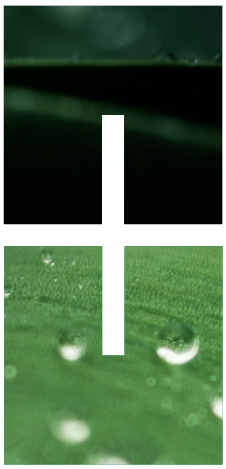
TAB
Li-Ion batteries

# USER MANUAL

e.leisure



## User Manual

Dear customer,

this manual contains all relevant information necessary to install, use and maintain the TAB Lithium Iron Phosphate Batteries, either 6.4V, 12.8V and 25.6V batteries. Read this manual carefully before installing and using the product. In this manual, our Lithium batteries as described above, will be referred to as: Sealed Lead Acid Replacement Batteries.

This manual is meant for the installer and the user of the LiFePO4 batteries. Only qualified, certified personnel may install and perform maintenance on the Sealed Lead Acid Replacement Batteries.

Please consult the index at the start of this manual to read information relevant to you.

This is the original manual, keep it at a safe location!

# Contents

# 1. Introduction

## 1.1. Product Description

TAB's Sealed Lead Acid Replacement Batteries are Lithium Iron Phosphate rechargeable batteries. Lithium Iron Phosphate (LiFePO4) technology is considered as the latest and safest lithium technology available in the market.

Potential applications of this TAB LiFePO4 battery include: recreational vehicles/Caravans, boats, mobile homes, industrial energy storage solutions.

## 1.2. Glossary of Terminology

| | |
|---|---|
| BMS: | Battery Management System |
| Charge cycle: | A period of use from fully charged, to fully discharged, and fully recharged again |
| Endurance Life-cycle: | The products maximum lifespan, achieved by following the guidelines presented in this manual |
| LiFePO4: | Lithium Iron Phosphate |
| SoC: | State of Charge |
| CC-CV: | Constant Current - Constant Voltage |

# 2. Product Specification

## 2.1. Product Features & Benefits

- Replacement for sealed lead acid batteries
- Traction battery behavior
- Lithium Iron Phosphate (LiFePO4): Safe lithium technology
- High performance, even under extreme conditions
- Integrated BMS (Battery Management System)
- Fast charging and discharging
- Very efficient, no charge factor
- Maintenance free
- Adaptive cell balancing
- Low self-discharge

## Optional

- Smart Battery Monitoring System
- DC Disconnect by Latch Relay (external discharge protection)
- Smart battery charging by Handi/ Supreme/ Supreme Pro chargers
- Smart battery charging by DC alternator with smart regulator (ACR)
- Solar charging by WP solar + smart MPPT regulator
- LED/LCD Display

## Types Specifications

| Article Nr. | 6.4V | 12.8 V | 25.6 V |
|---|---|---|---|
| **TECHNICAL SPECIFICATIONS** | | | |
| Nominal Voltage (V) | 6.4 V | 12.8 V | 25.6 V |
| Charge Cut-off Voltage | 7.8V | 15.6 V | 31.2 V |
| End Charge Voltage | 7.3 VDC +- 0.2 V | 14.6 VDC +- 0.2 V | 29.2 VDC +- 0.2 V |
| Cycle Life @ 1C 100% DOD | >2000 cycles (Clever)<br>>4000 cycles (Premium) | >2000 cycles (Clever)<br>>4000 cycles (Premium) | >2000 cycles (Clever)<br>>4000 cycles (Premium) |
| Monthly Self Discharge | <3% | <3% | <3% |
| Temperature Range (Charging) | 0°C to 45°C | 0°C to 45°C | 0°C to 45°C |
| Temperature Range (Discharging) | -20°C to +60°C | -20°C to +60°C | -20°C to +60°C |
| Temperature Range (Storage) | 0°C to +40°C | 0°C to +40°C | 0°C to +40°C |
| Water Dust Resistance | IP56 | IP56 | IP56 |
| Cell Configuration | 2S | 4S | 8S |
| Cell Size | 18650/26650 | 18650/26650 | 18650/26650 |
| Cell Chemistry | LiFePO4, Lithium Iron Phosphate Battery | | |
| Battery Housing | ABS Plastic, UL V0-94 | | |

