



# HAWKER FLEX<sup>®</sup> ELITE TPPL BATTERY



# OWNER'S MANUAL



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# INTRODUCTION



The information contained in this document is critical for safe handling and proper use of the HAWKER FLEX® Elite battery for powering electrical industrial trucks. 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. 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 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 industrial truck or HAWKER FLEX® Elite battery 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.

Refer to the abbreviations and terms at the end of this document.

**For service, contact your sales representative or call:**

**1-877-7HAWKER (USA and Canada)**

[www.hawkerpowersource.com](http://www.hawkerpowersource.com)

**Your Safety and the Safety of others is Very Important**

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

# INTENDED USE

## Intended Use

HAWKER FLEX® Elite batteries are designed for industrial truck applications only. Only HAWKER®-approved chargers are to be used with HAWKER FLEX® Elite batteries.

The truck harness used between HAWKER FLEX® Elite batteries and the industrial truck is dictated by the truck original equipment manufacturer (OEM). The truck harness shall comply with UL 583

requirements for electrical current carrying capability and truck interface requirements. Compliance shall be confirmed by the truck OEM.

**⚠ WARNING** Installing the battery in a non-UL 583 compliant truck is a fire risk due to a potential for improperly sized cable harnesses, and will void your warranty.

## Battery Architecture

The parts of the battery are shown in **Figures 1 & 2**.

**Figure 1:** External Battery Features

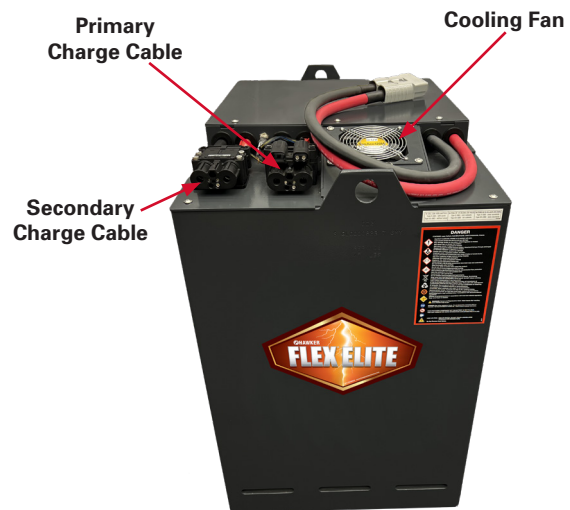
**Figure 2:** Battery Management System (BMS) Connections

Harness connection (35 pins) provides connectivity to:

- Power
- Voltage sense leads (X2)
- Current measurement sensor
- CAN bus (charger communication)
- T°C (temperature leads [X3])
- Charger plug detection leads (X2)
- Contactor control
- Fan control leads (X2)
- HMI port allows connectivity with all the Human Machine Interface devices as the BBWC and HAWKER® battery discharge indicator (BDI)
- Controller area network (CAN) open port to interface with the truck CAN bus

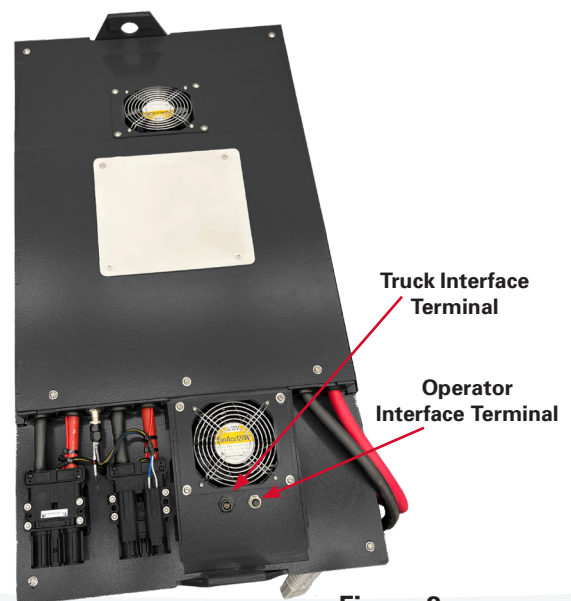
The battery is a modular design made of 12-Volt Thin Plate Pure Lead (TPPL) blocs, combined in serial and parallel to provide the energy content required for the application. Different configurations are available or can be designed. Please contact your local HAWKER® representative for more information.

