations: ON/OFF, external keys, external joystick (& service)
- Switching the regular key functions to multi-function over the joystick.
Display shows: **F H**



Magnetic key function

The wheelchair can be locked with a magnetic key. For this magnetic key function must be enabled. This is the case directly from the manufacturer. The clearance can be done subsequently over the CAN-bus software.

Attention:

- ! The magnetic key can damage magnetic cards. – Do not store the magnetic key near magnetic cards!

Locking

- For locking slide the magnetic key in vertical direction slightly left or right of the key symbol. – Afterward the display shows *SCH* (German abbreviation for Schloss = key). The wheelchair is now locked and can be switched off.

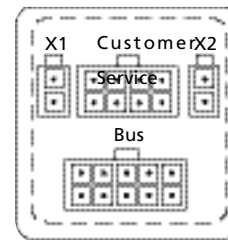
Switch functions

To supervise the settings for the drive resp. push mode and the faultless functioning of the micro switches the display shows the switch setting(s):

- S-S (Switch pushing): The magnetic brake is disengaged and the push mode activated.
- S-L (Switch steering): The steering is ungeared (only Optimus).
- S-b (Switch brake): The drum brake is activated (only Optimus option).

Charging function

When a charger is connected to the operation device and the wheelchair is switched on the display shows *LAD*. The wheelchair cannot be driven.



Plug assignment

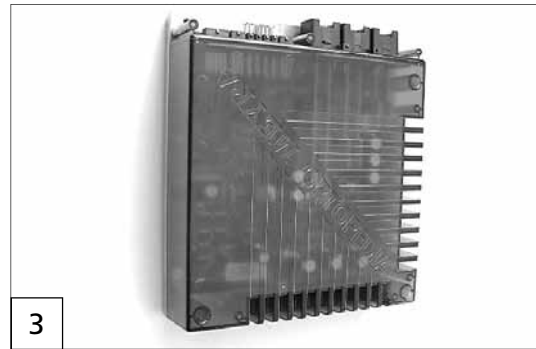
X1	external ON/OFF key
X2	external keyboard
Service	external joystick, special operations, PC-service-interface
Bus	Bus-cable

POWER MODULE

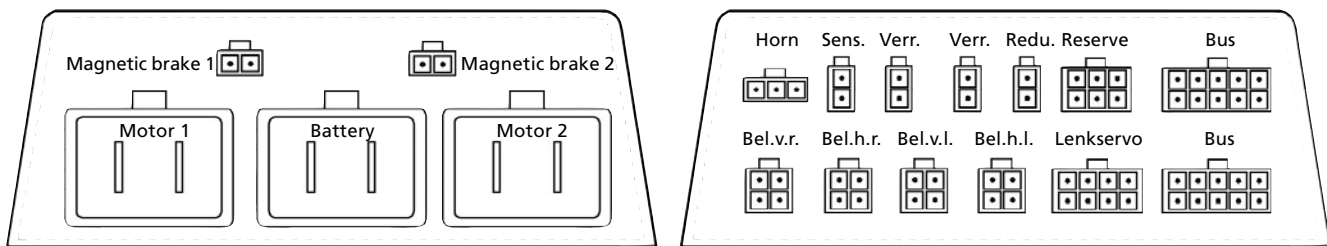
The power module < PM >(3) stores the settings of the driving parameters and adopts as the power electronic the addressing of the driving- and steering motor respectively on two motor wheelchairs the addressing of both driving motors.

The inlets and outlets of the power module are short circuit proof, so that the lead fuse is not applicable. – Further features are:

- Automatic and selective deactivation of disturbed outlets
- Green and red LEDs as a status indicator, visible through the transparent lid. During faultless function a green and red LED light up shortly after one another when switching on the wheelchair.



PLUG ASSIGNMENT



(upper row from left to right)

Magnetbremse 1	Magnetic brake (on two motor wheelchairs: left magnetic brake)
Magnetbremse 2	right magnetic brake (only on two motor wheelchairs)
Hupe	Enforced horn (option)
Sens.	Magnet sensor speed
Verr.	Micro switch magnetic brake
Verr.	Micro switch drum brake (only option Optimus)
Redu.	Speed reduction (option)
Reserve	External power supply
Bus	Bus-cable

(bottom row from left to right)

Motor 1	Motor (on two motor wheelchairs: left motor)
Batterie	Battery cable
Motor 2	Right motor (only on two motor wheelchairs)
Bel.v.r.	Lighting, front right
Bel.h.r.	Rear lighting, right
Bel.v.l.	Lighting, front left
Bel.h.l.	Rear lighting, left
Lenkservo	Steering motor
Bus	Bus-cable

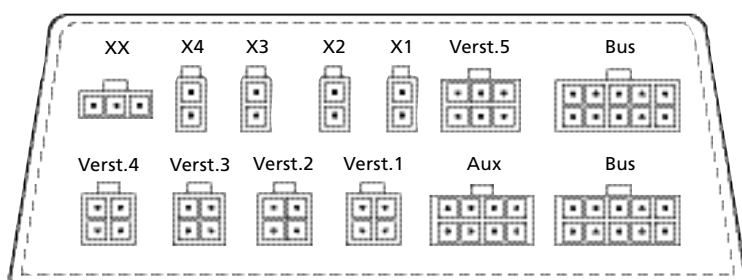
ADJUSTMENT MODULE

When applying electric adjustment units the vehicle is equipped with an adjustment module < AM > (4) for addressing the adjustment motors. – The adjustment module is available in two different versions:

- AM1 for 4 adjustment drives (back support, tilting, and two leg supports)
- AM1 for 6 adjustment drives (needed for additional seat height adjustment)

The output current (0 to 10A) and the output voltage (0 to 24 V) can be adjusted. – Further features are:

- Gentle motor initiation, operation via keys and/or joystick(s)
- Green and red LEDs as a status indicator. During fault-less function a green and red LED light up shortly after one another when switching on the wheelchair.



PLUG ASSIGNMENT

- | | |
|----------|---|
| XX | End-switch (on two motor wheelchairs and on the adjustment motor 1 mounted to the back: End-switch adjustment motor 4. On one motor wheelchairs: End-switch adjustment motor 3) |
| X1 | Switch (reserve) |
| X2 | Locking switch adjustment motor 5 against adjustment motor 2 |
| X3 | Locking switch adjustment motor 2 against adjustment motor 5 |
| X4 | End-switch adjustment motor 4 |
| Verst. 1 | Adjustment motor 1 (electrically adjustable leg support left, code 86) |
| Verst. 2 | Adjustment motor 2 (electrically adjustable leg support right, code 86) |
| Verst. 3 | Adjustment motor 3 (electrically adjustable seat angle, code 118) |
| Verst. 4 | Adjustment motor 4 (electrically adjustable back, code 25) |
| Bus | Bus-cable |

Only Adjustment module 2 (AM2)

- | | |
|----------|--|
| Verst. 5 | Adjustment motor 5, with end-switch (electrically adjustable seat height, code 27) |
| Aux | optional outlet/AUX |

CAN-BUS SOFTWARE

Operating module, power module and adjustment module have different tasks. That is why different parts of the CAN-Bus software are installed on them.

A series of functions are included in the CAN-Bus software. Some functions (such as driving behaviour, switch off period) define the features of the wheelchair and can be amended. Other functions (such as diagnostic functions, error-lists) act for the service and repair.

The amendable functions can be adjusted

- a) indirectly through the service program (in connection with a PC, all functions available)
- b) directly through the operating module (only amendments to the driving behaviour)

The main portion of the setting for amendable functions is centrally stored on the power module.

Current software (updates) for the single CAN-bus modules is downloaded per internet from a Meyra-Homepage-Site and transferred to the respective module. The software version installed on the modules of a vehicle should always show the same version number.

Note:

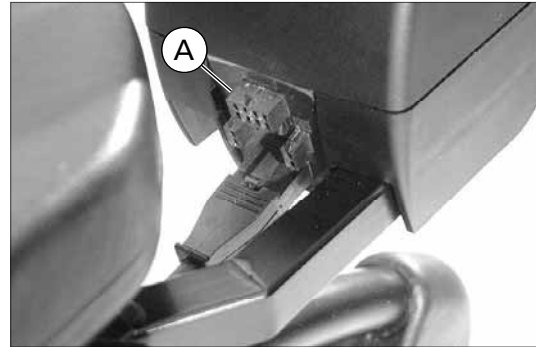
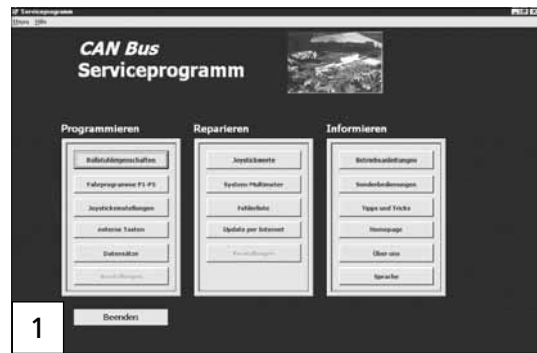
We recommend checking the current status of the software version regularly over the internet.

