powerbloc™ dry

Batteries

OWNER'S MANUAL

EnerSys®
Power/Full Solutions

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CONTENTS

INTRODUCTION

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The information contained in this document is critical for safe handling and proper use of the Powerbloc™ Dry batteries. 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 Powerbloc™ Dry 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 these instructions.

RATING DATA & SAFETY

Motive power batteries for small traction.

Sealed gas recombination monoblocs
MFP series: gel technology

Rating Data

1. Nominal capacity C_5:	See type
2. Nominal voltage:	See type
3. Discharge current:	C_5/5h
4. Rated temperature:	30°C

Powerbloc™ Dry batteries of the MFP series are valve-regulated lead-acid batteries. Unlike conventional batteries with liquid electrolyte, these batteries 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 batteries apply, to protect against hazards from electric current, from the explosion of electrolytic gas and, with some limitations, from the corrosive electrolyte. Battery valves should never be removed. These batteries do not require topping-up with distilled or demineralized water.

Safety Precautions

- Pay attention to the operation instructions and fix them close to the battery.
- Work on batteries must 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.

- Keep children away from batteries!!

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

Safety Precautions (cont.)

	• Risk of explosion and fire! • Avoid short circuits: do not use non-insulated tools, and 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 (gelled sulphuric acid) is corrosive like the liquid electrolyte.
	• Batteries and monoblocs are heavy. Ensure secure installation! Use only suitable handling equipment. • Lifting hooks must not damage the blocs, 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 contact and short circuits. • 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 repair with non-original parts will render the warranty void.

All failures, malfunctions, or defaults of the battery, the charger, or any other accessories must be notified to our After Sales Service.

Commissioning

The MFP series monoblocs are supplied in a charged condition. The battery should be inspected to ensure it is in perfect physical condition.
Check:

- the battery cleanliness. Before installing, the battery compartment must be cleaned.
- the battery end cables have a good contact with the terminals and the polarity is correct; otherwise, battery, vehicle, or charger could be destroyed.

Use special coding systems for maintenance-free batteries for the charging plug-and-socket devices to prevent accidental connection to the wrong type of charger. Never directly connect an electrical appliance (for example: a warning beacon) to a 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, and damage to the cells, and may also AFFECT THE WARRANTY OF THE BATTERY.

Charge the battery (see Charging section) before commissioning. Only blocs with the same state of discharge (the same voltage and tolerance as in the following table) should be connected.

Bloc voltage (V)	Max. tolerance from average value - U_{bloc}
6	± 0.035
12	± 0.049

Commissioning (cont.)

After connecting, the terminals must be covered with grease as protection against external corrosion. The specified torque loading for the bolts/screws of the end cables and connectors are in the table at the right.

Flat pole M6	DIN conic post
6 ± 1 Nm	8 ± 1 Nm
Type of monobloc	Specific value

Operation

EN 62485-3 "Traction batteries for industrial trucks" is the standard which applies. The nominal operating temperature is 30°C. The optimum lifetime of the battery depends on the operating conditions (temperature and depth of discharge). The temperature range of use for the battery is between +15°C and +35 °C. Any use outside of this range must be approved by a Service Technician. Optimal battery life is obtained with the battery at a temperature of 25-30°C. Higher temperatures shorten the life of the battery (according to the IEC 1431 technical report); and lower temperatures reduce the available capacity. 45°C is the upper temperature limit, and batteries should not be operated above this temperature. The capacity of the battery changes with temperature and falls considerably under 0 °C. The optimum lifetime of the battery depends on the operating conditions (moderate temperature and discharges equal to or lower than 80% of the nominal capacity C_5). The battery obtains its full capacity after about 10 charging and discharging cycles.

Discharge

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 deep discharges and are not acceptable. They reduce considerably the life expectancy of the battery. Discharged batteries must be recharged immediately and must not be left in a discharged condition:

Discharge	Recharge
>40%	Every day
<40%	Every second day

This also applies to partially discharged batteries. Discharged batteries can freeze. Limit the discharge to 80% DoD. The presence of a discharge limiter is imperative with an energy cut-off set at 1.90 Volts per cell.