The battery is protected by the BMS packaged inside the unit. This control module contains safety components and logic to control the main contactor, preventing the operation of the battery in unsafe or abusive conditions.



(Connector type and appearance may vary.)

**Figure 1**



**Figure 2**

# BATTERY ARCHITECTURE

## Battery Architecture (cont.)

### Safety Features:

- Functional safety qualified electronic monitoring and control system to ensure safe electrical operation within voltage, current and temperature limits.
- A safe shut-off strategy to respond if operating limits are violated (voltage, current, and temperature).
- Charge circuit to prevent arcing if improper disconnection is attempted.
- Dedicated handling/lifting points.
- Dedicated bloc ventilation to enhance performance and energy throughput even in high-temperature applications.

**Interface Terminals:** There are multiple low-voltage interfaces on the battery exterior which must be connected during commissioning, depending on the end-user requirements:

**Charge Interface Terminal:** This is a required connection for all HAWKER FLEX® Elite batteries. This interface connects the charging adapter to the battery system, allowing CAN communication between the battery and charger.

### Interface Terminals (cont.):

**Truck Interface Terminal:** This interface provides specific communications for integration with the truck's state of charge (SoC) related features and controls. This truck interface is not a requirement from HAWKER® but may be required by the truck manufacturer.

- **Interlock:** Allows the truck to send a signal to tell the battery to shut down.
- **Early Warning Signal:** Battery will provide a signal to the truck 10 seconds before battery shutdown.
- **CAN Open:** Operating communications for protocol sharing between truck and battery.

**NOTE:** If the use of this signal as the interface with the truck is necessary, but not previously discussed with HAWKER®, please contact your HAWKER® service representative for support prior to installation. Application prequalification and a specialized cable could be required.

**Operator Interface Terminal:** 12-pin amphenol connector to HAWKER® ABI device or battery discharge indicator (BDI).

The low-voltage interfaces are protected by a 0.5A fuse.

**NOTE: Any unused connector must be protected by a threaded cover to prevent the ingress of contaminants or foreign material.**

## Operator Interfaces

An operator interface is required to be installed in the truck cabin for ease of use and to ensure the operator is alerted to any visual or audible warnings such as low SoC. This in-cabin interface can be either the BDI or the HAWKER® ABI smart battery dashboard.

This requirement for an in-truck interface can only be eliminated if full industrial truck OEM integration options are deployed that allow the truck's preexisting operator interfaces to be utilized. Truck integrations require prequalification and approval from both HAWKER® and the truck OEM.

During operation as the SoC decreases, the operator interfaces will provide an audible alarm and visual warnings when the battery drops to the Warning SoC level. After the battery continues to fall below the alert level, the alarm will increase in speed. Continuing to run the battery without charging will ultimately result in the battery deactivating due to low SoC.

The buzzer and LED behavior for the devices are as follows:

- |               |                          |
|---------------|--------------------------|
| • Warning SOC | ON 1 sec./OFF 1 sec.     |
| • Alert SOC   | ON 0.5 sec./OFF 0.5 sec. |
| • BMS error   | ON 0.1 sec./OFF 0.1 sec. |

# OPERATOR INTERFACES

## Operator Interfaces (cont.)

With truck integration, the CAN cable must be connected from the CAN port on the battery (Figure 2 [see page 4]) to the truck. With truck integration, warnings and alerts will follow the truck OEM's structure.

### External BDI:

This device can be installed outside of the battery compartment to allow operators to view the SoC and the presence of a battery error as well as to provide easy access to an activation/deactivation button. The series of lights will indicate the SoC, whilst audible alarms will notify the operator that the battery requires recharging or that there are battery errors. Continued operation after the BDI indicated low SoC will ultimately result in deactivation of the battery due to low SoC. The BDI must be permanently and securely fixed in a position for the operator to view the BDI for information and access the button.



Figure 3

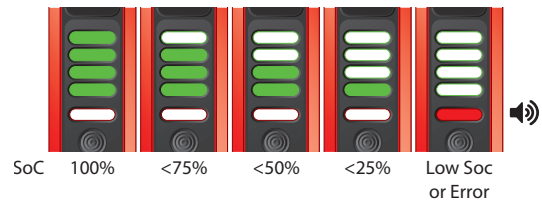


Figure 4

### Figure 3: External BDI

### Figure 4: SoC indicator screen

### Truck iQ™ Smart Battery Dashboard:

### Figures 5 & 6: HAWKER® ABI smart battery dashboard

### HAWKER® Advanced Battery Interface™ Dashboard:

The HAWKER® ABI smart battery dashboard is an operator interface that provides operators with more detailed battery information compared to the BDI. The HAWKER® ABI device includes the activation/deactivation button, as well as audible and visual alarms. The HAWKER® ABI device must be installed per the installation instructions provided with the HAWKER® ABI device unit. The HAWKER® ABI device must be permanently and securely fixed in a position where the operator can view the information and access the button.