SERVICE PROGRAM

The service program (1) item no. 1051871 is installed on a PC. The PC is connected to the vehicle with a data cable. – For this the data cable is plugged into the serial socket of the PC and the 8-pin socket *Service* (A) on the backside of the operating module, view chapter < *Operating module* >.

Afterwards different functions can be executed:

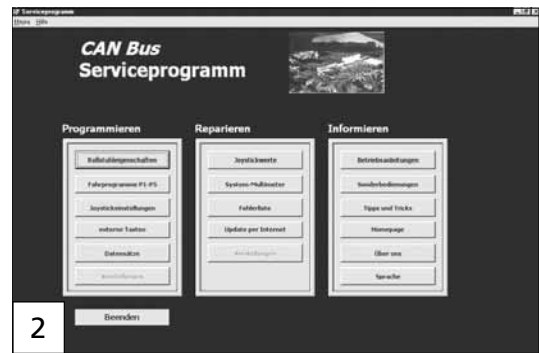
- Updating the CAN-Bus software,
- Influencing functions that are included in the CAN-Bus software,
- A function check resp. error elimination based on the stored and current data.



Operating system

Precondition for the service program is one of the following Microsoft operating systems:

- Win 98
- Win ME
- Win NT
- Win 2000
- Win XP

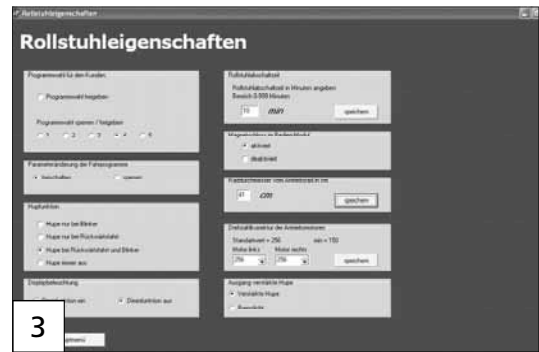


Functions of the service program

The service program (2) is divided into the sections

- Programming,
- Repair,
- Informing.

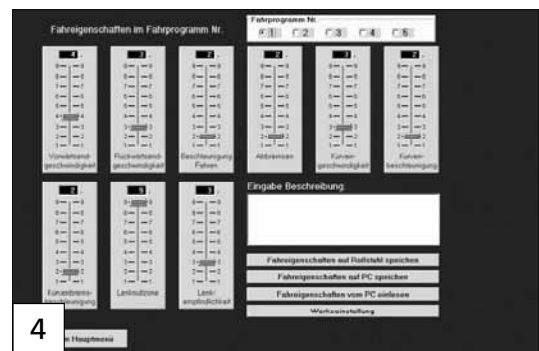
The amendments carried out with the service program become active after switching the wheelchair off and back on.



Section programming

Wheelchair characteristics (3):

- Locking or activating the amenability of driving behaviour over the operating module.
- Locking or activating the program selection P1-P5 for the user.
- Selecting horn function.
- Setting the switch off period.
- Activating/deactivating the magnetic lock.
- Setting the wheel diameter.
- Display light dimmer.
- Switching between external horn and brake lights.



Driving programs (4):

- Programming the driving parameters 1-9 for the driving programs P1-P5 (amendment of the driving behaviour).

Joystick adjustment (5):

- Changing the movement limits of the joystick.
- Changing the movement direction of the joystick.



External keyboards (1):

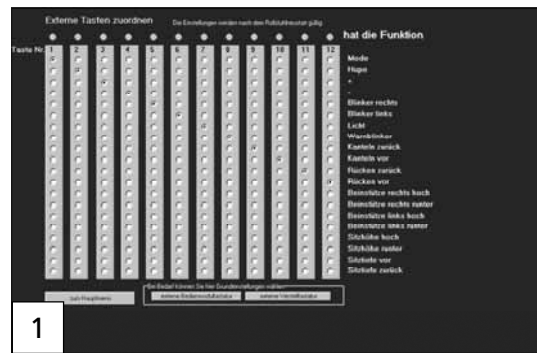
- Setting the functions for external keys.

Data record (2):

- Current operating software (download of new wheelchair software to the wheelchair).
- Setting the wheelchair type.
- Basic settings (resets the parameters to the manufacturer settings).
- Setting the driving parameters back to the manufacturer settings.
- Errors while loading the operating software.

Adjustments:

- Adjusting the adjustment motor voltage.



Section repair

Joystick values (1):

- Display of the signal values from the joystick to the motor director.

System multimeter (2):

- Measuring the battery voltage, motor voltage and motor current.
- Data recorder for the current consumption of the motor.

Error list (3):

- Input item for customer data.
- Error count by reading out all error lists of the CAN-Bus modules.
- Time indicator for the last 10 errors.
- Error description for the listed error codes.

Update per internet:

- Internet connection for downloading new software.

Adjustments (4):

- Data recorder for the current consumption of the adjustment motors.

Section information

Operating manuals:

- Operating manuals stored on the PC can be viewed or printed.

Special operations:

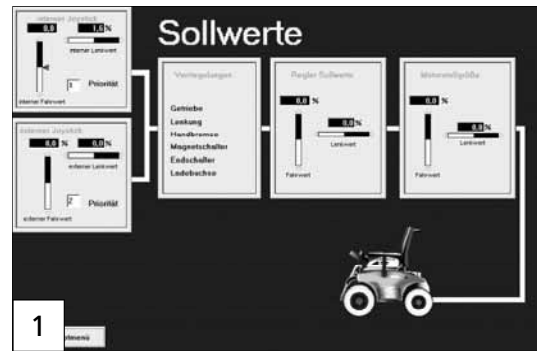
- Information to special operations stored on the PC can be viewed or printed.
- Tips & tricks.

MEYRA-Homepage:

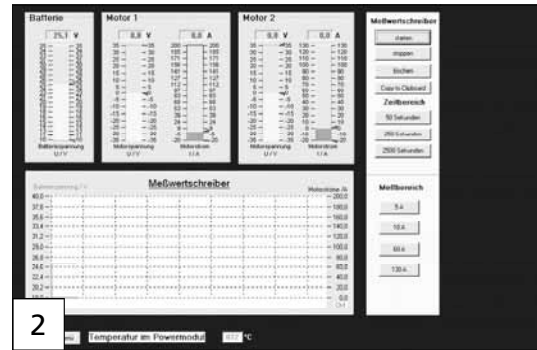
- Direct link to the MEYRA-Homepage.

About us:

- Version number of the service programs.



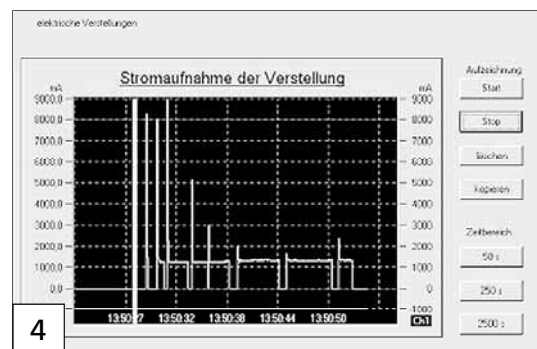
1



2



3



4

NOTES FOR LOADING NEW SOFTWARE INTO MEYRA-CAN MODULES:

Before starting the following instructions are to be read completely. If something is not clear contact the MEYRA service department before starting the work:

☎ **Fon: +49 (5733) 922 174 or +49 (5733) 922 304**

☎ **Note:**

Also inform yourself on our homepage www.meyra.de under ‚Downloads‘ / ‚Software‘ about the current versions of the MEYRA-CAN PC-software and the MEYRA-CAN module files and if necessary download the current software to your PC.

IMPORTANT:

- ! While downloading the new software into MEYRA-CAN modules always ensure that this process may not be interrupted under any circumstances.

During the download period of about 3min the PC should run stably, so do not start any further programs etc..

☎ **Note:**

If a notebook-PC is used, ensure that the battery of the PC is completely charged before starting.

Under all circumstances make sure that during the download:

- ☎ the wheelchair is not switched off,
- ☎ no plug of the interface cable is pulled,
- ☎ no work is carried out on other cables or plugs of the wheelchair,
- ☎ the mains fuse of the wheelchair is not removed,
- ☎ the batteries of the wheelchair are sufficiently charged.

If problems occur repeatedly concerning the data transfer while working with the service program or during the download of new software in MEYRA-CAN modules, contact our service department or send in the interface cable for inspection / repair.

Errors while loading the operating software.

If the above listed notes are not observed, new MEYRA-CAN modules may remain in an inoperational state during the download.

Nevertheless the affected modules can be restored by running the program „Errors while loading the operating software“.

Initial situation:

Please switch the wheelchair OFF and ON again in order to definitely restore the initial situation.

