BATTERY
MONITORING

WiiQ5®

Battery Monitoring Device



OWNER'S MANUAL

CE UK CA

www.enersys.com

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INTRODUCTION

The information contained in this document is critical for safe handling and proper use of the Wi-iQ®5 battery monitoring device. It contains a global system specification as well as related safety measures, codes of behavior, a guideline for commissioning and recommended maintenance. This document must be retained and available for users working with and responsible for the battery monitoring device. All users are responsible for ensuring that all applications of the system are appropriate and safe, based on conditions anticipated or encountered during operation.

This owner's manual contains important safety instructions. Read and understand the sections on safety and operation of the battery monitoring device before operating the battery monitoring device and the equipment into which it is installed.

It is the owner's responsibility to ensure the use of the documentation and any activities related thereto, and to follow all legal requirements applicable to themselves and the applications in the respective countries.

This owner's manual is not intended to substitute for any training on handling and operating the Wi-iQ®5 battery monitoring device that may be required by local laws and/or industry standards. Proper instruction and training of all users must be ensured prior to any contact with the battery system.

For service, contact your sales representative or call 1-800-ENERSYS.

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Your Safety and the Safety of others is Very Important

⚠ WARNING You can be killed or seriously injured if you don't follow these instructions.

FEATURES & SPECIFICATIONS

Features

The Wi-iQ®5 battery monitoring device is the fifth generation of battery sensor technology, providing incremental features such as LTE, Bluetooth® and CAN bus connectivity to improve communication and integration with other devices and external equipment. Features added to the new compact design include LEDs to communicate status visible from the top and from both sides, a new 2" TFT display to show important battery information, and an audible alarm.

- Programmable
- Wi-iQ®5 device is available in two configurations; it can be assembled on batteries from 24V to 120V
- Small and slim fit
- IP66 enclosure, acid-proof
- Available for flooded lead-acid and NexSys® TPPL battery chemistries
- Single or dual cable current sensors
- TFT display and low-voltage alarm buzzer
- Memory capable of more than 10k events
- Multiple communication channels
- Zigbee® wireless to EnerSys charger
- Bluetooth® to E Connect™ mobile app
- LTE for cloud communication
- The newly designed E Connect™ mobile app enables fast and easy checkup of battery fleet and data sharing
- Connection via CAN with our external Truck iQ™ device that shows real-time data to the operator about battery status, alarms, and remaining working time
- Optional CAN bus module provides State of Charge (SoC), and other data to CAN network (e.g. lift trucks, AGVs)
- Compatible with EnerSys cloud system to simplify both data collection and reporting
- Wireless communication with our modular charger allows for better asset control
- Adjustable SoC warning and provides an audible alarm

NOTE: The Wi-iQ®5 device is designed to be installed only on industrial batteries and will not function properly if mounted on the truck side of battery connector for a power study.

Technical Specifications

Item	Description
Nominal Battery Voltage	24VDC to 120VDC (EU) to 80VDC (US)
Operating Voltage	15VDC to 180VDC
Operating Temperature	4°F (-20°C) – 149°F (65°C)
Bi-directional Current Measurement	Allows for throughput data collection using a Hall effect sensor, which can measure up to +/- 1000A. 1A resolution
Voltage Measurement	Continuous monitoring of overall battery voltage and half battery voltage
Voltage Accuracy	0.1V
Temperature	External thermistor
Altitude	<2,000m (<6,561 ft)
Electrolyte Level Detection	With electrolyte sensor
Wireless Interface	Zigbee® (SMAC -2.4Ghz), Bluetooth® BLE, LTE

Item	Description
Real Time Clock	Timekeeping and stamping of data
Data Storage	Upload data to PC via E Connect™ app. Upload to cloud server via LTE or E Connect™ mobile app
Data Collection	Up to 10k event log records
Wireless Range	Open field up to 10m (32ft) (Zigbee and BLE)
CAN Communication	2 different CAN protocols: CANopen or J1939
Max Power Consumption	1.6W (single current sensor) / 1.9W (dual current sensor)
Protection	Overvoltage reverse polarity protection
Enclosure	Water- and acid-resistant UL 94V-0 Pollution level 3 protection (dusty environment) - IP66 enclosure
Physical Dimensions	1.65" L x 0.83" W x 4.49" H (42mm L x 21 mm W x 114mm H)

Technical Specifications (cont.)