Figure 5

### Low SOC Audible Warnings

SOC	Buzzer	Stop Condition
Warning	ON/OFF 1 sec.	Normal SOC/On Charge
Alert	ON/OFF 0.5 secs.	Normal SOC/On Charge

Refer to the HAWKER® ABI smart battery device manual for further information.

### CAN bus Connectivity

The HAWKER FLEX® Elite battery can be integrated into an OEM industrial truck CAN bus system which allows full integration of the battery.

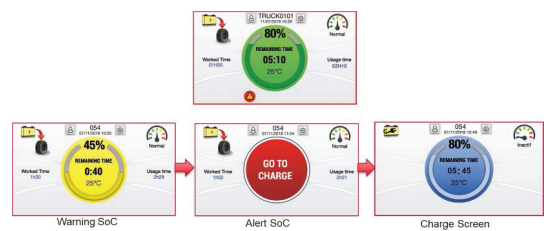


Figure 6

## Operator Interfaces (cont.)

Please contact your local HAWKER® Representative for this option. This requires engineering consultation between HAWKER® and the industrial truck OEM.

### HAWKER® MOD-ifi™ Smart Device App:

All data relating to the battery cycle life are stored in the BMS (Figure 7).



The BMS data can be read wirelessly through the HAWKER® MOD-ifi™ Smart Device App available on both iOS® and Android™ platforms. Contact your HAWKER® Representative for more information.

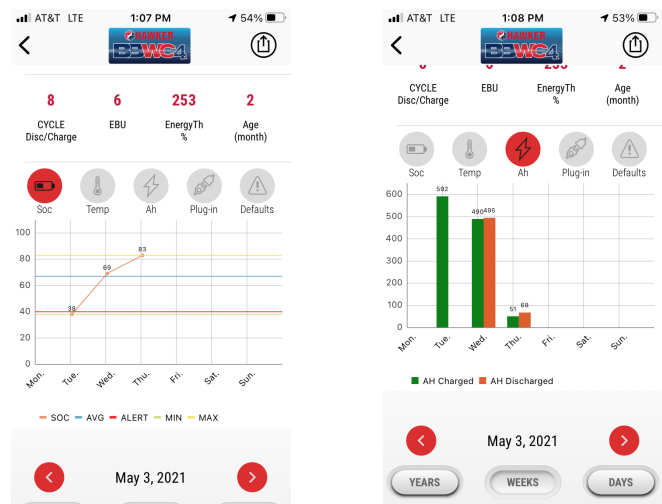


Figure 7

## Safety

### Important Safety Instructions

- Read all safety and operation instructions before operating this battery.
- Anybody involved in handling, operating, or maintenance of this battery must receive appropriate training and use appropriately rated tools and personal protective equipment.
- Follow all regulatory requirements for handling electrical systems. The voltage of an electrical system may impact what regulations are applicable.
- Do not over-discharge or overcharge HAWKER FLEX® Elite batteries as this poses a substantial risk of damaging the battery.
- Only store and operate the battery within the limitations given in the sections on operational data and environmental limits.
- Keep the battery away from heat and ignition sources.
- Do not charge or operate the battery in hazardous environments.
- Only handle and store the battery in a dry environment.
- Store only in monitored areas with suitable fire control and protection per local requirements, including local fire regulations.
- Recharge or operate only in monitored areas with suitable fire control and protection per local requirements, including local fire regulations.
- Recharge requires ventilation (refer to local standards or contact your HAWKER® Representative).
- Do not customize the battery hardware or software as supplied by HAWKER®; or your warranty may be voided.
- Only operate with HAWKER®-approved interface devices.
- Service of the battery must only be performed by HAWKER®-approved technicians.
- Dismantling of the battery is not authorized except by qualified HAWKER® personnel due to potential hazards involved; or your warranty may be voided.
- In the case of any error that cannot be reset, do not attempt to continue the operation of the battery until support and direction is provided by HAWKER®; or your warranty may be voided.
- Do not leave the truck idle in temperatures below the battery operating temperature as this may result in the truck becoming nonoperational.
- Do not attempt to operate this battery in temperatures above the operating range.
- Do not expose the battery to extended periods of direct sunlight that allow the temperature of the battery to rise above the storage or operating temperatures of the battery.
- Do not operate the battery outdoors without suitable weatherproof protection.
- Do not immerse the battery in water or clean the battery using pressurized water.
- Do not operate the battery in condensing environments.
- Do not install the battery on the underbody of an electrical industrial truck.

