GEL TECHNOLOGY

HAWKER

evolution®

Batteries

OWNER'S MANUAL

CE UK CA

EnerSys®
Power/Full Solutions

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INTRODUCTION

HAWKER evolution®

The information contained in this document is critical for safe handling and proper use of the Evolution® batteries. It contains a global system specification as well as related safety measures, codes of behaviour, a guideline for commissioning and recommended maintenance. This document must be retained and available for users working with and responsible for the battery. 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 before operating the battery and the equipment into which it is installed.

It is the owner's responsibility to ensure that the use of this documentation and all related activities comply with applicable legal requirements in their respective countries.

This owner's manual is not intended to substitute for any training on handling and operating the Evolution® certified batteries 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:

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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.

RATING DATA & SAFETY

Rating Data

1. Nominal capacity C_5:	See type plate
2. Nominal voltage:	2.0 V x No of cells
3. Nominal discharge current:	C_5/5h
4. Rated temperature:	30°C

Evolution® batteries are valve-regulated, maintenance-free batteries. Unlike conventional batteries with liquid electrolyte, they have immobilised electrolyte (gelled sulphuric acid). Instead of a vent plug, a valve is used to regulate the internal gas pressure, preventing the ingress of oxygen from the air and allowing the escape of excess charging gases. When operating valve-regulated lead-acid batteries, the same safety requirements as for vented cells apply, to protect against hazards from electric current, from explosion of electrolytic gas and—with some limitations—from the corrosive electrolyte. Evolution® battery valves should never be removed. These batteries do not require topping-up with distilled or demineralised water.

Safety Precautions

- Pay attention to the operation instructions and keep them close to the battery.
- Work on batteries to be carried out by skilled personnel only!

- Wear protective glasses and wear safety clothing when working on batteries.
- Pay attention to the accident prevention rules as well as EN 62485-3 and EN 50110-1.

- No smoking!
- Do not expose batteries to naked flames, glowing embers, or sparks, as it may cause the battery to explode.

- Acid splashes into the eyes or on the skin must be washed immediately with an abundance of clean water. After abundant flushing, consult a doctor immediately!
- Clothing contaminated by acid should be washed in water.

- Risk of explosion and fire! Avoid short circuits.
- **Caution:** Metal parts of the battery are always live. Do not place tools or other metal objects on the battery!

- Electrolyte is highly corrosive. In the normal operation of this battery, contact with acid isn't possible. If the cell containers are damaged, the immobilised electrolyte (gelled sulphuric acid) is corrosive like liquid electrolyte.

- Batteries and cells are heavy.
- Ensure secure installation! Use only suitable handling equipment. Lifting hooks must not damage the cells, connectors or cables.

Safety Precautions (cont.)

- Dangerous electrical voltage!

- Pay attention to the hazards that can be caused by batteries.

Ignoring the operation instructions, repair with non-original parts, unauthorized modifications or using additives for the electrolyte will render the warranty void.

Electronic Devices

The type of device required must be specified at the time of ordering the battery from the factory.

Please follow the table:

Charger	Device	
EnerSys® HF approved chargers	Wi-iQ® monitoring device	Mandatory

We encourage you to use an electronic device (according to the table to the left) on all Evolution® batteries to make sure that the batteries are properly used, and to be able to assist with potential warranty claims.

Commissioning

The battery should be inspected to ensure it is in perfect physical condition. Use special coding systems for maintenance-free batteries for the charging plug-and-socket devices to prevent accidental connection to a wrong type of charger. The battery end cables must have a good contact with terminals; check that the polarity is correct. Otherwise, battery, vehicle, or charger could be damaged. The specific torque loading for the bolts of the charger cables and connectors are:

M10 perfect connector	25 ± 2 Nm

Never directly connect an electrical appliance (for example, a warning beacon) to some cells of the battery. This could lead to an imbalance of the cells during the recharge, i.e. a loss of capacity, the risk of insufficient discharge time, damage to the cells and this may AFFECT THE WARRANTY OF THE BATTERY.

Charge before use.

OPERATION & CHARGE

Operation

EN 62485-3 “Safety requirements for secondary batteries and battery installations Part 3: Traction batteries” is the standard that applies to the operation of traction batteries in industrial trucks.

Discharge

Ventilation openings must not be sealed or covered. Electrical connections (e.g. plugs) must only be connected or disconnected in the open circuit condition. To achieve the optimum life for the battery, operating discharges of more than 80% of the rated capacity must be avoided (deep discharge). They reduce the battery service life. To measure the state of discharge, use only the battery manufacturer’s recommended discharge indicators (imperative presence of a discharge limiter with an energy cut-off at 1.84 VPC operating voltage at 80% DOD C_5, when the recharging time is 12 hours, and 1.93 VPC at 60% DOD C_5 when the recharging time is 8 hours). Discharged batteries must be recharged and never be left in a discharged state for a long time.

Evolution® batteries can be used in normal duty applications for a maximum of 6 days per week.

Avoid applications where:

- no rest time is available allowing the battery to cool
- battery duty leads to a high increase in temperature during operation.

Charging

A full charge shall be carried out every working day. The charging time for an 80% discharged battery shall be 12 hours, or 8 hours for a 60% discharged battery with an appropriately assigned EnerSys®-approved HF charger.

After any changing of cables on the charger, our technician must visit the site to check the charger.

Evolution® batteries have a low gas emission. Nevertheless, when charging, proper provision shall be made for the venting of the charging gases (EN 62485-3). Battery container lids and the covers of battery compartments shall be opened or removed. With the charger switched off, connect the battery, ensuring that the polarity is correct. (Positive to positive, negative to negative). Now switch on the charger.

