

# Invacare® Colibri

## en Scooter Service Manual



PROVIDER: Keep this manual.  
The procedures in this manual MUST be performed by a qualified technician.



**Yes, you can.®**

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# 1 General

## 1.1 Introduction

This document contains important information about assembly, adjustment and advanced maintenance of the product. To ensure safety when handling the product, read this document and the user manual carefully and follow the safety instructions.

Find the user manual on Invacare's website or contact your Invacare representative. See addresses at the end of this document.

Invacare reserves the right to alter product specifications without further notice.

Before reading this document, make sure you have the latest version. You find the latest version as a PDF on the Invacare website.

Previous product versions may not be described in this Manual's current revision. If you require assistance, please contact Invacare.

For pre-sale and user information, see the user manual.

For more information about the product, for example product safety notices and product recalls, contact your Invacare representative. See addresses at the end of this document.

## 1.2 General Information

Service and maintenance work must be carried out taking this document into account.

Note that there may be sections in this document, which are not relevant to your product, since this document applies to all available models (on the date of printing). If not otherwise stated, each section in this document refers to all models of the product.

The models and configurations available in your country can be found in the country-specific sales documents.

It is imperative that you observe safety information.

Information about operation or about general maintenance and care work on the product should be taken from service manual.

Assembly of accessories/options might not be described in this document. Refer to the manual delivered with the accessory/option. Additional manuals can be ordered from Invacare. See addresses at the end of this document.

You can find information about ordering spare parts in the spare parts catalogue.

Spare parts must match original Invacare parts. Only use spare parts which have been approved by Invacare.

The product may only be maintained and overhauled by qualified personnel.

The minimum requirement for service technicians is suitable training, such as in the cycle or orthopedic mechanics fields, or sufficiently long-term job experience. Experience in the use of electrical measuring equipment (multimeters) is also a requirement. Special Invacare training is recommended.

Alterations to the scooter which occur as a result of incorrectly or improperly executed maintenance or overhaul work lead to the exclusion of all liability on the side of Invacare.

If you have any problems or questions contact your provider.

## 1.3 Notes on Shipping

- If the scooter has to be shipped back to the manufacturer for major repairs, you should always use the original packaging for transport.
- Please attach a precise description of the fault.

## 1.4 Symbols in This Manual

Symbols and signal words are used in this document and apply to hazards or unsafe practices which could result in personal injury or property damage. This document is printed in greyscale. For your information, the safety messages have the following colour coding according to ANSI Z535.6: Danger (Red), Warning (Orange), Caution (Yellow) and Notice (Blue). See the information below for definitions of the signal words.



### **DANGER!**

Indicates a hazardous situation that will result in serious injury or death if it is not avoided.



### **WARNING!**

Indicates a hazardous situation that could result in serious injury or death if it is not avoided.



### **CAUTION!**

Indicates a hazardous situation that could result in minor or slight injury if it is not avoided.



### **NOTICE!**

Indicates a hazardous situation that could result in damage to property if it is not avoided.



### **Tips and Recommendations**

Gives useful tips, recommendations, and information for efficient, trouble-free use.



### **Tools**

Identifies required tools, components and items which are needed to carry out certain work.

## 1.5 Images in This Manual

The detailed images in this manual are given marks to identify various components. Component marks in text and operational instructions always relate to the image directly above.

## 2 Safety

### 2.1 Safety Information



**WARNING!**

**Installation, mounting, maintenance or repairs made by unqualified persons can result in hazardous situations to you and others**

- The procedures in this service manual, must be performed by a specialised provider or qualified service technician.
- Invacare expects that the qualified technician is familiar with the product, with good technical knowledge to understand and follow the steps of the described instructions in this manual, and equipped with proper tools.
- Do not handle this product or any available optional equipment without first completely reading and understanding these instructions and any additional instructional material such as user manuals, installation manuals or instruction sheets supplied with this product or optional equipment.



- The CE marking is invalidated if components or accessories/options are replaced or added that have not been approved for this product by Invacare.
- In this case, the company that adds or replaces the components or accessories/options is responsible for the conformity assessment/CE marking or for registering the scooter as a special design and for the relevant documentation.



The information contained in this document is subject to change without notice.

### 2.2 Safety and Fitting Instructions

These safety instructions are intended to prevent accidents at work, and it is imperative that they are observed.

**Before any inspection or repair work**

- Read and observe this repair manual and the associated user manual.
- Observe the minimum requirements for carrying out the work (see 1.2 General Information, page 3).

**Personal Safety Equipment**

**Safety Shoes**

The scooter, and some of its components, are very heavy. These parts can result in injuries to the feet if they are allowed to drop.

- Wear standardised safety shoes during all work.

**Eye Protection**

It is possible that battery acid can be discharged when working on defective batteries or when handling batteries improperly.

- Always wear eye protection when working on any defective or possibly defective batteries.

**Safety Gloves**

It is possible that battery acid can be discharged when working on defective batteries or when handling batteries improperly.

- Always wear acid-proof safety gloves when working on any defective or possibly defective batteries.

**General Safety Information and Information About Fitting / Removal**



**DANGER!**

**Risk of Death, Serious Injury, or Damage**

Lighted cigarettes dropped onto an upholstered seating system can cause a fire resulting in death, serious injury, or damage. scooter occupants are at particular risk of death or serious injury from these fires and resulting fumes because they may not have the ability to move away from the scooter.

- DO NOT smoke while using this scooter.



**WARNING!**

**Risk of Serious Injury or Damage**

Storing or using the scooter near open flame or combustible products can result in serious injury or damage.

- Avoid storing or using the scooter near open flame or combustible products.



**CAUTION!**

**Risk of crushing**

Various components such as the drive unit, batteries, seat etc are very heavy. This results in injury hazards to your hands.

- Note the high weight of some components. This applies especially to the removal of drive units, batteries and the seat.



**CAUTION!**

**Injury hazard if the scooter starts moving unintentionally during repair work**

- Switch the power supply off (ON/OFF key).
- Engage the drive.
- Before lifting up, secure the scooter by using chocks to block the wheels.



**CAUTION!**

**Fire and burn hazard due to electrical short-circuit**

- The scooter must be completely switched off before removal of voltage-carrying components! To do this, remove the batteries.
- Avoid short-circuiting the contacts when carrying out measurements on voltage-carrying components.



**CAUTION!**

**Risk of burns from hot surfaces on the motor**

- Allow the motors to cool down before commencing work on them.

**CAUTION!****Injury hazard and risk of damage to scooter due to improper or incomplete maintenance work**

- Use only undamaged tools in good condition.
- Some moving parts are mounted in sockets with PTFE coating (Teflon™). Never grease these sockets!
- Never use "normal" nuts instead of self-locking nuts.
- Always use correctly-dimensioned washers and spacers.
- When reassembling, always replace any cable ties which were cut during dismantling.
- After completing your work / before renewed start-up of the scooter, check all connections for tight fitting.
- After completing your work / before renewed start-up of the scooter, check all parts for correct locking.
- Only operate the scooter with the approved tyre pressures (see technical data in the user manual).
- Check all electrical components for correct function. Note that incorrect polarity can result in damage to the control system.
- Always carry out a trial run at the end of your work.

**CAUTION!****Any changes to the drive program can affect the driving characteristics and the tipping stability of the scooter**

- Changes to the drive program may only be carried out by trained Invacare providers.
- Invacare supplies all scooters with a standard drive program ex-works. Invacare can only give a warranty for safe scooter driving behavior - especially tipping stability - for this standard drive program.

**CAUTION!****Risk of Injury**

Adaptions to the scooter can influence the performance.