## Safety (cont.)

### Interoperation with truck and battery charger

- The instructions in this owner's manual do not replace or supersede the instructions for the truck and battery charger.
- The operation limits given in this owner's manual do not replace or supersede the permissible operation parameters of the industrial truck or charger.
- Only charge this battery with HAWKER®-approved chargers for HAWKER FLEX® Elite batteries.
- The battery must be installed in a truck with appropriately sized cables.

### Risks posed during normal operation

- This battery is designed to be stable and tolerant to the applications within the scope laid out in the operating conditions, however, battery systems are inherently hazardous.
- Do not short the battery terminals. A shorting event with a high current may occur, leading to potential explosions and various hazards for the operator. A resulting electric arc fault may emit an intense hot flash of infrared, visible, and ultraviolet light. Molten and vaporized metal may be ejected. Toxic fumes may be released. Components may become extremely hot.
- The weight and size of the battery make it cumbersome to handle.
- Always properly restrain the battery. Failure to restrain the battery may result in the battery shifting or dropping. Additionally, this may result in the battery crushing, pinching, or impacting personnel or nearby equipment.

### Damaged batteries

- Exposure of the battery to conditions outside of its operational and environmental limits poses a substantial risk of damage to the battery. Do not assume damage to the battery will be apparent.
- If the battery experiences conditions outside of the allowable limits as stated in this document, immediately cease and do not resume operation, and contact your HAWKER® Representative.
- If the mechanical integrity of the battery is compromised (e.g., penetration of case, rupture of the case, etc.) immediately cease and do not resume operation of the battery. Contact your HAWKER® Representative.
- Stop operation of the battery if there is a crush, pinch, cut, or other damage to the power cables or power connectors.
- If any material, such as liquid electrolyte, from a damaged battery comes into contact with a person's skin or eyes, rinse the affected areas with clean water for at least 15 minutes. Then immediately obtain medical attention.
- If any material, such as liquid electrolyte, from a damaged battery comes into contact with the mouth or is swallowed, rinse out the mouth as well as the area around the mouth. Then immediately obtain medical attention.
- Contact with heated gases or components of a damaged battery may cause serious thermal burns. Treat any thermal burns, then immediately obtain medical attention.

Additional information can be found in the safety data sheet for the VRLA batteries, SDS 853027H.

## Operational Data and Limits

- Nominal capacity: Nominal Capacity (C6) : 840 Ah
- Nominal voltage: 36V
- Configurations: 3 blocs series 3 blocs parallel (3s3p)
- Max charging current: 588 Amps
- Discharge current (continuous): 1x C6, up to a max of 320 A (limited by traction cable harness)
- Max energy throughput per day: up to 180% C6



## Handling

### General Handling Considerations

- Handling of the battery is only allowed by trained personnel that are familiar with the potential risks of traction batteries for industrial trucks and for lifting heavy loads.
- Avoid sudden acceleration, deceleration, drops, and other mechanical abuse conditions while handling the battery.
- Handling must only be performed after the battery is disconnected from all electrical loads and charge sources.
- Prior to lifting, secure all connectors and cables so that they will not be crushed, pinched, or otherwise damaged during the lift. User interfaces may be removed prior to handling.
- Appropriate PPE must be worn during all lifts.
- Appropriate lifting methods and tools that can safely lift and control the load must be checked prior to all lifts. Tools must be properly rated for weight.
- Attach lifting tools to the tray lifting points.
- The battery must only be lifted vertically. Do not allow the battery to swing during lifting.
- The operational and safety instructions of the lifting gear manual must be respected.
- If the battery is being handled while installed on a truck, for instance during the battery installation or removal operation, the truck must be secured to prevent movement.

