





Dear customer,

Thank you for purchasing the newest product of the Taifun®-Series from SmokerStore, the "Skarabaeus Pro" (scarab pro). It is an unregulated battery carrier for exclusive use in so-called "e-cigarettes".

We wish you to spend a long and comfortable time with this high quality and easy-to-use unit.

Your SmokerStore team

Since safety is our priority, please understand the dramatic representation of the POSSIBLE dangerous situations.

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STRUCTURE

This battery carrier is distinguished by its relatively simple handling and excludes the usual disadvantages of a mechanical button, which usually occur in an uncontrolled mechanical battery carrier. The relatively high on-resistance and the increased wear-out of the button at larger currents is eliminated in our device.

Through a patented new development of our magneto-optical button, or "magneto", we have managed to develop a button that is not subject to wear-out and is also immune to moisture.

The consistently low-resistance structure of the scarab pro in conjunction with an extremely low-resistance evaporator and a high performance battery can cause EXTREMELY HIGH CURRENT peaks in or on the evaporator in case of a direct short circuit.

Please consider that the device might not be able to register these current peaks. We measure within 0.002 seconds after switching on, but nevertheless damaging our board can occur in RARE instances.

However, we have not been able to reproduce this extreme case with the scarab pro.

But we do not know what future batteries will "afford". Despite our monitoring of the overload and over-temperature of the MOSFET, avoid direct short circuits!

If possible, use evaporators with widely spaced coil contacts (> 4 mm). This minimizes short circuits and also ensures your safety. In evaporators with closely spaced contacts (≤ 1 mm) the risk of an accidental short circuit is very high!

WARRANTY

We warrant this product for a period of twelve months from date of purchase, but NOT for consequences caused by permanent fluid (liquid) on the circuit board inside the battery carrier or ANY defects caused by extremely excessive current peaks that exceed the permissible operating current of the respective battery (see manufacturer info)!

In addition, national warranties apply.



SAFETY INSTRUCTIONS

Please read these instructions carefully! The manufacturer is not liable for any damage caused by improper use.

- The device is not suitable for children or people with limited power of comprehension. Keep the device away from them. This device is not a toy!
- If you do not use the battery carrier for a long time, e.g. at night, please remove the battery! Electronics can fail and can cause malfunctions up to fire, when liquids get into the device.
- The evaporator coil gets hot (red hot). Turn on the device fully assembled only, otherwise it is a fire and burn hazard!
- Do not operate the unit in an environment that is near or around flammable gases, vapors or dusts! Danger of explosion!
- The battery is heavily loaded during operation. Using unsuitable batteries can cause short circuits (the current is higher as indicated by the battery manufacturer as the maximum permissible current!) with consequences such as fire or explosion!
Do not replace a battery with e.g. permitted 20A by a battery with max. permissible 10A without calculating the current caused by your coil FIRST ($I_{max} = 4.25V / R_{coil}$).
Follow the safety instructions of the battery manufacturer! Pay special attention on shape deformation, smell or smoke emission of the battery!
There is a danger of explosion or fire in case of a faulty battery!
- Keep the device dry!
- Keep the device away from heating elements! Do not dry the device in a microwave oven!
- Do not apply electrical voltage to the device!
- The device is only intended to provide the battery voltage to an evaporator unit with a minimum of voltage drop, for the purpose of a so-called "e-cigarette"!
Any other use is neither permitted nor covered by the warranty!
- This device is neither a medical device, nor is it suitable for such purposes!
- The operator is responsible for all personal injury and property damage caused by improper use, not the manufacturer!
- Due to the many possibilities and scenarios (various types of batteries and coils), all operating and connection errors are beyond our control. We can assume no liability for damages due to these extraneous circumstances.!
- Due to the EXTREMELY low internal resistance of the circuit board of typical 0.0015Ω in conjunction with a high-capacity battery, that delivers 30A (or more), a short circuit on or in the evaporator or liquid entry into the device MIGHT have dramatic effects such as fire.