- When adaptions with third party products are made, this is only allowed within the scope of a valid combination agreement.
- The maximum values and restrictions of both products shall be observed.
- Machining, bending, welding, or bracing on any safety relevant components is not allowed.



Mark all current settings for the scooter (seat, armrests, backrest etc.), and the associated cable connecting plugs, before dismantling. This makes reassembly easier. All plugs are fitted with mechanical locks which prevent release of the connecting plugs during operation. To release the connecting plugs the safety locks must be pressed in. When reassembling ensure that these safety locks are correctly engaged.

## 3 Hygiene

### 3.1 Handling of Returned Used Products

When reconditioning or repairing returned scooters:

- Take precautions for yourself and the product.
- Use protection equipment as specified locally.

#### Before Transport (According to Biological Agents Ordinance)

Treat product according to following process steps:

| Process Step    | Component              | Application                     | Conditioning technique  | Work Station              |
|-----------------|------------------------|---------------------------------|---|---------------------------|
| Manual cleaning | Surface of used device | Before repair or reconditioning | Use saturated towel to apply cleaning detergent and remove residues after impact. | Cleaning and disinfection |
| Disinfection    | Surface of used device | Before repair or reconditioning | Use saturated disinfectant wipes and clean* the device surface.                   | Cleaning and disinfection |

\*The detergent "Nüscosept Spezial" has been tested on product surfaces.

#### Disinfection Tools

- Disposable wipes (fleece)
- Brushes to clean areas difficult to access

#### Further Information



For more information contact your Invacare service department.

## 4 Service

### 4.1 General Safety Information on Installation Work

- ! NOTICE!**  
Collisions can be caused if shim rings are removed from the drive wheels during installation work. Shim rings are frequently placed between drive shaft and wheel hub to compensate tolerances. Collisions can be caused if these shim rings are removed and not re-installed.
- Install all shim rings in exactly the same positions they were in before dismantling.

### 4.2 Tightening Torques


- ⚠ CAUTION!**  
**Risk of damage to scooter due to improperly tightened screws, nuts or plastic connections.**
- Always tighten screws, nuts etc. to the stated tightening torque.
  - Only tighten screws or nuts which are not listed here fingertight.

The tightening torques stated in the following list are based on the thread diameter for the nuts and bolts for which no specific values have been determined. All values assume dry and de-greased threads.

| Thread | Tightening Torque in Nm $\pm 10\%$ |
|--------|------------------------------------|
| M4     | 3 Nm                               |
| M5     | 6 Nm                               |
| M6     | 10 Nm                              |
| M8     | 25 Nm                              |
| M10    | 49 Nm                              |
| M12    | 80 Nm                              |
| M14    | 120 Nm                             |
| M16    | 180 Nm                             |

### 4.3 Accessories / Options List

- Personal key
- Crutch / cane holder (right or left)
- Front basket
- Rear basket
- Covers: Storage cover (Full scooter cover)
- Position lights
- Seat suspensions

 The installation instructions for additional accessories / options are available at your Invacare provider or directly from Invacare.

### 4.4 Troubleshooting

#### 4.4.1 Operational Faults

Proceed as follows if you have any problems:

1. First assess the possible cause of the problem using the following table.
2. Check operating console status display. Evaluate flash code.
3. Carry out necessary checks and repairs as recommended in the following table.

## 4.4.2 Drive Fault Diagnosis

| Problem                              | Other Symptoms  | Possible Cause                                | Solution  | Documentation                                      |
|--------------------------------------|---|---|---|--|
| <b>Scooter will not start</b>        | Status display on operating console does not illuminate | Batteries defective                           | Replace batteries   | See user manual                                    |
|                                      |   | Completely discharged battery                 | Pre-charge batteries  |  |
|                                      |   | Power supply to operating console interrupted | Check main fuse   | See user manual for main fuse position             |
|                                      |   | Operating console defective                   | Check cable between modules for loose connections or damage | See 6.5 Checking Cables, page 16                   |
|                                      |   |   | Replace operating console                                   | See 8.2 Replacing Operating Console, page 19       |
|                                      | Status display on operating console flashing            | Various causes                                | Assess error code   | See 4.4.3 Error Codes and Diagnostic Codes, page 9 |
| <b>Scooter judders in drive mode</b> | None  | Drive motor(s) defective                      | Replace motor(s)  | See 11.1 Replacing Drive Motor, page 29            |
|                                      |   | Drive lever potentiometer defective           | Replace potentiometer                                       | See 8.3 Replacing Potentiometer, page 20           |
| <b>Batteries not being charged</b>   | None  | Batteries defective                           | Replace batteries   | See 6.3 Replacing Batteries, page 15               |
|                                      | LEDs flashing on charger                                | Charger defective                             | Replace charger   | See user manual                                    |
| <b>Scooter runs too slowly</b>       | None  | Operating console defective                   | Replace operating console                                   | See 8.2 Replacing Operating Console, page 19       |
|                                      |   | Batteries defective                           | Replace batteries   | See 6.3 Replacing Batteries, page 15               |



### 4.4.3 Error Codes and Diagnostic Codes

| Flash Code | Fault   | Consequence for the Scooter | Comments   |
|------------|---|-----------------------------|--|
| 1          | Batteries must be charged                     | Continues to drive          | <ul style="list-style-type: none"> <li>The batteries are discharged. Charge the batteries as soon as possible.</li> </ul>  |
| 2          | Battery voltage too low                       | Stops driving               | <ul style="list-style-type: none"> <li>The batteries are depleted. Charge batteries.</li> <li>If you switch the scooter off for a few minutes, the batteries can often recuperate to such a stage that a short journey is still possible. You should only do this in an emergency, however, because this causes the batteries to become excessively discharged.</li> </ul>   |
| 3          | Battery voltage too high                      | Stops driving               | <ul style="list-style-type: none"> <li>The battery voltage is too high. If the battery charger is connected, disconnect it from the scooter.</li> <li>The electronic system charges the batteries when running downhill and when braking. This fault is caused when the battery voltage becomes too high during this process. Switch the scooter off and on again.</li> </ul>  |
| 4          | Power time exceeded                           | Stops driving               | <ul style="list-style-type: none"> <li>The maximum current was exceeded over too long a period, probably because the motor was overloaded or has been working against an immovable resistance. Switch the scooter off, wait a few minutes and then switch on again.</li> <li>The electronic system has determined a motor short-circuit. Check the wiring harness for short-circuit and check the motor.</li> <li>Contact your Invacare provider.</li> </ul> |
| 5          | Brake failure                                 | Stops driving               | <ul style="list-style-type: none"> <li>Ensure that the disengaging lever is in the engaged position.</li> <li>There is a defect in the braking coil or in the cabling. Check the magnetic brake and cabling for open or short-circuited circuitry. Contact your Invacare provider.</li> </ul>  |
| 6          | No neutral position when switching scooter on | Stops driving               | <ul style="list-style-type: none"> <li>Drive lever is not in neutral when the keyswitch was turned. Put the drive lever in neutral, turn the power off and then turn on again.</li> <li>It may be necessary to replace the drive lever. Contact your Invacare provider.</li> </ul>   |
| 7          | Fault in speed potentiometer                  | Stops driving               | <ul style="list-style-type: none"> <li>The drive lever controls could be faulty or incorrectly connected. Check the cabling for open or short-circuited circuitry.</li> <li>Potentiometer is not correctly adjusted and must be replaced. Contact your Invacare provider.</li> </ul>   |
| 8          | Motor voltage error                           | Stops driving               | <ul style="list-style-type: none"> <li>The motor or its cabling is defective. Check the cabling for open or short-circuited circuitry.</li> </ul>  |
| 9          | Miscellaneous internal fault                  | Stops driving               | <ul style="list-style-type: none"> <li>Contact your Invacare provider.</li> </ul>  |
| 10         | Push / freewheel mode error                   | Stops moving                | <ul style="list-style-type: none"> <li>The scooter has exceeded the permissible maximum speed during pushing or freewheeling. Switch the electronics system off and on again.</li> </ul>   |