## Installation into Industrial Truck

### Mechanical Installation

- This battery is designed to be a direct replacement of a standard lead-acid battery intended to power an electric industrial truck.
- Upon receipt of the battery, it must be checked for any visible signs of damage to the battery and all cables, plugs, and accessories.
- Before installation, check that the battery is supplied with the appropriate cable harness to connect the battery to the industrial truck.
- Ensure that the battery weight and center of gravity requirements per the truck manufacturer are followed.
- The battery must be handled in a way that mitigates the risk of drop events and crashes. The correct tools, lifting points, and methods should be used.
- After placement of the battery into the truck's battery compartment, the technician must ensure the battery is mechanically secured in the truck against movement as specified by the industrial truck manufacturer. After the battery is secured in the truck's battery compartment, the battery unit must be checked again to ensure no cables, wires, or plugs were crushed, pinched, cut or damaged during insertion.

### Electrical Installation

- The battery must be connected with the appropriate cables and connector to the industrial truck per the truck manufacturer's recommendation.
- Only use HAWKER®-approved fasteners, connectors, cabling, and plugs with this battery.
- The cable dimensioning and DC connecting plug will vary depending on the truck and end-user requirements. The truck harness shall comply with relevant requirements for current carrying capability and truck interface requirements. Compliance shall be confirmed by the truck's OEM.

**⚠ WARNING** Defective cables and connectors can result in functional issues and/or severe safety hazards such as short circuits and/or fire. Cables and connectors must be regularly inspected for any damage or issues. Cables and connectors should only be repaired or replaced by an authorized HAWKER® Representative using the correct factory replacement parts. No substitution is allowed.

# OPERATION

## Operation

While HAWKER® has used reasonable efforts towards the application of legal requirements, this documentation should neither be considered nor relied upon as legal advice.

Anybody using this battery must be trained on the aspects of the battery they are responsible for as required by local laws and regulations.

The battery must be handled, operated, stored, maintained, and serviced in accordance with the instructions in this owner's manual.

**⚠ WARNING** Failure to follow the instructions in this owner's manual can result in serious damage to the battery and may result in serious injury. Failure to follow the instructions in this owner's manual or using parts that are non-original will void the battery warranty.

Opportunity charging is highly recommended to maximize the daily operating capability of the battery. It will also optimize the service life of the battery by decreasing the discharge window of the battery during discharge.

The capability of the battery to power the truck decreases at low SOC. If the truck is operated at a low SOC, this may result in the battery shutting down with or without a 10-second warning. If this occurs, reactivate the battery and slowly drive the truck to a matching charger to connect and recharge.

In contrast to traditional lead acid batteries, it is beneficial to operate HAWKER FLEX® Elite batteries at a partial state of charge with frequent and rapid opportunity charges during periods of non-use (operator breaks, shift changes, etc.).

This battery is designed to be charged indoors in the truck.

The battery temperature influences the capacity of the battery. For example, run time may be reduced at lower temperatures. Battery temperatures at the extreme ends of the temperature limits as stated in this owner's manual will influence performance.

Respect all visual and audible warnings from the user interface devices.

## Activation/Deactivation of Battery

The BMS will deactivate automatically when a no-load condition is detected for a default setting of 156 continuous hours to ensure that an unused battery is not deeply discharged.

### **Activation:**

**During use:** Provided the pack is not connected to a charger and there are no battery errors, the battery will automatically switch to the traction state applying power to the truck. In all cases, a short press of about half a second is required.

**During charging:** The battery is activated when it is plugged into the charger. This allows battery activation and charging even without previous activation of the battery by other measures above.

### **Deactivation:**

**Extended non-use:** The battery will deactivate after a default of 156 hours when there is less than a 3 A current draw. If different values for these are desired, contact your HAWKER® Representative to make adjustments.

**Manual deactivation:** Ensure the equipment is shut down prior to deactivating the battery. To manually deactivate the battery, press the button on any user interface for 3 to 5 seconds. Holding for longer may result in turning the unit OFF and then back ON.

**⚠ WARNING** When deactivating the battery, there is approximately a 20-second shutdown sequence in which an audible alarm will be heard. Pushing the button again during this time will stop the shutdown procedure and return the pack to a fully ON state.

# CHARGING BATTERY

## Charging Battery

Unlike standard lead acid batteries, HAWKER FLEX® Elite batteries must remain connected to the traction connector of the truck. To charge, dedicated charging plug(s) must be used connecting to a HAWKER®-approved charger. Upon connecting the first charging plug, power to the industrial truck is disabled, preventing inadvertent operation.

