Battery Information Sheet
Pepperl+Fuchs Group
ECOM Instruments GmbH
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Lithium-ion battery packs and products with integrated Lithium-ion cells

1. PRODUCT AND COMPANY IDENTIFICATION

Product identifier
This information sheet is valid for all batteries that are listed in the table in section 16

Recommended use of product and restriction on use:
Identified use : Power supply for electronic device
Restriction on use : Do not rupture cell or battery pack

Details of the supplier of the battery information sheet

Manufacturer:
Pepperl+Fuchs SE
Lilienthalstrasse 200
68307 Mannheim
Germany
Tel.: +49 621 776-0
Internet: www.pepperl-fuchs.com

Supplier/Manufacturing site:
ECOM Instruments GmbH
Industriestrasse 2
97959 Assamstadt
Germany
Tel: +49 (6294) 4224 0
Internet: www.ecom-ex.com

Contact Data for further information
E-mail: battery@de.pepperl-fuchs.com
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2. HAZARDS IDENTIFICATIONS

The Lithium-ion cells and Lithium-ion battery packs are classified as articles, which have a gas-tight seal and are safe as long as they are used and handled in accordance with the manufacturer's specifications.

Handling and Operational Safety

Handle discharged batteries carefully
Batteries still represent a source of danger as they may deliver a very high short-circuit current. Even if assumed to be discharged, lithium ion batteries may - as other batteries- never totally discharge.

Avoid impact to the battery
Impact and penetration may damage the battery. This may cause the battery to leak, generate heat, smoke, catch fire, or explode.

Keep batteries away from other metal objects
like paperclips, coins, keys, nails, screws or other small metal objects that can make a connection from one terminal to another. Shorting the battery terminals together may cause burns or a fire.

Under abusive conditions, liquid may be ejected from the battery
Avoid contact. If contact accidentally occurs, flush with water. If liquid contacts eyes, additionally seek medical help. Liquid ejected from the battery may cause irritation or burns.

Do not expose a battery to fire or excessive temperature
Exposure to fire or temperature **above 120 °C** may cause explosion.

Do not disassemble the battery
Disassembly or modification of the battery may damage the protection circuit. This may cause the battery to generate heat, smoke, catch fire, or explode.

Do not immerse the battery in liquid such as water, beverages, or other fluids
Exposure to liquid may damage the battery. As a result, the battery may generate heat, smoke, catch fire, or explode.

Recharge batteries only with the charger specified by the manufacturer
A charger that is suitable for one type of batteries may create a risk of fire when used with another battery.

Use batteries only with specifically designated tools
Use of any other tools may create a risk of injury and fire.

Do not use a battery that is damaged or modified
Damaged or modified batteries may exhibit unpredictable behavior resulting in fire, explosion or risk of injury.

Do not use abnormal batteries
Immediately stop using the battery if there are noticeable abnormalities, such as smell, heat, discoloration, or deformity. The battery may be defective and could generate heat, smoke, catch fire, or explode with continued use.

Excessively high charging voltages and overcharge must be avoided at all costs. They cannot only lead directly to critical situations, but also have a negative effect on the battery's life.

The hazard is associated with the contents of the cell or battery
Under recommended use conditions, the electrode materials and the liquid electrolyte are non-reactive provided that the cell or battery integrity remains, and seals remain intact. The potential for exposure should not exist unless the cell or battery leaks, is exposed to high temperatures or is mechanically, electrically or physically abused/damaged. If the cell or battery is compromised and starts to leak, based upon the battery ingredients, the contents are classified as Hazardous.

3. COMPOSITION / INFORMATION ON INGREDIENTS

Characterizations
The battery pack contains cells with lithium metal oxide cathode.

Important note
The battery may not be opened, heated up to temperatures above 120°C or burned, as exposure to its contents can be dangerous under certain conditions. The product contains neither metallic lithium nor lithium alloys

As a solid, manufactured article, exposure to hazardous ingredients is not expected with normal use.