The modules that behave as follows, are in the < **Boot Modus** >:

Operating module:

The green LED beside the ‚Light‘-key is constantly lit, no other displays are active.

Power module:

The green LED in the module is constantly lit.

Adjustment module:

The green LED in the module is constantly lit.


In order to be able to carry out an ‚Emergency boot‘ the operating module must be in boot-mode. Therefore should the green LED beside the ‚Light‘-key in the operating module only light up shortly and no other displays light up after the module is switched on, it has to be brought into the boot-mode as follows:

- Switch the operating module on (red and green LED light up shortly and go off again).
- Press the following three keys and keep them depressed: Key < minus >, key < plus > as well as key < right turn signal >.
- Switch off the operating module with the < ON / OFF > –key.

Note:

The off-switching procedure may take up to 15 sec.. The red and green LED light up shortly in the operating module at the moment when the CAN-Bus system switches off.

- After the system has switched off, release the three keys (< minus >, < plus > and < right turn signal >).
- Switch on the operating module with the < ON / OFF > –key again.

 The green LED of the operating module beside the ‚Light‘-key is constantly lit.

Carrying out the emergency boot

Carry out the following steps:

- The wheelchair is switched off, if not switch the wheelchair off.
- Connect the operating module with the interface cable with a serial port (COM1 or COM2) of your PC and start the service program.
- Wait for the service program message “ Connection to wheelchair cancelled. Please end program”, then confirm this message with ‚OK‘.
- Now switch on the wheelchair.
- In the menu select ‚Data files‘ / ‚Error while loading the operating software‘ / ‚Emergency boot‘.
- Answer to all questions with a click on the respective data button.
- Activate the ‚Emergency boot‘ button and follow the course of the program.
- After the program is completed the MEYRA-CAN modules should automatically return into a functioning state.

SETTING AND CHANGING THE WHEELCHAIR TYPE

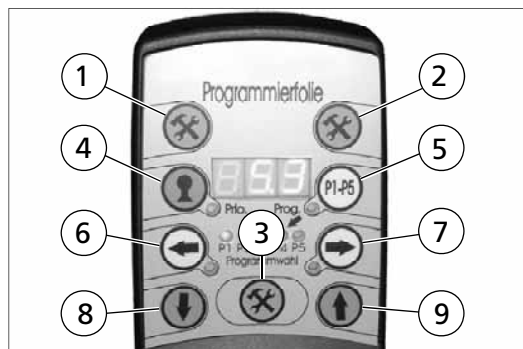
The type of wheelchair has to be defined since different motors and wheel sizes are applied and the standard parameters have to be adapted.

Setting the wheelchair type

All power modules are supplied with a software version 10 or higher and are in the basic settings.

The wheelchair cannot be driven. First the wheelchair type has to be entered. Proceed as follows:

1. Switch the wheelchair on and place the programming foil. – The display of the operating module shows < **000** >.
2. In order to enter, for example a Sprint GT 6 km/h, adjust the setting to < **6** > by pressing the up- or down key (8) or (9).
- ☞ For the selection of the setting required for the wheelchair type view table 1 and 2.
3. For confirmation press the left-key (6). – The display shows < **HHH** >.
4. Press the right and lower service key (2)+(3) simultaneously and keep them pressed.
 - Additionally press the left service key (1) and release again. – This switches the wheelchair off.
 - Release all keys. – After the next activation the wheelchair type is set as selected.



1

Key assignment of the operating module

(with programming foil applied)

- ① Left service-key
- ② Right service-key
- ③ Lower service-key
- ④ Joystick-key
- ⑤ P1-P5-key
- ⑥ Left-key
- ⑦ Right-key
- ⑧ Down-key
- ⑨ Up-key

DISPLAY-ENTRY OF THE WHEELCHAIR TYPE

Table 1: Two-motor drive

Wheelchair type	Wheel diameter	Display-entry
Sprint GT 6 km/h with enforced 6 km/h motors	38 cm	5
Sprint GT 6 km/h	38 cm	6
Champ 6 km/h	35 cm	7
Champ 10 km/h	35 cm	8
Sprint GT 10 km/h	38 cm	10
Sprint GT 12 km/h	38 cm	12

Table 2: One-motor drive:

Wheelchair type	Display-entry
Optimus hand steering 6 km/h	5
Optimus 6 km/h	6
Touring 927 6 km/h	7
Touring 927 10 km/h	8
Optimus hand steering 10 km/h	9
Optimus 10 km/h	10
Optimus 2 / Touring 928 6 km/h	11
Optimus 2 / Touring 928 10 km/h	12
Optimus 2 / Touring 928 12 km/h	13
Optimus 2 / Touring 928 15 km/h	14 (version 13 and up)

Changing the wheelchair type

Should it become necessary to change the wheelchair type setting, for example when the power module is fit into a different wheelchair, this is possible through our service program.

DRIVING PROGRAMS

The software installed on the power module contains five driving programs with different driving behaviour. You can for example call on separate programs for indoor and outdoor use. The user can change the driving behaviour of the wheelchair at any time by changing into a different driving program. The manufacturer settings of these driving programs can be viewed in table 1.

Each of the driving programs is defined through the respective setting of the 9 parameters. The parameters are set by the manufacturer to the values shown in table 2.

The values serve for orientation and should as a rule be maintained. Should the demands of the user vary from the manufacturer settings, the values for amending the driving characteristics are to be changed.

Table 1: Standard manufacturer setting of the driving programs

Program	Characteristic
Program 1:	Indoor soft - Operating indoors ☞ soft driving behaviour - very slow and very soft
Program 2:	Indoor normal - Operating indoors ☞ normal driving behaviour - slow and soft
Program 3:	Outdoor soft - Operation outdoors ☞ soft driving behaviour - slightly faster and slightly harder
Program 4:	Outdoor normal - Operation outdoors ☞ normal driving behaviour - full speed and harder
Program 5:	Outdoor normal - Operation outdoors ☞ normal driving behaviour - full speed and harder

Table 2: Standard manufacturer setting of the parameters

Parameter		Programs				
No.	Description	P1	P2	P3	P4	P5
1	Forward final speed	04	05	07	09	09
2	Backward final speed	03	03	04	05	05
3	Acceleration	02	03	03	05	05
4	Brake delay	02	03	04	04	04
5	Curve speed	03	03	03	03	03
6	Curve acceleration	02	03	03	04	04
7	Curve braking delay	02	03	03	04	04
8	Steering null-zone	09	08	06	05	05
9	Steering sensibility	03	03	03	05	05

Description of the programmable CAN-bus parameters

1. Forward final speed:

The values 1 to 9 set the final speed forward, dependant on the maximum final speed of the wheelchair (6 or 10 km/h).

1 stands for minimum.
9 stands for maximum.

2. Backward final speed:

The values 1 to 9 set the final speed backward, dependant on the maximum final speed of the wheelchair (6 or 10 km/h).

1 stands for minimum.
9 stands for maximum.

3. acceleration:

The values 1 to 9 set the time that the predetermined driving set-point requires from zero to max. (forward joystick movement).

This means that the driving set-point is delayed through a run-up ramp.

1 stands for longest acceleration period.
9 stands for the shortest acceleration period.

4. Brake delay:

The values 1 to 9 set the time that the driving set-point requires (joystick movement from the front back into zero-position), in order to return from the maximum value back to zero.

This means that the driving set-point is delayed through a run-down ramp.

1 stands for the longest delay period.
9 stand for the shortest delay period.

5. Curve speed:

The values 1 to 9 set the steering final speed, depending on the maximum steering final speed of the wheelchair (6 or 10 km/h).

1 stands for minimum.
9 stands for maximum.

The effect shows how fast the wheelchair performs a circle with maximum movement of the joystick to the right or left.

6. Curve acceleration:

The values 1 to 9 set the time that the steering set-point requires (joystick movement toward the right or left) in order to reach from zero to maximum value.

This means the steering set-point is delayed through a run-up ramp.

1 stands for longest acceleration period.

9 stands for the shortest acceleration period.

7. Curve braking delay:

The values 1 to 9 set the time that the steering set-point requires (joystick movement from the right or the left back to zero-position).

This means the steering set-point is delayed through a run-down ramp.

1 stands for the longest delay period.

9 stand for the shortest delay period.

8. Steering null-zone:

The steering zero-zone is an area within which the joystick can be moved to the right or left and the steering set-point remains on the value zero.

1 stands for no zero-zone.

9 stands for largest zero-zone.

9. Steering sensibility:

The values 1 to 9 set how extreme the driving speed in curves when moving the joystick.

1 stands for no reduction of the driving set-point when increasing the steering set-point.

9 stands for most extreme reduction of the driving set-point when increasing the steering set-point.

