TRIATHLON®

INTELLIGENT BATTERIES

Installation and Operating Instructions
Lithium-Ion Batteries/TC

Energy. Endurance. Power.

Installation and Operating Instructions

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1. General Information

Thank you for opting for the *Triathlon® Lithium-Ion battery system*.

The purpose of these instructions is to familiarize you with the installation and operation of your *Triathlon® Lithium-Ion battery system*. For your own safety and the operating safety of the system, read completely and carefully the following instructions before starting up the system. Note and follow all warnings and information (ignoring them can result in damage to the *Triathlon® Lithium-Ion battery system*).

These instructions describe proper handling of the *Triathlon® Lithium-Ion battery system*. It is necessary for each person who uses and operates the *Triathlon® Lithium-Ion battery system* to be familiar with and follow the content of this manual including the operating and safety instructions.

Please keep these Installation and Operating instructions in the area of use and bring them to the attention of all persons who use and operate the *Triathlon® Lithium-Ion battery system*, including those in future who are new to the system.

With your *Triathlon® Lithium-Ion battery system* you are now the owner/user of a high-quality investment. It will serve you well and reliably for many years to come as you carefully follow the instructions in this manual.

1.1. Scope of supply

The following parts are included in the scope of supply:

- *Triathlon® Lithium-Ion battery system*
- Documentation
  (Installation and Operating Instructions,
  technical specifications)
- External multi-functional display (optional)

After unpacking the parts, please examine them for possible damage. If any damage is found, please do not use the product; if in doubt, please contact the manufacturer.

1.2. Liability / Warranty

The *Triathlon® Lithium-Ion battery system* is exclusively intended for use in electric industrial trucks. *Triathlon® Lithium-Ion battery system* is not intended for any other uses. If used in other applications, the owner is liable for any damage that may occur as a result of misuse.

Failure to follow the Installation and Operating manual instructions will result in the forfeiture of all warranty claims. Furthermore, the manufacturer does not accept any liability whatsoever for consequential damage or losses incurred as a result of non-intended or improper use of the *Triathlon® Lithium-Ion battery system*.

The *Triathlon® Lithium-Ion battery system* is a maintenance-free, gassing-free (emission free) sealed, valve-regulated system. The *Triathlon® Lithium-Ion battery system* does not require any topping-up of liquids or other substances.

The battery is sealed and may not be opened. Do not attempt to repair it if it is not functioning properly. Repairs and maintenance work on the *Triathlon® Lithium-Ion battery system* may only be carried out by your local service partner or supplier.

2. Nameplate

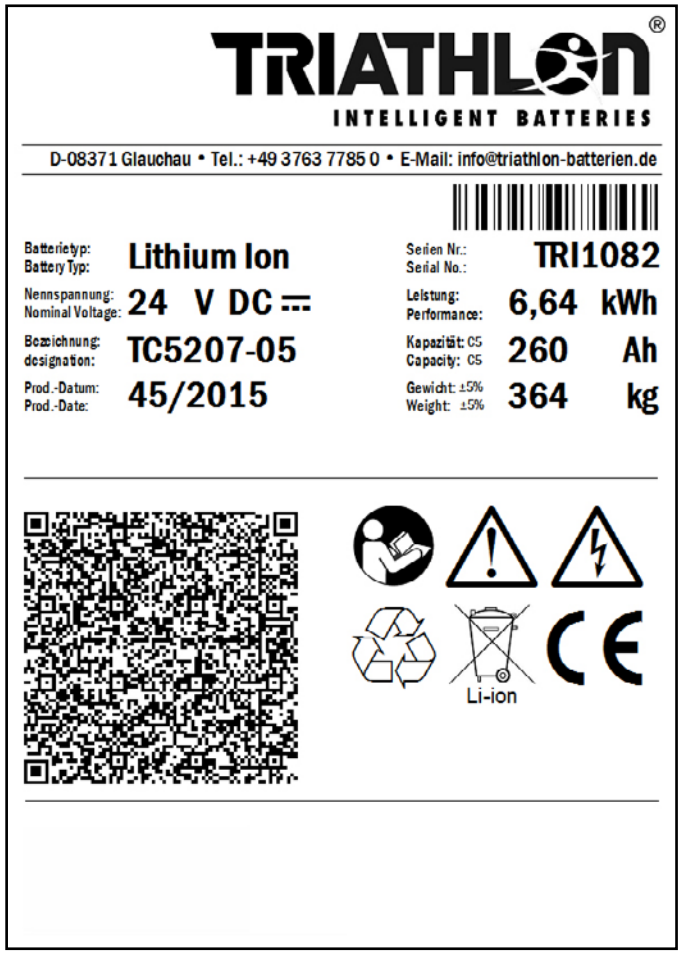

Figure 1

Each *Triathlon® Lithium-Ion battery system* is fitted with a corresponding nameplate. It contains the typical battery performance data and the battery serial number. Always give the serial number when making inquiries.