#### 4.4.4 Service Plan

| Component                           | Check   | Remedy   | Notes   | ✓ |
|-------------------------------------|---|--|---|---|
| Seat                                | Check welded seams, fixings and upholstery            | Tighten screws, replace parts if damaged               |   |   |
|                                     | Check seat suspension                                 | Grease the spring generously, replace parts if damaged | See 5.3 Replacing Seat Suspension / Spring, page 12   |   |
| Frames (chassis) / battery mounting | Check fixings, welded seams and battery mounting      | Tighten screws, replace parts if damaged               |   |   |
|                                     | Check battery fixing straps                           |  |   |   |
| Wheel suspension and wheels         | Check drive wheels for tight fit                      | Tighten hub nuts, replace if necessary                 |   |   |
|                                     | Check front wheels for tight fit, float and side play | Adjust / replace                                       |   |   |
|                                     | Check pneumatic tyre                                  | Repair or replace if damaged                           | See user manual                                       |   |
|                                     | Check tracking and steering link                      | Tighten screws   |   |   |
|                                     |   | Check tracking and steering                            | Installing and removing wheels, see 9 Wheels, page 22 |   |
| Drive units, coupling mechanism     | Check functions in drive and push modes               | Replace motor if necessary                             | See user manual                                       |   |
|                                     | Check clutch mechanism                                | Tighten screws / nuts, adjust or replace               |   |   |
| Batteries                           | Check batteries for damage                            | Replace batteries                                      | See user manual                                       |   |
|                                     | Check battery voltage                                 | Charge batteries                                       | See user manual                                       |   |
|                                     | Check contacts and terminals                          | Clean contacts and terminals                           |   |   |
| Drive controls                      | Check status display (flashing)                       | Evaluate flash code                                    | See 4.4.3 Error Codes and Diagnostic Codes, page 9    |   |
|                                     | Check fixing  | Tighten or replace fixing                              |   |   |
|                                     | Check cable, connecting plug                          | Replace cable, connecting plug                         |   |   |
|                                     | Check drive lever function                            | Replace drive lever                                    |   |   |
|                                     | Check power supply                                    | Replace cable, connecting plug or console              |   |   |
| Drive program                       | Check drive program version. New version available?   | Update software  |   |   |
| Screws                              | Check screws for tight fit                            | Tighten screws if necessary                            |   |   |

## 5 Seat System

### 5.1 Removing / Installing the Seat


**WARNING!**
**Risk of falling from the scooter**

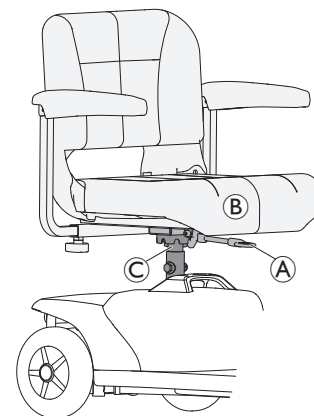
- Before use, ensure that the seat is in the locked position. The seat lever must be pulled up all the way to allow the seat to drop into the locked position. Otherwise, a fall from the scooter could occur causing bodily injury and/or damage to the scooter.

**Removing**

1. Pull up the seat lock lever **A** upwards to disengage the seat.
2. Turn the seat assembly **B** to one side.
3. Hold the seat assembly firmly by the backrest and the front edge of the seat.
4. Lift the seat assembly up and away from the seat post **C**.

**Installing**

1. Lower the seat assembly **B** onto the seat post **C**.
2. Turn the seat so it faces forward and locks into position.
3. Lift up on seat assembly to ensure the seat is secure.



### 5.2 Replacing Seat Support Tube

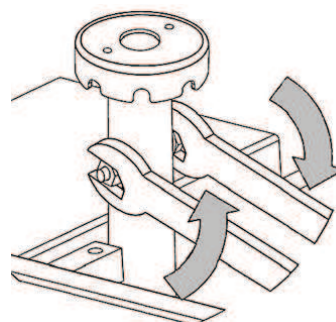


- 17 mm wrench (2x)


**CAUTION!**
**Risk of tipping**

- 3-wheel could tip over when driving uphill when incorrect seat support tube/ seat suspension is installed.
- Always install seat support tube with two holes only.
  - Always install seat support tube medium or short when retrofitting.

1. Remove seat, see *5.1 Removing / Installing the Seat, page 11*.
2. Remove battery box, see *6.2 Removing / Installing the Battery Box, page 14*.
3. Remove securing bolt, nut and washers of seat support tube.
4. Replace seat support tube.
5. Adjust seat height.
6. Reinsert securing bolt, nut and washers and tighten.



## 5.3 Replacing Seat Suspension / Spring



### CAUTION!

#### Risk of accident

Accidental rolling can lead to accidents.  
— Secure scooter against rolling away.



When removing, note position of small parts such as screws and washers. Put small parts down so that they can be installed in correct sequence.



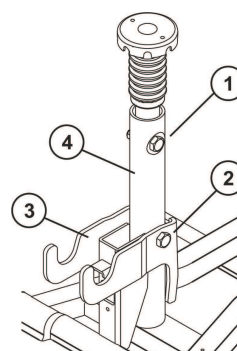
The following seat support tubes are available for the seat suspension:

- Low: 425 mm
- Medium: 450 mm
- High: 475 mm

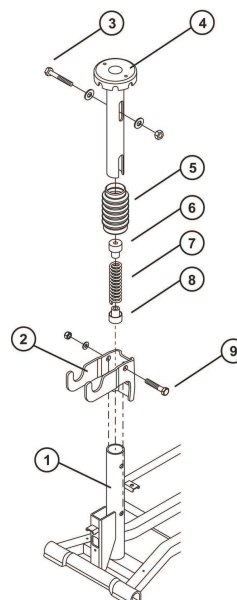


- 13 mm wrench
- 17 mm wrench (2x)
- Grease

1. Secure scooter against rolling away.
2. Remove seat, see *5.1 Removing / Installing the Seat, page 11*.
3. Loosen bolted connection (1) on mounting sleeve (4) and counter it.
4. Loosen bolted connection (2) on rear closure (3) and counter it.



5. Remove bolts (3 and 9), nut and washers.
6. Remove seat support tube (4) from receptacle tube (1).
7. Remove connection hook (2).
8. Remove bellow (5) including spring (7) and plastic end pieces (6 and 8).
9. Install plastic end pieces (6 and 8) to new spring.
10. Grease spring generously. The spring should be covered completely.
11. Install bellow (5) including spring (7) and plastic end pieces (6 and 8).
12. Install connection hook (2).
13. Insert seat support tube (4) into receptacle tube (1) and press down gently.
14. Reposition bolts (3 and 9), nut and washers.
15. Firmly tighten bolts of seat support tube.
16. Reposition seat.



## 6 Batteries



### CAUTION!

**Injury hazard and possible material damages if batteries are handled improperly**

- Observe the warning information on the batteries.
- Only use battery versions stated in the specifications.