PROGRAMMING WITH THE OPERATING MODULE

The following functions can be amended directly through the operating module:

- Adjustment of the parameters
- Setting the joystick priorities
- Selection of the special operation **F H**
- Locking the program selection P1-P5
- Setting the wheel diameter
- Setting the speed factor

ADJUSTMENT MODUS

For adjustment of the driving behaviour through the operating module you have to switch from the driving modus into the adjustment modus. This is done by pressing a certain key combination on the operating module, view chapter < *switching into the adjustment modus* >.

PROGRAMMING FOIL

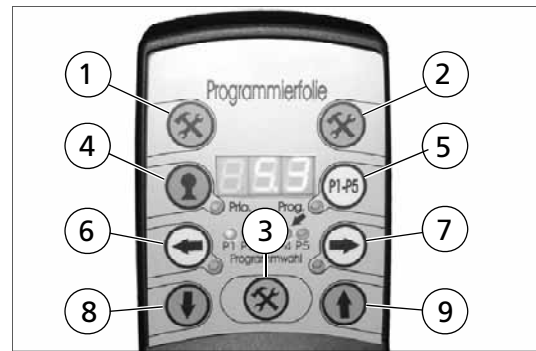
When the adjustment modus is activated the function of the keys changes.

In order to make allocation of these functions easier, a programming foil (Order no. 1 052 967) is placed onto the operating field of the operating module. This foil displays the key functions that are activated when pressing the keys while the adjustment modus is active.

Key allocation in the adjustment modus

(with programming foil applied)

- Left service-key
- Right service-key
- Lower service-key
- Joystick-key
- P1-P5-key
- Left-key
- Right-key
- Down-key
- Up-key



SWITCHING TO THE ADJUSTMENT MODUS

- Switch the wheelchair on.
- Press the lower and the right service-key (2)+(3) simultaneously and keep the pressed.
- Additionally press the left service-key (1) and release it again. – This switches the wheelchair off.
- After switching off the wheelchair, release all keys.
 - After the next switching on the display will show < **HHH** > after the initialisation as a signal that the adjustment modus has been activated.



FUNCTIONS

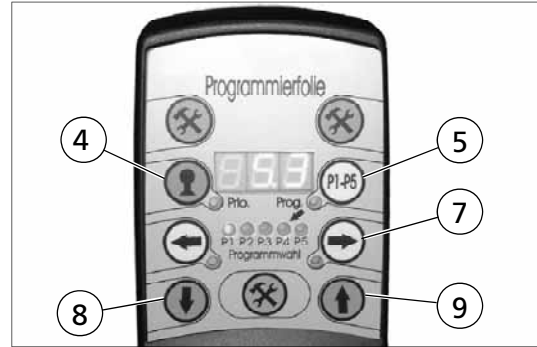
Adjustment of the driving behaviour consists of six parts:

- Pressing the joystick-key (4): The joystick priority of the maximally connected 3 joysticks can be determined.
- Pressing the P1-P5-key (5): The parameters for the driving behaviour can be set.

Note:

Both keys are locked against each other.

- Pressing the down-key (8): The special operation **F H** can be selected.
- Pressing the up-key (9): Locking or unlocking the driving program selection P1-P5.
- Pressing the right-key (7): Setting the wheel diameter.
- Press the joystick toward the back: Defining the speed factor.



ADJUSTING THE JOYSTICK PRIORITY

- Activate the joystick-key (4).
 - The joystick-key LED light up and the display shows **JPO**.
- Align the joystick in the desired priority sequence. – The joystick that is aligned first has the highest priority. The joysticks that are not aligned are deactivated. While the first joystick is aligned e.g. the external joystick for an attendant (A), the display changes to Display < **JP1** > and so forth.
- Press the joystick-key (4).
 - The program is ended. The corresponding LED goes off and the display again shows < **HHH** >.

Note:

Joysticks that are not moved during the adjustment are deactivated.



ADJUSTMENT OF THE PARAMETERS

Selecting the driving program

- Activate the P1-P5-key (5). – The P1-P5-key LED lights up. The LED for the program 1 < P1 > (10) lights up in the program number display for P1 to P5.

Note:

By pressing the left-key (6) or right-key (7) the driving program is determined within which the adjustments to the parameter contents are to be made. – The selected program is indicated through the lighting up of the corresponding LED.

The display shows the first parameter of the selected program and its contents (e.g. 1–5 for the first parameter with the adjusted parameter value 5).

Selection of the parameter

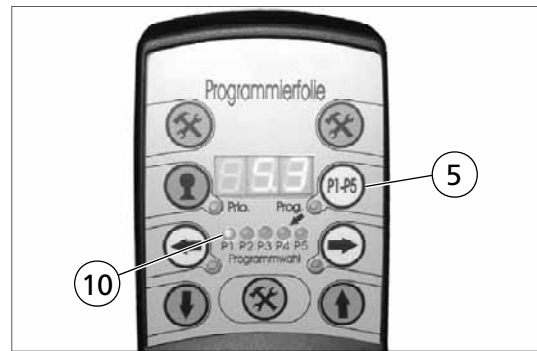
- Press the bottom service-key (3) to select the parameter from the parameters 1 to 9 that is to be set.

Changing the parameter value

- Press the up-key (9) or down-key (8) to change the content of the parameter to a value between 1 and 9.
- Select further parameters that are to be adjusted (view chapter < *Description of the programmable CAN-Bus parameters* >) and change their values too.

Concluding the parameter settings

- Press the P1-P5-key (5). – The program is ended. The corresponding LED goes off and the display again shows < **HHH** >.



CONCLUDING THE ADJUSTMENT MODUS

In order to conclude the adjustment modus and switch back into the driving modus the same keys are pressed in the same sequence as when starting the adjustment modus:

- (While the vehicle is switched on:) Press the right and lower service key (2)+(3) simultaneously and keep them pressed.
- Additionally press the left service-key (1) and release it again. – This switches the wheelchair off.
- Then release all keys. – After the next activation the display shows 0.0 KMH or < **FH** > after the initialisation phase as a signal that the adjustment modus has been completed and you have switched to the regular drive mode.



QUICK RESET TO STANDARD VALUES

It is possible to easily reset the values to the standard manufacturers setting should you have lost track during the adjustment.

Initial situation

The adjustment modus was activated and to adjust the driving behaviour parameters the P1-P5-key was pressed. This is evident through the lighting up of one of the LEDs marked P1 to P5.

Measure

- For quick setting press the joystick-key (4). – The display shows the standard value and all driving parameters were reset to the standard manufacturers setting. Now press the P1-P5-key (5).
- Now conclude the adjustment modus, view above chapter < *Concluding adjustment modus* >. – After the next activation the vehicle drives with the standard manufacturers setting of the driving parameters.



LOCKING THE DRIVE PROGRAM SELECTION

Since some customers cannot cope with the possibility of selecting the driving programs P1 to P5 this possibility can be locked over the operating module.

Proceed as follows:

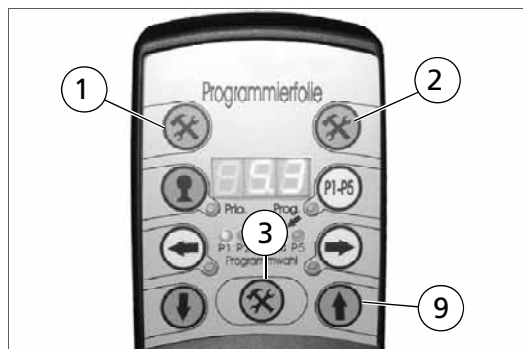
1. Switch on the wheelchair.
2. Select the program that should remain active with the mode key and activate it by moving the joystick.
- 3.– Place the programming foil.
4. Press the right and lower service key (2)+(3) simultaneously and keep them pressed.
 - Additionally press the left service-key (1) and release it again. – This switches the wheelchair off.
 - Then release all keys.
5. Switch the wheelchair back on.
 - After the initialisation phase the display shows < **HHH** > as a signal that the adjustment modus has been activated.
6. Press the up-key (9).
7. Press the right and lower service key (2)+(3) simultaneously and keep them pressed.
 - Additionally press the left service-key (1) and release it again. – This switches the wheelchair off.

After the next activation the driving modus selection via the service-key (3) is no longer possible (without programming foil this is the mode-key).

UNLOCKING THE DRIVE PROGRAM SELECTION

To unlock the driving program selection repeat the items 1. to 5. The display shows the normal display with 0.0 KMH.

After the next activation the driving modus selection via the service-key (3) is possible again (without programming foil this is the mode-key).



TURNING SPECIAL MODE **F H** ON

The special control mode makes it possible to use the joystick in place of the buttons.

