



evolution[®]

ATEX-Certified Batteries



OWNER'S MANUAL

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INTRODUCTION



The information contained in this document is critical for safe handling and proper use of the Evolution® ATEX-certified batteries. It contains a global system specification as well as related safety measures, codes of behaviour, a guideline for commissioning and recommended maintenance. This document must be retained and available for users working with and responsible for the battery. All users are responsible for ensuring that all applications of the system are appropriate and safe, based on conditions anticipated or encountered during operation.

This owner's manual contains important safety instructions. Read and understand the sections on safety and operation of the battery before operating the battery and the equipment into which it is installed.

It is the owner's responsibility to ensure that the use of this documentation and all related activities comply with applicable legal requirements in their respective countries.

This owner's manual is not intended to substitute for any training on handling and operating the Evolution® ATEX-certified batteries that may be required by local laws and/or industry standards. Proper instruction and training of all users must be ensured prior to any contact with the battery system.

For service, contact your sales representative or call:

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Baarerstrasse 18
6300 Zug, Switzerland
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Your Safety and the Safety of others is Very Important

⚠ WARNING You can be killed or seriously injured if you don't follow these instructions.

STANDARD & CONDITION OF USE

These Evolution® ATEX-certified batteries are certified for use in areas with risks of explosion due to gas or dust.

- Explosion group I Category M2/Mb mining
- Explosion group II Category 2 and 3 [Zone 1 2G/ Gb, Zone 2 3G/Gc (Gas)]
- Explosion group III Category 2 and 3 [Zone 21 2D/ Db, Zone 22 3D/Dc (Dust)]

They should be in perfect condition and free from any damage. If any damage is noted or accessories missing, please contact your supplier within the first 24 hours of receiving this product. Extraction

batteries are designed for use in battery-powered applications within hazardous areas, such as: electric counterbalance, reach and pallet trucks, also floor sweepers and other cleaning equipment. The cells and connectors comply with IP (ingress protection) 65, the crates with IP23.

The patented ventilation design makes it possible for these traction batteries to fit within existing DIN and British standard crate sizes, offering the same capacity, as specified, by the truck manufacturer protection 65, the crates with IP23.

Standard

Motive power Evolution® ATEX-certified batteries comply with the ATEX Directive 2014/34/EU. Conformity has been demonstrated with reference to the following documentation:

EC type-examination certificates:

UKEX	ATEX	IECEX	Description
• CSAE 23UKEX1000X (Batteries up to 68.8 KWh)	• SIRA 01ATEX3022X • SIRA 01ATEX3025X	• SIRA IECEX® 07.0065X • SIRA IECEX® 07.0066X	• Batteries up to 68.8 KWh • Batteries above 68.8 up to 153.6 KWh
• CSAE 23UKEX1001X (Batteries above 68.8 KWh up to 153.6 KWh)	• SIRA 03ATEX3087U • SIRA 03ATEX3090U	• SIRA IECEX® 07.0063U • SIRA IECEX® 07.0064U	• BS Gel cells • DIN Gel cells

ATEX certificates apply to the EEC and IECEX certificates apply to the rest of the world except North America (USA and Canada).

Quality Assurance Notification: Sira 01 ATEX M103

Condition of Use

Do not charge in a hazardous area.

The image shows a detailed battery label for Hawker batteries. It includes the following information:

- Top Left:** Recycling symbol and a globe icon.
- Top Center:** HAWKER logo.
- Top Right:** A warning symbol (a crossed-out flame) and a 'PL' symbol.
- Left Column:**
 - Type: [Blank box]
 - Capacity: C₅ [Blank box]
 - CE Marking: 2813, 0518
 - Layout No. Trace: [Blank box]
 - Service Mass: [Blank box] Kg
- Right Column:**
 - Nominal Voltage: [Blank box] V
 - Number of cells: [Blank box]
 - IECEX Marking: SIRA 01ATEX3022 X, IECEX SIR 07.0065 X, CSAE 23UKEX1000 X
 - Ref: [Blank box]
 - Serial No.: [Blank box]
- Bottom:** Manufacturer information: Hawker GmbH, Beckstrasse 42, 50809 Hagen, Germany. Website: www.energysys.com. Made in Czech republic.

Example of battery labeling

Rating Data

- | | |
|---|---------------------|
| 1. Nominal capacity C_5 : | See type plate |
| 2. Nominal voltage: | 2.0 V x No of cells |
| 3. Nominal discharge current: | $C_5/5h$ |
| 4. Nominal S.G. of electrolyte* Type PzV: | 1.29 kg/l |
| 5. Rated temperature Commissioning: | 30°C |

*Will be reached within the first 10 cycles

Evolution® ATEX-certified batteries are valve-regulated, maintenance-free batteries. Unlike conventional batteries with liquid electrolyte, they have immobilised electrolyte (gelled sulphuric

acid). Instead of a vent plug, a valve is used to regulate the internal gas pressure, preventing the ingress of oxygen from the air and allowing the escape of excess charging gases. When operating valve-regulated lead-acid batteries, the same safety requirements as for vented cells apply, to protect against hazards from electric current, from explosion of electrolytic gas and—with some limitations—from the corrosive electrolyte. Evolution® ATEX-certified battery valves should never be removed. These batteries do not require topping-up with distilled or demineralised water. Evolution® ATEX-certified batteries are designed for max. 4 years of use.