CHARGING & EQUALISING

Charge

Powerbloc™ Dry batteries can be recharged with 50 Hz or HF chargers. If you wish to use an existing charger with WUIa or IUIa profile, you should check that the profile is approved by our Technical Department. Only connect the battery to the correctly assigned charger, which is suitable for the battery type.

After any changing of cables on the charger, our Technician must visit the site to check the charger setting. Nevertheless, when charging, correct provision must be made for venting of the charging gases. Battery container lids and the covers of battery compartments must be opened or removed. With the charger switched off, connect up the battery, ensuring that the polarity is correct (positive to positive, negative to negative). Then switch on the charger.

When charging, the temperature of the battery rises by about 10°C; so charging should only begin if the battery temperature is below 35°C. The electrolyte temperature of the battery should be at least +15 °C before charging; otherwise, a full charge will not be achieved without specific settings of the charger.

Use the correction factor according to DIN VDE 0510-1 (draft) with –0.005 Vpc per °C.

Normal Charge

It is applied further to a normal discharge of the battery (up to 60% of C_5); it is not interrupted until the end of charge indication by the charger display.

It is not necessary to recharge the battery immediately if, after a use cycle, the residual capacity is still more or equal to 60% of its capacity. In that case, it is necessary to recharge the day after, at the latest.

Equalising Charge

Equalising charges are used to safeguard the life of the battery and to maintain its capacity. Equalising charges are carried out following normal charging. They are necessary after deep discharges and repeated incomplete recharges. For the equalising charges, only the chargers prescribed by the battery manufacturer can be used.

Battery Check

After a normal charge, measure:
- the total voltage
- the voltage per cell

NOTE: Measure at the constant intensity of I=0.033 C5 or if the charger can do it, at "equalising charge". The voltages for a new battery will be greater than or equal to 2.65 Volts per cell under I=0,033 C_5.

Maintenance

The electrolyte is immobilised. The density of the electrolyte cannot be measured.
Never remove the safety valves from the monobloc.
In case of accidental damage to the valve, contact our After Sales Service for replacement.

Daily
- recharge the battery after every discharge of more than 40% C_5.
- check the condition of the plugs, and cables, and that all insulation covers are in place and in good condition.

Weekly
Visual inspection after recharging for signs of dirt and mechanical damage.

Quarterly
At the end of the charge, carry out end-of-charge voltage readings, measure, and record:
- the voltage of the battery
- the voltages of each cell

If significant changes from earlier measurements or differences between the monoblocs are found, please contact our After Sales 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.

Annually
Internal dust removal from the charger. Electrical connections: test all connections (sockets, cables, and contacts). Monoblocs having terminals with insert: check the torque loading of the bolts/screws. According to EN 1175-1 when necessary, but at least once a year, the insulation resistance of the truck and the battery must be checked by an electrical specialist. The test on the insulation resistance of the battery must be conducted following EN 1987-1. The average insulation resistance of the battery must not be lower than 50Ω per Volt nominal voltage (EN 62485-3). For batteries up to 20 V nominal voltage, the minimum value is 1000Ω.

Storage and Transportation

Batteries must always be stored and transported securely in a vertical position to avoid any electrolyte leakage.

Store the battery in a fully charged condition in a dry, clean, and frost-free area.

Always disconnect the battery from the electric vehicle before storage. For easy recharge of the batteries, it is advised not to store without recharge for more than 3 months at 20°C, and 2 months at 30°C.

The storage time is to be considered within the battery life expectancy.

To ensure the battery is always ready for use, a choice of charging methods can be made :

- monthly equalising charge according to the Equalising Charge section.
- float charge with 2.27 V x number of cells.

Always recharge before putting the battery into service.

The storage time should be taken into account when considering the life of the battery.

 Battery must be recycled	**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!**

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