

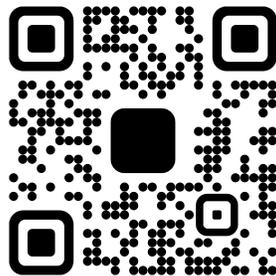
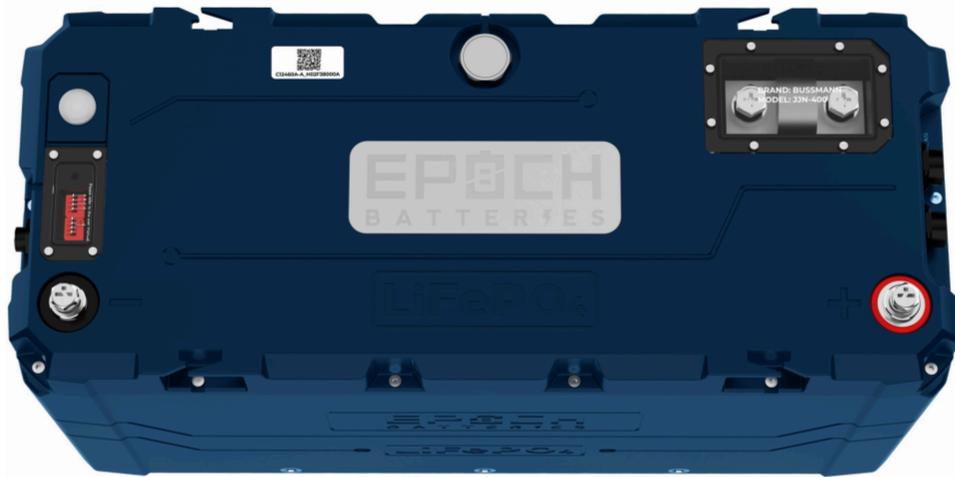
# EPÖCH

B A T T E R I E S

## Elite Series V2-T

### Installation Manual

C28YM



# Document Control

<b>Document title</b>	Elite Series V2-T Installation Manual
<b>Edition</b>	C28YM
<b>Models</b>	C12460A-A, C24230A-A, C48100A-A
<b>Prepared date</b>	March 18, 2026
<b>Intended user</b>	Qualified installers and service technicians

## Purpose

This manual is a task-oriented field guide for the Elite Series V2-T battery platform. It is written for qualified installers working in marine, RV, and stationary energy-storage systems.

## How to use this manual

Chapter 4 is dedicated to model-specific electrical, mechanical, environmental, and configuration values. Chapter 14 is the single source for named regulations, standards, and compliance references. All other chapters focus on workflow, safety, installation practice, and recordkeeping.

## What is included

Planning, installation, system integration, operation, charging guidance, monitoring, maintenance, troubleshooting, and DIP-switch configuration.

## What is intentionally separate

Commercial terms, warranty language, and installer worksheets which may be published as companion documents rather than embedded in the manual.

## Revision history

<b>Edition</b>	<b>Date</b>	<b>Summary of changes</b>	<b>Approved by</b>
C28YM	March 18, 2026	Initial controlled issue of the Elite Series V2-T Installation Manual.	KV

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# 1. Introduction

*This chapter defines the scope, audience, and document architecture for the guide.*

## 1.1 Purpose and scope

The Elite Series V2-T battery platform is intended for house-power and energy-storage service in properly designed DC systems. This manual explains how to plan, install, integrate, commission, operate, and maintain the product safely and consistently.

## 1.2 Intended audience

This guide is written for qualified installers and service technicians familiar with high-current DC systems, safe isolation procedures, and disciplined project documentation.

## 1.3 Manual architecture

To improve usability and remove duplication, all model-specific ratings and limits are consolidated in Chapter 4, and all named regulations and standards are consolidated in Chapter 14.

## 1.4 Installation boundaries

Use the battery only in supported applications, with compatible charge sources, appropriate switching and overcurrent protection, and a complete as-built project record. Do not treat the product as an engine-starting battery.

## 1.5 Project record

- Record the model identifier, serial number, installation date, and equipment location.
- Retain the one-line diagram, conductor and protection basis, torque log, commissioning results, and installation photographs.
- Keep service notes, firmware notes, alarm history, and later configuration changes with the original project file.

## 1.6 Terms and abbreviations used in this guide

Term	Meaning in this manual
<b>BMS</b>	Embedded battery management system. Supervises cell conditions, protective actions, and balancing behavior
<b>SoC</b>	State of charge shown by the selected authoritative monitoring source
<b>OCP</b>	Overcurrent protection device or protective function in a source or branch circuit
<b>AIC</b>	Interrupt rating basis used when selecting protective devices for the expected fault duty
<b>Master</b>	The one battery in a supported bank or string designated to present the managed-battery view
<b>Member</b>	Any additional battery in the same bank or string that is not assigned as the Master
<b>Shunt</b>	Current-sensing device used as a secondary reference when installed in the return path
<b>Standalone</b>	A one-battery installation with no parallel or series companion units
<b>Parallel bank</b>	Multiple identical batteries connected positive-to-positive and negative-to-negative
<b>Series string</b>	Multiple identical batteries connected to increase system voltage
<b>Managed battery</b>	A battery that can publish status and operating limits to a compatible control platform
<b>Commissioning</b>	The controlled process of verifying wiring, protection, monitoring, settings, and documentation before handoff

## 2. Safety

*Work only on an isolated system and treat every exposed conductor as energized until it has been verified safe.*

### **Safety checkpoint**

- Disable every charge source before opening covers or touching conductors.
- Open the battery disconnect and verify zero energy at the work point with a meter.
- Keep terminal protection installed until the moment a connection is made or inspected.

