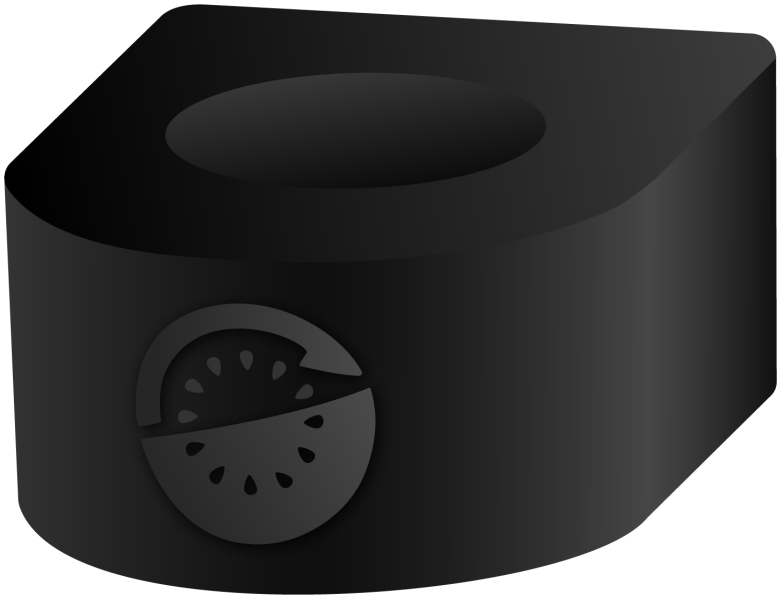
Edition 24th August 2023

Kiwitron
SMART INDUSTRY SOLUTIONS

KiwiBat

X001810

Manual for installation, use and maintenance



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CE

Declaration of Conformity - (DoC)

We

Manufacturer:	Kiwitron S.R.L.
Address:	Via Vizzano 44, 40037 Sasso Marconi (BO) - Italy

Declare that the DoC is issued under our sole responsibility and belongs to the following product:

KiwiBat X001810;

Object of the declaration:

Device for monitoring and analysis of industrial vehicle batteries

The subject of the above declaration is in accordance with the following rules:

Electromagnetic Compatibility Directive 2014/30/EU

Directive RED 2014/53/EU

and therefore complies with the following norms / standards:

UNI EN 12895:2019 Industrial trucks - Electromagnetic compatibility

and related standards / ETSI standards

Place: Sasso Marconi (BO) - Italy **Valid from:** 10/05/2022

Last update: 08/03/2023

Person authorized to compile the technical file: Daniele Parazza

Legal representative: Andrea Filippini

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UK CA

UKCA Declaration of Conformity - (DoC)

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Address:	Via Vizzano 44, 40037 Sasso Marconi (BO) - Italy

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KiwiBat X001810;

Object of the declaration:

Device for monitoring and analysis of industrial vehicle batteries

The subject of the above declaration is in accordance with the following rules:

Statutory Instruments: S.I. 2016:1091

Statutory Instruments: S.I. 2017:1206

and therefore complies with the following norms / standards:

UNI EN 12895:2019 Industrial trucks - Electromagnetic compatibility

and related standards / ETSI standards

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REVISIONS

Version	Comments	Amended chapters
00	First edition	All

Tab.1 - Document revisions

PURPOSE AND SCOPE

USERS	Installer; Operator of the vehicles on which it is installed; Qualified personnel authorised to maintain the device.
PURPOSE	Provide information needed for: ➢ The correct installation of the device; ➢ The correct awareness of operators to safety issues; ➢ Using the device under safe conditions.

Tab.2 - Purpose and scope

KEY

	Warning/Caution - important safety information
	General information and suggestions
	PROHIBITION: Operations or actions NOT permitted.

Tab.3 - Key

SAFETY INSTRUCTIONS AND WARNINGS

The device must be operated by appropriately trained and qualified personnel.

Before installing and operating the device, please read and understand this manual carefully to avoid damaging the product and putting your own safety at risk.

The technical information in this document is provided for information purposes only and does not constitute a contractual commitment.
Kiwitron s.r.l. reserves the right to make any graphic or functional changes to devices and/or software without prior notice.

The KiwiBat device **CANNOT** replace the safety devices of the vehicle on which it is installed.

The KiwiBat device **MUST** be installed in compliance with general safety regulations.

It is **forbidden** to install the KiwiBat device to inhibit or alter the operation of the safety systems already present on the vehicle.

It is **forbidden** to use the system to operate power remote control units, as opening them while current is passing would cause an electric arc.

WARN the operator of the vehicle before carrying out any remote operation (web cloud or remote connection via PC) to prevent dangerous situations.

Lockout (or slowing down) **MUST** observe the safety of the vehicle and operators. The blocking of a vehicle **MUST NOT** create potential dangerous situations.

Do not use the device in the presence of flammable gases or fumes, in the vicinity of filling stations, fuel depots, chemical plants or during blasting operations. **Avoid any potentially explosive atmosphere.**

Warnings on the emission of radio waves

The device receives and emits radio waves.

The maximum power radiated by the device is below the thresholds imposed by regulations.

Interference may be generated if used in the vicinity of equipment such as TVs, radios, computers or any unshielded electrical and/or electronic equipment.

Observe the restrictions imposed on the use of electronic devices if the vehicle on which the device is installed is used:

- In hospitals or other health facilities.
- Near an airport.

In all areas where there are restrictions imposed due to the use of electronic devices.

Intended use

The KiwiBat device is designed to monitor lead-acid batteries.

Improper use

Any use of the KiwiBat device not expressly described in this manual is not permitted.

Risk assessment

It is the obligation of the operator (owner of the vehicle) to carry out an environmental risk analysis prior to installation.

Limitations on liability

Kiwitron s.r.l. disclaims any liability for damage caused by:

- Misuse of the device.
- Use by unqualified and/or trained personnel.
- Incorrect installation.
- Power supply defects.
- Improper maintenance.
- Unauthorised changes or interventions.
- Incorrect manoeuvres
- Use of non-original spare parts.
- Use of accessories not provided for or not authorised in writing.
- Total or partial non-compliance with the instructions.
- Unusual cases.
- Not in accordance with the regulations and legislation currently in force in the country of installation.

Kiwitron s.r.l. disclaims any liability in the event the KiwiBat device is installed on vehicles that are also authorised to travel on public roads.

It is the responsibility of the operator to decide to install and use the system on the vehicle.

Technical assistance and manufacturer's warranty

TECHNICAL ASSISTANCE

In the event of faults, please contact Kiwitron Technical Office.

Kiwitron s.r.l.

Customer Support Service

Ph. +39 051 1889 3470

Mail: support@kiwitron.it

web site: www.kiwitron.it

WARRANTY

The warranty shall not apply to breakage and/or defects caused by:

- Misuse of the device.
- Use by unqualified and/or trained personnel.
- Incorrect installation.
- Power supply defects.
- Improper maintenance.
- Unauthorised changes or interventions.
- Incorrect manoeuvres
- Use of non-original spare parts.
- Use of accessories not provided for or not authorised in writing
- Total or partial failure to comply with the instructions
- Special events
- Not in accordance with the regulations and legislation currently in force in the country of installation.

The warranty does not extend to parts that wear out as a result of normal use such as cables and electrical connectors.

Please refer to the sales documentation for all contractual warranty terms.