Opportunity charge, to keep batteries almost fully charged, is not allowed. Especially it is not allowed to extend the 80% daily turnover by supplementary charge in multiple shift applications or with normal opportunity charges.

BATTERY & MAINTENANCE

Equalising Charge

Equalising charges are used to optimise the life of the battery and to maintain its capacity. A unique equalisation charge is automatically carried out weekly 8 hours after the end of the charge with an EnerSys®-approved HF charger.

Battery Life

The optimum lifetime of the battery depends on the operating conditions (temperature and depth of discharge).

Temperature

The temperature range of use for the battery is between +5°C and +35°C. Any use outside of this range shall be approved by a service technician. Optimal battery life is obtained for a battery temperature of 25-30°C. High temperatures reduce battery life according to IEC 61431 technical report;lower temperatures reduce the capacity available.

Maintenance

The electrolyte is immobilised in a gel. The density of the electrolyte cannot be measured.

- Never refill with water!
- Never remove the safety valve from the cell in case of accidental damage of the valve, contact our After Sales Service for replacement.

In case of accidental damage of the valve, contact our After Sales Service for replacement.

The battery should always be kept clean and dry to prevent current leakage. Any liquid in the battery tray shall be extracted. Damage to the insulation of the tray should be repaired after cleaning, to ensure a good insulation and to prevent tray corrosion. If it is necessary to remove cells, it is best to call our service department for this.

Daily
Check that the plugs and sockets are in good condition.

Monthly/Quarterly

- Carry out end of charge voltage readings at C_5/100, then measure and record:
- the voltage of the battery
- the voltage of each cell

If significant changes from earlier measurements or differences between the cells or bloc batteries are found, please contact an EnerSys® Service Representative.

If the discharge time of the battery is not sufficient, check:

- That the work required is compatible with the battery capacity
- The settings of the charger
- The settings of the discharge limiter

Annually/Biannually
Internal dust removal from the charger.
Check with attention:

- the state of the plugs: be sure to have a good contact between the plugs without trace of overheating
- the state of the output cables

If you check the torque loading, you shall use a torque wrench with respect of recommended value: 25 +/- 2 Nm. Following EN 1175:2000 at least once per year, the insulation resistance of the truck and the battery must be checked by an electrical specialist. The tests on the insulation resistance of the battery must be conducted following EN 1987 part 1. The insulation resistance of the battery thus determined must not be below a value of 50Ω per volt of nominal voltage, in compliance with EN 62485-3. For batteries up to 120V nominal voltage, the minimum value is 1000Ω.

STORAGE & MALFUNCTIONS

Storage

If batteries are taken out of service for a lengthy period they should be stored, disconnected from the truck, in the fully charged condition in a dry, frost-free room.

Batteries shall be recharged after a maximum storage time of:

- 2 months at 30°C
- 3 months at 20°C

Effect a recharge before putting the battery into service. A monthly refreshing charge is recommended. The storage time should be considered when considering the life of the battery. Never leave a battery connected to a truck for a long time.

Storage at open circuit is not allowed when in discharged state.

Malfunctions

If malfunctions are found on the battery or the charger, our service department should be called without delay. A service contract with us makes it easier to detect and correct faults in good time.

Wi-iQ® monitoring device will provide indications according to the table below.

Colors and Functions

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 Wi-iQ®4 device is first connected to the battery voltage, all LEDs are flashing and firmware revision is shown on the display (initialization sequence). The SoC shown will be a reloaded value from the manufacturer. To start, please set the device and reset the value (refer to the configuration section of the manual).

Buzzer

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. Reference Default Value of the Buzzer vs. Battery Type table.

Warning and Alert Time Frequency

	Normal SoC	Warning SoC	Alert SoC
Buzzer	OFF	2 chirps every 20 seconds	1 chirp every 5 seconds

EU DECLARATION OF CONFORMITY

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The Company declares that the below materials

WI-IQ4
MODEL
WIIQ4-101
WIIQ4-102
WIIQ4-202 B84-132 8B4-232

Are in conformity with the following European and UK regulations:

- **Electrical Equipment (Safety) Regulations 2016 (S.I. 2016/1101)**
- **Directive 2014/35/EU:**
  Safety
  BS EN 61010-1: 2010 /AI: 2019
- **EMC Regulations 2016 (S.I. 2016/1091)**
- **Directive 2014/30/EU**
  Electromagnetic compatibility BS EN 12895: 2015 /AI: 2019
- **Directive 2011/65/EU**
  RoHS
- **Radio Equipment Regulations 2017 (S.I. 2017/1206)**
- **Directive 2014/53/EU**
  ETSI EN 301489-1 V2.2.3 (2019)
  ETSI EN 301489-17 V3.2.2 (2019)
  ETSI EN 300 328 V2.2. 2 (2019)

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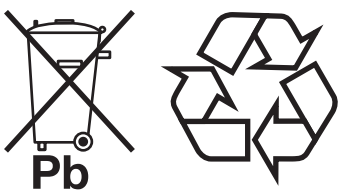 Battery must be recycled	**Environmental Risk!** **Risk of lead pollution.** **Back to the manufacturer!** Batteries with this sign must be recycled. Batteries which are not returned for the recycling process must be disposed of as hazardous waste! **When using motive power batteries and chargers, the operator must comply with the current standards, laws, rules, and regulations in force in the country of use!**

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