

DYNAMIS

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Dynamis LIX

Batteries

Technical Manual LIX Batteries

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Handling, Safety and Assembly of LIX batteries

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1 General Safety

In general, the use of a Lithium Thionyl Chloride Battery (LTC) with SCX capacitor shall be performed within the specified parameters of the manufacturer, given in each particular specification ("intended use").

In order to work properly throughout the expected life cycle DYNAMIS LIX batteries are manufactured using design and techniques avoiding side reactions or physical effects reducing the performance of the cell.

Some of these features include a good thermal conductivity avoiding accumulation of heat (dissipation), as well as optimized electrode surfaces for both LTC and SCX capacitor.

2 Information for safety

Based on the IEC 60086-4, the following safety information are given for both industrial and consumer use:

Charge protection

For assemblies such as memory back-up circuits etc. current limiting resistors and blocking diode shall be used, or other protective devices serving the same purpose. Charging from the main power source must be avoided this way.

Safety precautions during handling

- > Do not insert batteries in reverse polarity. Check thoroughly the "+" and "-" markings on battery and device. For batteries equipped with wire red is "+" and black is "-" if not stated otherwise.
- > Do not short-circuit batteries, use original packaging as long as possible
- > Do not charge primary/LIX batteries
- > Do not force discharge primary/LIX batteries
- > Do not mix batteries (replace all at once within any assembly)
- > Do not leave discharged batteries in equipment
- > Do not overheat batteries
- > Do not weld or solder directly on batteries
- > Do not open batteries
- > Do not deform batteries
- > Do not expose batteries to fire or direct sunlight
- > Do not expose batteries to water or any other conductive liquid
- > Keep batteries out of the reach of children

3 Marking

DYNAMIS products are marked for identification and quality purposes as legally required.

The information given is the range of product, the specific cell type, the nominal voltage, the capacity, the manufacturer, and the part number. In addition, the labels contain the production code and the disposal symbol as legally required.

The production code allows DYNAMIS to trace back any batch of cells to the manufacturing details.

4 Battery Packs

In addition to Chapter 4 more details are given with regard to the assembly of battery packs.

In general it is recommended that only qualified personnel should assemble battery packs, also the design of battery packs should be left to DYNAMIS.

Such details in terms of design and assembly are:

- Prevention of short circuits;
- Prevention of overheating

Overheating may occur not only in cases of damaged batteries but also due to the selection of wrong connectors. With respect to the max. short current specified the connectors must be conductive enough not to produce enough heat so that materials used for the assembly may melt. For larger packs and/or special arrangements the heat dissipation may not be sufficient. In such cases thermal fuses should be integrated.

- Prevention of charging

The use of blocking diodes in each string of batteries connected in parallel is strongly recommended.

- DYNAMIS advises her customers also not to replace single batteries in a battery pack with batteries of differing type, size and age compared to the others in that pack. Anyway, such differences must be avoided during assembly as well. Customers shall also refrain from using batteries from different manufacturers within one battery pack. The technical

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differences used during manufacturing the batteries create different behavior during discharges and may lead to situations described above.

The following list of features is given for assembly of battery packs:

- 1) Batteries must be insulated from each other
- 2) All electrical connections and contacts must be fixed and insulated to prevent short circuits
- 3) Batteries that contain larger cells, e.g. C-, D- or DD-cells shall be assembled and used in upright orientation
- 4) Pack-to-outside-connectors should provide keyed connection if possible, in order to prevent wrong polarity connection
- 5) Insulating or encapsulating materials should be used in sufficient quantity but on a level of minimum requirement to enable heat dissipation as effective as possible
- 6) Cell safety features such as safety vents must not be blocked in any way during assembly procedures
- 7) The materials used for assembly must be selected with regard to the environmental conditions of its intended use. This applies especially for battery packs which may be stressed by outside heat or mechanically. In such cases the design of the pack must be adapted with additional enforcements or insulation.
- 8) The design of the battery pack shall be verified for compliance with all relevant shipping and handling requirements, e.g. according to UN 38.3
- 9) For assembly procedures, materials and cells must be protected from damaging or potentially short-circuiting jewelry or similar items. Appropriate work protection is also advised for all steps.

5 Precautions for storage and handling

Refer also to DYNAMIS-MSDS_LIX-08-2016_d_rev1

Handling

The following list of basic precautions shall be applied:

- Do not short-circuit LIX batteries
- Do not recharge LIX batteries
- Do not overdischarge LIX batteries
- Do not incinerate LIX batteries
- Do not expose LIX batteries to higher temperatures than specified
- Do not damage, crush or puncture LIX batteries
- Do not open LIX cells, do not disassemble LIX battery packs
- Prevent LIX cells from all conductive liquids, e.g. water
- Do not connect with reverse polarity
- Do not weld or solder the battery case

Storage

For storage of LIX batteries, cool and dry rooms are recommended. A temperature below 35 °C is preferred. Do not store at higher temperatures than 70 °C.

Original packaging is the most recommended way of storage. Do not use anti-static bags or foam. Do not use metallic or other conductive materials for covering batteries.

In case of fire, use class D extinguishers. Do not use water, sand or carbon dioxide for this purpose.