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GENERAL DESCRIPTION

Device description

Device overview

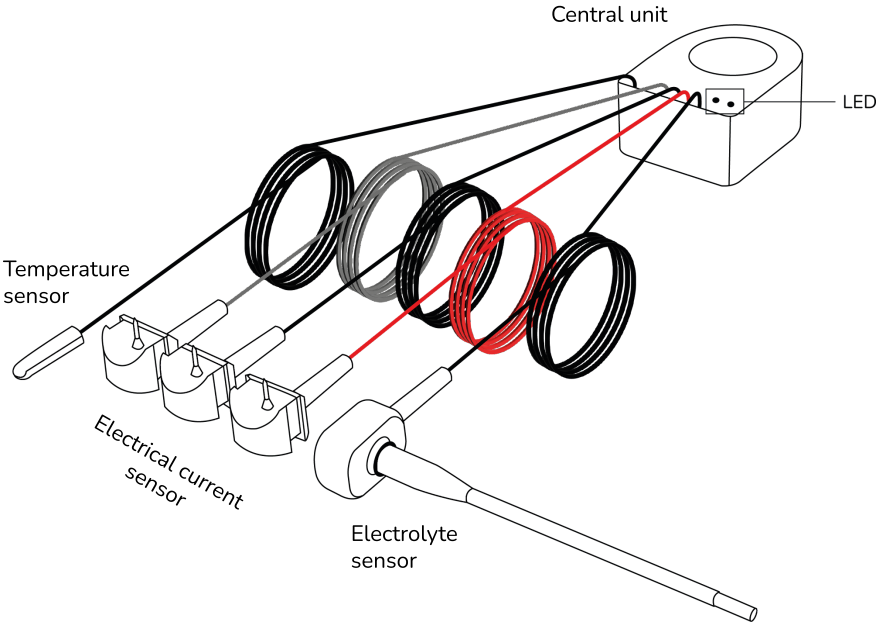

Fig.1- Device overview

The KiwiBat device is installed directly on the battery and is able to detect and analyse different types of data in real time.

Device functionality

KiwiBat detects and records the following battery data:

- Operating hours
- Charging cycles
- Battery status
- Current and voltage use
- Ampere-Hours charged and used
- Battery charge status
- Battery temperature
- Acid level in the battery

The data analysed is displayed via a dedicated app.

Function	Description
Detection and recording of working hours	Indicates the total working hours of the battery.
Detection and recording of battery charge and discharge cycles	Detects the charge and discharge cycles, with relative timing, of the battery.
Battery status detection and recording	Indicates whether the status of the battery is OK or has anomalies.

Function	Description
Current and battery voltage consumption detection and recording	Detects the average consumption and the maximum peaks of the voltage and current.
Battery temperature detection	It detects in°C the average temperature and the maximum and minimum temperature peaks of the battery.
Detection of Ampere-Hour consumption of the battery	Indicates the total of the Ampere/Hour used and charged by the battery.
Battery charge status detection	Indicates the battery charge status in percentage value.
Battery acid presence detection	Detects if the battery electrolyte is under the minimum level.
Anomaly detection	Report on the App if the battery has anomalies such as a low amount of electrolyte or high temperature.

Tab.4 - Device functionality

Technical data

Mechanical specifications			
Dimensions	43 x 45 x 58 mm	Material	PA 6 30%
Weight	140 g		
Electrical specifications			
Power	from 16 to 160 V	Consumption	1.5W
Battery voltages	from 24 to 120 Vdc		
Current sensor			
-1000 A to +1000 A			
Temperature sensor			
from -50 to + 120°C			
Battery acid level sensor			
Operational indicators			
Green LED slow flashing: Device powered up			
Fast flashing green LED: Device powered up and working			
Flashing red LED: Fault detected			

Tab.5 - Technical Data

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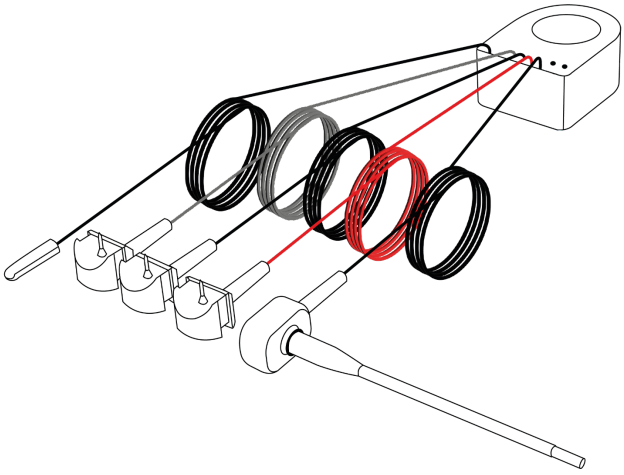
INSTALLATION

Electrolyte sensor probe setup

Material



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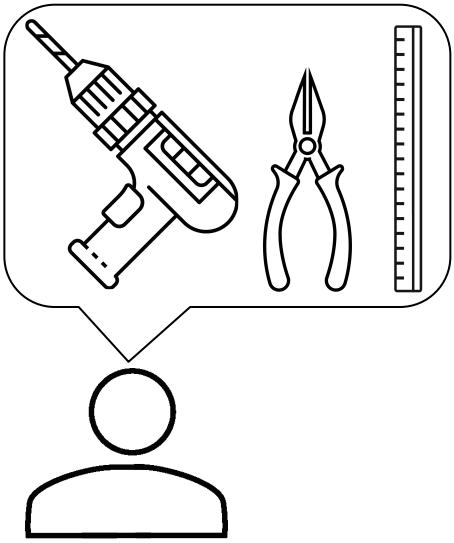
Instruments



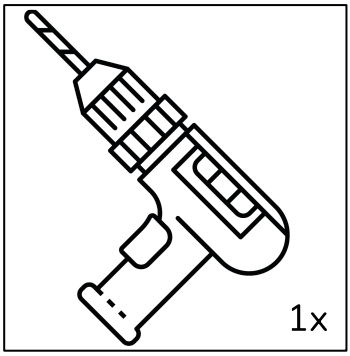
Identification of battery-powered element

Access the battery and identify, according to the following table, the element in which the electrolyte sensor will be inserted (battery element).
To identify the element positioned at ⅔ of the battery, it is necessary to count the elements present starting from the negative pole of the battery.

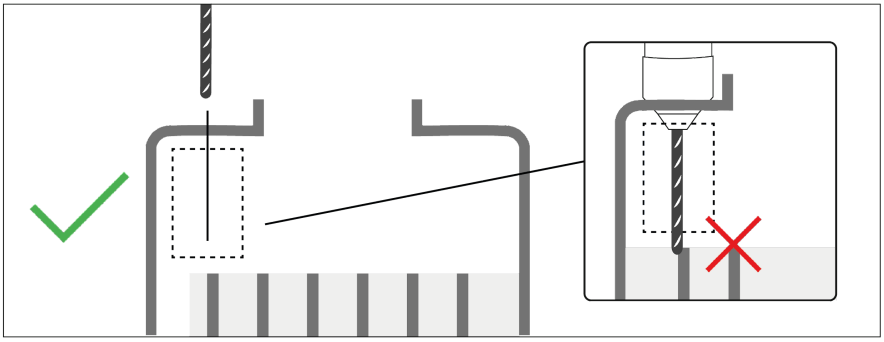
Battery voltage	Electrolyte sensor at ⅔ battery voltage
24 V	Positive side element 8 (16 V)
36 V	Positive side element 12 (24 V)
48 V	Positive side element 16 (32 V)
72V	Positive side element 24 (48 V)
80 V	Positive side element 28 (54 V)
96V	Positive side element 32 (64 V)
120V	Positive side element 40 (80 V)

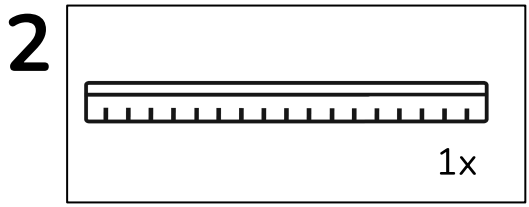
Tab.6 - Electrolyte sensor positioning

1



After identifying the battery element, drill it properly with a drill equipped with a 7.5 mm diameter drill, paying attention not to drill the plates underneath.