Item	Description
Compliance	**Applicable Regulations and Directives** **CE (European Union):** Directive 2014/53/EU (RED) Directive 2014/35/EU (LVD) Directive 2014/30/EU (EMC) Directive 2011/65/EU (RoHS) UKCA (United Kingdom): Radio Equipment Regulations 2017 (S.I. 2017/1206) Electrical Equipment (Safety) Regulations 2016 (S.I. 2016/1101) Electromagnetic Compatibility Regulations 2016 (S.I. 2016/1091) RoHS Regulations 2012 (S.I. 2012/3032) **Harmonised Standards Applied** **Safety:** EN 62368-1:2014 + A11:2017 **EMC:** EN 12895+A1:2019 EN 301 489-1 V2.2.3: 2019 EN 301 489-17 V3.3.1: 2024 EN 301 489-52 V1.3.1: 2024 EN IEC 61000-6-2:2019 **Radio:** ETSI EG 203 367 V1.1.1: 2016-06 EN 300 328 V2.2.2: 2019-07 EN 301 908-1 V15.2.1: 2023-01 EN 301 908-13 V13.3.1: 2024-10 **EMF:** EN 62311:2008 **Cybersecurity:** EN 18031-1:2024 UL: This equipment is certified to meet the safety requirements of the UL 583 standard (Electric-Battery-Powered Industrial Trucks) for both the United States and Canada. It is listed under UL File AU3519, product categories XWCW (USA) and XWCW7 (Canada).

Changes or modifications not expressly approved by EnerSys could void the user's authority to operate the equipment. Any unauthorized modification of the equipment or use outside of the specified conditions is prohibited and may result in harmful interference and void regulatory compliance.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Item	Description
	Warning: Refer to the manual for safety instructions before use.
	Do not dispose of this product in household waste.

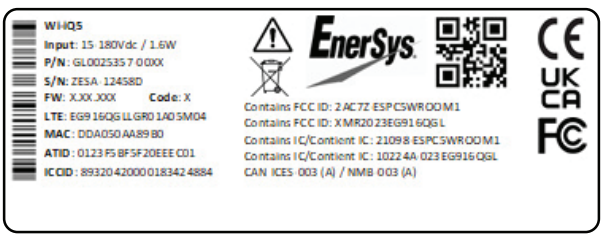
Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense. This device is not intended for use by children.

This device complies with Part 15 of the FCC Rules and contains licence-exempt transmitter(s)/ receiver(s) that comply with the applicable Innovation, Science and Economic Development Canada licence-exempt RSS standards. Operation is subject to the following two conditions:

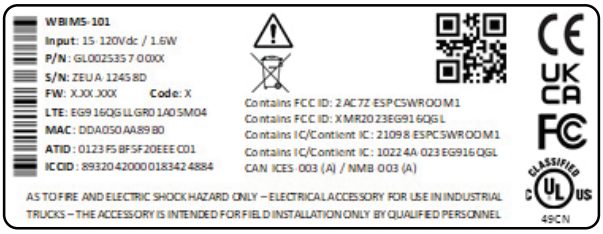
1. This device may not cause harmful interference
2. This device must accept any interference received, including interference that may cause undesired operation of the device.

Labelling:

EMEA



NA



Technical support:
Reference www.enersys.com to find your local contact.

Technical Specifications (cont.)

Components
The Wi-iQ®5 battery monitoring device consists of:

- One main unit (for voltage measurement, display, LEDs, buzzer, and communication features)
- One or two current sensors
- One CAN connection (use is optional)
- One red and one black cable to power the Wi-iQ®5 device
- One balance/gray wire for mid-battery voltage (with a fuse)
- One temperature probe
- One electrolyte level probe for flooded battery version
- Three crimping splices + 3 cable ties
- Installation hardware

