

# 10 Electrical system

## 10.1 Electronics protection system

The vehicle's electronics are equipped with an overload-protection system. If the motors are put under considerable strain for a longer period of time (for example, when driving up a steep hill) and especially when the ambient temperature is high, then the electronic system could overheat. In this case the vehicle's power is reduced gradually until it finally comes to a halt. The Status Display shows a corresponding error code (see chapter "**Error Codes and Diagnostic Codes**" on page 48). By switching the power supply off and back on again, the error code is cancelled and the electronics are switched back on. It will take approximately five minutes until the electronics have cooled down enough for the motors to restore full power again.

When the motors are stalled by an insurmountable obstacle, such as a high kerb, and the vehicle driver allows the motors to strain against this hindrance without moving, the electronics will automatically switch off after a maximum of 20 seconds to prevent the motors from being damaged. The Status Display shows a corresponding error code (see chapter "**Error Codes and Diagnostic Codes**" on page 48). By switching off and back on again, the error code is cancelled and the electronics are switched back on.

If the motors are stalled by an insurmountable obstacle, and the vehicle driver allows the motors to strain against this hindrance without moving, but then returns the joystick to a neutral position before the electronics have a chance to register the error, and repeats this a few times, the electronics may not activate the emergency shut-off. In this case, one or both of the circuit breakers on the battery boxes may overheat and pop out. See the next section for information on re-activating them.

## 10.1.1 The main circuit breakers



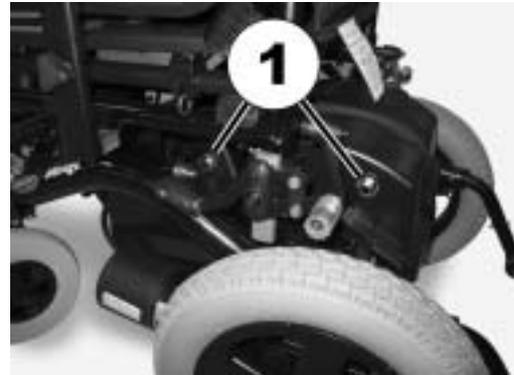
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### NOTE

The circuit breakers are located on the left sides of the battery boxes. If the electrical system draws too much power for a period of time, one or both may overheat and pop out. To reactivate the electrical system, wait a few minutes until they have cooled down a bit, then push them back in.

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The illustration at right shows the positions of the circuit breakers (1) on the battery boxes.



## **10.2 Batteries**

### **10.2.1 What you need to know about batteries**

Power is supplied by two 12 V batteries. The batteries are maintenance-free and only need regular charging.

New batteries should always be fully charged once before their first use. New batteries will be at their full capacity after having run through approx. 10 - 20 charging cycles. How fast the batteries discharge depends on many circumstances, such as ambient temperature, condition of the surface of the road, tyre pressure, weight of the driver, way of driving and utilisation of lighting.



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## NOTE

The batteries supplied with your electric vehicle are not hazardous goods. This classification is based on the German *GGVS Hazardous Goods Road Transport Ordinances*, and the *IATA/DGR Hazardous Goods Rail Transport / Air Transport Ordinances*. Batteries may be transported without restrictions, whether by road, rail or by air. Individual transport companies have, however, guidelines which can possibly restrict or forbid certain transport procedures. Please ask the transport company regarding each individual case.

Pay attention to the Battery Charge Indicator! Make sure to charge the batteries when the Battery Charge Indicator shows that battery charge is low. We recommend charging the batteries after each trip, as well as each night over night. Depending on the level of discharge, it can take up to 12 hours until the batteries are fully charged again.

Protect your charger from sources of heat such as heaters and direct sunlight. If the battery charger overheats, charging current will be reduced and the charging process delayed.

To avoid damaging the batteries, never allow them to be fully discharged. Do not drive on heavily discharged batteries if it is not absolutely necessary, as this will strain the batteries unduly and shorten their life expectancy.