FEATURES

- Microprocessor controlled.
- New wear-free magnetic optical button ("magneto").
- Shutdown after 15 seconds of CONTINUOUS "operation" as SAFETY against unintended activation. However, you can extend vaping by short interruptions ($\ll 1$ s)!
To reactivate after shutdown the battery cover must be loosened and tightened again.
- Electronic key-lock for temporary deactivation of the device. If you want to leave the device unattended, please remove the battery.
- High-power MOSFET (power transistor) with 0.001Ω on-resistance during operation.
- Temperature sensor for the MOSFET to protect the device in continuous operation at extreme currents.
- Low battery warning from 3.0V to 2.6V (shutdown).
- Electronic overload protection of the MOSFET (detecting of a possible overload, $R_{coil} \ll 0.1\Omega$).
- Additional electronic monitoring of the switching function of the MOSFET on voltage drop in the ON state, as well as on offset voltage at the evaporator in OFF state.
- Electronic reverse polarity protection for the electronics and mechanical reverse polarity protection by a new battery cover that prevents immediate and lasting steaming in reverse polarity!

This combination developed by us makes the rare case of reverse polarity as safe as possible WITHOUT impacting the normal operation (voltage-drop / efficiency).



TECHNICAL DATA

Warning: Use only batteries suitable for your coil!

The max. current, the battery needs to supply, is calculated as follows: $I_{max} = 4.25 / R_{coil}$. E.G.:

- $4.25V / 1\Omega = 4.25A$
- $4.25V / 0.2\Omega = 21.25A$
- $4.25V / 0.1\Omega = 42.5A$ (Risk of damaging the PCB)

Sample calculations of coil resistance and the power range of a conventional battery:

battery voltage (fully charged) of 4.2V ; Coil with 1Ω

$$\Rightarrow 4.2V / 1\Omega = 4.2A \Rightarrow 4.2V * 4.2A = 17.6W$$

battery voltage (empty) of 3.0V ; coil resistance of 1Ω

$$\Rightarrow 3.0V / 1\Omega = 3.0A \Rightarrow 3.0V * 3.0A = 9.0W$$

Specifications

Li-ion battery with flat (flat-top) or increased (button-top) positive

Max. operating voltage (no load):	4.5V
(no additional electronics (like "Kick"), no stacking!)	
Min. operating voltage (under load):	2.6V
Min. coil resistance:	0.1Ω
Max. operating current:	30A
Extreme danger to the battery	
Max. peak current (transient 500μs):	60A (400A)
Standby current:	< 1mA

Voltage loss (Volt-drop) of electronics without contact resistances and internal resistance of the battery:

Voltage loss @ 10A:	ca. 0.015V
Voltage loss @ 20A:	ca. 0.030V
Voltage loss @ 30A:	ca. 0.045V



OPERATION

1. Install the evaporator WITH coil on the battery carrier first, then insert the battery with the positive forward into the battery carrier and screw the battery firmly (no violence).

Caution:

The electronic reverse polarity protection prevents damage to the electronics ONLY! As far as possible, the mechanical reverse polarity protection in the battery cover prevents uncontrolled vaporizing in reverse polarity.

Due to the different, and future, battery types, there is no guarantee for it!

Anyway, use only the original battery cover!

2. The scarab pro now performs a self-test and overload test. If the red LED goes out, the device is ready. Otherwise please refer to the appendix for eventual messages.
3. By pressing the button you supply the maximum possible power to the evaporator that your battery allows because of your coil and its charge level.
4. When you press the button, the green LED should light.

From a **battery voltage** of 3.0V, the red LED will pulse additionally (the lower the voltage, the faster the pulses) down to the **cut-off voltage** of 2.6V.

Thereby you will be warned of the imminent replacement and also of a possible deep discharge of the battery.

- **key-lock**

You can activate an electronic key-lock by rapidly pressing of the button five times. This is indicated briefly by the red-lit LED!

The deactivation of the key-lock is done and signaled in the same way.

The key lock is used only for temporary deactivation of the device against accidental activation!

