



OPERATING & MAINTENANCE INSTRUCTIONS

WARRANTY TERMS & CONDITIONS



HEADQUARTERS
SCHOLIOU 6, IONIA,
THESSALONIKI, GREECE
PC: 57 008 PO BOX: 485
T.: +30 2310 785722
F.: +30 2310 760882



info@northbatt.com



www.northbatt.com

**Power
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Life**



01 OPERATION WARRANTY



CLIENT

NAME:

ADDRESS:

TELEPHONE:

BATTERY DETAILS

TYPE OF BATTERY PACK:

NUMBER OF BATTERY PACK:

CAPACITY (Ah):

VOLTAGE (V):

PURCHASE DATE:

THANK YOU

Thank you for your preference and trust. We assure you that the battery you have chosen is manufactured under the highest quality standards.



The warranty is valid and in effect for thirty six (36) months from the date indicated on the purchasing invoice.



The following cases are not covered by the warranty:

- 01** | Damages caused by non-compliance to the instructions of use and maintenance of the battery
- 02** | Damages due to intervention or repair by non-authorized technicians.



- + Check the battery to ensure there is no mechanical failure or apparent damage. The connectors should be screwed and connected well. The clamping torque should be 25 +/- 2 Nm. Check the polarity when the cables and connectors are connected. A reverse polarity connection can damage the battery as well as the charger.

For the optimal operation of the battery, the discharge must not exceed 80% of the nominal capacity (deep discharge). This corresponds to a minimum density of the electrolyte of 1.13kg/l at the end of the discharge. Deep discharges reduce the battery lifespan dramatically.

Place the battery on the appropriate charger. In case the battery was supplied without a charger you can contact our company for further information.

The charge is done daily except when the battery is discharged below 10%. In these cases the charge can be carried out the day after. The desirable level of discharge before charging varies between 30% and 80%.

The in-between (occasional) charges limit the battery's lifespan.

Only deionized water can be used to top up the battery. Additives and impurities in the deionized water reduce drastically the battery's lifespan.

- + The charge must be carried out with the truck's hood open and the battery's filling plugs closed at a room temperature of 15 to 25°C and sufficient ventilation of the room. The charger must be deactivated before the connection to the battery.

When necessary, add deionized water to the battery and under no circumstance electrolyte.

During the charging process, the temperature of the electrolyte rises by about 10°C. Charging must not begin in case the temperature of the battery is above 45°C. The electrolyte temperature of batteries must be at least 10°C before charging, otherwise a full charge will not be achieved. A charge is finished when the specific gravity of the electrolyte and the battery voltage remain constant for more than two hours.

Water refilling is performed always after the battery's charging. Do not refill water if the battery is not fully charged.

The equalizing charge is used to increase the life of the battery and to maintain its capacity. The equalizing charge is necessary after deep discharges and repeated incomplete recharges. The charging current must not exceed 5 A/100 Ah of the nominal capacity. Equalizing charges are carried out following normal charging. If none of the above reasons apply, it is advised to carry out the equalizing charge once a month.

The battery must not remain discharged for more than a day. In case the batteries are not used for a significant time period they must be stored charged and disconnected from the truck in a dry area with a temperature of 15°C to 25°C. Batteries that remain inactive must be charged once a month.



+ Observe the operating instructions of the battery. The maintenance process must be carried out by specialized personnel.

The transportation/ installation process must be carried out carefully and with safety equipment.

Work in the area close to the battery is carried out with protective eyeglasses and clothing.

The electrolyte is highly corrosive. It can cause severe damage if it comes into contact with the eyes or the skin. In the event of exposure you must wash the area with plenty of water and consult a doctor immediately.

Avoid inhaling above the battery especially during charging.

Smoking is prohibited. The use of fire or spark is not allowed; there is a danger of explosion or fire.

Avoid short circuit, there is a risk of explosion or fire. Do not place metal parts on the battery; they can cause damage or short circuit.

The output wires of the battery must be protected; no hitting or folding. Danger of short circuit and damage of the battery.

Metal parts of the battery are always live. Danger of electrocution.