### CAUTION!

**Fire and burns hazard if battery terminal is bypassed**

- Take great care to ensure that the battery terminals are never short-circuited with tools or mechanical scooter parts.
- Ensure that the battery terminal caps have been replaced if you are not working on the battery terminals.



### CAUTION!

**Risk of crushing**

Batteries can be extremely heavy. This results in injury hazards to your hands.

- Handle the batteries with care.
- Ensure that batteries do not fall to the ground when removed from chassis.
- Pay attention to hands.
- Use proper lifting techniques.



When removing, take care of small parts such as screws and washers. Put all small parts down so that they can be installed in correct sequence.

### 6.1 General Instructions on Handling Batteries

- Never mix and match different battery manufactures or technologies, or use batteries that do not have similar date codes.
- Never mix gel with AGM batteries.
- The batteries reach their end of life when the drive range is significantly smaller than usual. Contact your provider or service technician for details.
- Always have your batteries installed by a properly trained scooter technician or a person with adequate knowledge. They have the necessary training and tools to do the job safely and correctly.

## 6.2 Removing / Installing the Battery Box



### CAUTION!

**Risk of strains from lifting heavy parts**

- Use proper lifting techniques.

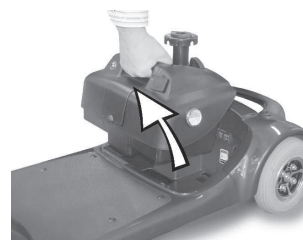
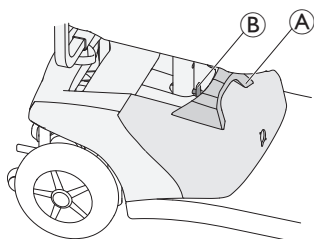


### CAUTION!

**Risk of injury from unsecured scooter parts**

Removing the battery box will release the LITE-LOCK™ mechanism allowing the front frame assembly to separate from the rear frame assembly.

- Do not lift or move the scooter without the battery box unless you want to disassemble it, see 6.2.1 *Removing / Installing the Drive Unit*, page 14 or *Dismanteling The Scooter for Transport* in the user manual.



### Removing the Battery Box

1. Remove the seat, refer to 5.1 *Removing / Installing the Seat*, page 11.
2. Grab the handle of the battery box A, pull the battery box latch B with your thumb and remove the battery box.

### Installing the Battery Box

1. Remove the seat, refer to 5.1 *Removing / Installing the Seat*, page 11.
2. Holding the battery box handle A, carefully lower the battery box on to the battery tray in the scooter.
3. Press down the battery box to engage the connector on the battery box with the connector on the scooter base.
4. Ensure the battery box latch B engages the mounting hole in the seat post.
5. Reinstall the seat, refer to 5.1 *Removing / Installing the Seat*, page 11.

## 6.2.1 Removing / Installing the Drive Unit



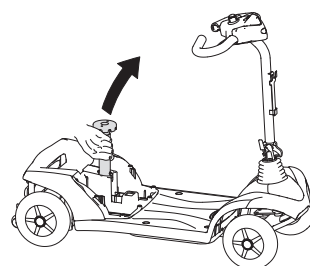
### CAUTION!

**Risk of strains from lifting heavy parts**

- Use proper lifting techniques.

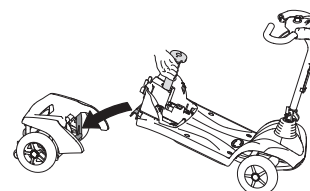
### Removing the Drive Unit

1. Pull up the seat post to lift up the chassis.
2. The drive unit separates from the chassis.



### Installing the Drive Unit

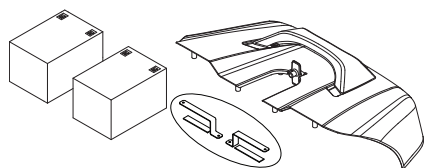
1. Pull up the seat post to lift up the chassis and hook the chassis onto the drive unit.
2. Refit the battery box, refer to 6.2 *Removing / Installing the Battery Box*, page 14.
3. Make sure the latch of the battery box is locked.
4. Refit the seat, refer to 5.1 *Removing / Installing the Seat*, page 11.



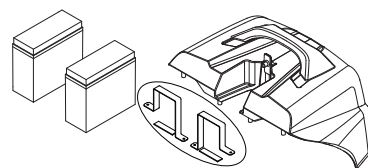
## 6.3 Replacing Batteries



- Phillips screwdriver
- 8 mm wrench (18 Ah battery only)

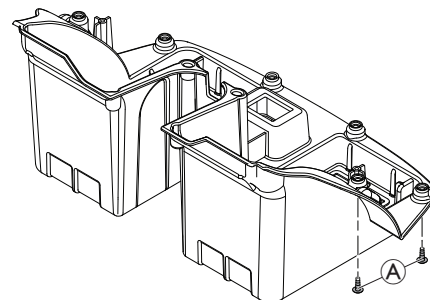


12 Ah batteries, clips and shroud



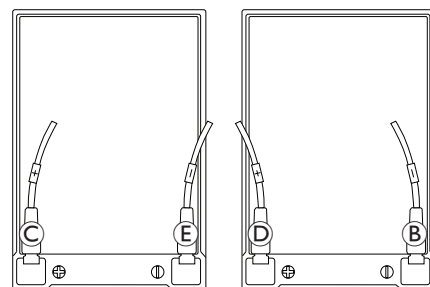
18 Ah batteries, clips and shroud

1. Remove seat, see 5.1 Removing / Installing the Seat, page 11.
2. Remove battery box, see 6.2 Removing / Installing the Battery Box, page 14.
3. Turn battery box upside down.
4. Remove screws **A** on both sides of battery box.
5. Carefully return battery box to upright position and remove battery shroud.

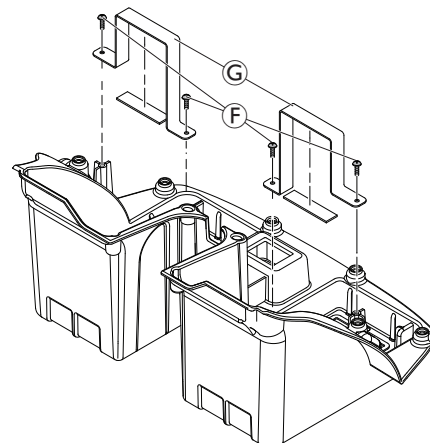


Depending on battery type, disconnect connectors as follows:

- 12 Ah batteries: Pull plugs from battery terminals.
  - 18 Ah batteries: Loosen screws.
6. Remove all connecting plugs on battery terminals. Disconnect cable harness from batteries in following order:
    - a. BLACK cable **B** from negative battery terminal on right battery
    - b. RED cable **C** from positive battery terminal on left battery
    - c. WHITE cable **D** from positive battery terminal on right battery
    - d. WHITE cable **E** from negative battery terminal on left battery

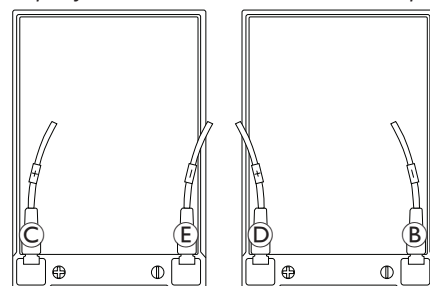


7. Remove screws **F** and clips **G**.
8. Replace batteries.
9. Install new batteries and secure them with clips.



Clips of 18 Ah batteries serve as an example

10. Install all connecting plugs on battery terminals. Connect cable harness to batteries in following order:
  - a. BLACK cable **B** to negative battery terminal on right battery
  - b. RED cable **C** to positive battery terminal on left battery
  - c. WHITE cable **D** to positive battery terminal on right battery
  - d. WHITE cable **E** to negative battery terminal on left battery
11. Install remaining parts in reverse order.
12. Test all functions.