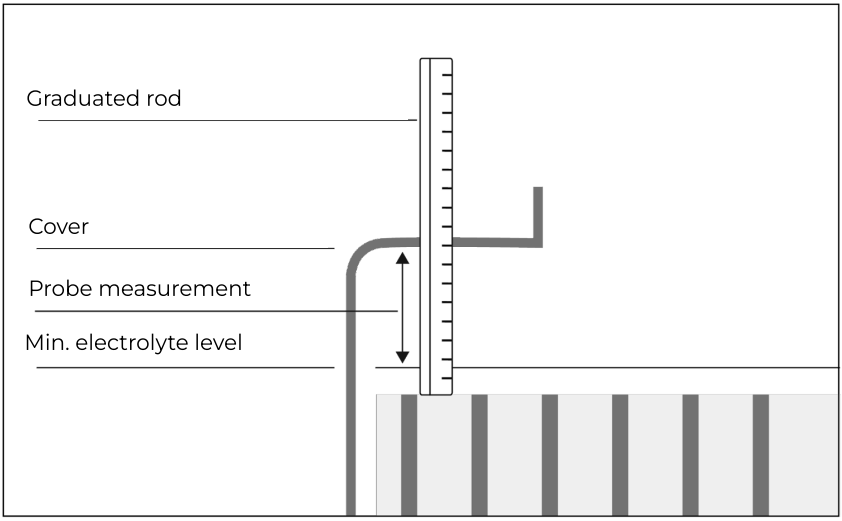




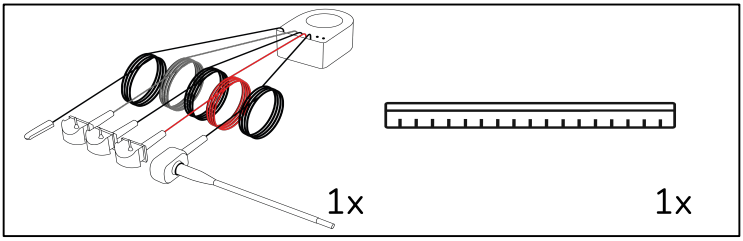
Use a graduated rod, insert it inside the battery element until it touches the base of the plates.

Read the value that appears at the height of the battery cover.

Decrease the value by 5 mm to determine the maximum length that the electrolyte sensor probe can have.



3



After determining the maximum length of the probe, compare it with the length of the probe itself.

There will be two possibilities:

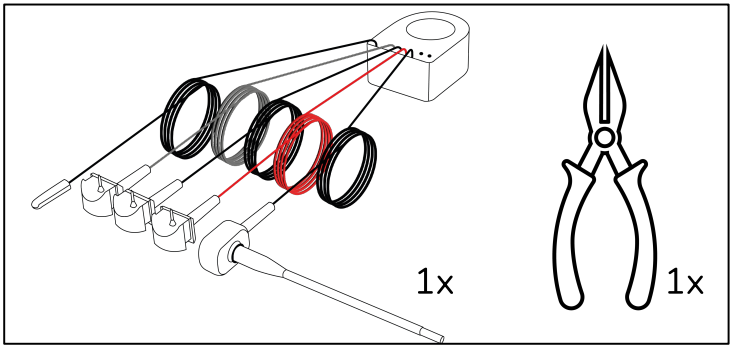
1. The probe is equal to or shorter than the maximum length identified: in this case the probe is suitable for installation. Go directly to the “Connections” section.

OR

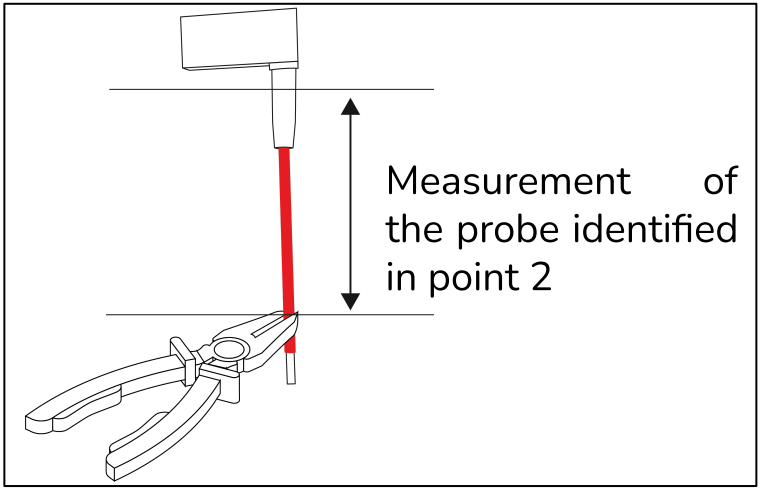
2. The probe is **longer than** the maximum length identified: in this case, the probe **is NOT suitable for installation**, so it must be shortened as indicated below.

This step is only required if the electrolyte sensor probe is longer than the maximum identified length.

4



Shorten the electrolyte sensor probe with the help of shears. The maximum length is that identified at step 2.



Below is the recommended length for installation of the electrolyte sensor probe:

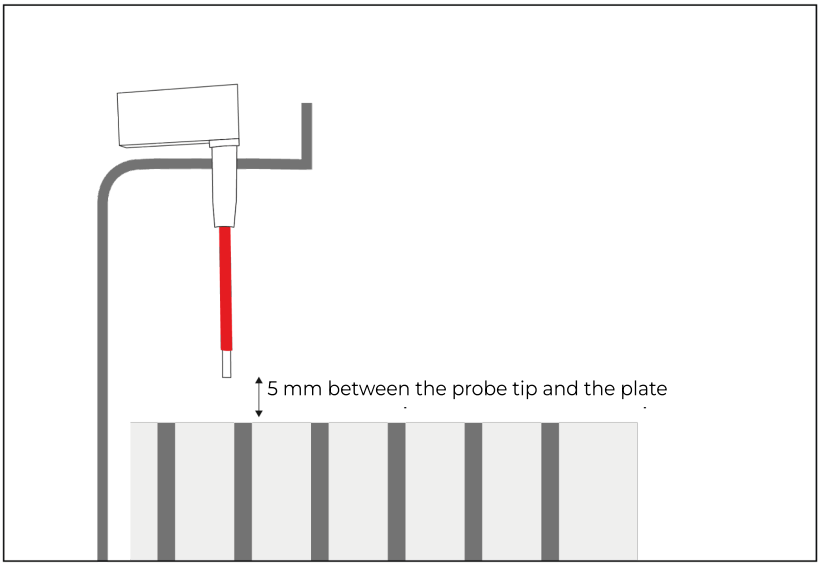


Fig.2- Correct preparation of electrolyte sensor probe

Installation scheme[1]

ATTENTION: The device is installed in the presence of voltage.

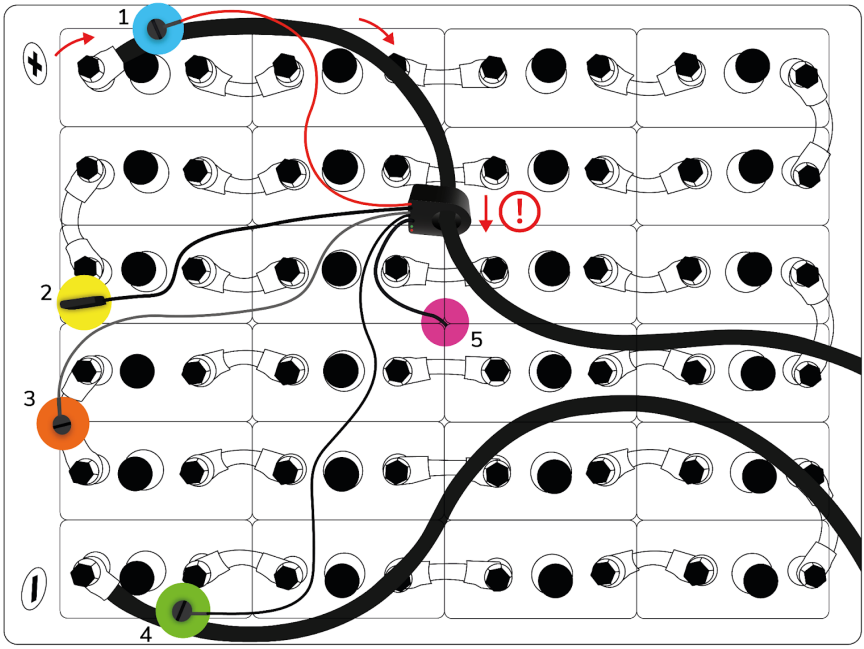


Fig.3- KiwiBat installation

[1] The installation diagram refers to a 48 V battery, for other types of batteries refer to Table 7.

Identification of battery-operated element

Access the battery and identify, according to the following table, the element in which the grey electrical current sensor is to be inserted (battery element).

In order to identify the element positioned at ⅓ of the battery, it is necessary to count the elements present starting from the negative pole of the battery.