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04

MAINTENANCE PROGRAM OF TRACTION BATTERIES



WORKS	DAILY	WEEKLY	MONTHLY	ANNUALLY
Charging and water refill	*			
Visual inspection of the battery – metal box			*	
Auto refill system inspection		*		
Air Lit system inspection		*	*	
Battery state inspection			*	
Inspection of the temperature, level and capacity of the electrolyte			*	
Cleaning of the battery's surface and the metal box			*	
Battery's wiring inspection			*	
Charger's inspection			*	
Check the insulation resistance of battery and truck				*



MAINTENANCE PROGRAM OF TRACTION BATTERIES



You can find below a more detailed description of the above works:



Charging and water refill

Inspect the level of the water daily before charging. Before the end of the charging check the level of the electrolyte and add deionized water, if necessary, up to the normal level. The level of the electrolyte must not fall below the upper edge of the splitter or the indicator of the normal level of the electrolyte.

Visual inspection of the battery and metal box

Check the manufacturing parts of the batteries after the charge for impurities and mechanical failure. A similar check must be carried out on the metal box for corrosions.

Auto refill system inspection

Check if the indicators of the plugs are stuck. In that case tap lightly to loosen or remove and clean.

Air lift system inspection

Check the air connectors.

Battery state inspection

Carry out the inspection and record-

ing of the temperature, the voltage, the capacity as well as the level of the electrolyte after the charge and after at least 2 hours of rest in order to create a track record for every battery.

Cleaning of the battery's surface and the metal box

Clean the battery's surface from residues of dust and electrolyte and neutralization of overflows that ended up inside the metal box.

Battery's wiring inspection

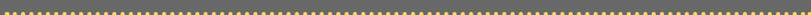
Check and tighten the wiring where necessary, for the secure and proper function of the batteries. The torque of the bolts is 25Nm+- 2Nm.

Charger's inspection

Check the proper functioning of the charger as well as the state of the peripheral parts (wires, plugs).

Check the insulation resistance of battery and truck

For prevention purposes, check the state of the insulation resistance of your battery and truck.



05 ADDITIONAL (OPTIONAL) EQUIPMENT

+ Automatic Filling System

The automatic filling system helps the maintenance of the electrolyte's level at the nominal height. The system comes with special plugs bearing ventilation holes for the release of gases during charge. The proper level in each battery is checked and reached with the help of a valve and a float. The valve secures the water flow in such a way that when the proper level is reached the float is shutting it. When all the valves are shut the process of the automatic filling is complete.

The satisfactory mixing of the electrolyte is performed at the end of the charging therefore the refill must always be carried out with deionized water just before the end of the

charging (1-2 hours). To start the refill the connector of the tank must be connected to the coupling of the battery. The tank and the piping must be defined before operating.

The frequency and the duration of the refill depend directly from the operation and temperature of the battery. The duration of the refill usually takes a few minutes and differs for each type of battery.

Break the water supply after refill. The water pressure for the proper functioning of the automatic filling system should be 0.2-0.6 bar (there should be at least 2 meters difference between the upper part of the battery and the bottom of the tank).

+ Airlift System

The airlift system in a battery prevents the stratification of the electrolyte, optimizes the battery charge and maintains the uniformity during charging. This is achieved with airflow inside the battery. The airlift system is almost necessary in heavy battery uses, under high room temperature and when short charge times are required.

The airlift system consists of special tubes which are installed inside the battery. For the operation of the airlift system a suitable charger is required (with built-in pump) for the air supply. The air is supplied when the connector of the charger is connected to the coupling of the battery. Then the pump of the charger sends air inside the batteries creating bubbles in the inside and lower parts of the batteries, lifting (circulating) thus the electrolyte. The system should be checked regularly to avoid air leaks.

In case of air leaks the characteristic charging curve will be aligned to the characteristic charging curve of the battery without airlift. Any leaking tubes and parts must be immediately replaced by the manufacturer.

Battery Monitoring System

The monitoring system helps to check and best manage the pool of batteries in order to be more productive and profitable. The system collects data from the battery (charges, discharges, Ah, temperatures, electrolyte level etc.). The data are collected and stored in a device that is placed on the battery and are transferred and displayed through wireless communication in a computer.