design life:
15 years

cycle life:
4.000 cycles
with 80%
DOD

good
vibration
resistance

good thermal
cycling
resistance

user friendly

allows high
charge/discharge
currents

battery cell:
3C rate

easy battery
handling

self-discharge:
<1%

# TAB E.LEISURE PREMIUM

| | | | | Dimensions (mm) | | | Weight | |
|---|---|---|---|---|---|---|---|---|
| Code | V | Ah | Wh | L | W | H | Kg | Terminal |
| HD 12-4,5 P | 12,8 | 4,5 | 57,6 | 90 | 70 | 106 | 0,8 | F1 |
| HD 12-7,5 P | 12,8 | 7,5 | 96 | 152 | 65 | 95 | 1,1 | F1 |
| HD 12-10 P | 12,8 | 10 | 128 | 152 | 100 | 95 | 1,2 | F1 |
| HD 12-20 P | 12,8 | 20 | 256 | 181 | 77 | 168 | 2,4 | M5 |
| HD 12-45 P | 12,8 | 45 | 576 | 197 | 165 | 170 | 5,7 | M6 |
| HD 12-50 P | 12,8 | 50 | 640 | 228 | 140 | 215 | 6,8 | M6 |
| HD 12-60 P | 12,8 | 60 | 768 | 228 | 138 | 228 | 7,9 | M6 |
| HD 12-65 P | 12,8 | 65 | 832 | 260 | 168 | 210 | 8,1 | M6 |
| HD 12-75 P | 12,8 | 75 | 960 | 260 | 168 | 210 | 8,8 | M6 |
| HD 12-80 P | 12,8 | 80 | 1024 | 260 | 168 | 210 | 9,2 | M6 |
| HD 12-100 P | 12,8 | 100 | 1280 | 330 | 173 | 212 | 11,6 | M8 |
| HD 12-100 P(L)* | 12,8 | 100 | 1280 | 335 | 175 | 195 | 11,6 | M8 |
| HD 12-100 P(R)** | 12,8 | 100 | 1280 | 335 | 175 | 190 | 11,2 | M8 |
| HD 12-120 P | 12,8 | 120 | 1536 | 410 | 175 | 225 | 13,6 | M8 |
| HD 12-150 P | 12,8 | 150 | 1920 | 483 | 170 | 238 | 17,6 | M8 |
| HD 12-200 P | 12,8 | 200 | 2560 | 522 | 240 | 224 | 23,5 | M8 |
| HD 12-250 P | 12,8 | 250 | 3200 | 522 | 240 | 224 | 27,8 | M8 |
| HD 12-300 P | 12,8 | 300 | 3840 | 522 | 240 | 224 | 32,5 | M8 |
| HD 24-6 P | 25,6 | 6 | 153,6 | 152 | 99 | 96 | 1,7 | F2 |
| HD 24-10 P | 25,6 | 10 | 256 | 181 | 77 | 167 | 2,8 | M5 |
| HD 24-20 P | 25,6 | 20 | 512 | 195 | 130 | 180 | 4,8 | M5 |
| HD 24-50 P | 25,6 | 50 | 1280 | 330 | 173 | 212 | 12,5 | M8 |
| HD 24-75 P | 25,6 | 75 | 1920 | 483 | 170 | 238 | 17,6 | M8 |
| HD 24-100 P | 25,6 | 100 | 2560 | 522 | 240 | 224 | 22,7 | M8 |
| HD 24-125 P | 25,6 | 125 | 3200 | 522 | 240 | 224 | 29,6 | M8 |
| HD 24-150 P | 25,6 | 150 | 3840 | 522 | 240 | 224 | 32,5 | M8 |