The nameplate must not be removed!

3. Safety

3.1. General safety instructions

General safety information

Information and instructions attached directly on the *Triathlon® Lithium-Ion battery system* must always be followed. These instructions contain basic information and guidance to be noted and followed during operation and maintenance. These Installation and Operating Instructions must therefore always be thoroughly read by the responsible personnel and must be kept available in the system's work area at all times.

Not only the general safety instructions listed under this main Safety section are to be followed. The other specific safety instructions inserted in the other main sections are to be followed as well.

General safety information

The *Triathlon® Lithium-Ion battery system* is built according to the current technical specifications and regulations available and is therefore safe to operate in all standard applications. Nonetheless, hazards can result from the system, which are described and explained in greater detail in this chapter and in the individual working instructions in this manual. Therefore the *Triathlon® Lithium-Ion battery system* may not be operated without precise knowledge of these Installation and Operating Instructions or without strict adherence to all safety instructions.

Knowledge of the contents of the Installation and Operating manual is a fundamental requirement to protect people from danger, to avoid errors and to operate the system safely and fault-free.

The *Triathlon® Lithium-Ion battery system* may only be used and operated properly and as intended by appropriately trained personnel. Otherwise the system can result in danger to operators, the system itself and third parties.

The Installation and Operating Instructions must be accessible to operating and maintenance personnel at all times. Each person given the task of operating or maintaining the system must have read and understood the instructions.

The maintenance personnel must also read, understand and follow the manuals and documentation of the system components, especially the safety requirements.

The health and safety information refers to the current directives of the European Union. In other countries the relevant laws and regulations must be noted and followed:

- Not only in the European Union, but also in other countries, the respective current laws and regulations must be determined by the owner and they must also ensure compliance with all such laws and regulations.
- Apart from the health and safety instructions in these instructions for use, all generally valid health and safety regulations must be noted and followed.

3.2. Safety instructions

Please read and follow the Installation and Operating Instructions. Work on a *Triathlon® Lithium-Ion battery system* may only be carried out by your local service partner or supplier. These instructions should be kept near the battery and always be accessible to the operator in their work area for when questions arise.

The *Triathlon® Lithium-Ion battery system* must not be dismantled or modified. Do not operate it in potentially explosive zones. Do not allow it to come into contact with fire or be short circuited. The system may only be charged with a *Triathlon®* approved charger. If these regulations are not followed, escaping liquid or gas, a fire hazard or excessive heat generation can occur.

The terminals of the *Triathlon® Lithium-Ion battery system* may be live! There is a short-circuit risk.

If electrolyte substances of the *Triathlon® Lithium-Ion battery system* get on your skin or in your eyes, please rinse immediately with plenty of water. Consult a doctor immediately. If your clothing becomes contaminated, remove it without delay.

Never attempt to open or dismantle the *Triathlon® Lithium-Ion battery system*. Electrolyte is very caustic. Under normal working conditions contact with the electrolyte is not possible. If the battery case is damaged, do not touch the unprotected electrolyte.

The *Triathlon® Lithium-Ion battery system* must not be discarded with household or industrial waste.

The *Triathlon® Lithium-Ion battery system* should be returned to your service partner or supplier for disposal or delivered to an approved and certified recycling company.

Do not lift the *Triathlon® Lithium-Ion battery system* diagonally or unevenly. The battery must always remain upright. Always use a battery lifting beam. Unplug the battery/load or charger connectors before lifting.

3.3. What to do in case of fire

Lithium-Ion battery fires can in principle be fought with water. Due to the design and the battery's chemical properties there is no need for any special extinguishing agents or methods other than water. Extinguishing with large quantities of water results in the best possible cooling of the battery. Other extinguishing methods may only increase the heat.

The abundant availability of water makes it the best extinguishing candidate; however, it should be noted that lithium embedded in the carbon can react with water and form flames in the process. Hydrogen may be produced if the lithium reacts with the electrolyte or with the water used to extinguish. Under certain circumstances this hydrogen can form ignitable mixtures with the ambient air and burn suddenly.

If water extinguishing attempts are not successful or water is not easily available, dry powder can be used as an alternative. Covering with sand or a fire extinguishing powder starves the fire source of the necessary oxygen. However, use of this extinguishing method is often difficult due to the large size of an industrial battery. Also, these extinguishing agents have a minimal cooling effect, so that the reaction between the lithium and organic constituents of the battery, e.g. the electrolyte, may not be prevented under certain circumstances. Therefore, on removing the cover, the sudden supply of oxygen can combust with the still hot sulphur.