Proceed as follows:

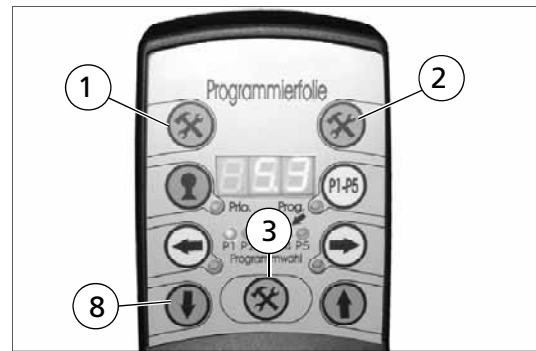
1. Switch on the wheelchair.
 - Place the programming foil.
2. Press the right and lower service key (2)+(3) simultaneously and keep them pressed.
 - Additionally press the left service-key (1) and release it again. – This switches the wheelchair off.
 - Then release all keys.
3. Switch the wheelchair back on.
 - After the initialisation phase the display shows < **HHH** > as a signal that the adjustment modus has been activated.
4. Press the down-key (8).
 - The adjustment mode is exited automatically. The display shows < **F H** >.

The special operation is activated.

TURNING SPECIAL MODE **OFF**

Repeat the items 1. to 5. to switch the special operation off.

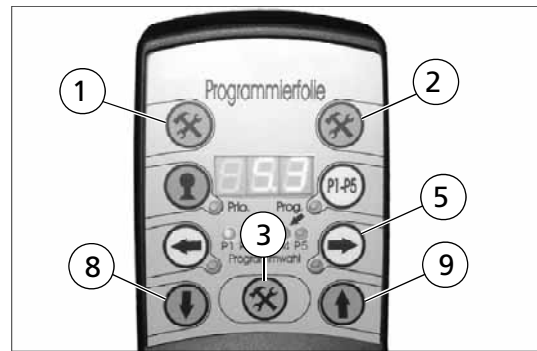
The display shows 0.0 KMH to indicate that the special operation is ended and a switch to regular drive mode had been carried out.



SWITCHING THE WHEEL DIAMETER ON

Proceed as follows:

1. Switch on the wheelchair.
 - Place the programming foil.
2. Press the right and lower service key (2)+(3) simultaneously and keep them pressed.
 - Additionally press the left service-key (1) and release it again. – This switches the wheelchair off.
 - Then release all keys.
3. Switch the wheelchair back on.
 - After the initialisation phase the display shows < **HHH** > as a signal that the adjustment modus has been activated.
4. Press the right-key (5).
 - The display shows the current wheel diameter, e.g. < **d38** >.
5. Set the desired diameter with the up- or down-key (9) or (8)
6. Confirm with the right-key (5).
 - The program is ended and the display shows < **HHH** > again.
7. Conclude adjustment modus, view chapter < *Concluding adjustment modus* >.



SETTING THE SPEED FACTOR

Setting the wheelchair type automatically sets everything and normally this setting fits if the components bought correspond with your declaration.

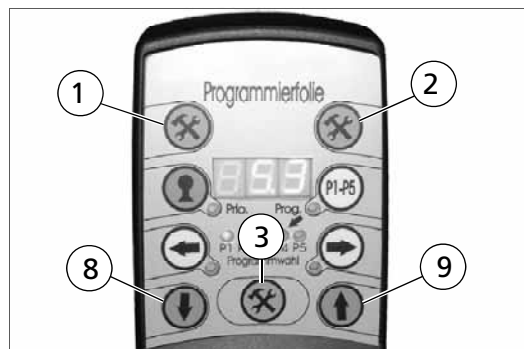
Since the speed torque of the motors that are built into the Sprint or Champ can vary from your declaration, the final speed can be aligned over this factor.

Even when for example the motors or the power module have been replaced on the wheelchair and the wheelchair afterwards does not reach the accustomed final speed, the final speed can be aligned through this factor.

Values from 50 to 127 can be selected. In doing so an adjustment by one step means a change of about 0.1 km/h final speed.

Proceed as follows:

1. Switch on the wheelchair.
 - Place the programming foil.
2. Press the right and lower service key (2)+(3) simultaneously and keep them pressed.
 - Additionally press the left service-key (1) and release it again. – This switches the wheelchair off.
 - Then release all keys.
3. Switch the wheelchair back on.
 - After the initialisation phase the display shows < **HHH** > as a signal that the adjustment modus has been activated.
4. Press the joystick toward the back.
 - The display shows the currently set speed factor, e.g. 105.
5. Select the desired speed factor with the up- or down-key (9) or (8).
6. For confirmation move the joystick backward.
 - The program is ended and the display shows < **HHH** > again.
7. Conclude adjustment modus, view chapter < *Concluding adjustment modus* >.



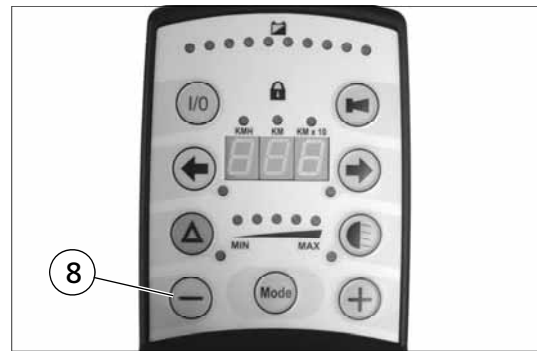
HORN SIGNAL PHASE

(The operating module without programming foil)

The horn-signal can be switched on or off while giving a turn-signal or driving backwards.

- Press and hold the minus-key (8).
- Switch off the operating module.

The change will become effective the next time the operating module is switched on.



CAN-BUS ERROR LIST

Error-Number	Type of Error	Short-info to the cause	Suggestion for trouble shooting
E01/ E02	Watchdog error	The watchdog-device of the operating module has activated a re-set.	Replace defective bus-cable, exchange operating module.
E09	CAN- Bus- error	The CAN module has switched into the error-passive-mode.	Replace defective bus-cable, exchange operating module.
E12	µController-overload	Warning for overload of the micro-controller inside the power module.	Software- Update of the power module, exchange power module.
E16	Temperature rise power module	The temperature of the power module is too high after and overload of electronic and/or drive motor.	Switch the wheelchair off, let the electronic cool down.
E17	Overload of the, resp. one drive motor	The overload monitor of a drive motor had activated with high demand to the wheelchair.	Avoid motor overload, switch the controller „off“ and „on“ again.
E18	Internal error power module	Error in the automatic alignment of the closed current measurement in the power module.	Software- Update of the power module, exchange power module.
E19	“BUS-ON“- signal error	Error in the ON / OFF switch logic.	Exchange defective Bus cable, exchange operating module, exchange power module

CAN-BUS ERROR LIST PAGE 2

Error-Number	Type of Error	Short-info to the cause	Suggestion for trouble shooting
E20	Dead-man-system error	Shortage in the dead-man-conduit against +24V noted (PM).	Replace defective bus-cable, exchange operating module.
E21	CAN-Watchdog OM	The operating module did not send a Watchdog-message.	Replace defective bus-cable, exchange operating module.
E24	Motor short circuit	Short circuit in the drive motor, error in the cables of the drive motor, defective motor (short circuit to the housing).	Short circuit of the power stage, in the motor cable or the motor itself.
E25	Motor idle	Idle-running error of the drive- or steering motor (only PM1), error in the wiring of the drive- or steering motor (only PM1), defective motor (e.g. carbon brushes worn), wheelchair does not stop on slopes due to worn or incorrectly adjusted safety brake (SPRINT GT).	Wrong power module installed (PM2 instead of PM1)? Magnetic brake error, motor defect (brushes), motor-cable- error, error in the power level, exchange power module.
E26	Battery over voltage	Battery overcharge while driving on slopes with fully charged battery.	Drive down-hill slowly and carefully.
E29	Main relay error	The relay is closed even though it should be open, or: Motor-idle-running, contact error on motor cable and/or plugged connection, carbon brushes worn.	Wrong power module installed (PM2 instead of PM1)? Software- Update of the power module, check motor cable, check motor resp. carbon brushes, exchange power module.

CAN-BUS ERROR LIST PAGE 3

Error-Number	Type of Error	Short-info to the cause	Suggestion for trouble shooting
E30	Main relay error	The relay is open even though it should be closed.	Exchange power module.
E44	Magnetic brake error	Failure (shortage or short cut) on the magnetic brake (PM1) or at one of the two magnetic brakes (PM2), short circuit of the coil against the housing, low voltage noted on the magnetic brake	Check magnetic brake(s), software-Update of the power module, check cables.
E45	Magnetic brake error	Shortage of the magnetic brake (PM1) or shortage of one of the two magnetic brakes (PM2), low voltage noted on the magnetic brake.	Check magnetic brake(s), software-Update of the power module, check cables.
E46	Error in the power module (drive motor)	Error in the power level of the power module PM1 / PM2, error in the battery- / drive motor cable, wheelchair does not stop on slopes due to worn or incorrectly adjusted safety brakes (SPRINT GT),	check cables, software- Update of the power module, if necessary exchange power module, check the function of the magnetic brake.
E47	Error on the actual value potentiometer of the steering servo	Cable-/ plug-error to the steering servo (OPTIMUS), actual value potentiometer defective.	Check the wiring to the steering servo, check actual value potentiometer.
E48	Joystick defective	Joystick defective, plug resp. cable to the joystick defective.	Check joystick, if necessary replace joystick, exchange operating module.