*L=Low box, **R=for RV

design life:
10 years

cycle life:
2.000 cycles
with 80%
DOD

good
vibration
resistance

good volume
efficiency

allows high
charge/discharge
currents

good price
efficiency

battery cell:
1C rate

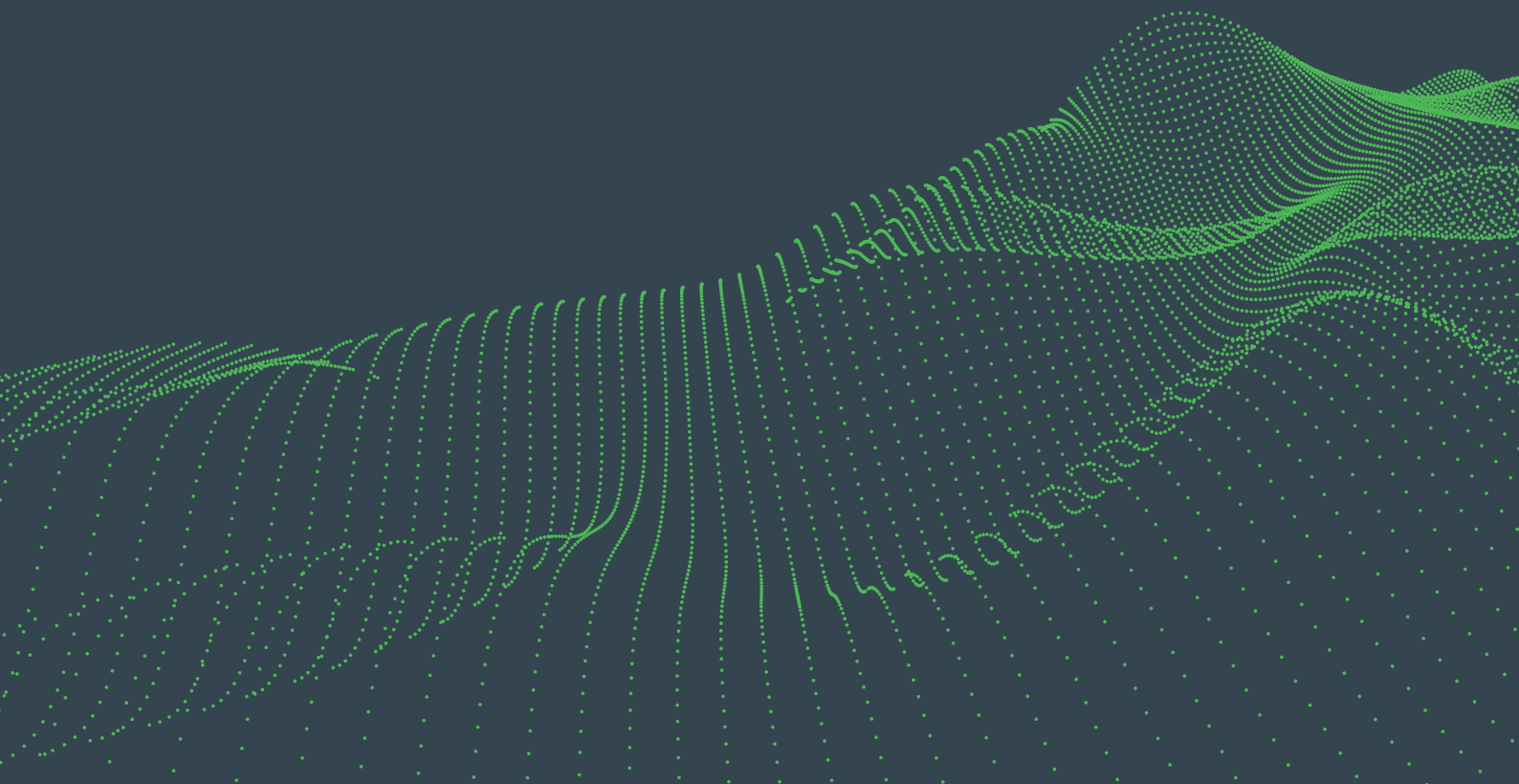
user
friendly

self-discharge:
<1%

## TAB E.LEISURE CLEVER

| | | | | Dimensions (mm) | | | Weight | |
|---|---|---|---|---|---|---|---|---|
| Code | V | Ah | Wh | L | W | H | Kg | Terminal |
| HD 12-50 C | 12,8 | 50 | 640 | 228 | 140 | 215 | 6,8 | M6 |
| HD 12-65 C | 12,8 | 65 | 832 | 260 | 168 | 210 | 8,1 | M6 |
| HD 12-75 C | 12,8 | 75 | 960 | 260 | 168 | 210 | 8,8 | M6 |
| HD 12-80 C | 12,8 | 80 | 1024 | 260 | 168 | 210 | 9,2 | M6 |
| HD 12-100 C | 12,8 | 100 | 1280 | 330 | 173 | 212 | 11,6 | M8 |
| HD 12-100 C(L)* | 12,8 | 100 | 1280 | 335 | 175 | 195 | 11,6 | M8 |
| HD 12-120 C | 12,8 | 120 | 1536 | 410 | 175 | 225 | 13,6 | M8 |
| HD 12-150 C | 12,8 | 150 | 1920 | 483 | 170 | 238 | 17,6 | M8 |
| HD 12-200 C | 12,8 | 200 | 2560 | 522 | 240 | 224 | 23,5 | M8 |
| HD 12-250 C | 12,8 | 250 | 3200 | 522 | 240 | 224 | 27,8 | M8 |
| HD 12-300 C | 12,8 | 300 | 3840 | 522 | 240 | 224 | 32,5 | M8 |
| HD 24-50 C | 25,6 | 50 | 1280 | 330 | 173 | 212 | 12,5 | M8 |
| HD 24-75 C | 25,6 | 75 | 1920 | 483 | 170 | 238 | 17,6 | M8 |
| HD 24-100 C | 25,6 | 100 | 2560 | 522 | 240 | 224 | 22,7 | M8 |
| HD 24-150 C | 25,6 | 150 | 3840 | 522 | 240 | 224 | 32,5 | M8 |

*L=Low box



## 2.3. Environmental Conditions

⚠ **Caution!** TAB's LiFePO4 batteries may only be used in conditions specified in this manual. Exposing the LifePO4 battery to conditions beyond the specified bound varies may lead to serious damage to the product and/or the user. Use the LiFePO4 battery in a dry, clean, dust free, well ventilated space. Do not expose the LiFePO4 battery to fire or water or solvents.