Safety Precautions



- Pay attention to the operation instructions and keep them close to the battery.
- Work on batteries to be carried out by skilled personnel only!



- Wear protective glasses and wear safety clothing when working on batteries.
- Pay attention to the accident prevention rules as well as EN 62485-3 and EN 50110-1.



- No smoking!
- Do not expose batteries to naked flames, glowing embers, or sparks, as it may cause the battery to explode.



- Acid splashes into the eyes or on the skin must be washed immediately with an abundance of clean water. After abundant flushing, consult a doctor immediately!
- Clothing contaminated by acid should be washed in water.



- Risk of explosion and fire! Avoid short circuits.
- **Caution:** Metal parts of the battery are always live. Do not place tools or other metal objects on the battery!



- Electrolyte is highly corrosive. In the normal operation of this battery, contact with acid isn't possible. If the cell containers are damaged, the immobilised electrolyte (gelled sulphuric acid) is corrosive like liquid electrolyte.



- Batteries and cells are heavy.
- Ensure secure installation! Use only suitable handling equipment. Lifting hooks must not damage the cells, connectors or cables.

SAFETY, SERVICE, & HANDLING

Safety Precautions (cont.)



- Dangerous electrical voltage!



- Pay attention to the hazards that can be caused by batteries.

Ignoring the operating instructions, and repairing with non-original parts will render the warranty void. All failures, malfunctions, and default codes of the battery, the charger, or any other accessories must be communicated to EnerSys® service centre immediately.

Safety

Always remember that the battery is a source of power; even when fully discharged there remains sufficient energy in the battery to cause serious damage.

Follow these safety rules:

- Never charge an Ex battery in a zoned controlled area.
- Never disconnect the battery in a zoned area. Isolate circuits before disconnecting the battery outside of a zoned area.
- Never open the battery cover in a zoned area.
- Always use certified DC plugs for connection to the battery.
- Never use the battery if damaged or bare cables are evident.
- Never use the battery if the DC plugs are damaged.
- Never attempt to repair the battery. Call your recommended authorised service centre.

Service

Your local authorised service engineer provides local help and support. This handbook gives guidelines of a general nature; our engineer will help you to interpret your needs about your particular requirements.

Your authorised engineer can answer the questions that are beyond the scope of this manual and obtain specialist help should it be required. Your battery is an expensive investment and designed for use in a zoned area, and it is our aim to help you obtain the best possible results from it. Please do not hesitate to call your local service centre if you have any questions relating to the battery.

Handling

Lead-acid Ex batteries are very heavy. Always use approved moving equipment when attempting to change batteries. When lifting and handling the Ex batteries, use the correct approved lifting equipment and keep the battery in an upright position. Due to the wide variation in types of electric vehicles, designs of battery containers, equipment used, and methods of battery changing, it is not possible to give detailed instructions on the procedures to be followed when changing the batteries on an electric vehicle. The manufacturer of the vehicle or the battery-changing equipment must supply the correct method and procedure.

BATTERY & COMMISSIONING

Taking Delivery of Your Battery

Do not carry out any of the following procedures in a zoned area. Use special coding systems for maintenance-free batteries for the charging plug-and-socket devices to prevent accidental connection to a wrong type of charger. The possibility of the battery being connected in the wrong polarity is prevented by visibly marking the polarities adjacent to the connection plug with an identification colour (Positive Red and Negative Blue).

The possibility of the insulation on the overall battery voltage leads being cut to expose the conductor is prevented by sleeving the insulation with cable retention material (i.e. spiral wrap). Remove all packing material and carefully examine the containers, etc. to ensure that there is no physical damage.

If the battery is not used at receipt, please refer to the Storage section on page 11.

Commissioning

The charger cables must be connected to ensure a good contact, ensuring that the polarity is correct. Otherwise, the battery, vehicle, or charger could be damaged. Wipe over the tops and sides of the cells and container with a damp cloth to remove dust and water. Cell cleanliness cannot be too highly stressed. Check that all connections are tight.

The specified torque loading for the pole screws is 25 +2Nm (screw M10).