CAN-BUS ERROR LIST PAGE 4

Error-Number	Type of Error	Short-info to the cause	Suggestion for trouble shooting
E51	Motor shortage on adjustment module „1“	Error on an adjustment motor (shortage), adjustment motor not refit for MEYRA-CAN, error in the wiring to an adjustment motor.	Check adjustment motor including the wiring, replace adjustment module.
E52	Motor shortage on adjustment module „2“	Error on an adjustment motor (shortage), adjustment motor not refit for MEYRA-CAN, error in the wiring to an adjustment motor: Seat height adjustment SPRINT GT.	Check adjustment motor including the wiring, replace adjustment module.
E54	Battery total-discharge	Battery is totally discharged: Warning at 19 V battery voltage.	Urgently recharge the battery.
E55	Battery total-discharge	Battery is totally discharged: Warning at 18 V battery voltage.	Urgently recharge the battery.
E56	Overload of the adjustment motor	The power monitor of an adjustment motor has activated due to a high strain of an electrical seat adjustment.	Avoid motor overload, switch the controller „off“ and „on“ again.
E57	Temperature rise of the adjustment module	The temperature of the adjustment module is too high, overload of the electronic and/or adjustment motor.	Switch the wheelchair off, let the electronic cool down.

FURTHER SYMBOLS

Symbol	Meaning	Info	Remedy
S-S	Brake release lever for push mode activated	The traction drive is set to „push“: the safety magnetic brake is mechanically aired, the wheelchair is electrically blocked. OPTIMUS: Brake release lever at the front on the gear box cover. SPRINT GT: Brake release lever at the side of the vehicle.	Move the brake release lever to drive mode.
S-B	Handbrake activated	OPTIMUS: The handbrake is activated, the wheelchair is electrically blocked.	Move the brake release lever to drive mode.
S-L	Brake release lever for push mode activated	OPTIMUS: The brake release lever at the rear of the vehicle is activated and the steering unlocked for pushing, the wheelchair is electrically blocked.	Move the brake release lever to drive mode.
SCH	Magnetic key	The wheelchair is blocked against foreign use with help of the magnetic key.	Unlock the vehicle with help of a magnetic key.
Lad	Charging procedure	The charger is connected, the wheelchair is electrically blocked.	Await the end of the charging cycle, pull the plug of the charger off.
FH	Special operation "FH"	The controller was set into a certain mode that makes operation of all wheelchair functions without the help of a keyboard possible (e.g. chin operation), view chapter < <i>Switching the special operation FH on</i> >.	Reset: Up to software-version „9“: With the wheelchair switched on, press the keys for "left turn signal" and keep it pressed, then switch "off", afterwards release the "left turn signal" key. From software-version "10": Subcategory of the ON-BOARD programming, view chapter < <i>Activation of the special operation FH</i> >.

REPLACING THE CAN-BUS MODULES

The power module (A) is screwed from the back onto the rear wall of the battery case.

An optional adjustment module (B) is located on the bottom of the seat shell.

REPLACEMENT OF THE POWER- AND ADJUSTMENT MODULE

- Switch the vehicle off.
- Remove the mains fuse from the fuse holder.
- 🔧 Hereto observe chapter < fuses >.
- Pull all plugs out of the module that is to be replaced.
 - For this activate the plug locking device.
- Disassemble the module and mount the replacement module.
- Plug all plugs back into the new module.

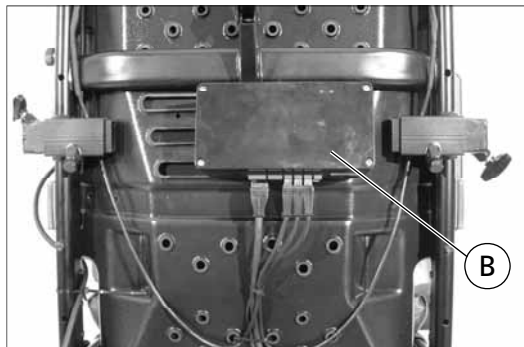
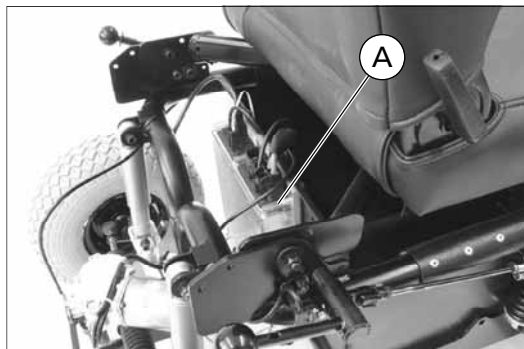
🔧 Note:

Most of the plugs are secured against interchange. In case of doubt follow the cables back. All sockets on the modules are labelled (also view the images for plug assignment in the corresponding chapters).

- Replace the mains fuse and switch the vehicle on.

🔧 Note:

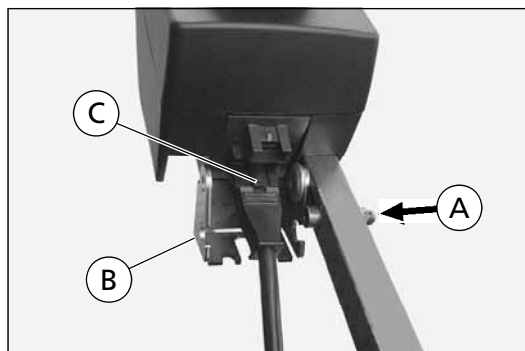
When error messages occur check all plugged connections for correct allocation and faultless fit. Otherwise view chapter < CAN-Bus error list >.



REPLACEMENT OF THE OPERATING MODULE

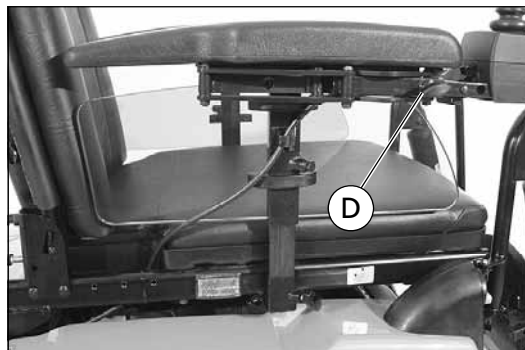
REMOVE THE OPERATING MODULE

- With the locking device bolt (A) depressed, swivel the cable protection down (B).
- Press the plug latch (C) and pull the plug.
- Loosen the clamping screw (D) of the bracket and pull the operating out toward the front.
- Mount the operating module off of the bracket.



FITTING OF THE OPERATING MODULE

- Mount the operating module to the bracket.
- Insert the operating module from the front into the bracket, adjust to the desired position and tighten the clamping screw (D).
- Insert the connector plug for the operating module (E).
- With the locking bolt (A) depressed, swivel the cable protection up (F), in doing so straighten the plug and prevent it from being bent.

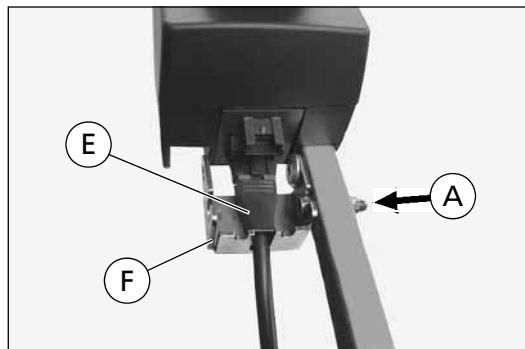


CHECKING THE CABLE LAYOUT

After replacing the operating module and during maintenance the correct layout of the cables of the supply lines to the operating module is to be checked:

Attention:

- ! a) The operating module must be able to swivel completely forward and backward without the cables being pulled taut.
- b) The cable may not exceed the contour of the vehicle in operation setting.



LIGHTING

The lighting equipment must be checked regularly for function.

REPLACING A LIGHTBULB

Note:

If a turn-signal bulb is defective, the remaining one blinks at double frequency.

Replacing the bulb of the headlight

Removal (Touring 928, model 9.928):

- Pull the headlight out to the front out of the bracket (1).
- Turn the bayonet catch by about 15° counter-clockwise and pull (A). - Keep hold of the headlight in order to prevent it from turning along.
- Remove the defective bulb from the reflector.

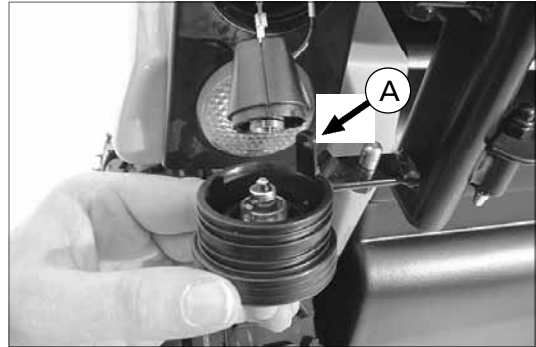
Assembly (Touring 928, model 9.928):

- Insert the new bulb into the reflector.