This battery must only be charged by HAWKER®-approved chargers for HAWKER FLEX® Elite batteries, which are specially designed to allow optimum energy transfer and CAN communication with the battery to control the battery recharge. This ensures a safe and optimal operation of the system. All operating instructions found in the owner's manual of the charger must be followed.

**⚠ WARNING** Never attempt to charge using the connector from the battery to the truck.

The battery system is equipped with drive-away protection that will disconnect the traction power—disabling the truck when any battery-charging plug is connected to a charger. This mitigates the risk of an operator accidentally driving away when the charger is still connected.

Charge the battery only in an appropriate environment. Additionally, follow all environmental requirements from the charger.

The charge plug has embedded anti-arc contacts to reduce arcing while performing inadvertent hot disconnect operations.

**NOTE:** The CAN-enabled charge (piggy-back) connector from the battery must be plugged into the matching CAN-enabled charge connector from the charger.

After installation is complete, the battery should not be disconnected from the industrial truck to charge, nor is it required to open the lids and covers on the battery compartment.

### Charging Sequence

- Inspect the battery and charging cable(s) to ensure they have no damage and are free of contaminants prior to connecting.

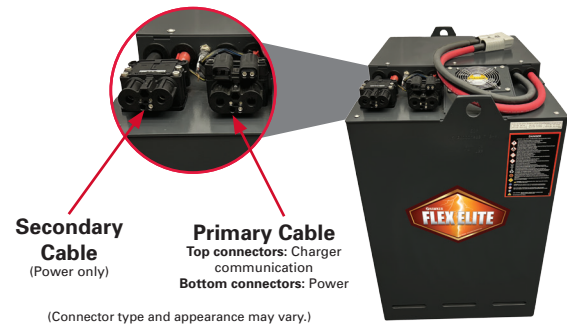


Figure 8

- Connect the charger to the battery-charging connectors (both primary and secondary DC cables).
- Once a charging cable is connected, the traction contactor will open, removing power from the truck for drive-away protection.
- Charging will begin after communication (CAN bus) has started between the battery and the charger, which occurs when the primary charging cable with the communication links is connected (**Figure 8**). The optimal charge current will automatically be determined based on the battery conditions (SOC, temperature, etc.) and charger conditions (temperature, charger size). The charge level will dynamically change during the charging process, ensuring fast charging and optimal lifetime of the battery. If the battery detects a fault condition, the charging will stop.
- To stop prior to completion of full recharge, such as during opportunity charging, press the ON/OFF button on the charger prior to disconnecting.

**⚠ WARNING** Even if the battery is equipped with anti-spark systems, the battery should not be disconnected while still being charged by the charger.

- After a full charge cycle is complete, the charger screen will indicate that charging is complete. At this point, the charger is no longer supplying power to the battery and the charging cable(s) can be disconnected from the battery. After completely disconnecting the charging cable(s), the battery will then automatically be ready for operation. If the battery remains connected, the charger will periodically provide a refresh charge to maintain the battery's full state of charge.

## Service and Maintenance

HAWKER FLEX® Elite batteries are designed to be virtually maintenance-free. However, external cabling, connectors, etc. (including operator interfaces) must be regularly examined to ensure there is no damage to such parts and in compliance with local regulations. If any of these parts are damaged or show signs of serious wear, they need to be replaced. Please contact your HAWKER® Representative for all repairs and replacements. All repairs must be done by an authorized HAWKER® technician trained on HAWKER FLEX® Elite products.

All power cables must be checked any time the battery has been exposed to any type of stress, whether it be overvoltage, overcurrent, or mechanical stresses such as crushing.

### Cleaning instructions

- The exterior of the battery can be cleaned using warm water and an antistatic cloth.
- Do not clean the battery with pressurized water.

## Troubleshooting

### Battery does not provide power to the truck.

- Ensure the battery is turned on using an operator interface.
- Deactivate and reactivate the battery.
- Ensure the battery is not connected to the charger. Power to the truck is turned off during charging to prevent drive-away from the charger.
- Confirm there are no active errors listed on the user interface. In case of errors, review the error ID checklist below.
- Inspect power cables to the truck to ensure they are not damaged.
- If the battery has OEM integration, check the communication cables between the truck and the battery.
- Contact your HAWKER® Representative for further troubleshooting steps.

