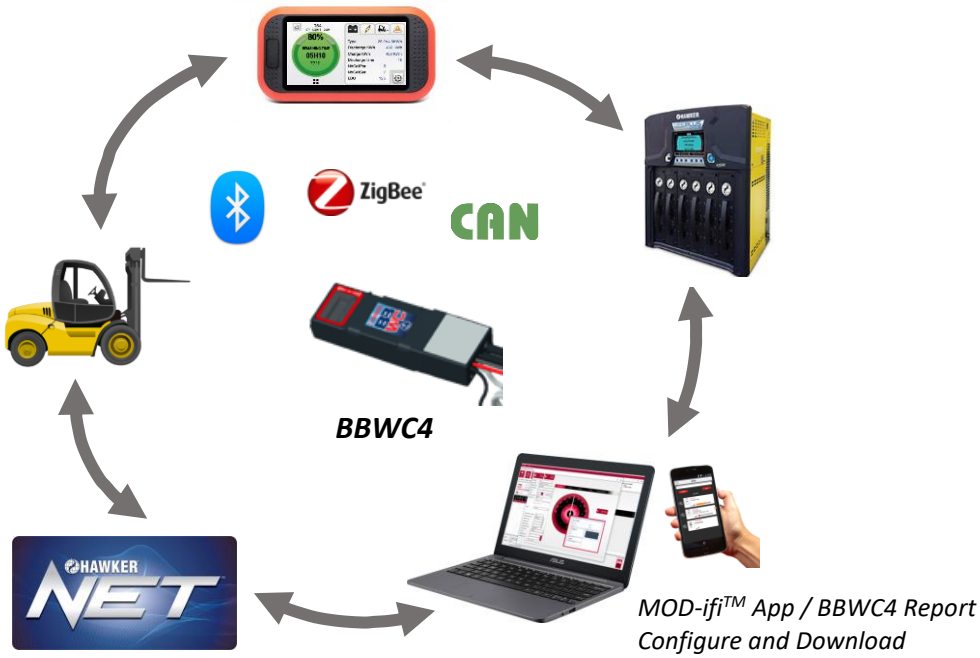
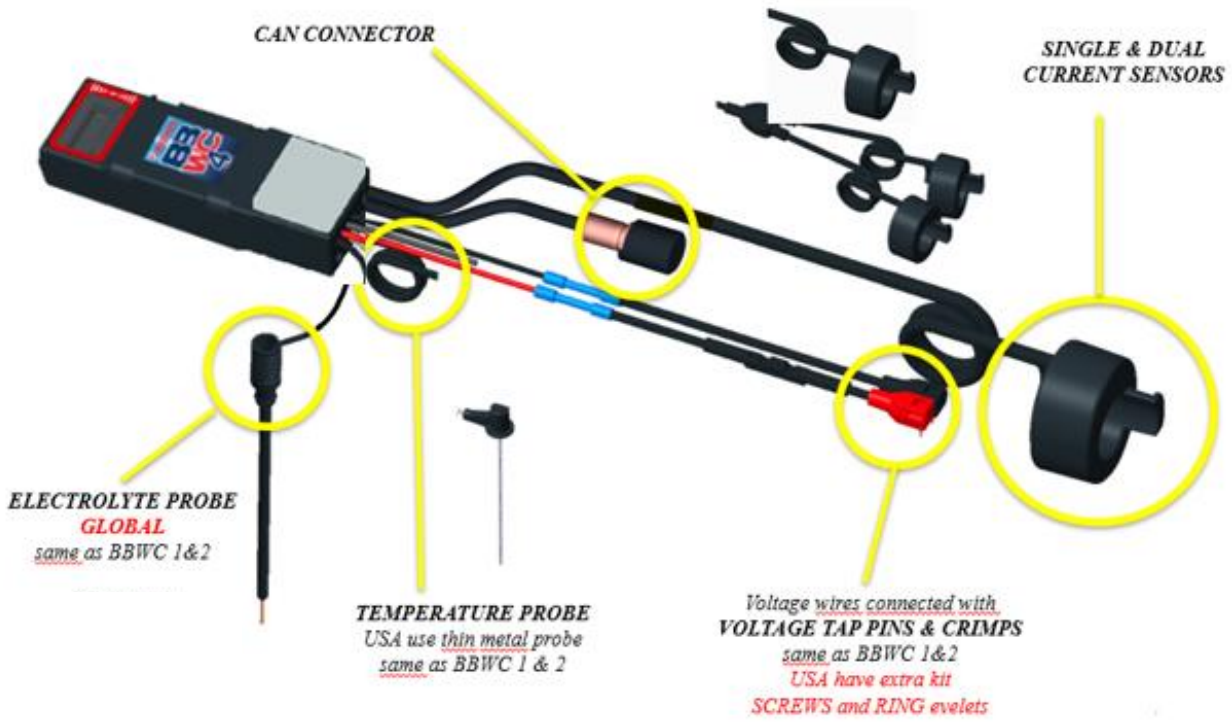
The Battery Boss™ WC 4 (BBWC4) device is a compact, wireless electronic device that attaches to the battery to provide real-time battery diagnostics. The BBWC4 device is now equipped with fourth generation battery sensor technology that provides incremental features such as Bluetooth and CAN bus connectivity. The highly integrated design embeds more memory for deeper analysis and a remote current sensor for easy installation with 1,000Ah current reading capability. The BBWC4 device embeds multiple communication links such as Bluetooth, Zigbee, and isolated CAN Bus for the communication with external equipment. Additionally, a new display has been added for better understanding of the battery conditions.