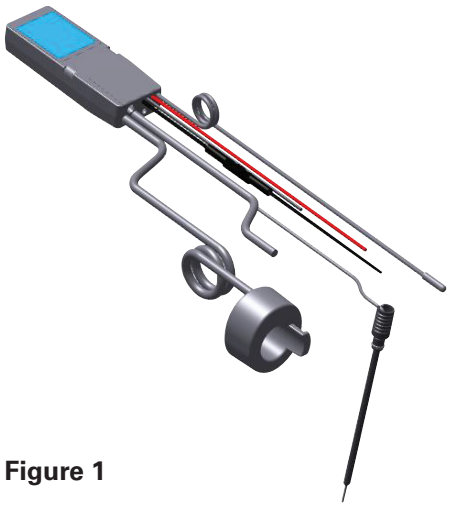


Figure 1

Figure 1: Example of Wi-iQ®5 device for flooded batteries with single current sensor, without CAN and with electrolyte probe.



Figure 2

Figure 2: Example of Wi-iQ®5 device for Thin Plate Pure Lead (TPPL) or Valve Regulated Lead Acid (VRLA) with single current sensor, with CAN and without electrolyte probe.

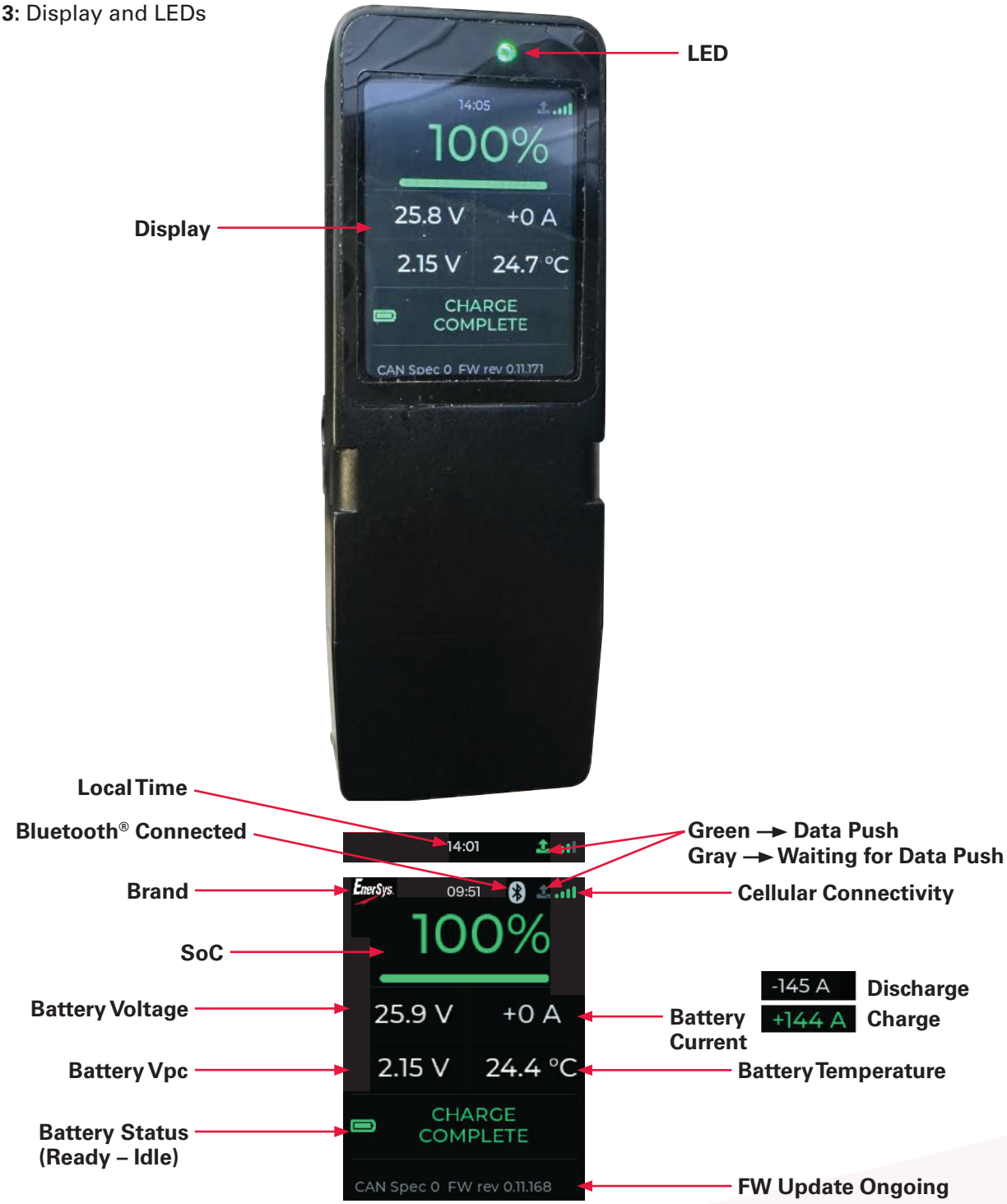
Wi-iQ®5 Device Part Numbers:

Wi-iQ®5 GL #	Name	Description	Region	Battery Technology	Current Sensor	Electrolyte Sensor Attached
GL0025357-0001	Wi-iQ®5 FLOODED BASIC SINGLE CABLE CE	Wi-iQ®5 (WBIM5) single cable, with electrolyte sensor, without CAN	EMEA/APAC	Flooded	Single	Yes
GL0025357-0003	Wi-iQ®5 VLRA CAN PREMIUM SINGLE CABLE CE	Wi-iQ®5 (WBIM5) single cable, without electrolyte sensor, with CAN		TPPL or VRLA	Single	No
GL0025357-0004	Wi-iQ®5 VLRA CAN PREMIUM DUAL CABLE CE	Wi-iQ®5 (WBIM5) dual cable, without electrolyte sensor, with CAN		TPPL or VRLA	Dual	No
GL0025357-0005	Wi-iQ®5 VLRA BASIC SINGLE CABLE CE	Wi-iQ®5 (WBIM5) single cable, without electrolyte sensor, without CAN		TPPL or VRLA	Single	No
GL0025357-0007	WBIM5 VLRA CAN PREMIUM SINGLE CABLE UL	WBIM5 single cable, without electrolyte sensor, with CAN	Americas	TPPL or VRLA	Single	No
GL0025357-0008	WBIM5 VLRA CAN PREMIUM DUAL CABLE UL	WBIM5 dual cable, without electrolyte sensor, with CAN		TPPL or VRLA	Dual	No
GL0025357-0009	WBIM5 FLOODED BASIC SINGLE CABLE UL	WBIM5 single cable, with electrolyte sensor, without CAN		Flooded	Single	Yes
GL0025357-0010	WBIM5 FLOODED BASIC DUAL CABLE UL	WBIM5 dual cable, with electrolyte sensor, without CAN		Flooded	Dual	Yes
GL0004896-0000	Water Level Probe	Level probe spare part for Wi-iQ®5	All	Flooded	X	X

Technical Specifications (cont.)

The Wi-iQ®5 device display and LEDs. An LCD display and three LEDs on the Wi-iQ®5 device provides status indication. The display is turned OFF after 15 minutes of no activity (sleep mode). A light touch to the Wi-iQ®5 device display will turn the display back ON.

Figure 3: Display and LEDs



Technical Specifications (cont.)

Parameters

Description	Value	Comment
SoC	0-100%	State of Charge of the battery
Battery Voltage	Ex: 27.2 V	Overall battery voltage (V)
Battery Vpc	Ex: 2.15 V	Battery average voltage per cell
Status	Discharging	Battery
	Charging	Battery
	Charge Complete	Battery
	OTA Update	Device FW Update in progress
	Ready	Battery idle
Temperature	Ex: 64°F (18°C)	Battery temperature
Current	Ex: 10A	Current value in A (+ charge green, - discharge gray)
BLE Connected		When the smartphone is connected to the Wi-iQ®5 device through E Connect™ app
Local Time		Time set up on the device based on manual time zone setting
ATECC Serial		Device ID

Colors, Buzzer, and Functions
NOTE: When the Wi-iQ®5 device is first connected to the battery voltage, all LEDs are flashing green (initialization sequence).

Figure 4: Power ON screen

There is a buzzer located inside the main unit. The buzzer is activated when the SoC of the battery is low and the battery needs to be charged or when the battery requires water to be filled.