The key-lock is not suitable to leave the device UNATTENDED (drawer, purse, table, glove compartment, etc.). Each electronic CAN react uncontrollably by liquid entry or technical failures and MIGHT turn on the device and / or cause a fire!

We can not guarantee a 100% secure device, despite our security features!

ANY electronic device ALWAYS has an element of risk, as long as it is connected to a power supply! Consider the possible consequences (A stand-by device may just turn on, but an e-cigarette may start to vapor with uncontrolled high currents).

It may take several hours until an ingress of liquid causes malfunction. The only SAFE PROTECTION is the removal of the battery!



OPTICAL SIGNALS

Self-test after inserting the battery

Okay:

- The red LED lights up for about 1 second and then goes out (<Red> ... <Off>)

Error:

- The red LED lights up and stays lit up permanently (<Red> ...)!
The photocell of the magneto-optical switch is not working properly. This happens, for example, if you insert the battery while pressing the button. Moisture in the device may cause this malfunction as well.
- The red LED lights up, goes out shortly, lights up again and stays lit up permanently (<Red> ... <Off> ... <Red> ...)!
There is an overload or short circuit in the evaporator. Liquid entry may be the cause, too.
In both cases, only a power off resets the device (remove the battery cover and tighten again).

Permanent over-temperature protection

Once the battery is installed and the device has not been switched off, the temperature of the MES-FET is permanently monitored!

If, in on-state or off-state, the permissible temperature of the MOSFET is reached, this is indicated by a slow flashing red LED (approximately 1 x per second).

Vaporizing is not possible then. The device needs to cool down until the flashing stops, before it is ready for use again!

While pressing the button (vaporizing)

Okay:

- The green LED should light up only when the device is ready and you press the button!
From 3.0V, the red LED will pulse additionally to the green LED (the lower the voltage, the faster the pulses). At 2.6V the green LED goes out and the red LED stays on for about 10 seconds more, then the device shuts down completely! You need to insert a new battery.

Error:

- The device does not start to vapor and the green LED will not light up!
The key lock is activated or the scarab pro has been completely shut down before due to low battery voltage or an error.
- The red LED lights up for about 10 seconds and then the device shuts down completely!
The minimum permissible battery voltage of 2.6 V was reached.



- Fast flashing red LED for about 10 seconds, then normally complete shutdown!
The overload protection has triggered, probably due to a short circuit in the evaporator or moisture.

Without pressing the button (sleep)

Okay:

- No display, neither red nor green.

Error:

- Suddenly, the red LED lights up for about 10 seconds and then the device shuts down completely!

The minimum permissible battery voltage of 2.6 V was reached.

- Fast flashing red LED for about 10 seconds, until the removal of the battery! Possibly in conjunction with a lit up green LED.

A voltage has occurred at the output to the evaporator, which was not initiated by pressing the button.

MOSFET defect or fluid (liquid) "bypasses" the photo sensor.

Maybe "unlimited permanent Vaporing"!

CAUTION! Remove the battery IMMEDIATELY!



APPENDIX

Dear customer,

At this point we would like to help you to get a deeper understanding of the structure of the device and help with problems. We wish to emphasize that the following comments have nothing to do with the "normal" operation! This appendix refers only to extreme situations or to better understanding.

MOISTURE GUARD

For many practical and aesthetic reasons, we have NOT built the battery carrier watertight! But we have put much effort into the scarab Pro to develop a battery carrier which is not damaged by moisture. We think we have did it!

Penetrating fluid can neither damage the button, nor lead to failures. However, it may cause malfunction! **In the worst case accidental "steaming" of the device for an indeterminable time! The built-in cut-off may be pointless!**

Depending on the ingredients liquids conduct the current from bad (distilled water) to excellent (saturated brine, sea water, sweat but also various liquids in connection with contamination)!

The smallest break of the seal, which is more likely than not in production, may short-circuit tracks on the PCB what the microprocessor may misinterpret. We have, however, despite extensive testing (with saturated salt solution) failed to damage the device.