### Battery will not charge.

- Ensure the charger is powered and the charger does not have any errors. In case of an error on the charger, follow the instructions in the charger owner's manual.
- Deactivate and reactivate the battery.
- Ensure the charging cables are properly connected to a HAWKER®-approved charger.
- Ensure the charger communication cable is properly connected to the charge communication port.
- Confirm there are no active errors listed on the battery user interface. In case of errors, review the error ID checklist below.
- Check connectors, auxiliary pins, and CAN cables for damage.
- Contact your HAWKER® Representative for further troubleshooting steps.

# STORAGE

## Troubleshooting (cont.)

### Error ID Checklist and Recommended Actions

ID	Description	Action
8	Contactors stuck open	Contact your HAWKER® service representative
9	Contactors stuck closed	Contact your HAWKER® service representative
74	Interlock 1 or 2 error	Contact your HAWKER® service representative
154	NTC Ambient (TP1)	Contact your HAWKER® service representative
155	NTC Bloc 1 (TP2)	Contact your HAWKER® service representative
156	NTC Bloc 3 (TP3)	Contact your HAWKER® service representative
444	Fan error	Contact your HAWKER® service representative for replacement
449	No charger CAN communication with plug connected	Contact your HAWKER® service representative

In case of any other error ID please contact your HAWKER® Representative for further troubleshooting direction.

## Storage

**During storage, it is recommended to turn the battery on at least every two months to confirm it has not dropped below 75% SOC.**

Make a full recharge cycle if the battery is below 75% SOC.

The battery must be stored in a dry environment away from fire, sparks, and heat.

The allowable storage temperatures are -40°F to 140°F (-40°C to 60°C). To ensure battery health and maximize service life, the maximum temperature of the long-term storage location should be less than 95°F (35°C).

The storage area must be compliant with local regulations (including fire, safety, and building regulations) for lead acid batteries and in accordance with the building's insurance.

The battery must only be stored in an upright position (as installed in the vehicle) with all service lids properly attached.

During storage, it is highly recommended to disconnect the truck and battery communication connector as there may be a slight trickle discharge.

When storing for longer than one month, precautions must be taken to ensure the battery is not deeply discharged. The pack must be stored at full charge.

# LABELING AND SHIPPING

## Description of Battery Labels

Label Type:

### Identification Labels

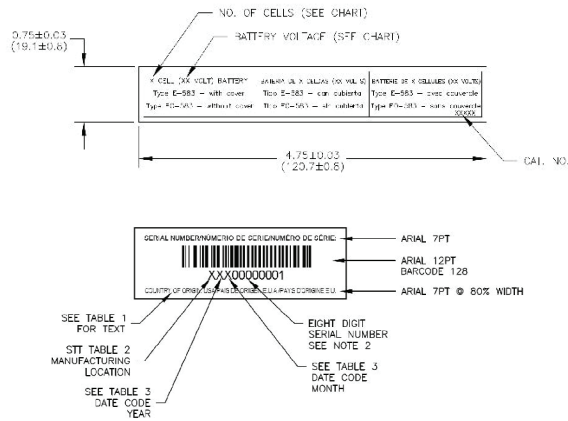


TABLE 3

DATE CODE			
① YEAR		② MONTH	
2013	L	JAN	A
2014	M	FEB	B
2015	N	MAR	C
2016	P	APR	D
2017	R	MAY	E
2018	S	JUN	F
2019	T	JUL	G
2020	U	AUG	H
2021	V	SEP	I
2022	W	OCT	J
2023	X	NOV	K
2024	Y	DEC	L

### Danger Label

The danger label, located on the side of the battery, contains warnings critical for safe usage of the battery.