Make sure that the cells are readily accessible for testing. This will make regular maintenance hassle-free. Check that the battery compartment is well drained and ventilated, and that there is no risk of metal objects dropping through the top ventilation of the battery. Check that the battery sits quite firmly and securely in its housing, and

use suitable packing to prevent any movement when the vehicle is in motion. The cables should be flexible and of sufficient length to prevent any strain from being imposed either on the cable or the certified terminals to which the cables are connected. If a new Ex battery is to be used in an application where there is uncertainty about the zoned area, please contact your local factory inspector. Never directly connect an electrical appliance (for example, a warning beacon) to some cells of the battery. This could lead to an imbalance of the cells during the recharge, i.e. a loss of capacity, the risk of insufficient discharge time, or damage to the cells and this may AFFECT THE WARRANTY OF THE BATTERY.

The battery is then charged as in the Recharge section on page 9.

Maintenance

The electrolyte is immobilised in a gel. The density of the electrolyte cannot be measured.

- Never refill with water!
- Never remove the safety valve from the cell in case of accidental damage of the valve, contact our After Sales Service Centre for replacement.

Daily

Recharge the battery after discharge.

- **Remember**, never charge an Ex battery in a zoned area, even if approved charging equipment is available. Always check that the charger is operating correctly.
- Check that the plugs and sockets are in good condition.

MAINTENANCE & DISCHARGE

Maintenance (cont.)

Weekly

Check all connections and take off leads for any frayed or worn insulation. If frayed wires or worn insulation is noted, take the battery **out of service immediately** and place it in a safe area that is outside the zoned area. **Do not attempt to repair an Ex battery.** Call your local EnerSys® service representative.

Check that all insulators and vent plugs are in place and that the battery plugs are in sound condition.

Ensure that the top of the battery is clean and dry. Dirt and moisture can provide tracking paths for the electricity and potentially cause a spark in a zoned area. Should there be any corrosion of the metal container, scrape this off and neutralise the area with a solution of water and baking soda, or diluted ammonia, and protect the part from further corrosion by painting it with acid-proof paint.

Monthly

Carry out end-of-charge voltage readings at $C_5/100$, then measure and record:

- the voltage of the battery
- the voltage of each cell

If significant changes from earlier measurements or differences between the cells or bloc batteries

are found, please contact an EnerSys® Service Representative.

If the discharge time of the battery is not sufficient, check:

- that the work required is compatible with the battery capacity
- the settings of the charger
- the settings of the discharge limiter.

Annually

Check with attention:

- the state of the plugs: be sure to have a good contact between the plugs without a trace of overheating.
- the state of the output cables. If you check the torque loading, you must use a torque wrench with respect to the recommended value: 25+2 Nm

Following EN 1175-1 at least once per year, the insulation resistance of the truck and the battery must be checked by an electrical specialist. The tests on the insulation resistance of the battery must be conducted following EN 1987 part 1. The insulation resistance of the battery thus determined must not be below a value of 50Ω per volt of nominal voltage, in compliance with EN 62485-3. For batteries up to 120V nominal voltage, the minimum value is 1000Ω.

Discharge

Ventilation openings must not be sealed or covered. Electrical connections (e.g. plugs) must only be connected or disconnected in the open circuit condition. To achieve the optimum life for the battery, operating discharges of more than 80% of the rated capacity must be avoided (deep discharge). They reduce the battery service life. To measure the state of discharge, use only the battery manufacturer's recommended discharge indicators (imperative presence of a discharge limiter with an energy cut-off at 1.83 VPC operating voltage at 80% DOD C5, when the recharging time is 12 hours, and 1.87 VPC at 60 % DOD C5 when the recharging time is 8 hours). Discharged batteries must be recharged and never be left in a discharged state for a long time.

Evolution® ATEX-certified batteries can be used in normal duty applications one cycle per day at a max. DOD 80% C5 and a maximum 6 days per week.

Avoid applications where:

- no rest time is available allowing the battery to cool
- battery duty leads to a high increase of temperature during operation.

It is recommended that the battery is discharged evenly and the use of tapings across a part of the battery is discouraged. To overcome this problem a D.C.–D.C. converter must be used to allow auxiliary loads to be supplied from the whole battery.

NOTE: The D.C.–D.C. converter must be certified for use in a zoned area as well as the auxiliary equipment. Battery performance is directly related to temperature. Batteries are rated at 30°C. Where the battery temperature is lower than this, the available performance is reduced. Additional capacity is therefore required when the batteries are to be used in areas of low ambient temperatures (e.g. cold stores).

RECHARGE & TEMPERATURE

Recharge

NOTE: Never recharge an Ex battery in a zoned area.

A full charge shall be carried out every working day with an EnerSys®-approved charger.

The charging time for an 80% discharged battery shall be 12 hours, or 8 hours for a 60% discharged battery with the appropriately assigned high-frequency charger. After any changing of cables on the charger, our technician must visit the site to check the charger.