Composition:

Cell component	Chemical Name	CAS No.	EINECS	*Concentration range in electrolyte (w/w%)	*Mass range in cell (g/g%)	GHS Classification
Electrolyte	Conatins Electrolyte salt and solvents				5-20	Skin Corr 1B – H314
Electrolyte salt	Lithium hexafluorophosphate	21324-40-3	244-334-7	5-30	1-5	
PVDF	Polyvinylidenfluoride	24937-79-9	Not listed	-	<1	-
Electrolyte solvents	Electrolyte solvents – Includes one more of the following: Ethylene Carbonate Propylene Carbonate Diethyl Carbonate Dimethyl Carbonate Ethyl Methyl Carbonate	 96-49-1 108-32-7 105-58-8 616-38-6 623-53-0	 202-510-0 203-572-1 203-311-1 210-478-4 Not Llisted	70-95	5-20	-
Aluminium	Al	7429-90-5	231-159-6	-	9-18	-
Cathode	Includes one or more of the following: Lithium Cobalt Manganese Nickel Aluminium	 12190-79-3 7439-96-5 7440-02-0 7429-90-5	 235-362-0 231-105-1 231-111-4 231-072-3	-	20-50	-
Anode	Includes one or more of the following: Graphite Carbon Black	 7782-42-5 1333-86-4	 231-955-3 215-609-9	-	13-18	-
Steel, Nickel And inert components		Various	Various	-	Balance	-

*Quantities may vary depending on cell or battery model.

4. FIRST AID MEASURES

Description of first aid measures - General instructions

The hazardous components of this cell or battery are contained within a sealed unit. The following measures are only applicable if exposure has occurred to components when a cell or battery leaks, is exposed to high temperatures or is mechanically, electrically or physically abused/damaged. The hazardous contents are caustic alkaline electrolytes contained in cells with lithium metal oxide cathodes, graphite and carbon anodes and Polyvinylidenfluoride binders.

After skin contact

Wash area thoroughly with water for 15 minutes.

After eye contact
If eye contact with contents of an open cell occurs, immediately flush the contaminated eye(s) with water for 15 minutes and seek medical advice.

After burns
If burns are caused, treat them accordingly and seek medical advice.

After inhalation
In case of intensive smoke generation and gas release or bad smell leave the room and initiate an alarm and firefighting action, if required. Seek medical advice if there are large quantities and irritation of the airways. Ensure sufficient ventilation.

After ingestion
Rinse out the mouth and around the mouth with water. Immediately seek medical advice.

5. FIREFIGHTING MEASURES

Fires from lithium batteries in use can in principle be fought with water. No additional or special extinguishing agents need to be used, since the batteries are protected accordingly. Fire surroundings of batteries are to be fought with conventional extinguishing agents. The fire of a battery cannot be considered separately from the surrounding fire.

Suitable extinguishing media
Water is the most effective firefighting tool to control the spread of fire to other cells and batteries.
The cooling effect of water effectively impedes fire from spreading to battery cells which still have not reached the critical ignition temperature ("thermal runaway").
If any cells or batteries are burning, flood the area with water. Water may not directly extinguish them, but will cool the adjacent cells or batteries and control the spread of fire. Burning cells or batteries will burn themselves out.

Explosion Data:	Closed containers may explode, burst, rupture or vent when exposed to temperatures above 120°C (248°F).
Sensitivity to Mechanical Impact:	Extreme mechanical abuse will result in rupture of the individual battery cells.
Sensitivity to Static Discharge:	Electrostatic discharges imposed directly on the spilled electrolyte may start combustion.

Special hazards arising from fire gas and fumes due to battery ingredients
As with any fires, the fire gas can be a health hazard if inhaled. For this reason, sufficient ventilation should be ensured. The interaction of water vapor and exposed lithium hexafluorophosphate (LiPF6) may result in the generation of hydrogen and hydrogen fluoride (HF) gas. Contact with battery electrolyte may be irritating to skin, eyes and mucous membranes. Thermal degradation may produce hazardous fumes of lithium, cobalt and manganese, hydrofluoric acid, hydrogen and oxides of carbon, aluminum, lithium, copper and cobalt as well and smoke and irritating, corrosive and/or toxic gases. Fumes may cause dizziness or suffocation.

6. ACCIDENTAL RELEASE MEASURE

Personal precautions, safety equipment

If the battery housing gets damaged, electrolyte can leak out. As an immediate precautionary measure, isolate large leak areas for at least 25 meters (75 feet) in all directions. Keep unauthorized personnel away. Ventilate closed areas before entering.Do not enter corrosive vapor contaminated areas without a breathing protection (respirator or Self-Contained (SCBA) Breathing Apparatus).
Use personal protective clothing: Chemical resistant gloves, safety glasses/goggles or face shield and chemical resistant clothing. Adequate personal protective equipment is indicated in Section 8.