### DANGER

**CONTAINS:** Lead, sulfuric acid (electrolyte), lead compounds, arsenic. Harmful if swallowed, inhaled, or in contact with skin. Acid causes severe skin burns and eye damage. May damage fertility or the unborn child if ingested or inhaled. May cause harm to breast-fed children. May cause cancer if ingested or inhaled. Causes damage to central nervous system, blood and kidneys through prolonged or repeated exposure if ingested or inhaled. Causes skin irritation, serious eye damage. Irritating to eyes, respiratory system, and skin. Contact with internal components may cause irritation or severe burns. May form explosive air/gas mixture during charging. Extremely flammable gas (hydrogen). Explosive, fire, blast or projection hazard. Obtain special instructions before use. Do not handle unless all safety precautions have been read and understood. Wash thoroughly after handling. Do not eat, drink, or smoke when using he product. Avoid contact during pregnancy/while nursing. Wear protective gloves/protective clothing, eye protection/face protection. Use only outdoors or in a well ventilated area. Avoid contact with internal acid. Do not breathe dust/fume/gas/mist/vapors/spray. Keep away from heat/sparks/open flames/hot surfaces. No smoking. **IF SWALLOWED OR CONSUMED:** Rinse mouth. Do NOT induce vomiting. Call a poison center/doctor if you feel unwell. **IF ON CLOTHING OR SKIN** (or hair): Remove/take off immediately all contaminated clothing and wash it before reuse. Rinse skin with water/shower. **IN INHALED:** Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER or doctor/physician. **IF IN EYES:** Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If exposed/concerned, or if you feel unwell seek medical attention/advice. Store locked up in a well ventilated area, in accordance with local and national regulations. Dispose of contents/container in accordance with local and national regulations. Keep out of reach of children.

**WARNING:** Cancer and reproductive harm. Wash hands after handling. [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

**WARNING:** Risk of fire, explosion, or burns. Do not disassemble, heat above 60°C or incinerate. Not recommended for inverted use. Follow product charging instructions.

**EACH AND EVERY COMPONENT OF THIS BATTERY IS RECYCLABLE. VISIT OUR WEBSITE FOR MORE INFORMATION CONCERNING RECYCLING.**

**HIGH VOLTAGE: RISK OF SHOCK. DO NOT TOUCH UNINSULATED TERMINALS OR CONNECTORS.**

**Do Not Remove Vent Valves.**

## Shipping HAWKER FLEX® Elite TPPL Batteries

HAWKER FLEX® Elite batteries are classified as “non-spillable wet electric storage batteries” and may be shipped by air or ground transportation without restriction.

**HAWKER FLEX® Elite batteries comply with the requirements of:**

1. US Dept of Transportation - 49 CFR Section 173.159 para d
2. ICAO/IATA Packing Instruction 872, Special Provision A67
3. IMDG Class 8, UN ID 2800 special provisions 238
4. ADR 2011 and RID 2011 Special Provisions 238, 295, and 598 are classified as non-spillable and exempt from hazardous goods regulations when securely packed and protected against short circuits.

For further transport and regulatory information (USA and EU; classifications and labeling) refer to VRLA batteries - SDS 853027H instructions or regulations by the International Civil Aviation Organization (ICAO), International Air Transport Association (IATA), International Maritime Dangerous Goods (IMDG), Convention concerning the Carriage of Goods by Rail (CIM), and Annex A: International Regulations concerning the Carriage of Dangerous Goods by Rail (RID) codes. Other laws and regulatory requirements may apply.

# RECYCLING AND TERMS

## Disposal and Recycling

HAWKER FLEX® Elite TPPL batteries are recyclable. Scrap units must be packaged and transported in accordance with prevailing transportation rules and regulations. Scrap units must be disposed of in compliance with local and national laws by a licensed or certified lead acid bloc recycler with these attributes.

HAWKER®, in line with local regulations, will accept HAWKER FLEX® Elite batteries and related products at specific facilities for disposal. Contact your local HAWKER® Representative for specific recycling instructions for your area.

## Terms and Abbreviations

Term/Abbreviation	Explanation/Description
<b>BDI</b>	Battery Discharge Indicator
<b>BMS</b>	Battery Management System
<b>C</b>	Capacity at six-hour rate of discharge
<b>DC</b>	Direct Current
<b>LV</b>	Low Voltage (may also refer to communication)
<b>OEM</b>	Original Equipment Manufacturer
<b>PPE</b>	Personal Protective Equipment
<b>SDS</b>	Safety Data Sheet
<b>SOC</b>	State of Charge
<b>SOH</b>	State of Health
<b>Activated</b>	In an ON state
<b>Deactivated</b>	In an OFF state
<b>Cable Harness</b>	DC cable and plug that connects to the industrial truck or battery charger
<b>Operation</b>	Refers to charging or discharging the battery. Includes idling of the battery while activated
<b>Storage</b>	Refers to the battery being stored
<b>Handling</b>	Refers to activities such as lifting, moving, positioning of the battery. Includes connecting and disconnecting of charge and power cables
<b>Maintenance</b>	Cleaning of the battery and inspection of the battery and connected components (charging cables and user interfaces) for damage
<b>Service</b>	Operations performed by HAWKER® Representatives to restore the battery to full performance

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