When the batteries are placed in an enclosed environment without air circulation, it is advised to provide 2 ventilation holes of 100 mm x 100 mm each, to prevent heat built-up.

## 2.4. Product Lay-out and Connections

| | |
|---|---|
| Recommended charge temperature range | 0°C to +45°C |
| Discharging operating temperature range | -20°C to +60°C |
| Short term (<1 month) storage temperature range | -10°C to +35°C |
| Long term (>1 month) storage temperature range | 23 ± 5°C |
| Relative humidity | 10-90% |


1. (–) Terminal to connect charger/consumer
2. (+) Terminal to connect charger/consumer
3. Handle for lifting
4. Bottom (we advise to install the bottom in position as shown on the image)

### 2.5. Operation Modes

**Discharge mode**
When the LiFePO4 battery voltage is below 2.5 V/Cell.
**Deep discharge mode**
For example, with 12V battery, when the LiFePO4 voltage is below 6 V. The LiFePO4 battery is not usable anymore, and cannot be repaired, only recycled. Make sure the batteries are not deeper discharged than 10 VDC.

## 3. Safety Guidelines and Measures

### 3.1. General

- Do not short-circuit TAB LiFePO4 battery.
- Treat TAB LiFePO4 battery as described in this manual.
- Do not dismantle, crush, puncture, open or shred TAB LiFePO4 battery.
- Do not expose TAB LiFePO4 battery to heat or fire. Avoid exposure to direct sunlight.
- Do not remove TAB LiFePO4 battery from its original packaging until required for use.
- In the event of TAB LiFePO4 battery leaking, do not allow the liquid to come in contact with the skin or eyes. If contact has been made, wash the affected area with copious amounts of water and seek medical advice.
- Use battery charger devices that are capable to charge TAB LiFePO4 battery.
- Observe the plus (+) and minus (–) marks on TAB LiFePO4 battery and equipment and ensure correct use.
- Do not use any battery which is not designed for use with TAB LiFePO4 battery.
- Do not mix batteries of different manufacture, capacity, size or type within a device.
- Keep TAB LiFePO4 battery clean and dry.
- Secondary batteries need to be charged before use. Always use the correct charger and refer this manual for proper charging instructions.
- Do not leave TAB LiFePO4 battery on continuous charge when not in use.
- After extended periods of storage, it may be necessary to charge and discharge TAB LiFePO4 battery several times to obtain maximum performance.
- Retain the original product documentation for future reference.

⚠ **Warning!** Keep the battery away from water, dust and contamination.
**Warning!** Do not crush or puncture the battery.
**Warning!** Never touch the battery contacts or allow (conductive) objects to touch the contacts.

### 3.2. Disposal

Dispose of TAB LiFePO4 battery in accordance with local, state and fed eral laws and regulations.
Batteries may be returned to the sellers or TAB d.d.
Do not mix with other (industrial) waste.

## 4. Installation

### 4.1. General Information

⚠ **Warning!** Never install or use a damaged LiFePO4 battery.
⚠ **Caution!** Do not reverse connect the power cables (polarity).

When connecting several batteries in parallel, always use batteries of the same brand, type, age, capacity and state of charge.

### 4.2. Unpacking

Check TAB LiFePO4 battery for damage after unpacking. If TAB LiFePO4 battery is damaged, contact your reseller or TAB d.d.. Do not install or use TAB LiFePO4 battery if it is damaged!

### 4.3. Preparing the Battery for Use

⚠ **Warning!** Always remain within the limits indicated in chapter 2 during the use of TAB LiFePO4 battery.
⚠ **Caution!** In case of an empty LiFePO4 battery shutdown, charge immediately.

#### 4.3.1. Location of the LiFePO4 battery

Before it is used, the battery must be positioned in such a way that it will not move around in its compartment during use.

Use appropriate LN5 (DIN88) or alternative metal fastening brackets for mounting.
Note: battery holddown mounting brackets are not provided with TAB LiFePO4 battery.

## 4.4. Connection Cables (+ and -)

Use appropriate wires for instalation to eliminate overheating and unnecessary losses. Use appropriate fuses matching the wires and load.

## 4.5. Connecting a Charger to the LiFePO4 Battery

⚠ **Warning!** Ensure you have completed all the previous steps described in chapter 4 before connecting the battery to the charger.

