



ZeMaRail™ DS

12V Batteries



OWNER'S MANUAL

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INTRODUCTION



ZeMaRail™ DS

12V Batteries

The information contained in this document is critical for safe handling and proper use of the 12V ZeMaRail™ DS batteries, which are maintenance-free Thin Plate Pure Lead (TPPL) Batteries and do not require water topping. It contains a global system specification as well as related safety measures, codes of behavior, 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 the use of the documentation and any activities related thereto, and to follow all legal requirements applicable to themselves and the applications in the respective countries.

This owner's manual is not intended to substitute for any training on handling and operating the 12V ZeMaRail™ DS 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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Your Safety and the Safety of others is Very Important

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

RATING DATA & SAFETY

Rail Diesel Starter batteries, VRLA/AGM/TPPL valve regulated lead acid-battery with absorbent glass mat and Thin Plate Pure Lead technology ZeMaRail™ DS battery types: DS12ZeMa126, DS12ZeMa214

Rating Data

1. Nominal capacity: C20
2. Nominal voltage: 12V
3. Rated temperature: 30°C

Owner's manual, nameplate, warning signs, etc. must always be kept at the plant site and if possible, made clearly visible in the battery compartment.

In principle, the internal instructions of the railway companies or OEMs shall apply.

Safety Precautions



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



- Wear protective glasses and wear safety clothing when working on batteries.
- Adhere to the current accident prevention rules in the country where the battery is used or EN 50272-3, EN 50110-1.



- No smoking!
- Do not expose batteries to naked flames, glowing embers, or sparks, as it may cause the battery to explode
- Avoid sparks from cables or electrical apparatus as well as electrostatic discharges.



- 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: do not use non-insulated tools, do not place or drop metal objects on top of the battery. Remove rings, wristwatches, and articles of clothing with metal parts that might come into contact with the battery terminals.



- 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 (absorbed in the separator) is corrosive like the liquid electrolyte.

SAFETY & COMMISSIONING

Safety Precautions (cont.)



- Batteries are heavy. Ensure secure installation! Use only suitable handling equipment.
- Lifting hooks must not damage the cell connectors or cables.
- Do not place batteries in direct sunlight without protection. Discharged batteries can freeze. For that reason, always store in a frost-free zone.



- Dangerous electrical voltage!
- Avoid short circuits: ZeMa™ batteries are capable of high short circuit currents.
- Caution—metal parts of the battery are always live: do not place tools or other objects on the battery!



- 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 immediately.

Commissioning

ZeMaRail™ DS batteries are supplied in a charged condition. The battery should be inspected to ensure it is in perfect physical condition.

Check:

1. The battery cleanliness. Before installing, the battery compartment must be cleaned.
2. The battery end cables have a good contact to the terminals and the polarity is correct. Otherwise, the battery, vehicle, or charger could be damaged.

Never directly connect an electrical appliance (example: warning beacon) to any part 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, damage to the cells, and voids the battery warranty.

Charge the battery (see Charging section) before commissioning.

OPERATION

Operation

- EN 62485-3 “Safety requirements for secondary batteries and battery installations Part 3: Traction batteries” is the standard that applies to the operation of traction batteries in powered locomotives.
- The nominal operating temperature is 30°C.
- The optimum lifetime of the battery depends on the operating conditions (temperature and depth of discharge).
- The optimal temperature range of use for the battery is between +10°C and +35°C. Higher temperatures shorten the life of the battery (according to the IEC1431 technical report), and lower temperatures reduce the available capacity.

The upper temperature limit is 50°C and batteries should not be operated above this temperature. The capacity of the battery changes with temperature and falls considerably at temperatures below 0°C.

The optimum lifetime of the battery depends on the operating conditions, and the lifetime will be optimised with 60% Depth of Discharge (DoD) or lower. The maximum permissible discharge is 80% of C (nominal capacity). The battery obtains its full capacity after about 3 charging and discharging cycles.