Note:

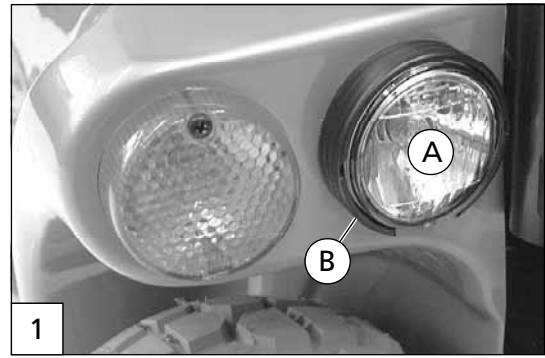
Do not touch the halogen bulb with bare hands.

- Replace the bayonet catch and turn by about 15° clockwise (1).
- Insert the headlight, with the link facing downward, into the headlight housing (2).



Removal (Optimus 2, model 2.322):

- Pull the headlight insert (A) toward the front out of the housing (B).
- Turn the bayonet catch by about 15° counter-clockwise (2) and pull (3). – Keep hold of the headlight insert in order to prevent it from turning along.
- Remove the defective bulb from the reflector.



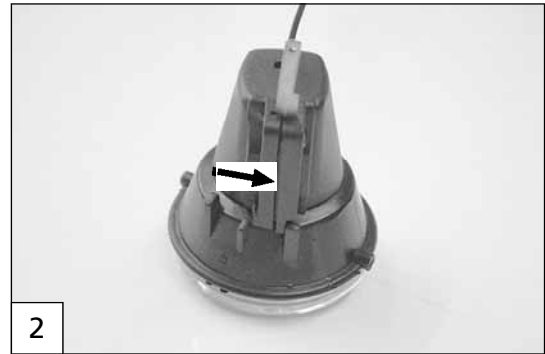
Assembly (Optimus 2, model 2.322):

- Insert the new bulb into the reflector.

Note:

Do not touch the halogen bulb with bare hands.

- Replace the bayonet catch into the headlight insert and turn by about 15° clockwise (4).
- Push the headlight insert (A) with the joint pinion (C) aligned horizontally into the housing (B) until it locks into place (1).

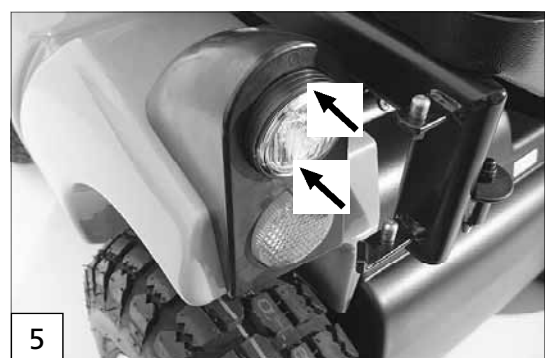
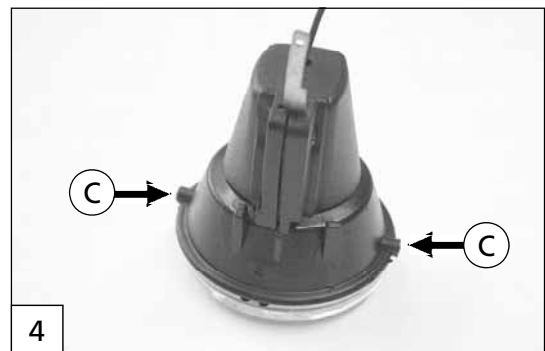


ADJUSTING THE HEADLIGHTS

Note:

The adjustment is to be done on both headlights. – Therefore place the vehicle on level ground.

- Adjust the headlights by tilting the insert (5).
- The headlights are adjusted correctly when the lower edge of the cone of light reaches the ground about 3 meters in front of the vehicle.



Lighting components with dispersion disc:

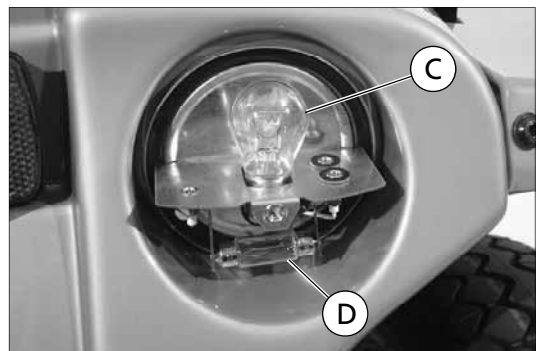
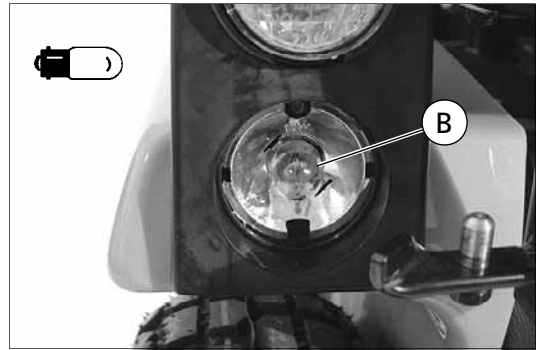
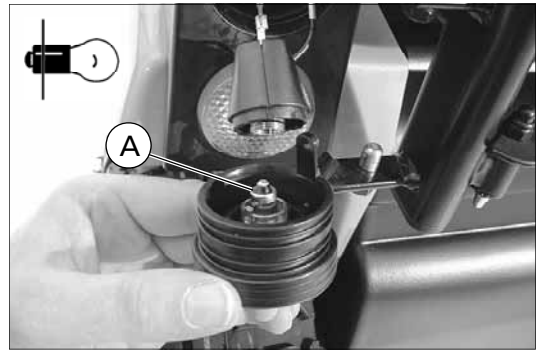
- Disassemble the dispersion disc from the affected lighting component.
 - To achieve this unscrew the attachment screw(s) and remove the dispersion plate.
- Replace the defective light bulb.
- Remount the dispersion plate.

Attention:

! Watch for the correct voltage of the replacement bulb!

Filament bulbs:

- (A) Headlight (halogen): 6V/2.4W PX 13.5s
- (B) Front indicator: 12V/R10W BA 15s, bayonet mount
- (C) Rear indicator: 12V/P21W BA 15s, bayonet mount
- (D) Back light: 6V/C5W S 8.5, festoon bulb



BATTERIES

CHARGE

Attention:

- ! Deep discharge very quickly leads to capacity loss. –
- Therefore the batteries have to be charged at once (1). Especially before a longer storage the batteries are to be completely charged and because of the constant own discharge to be recharged in-between.

Marginally increased transition resistance ($> 0.2 \text{ Ohm}$) in the charging cables and -plugs already prevent a complete charging. Plugs that become hot during charging are to be replaced.

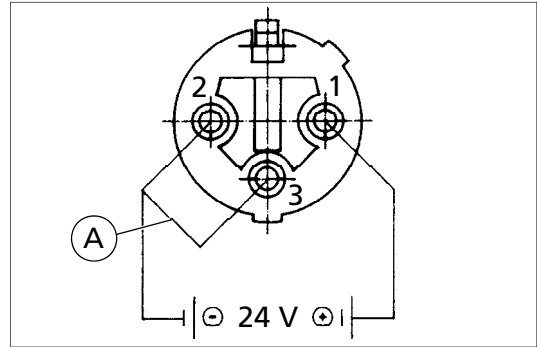
BATTERY CHARGERS

Note:

When changing to batteries with considerably different capacity also use a corresponding charger, so that the charging periods remain limited and the batteries are charged completely.

Note:

When replacing the secondary plug (part-no. 206 917 100) a bridge (A), view inside view of the plug, must be welded between the contacts 2 (earth) and 3.



TYPES OF BATTERIES

Wet type batteries are filled with diluted sulphur acid and have screw-off cover caps (B).

Benefits:

- large specific capacity.
- small acquisition costs.

Disadvantages:

- not leak proof.
- not maintenance free.
- susceptible to deep discharge.

Maintenance free batteries with bound electrolytes have a sealed case (C).

Benefits:

- leak-proof.
- maintenance free.
- less sensitive when deep discharged.
- long storage possible without recharging.

Disadvantages:

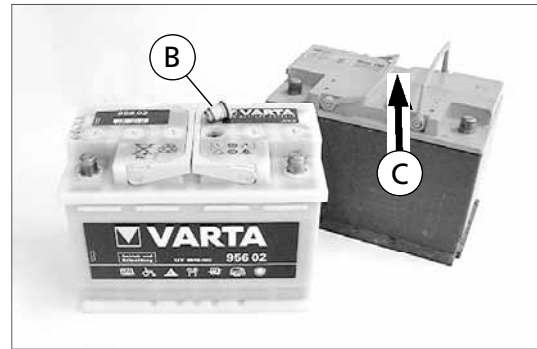
- high acquisition costs.
- less specific capacity than wet batteries.