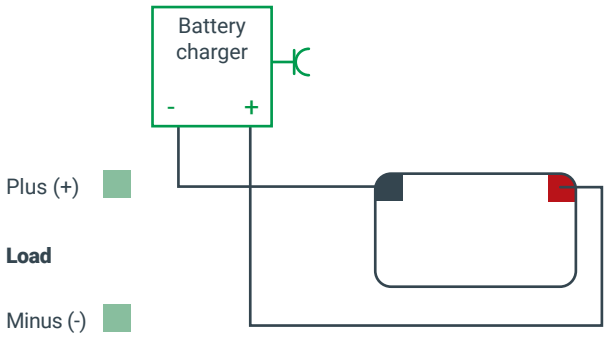



Figure 1. Connecting a charger to the battery

## 4.6. Connecting Batteries in Parallel to a Charger Device

The max. number of batteries in parallel is 20pcs and the max. number of batteries in series is 4pcs. To divide the current equally amongst batteries, use the schematic bellow:

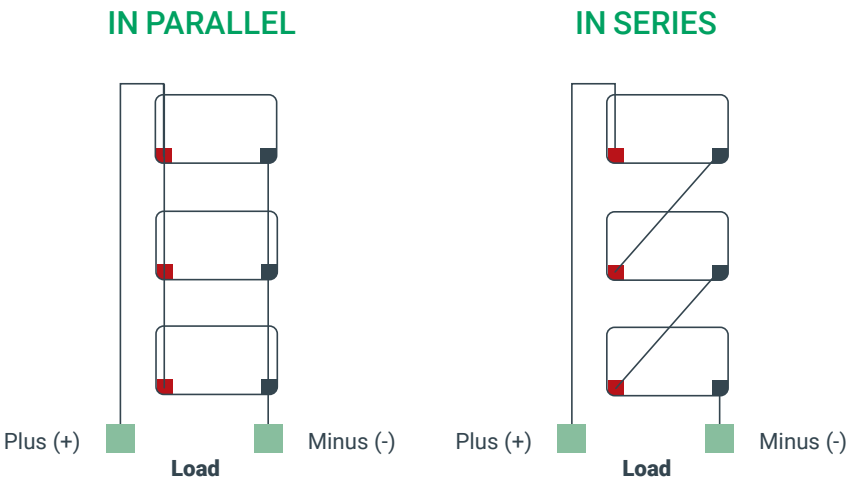



Figure 2: Connecting batteries in parallel or in series

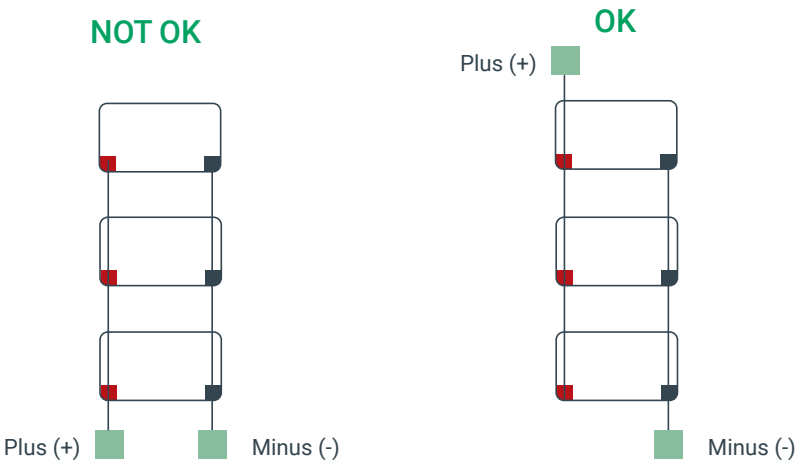



Figure 3: Connecting batteries for correct current distribution

**OK:** Equally divided battery current. All batteries contribute equally to the current into the load.

**NOT OK:** Current not equally divided.

Batteries closest to load will have the highest contribution to the current into the load. Whereas batteries further away from load will have lesser current contribution.
Wear and tear will be higher on TAB LiFePO4 battery close to the load.

## 4.7. DC Load Connected - Discharge Protection

TAB LiFePO4 batteries are as standard equipped with a DC switch-off device which is integrated inside the battery, which is activated at 80% discharge. However, we recommend to install a bi-stable latch relay which should be installed between the battery and the entire DC load (or inverter) as an extra security.
Ask your dealer or supplier for the right device.

## 4.8. Parallel Battery Use

- 6V batteries can be connected in parallel up to 20 pcs;
- 12V batteries can be connected in parallel up to 20 pcs;
- 24V batteries can be connected in parallel up to 20 pcs;
- 6V batteries can be connected in series up to 4 pcs;
- 12V batteries can be connected in series up to 4 pcs;
- 24V batteries can be connected in series up to 2 pcs;

⚠ **Caution! Please sort the voltage and internal resistance of the battery blocks before make the connection. To make sure the battery blocks for a battery pack have the same/similar parameters.**

# 5. Battery Use

## 5.1. General Information

⚠ **Warning!** Follow the safety guidelines and measures of chapter 3.

## 5.2. Charging

⚠ **Warning!** Never charge TAB LiFePO4 battery with a charging current larger than specified.
⚠ **Warning!** Stop charging in case TAB LiFePO4 battery switches into warning mode.
⚠ **Warning!** Never charge a battery with a charging current larger than 1C.
⚠ **Caution!** Charge before use.
⚠ **Caution!** Disconnect the charger from TAB LiFePO4 battery if it is not used for a long time.
⚠ **Caution!** To preserve the lifespan of TAB LiFePO4 battery use a TAB d.d. charger or acharger approved by TAB d.d..