But due to the large number of customers and usage scenarios we can NOT call our device indestructible by liquid. We can not reproduce EVERY situation accurately! Unfortunately, there is no watertight switch in this design size, too!

Fact is: Liquid can most easily enter into the battery carrier through the button!

Simplest solution: Do not allow liquid to enter!



CLEANING

In case of liquid has entered the device, proceed as follows (WITHOUT WARRANTIES):

1. Remove the battery IMMEDIATELY and leave the battery compartment open.
2. Unscrew the evaporator.
3. With the open battery compartment downwards shake the device to get the liquid out of it as far as possible (depending on the quantity maybe outdoors!).
4. Rinse the device with warm, clean tap water directly into the battery carrier shaft and onto the circuit board.
5. Again step 3.
6. Flood the interior again with distilled water to prevent causing calcium deposits (available e.g. for car batteries and irons).
7. Again step 3.
8. Dry the device extensively WITHOUT battery, battery cover and evaporator e.g. in the oven at max. 60°C for at least two, or better three hours. Open the oven from time to time, so that the moisture can escape. Press the button in between (CAUTION HOT!).
Alternatively, you can dry the device on the powered, warm heating over night.
9. Mount the device again, first the evaporator and finally the battery. In our tests it worked again then EVERY TIME without any problems - thanks to our new button! Please don't try this approach with a conventional push-button! Generally, you won't get the liquid out of a classic miniature push-button housing by this procedure.

Attention:

- Do not use an ultrasonic bath for cleaning
- Do not use a microwave and no hairdryer to dry
- Use only water for rinsing
- Do NOT use solvents such as alcohol, spirits, etc. and cleaning fluids neither

Why the effort?

It is important that the liquid between the magnets inside of the button is completely evaporated at moderate temperatures!

The "actuating slot" is only 0.1mm in size and the gaseous water molecules need TIME to evaporate through this slot without condensing on the steel again. That needs much longer than the water needs to enter. Water is "thin" and "fast"!

The longer you dry the device at 40-60°C and push the button in between, the better. The circuit board may be dry already after 20 minutes, but not the interior of the button (between the magnets).



The magnets (gold-plated) and the stainless steel button won't corrode, if water is left inside. But - depending on the cleaning success - residues (resins, lime, salts) could remain and make the button get stuck. Also, a later escape of liquid in connection with malfunction is possible!

Most important:

Damages that are caused by fluid are NOT covered by the warranty!

Rinse neither prophylactically, nor weekly. Only the outer layers of our PCB are protected against corrosion by a gold layer. The component terminals and the inner copper layers are not. The destruction of the inner layers of the PCB by corrosion occurred by regular flooding with water is possible.

OVERLOAD PROTECTION / SHORT CIRCUIT SAFENESS

Due to the consistent development of our battery carrier for maximum efficiency and therefore lowest voltage drop (no ground-spring, no cable connections, MOSFET with only 1mΩ! and multilayer structure) our battery carrier is such low impedance, that the total resistance becomes very low (typically 1.5mΩ). That's why a short circuit may cause irreparable damage.

If you are using a freshly charged high-capacity battery (extremely low internal resistance) and accidentally an evaporator with a coil resistance $< 0.1\Omega$ (or make a short circuit), the max. permissible current is exceeded EXTREMELY in the first moment (< 0.001 sec.). In that split second, the built-in "power amplifier" (MOSFET) is like replacing your coil and heats up so quickly that the heat can NOT be removed and accordingly, we can't measure any temperature increase! The integrated temperature protection is reliable only for the ongoing operation with permissible currents and temperature changes within seconds (physically not feasible any other way).

Therefore, we measure the voltage drop ADDITIONALLY directly "above" the MOSFET to decide whether an impermissibly high current flows through the MOSFET. In theory (without consideration of production tolerances) the measure is taking place on every keystroke and during operation (with different parameters). We measure as follows:

In the first 1.5ms the MOSFET passes through the area from non-conductive ($> 10M\Omega$) to perfect conducting (0.001Ω). In the following 0.5 milliseconds, we measure the voltage drop at full load and decide: Shutdown (short circuit) or operation!