## 6.4 Handling Damaged Batteries Correctly



### **WARNING!**

#### **Risk of burns**

- Never touch or remove overheating batteries. Only unplug the charger.
- Never touch leaking batteries.



### **WARNING!**

#### **Burn hazard**

Injury hazard due to discharged acid.

- Always wear acid-proof protective gloves when handling batteries.
- Always wear protective goggles when handling batteries.

#### **What to do if acid is discharged**

- Always take clothing which has been soiled by or dipped in acid off immediately!
- Rinse any areas of your skin which has come into contact with battery acid off immediately with plenty of water!

#### **If contact with eyes is made**

- You should also consult an eye specialist immediately afterwards!

- Place damaged batteries in an acid-resistant receptacle immediately after removing them.
- Only ever transport damaged batteries in an appropriate acid-resistant receptacle.
- Wash all objects that have come into contact with acid with lots of water.

### **Disposing of Dead or Damaged Batteries Correctly**



### **WARNING!**

#### **Environmental Hazard**

- DO NOT dispose of batteries in normal household waste.
- DO NOT throw batteries into a fire.
- Batteries MUST be taken to a proper disposal site. The return is required by law and free of charge.
- Only dispose of discharged batteries.
- Cover terminals of batteries prior to disposal.



### **CAUTION!**

#### **Fire and burns hazard if battery is not stored correctly**

- Take great care to ensure that the battery terminals are never short-circuited by metallic parts or liquids.
- Ensure that the battery terminal caps have been installed before storing.

Batteries are following special disposal rules. Your provider has all information available to safely exchange and dispose the defect batteries.

## 6.5 Checking Cables

1. Switch controls OFF on the operating control.
2. Open operating console, see *8.2 Replacing Operating Console, page 19*.
3. Check all cables for visible damage, crushing points or abrasion points.
4. Replace damaged cables.
5. Pull on each plug carefully. The plug must not come out of its socket when pulled on lightly.
6. If a plug is loose, apply slight pressure to push the plug into the socket. The plug must snap in place securely.
7. Check that the plug is firmly attached to its socket.
8. Remove batteries, see *6.3 Replacing Batteries, page 15*.
9. Check battery cables for visible damage, crushing points or abrasion points.
10. Replace damaged cables.
11. Assemble all parts again in reverse order.
12. Test all functions of the scooter.



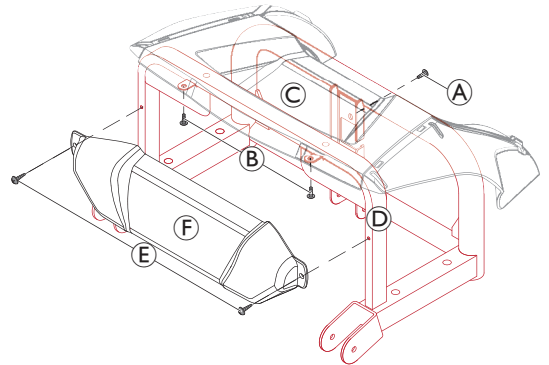
## 7 Shrouds

### 7.1 Replacing Rear Shrouds



- Phillips screwdriver

1. Remove screws **A** and **B** to remove rear shroud **C** from chassis **D**.
2. Remove screws **E** to remove motor protection shroud **F** from chassis **D**.
3. Install parts in reverse order.



### 7.2 Replacing Front Shroud

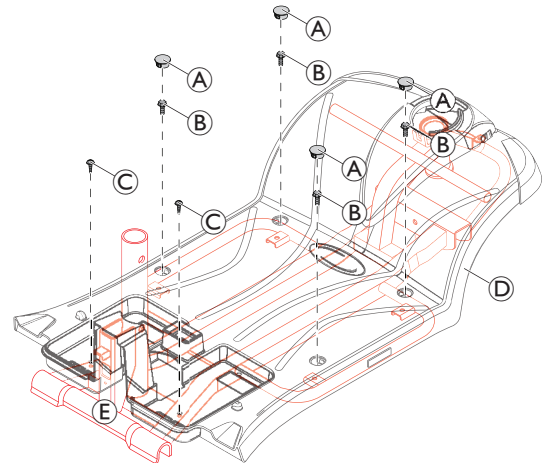


- 10 mm socket wrench
- Phillips screwdriver

1. Remove caps **A**.
2. Remove screws **B**.
3. Remove screws **C**.
4. Take off front shroud **D** from chassis **E**.
5. Install parts in reverse order.



The assembly of the front shroud is the same for 3-wheel and 4-wheel version.



## 8 Controls

### 8.1 Replacing Power Module


**CAUTION!**
**Risk of accident**

When parking scooter on its support wheels it is no longer slowed by the motor brake. The scooter can roll away out of control.

- Place scooter's rear frame on a supporting wooden block before you remove wheels.
- Secure scooter against rolling away.


**CAUTION!**
**Burn and scald hazard if power cable is shorted**

Turn off the power completely before removing any power supply components of scooter. Therefore take out batteries.

- Avoid a bridging of the contacts during measurements on live electrical components.


**CAUTION!**
**Any changes to the drive program can affect the driving characteristics and the tipping stability of the scooter.**

- Changes to drive program may only be carried out by trained Invacare providers.
- Invacare can only give a warranty for safe scooter driving behavior - especially tipping stability - for unaltered standard drive programs.



The electronic system is supplied with a standard drive program. If you have carried out customer-specific modifications to the drive program, you will have to make these changes again after installing the new power module.

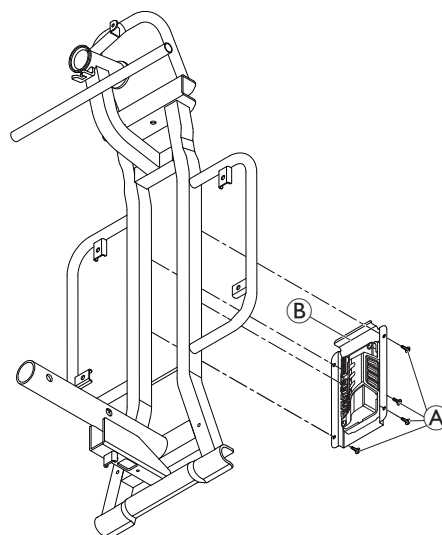


When removing, note position of small parts such as screws and washers. Put small parts down so that they can be installed in correct sequence.

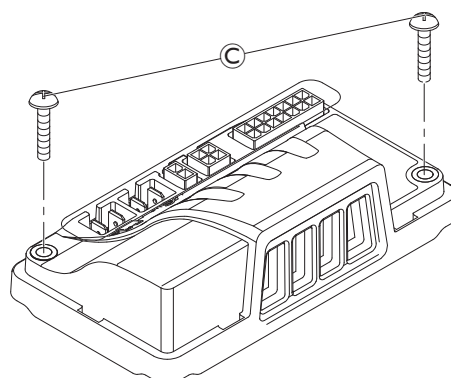


- Phillips screwdriver
- To adapt drive program: programming software or hand programming device and controls system installation manual, available from Invacare.

1. Remove seat, see 5.1 Removing / Installing the Seat, page 11.
2. Remove battery box, see 6.2 Removing / Installing the Battery Box, page 14.
3. Remove drive unit, see 6.2.1 Removing / Installing the Drive Unit, page 14.
4. Place chassis upright on its seat adapter.
5. Secure chassis against falling over.
6. Remove four screws **A** from electronics shroud **B**.