In case your vehicle is not used for a longer period of time, then the batteries must be charged at least once a month to maintain a full charge. Alternatively, the vehicle can stay connected to the charger. The batteries cannot be overcharged with the specified charger.

Please use only charging devices in Class 2. This class of chargers may be left unattended during charging. All charging devices which are supplied by Invacare® comply with these requirements.

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## 10.2.2 Charging the batteries

- Make sure you read and understand the battery charger's User's Manual, if supplied, as well as the safety notes on the front and rear panels of the charger!
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**WARNING: Danger of explosion and destruction of batteries if the wrong battery charger is used!**



- *Only ever use the battery charger supplied with your vehicle, or a charger that has been approved by Invacare®.*

**Danger of electric shock and damage to the battery charger if it is allowed to get wet!**

- *Protect the battery charger from water.*
- *Always charge in a dry environment.*

**Danger of short circuit and electric shock if the battery charger has been damaged!**

- *Do not use the battery charger if it has been dropped or damaged.*

**Danger of fire and electric shock if a damaged extension cable is used!**

- *Only ever use an extension cable if it is absolutely necessary. In case you must use one, make sure it is in good condition.*
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### Charging the batteries

- Switch off the electric wheelchair at the remote.
- Connect the charging device to the remote. The charging socket is to be found on the underside of the remote (1).
- Connect the charging device to the mains supply and switch on if necessary.
- After charging, first disconnect the charging device from the mains supply, then disconnect the plug connection from the remote.



### 10.2.3 Removing and fitting batteries

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**WARNING:**

**Danger of injury if the batteries are not handled correctly during assembly and maintenance work!**

- *New batteries should be installed by authorised technicians!*
- *Observe the warnings on the batteries!*
- *Take into account the heavy weight of the batteries!*
- *Only ever use the battery type defined in the technical specifications (see "**Technical specifications**" on page 117)!*

**Danger of fire and burns if battery terminals are short-circuited!**

- *DO NOT short-circuit battery terminals with a tool!*
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**WARNING:**

**Corrosion and burns from acid leakage if batteries are damaged!**

- *Remove clothes that have been soiled by acid immediately.*

**After contact with skin:**

- *Immediately wash affected area with lots of water.*

**After contact with eyes:**

- *Immediately rinse eyes under running water for several minutes; consult a physician.*
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### 10.2.3.1 Removing the batteries



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**CAUTION: Risk of fire and burns if battery poles are bridged!**

- *When replacing the batteries the battery poles MUST NOT come into contact with metal parts of the wheelchair causing bridging.*
  - *Be sure to replace the battery pole caps after the batteries have been replaced.*
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**WARNING: Risk of fire and burns due to damage to the battery cables!**

- *The battery cables and other cables are positioned in a cable duct above the batteries. The cable duct protects the cables against crushing and other damage. It may not be removed.*
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**Requirements:**

- 1x jaw spanner 11 mm
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**PLEASE NOTE:**

If your wheelchair is fitted with a lifter the seat unit must be pulled upward in order to access the batteries. This work should be carried out by at least two people.

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- Open battery fixing strap (buckle).



- Remove battery cable connecting plugs on both sides (the figure only shows the right-hand side).



- Pull the rear battery box out towards the back.



- Open the battery retaining strap velcro fastening.



- Pull the battery retaining strap to the side over the edge of the battery box.



- Open the battery box.
- Pull the battery terminal caps (1) upwards and push them back to allow access to the battery terminals.
- Loosen battery terminal clamps with the spanner.
- Replace battery.
- Re-assembly is done in reverse order.



### 10.2.3.2 How to handle damaged batteries correctly

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#### **WARNING:**

#### **Corrosion and burns from acid leakage if batteries are damaged!**

- *Remove clothes that have been soiled by acid immediately.*

#### **After contact with skin:**

- *Immediately wash affected area with lots of water.*

#### **After contact with eyes:**

- *Immediately rinse eyes under running water for several minutes; consult a physician.*
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- Always wear safety goggles and appropriate safety clothing when handling damaged batteries.
- 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**

Dead or damaged batteries can be given back to your dealer or directly to Invacare®.