But we do not know what future batteries will provide. Accordingly, we can not guarantee a short-circuit protection in general. In Reality the interplay of coil, coil inductance and the various batteries is much to complex! Therefore:

- Consider the minimum resistance of 0.1Ω!
- Make sure that it does not go below it in any operating conditions!
- Use a coil >> 0.2Ω, if you are unsure!

Actually, there is NO battery that is approved for a load of 0.1Ω. A short circuit occurs when a battery that is approved for 25A (for example) is used with a coil of 0.17Ω or less! Calculation example:

$R_{coil} = U_{battery} \text{ (freshly charged)} / I_{max} \text{ (in the first moment)}$

$\Rightarrow R_{coil} = 4.2V / 25A = 0.17\Omega$ (Minimum resistance for the battery)

A coil with 0.1Ω is therefore NOT permitted ("worst case")!

Why do we write so much about "possible dangers" and not "great new things"?

Very simple...

We don't want you to get hurt due to a lack of information!

You can run a high performance battery outside the permissible parameters of the manufacturer and sometimes are not even be aware.

That is why we mention scenarios that may never occur (or which consequences are not nearly as serious as described here) over and over again. They are just feasible...

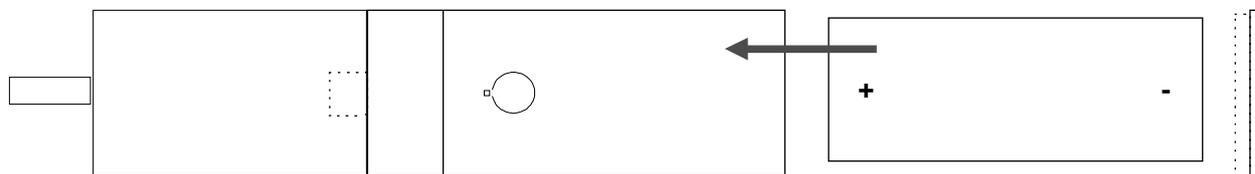
In the tests during the development more than one or two devices are "intentionally" destroyed. Also, of course, batteries will be "tortured" and "really" short-circuited to the end. We try to imagine all possible scenarios and tests that "could" happen.

We prefer to EXHAUSTIVELY inform in advance, whitewash nothing and would hope that you follow these relentless instructions. It may just be in your interest!