7. Open the electronics shroud.
8. Unplug all plugs from power module.
9. Remove screws **C** on both sides of power module.
10. Replace power module.
11. Install parts in reverse order.
12. Modify drive program.
13. Complete installation of scooter.
14. Test all functions.



## 8.2 Replacing Operating Console



### CAUTION!

#### Risk of Burning if Power Cable is Shorted

- Turn off the power completely before removing any power supply components of the scooter. Therefore take out batteries.
- Avoid bridging of contacts during measurements on live electrical components.



### CAUTION!

#### Risk of Damage to Operating Console by Instant High Current/Voltage

- Unplug battery cable before removing/installing operating console.
- Make sure all pins are correctly connected.



### NOTICE!

#### Risk of damaging circuit board by electrostatic discharge

- Handle circuit boards only in Electrostatic Protected Areas (EPA).

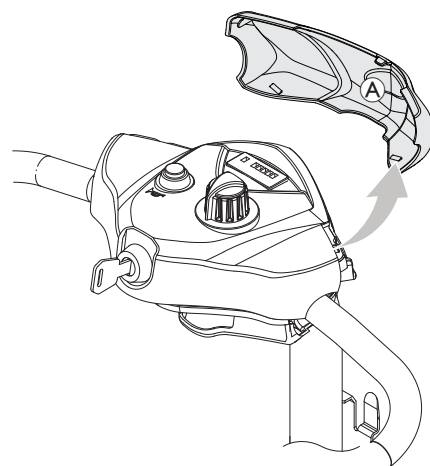


When removing, note position of small parts such as screws and washers. Put small parts down so that they can be installed in the correct sequence.

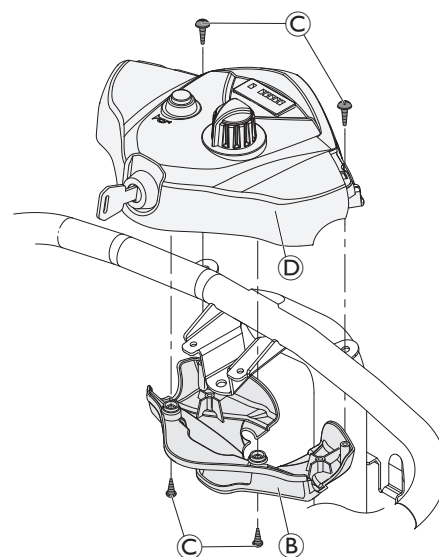


- Phillips screwdriver

1. Remove seat, see 5.1 Removing / Installing the Seat, page 11.
2. Remove battery box, see 6.2 Removing / Installing the Battery Box, page 14.
3. Pull colour shroud **A** upwards out of fixing.



4. Secure bottom shroud **B**. Remove screws **C**.
5. Remove bottom shroud.
6. Remove all plugs from top operating console assembly **D**.
7. Replace operating console.
8. Install parts in reverse order.
9. Test all functions.



## 8.3 Replacing Potentiometer



### CAUTION!

#### Risk of burning if power cable is shorted

- Turn off the power completely before removing any power supply components of the scooter. Therefore take out batteries.
- Avoid bridging of contacts during measurements on live electrical components.



### CAUTION!

#### Risk of damage to operating console by instant high current / voltage

- Unplug battery cable before removing / installing operating console.
- Make sure all pins are correctly connected.



### CAUTION!

#### Risk of accident

- Wrong potentiometer setting can result in dangerous driving situations.
- Connect potentiometer to drive lever mounting.



### NOTICE!

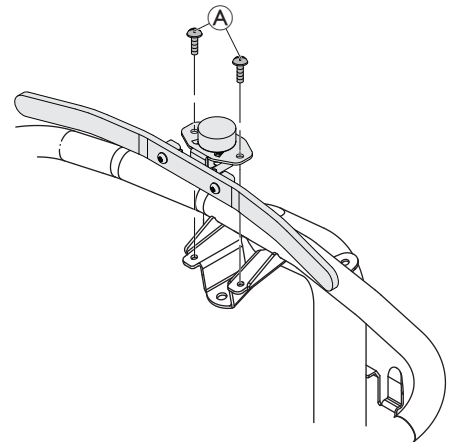
#### Risk of damaging circuit board by electrostatic discharge

- Handle circuit boards only in Electrostatic Protected Areas (EPA).



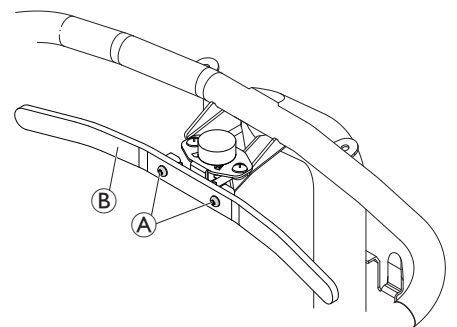
- Phillips screwdriver
- Digital multimeter

1. Remove seat, see 5.1 Removing / Installing the Seat, page 11.
2. Remove battery box, see 6.2 Removing / Installing the Battery Box, page 14.
3. Remove operating console, see 8.2 Replacing Operating Console, page 19.
4. Remove screws **A** on potentiometer.
5. Replace potentiometer.
6. Install parts in reverse order.
7. Test all functions (trial run).



### Removing Drive Lever

1. Remove seat, see 5.1 Removing / Installing the Seat, page 11.
2. Remove battery box, see 6.2 Removing / Installing the Battery Box, page 14.
3. Remove operating console, see 8.2 Replacing Operating Console, page 19.
4. Remove screws **A** of drive lever **B**.
5. Replace drive lever.
6. Install parts in reverse order.
7. Test all functions (trial run).



## 8.4 Updating Driving Program

The driving programs for scooters are continually updated and improved by Invacare. For this reason, you should check whether the version number is still up to date each time a wheelchair comes in for repairs, and also during regular inspections.

If a newer version is available, the driving program must be updated. The procedure for updating the driving program is described in the user manual of the Wizard software.



The electronic system is supplied with a standard drive program. If the driving program has been customised, you have to perform this customisation again, after installing the new driving program.



### CAUTION!

**Every alteration to the drive program can influence scooter handling and the tipping stability of the scooter!**

- Alterations to the drive program must only be carried out by trained Invacare-provider.
- Invacare can only assume a warranty for the safe vehicle handling of the wheelchair – in particular tipping stability – for unaltered standard drive programs.



- Dynamic® Wizard software
- User manual for the Wizard software
- For further information on other requirements - such as the minimum system configuration of the PC to be used for programming, necessary programming cables - see the user manual of the Wizard software. You find the latest version of the user manual in the download area on <http://www.dynamiccontrols.com/>.

## 9 Wheels

### 9.1 Replacing Wheels (4-Wheel Version / Rear Wheels of 3-Wheel Version)


**CAUTION!**

**Risk of injury caused by uncontrolled movement of scooter**

- Turn off power.
- Engage motors.
- Secure scooter against rolling away by placing wedges under wheels.
- Place rear frame of scooter on a supporting wooden block before removing wheels.



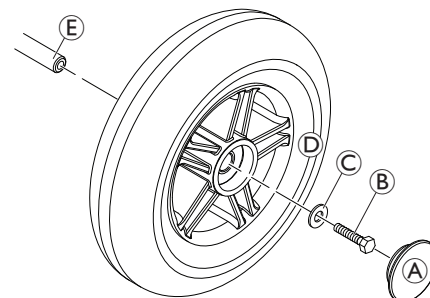
When removing, take care of small parts such as screws and washers. Put all small parts down so that they can be installed in correct sequence.