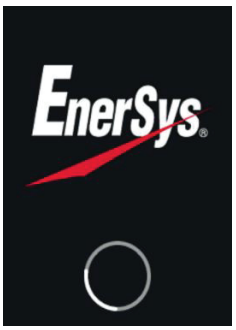


Figure 4

Default Value of the Buzzer and LED Color vs. Battery Warning Table

WARNING			
LEDs	Display	Buzzer	Push to Cloud
Orange flashing	% Orange "Low SoC" pop up 3 sec ON/OFF	1 beep every 15 sec	Yes
Red flashing	T°C Red "Warning Temp" pop up 3 sec ON/OFF	No	Yes
Yellow flashing	"Warning Eth" pop up 3 sec ON/OFF	No	Yes
Blue flashing	"Low Water" pop up 3 sec ON/OFF	1 beep every 15 sec	Yes
Orange flashing	"Unbalanced cells" pop up 3 sec ON/OFF	No	No

Default Value of the Buzzer and LED Color vs. Battery Alert Table

WARNING			
LEDs	Display	Buzzer	Push to Cloud
Orange flashing	% Red "Low SoC" pop up 3 sec ON/OFF	2 beeps every 10 sec	Yes
Red flashing	T°C Red "Alert Temp" pop up 3 sec ON/OFF	No	Yes
Yellow flashing	"Critical Eth" pop up 3 sec ON/OFF	No	Yes
Blue flashing	"Critical Low Water" pop up 3 sec ON/OFF	2 beeps every 10 sec	Yes

Technical Specifications (cont.)

The Wi-iQ®5 Device Current Sensor(s)
The current sensor is a solid core Hall effect device.

Current Sensor Technical Specification

DC Cable Gauge	AWG	Internal Diameter	Truck Class Recommendation	Max DC Current
Up to 120 mm²	Up to 4/0	20.1 mm	Class 1, 2, and 3	1000A

NOTE: The DC cable gauge does not consider the terminal lug or contact dimensions. Terminal lugs or contacts may need to be assembled after inserting the cable into the current sensor, mostly for the 4/0 cables.

Wi-iQ®5 Device CAN Option
If equipped, the Wi-iQ®5 device communicates via CAN protocol.

The Wi-iQ®5 device main unit is delivered with a protective plastic cap that needs to be removed to use the CAN option.