1. Connect the charger to the battery as described in paragraph 4.6.
2. Charge TAB LiFePO4 battery in case of an empty shutdown or if the state of charge drops below 20% to preserve the lifespan of TAB LiFePO4 battery.

## 5.3. Charging Rate

TAB d.d. Lithium Iron Phosphate batteries can be charged in 1 hour. Displayed in Table are the charge times for TAB LiFePO4 battery at different charge currents. Always use the indicated charge current and end of charge voltage during charging.

| Charging rate | | |
|---|---|---|
| Parameter | Time | Charge current |
| Maximum | 1 hour | 1C |
| Endurance lifecycle | 3 hours | 0.3C |

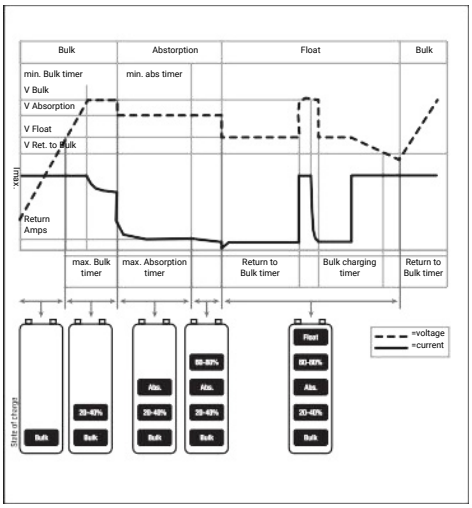
Table 1. Charging rates at different charge currents

### 5.3.1. Charging Method

TAB d.d. recommends using the following charging method.

**A.** Constant voltage, constant current, 14.6 V +/- 0.2V for a 12 V battery, 29.2 V +/- 0.2 V for a 24 VDC battery. We recommend to use TAB d.d. battery chargers with settings at "Lithium-mode" for the best result and most safe and reliable configuration.

**B.** Multiple or three-stage charging, see graphic at right, is allowed. TAB d.d. can supply you with a battery charger with an optimized curve. We recommend to use TAB d.d. chargers with settings at "Lithiummode" for the best result and most safe and reliable configuration.




### Bulk phase

In this phase the batteries are charged with a constant current up to the end of charge voltage (Ubulk), If UBulk is reached the charger will automatically switch to absorption phase. The maximum charge current (Imax) for TAB d.d. batteries is up to 1C, however for endurance cycle life TAB d.d. suggests to limit the current to 0.3C.
(1C = nominal battery capacity, C3 = 1/3 of nominal capacity). On some chargers the maximum charger active time (t0) can be programmed. TAB d.d. suggests setting t0 to: t0 = 2*(BTcap / Chcur) Example: Battery capacity = 90Ah, Charger = 45A, set to a maximum of 2*(90/45) = 2 hours.

| Bulk Phase | | | | |
|---|---|---|---|---|
| Parameter | Typical | Min | Max | Remark |
| $I_{max}$ | | - | - | up to 1C |
| $t_0$ | Depends on the battery SOC | | - | 2*(BTcap / Chcur) |

Table 2: Bulk Phase

### Absorption phase

In this phase the charge voltage must be maintained at UAbsorption to fully charge TAB d.d. battery and set the SOC counter to 100%, see Table. This phase is finished when the SoC is indicating 100%.

| Absorption Phase | | | |
|---|---|---|---|
| Parameter | Typical | Min | Max |
| $U_{Absorption}$ | 14,6V DC | 14,2V DC | 14,6V DC |
| $t_1$ | 20 minutes | 10 minutes | 1 hour |

Table 3. Absorption Phase

### Float phase

In this phase the charge voltage is set to UFloat.

| Float Phase | | | |
|---|---|---|---|
| Parameter | Typical | Min | Max |
| $U_{Float}$ | 13,8V DC | 13,6V DC | 14V DC |

Table 4. Float Phase

| Discharge Phase | | | |
|---|---|---|---|
| Parameter | Typical | Min | Max |
| $U_{Float}$ | 13.5V DC | 13.4V DC | 13.6V DC |

Table 5. Maintenance phase

## 5.3.2. Battery Balancing

The BMS automatically balances the cells if necessary. Balancing can take place during charging and idle mode and will not have an effect on the functionality of TAB d.d. battery.

# 6. Inspection, Cleaning and Maintenance

## 6.1. General information

⚠ **Warning!** Never attempt to open or dismantle TAB Li-Ion LiFePO4 battery! The inside of TAB Li-Ion LiFePO4 battery does not contain serviceable parts.