Note:

Do not use starter batteries, but only batteries that are declared as driving-, power- or traction-batteries. – Starter batteries are not suitable for transfer of small and middle currents over a longer period of time. Furthermore the maximal capacity sinks very rapidly in starter batteries. Even though the acquisition costs are higher the use of traction batteries is more economical.

Note:

Only use batteries released by Meyra-Ortopedia when replacing old batteries.



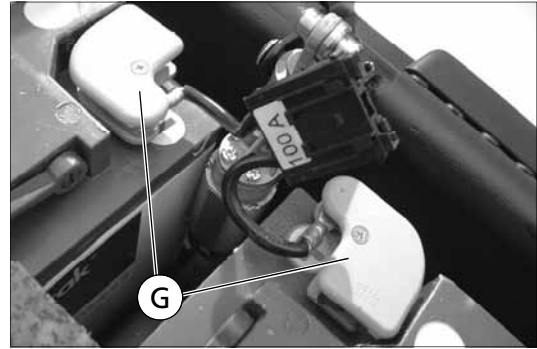
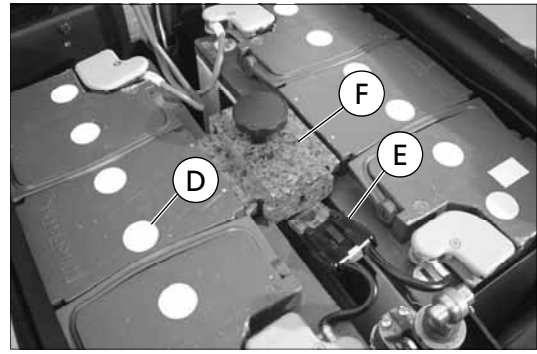
MAINTENANCE OF LIQUID BATTERIES

Power batteries that are cyclically strained need to be charged above the gas dimerisation due to the demand for short charging cycles and the necessary acid blending. This means water consumption by water disruption that must be balanced through regular refills. For refilling only use distilled water.

- Charge the batteries completely.
- Unscrew all cover plugs (D).

Attention:

- ! Battery acid is caustic! In event of acid droplets on the skin, in the eyes or on clothing, rinse immediately under running water. – If necessary place an emergency call!
- Fill up missing acid level with distilled water. The acid level is correct when it is
 - a) just above the filling hole insert or
 - b) approx. 5 mm above the top edges of the plates.
- Replace the sealing plugs.



REPLACEMENT

REMOVAL

- Pull the main fuse out of the fuse holder (E).
- Remove the battery clamping block (F) after screwing off the handwheel.
- Remove all pole clamp covers (G).
- Lift all four pole clamps from the battery poles.
- Lift the batteries out.

MOUNTING

The fitting is done analogue in reverse order.

Attention:

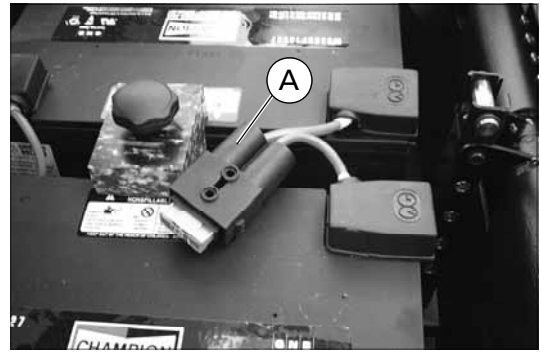
- ! Attach the pole clamp covers (G) to the battery poles.
- – Otherwise danger of fire through short circuits!

FUSES

MAIN FUSE

The main fuse is switched in line in-between the two batteries.

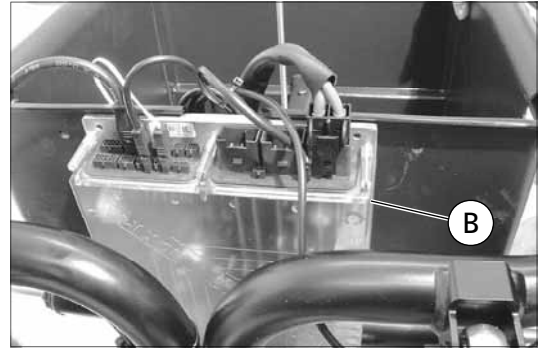
The main fuse holder (A) is located underneath the seat, on top of the batteries.



ELECTRONIC SECURITY

All electrical components (except for the batteries) are electronically protected by the power module (B). The power module also sees to a power limitation of the motors.

In case if a shortage only the defective component is deactivated. All other components (e.g. all other lights except for the defective one) remain available. After removal of the shortage, the affected component is automatically activated again.



MAINTENANCE/SERVIC- ING

Wheelchairs are medical devices of the class I-MDD. As a medical device they underlie the operator provision and are to be maintained regularly. We recommend at least once a year. The work done and replacement of essential parts is to be documented.

For the documentation in the course of the maintenance the itemised maintenance checklist can be used. The maintenance checklist is designed for duplication through copying. The filled in maintenance checklists are to be added to the documentation.

With the signature the undersigned declares to have duly performed the measured declared in the maintenance checklist.

Designation:

Maintenance/Inspection date:

Vehicle Identification number (Fz-I-Nr.):

Maintenance/Inspection done by:

Year of construction:

Signature:

Stamp of the executing workshop:

MAINTENANCE CHECKLIST

ELECTRICAL SYSTEM

Batteries

- No external damage or stains on the batteries?
- Attachment cables tight on the battery contacts?
- Poles and attachment clamps cleaned and greased with Vaseline or Acid protector grease?
- Operation capability of the batteries ensured (capacity check)?
- With liquid batteries: Acid level checked (view chapter < *maintenance of liquid batteries* >)?

Electrical conduits and alignment

- Steering-, battery- and motor-cable
 - a) undamaged?
 - b) layed out stress relieved and without jamming points (view chapter < *replacement of the CAN-Bus-modules/checking the cable layout* >)?
- Plugged connectors undamaged and not corroded?
- Are the cables to the lighting units and sensors undamaged and attached correctly?

CAN-Bus Control

- Keys on the operation module work bounce-free?
- Controlling display functions?
- Keyboard foil undamaged and tightly glued?
- Key-lock function flawless?
- Joystick functions easily and returns from arbitrary drooping back into the home position?

Lighting

- Do all components of the lighting equipment function?
- Dispersion plates and bulbs undamaged?
- Headlights adjusted correctly?
- Passive lighting (reflectors on the rear and sides) complete and undamaged?

MAINTENANCE CHECKLIST

Driving

- Test drive done?
- Personal barriers of the user regarded during the adjustment of the driving features?
- Variation from the adjusted maximum speed not more than + 10 % on level surface?
- Vehicle drives straight with straight setting of the joystick?
- Level at which no driving impulse is given (Zero-zone), for forward and backward motion identical?
- When steering into curves automatic speed reduction of the set speed?
- Working angle of the reduction automatic the same left and right?

Braking behaviour

- Stopping distance is met after the driving encoder is released at maximum speed with the max. permitted overall weight?
 - 1.0 m braking distance at 6km/h
 - 1.5 m braking distance at 8km/h
 - 2.1 m braking distance at 10km/h
 - 2.9 m braking distance at 12km/h
 - 4.5 m braking distance at 15km/h
- Magnetic brake holds the max. permitted loaded vehicle safely on the permitted incline (Values view type plate)?
- The magnetic brake engages about one second after releasing the drive impulse lever?
- With selected push mode no driving function reacts?

MECHANIC

Seat

- Seat lock engages flawlessly?
- Arm supports attached correctly (Torque according to table)?

Frame/Coachwork

- Frame parts/coachwork do not show signs of deformation or fractures?
- Panels are screwed on at each available attachment point?

MAINTENANCE CHECKLIST

Tyres and rims

- Tread pattern depth of the tyres is greater than 1.5 mm?
- Tyres free of damages or foreign bodies and not brittle?
- Air pressure front and rear 2.5 bar?
- Hubs do not show tears or ruptures?
- Hubs without axial run out of more than 2 mm?
- Wheel attachment screws tightened with the value indicated in the table?

Chassis

- Screws with which the drive is attached to the vehicle tightened to the value in the table?

DIN NORMS AND GUIDELINES

The torque according to DIN for screwed connections can be extracted from the table at the side.

Tyres

Filling pressure front: 2.5 bar (35 psi)
Filling pressure rear: 2.5 bar (35 psi)
Minimal profile depth acc. to STVO: ... 1.5 mm

Order number

Loctite 243 (medium hard) 205 638 800

Table: Torque according to DIN for screwed connections

Thread diameter	Tightening torque
M 4	3 Nm
M 5	5 Nm
M 6	10 Nm
M 8	25 Nm
M 10	50 Nm
M 12	85 Nm



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NOTES



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