Safety device for damaged cells or batteries

Place damaged cells or batteries into airtight plastic bags, add dry sand, chalk powder (CaCO3) or vermiculite using safety gloves. Place the enclosed cells or batteries after into appropriate containers and close tightly for disposal. Immediately transport closed containers outside. Lined steel drums are suitable for storage of damaged cells or batteries until proper disposal can be arranged. Please consult local regulations on disposal of hazardous waste for complete details.

After pickup of damaged cells or batteries is completed, traces of electrolyte can be soaked up with dry paper towels. When doing so, prevent direct contact with skin by wearing chemical resistant gloves. Soaked paper towels with electrolyte shall be disposed according to local regulations on disposal of hazardous waste.

Environmental precautions:

Absorb leaked material with non-reactive absorbent such as vermiculite, clay or earth. Prevent from migration into soil, sewers and natural waterways – inform local authorities if this occurs.

7. HANDLING AND STORAGE

Instructions for safe handling

No special protective clothing is required for handling individual batteries. Batteries are products which release no substance when used properly. Observe good industrial hygiene practices. Wash hands thoroughly after handling.
Do not short circuit, open, disassemble, crush, puncture or burn cells or batteries. Do not expose cells or batteries to extreme heat or fire. Do not solder cells. Do not mix cells of different types and brands. Do not mix new and used cells or batteries. Do not incinerate the cells or batteries as there is a danger of explosion. Do not use or charge damaged, defective or deformed cells or batteries.

Conditions for safe storage

In each case, carefully observe the warnings on batteries and the operating instructions.
Store Lithium batteries and/or cells in dry, well-ventilated area, out of direct sunlight and away from heat and ignition sources. To minimize any adverse effects on cell and/or battery performance, it is recommended that the cells and/or batteries be kept at room temperature (25°C +/- 5°C). Elevated temperatures can result in shortened cell and/or battery life. Keep out of reach of children. Store away from incompatible materials, like water, strong oxidizing agents, strong reducing agents, strong acids and strong alkalis.
When storing large quantities of lithium batteries, consult local authorities and insurers.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Batteries / cells in normal use scenarios
Lithium ion batteries are products, from which no substance is released under normal and reasonably foreseeable conditions of use. Exposure standards are not applicable to the sealed articles. Special ventilation, eye protection, skin protection and respiratory protection is not required when handling cells or batteries during normal use.

Handling of leaking or ruptured cells or batteries
Ventilation is required if there is leakage from the cell or battery.

Eye and face protection:	Wear chemical resistant safety glasses/goggles or face shield
Skin (hand) protection:	Chemical resistant gloves are recommended
Skin (clothing) protection:	Wear long sleeved clothing to avoid skin contact. Soiled clothing should be washed with detergent prior to re-use.
Respiratory protection:	However, if dealing with an electrolyte leakage and irritating vapors are generated, an approved half face inorganic vapor and gas/acid/particulate respirator is required.
Other protective equipment:	Have a safety shower or eye wash station readily available
Hygiene measures:	Do not eat, drink or smoke in work areas. Avoid storing food, drink or tobacco near the product. Practice and maintain good housekeeping.

Environmental exposure controls: Avoid release to the environment

Respiratory Protection	Hand Protection	Eye Protection	Other
			
In all fire situation use self-contained breathing apparatus.	In the event of leaking or ruptured cells or batteries, wear gloves.	Safety glasses are recommended in case of leaking or ruptured cells or batteries.	In the event of leaking or ruptured cells or batteries, wear protective clothing.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid, Sealed Unit*	**Solubility in Water:**	Insoluble
Appearance:	Cell or Battery Pack	**Odor Type:**	Odorless
pH:	Not Applicable	**Decomposition Temperature:**	90°C

Other physical states are not applicable

10. STABILITY AND REACTIVITY

The cells or batteries are stable under normal ambient and anticipated conditions of use, storage and transport.

Conditions to avoid: Avoid exposing the cells or batteries to fire or temperatures above 80°C. Do not disassemble,crush, short circuit, puncture, immerse in liquid, burn, expose to flame or install with incorrect polarity. Avoid mechanical, physical or electrical abuse.

If an upper temperature limit of 120°C is exceeded, the batteries are in danger of bursting.
When charging a rechargeable system, always be sure to comply with the upper voltage limit. If the limits are exceeded, the battery may burst or even explode. Charging a non-rechargeable system, which is not permitted, may cause the battery to burst or explode.

11. TOXICOLOGICAL INFORMATION

The hazardous components of the cell or battery are contained within a sealed unit. Under recommended use conditions, the electrode materials and liquid electrolyte are non-reactive provided that the cell or battery integrity remains, and the seals remain intact. The potential for exposure should not exist unless the battery leaks, is exposed to high temperature or is mechanically, electrically or physically abused/damaged.