A) BBWC4 Device

BBWC4 device consists of:

- Main unit (for voltage measurement, display, LEDs, audible alarm, and communication features)
- 1 or 2 current sensors
- Cable for CAN connection
- Red and Black cables to power the BBWC4 device
- Balance/Gray cable for mid-battery voltage
- Temperature probe
- Electrolyte level probe (Optional)



The BBWC4 device can be installed on **24V-80V** batteries.

B) BBWC4 Device Part Numbers

There are multiple part-numbers depending on the options and application:

Region	PN	Description	Current sensor (internal diameter)	T°C Sensor	Level sensor	CAN BUS	Voltage pins
HAWKER®	BBWC4 (6LA20743-U1H)	FLOODED – CAN PREMIUM / VRLA SINGLE CURRENT SENSOR	1 x 1000A (21,5mm)	US	Optional BBWC4F *(includes flooded probe - 6LA20761)*	YES	YES + Screws
	BBWC4DUAL (6LA20743-U2H)	FLOODED – CAN PREMIUM / VRLA DUAL CURRENT SENSOR	2 x 1000A (21,5mm)	US	Optional BBWC4DUALF *(includes flooded probe - 6LA20761)*	YES	YES + Screws

C) BBWC4 Device Display & LEDs

There is a display screen and 3 LEDs on the BBWC4 device for status indication. The display automatically turns OFF after 15 mins of no activity. Tap on the BBWC4 device to turn the display ON.

Description	Value	Comment
SoC	0-100%	State of charge of the battery
Battery Voltage	Ex: 27.2V	Overall battery voltage (V)
Temperature	Ex: +18°C (or °F)	Battery Temperature
Current	Ex: 10.4A	Current value in A (+ charge, - discharge)
Bluetooth Connected		When the smartphone is connected to the WIIQ4
Warning	Level	Blue Led ON
	Temperature	Red Led Flashing or ON
	Low Soc	Audible Alarm ON
	Unbalance	Blue Led flashing
	No Current sensor	CURRENT/SENSOR NO/SIGNAL
	No Temperature sensor	TEMP/SENSOR NO/SIGNAL

LED	Color	Lit	Fast blinking (0.5s ON / 0.5s OFF)
Left	Red	High Temperature	Warning Temperature
Center	Orange	Alert DOD	Warning DOD
Right	Blue	Low level	unbalance
	All	Fast blink every 5 seconds (for normal operation)	

Note: When the BBWC4 device is first connected to the battery, all LED's will flash and the firmware revision will display on the screen (initialization sequence). The SoC shown will be a reloaded value from manufacturing, then will recalibrate the real SoC after a few minutes.