As with any fire, the fire gases produced cause health damage if inhaled. Therefore, ensure adequate ventilation.

Other fires in the area surrounding the batteries are to be fought with conventional extinguishers. A battery fire cannot be dealt with independently of a surrounding fire.

4. Intended use

4.1. Putting into service

The *Triathlon® Lithium-Ion battery system* is installed in the vehicle and put into service by your local service partner or supplier. The relevant safety guidelines (see Section 3) must be followed. Installation by the customer is therefore not required. During installation it is necessary to ensure that the *Triathlon® Lithium-Ion battery system* is securely fixed (ideally vibration-free by mechanical means) in the forklift truck's battery compartment.

4.2. Operation

Only appropriately qualified and trained personnel may operate the *Triathlon® Lithium-Ion battery system*. Monitoring and control electronics (power protection unit) PPU are installed in the *Triathlon® Lithium-Ion battery system*. It monitors the operating status of the *Triathlon® Lithium-Ion battery system* and display the status to the operator on the dashboard or via an optional external multifunction display. The PPU also communicates with the accompanying *Triathlon®* certified charger (if connected).

4.3. Display Panels

4.3.1 Display via discharge indicator of the industrial truck (Optional)

The battery is connected to the vehicle via CAN-Bus protocol. For details of the display options, please refer to the instructions for use of the vehicle manufacturer.

4.3.2 External Multi-Function Dashboard Display Unit (Optional)

All necessary battery information is accessible through the display unit.

Figure 2

① Scroll Up
- Scroll up to change the menu

② Scroll Down
- Scroll Down to change the menu

③ Diamond
- Change Screen Brightness

④ On / Off
- Turn battery on / off

Menu

Battery's state of charge
- 0-100%

Menu

Actual Status Menu
- Battery voltage
- SOC = State of Charge
- Battery Current

Menu

Service Menu
- Hours in service
- Days in service
- Next service

Menu

Settings
- Display brightness (background lighting)
- Sound on / off
- Language German / English

We recommend communication with the industrial truck via CAN bus or use of the external multi-function display.

The battery discharge indicators set for Lead-Acid batteries are not compatible with the *Triathlon® Lithium-Ion battery system*.

4.4. Charging

4.4.1 Charging procedure

The *Triathlon® Lithium-Ion battery system* may only be charged with an appropriate *Triathlon® certified battery charger*. Connect the *Triathlon® Lithium-Ion battery system* with the corresponding charger (using the charging connector).
The *Triathlon® Lithium-Ion battery system* communicates with the charger and is only cleared for charging if the identification code (incl. battery capacity and charge current) has been transmitted. Please also refer to the Installation and Operating Instructions for the *Triathlon®* certified battery charger.

The *Triathlon® Lithium-Ion battery system* is charged as follows:

- Bring the vehicle to the *Triathlon® certified battery charger.*
- Check that all cables and plug-in connections are in working condition.
- For charging, only the charging plug must be connected with the separate battery plug (e.g. mounted on the surrounding battery tray). During charging the vehicle is electronically disconnected from the *Triathlon® Lithium-Ion battery system* (via an internal switch device).
- Please note and follow the Installation and Operating Instructions for the *Triathlon®* certified battery charger.
- If charging is finished the connector can be disconnected (press stop button on the charger first).

Triathlon® certified chargers are equipped to control and terminate the charge cycle automatically. After charging, the vehicle can be put back into service immediately. A rest phase or cooling is not required for the *Triathlon® Lithium-Ion battery system*.

The *Triathlon® Lithium-Ion battery system* can become permanently damaged if it sits discharged for a lengthy period of time. The *Triathlon® Lithium-Ion battery system* has a very low self-discharge and when fully charged can be put into storage for up to 6 months. It must then be recharged (see above).

4.4.2 Opportunity charging

Unlike conventional Lead-Acid batteries, opportunity charging of the *Triathlon® Lithium-Ion battery system* is recommended and, depending on the application, absolutely necessary.

4.5. Discharging

The *Triathlon® Lithium-Ion battery system* can only be used in industrial trucks if the vehicle communicates with the *Triathlon® Lithium-Ion battery system* via the CAN bus. If the battery is equipped with an external multifunction display and no CAN bus interface is available, the ON must be pressed. Only after successful CAN bus communication or switching on via the external multi-function display is the voltage/current of the battery available.

The battery may not be discharged using a load bank.