Battery voltage	Grey electrical current sensor at ⅓ battery voltage
24 V	Jumper between elements 4 and 5 (8 V)
36 V	Jumper between elements 6 and 7 (12 V)
48 V	Jumper between elements 8 and 9 (16 V)
72V	Jumper between elements 12 and 13 (24 V)
80 V	Jumper between elements 13 and 14 (26 V)
96V	Jumper between elements 16 and 17 (32 V)
120V	Jumper between elements 20 and 21 (40 V)

Tab.7 - Positioning of the grey electrical current sensor

Connections

To install the KiwiBat, you need to:

1. Prepare the electrolyte sensor probe as indicated in the section of the same name ("Preparation of electrolyte sensor probe");
2. Connect the electrolyte sensor to the battery (see Table 6);
3. Remove the appropriate protection from all three electrical current sensors;
4. Connect the grey electrical current sensor to the battery voltage (see Table 7);
5. Connect the red electrical current sensor to the positive pole of the battery;
6. Connect the black electrical current sensor to the negative pole of the battery;
7. Insert the temperature sensor in the centre of the battery pack or in the hottest point of the battery.

KiwiBat setup

The device is configured via a dedicated App, for more details refer to the section "Using the configuration app".

Check for a correct installation

After installing and configuring the device through the dedicated App, make sure that the green LED flashes quickly (device powered and connected via bluetooth) and the red LED is off (no errors/faults).

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USE AND MAINTENANCE

Use of configuration apps

Download and install the "KiwiBat" application, framing the QR Code with your mobile device:

Fig.4 - QR code

The screens described below are for illustrative purposes only and may differ from what is present on the App

To be displayed correctly some screens require scrolling down or a side swipe

Device Association

Open the previously installed KiwiBat application and approach the vehicle. Devices will be automatically scanned.

Fig.5 - Scanning in progress

At the end of the scan: there are two sections:

1. “TO CONFIGURE”
2. "CONFIGURED"

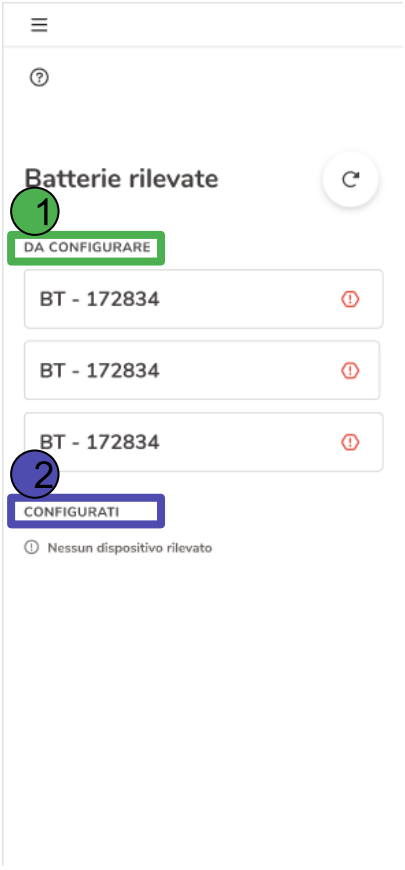


Fig.6 - Detected devices

Select, in the appropriate section, the device to configure:

Fig.7 - Select device to configure

Authenticity

After selecting the device to configure, you will be prompted to set up authentication or leave access free.

Authentication with password:

1. Enter password
2. Password confirmation
3. Click “Next”

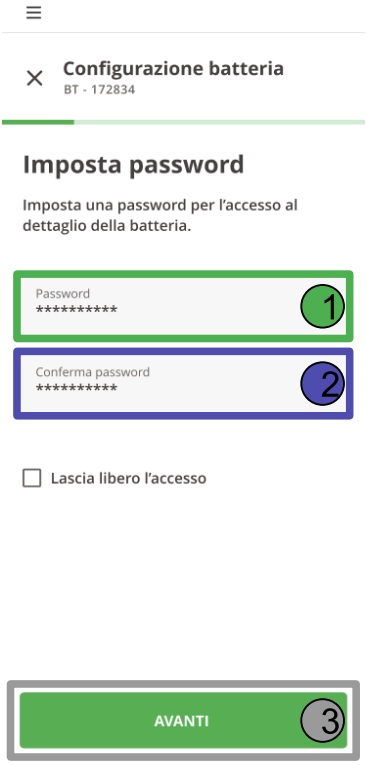


Fig.8 - Set Password

Do not hinder access:

1. Tick the "leave access free" box
2. Click on “Proceed”

Fig.9 - Leave access free

Serial Assignment

After choosing the type of authentication, the device must be assigned to the serial number of the battery on which it will be installed.

To assign the serial number:

1. Enter the serial number in the appropriate field
2. Click “Next”

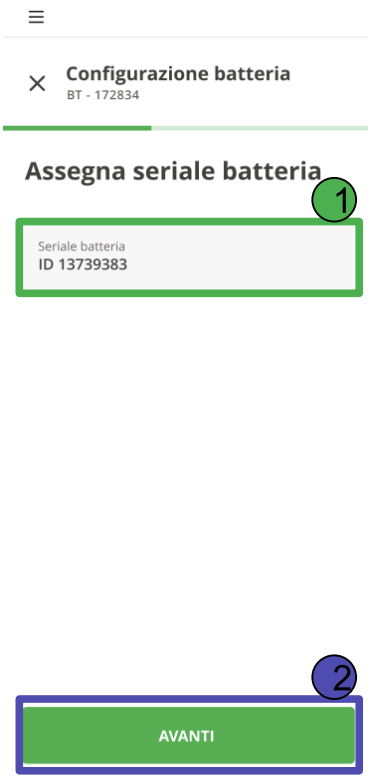


Fig.10 - Serial assignment

Wait for the confirmation message the device configuration has taken place:

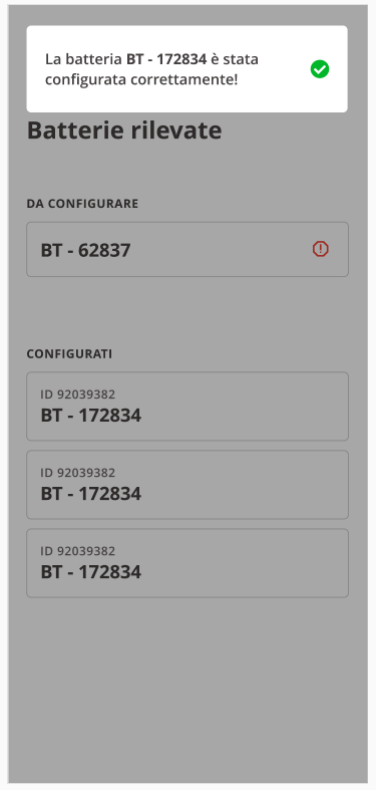


Fig.11 - Configuration complete

Live monitoring devices

After configuring the device, the main screen displays the device in the "CONFIGURED" section.
To monitor a device:

1. Select the device to be monitored
2. Authenticate (if required)
3. Click on "view":

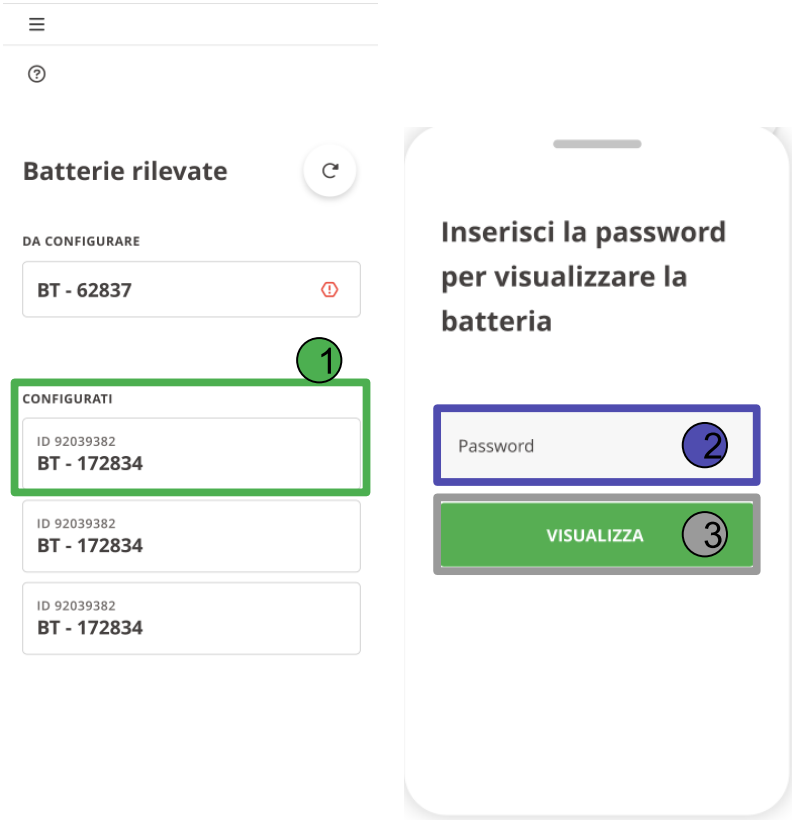
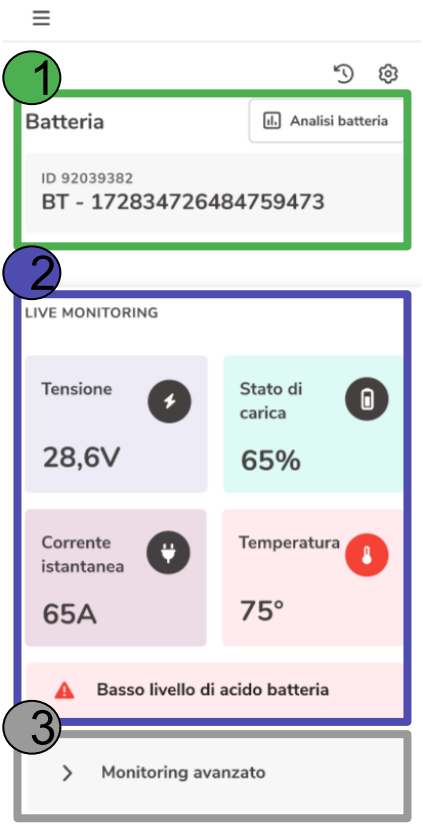


Fig.12 - Select device to monitor

The next screen displays:



KEY

1. "Battery": displays the device ID and the serial number of the battery on which it is installed. Clicking on "Battery analysis", you can display the trend graphs of the parameters of voltage, current, state of charge and temperature of the battery and the anomalies recorded on the battery;
2. "Live monitoring": in this section, the voltage, charge status, instantaneous current and battery temperature data are displayed and updated in real time;
3. "Advanced monitoring": shows the detail of the last Ah loaded, the total Ah loaded, the working time, discharge and recharge, a recharge meter and a discharge meter.

Log

Setup

Fig.13 - General screen for configured device

Battery Battery→ analysis

Clicking on "Battery analysis" displays the trend graphs of the battery voltage, charge and temperature parameters and the anomalies recorded on the battery.

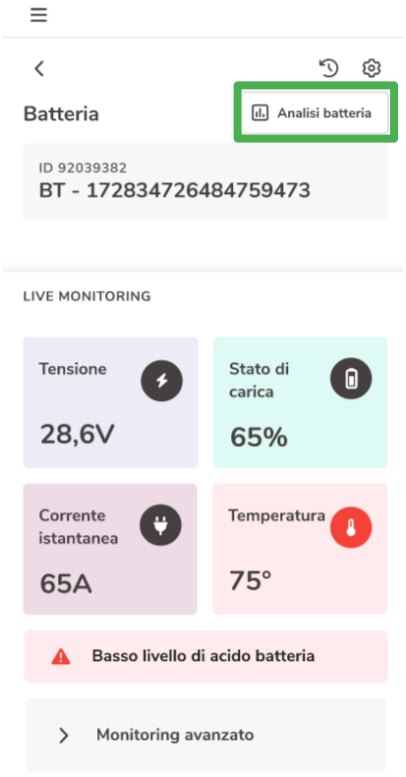
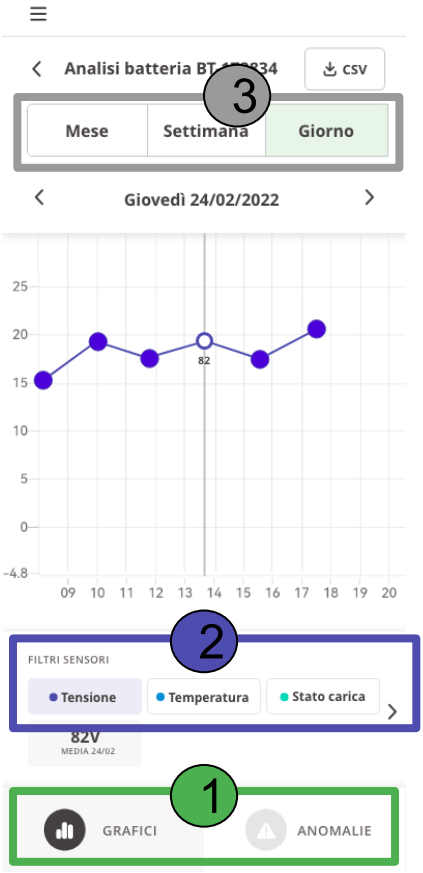


Fig.14- Battery analysis

To analyse the battery data:



1. Select, at the bottom, the type of data to be analysed: Graphs (of monitored parameters) or Anomalies;
2. Select the parameters of interest in "Sensor filters" (scroll the menu to the right to view all available filters);
3. Select the desired time interval: Month, Week or Day;

To obtain an extract of the graphs in .csv format, press on the csv top right-hand side of the screen.

Fig.15- Sensor filters

Below are two examples of Graph display (monthly, and daily):

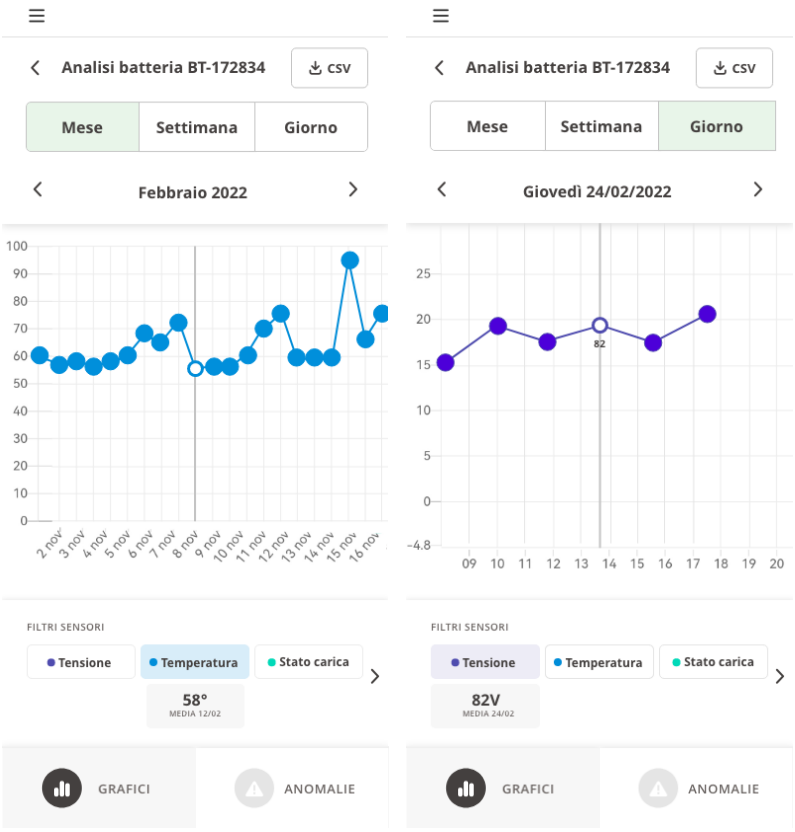


Fig.16- Graphic Examples

Below are two examples of Anomalies display (monthly, and daily):