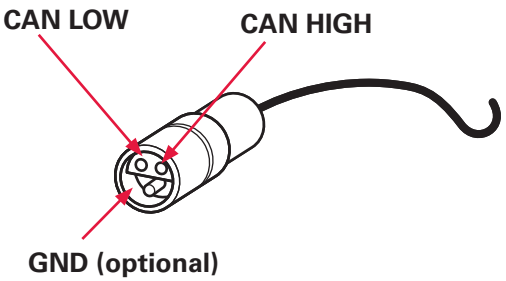


Figure 5

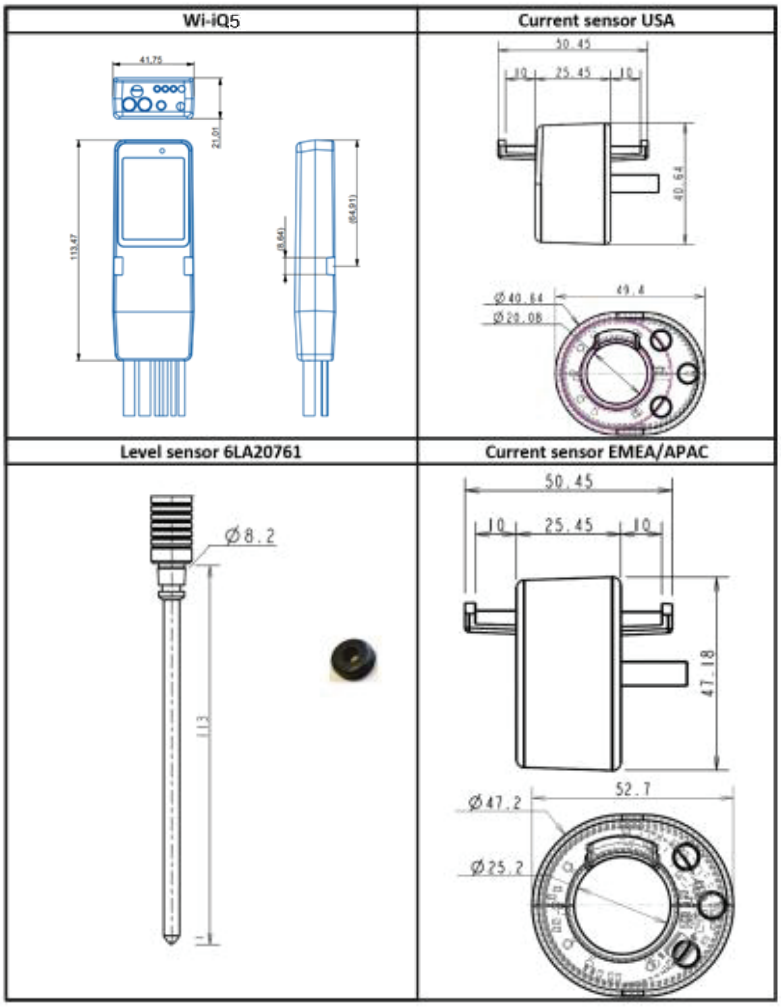
Figure 5: Female connector pinout

The male connector is NOT included (ITT-CANON SURE-SEAL IP68 3-contact receptacle with two pins and one socket adapted for 0.75-1.5mm² wires).

CAN Connector Specification

Product	Receptacle Part Number	Wire Gauge	Pin (qty 2)	Socket (qty 1)
ITT-CANON SURE-SEAL	120-8551-001 (SS3R)	0.5–1.0 mm²	330-8672-001 (SS20)	031-8703-001 (SS20)
		0.75–1.5 mm²	330-8672-000 (SS10)	031-8703-000 (SS10)

Dimensions



NOTE: All dimensions are given in mm.

Probes and Sensors



Electrolyte Probe



Temperature Sensor

Installation

Figure 6: Wi-iQ®5 Device Final Assembly on 2V Cell Tray

Figure 7: Wi-iQ®5 Device Final Assembly on 12V Block Tray

NOTES:
- The stack order on the stud is: battery cable, Wi-iQ®5 device ring terminal, flat washer, lock washer, and nut.
- Ensure the threads on the nut and stud are clean, place a drop of blue Loctite™ on the stud, and tighten the nut in place.
- Torque the nut to the proper specification (**Figure 7**). Ensure the battery cable lug is flat against the plate.

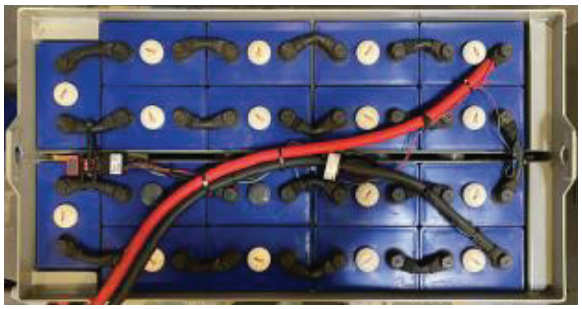


Figure 6

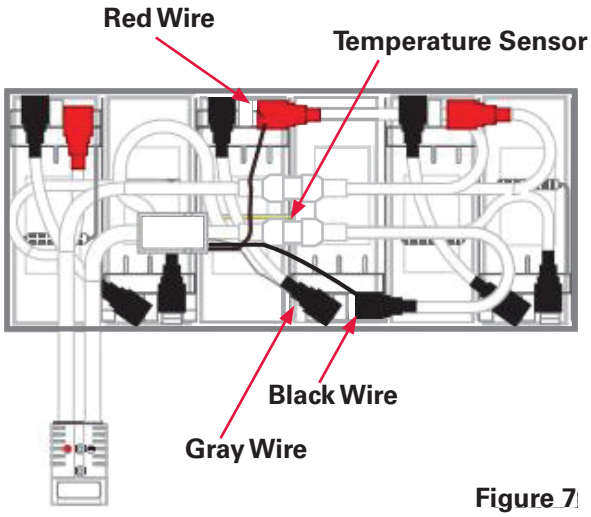


Figure 7

Communication

There are three modes of communication (BLE, Zigbee and LTE) + CAN available on the Wi-iQ®5 device: Wireless

BLE
- Connect to a smartphone via the E Connect™ mobile app

Zigbee® (legacy protocol in use with previous generations of Wi-iQ® devices)
- Connect to chargers (NexSys®+ battery charger)

LTE
- Connect to the EnerSys Cloud via cellular connectivity

The Wi-iQ®5 device can be configured and provide data via BLE (E Connect™ app–v3.4.11 minimum).