- 12 mm wrench
- Rubber hammer
- Flat screwdriver
- Jacking device

#### Removing Wheel

1. Secure scooter against rolling away.
2. Place a jacking device under frame in vicinity of battery box.
3. Remove plastic cap **A**.
4. Remove locking nut **B** and washer **C**.
5. Remove wheel **D** from axle **E**. If necessary, loosen the wheel by tapping it lightly with a rubber hammer.



#### Installing Wheel

1. Install parts in reverse order. Ensure to use a new locking nut.
2. Test all functions.

## 9.2 Replacing Front Wheel / Axle (3-Wheel Version)



### CAUTION!

#### Risk of accidents

Accidents may result from standing the chassis upright on its end.  
— Secure the chassis against falling over.



### NOTICE!

The plastic shroud can be damaged if you attempt to lift scooter by its shroud.  
— Lift scooter by the chassis only.



When removing, take care of small parts such as screws and washers. Put all small parts down so that they can be installed in correct sequence.



- 12 mm wrench
- 13 mm wrench

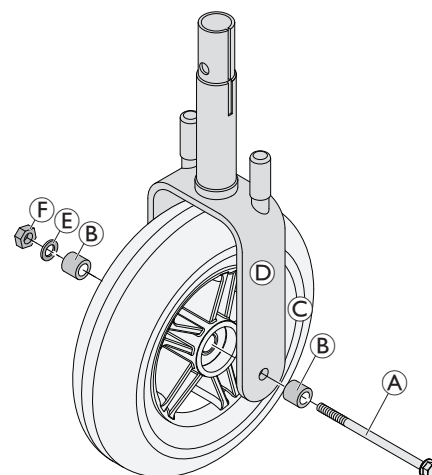
1. Remove seat, see *5.1 Removing / Installing the Seat, page 11*.
2. Remove battery box, see *6.2 Removing / Installing the Battery Box, page 14*.
3. Remove drive unit, see *6.2.1 Removing / Installing the Drive Unit, page 14*.
4. Place chassis upright on its seat adapter.
5. Secure chassis against falling over.

### Removing Wheel

1. Loosen self-locking nut (F). Secure axle bolt (A) against slippage.
2. Remove axle slowly.
3. Remove wheel (C) along with distance bushings (B) and washer (E) from fork (D).

### Installing Wheel

1. Install parts in reverse order. Pay attention to correct positions of bushings and washer.
2. Install and tighten new self-locking nut.
3. Test all functions.



Only front fork shown for better overview.

## 9.3 Replacing Front Axle (4-Wheel Version)



### CAUTION!

#### Risk of Accidents

Accidents may result from standing the chassis upright on its end.

- Secure the chassis against falling over.



### Risk of Damage to Mobility Device

The plastic shroud can be damaged if you attempt to lift scooter by its shroud.

- Lift scooter by the chassis only.




When removing, take care of small parts such as screws and washers. Put all small parts down so that they can be installed in correct sequence.

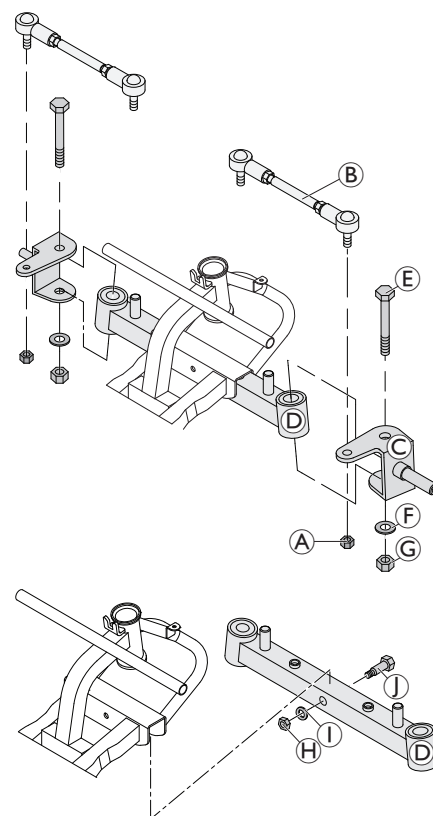


- 12 mm wrench
- 17 mm wrench

1. Remove seat, see 5.1 *Removing / Installing the Seat*, page 11.
2. Remove battery box, see 6.2 *Removing / Installing the Battery Box*, page 14.
3. Remove drive unit, see 6.2.1 *Removing / Installing the Drive Unit*, page 14.
4. Place chassis upright on its seat adapter.
5. Secure chassis against falling over.

### Removing Axle

1. Remove front wheels, see 9.1 *Replacing Wheels (4-Wheel Version / Rear Wheels of 3-Wheel Version)*, page 22.
2. Remove track rods ② from steering tube (not shown in the graphic).
3.  Hold in place track rod end with a wrench while removing nut ① so it cannot rotate.  
Loosen and remove nuts ① on track rods ②.
4. Remove track rods from steering plates ③.
5. Loosen and remove screws ⑤, washers ⑥ and nuts ④ including washer.
6. Remove steering plates from axle ⑦.
7. Remove screw ⑧, washer ⑨ and nut ⑩.
8. Remove axle ⑦ from chassis.



### Installing Axle

1. Install parts in reverse order.
2. Test all functions.



## 9.4 Replacing Anti-Tipper Wheels



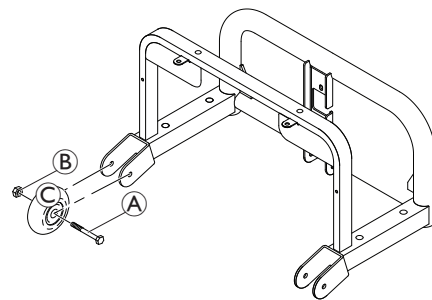
- 10 mm wrench (2x)

### Removing Wheel

1. Remove bolt (A) and nut (B).
2. Pull wheel (C) out of rear chassis.
3. Replace wheel.

### Installing Wheel

1. Install parts in reverse order. Tighten self-locking nut just tight enough that the wheel can still rotate without resistance.
2. Test all functions.



## 10 Steering

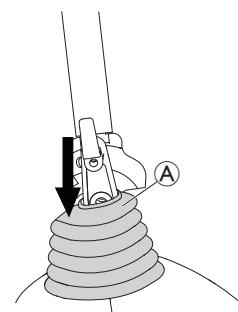
### 10.1 Removing / Installing the Tiller



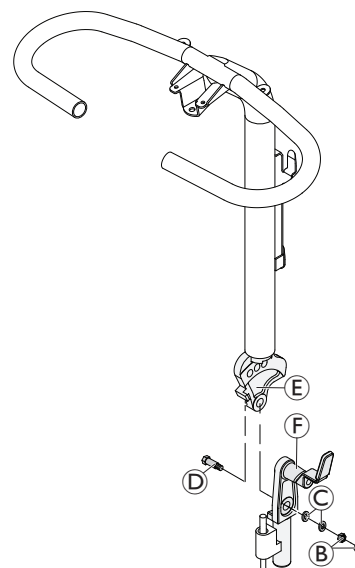
- 2 x 13 mm wrench

#### Removing

1. Remove operating console, see 8.2 *Replacing Operating Console*, page 19.
2. Push down the steering cover (A).



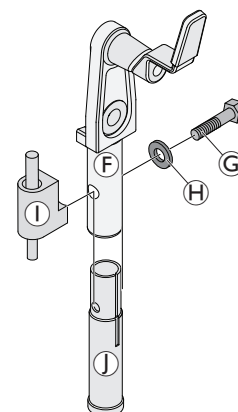
3. Remove nuts (B) and washers (C) to pull out screw (D).
4. Remove steering bar (E) from steering pivot (F).