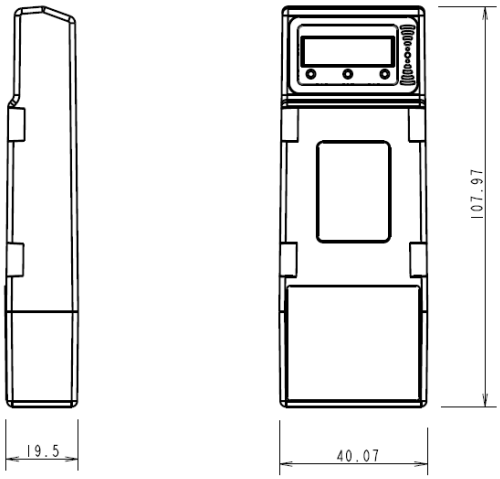
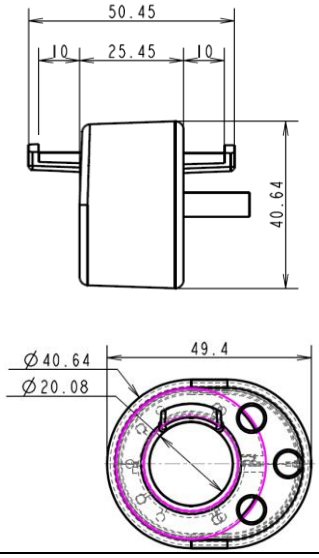
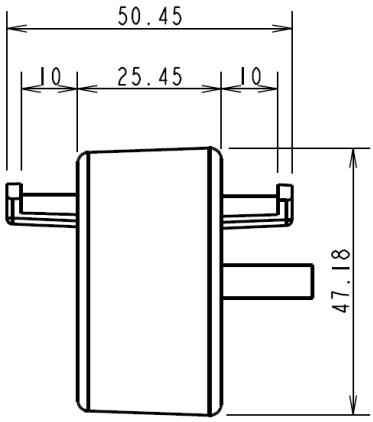
D) Audible Alarm

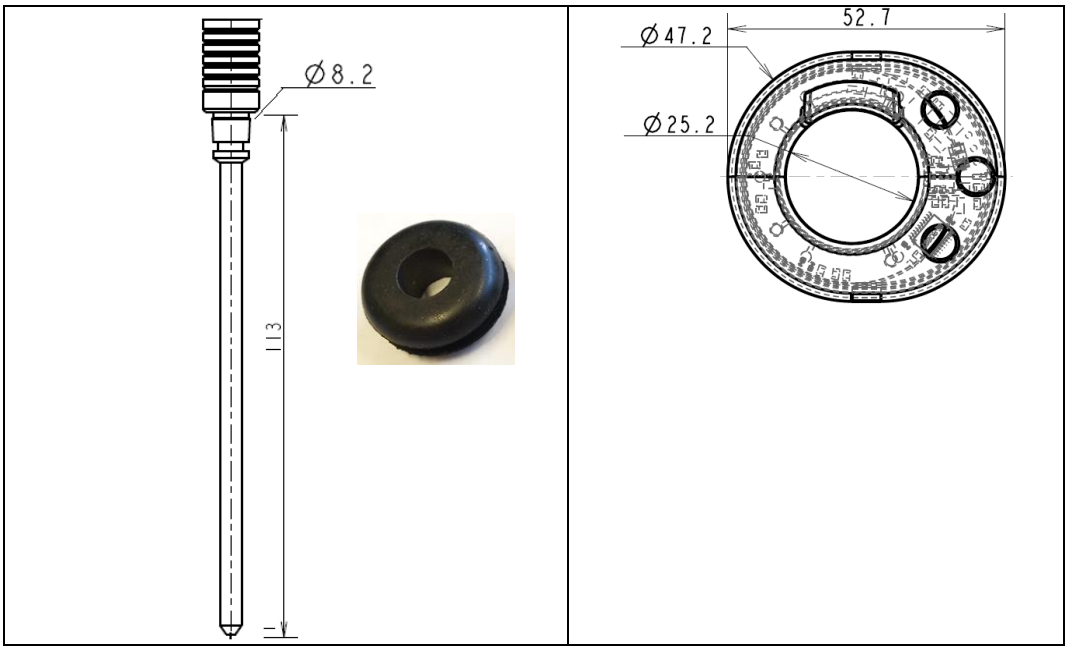
There is an audible alarm located inside the main unit. The alarm will sound when the SoC of the battery is low and the battery needs to be charged.