CAN (Controller Area Network)
CANopen or J1939
- Interface with truck using an Original Equipment Manufacturer (OEM) proprietary CAN protocol implemented.
- Interface with truck using EnerSys proprietary CAN protocol.

Configuring Wi-iQ®5 device within the E Connect™ mobile app
A mobile app called E Connect™ was developed for iOS® and Android® operating systems (will not work on Windows platforms), available to download for free from the App Store and Play Store. Access is protected by login/password. Different access levels will be granted through different access codes.

Communication (cont.)

The E Connect™ mobile app allows mainly:

- Scanning and then associating the Wi-iQ®5 device to a customer site (list of devices will be automatically recorded on a remote server).
- Setting the Wi-iQ®5 device battery parameters (such as technology and capacity).
- A quick review of historical parameters such as SoC, voltage, and temperature.
- Downloading the Wi-iQ®5 device history data (data downloaded are automatically transferred to a remote server – there is no data stored on the smartphone).

DATA ACTTEXTTO BE ADDED BY LEGAL (SEE WARRANTY?)

NOTES:

- When launching the mobile app, Bluetooth® is automatically activated.
- If the Smartphone is not connected to 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 E Connect™ mobile app with the main parameters are shown at right.

Figure 8: E Connect™ Mobile App Screens

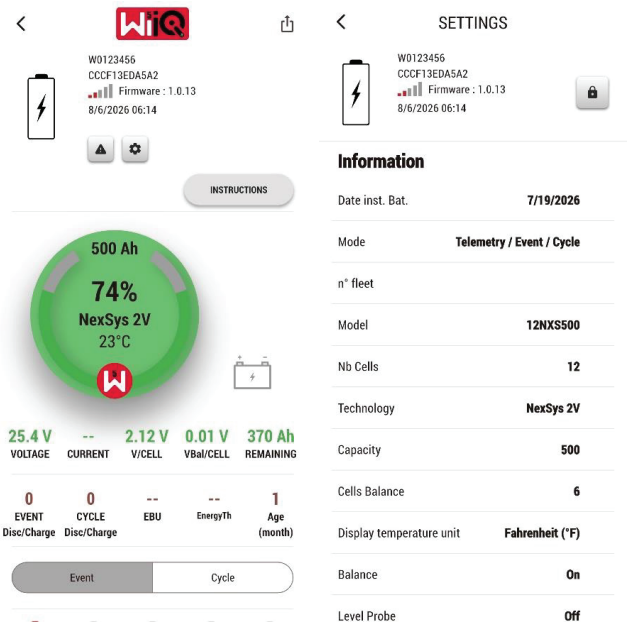


Figure 8

Device configurable parameters:
Fleet number: As required

Model: Enter the battery type, ex: 18-E100-21

Cells: Enter the number of cells on the battery

For NexSys®TPPL 2V batteries, use total voltage divided by 2 to determine the number of cells. Example: The battery type is 36NXS700. 36 describes the total voltage of the battery. Take this number and divide by 2 to get "cells"; in this example, 36/2 = 18 cells.

Cells Bal.: Enter the cell number where the gray wire was installed, counting from the positive post.

For NexSys®TPPL Bloc Battery: The black Wi-iQ®5 device wire and the gray Wi-iQ®5 device wire should be attached to the negative and positive posts of the same bloc as described in the Installation section. In this configuration "Cells Bal." will always be 6.

Battery Technology: Select the appropriate type of battery. Refer to line-item notes on the order requesting any specific battery technology setting by the customer or sales representative. If nothing is requested in the line item notes, please contact your EnerSys Representative.