If the battery is not used for a long period of time (>2 hours <2A discharge current), the battery automatically switches to the Sleep Mode.The battery can be reactivated by pressing the On-button on the battery display.

At a discharged level of 15%, the integrated alarm horn briefly sounds once. The battery should be charged as quickly as possible.

At a discharged level of <10%, the integrated alarm horn sounds, pulsing steadily. The battery has to be charged immediately.

At a discharged level of 0%, the battery is turned off.

WARNING: This should be avoided at all costs as the sudden cutoff of the battery can lead to damage and hazards.

After one minute the battery can be activated by pressing the On-button one more time in order to directly drive to the charger. After that, the battery remains turned off in order to avoid further damage. The vehicle now has to be towed to the charge with auxiliary means.

WARNING: If the battery has shut off due to a low discharge level, it must be charged immediately. Long sitting times of discharged batteries are to be avoided at all costs! Non-observance can lead to battery damage!

4.6. Battery maintenance and inspection

The *Triathlon® Lithium-Ion battery system* must be kept clean and dry at all times.

Cleaning

Only clean *Triathlon® Lithium-Ion battery system* if the system is switched off.

If it is necessary to clean the battery tray, use a soft, clean cloth, but never use liquids (acidic or abrasive cleaning products). Before each use, check the *Triathlon® Lithium-Ion battery system* for external damage (e.g. loose plug-in connections, defective

cables, etc.). If a defect exists, please follow your lock out/tag out procedures and contact your local service partner or supplier without delay. Never carry out any repairs yourself.

If the *Triathlon® Lithium-Ion battery system* has been damaged mechanically, e.g. due to a vehicle accident, or if one of the following cases occur due to other circumstances, notify your local service partner or supplier without delay and stop use of the *Triathlon® Lithium-Ion battery system* immediately:

- The battery tray of the *Triathlon® Lithium-Ion battery system* is damaged.
- An odor is emitted from the *Triathlon® Lithium-Ion battery system*.
- The *Triathlon® Lithium-Ion battery system* becomes hot.
- The *Triathlon® Lithium-Ion battery system* cannot be switched on.
- Liquids or other substances leak.

4.7. Service and Repair

*Triathlon® Lithium-Ion battery system*s require regular service inspections and maintenance as performed through a *Triathlon®* authorized service partner. If any errors are displayed or the unit malfunctions, immediately contact your *Triathlon®* service provider. Do not under any circumstances attempt to repair the battery on your own. It is necessary that only original parts are used for the repairs.

4.8. Error Messages

When errors occur an error menu is accessible.

4.8.1

- The battery system will not start or it shuts itself down.
  Necessary Action: Press button ② and scroll to menu settings, record the error code and contact your *Triathlon®* service provider.

- Horn is on (optional): Maximum discharge of 90 % was reached (10 % remaining).
  Necessary Action: Charging is required.

- The battery system shuts down: 100 % discharge has been reached (0 % remaining)
  Necessary Action: Acknowledge that the battery is in a state of deep discharge by pressing the button ④ ON/OFF or optionally turn the ON/OFF switch knob of the central control unit. Immediately creep slowly back to the charging station and put the battery on charge to prevent battery damage!

4.8.2

- Battery does not switch on –
  possibly no communication with the charger or vehicle.
  Necessary Action:
  Check the plug and cable (contact problems)

4.8.3

- External display does not respond
  Necessary Action:
  Check the plug and cable (contact problems)

Any other errors or faults, the service partner or supplier must be notified immediately.

4.9. Withdrawal from service and disposal

Withdrawal from service

If the *Triathlon® Lithium-Ion battery system* has been taken out of use, storage in a dry and well-ventilated place must be ensured. During this time the system discharges itself by a minimum amount: the rate is approx. ≦3 % per month at a temperature of 73° F. We recommend that the fully charged *Triathlon® Lithium-Ion battery system be recharged* every 3 months. Higher ambient temperatures increase the self-discharge rate and accelerate the natural aging process of the battery.

Disposal

The *Triathlon® Lithium-Ion battery system* can be returned to your service partner or supplier for proper disposal or handed over to an approved and certified recycling company. The *Triathlon® Lithium-Ion battery system* must not be thrown away with household or industrial waste.

5. Technical specifications

Further performance data of the *Triathlon® Lithium-Ion battery system* is given on the respective nameplate (Figure 1).

Operating temperature range -28 °F to +130 °F (discharge) -28 °F to +130 °F (charge)
Nominal operating temperature 77 °F
Storage temperature 0 °F to + 113 °F
Self-discharging ≤ 3 % per month at 77 °F

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