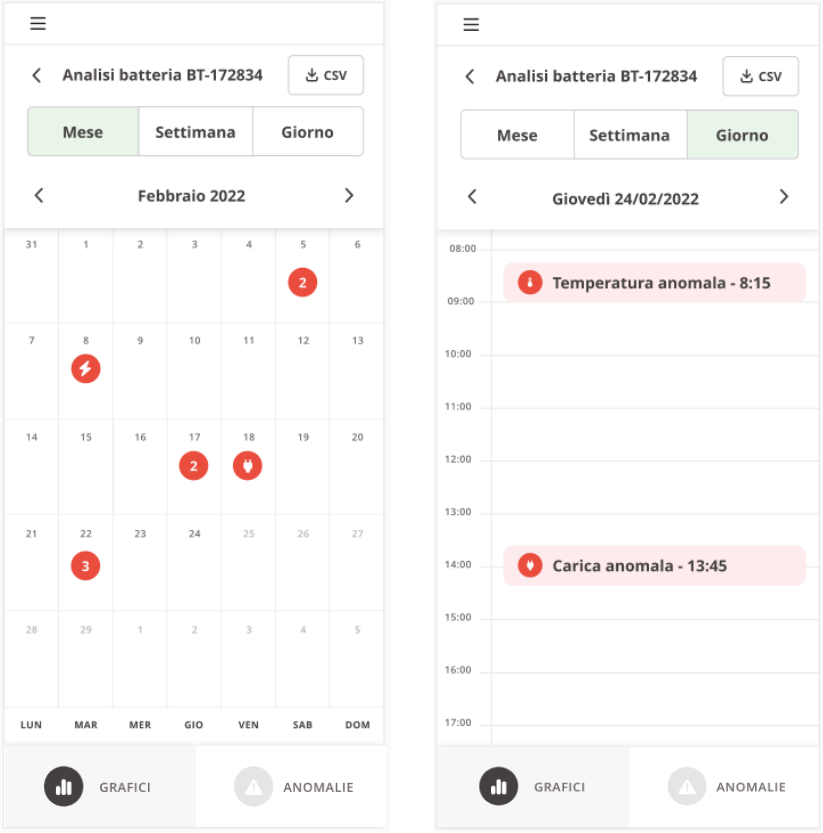


Fig.17- Examples of anomalies

Live Monitoring

This section displays the battery data in real time (and updated every second). In particular:

- Voltage (V)
- State of Charge (%)
- Temperature (°C)
- Instantaneous Absorbed Current (A)

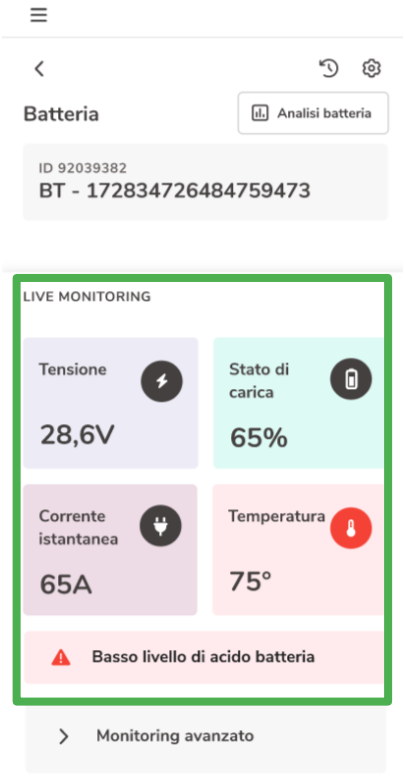


Fig.18- Live monitoring

Advanced monitoring

By clicking on the arrow in the "Advanced Monitoring" section, you can view:

- Total recharged current (Ah)
- Output current from the last recharge (Ah)
- Total current delivered(Ah)
- Total regenerated current (Ah)
- Residual capacity (Ah)
- Discharge time (h)
- Charging time (h)
- Work time (h)
- Total top-ups: divided into partial and complete
- Total discharges

Fig.19- Advanced monitoring

Battery log

Clicking on the clock-shaped button in the top right you can display the battery data history.

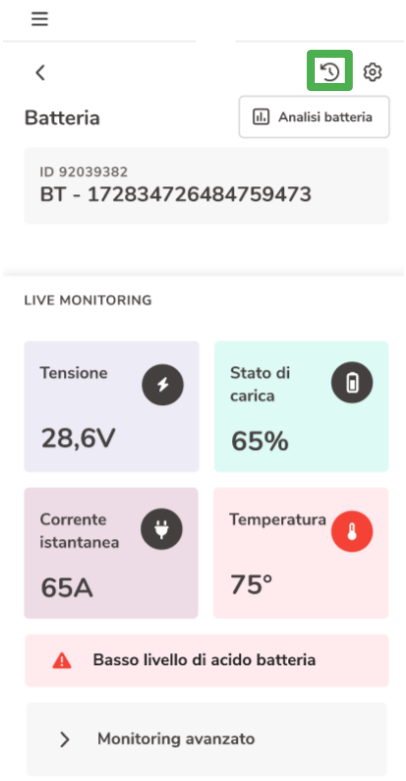


Fig.20- Battery log

Select the date for which you want to obtain the history.

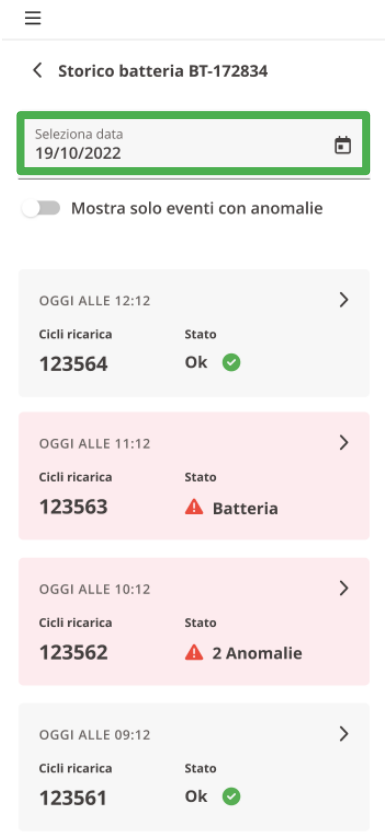


Fig.21- Complete battery history

The displayed history can be filtered to "Show only events with anomalies" to display only events with anomalies recorded during the selected day:

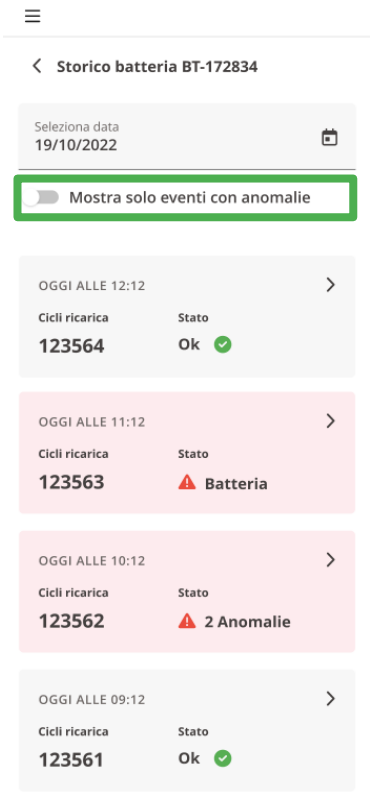


Fig.22- "Show only events with anomalies" filter

For more details on the event, you can click on the relevant arrow (to the right of the event):

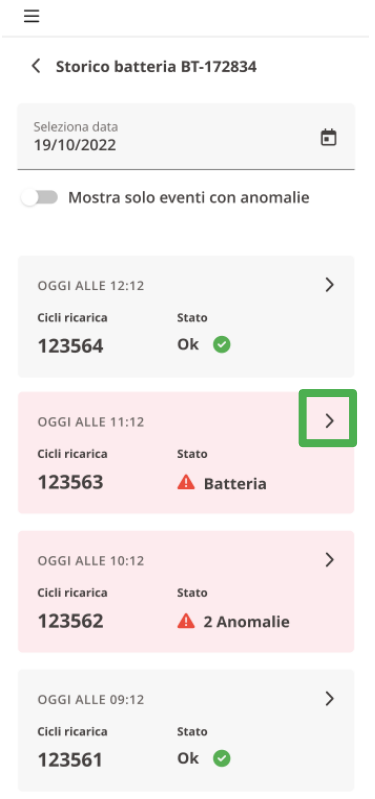


Fig.23- Battery history details

Scrolling down you can display the details of the battery history (see examples below):

Fig.24- Historical details 1/3

Fig.25- Historical details 2/3

Fig.26- Historical details 1/3

Setup

By clicking on the gear-shaped button in the top right, it is possible to view the settings.