	Normal Soc	Warning Soc	Alert Soc
Alarm	OFF	2 beeps every 20 sec.	1 beep every 5 seconds

Default value of the alarm vs battery type*		
	Warning DOD	**Alert DOD**
Flex 2V/Bloc	70%	80%
Flex Premium 2V/Bloc	50%	60%
*adjustable with high level password		

E) BBWC4 Device Dimensions

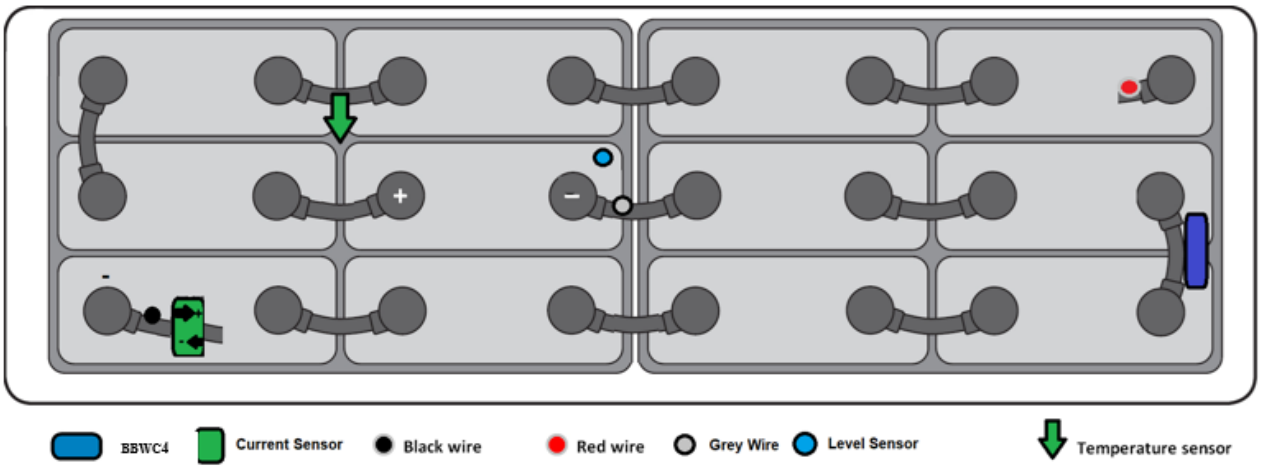
BBWC4	Current sensor USA
	
Level sensor 6LA20761	**Current sensor EMEA/APAC**
	



Note: All dimensions are given in mm.

F) BBWC4 Device Installation

The figure below is an example for installation.



Carefully follow the installation procedure described below.

1. Be sure that the installation site of the BBWC4 device is safe/protected and there is no way to damage the device or wires when the battery or cables are moved.

2. Carefully remove the negative (black) cable pin from the battery connector. ***HOLD THE CABLE FIRMLY – DO NOT ALLOW THE CABLE END TO TOUCH ANY PART OF THE BATTERY.***

3. Slide the cable through the current sensor. Follow the arrow (–) Negative or (+) positive showing the cells/battery polarities.

4. Reinstall the negative connector pin in the battery connector. Use cable ties to secure the current sensor device. Battery cables should be clamped on to the tray to prevent any movement.

5. The BBWC4 device should be mounted in a position that will allow all connections to be made easily and allow viewing the end of the device where the LEDs and Display are located. Use cable ties to secure the main unit.