5. Remove screw (G), washers (H) and steering stop (I).
6. Remove steering pivot (F) from steering tube (J).



Removing the steering pivot is the same for 3-wheel and 4-wheel version.



#### Installing

1. Install parts in reverse order. Make sure steering stop (I) fits into steering bar (E).
2. Test all functions.

Chassis not shown for better overview.

## 10.2 Replacing the Fork (3-Wheel Version)

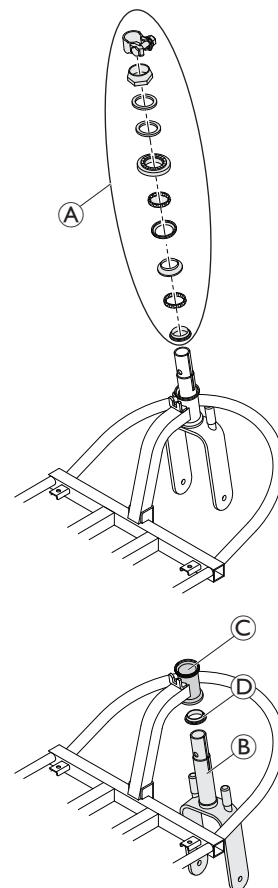


Take note of position and orientation of wheel and mounting hardware before removing.



- 13 mm wrench
- 32 mm wrench

1. Remove seat, see *5.1 Removing / Installing the Seat, page 11*.
2. Remove battery box, see *6.2 Removing / Installing the Battery Box, page 14*.
3. Remove drive unit, see *6.2.1 Removing / Installing the Drive Unit, page 14*.
4. Remove front shroud, see *7.2 Replacing Front Shroud, page 17*.
5. Remove front wheels, see *9.1 Replacing Wheels (4-Wheel Version / Rear Wheels of 3-Wheel Version), page 22*.
6. Remove tiller, see *10.1 Removing / Installing the Tiller, page 26*.
7. Remove steering bearing kit (A).
8. Pull fork (B) out of steering head holder (C). This can require a lot of strength.
9. Remove ball bearing (D).
10. Install parts in reverse order.
11. Test all functions.

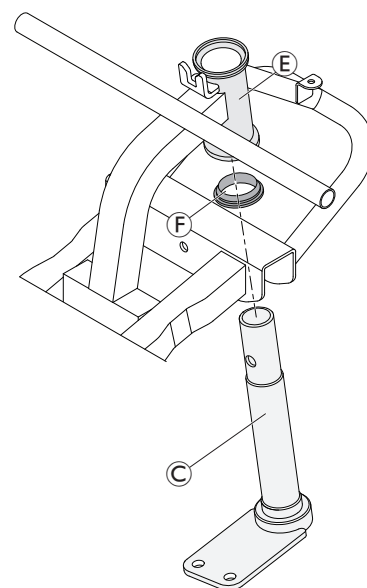
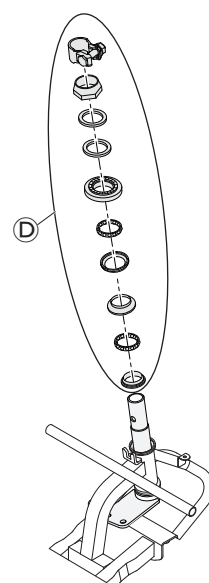
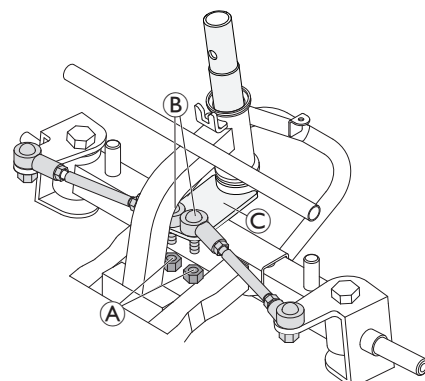


## 10.3 Replacing Steering Head (4-Wheel Version)



- 13 mm wrench
- 32 mm wrench

1. Remove seat, see *5.1 Removing / Installing the Seat*, page 11.
2. Remove battery box, see *6.2 Removing / Installing the Battery Box*, page 14.
3. Remove drive unit, see *6.2.1 Removing / Installing the Drive Unit*, page 14.
4. Remove front shroud, see *7.2 Replacing Front Shroud*, page 17.
5. Remove front wheel, see *9.2 Replacing Front Wheel / Axle (3-Wheel Version)*, page 23.
6. Remove tiller, see *10.1 Removing / Installing the Tiller*, page 26.
7. Remove nuts (A).
8. Remove track rods (B) from steering tube (C).
9. Remove steering bearing kit (D).
10. Pull steering tube (C) out of steering head holder (E). This can require a lot of strength.
11. Remove ball bearing (F).
12. Install parts in reverse order.
13. Test all functions.



## 11 Drive Components

### 11.1 Replacing Drive Motor


**CAUTION!**
**Risk of accident**

When parking the scooter on the scooter's support wheels it is no longer slowed by motor brake. The scooter can roll away out of control.

- Place the scooter rear frame on a supporting wooden block before you remove the wheels.


**CAUTION!**
**Risk of accident**

Accidental rolling can lead to accidents.

- Secure scooter against rolling away.



When removing, note position of small parts such as screws and washers. Put small parts down so that they can be installed in correct sequence.




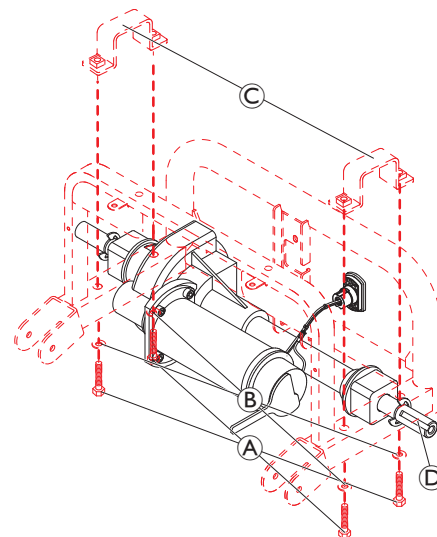
Plugs on power module cannot be wrongly connected because all plugs have a different size and only fit in one socket.



- 8 mm wrench
- 13 mm wrench
- Phillips screwdriver

- Rubber hammer
- Jacking device
- Cable ties

1. Remove seat, see 5.1 Removing / Installing the Seat, page 11.
2. Remove battery box, see 6.2 Removing / Installing the Battery Box, page 14.
3. Remove drive unit, see 6.2.1 Removing / Installing the Drive Unit, page 14.
4. Support drive unit with a jacking device.
5. Remove rear shroud, see 7.1 Replacing Rear Shrouds, page 17.
6. Remove wheels, see 9.1 Replacing Wheels (4-Wheel Version / Rear Wheels of 3-Wheel Version), page 22.
7. Remove screws **A** and washers **B**.
8. Remove brackets **C**.
9. Fold drive to rear onto chassis and anti-tipper wheels.
10. Remove motor **D** downwards out of rear frame.
11. Replace motor.
12. Install parts in reverse order.
  -  Install motor plug floating. This means you should ensure that the plug still has little play after the bolts have been tightened. Tighten bolts to max. 1.5 Nm.
13. Secure motor cable with cable tie.
14. Install parts in reverse order.
15. Test all functions.



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