The system detects problems preventing thus the expansion of the damage throughout the battery. It also records unnecessary and incorrect uses of the battery helping to save energy and optimize the lifespan of the battery. The installation and use of the system is simple and affordable.



We are driven by our passion to create products that deliver great results for your business.

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WARRANTY TERMS & CONDITIONS

PzS & PzB TRACTION BATTERIES

APPLICABLE FOR BATTERIES USED IN TRACTION CYCLING APPLICATIONS

Northbatt S.A. guarantees to the original Purchaser that all PzS and PzB batteries delivered in wet condition will be free of defects in material and/or workmanship for the following limited warranty periods:

36 months for average battery operating temperature less than 30°C and for less than 300 cycles per year.

The above limited warranty term is valid as from the date of shipment as determined from the bill of lading, when the Batteries are stored, installed, operated (in traction cycling application only), service and maintained according to the Installation, Operation & Maintenance Instructions provided exclusively by Northbatt S.A.

In the event of an alleged defect, the Purchaser must report it in writing within fifteen (15) days.

The Purchaser may be instructed to either:

1. Return the claimed Batteries for examination.
2. Hold the Batteries at the installation site and permit their inspection by Northbatt representative.

In case Northbatt determines a Battery to be defective, it may, at its sole option, repair or replace the defective Battery,

EXW Northbatt warehouse in Thessaloniki, Greece, without charge to the Purchaser for replacement of the materials.

A battery may be considered defective:

- if there are flaws in material or workmanship which have an effect on product safety, life or performance or if it fails to deliver
- initially, 90% of its C5 rated capacity, after proper commissioning charge, as determined by a capacity test approved by Northbatt S.A.
- 80% of its C5 rated capacity, until the end of warranty period, as determined by a capacity test approved by Northbatt S.A.

The replacement Battery or the Battery that has been repaired shall only be warranted for the remaining unused portion of the warranty of the original Battery.

The Purchaser is responsible and obliged to return any defective Battery to Northbatt S.A. Upon return of any defective Battery by Purchaser, Purchaser releases to Northbatt S.A. all title and interest with respect to the returned Battery.

The cost and responsibility for removal of the defective Battery and its shipment to Northbatt premises, the freight & installation charges of the replacement Battery and all other costs related to the replacement process will be the responsibility of Northbatt, unless otherwise agreed between the Parties.

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WARRANTY TERMS & CONDITIONS

TERMS AND CONDITIONS:

1. Each battery must be properly sized in regards to weight and capacity for the duty cycle it is to perform. The battery must be matched to the proper size charger and proper control to recharge the battery. Minimum charging times and loads according to the ZVEI leaflet: "Charging assignments for traction batteries" shall be respected. In case the battery charger is not provided or approved by Northbatt, the Purchaser is responsible for his selection.
2. Use in cold storage house requires special warranty terms.
3. This warranty is void if the Battery becomes unserviceable due to fire, wreckage, freezing, neglect, evidence of high temperatures, any act of God, or if the Battery is subject to misuse or physical damage, or if the Battery has been serviced, or repaired by someone other than an authorized Northbatt S.A. service agent.
4. Purchaser must immediately discontinue the use of the Battery after discovery of a safety defect and report it to Northbatt S.A. in writing. Otherwise, this warranty is void.
5. Damages related to transportation will be handled according to the each time agreed Incoterm.
6. This warranty applies only to the original purchaser and is non-transferable.

LIMITATIONS

Northbatt S.A. shall not be liable for any special, indirect, incidental or consequential damages arising out of the sale or relating to the use, maintenance, transportation or installation of the Battery.

The Purchaser assumes responsibility for personal injury and property damage resulting from the handling, possession or use of the Battery.

In no event, shall the liability of the company **Northbatt S.A.** for any and all claims, including claims of breach of warranty or negligence, exceed the purchase price of the Battery. The assertion of a warranty claim in no case extends the warranty period.

This warranty is understood to be the exclusive agreement between the parties relating to the subject matter here for. No representing agent unless noted so by **Northbatt S.A.** in writing is authorized to any warranty in addition to those made in this agreement.

THIS WARRANTY IS GOVERNED BY AND CONSTRUED IN ACCORDANCE WITH THE LAWS OF GREECE.

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