1. Disconnect TAB Li-ion LiFePO4 battery from all loads and charging devices before performing cleaning and maintenance activities (see paragraph 4.8).
2. Place the enclosed protective caps over the terminals before cleaning and maintenance activities to avoid the risk of contacting the terminals.

## 6.2. Inspection

1. Inspect for loose and/or damaged wiring and contacts, cracks, deformations, leakage or damage of any other kind. If damage to TAB Li-Ion battery is found, it must be replaced by a professional. Do not attempt to charge or use a damaged TAB Li-Ion battery. Do not touch the liquid from aruptured battery.
2. Regularly check the TAB Li-Ion battery's state of charge. TAB Li-Ion battery will slowly selfdischarge when not in use or whilst in storage (see paragraph 5.3).
3. Consider replacing the TAB Li-Ion battery with a new one if you note either of the following conditions: TheTAB Li-Ion battery run time drops below 80% of the original run time. The TAB Li-Ion battery charge time increases significantly.

## 6.3. Cleaning

If necessary, clean TAB Li-ion battery with a soft, dry cloth. Never use liquids, solvents, or abrasives to clean the TAB Li-Ion battery.

# 7. Storage

## 7.1. General information

Follow the storage instructions in this manual to optimize the lifespan of TAB Li-ion LiFePO4 battery during storage. If these instructions are not followed and TAB Li-ion LiFePO4 battery has no charge remaining when it is checked, consider it to be damaged. Do not attempt to recharge or use it. Replace it with a new LiFePO4 battery.
See chapter 2.4 for storage temperature conditions.
The self-discharge of TAB Li-ion LiFePO4 battery is 1-2% per month.

⚠ **Warning!**
1. Charge TAB Li-ion LiFePO4 battery to > 80% of its capacity before storage.
2. Disconnect TAB Li-ion LiFePO4 battery from all loads and, if present, the charging device.
3. Place the terminal covers over TAB Li-ion LiFePO4 battery's terminals during storage.
4. Charge TAB Li-ion LiFePO4 battery to > 80% of its capacity every 100 days. After charging set the LiFePO4 battery in storage mode again.

# 8. Disposal and Recycling

## 8.1. General Information

Always discharge TAB Li-ion LiFePO4 battery before disposal. Use electrical tape or other approved covering over the battery connection points to prevent short circuits. Battery recycling is encouraged. Dispose of the battery in accordance with local, state and federal laws and regulations. Batteries may be returned to the manufacturer.

**USA & Canada:**
Lithium Iron Phosphate batteries are subject to disposal and recycling regulations that vary by country and region. Always check and follow your applicable regulations before disposing of any battery. Contact Rechargeable Battery Recycling Corporation (www.rbrc.org) for U.S.A. and Canada, or your local battery recycling organization.

**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.

**Other**
Many countries prohibit the disposal of waste electronic equipment in standard waste receptacles.

## 9. Warranty and Liability

9.1

Upon delivery, the customer is obliged to immediately verify whether the products have been damaged during transport. The customer must notify the dealer of such
transport damage as soon as possible, in any event no later than within three (3) days of delivery, by means of an accurate, written statement, stating the damage and where possible a photograph. Failure to inspect the products and inform the dealer within the stated time or the use of the products at any time shall be conclusive evidence that TAB d.d. has satisfactorily tendered delivery.

9.2

In the event that the customer demonstrates that any of the delivered products do not conform to the agreement, TAB d.d. (at its option, upon having received those products returned by the customer) has the option to either repair or replace such products by new products, or to refund the invoice value, exclusive of any dispatch costs.

9.3

TAB Li-ion grants 3 years for Premium and 2 years for Clever line with 80%DOD and 0.2C warranty for damages caused by manufacturing defects starting at the time of delivery. Damages caused by manufacturing defects do not include damage resulting from (a) general wear and tear, (b) short circuit, (c) overcharging, (d) deep discharging, (e) overheating of the products (f) installation of the product by persons unskilled to work with electro-technical devices or components, (g) any other wrongful use contrary to the TAB d.d. user manual or the safety instruction, (h) any use contrary to the product specifications of that product; (i) any acts of force majeure.

9.4

TAB d.d. provides covering maintenance and spare parts for the averagege 3 years for Premium and 2 years for Clever line warranty period.

9.5

The warranty does not exclude consumer's rights arising from the seller's liability for defects in the goods.

9.6.