The following toxicology data is in respect to if a person comes into contact with the electrolyte.

The electrolyte contained within the cell or battery is a corrosive liquid.

Swallowed: Ingestion of this electrolyte would be harmful. During normal usage ingestion should not be a means of exposure.

Eye: It is expected that it would cause irreversible damage to the eyes (*exhibit serious Damage/Corrosivity*). Contact may cause corneal burns. Effects may be slow to heal after eye contact. Correct handling procedures incorporating appropriate eye protection should minimize the risk of eye irritation.

Skin: It is expected that it would cause skin burns or severe irritation to the skin (*exhibit Dermal Corrosivity/Irritation*) if not washed off immediately. Correct handling procedures should minimize the risk of skin irritation. People with pre-existing skin conditions, such as dermatitis, should take extreme care so as not to exacerbate the condition.

Inhaled: Inhalation of vapors from a leaking cell or battery may lead to severe irritation of the mouth andupper respiratory tract with a burning sensation, pain, burns and inflammation in the nose and throat; there may also be coughing or difficulty breathing.

12. ECOLOGICAL INFORMATION

The sealed cell or battery does not pose an Ecotoxicity hazard. Cells or batteries under normal use conditions pose no ecotoxicity hazard. In the case of a broken or damaged cell or battery and leakage of the electrolyte, it will react with water and potentially cause damage to flora and fauna if not disposed of properly.

Solid cells and batteries released into the natural environment will slowly degrade and may release harmful or toxic substances. Cells and batteries are not intended to be released into water or on land but should be disposedor recycled according to local regulations.

See section 13 of this Battery Information Sheet for Disposal Considerations.

13. DISPOSAL CONSIDERATIONS

Lithium batteries are marked with the symbol of the crossed-out wheeled bin (see figure).

The symbol reminds the end user that batteries in the EU are not permitted to be disposed of with household waste, but must be collected separately. Cell and battery recycling is encouraged. Cells and batteries should not be released into the environment, do **NOT** dump into any sewers, on the ground or into any body of water. Do not dispose of in fire.
Spent batteries have to be returned free of charge to collection schemes or distributors.
To prevent short circuits and associated heating, lithium batteries must not be stored or transported in bulk form and unprotected. Suitable measures against short circuits include:

- Placing the batteries in original packaging or a plastic bag.
- Masking the terminals/contacts
- Embedding in dry sand

Cells and batteries should be fully discharged before being sent for recycling. Do not store used cells or batteries near heat sources, chemicals or food. Do not break open or damage lithium-ion cells or batteries prior to disposal.

EU: Waste must be disposed of in accordance with relevant EC Directives and national, regional and local environmental control regulations. For disposal within the EC, the appropriate code according to the European Waste Catalogue (EWC) should be used. See Directive 2006/66/EC of the European Parliament and of the Council of 6 September 2006 on batteries and accumulators and waste batteries and accumulators.
EU Waste Code: 16 06 05 – other batteries and accumulators

Non-EU: National regulations on battery disposal must be observed. Waste must be disposed of in accordance with local, provincial and federal laws and regulations.

14. TRANSPORT INFORMATION

Commercial transport of lithium ion batteries is subject to dangerous goods regulations. Transport preparations and transport are exclusively to be carried out by appropriately trained personnel and/or the process has to be accompanied by experts with suitable knowledge or qualified companies.
Transport regulations:
Lithium batteries are subject to the following dangerous goods regulations and exemptions based on the respective valid revision:

It is prohibited to carry defective or damaged cells and batteries by air.
ECOM cells and batteries are designed to comply with all applicable shipping regulations as prescribed by industry and legal standards which include compliance with the UN Recommendations on the Transport of Dangerous Goods.

UN Proper Shipping Name: **UN 3480**: LITHIUM ION BATTERIES
UN 3481: LITHIUM ION BATTERIES CONTAINED IN EQUIPMENT,
(i.e. inserted in battery operated product) or
LITHIUM ION BATTERIES PACKED WITH EQUIPMENT
(i.e. packed together with battery operated product)

Transport Hazard Class: **9**

Pepperl+Fuchs products listed under this Battery Information Sheet will conform to various sections of the packing instructions based on the contents, packaging and mode of the shipment. Please see the shipping documents for complete details for individual shipments. This document is not intended to replace or authorize shipments of lithium-ion cells; it is intended as a guide for use by trained individuals.

