

Risk Assessment of LiON Box Max

1. Risk Assessment of LiON Box Max Product

- **Product name:**
LiON Box Max
- **Manufacturer information:**
ONgineer GmbH
Hindenburgring 9a
32339 Espelkamp, Germany
- **Related documents:**
 - CE Declaration of Conformity,
 - Installation and Operating Instructions,
 - Technical Data Sheet,
 - Construction Certificate in accordance with EN 61439-1.
- **Funktion:**
Charging station with two independent DC charging points and one AC charging point in the form of an integrated IP 54 socket, suitable for e-bike batteries from various manufacturers (e.g., Bosch, Shimano, Yamaha).
- **Scope of application:**
Public and private charging infrastructure
- **Technical specifications:**
 - Supply voltage: 220–240 V
 - Output: DC and ACAC
 - Protection class: IP54 (dust and splash protection), IK09 (impact resistance)
 - Operating temperature range: -25 to +40 °C
 - Safety features: overtemperature protection, short circuit protection, and reverse polarity protection

2. Hardware limitation

- **Intended use:**
Charging of electric bike batteries in safe environments
- **Power supplies interfaces:**
Electric power supply
- **Expected improper use:**
 - Use of incompatible batteries,
 - Incorrect connection of plugs,
 - Use in extreme environmental conditions outside the specifications.
- **Product durability aspects:**
Regular maintenance of connectors and inspection for mechanical damage

- **Timeframes**
Expected service life – unlimited service life,
Recommended maintenance intervals – see the assembly and operating instructions.

3. Hazard Identification

Mechanical hazards:

- Possible damage to housing parts due to strong physical impact (IK09 protects against normal stress), e.g., vandalism.

Electrical hazards:

- Short circuit or reverse polarity due to incorrect connection,
- Risk of electric shock due to defects in the insulation system,
- Risk of electric shock through the built-in socket in case of misuse.

Thermal hazards

- Overheating due to long operating times or high ambient temperatures.

Enviromental hazards:

- Water ingress in case of improper installation (despite IP54 rating).

Ergonomic hazards:

- Lack of intuitive operation may lead to improper use.

4. Risk assesment

Risk assessment before implementing protective measures:

- **Mechanical hazards:** low risk
- **Reverse polarity:** low risk
- **Electric shock due to insulation failure:** medium risk
- **Electric shock due to contact with the electrical socket:** medium risk
- **Thermal overload:** low risk
- **Water ingress (improper installation):** low risk
- **Incorrect operation:** low risk

5. Risk minimizing

Internally safe construction:

- Robust and insulated housing design (polycarbonate, IP54, IK09),
- Implementation of reverse polarity protection mechanisms,
- Electronic locking of individual battery charging plugs relative to each other.

Technical protective measures:

- Electronic protection against overheating and short circuits,
- Use of a built-in socket integrated with child protection,
- Intuitive, reverse polarity-protected plug connections through appropriate, manufacturer selection.

User's information:

- Warnings regarding environmental conditions and maximum load,
- Clear user manual with pictograms and step-by-step instructions.

6. Verification

- Design and operation of the charging station in accordance with EN 61439-1,
- Preparation of the design certificate,
- Conducting final electrical safety and functionality tests during production

7. Documentaion

- Full technical documentation of protection systems (design certificate),
- Risk analysis before and after implementing corrective measures,
- Information on residual hazards: Improper use by the user cannot be completely excluded.