For connecting each wire on the battery, use only the genuine parts supplied with the BBWC4 device:

- **Black** voltage tap for **red and black** wire
- **Gray** voltage tap for Gray wire
- Heat-shrinkable crimping splice
- Small or large ring lugs

Wire connection assembly details

6. Wire installation on a flooded battery:
   - Positive Sense Wire (Red) Connection

     1. Route the red wire through the positive terminal insulator. Wires can be run under the battery's intercell connectors for protection.

     2. Cut the wire to the required length, strip 1/4", coat the bare wire with Noalox® compound, and crimp a ring terminal on the exposed wire.

     3. Drill a hole 1/4" deep in the positive battery post with a #29 or 1/8" drill bit and connect the ring terminal with the supplied #8 sheet metal screw.

   - Negative Sense Wire (Black) Connection

     1. Route the black wire through the negative terminal insulator. Wires can be run under the battery's intercell connectors for protection.

     2. Cut the wire to the required length, strip 1/4", coat the bare wire with Noalox® compound, and crimp a ring terminal on the exposed wire.

     3. Drill a hole 1/4" deep in the negative battery post with a #29 or 1/8" drill bit and connect the ring terminal with the supplied #8 sheet metal screw. The Green LED should start blinking on and off.

- Water Level Probe

1. Water level (if equipped – only for flooded battery) – Cut the level indicator to the specific length. The probe should not touch any part inside the cell and be just above the moss shield. Trim plastic leaving approximately 1/8 inch of metal exposed.

2. Pick a cell somewhere in the interior cells of the battery and drill a 1/2" hole halfway between the positive and negative terminals near the edge of the cover in the cell. Insert flexible rubber grommet into the 1/2" hole and insert the electrolyte probe into the rubber grommet.

- Balance Sense Wire (Gray) Connection

1. If a water level probe is being used, install the gray wire on the negative post of the cell where the water level probe was installed. If a water level probe is not used, select the middle of the battery and install the voltage balance wire there. Counting from battery negative, this will be the cell number to enter in the software.

2. Route the gray wire from the BBWC4 device to the intercell connector attached to the negative terminal of the selected cell. Wires can be run under the battery's intercell connectors for protection.
   Caution: Do not exceed 20 cells from the negative terminal of the battery.

3. Cut the wire to the required length, strip 1/4", coat the bare wire with Noalox® compound, and crimp a ring terminal on the exposed wire.

4. Drill a hole 1/4" deep in the center of the inter-cell connector with a #29 or 1/8" drill bit and connect the ring terminal with the supplied #8 sheet metal screw.

- Apply Noalox® Anti-oxidant joint compound to all screws and ring terminals. Reposition all terminal and connector insulators.

- Insert the thermal probe at a cell intersection close to the center of the battery. The probe should be inserted all the way to the strain relief. Do not install at a partition.

7. Wire installation on a thin plate pure lead (TPPL) battery:
   - Positive Sense Wire (Red) Connection

1. Route the red wire through the positive terminal insulator. Wires can be run under the battery's intercell connectors for protection.

2. Cut the wire to the required length, strip 1/4", coat the bare wire with Noalox® compound, and crimp included butt splice to the wire take off at battery positive or use the included voltage tap wire. Heat shrink after the splice is crimped.

- Negative Sense Wire (Black) Connection

1. Route the black wire through the negative terminal insulator. Wires can be run under the battery's intercell connectors for protection.

2. Cut the wire to the required length, strip 1/4", coat the bare wire with Noalox® compound, and crimp included butt splice to the wire take off at battery positive or use the included voltage tap wire. Heat shrink after the splice is crimped. The Green LED should start blinking on and off.

- Balance Sense Wire (Gray) Connection

1. Select the middle of the battery and install the voltage balance wire there. Counting from battery negative, this will be the cell number to enter in the software.

2. Route the gray wire from the BBWC4 device to the intercell connector attached to the negative terminal of the selected cell. Wires can be run under the battery's intercell connectors for protection.
   Caution: Do not exceed 20 cells from the negative terminal of the battery.

3. Cut the wire to the required length, strip 1/4", coat the bare wire with Noalox® compound, and crimp included butt splice to the wire take off at battery positive or use the included voltage tap wire. Heat shrink after splice is crimped.