Your SmokerStore team

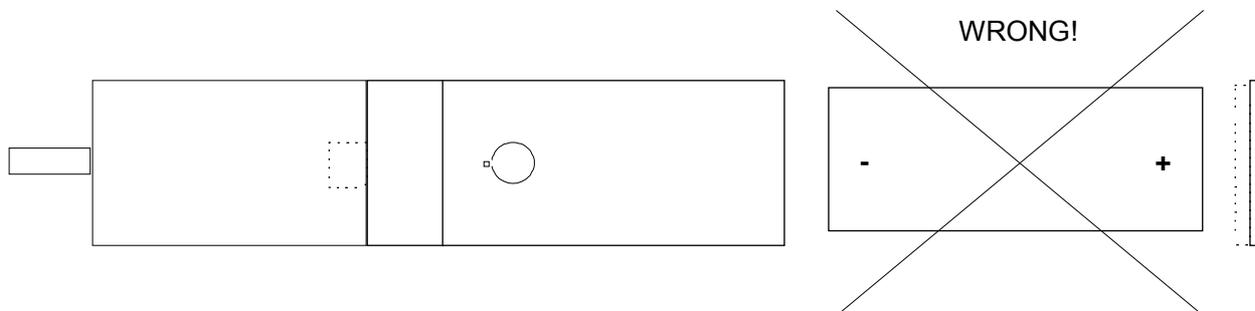


INSERTION OF THE BATTERY

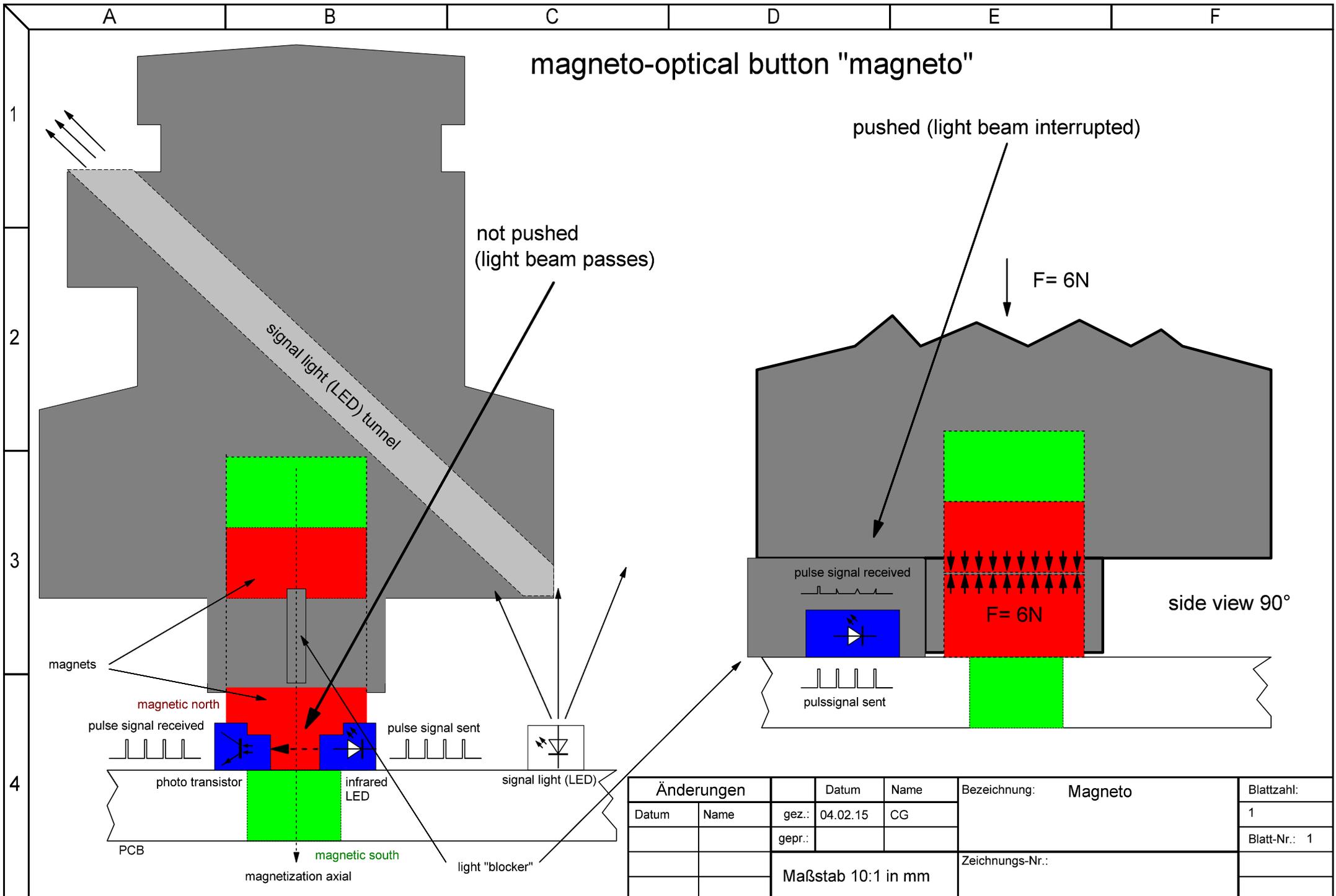


Correct!

Use a single protected Li-ion battery exclusively!



WRONG!



Änderungen		Datum	Name	Bezeichnung: Magneto	Blattzahl:
Datum	Name	gez.: 04.02.15	CG		1
		gepr.:			Blatt-Nr.: 1
		Maßstab 10:1 in mm		Zeichnungs-Nr.:	