Capacity (Ah): Enter the nominal Ah of the battery.

NexSys®TPPL Bloc Battery: Determine total battery Ah. Example: 24-12NXS186-3. 186 describes the amp hour rating of each block and 3 describes the number of parallel strings. Multiply these two numbers to get "Capacity (Ah)"; in this example 186 X 3 = 558 Ah.

NexSys®TPPL 2V Battery: Determine total battery Ah. Example: 18-NXS770. The 770 describes the amp-hour rating.

Equal Period (hours): Enter 158. This is the time in hours to request an equalization. If equal time is set to 0 hours, this disables the feature, and critical faults are not recorded on reports. This feature is not programmable for NexSys® battery profiles.

Balance: Check this box for all batteries.

Water Level Probe: Check this box for all batteries with an electrolyte probe installed.

Communication (cont.)

Mode: Telemetry+Event+Cycles

Figure 9: Truck iQ™ Smart Battery Dashboard
The device consists of a display powered by the battery via the truck cables. It reads in real time via CAN data from the Wi-iQ®5 device, displaying alerts, alarms, SoC, and other useful parameters to optimize the operation of the battery. Only J1939 EnerSys protocol can be used.

EnerSys allows integration via CAN-supported protocols interfacing with the following:

- Trucks using OEM's proprietary CAN protocol implemented in the Wi-iQ®5 device firmware.
- AGVs (Automated Guided Vehicle) using EnerSys proprietary CAN protocol (CANopen Cia 418 or J1939).
- List of parameters communicated via CAN to trucks as specified by OEM's proprietary protocol, but not limited to:
  - SoC (State of Charge)
  - DC Bus voltage
  - DC Bus current
  - System temperature (battery temperature)
  - Lift Lock-out trigger
  - Limited operation trigger
- For more details, please refer to the CAN Interface Specification provided with the truck's user manual for each specific OEM.



Figure 9: CAN (Controlled Area Network) Communication

- Parameter communicated via CAN to AGV as specified by EnerSys proprietary CAN protocol, but not limited to:
  - SoC (State of Charge)
  - DC Bus voltage
  - DC Bus current
  - System temperature (battery temperature)
- For more details, please refer to EnerSys Global: CANopen and CAN J1939 specification for battery controller document.

Service and Troubleshooting

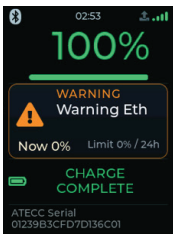
Check the LED indicators on the device. Fast blinking every five seconds of all LEDs indicates successful setup and normal operation. Refer to the table below for troubleshooting other indicators:

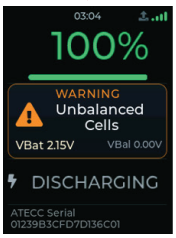
LEDs	Display	Buzzer	Push to Cloud
Orange flashing	% Orange "Low SoC" pop up 3 sec ON/OFF	1 beep every 15 sec	Yes
Red flashing	T°C Red "Warning Temp" pop up 3 sec ON/OFF	No	Yes
Yellow flashing	"Warning Eth" pop up 3 sec ON/OFF	No	Yes
Blue flashing	"Low Water" pop up 3 sec ON/OFF	1 beep every 15 sec	Yes
Orange flashing	"Unbalanced cells" pop up 3 sec ON/OFF	No	Yes











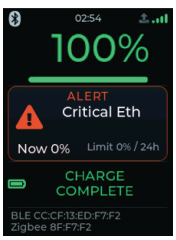


LEDs	Display	Buzzer	Push to Cloud
Orange flashing	% Red "Low SoC" pop up 3 sec ON/OFF	2 beeps every 10 sec	Yes
Red flashing	T°C Red "Alert Temp" pop up 3 sec ON/OFF	No	Yes
Yellow flashing	"Critical Eth" pop up 3 sec ON/OFF	No	Yes
Blue flashing	"Critical Low Water" pop up 3 sec ON/OFF	2 beeps every 10 sec	Yes











Maintenance and Service

For service, contact your sales representative.
For US only call: 1-800-ENERSYS (USA)
1-800-363-7797

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