Evolution® ATEX-certified batteries have a low gas emission. Nevertheless, when charging, proper provision shall be made for the venting of the charging gases (EN 62485-3).

Battery container lids and the covers of battery compartments shall be opened or removed. With the charger switched off connect the battery, ensuring that the polarity is correct. (Positive to positive, negative to negative). Now switch on the charger.

If the charger was not purchased together with the battery, it is best to have its suitability checked by the manufacturer's service department. When charging, proper provision must be made for venting of the charging gases.

PzV batteries (Evolution® ATEX-certified batteries) are low gas emission, so some charging gases could have evolved.

Battery container lids and the covers of battery compartments must be opened or removed.

During the charge, the battery must be removed from the closed battery compartment on the truck. The ventilation must comply with EN 62485-3 standard.

The length of the D.C. cable between the charger and battery affects the voltage drop back to the control unit of the charger. The cable should not be extended without prior consultation with the charger manufacturer and supplier of your Ex battery. In situations where the battery is generally only very lightly discharged, it may be an option to recharge the battery at less frequent intervals, perhaps every second day. In such circumstances, please seek the advice of your local service engineer.

Do not disconnect the battery until the charger has been switched off.

Your local area service centre must approve any managing charging system, otherwise the warranty may be invalidated.

Equalising

Equalising charges are used to optimise the life of the battery and to maintain its capacity. A unique equalisation charge is automatically carried out weekly 8 hours after the end of the charge with a HF charger.

But remember, never charge an Ex battery in a zoned area at any time.

Temperature

The temperature range of use for the battery is between +5°C and + 35 °C. Any use outside of this range shall be approved by an EnerSys® service technician. Optimal battery life is obtained for a battery temperature of 25-30°C. High temperatures reduce battery life according to IEC 1431 technical report, while lower temperatures reduce the capacity available.

The temperature on surface must never exceed 80°C in explosive area. If electrolyte temperature reaches 55°C during the charge, wait for the cooling before using the battery in the explosive

area. If a hot battery is detected, it should be taken out of the controlled zoned area and allowed to cool to ambient temperature. An investigation should be carried out into why the battery is getting hot before it is placed back into service.

Possible reasons why the battery might be getting hot is that there might be a fault in the equipment that the battery is powering, or a fault could have occurred within the cells of the battery. In the case of a suspected battery problem, contact your local service centre.

HAZARDS & CARE

Surrounding Area Conditions

The apparatus is designed to cope with the intended surrounding area conditions.

Effect of Explosive Atmosphere on Materials

The materials selected are not known to react with any explosive atmospheres to which the apparatus may be subjected.

Protection Against Other Hazards

The apparatus does not cause injury or harm when used as specified in the installation and operation manual.

Hazards From Different Ignition Sources

The apparatus does not produce ignition-capable electrical sparks or arcs. The apparatus has also been designed to not produce potential ignition sources from electromagnetic, acoustic, optical or other such external energy sources.

Withstanding Attack by Aggressive Substances

The individual cells contain sulphuric acid. These cells and enclosures which make up the apparatus are constructed from materials that are resistant to acid attack. See manufacturer's data sheet.

Care of the Battery

The battery should always be kept clean and dry to prevent tracking currents. Any liquid in the battery tray must be extracted and disposed of in the prescribed manner.

Damage to the insulation of the tray should be repaired after cleaning to ensure that the insulation value complies with EN 62485-3 and to prevent tray corrosion. If it is necessary to remove cells, it is best to call our service department for this.

STORAGE & MALFUNCTIONS

Storage

If batteries are taken out of service for a lengthy period, they should be stored in a fully charged condition in a dry, frost-free room. To ensure the battery is always ready for use, a choice of charging methods can be made:

1. A monthly equalising charge (See Equalising in the Recharge section), or
2. Float charging at a charging voltage of $2.27 \text{ V} \times$ the number of cells.

The storage time should be considered when considering the life of the battery.

Never leave a battery connected to a truck for a long time. Storage at open circuit is not allowed when in discharged state.

Malfunctions

If malfunctions are found on the battery or the charger, our service department should be called in without delay. The measurements taken in the Monthly Maintenance section on page 8 will facilitate fault-finding and elimination. A service contract with us will make it easier to detect and correct faults in good time.



Battery must be recycled



Disposal and back to the manufacturer!

Always dispose of the battery container and cells through your local service depot. Do not attempt to dismantle the battery or the cells in any way. Once the product has failed and is no longer repairable, store outside the zoned area until removed for reclaim.

Batteries with this sign must be recycled.

Batteries which are not returned for the recycling process must be disposed of as hazardous waste!

When using motive power batteries and chargers, the operator must comply with the current standards, laws, rules, and regulations in force in the country of use!

This document is an original version published in the English language and shall be considered the authoritative reference. In the event of any inconsistency or discrepancy between the English version and a translated version, the English version shall prevail.

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