- Reposition all terminal and connector insulators.

- Insert the thermal probe at a cell intersection close to the center of the battery. The probe should be inserted all the way to the strain relief. Do not install at a partition.

8. BBWC4 device SoC will calibrate a few minutes after installation.

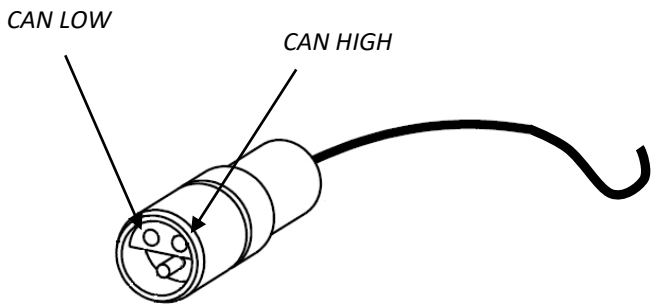
CAUTION: All wires should be protected against any external damage and secured with cable ties.

Voltage taps should be secured with cable ties. If used, should be installed with a heat shrink butt splice to avoid corrosion. If battery has leads in the terminals they can be utilized.

G) CANBUS

If equipped, it is possible to communicate with the BBWC4 device through CAN communication protocol. The BBWC4 main unit is delivered with a protective plastic cap that needs to be removed to use the CAN option. The BBWC4 device can communicate with different protocols like CANOpen or J1939.

1. The female connector pinout described below.



2. Male connector type not provided = ITT-CANON SURE-SEAL IP68 3-contact receptacle with 2 pins and 1 socket adapted for 0.75-1.5mm^2 wires.

Product	**Receptacle part number**	**Contact part number**		
		Wire gauge	**Pin** (*qty 2*)	**Socket** (*qty 1*)
ITT-CANON SURE-SEAL	120-8551-001 (*SS3R*)	0.5–1.0mm^2	330-8672-001 (*SS20*)	031-8703-001 (*SS20*)
		0.75–1.5mm^2	330-8672-000 (*SS10*)	031-8703-000 (*SS10*)

H) Communication / Download

There are two modes of communication available on the BBWC4 device:

- Zigbee: This is the existing protocol already in use on BBWC devices. It will continue to provide communication to existing HAWKER® chargers.
- BLE: This is a new feature which provides communication to a Smartphone.

The BBWC4 device can also be configured and can provide data via Zigbee (BBWC4 Report – **v5.4.5 minimum**) or BLE (Mod-ifi™ Mobile App – **2.16 minimum**).

I) MOD-ifi™ Mobile App

The MOD-ifi™ mobile app was developed for Apple iOS and Android Smartphones. The app will be available in the Apple App Store and Google Play Store. Access is protected by login/password. Several access levels will be available.

This app must be connected to the internet (3G/4G or WiFi) to take advantage of all features.

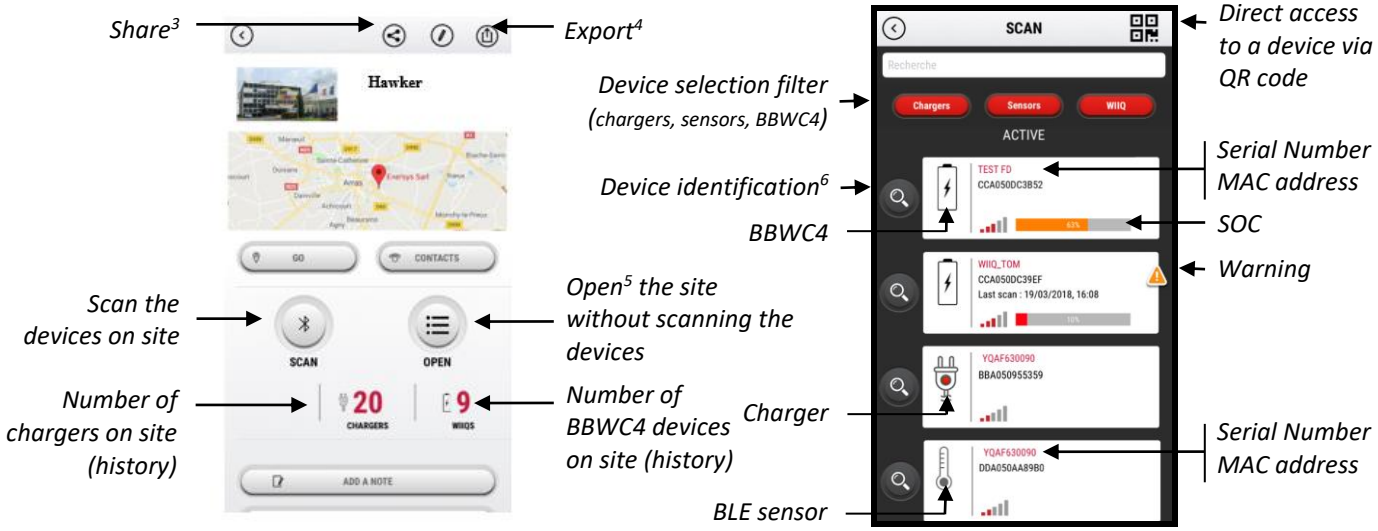
This app allows mainly:

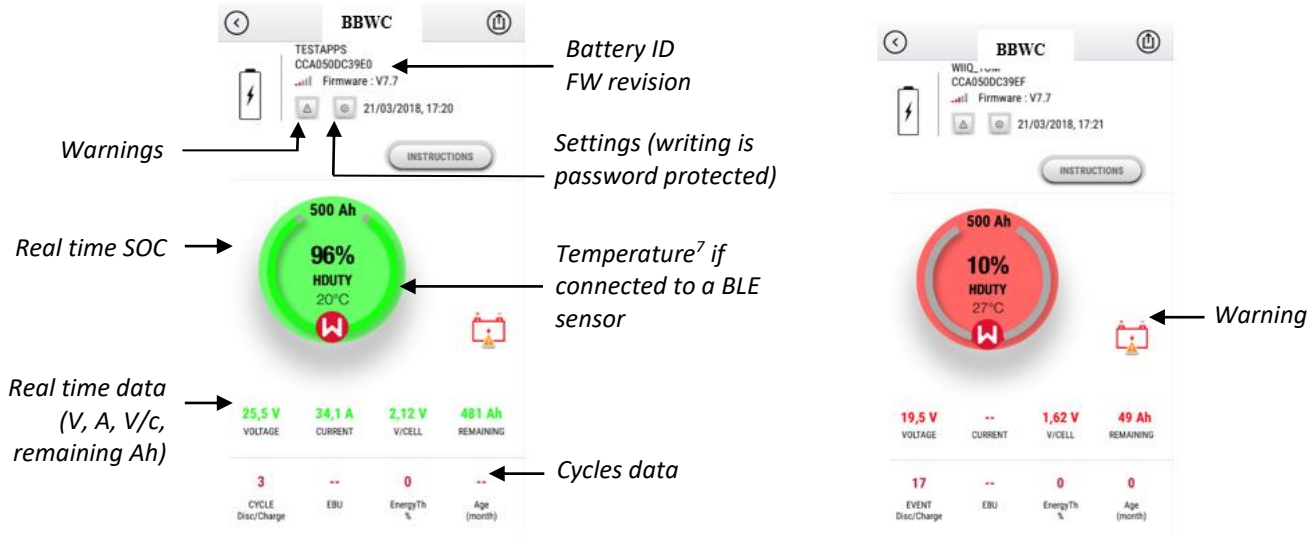
- To scan[1] and associate the BBWC4 device to a customer site (list of devices is automatically recorded on a remote server[2])

- To set the BBWC4 device battery parameters (such as SoC, capacity, temperature…)
- To download the BBWC4 device history data (data downloaded is automatically transferred to a remote server* - there is no data stored on the Smart device being used.)

Notes: (1) When launching the app, Bluetooth is automatically activated.
(2) If the Smartphone is not connected to the internet during scan and data download, the transfer to the remote server will be done as soon as the internet connection is restored.

The main screens of the app with the main parameters are shown below.