15. REGULATORY INFORMATION

Regardless of shape, volume, weight and application, batteries, in the EU are subject to the respective national implementation of the European Battery Directive (2006/66/EC). It includes but is not limited to regulations regarding placing on the market, collection, treatment and recycling of batteries.

EC Classification for the Substance/Preparation:

These products are not classified as hazardous according to Regulation (EC) No. 1272/2008.
Keep out of the reach of children.

EU Regulations:

Regulation (EC) No. 1005/2009 on substances that deplete the ozone layer, Annex I: Not listed.
Regulation (EC) No. 1005/2009 on substances that deplete the ozone layer, Annex II: Not listed.
Regulation (EC) No. 850/2004 on persistent organic pollutants, Annex I as amended: Not listed.
Regulation (EC) No. 689/2008 concerning the export and import of dangerous chemicals, Annex I, part 1 as amended: Not listed.
Regulation (EC) No. 689/2008 concerning the export and import of dangerous chemicals, Annex I, part 2 as amended: Not listed.
Regulation (EC) No. 689/2008 concerning the export and import of dangerous chemicals, Annex I, part 3 as amended: Not listed.
Regulation (EC) No. 689/2008 concerning the export and import of dangerous chemicals, Annex V as amended: Not listed.
Regulation (EC) No. 166/2006, REACH Article 59(10) Candidate List as currently published by ECHA: Not listed.
EU Authorizations:
Regulation (EC) No. 1907/2006, REACH Annex XIV Substances subject to authorization, as amended: Not listed.

EU Restrictions on use:

Regulation (EC) No. 1907/2006, REACH Annex XVII Substances subject to restriction on marketing and use as amended: Aluminium (CAS 7429-90-5)
Directive 2004/37/EC: on the safety and health of pregnant workers and workers who have recently given birth or are breastfeeding: Not listed.

Other EU Regulations:

Directive 96/82/EC (Seveso II) on the control of major accident hazards involving dangerous substances: Not listed. Directive 94/33/EC on the protection of young people at work: Not listed.

Chinese Regulations

General Rule for Classification and Hazard Communication of Chemicals (GB 13690-2009): Specifies the classification, labeling and hazard communication of chemicals in compliance with the GHS standard for chemical production sites and labeling of consumer goods.
General Rule for Preparation of Precautionary Labels for Chemicals (GB 15258-2009): Specifies the relevant applicationmethods of precautionary labels for chemicals.
Safety Data Sheet for Chemical Products Content and Order of Sections (GB/T 16483-2008)

Other Non-EU: National regulations on battery must be observed.

16. FURTHER INFORMATION

The instructions provide help for complying with legal specifications, but do not replace them.
The foregoing information was compiled to the best of our knowledge and belief.
We cannot accept, however, responsibility for any error or omission, nor for any consequential loss or damage so arising.
The instruction does not represent any guarantee of properties. Distributors and users of the product have their own responsibility for observing applicable laws and regulations. Distributors and users of the product are responsible for complying with applicable laws and stipulations.

Legal Remark
EC
These batteries are no "substances" or "preparations" according to Regulation 1907/2006 EC. Instead they have to be regarded as "articles", no substances are intended to be released during handling. Therefore there is no obligation to supply a MSDS according to Regulation (EC) 1907/2006, Article 31.

Table of relevant batteries

Model Name	Model Number	Nominal Voltage (V)	Typical Capacity (Ah)	Watt Hour Rating (Wh) (Volts x Ah)	Weight (grams)
Ex-BP Cube	323895 70139764	3.70 V	2.200 Ah	8.14 Wh	49.2 g
EX-BP H10	70103214	3.70 V	4.400 Ah	16.25 Wh	100 g
EX-BP H10C	70103213	3,70 V	3.920 Ah	14.5 Wh	100 g
EX-BP S02	70103216	3.70 V	4.400 Ah	16.28 Wh	99.3 g
EX-BP S03	70167357 70171113	3.70 V	4.400 Ah	16.28 Wh	130.86g
BP ID01	616747	3.70 V	2.200 Ah	8.14 Wh	96 g
AM Ci70 - Ex	616009	3.70 V	4.000 Ah	14.8 Wh	181 g
BLN Ex-2U	481751	3.70 V	1960 Ah	7.25 Wh	111 g
Ex-AM PMR 1000	481629	7.20 V	2.000 Ah	14.40 Wh	170 g
Ex-AM PMR 2000	481305	7.20 V	2.000 Ah	14.40 Wh	180 g