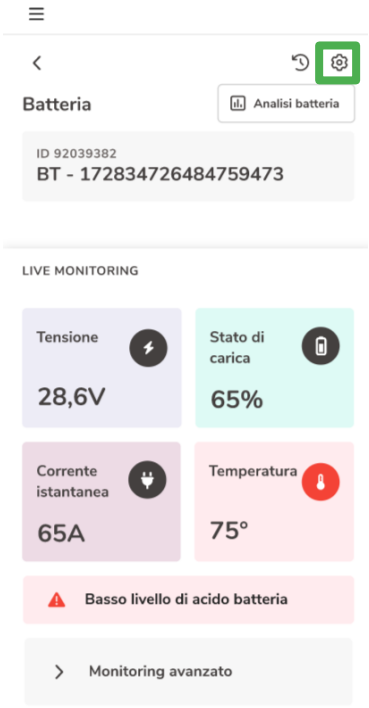


Fig.27- Settings Key

The following screen allows you to:

1. View general information
2. View Battery Configuration
3. Edit the password
4. Restore original settings

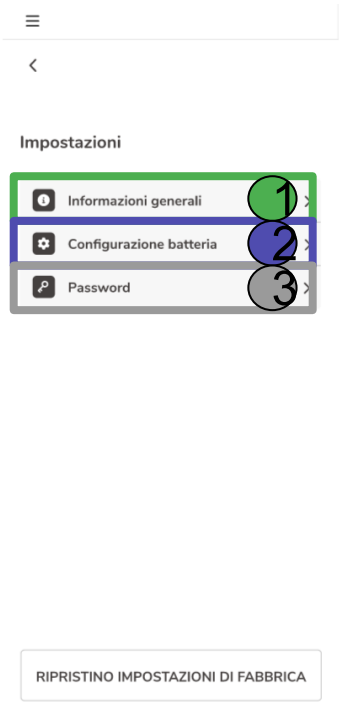


Fig.28- Settings menu

General → information settings

This screen displays general battery information, available updates, and network data:

Fig.29- Settings - General info

If a new Software or Firmware version is available, a notification icon appears in the updates section; to download the new version, click on the relevant arrow (on the right):

Fig.30- Update available

Click on "Upload firmware" to upload the version of the updated firmware:

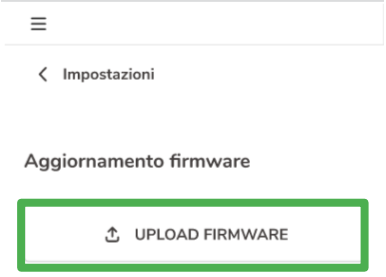


Fig.31- Upload firmware

To configure the network settings of the device click on the relevant arrow (on the right):

Fig.32- Network configuration

If the connection is with the Key system (FW Key 0314N or higher), click on the appropriate button:

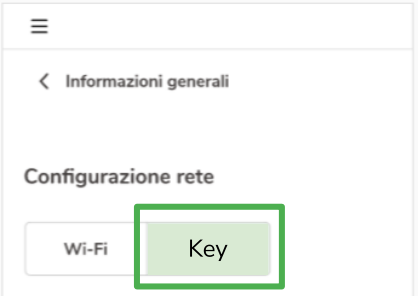


Fig.33- Key connection

The KiwiBat generates a Wi-Fi network with SSID kb_serial (for example kb_123456789) to which the Key device must connect using password: kiwibat2!

Please refer to the “Key SW Configuration Procedure” in the “Configuring a Wi-Fi Network” section for more details.

When the configuration is completed, the Key SW displays the connection status.

If the connection is made via Wi-Fi, click on the appropriate button, the screen displays the connection status and the possibility of connecting automatically or manually:

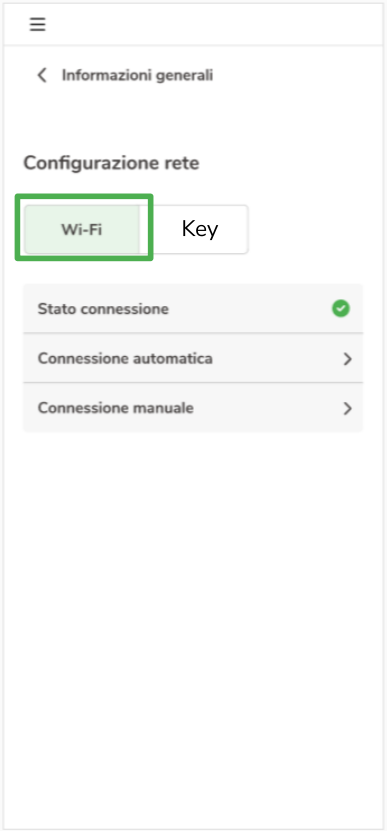


Fig.34- Wi-Fi connection

By clicking on "Automatic connection" the application searches and displays the available Wi-Fi networks. Click on the button corresponding to the network to which you want to connect (for example "Network 1"):

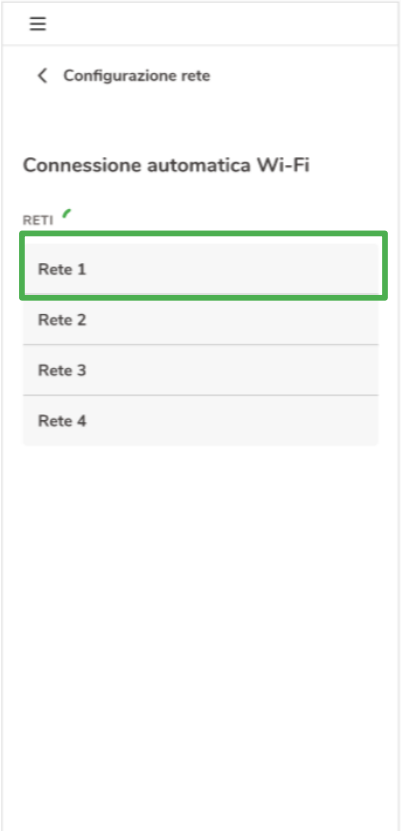


Fig.35- Automatic connection

Enter the network password and click on "Connect"

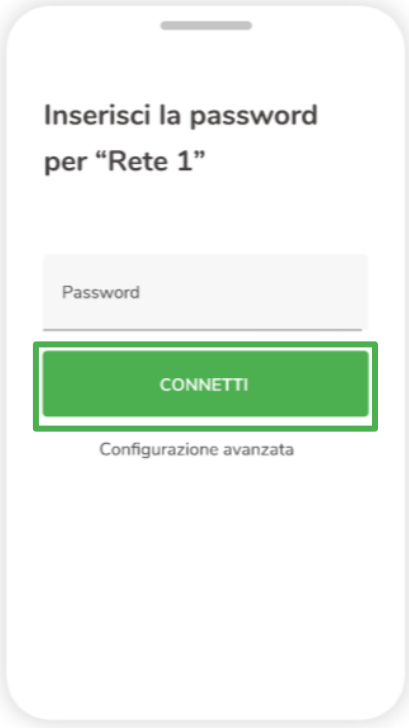


Fig.36- Wi-Fi password

The connection of the device to the network is identified by a green tick:

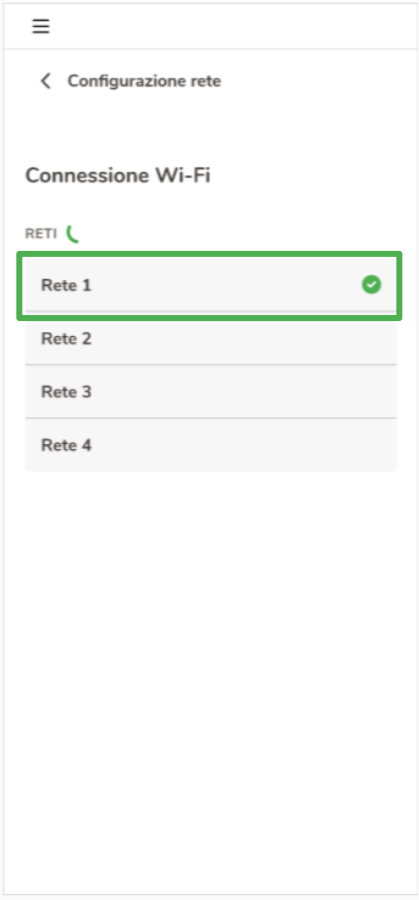


Fig.37- Wi-Fi connection OK

By clicking on "Manual connection", the user will be prompted to enter the network-specific data as shown on the screen:

Fig.38- Manual connection

The connection of the device to the network is identified by a green tick:

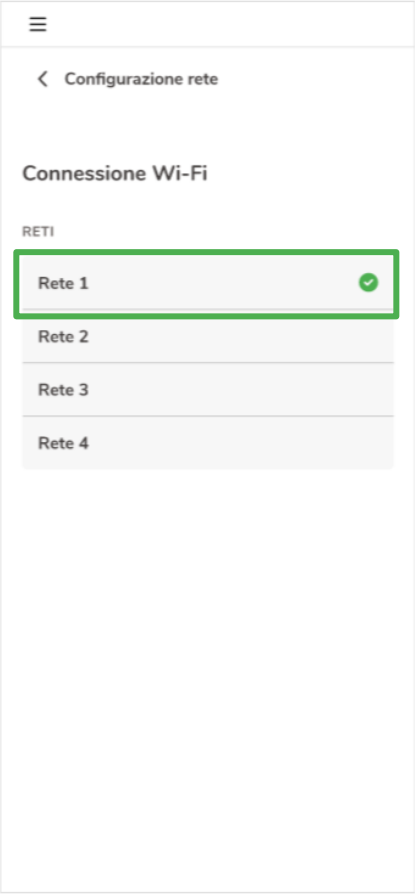


Fig.39- Wi-Fi connection OK

Battery → configuration settings

This section allows you to view the minimum voltage, maximum voltage, capacity and maximum working current of the battery.

Fig.40- Battery configuration

Settings → Password

This section allows changing the KiwiBat device password.

Enter the password previously set and click on "View"

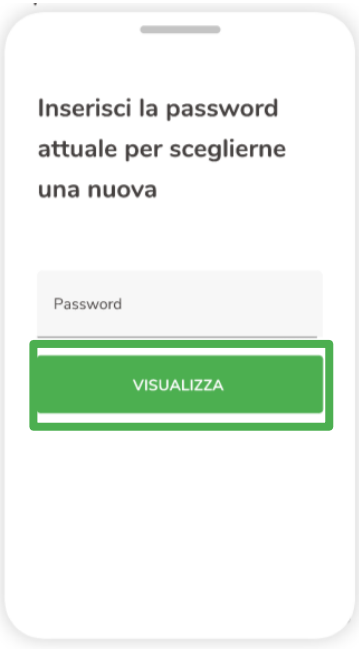


Fig.41- Change password 1/2

Change the fields with the new password and click "Change Password"

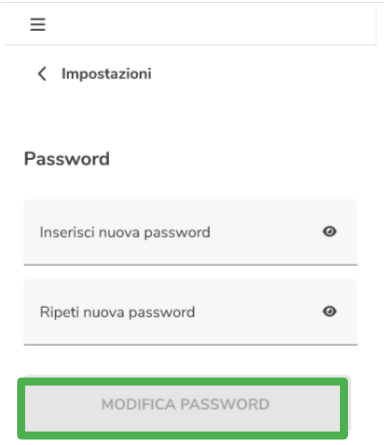


Fig.42- Change password 2/2

Settings → Restore factory settings

To reset the configuration of the device click on "Factory reset"

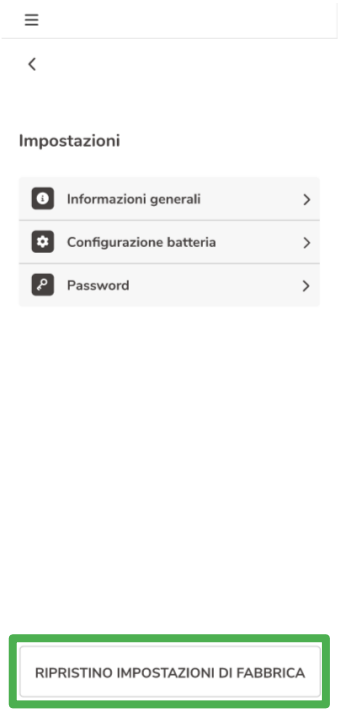


Fig.43- Advanced settings - Restoring factory settings

The next screen will ask for confirmation of wanting to reset the battery data saved on the phone, click confirmation and wait for the reset popup:

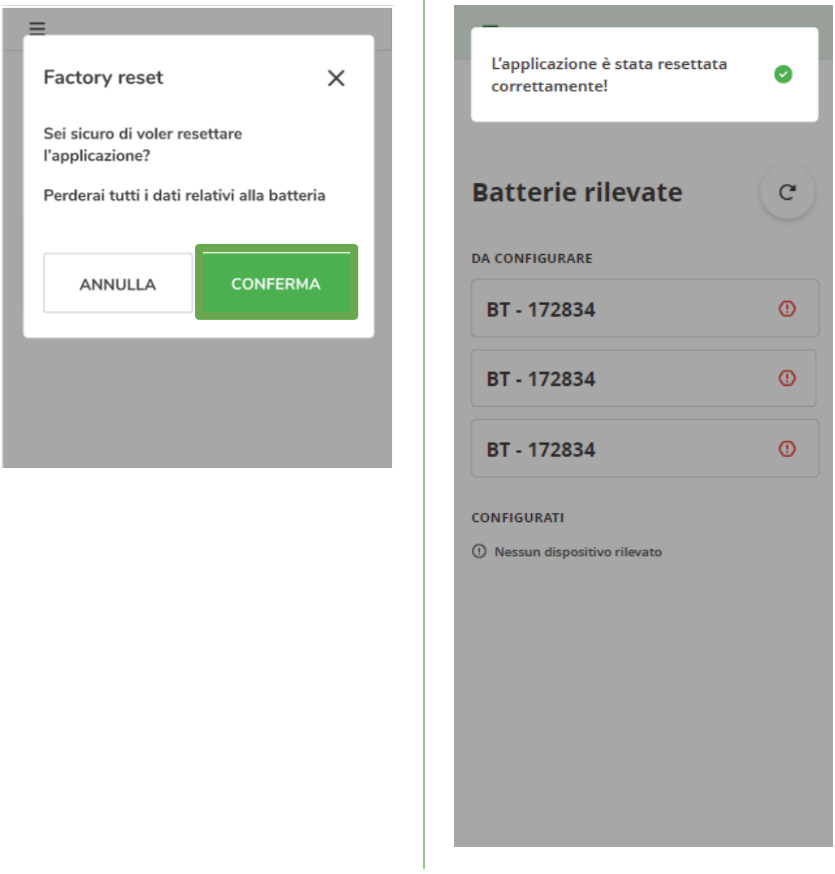


Fig.44- Factory reset

Visual signals

KiwiBat's visual signals consist of the lighting of a green LED and a red one:

Visual signalling		Meaning
Green LED	**Red LED**	
Slow flashing	Off	The device is powered.
Fast flashing	Off	The device is powered and the bluetooth connection is active.
[2]Fast flashing	Flash 1 time before the green LED flashes again	Fault detected: Error in section 1
	Blink 2 times before the green LED flashes again	Fault detected: Error in section 2
	Blink 3 times before the green LED flashes again	Fault detected: Error in Section 3
Fast flashing	Blink 4 times before the green LED flashes again	Fault detected: Battery error
	Blink 5 times before the green LED flashes again	Fault detected: High battery temperature
	Blink 6 times before the green LED flashes again	Fault detected: Low battery acid level

Tab.8 - Visual signals

[2] Green LED flashes scan device diagnostic cycles

Maintenance

It is advisable to clean the device periodically, using a soft, lint-free cloth.

Do not use abrasive cloths, towels, paper towels or similar.

Do not rub surfaces excessively

Do not use alcohol, solvents or chemicals.

Do not spray cleaning agents directly onto the product

Do not wash with water jets or pressurised water jets

What to do if

Trouble	What to do
Both LEDs are off, the device does not start	• Check all the system connections
The green LED flashes slowly, the red LED is off	• Activate the Bluetooth connection on the mobile device and proceed with the device configuration
The green LED flashes quickly and the red LED flashes	• Check positioning of probes and system connections. • Count the number of flashes of the red LED before the green LED flashes again and consult the table in the "Visual signals" section to identify the type of anomaly detected.

Tab.9 - Possible faults