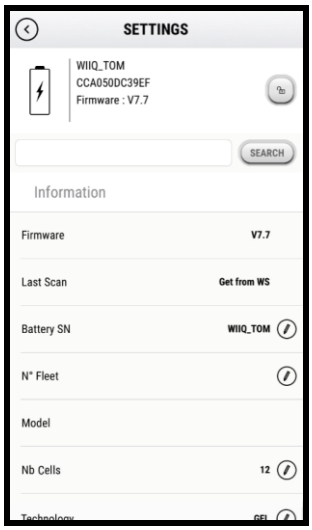
Notes: (3) The 'Share' button allows sharing the site data with another user via e-mail. By default, a customer site is only visible to its owner (who created it).
(4) The 'Export' button allows data exporting as a .XRP file which can be imported to the HAWKER® BBWC Report™ software for deeper analysis. A web link to download the file is provided or sent to any user e-mail address.

(5) The 'Open' button allows access to the list of devices already recorded in the customer site in Off-line mode.
(6) The 'Identification' button allows visual identification of the selected device through the identification sequence of its LEDs.
(7) As long as the BBWC4 device is connected to the app, there is no communication with the BLE sensor (i.e. temperature data is not refreshed). Not applicable to wired sensors.

Off-line status when displaying a BBWC4 device which is out of range.

Only settings parameters can be displayed.

Status page (Off-line)



Password

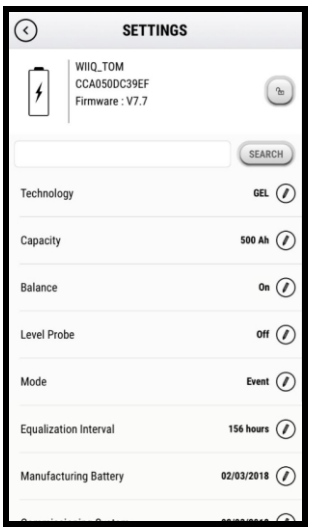
Battery s/n

Nb of cells

Settings page (1)

Set to ON to detect unbalancing

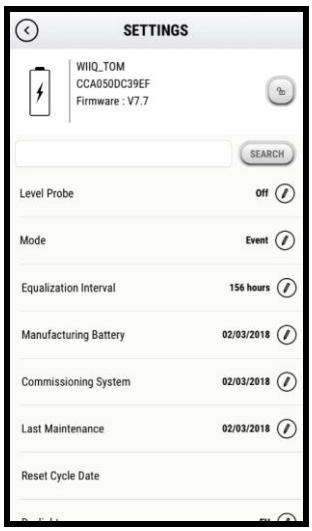
Set BBWC4 mode



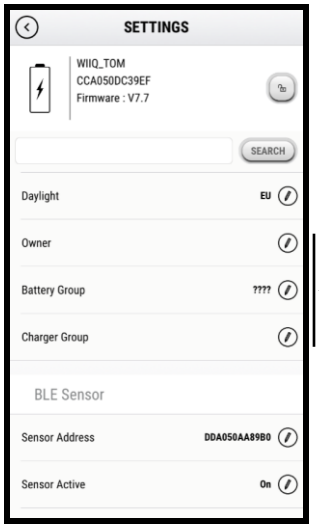
Battery technology & capacity

Set to ON if equipped w/ level probe.

Settings page (2)

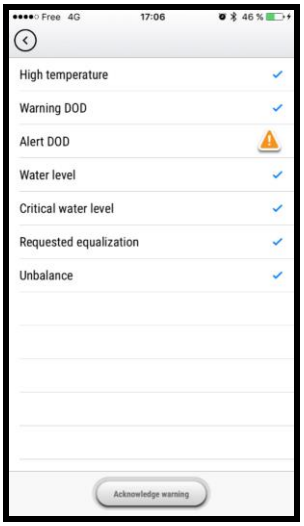


Settings page (3)



← *Customer data*

Settings page (4)



← *Warning*

← *Normal status*

Warning page

Multiple graphs are available (SOC, temperature, Ah…) with various period filters (day, week, year).

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