Discharging

The valves on the top of the battery must not be sealed or covered. Electrical connections (e.g. plugs) must only be made or broken in the open circuit condition. Discharges over 80% of the rated capacity are categorised as deep discharges and are not acceptable as they reduce the life expectancy of the battery considerably. Discharged batteries **MUST** be recharged immediately and **MUST** not be left in a discharged condition.

NOTE: The following statement only applies to partially discharged batteries.

Discharged batteries can freeze. Limit the discharge to a maximum of 80% DoD. The cycle life of the battery will depend on the DoD, the higher the DoD, the shorter the cycle life. The presence of a discharge limiter on the vehicle is imperative.

The following energy cut-off settings must be used:

- 60% DoD 1.96 V
- 80% DoD 1.92 V

when discharged with currents in the range of I1 to I5.

The battery is fitted with a Low Voltage Alarm (LVA) and the customer must observe the visual and audible warning signals that the battery has reached its maximum discharge level and must be charged immediately. At lower currents please seek advice from EnerSys® Service.

Charging

The specific charging profile developed for recharging ZeMaRail™ DS batteries allows a rapid recharge of less than 4 hours from 60% DoD and opportunity charging as often as needed without damaging the batteries. ZeMaRail™ DS batteries have extremely low gas emissions under normal circumstances. For safety purposes when calculating gas emission levels, use 1A/100Ah C5. Provision must be made

for venting the charging gases. Doors, battery container lids, and battery compartment covers must be opened or removed. With the charger switched off, connect the battery to the charger, ensuring that the polarity is correct (positive to positive, negative to negative). Now switch the charger on. ZeMaRail™ DS batteries must receive their full charge at least once a week.

Maintenance

- The electrolyte is immobilised.
- The density of the electrolyte cannot be measured.
- Never remove the safety valves from the cell. In case of accidental damage to the valve, contact EnerSys® Service for replacement.

If significant changes from earlier measurements or differences between the cells are found, please contact EnerSys® Service. If the discharge time of the battery is not sufficient, check:

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

Annually

Remove internal dust from the battery. Electrical connections: test all connections (sockets, cables, and contacts). In accordance with EN 62485-3, 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 in accordance with EN 1987, part 1. The insulation resistance of the battery thus determined must not be below a value of 50 Ω per volt of nominal voltage, in compliance with EN 62485-3. For batteries up to 20 V nominal voltage, the minimum value is 1000 Ω .

CARE & STORAGE

Care of the Battery

The battery should always be kept clean and dry to prevent tracking currents. Cleaning must be done in accordance with the ZVEI (German Electrical and Electronic Manufacturers' Association) code of practice, "The Cleaning of Vehicle Traction batteries". 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. Call EnerSys® Service if it is necessary to remove cells.


Storage

- Batteries are despatched from the manufacturer in a fully charged condition.
- The state of charge will decrease with storage.
- All batteries lose their stored energy when allowed to stand open-circuit, due to parasitic chemical reactions.
- The rate of self-discharge is non-linear and decreases with decreasing state of charge. It is also strongly influenced by temperature. High temperatures greatly reduce storage life.
- It is recommended that the fully charged battery be stored in a cool dry place, ideally below 20°C.
- The battery has a maximum inspection-free storage life of 2 years if stored at or below 20°C, after which a refresh charge should be administered.
- It is advisable to conduct an inspection and open circuit voltage check after 12 months, and recharge if the open circuit voltage (OCV) is less than 2.10 volts per cell (Vpc).
- The battery may be stored for up to 5 years without degradation of performance, provided that an OCV check is conducted every 12 months, and refresh charged if OCV is less than 2.10Vpc.
- When stored at temperatures over 30°C, the battery should be OCV checked every 6 months.

MALFUNCTIONS & DISPOSAL

Disposal

ZeMaRail™ DS batteries are recyclable. Scrap batteries must be packaged and transported in accordance with prevailing transportation rules and regulations. Scrap batteries must be disposed of in compliance with local and national laws by a licensed or certified lead-acid battery recycler.

 <p>Pb Battery must be recycled</p>	<p>Environmental Risk! Risk of lead pollution. Back to the manufacturer! 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!</p>
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