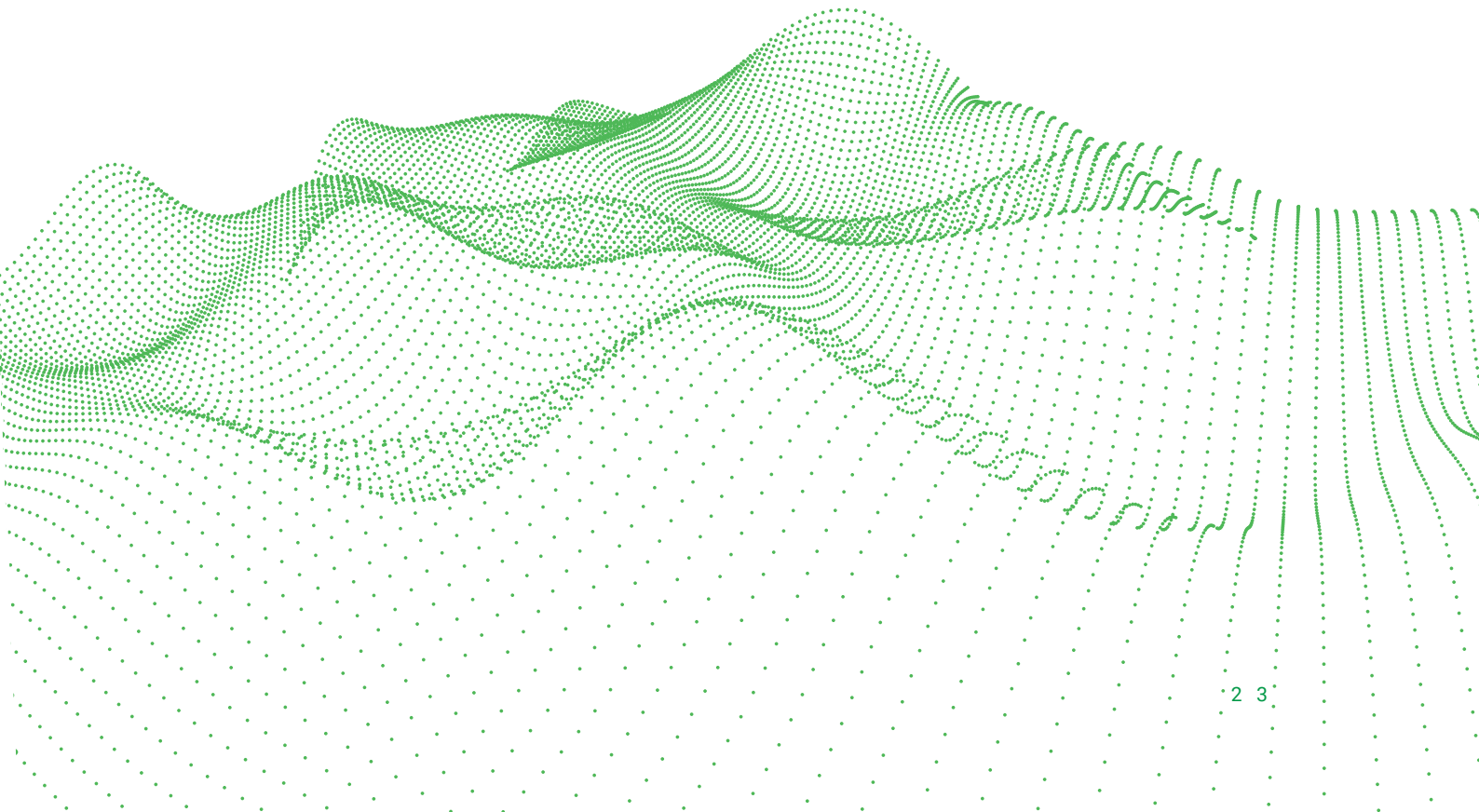
Except as specified in the clause 9.3 TAB d.d. makes no warranty, whether express or implied, including without limitation any implied warranty of merchantability and fitness for a particular purpose or any warranty arising from any course of dealing, course of performance or usage of trade and specifically disclaims any representation or warranty that the product will meet customer's requirements, perform any specific function or achieve a desired result other than expressly stated by TAB Li-ion in writing.

9.7

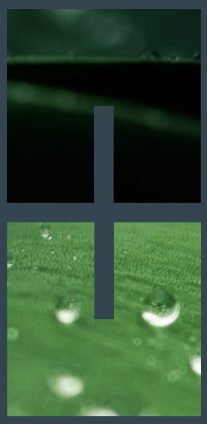
Any liability to the customer in any case ceases to apply in the event that the customer fails to notify TAB d.d. of the existence of the defect within ten (10) days of having discovered the defect, in writing, in order to enable TAB d.d. to investigate the damage.

9.8

Any liability of TAB d.d. for damage suffered by the customer is in any case limited to the invoice amount of the relevant products, unless such damage has been caused by gross negligence or willful misconduct of TAB d.d.. TAB d.d. can never be held liable for (a) damage caused by any of the circumstances mentioned in clause 9.3, leading to damage to the TAB d.d. products or to any other device located near those products, or (b) consequential damage or (c) loss of profits or goodwill.



# PURE ENERGY, MAXIMUM POWER



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TAB Li-Ion batteries

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