### 2.1 Qualified work only

Installation and service expose personnel to high fault current, arcing, stored energy, and equipment-damage risk. De-energize, isolate, and verify before touching conductors or opening distribution hardware.

### 2.2 Core safety rules

- Use insulated tools, appropriate eye and hand protection, and controlled work practices.
- Prevent accidental contact with positive terminals, busbars, fuse blocks, and exposed studs.
- Do not bypass protective devices, lockouts, alarms, or controlled charging limits.
- Do not work alone when energizing or troubleshooting a newly built bank.

### 2.3 Fire or thermal event response

If the battery overheats, smokes, or vents, isolate power immediately, protect personnel, cool the enclosure and surrounding area aggressively, and follow the site emergency response plan. Detailed regulatory and incident-handling references are consolidated in Chapter 14.

### 2.4 Damaged or wet battery

Remove the battery from service after immersion, fire exposure, severe impact, case damage, leakage, persistent odor, or unexplained heating until the condition has been evaluated and cleared.

### 2.5 Temperature and charging safety

Do not charge or discharge outside the limits in Chapter 4. Protective lockouts help prevent damage, but they do not replace correct environmental control, charger configuration, or installer judgment.

### 2.6 Lifting, handling, and storage

Support the battery by the enclosure or approved lifting points only. Never lift by the cables or terminals. Store the battery isolated, dry, clean, and within the limits listed in Chapter 4.

### **3. Product overview**

*This chapter explains what the product does, how it fits into a larger DC system, and what the installer must still provide.*

#### **3.1 Intended duty**

The Elite Series V2-T battery family is a deep-cycle house-power product for marine, RV, and stationary energy-storage applications. It is intended to be integrated with external switching, distribution, charging, and monitoring hardware appropriate to the project.

#### **3.2 Functional architecture**

- Cell stack: provides the battery platform's stored energy and working DC output.
- Embedded battery management system: supervises cell voltage, temperature, current protection, and balancing.
- Internal source fuse: reduces fault energy at the battery outlet but does not replace downstream conductor protection.

#### **3.3 Supported system arrangements**

The product may be used as a standalone battery, in supported parallel banks, or in supported series strings. Mixed series-parallel arrangements are not supported. Exact limits and bank-verification values are listed in Chapter 4.

#### **3.4 What the installer must still provide**

- A manually operable battery disconnect that can be reached quickly and serviced safely.
- Downstream overcurrent protection sized to the connected conductors and equipment.
- Conductors, lugs, busbars, and restraints suited to the current, environment, and routing path.
- A monitoring and documentation package that makes commissioning and later service repeatable.

#### **3.5 Identification and traceability**

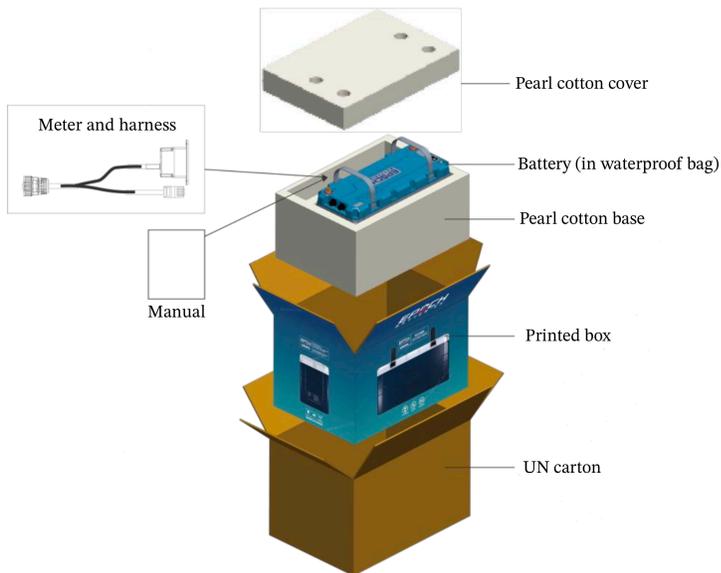
Record the installed model, serial number, revision or date code, firmware information, and the installation date. Keep that information with the as-built record and service history.

### 3.6 External features and service points

Use the table below to identify service points before routing conductors, assigning network roles, or beginning commissioning. Keep covers and seals installed except during controlled connection or inspection work.

Service point	Installer purpose	Field check before energizing
<b>Main positive terminal</b>	Source connection to disconnect and protection path	Correct polarity, clean contact surface, protective boot installed
<b>Main negative terminal</b>	Return connection to shunt or common negative path	Correct routing, clean contact surface, protective boot installed
<b>State of Charge meter</b>	Local status view and Bluetooth access where used	Meter wakes correctly and shows plausible pack data
<b>Communications connection</b>	Managed-battery link to other batteries or controller	Correct port used, connector secure, no branch or tee connection
<b>DIP switch bank</b>	Role and topology selection for supported banks or strings	Settings recorded and verified before final power-up
<b>Fuse / service-access area</b>	Protected service point requiring clear access	Cover secure and service access maintained
<b>External switch</b>	Controlled enable or remote interface where used	Wiring identified, secured, and documented
<b>Product label and serial number</b>	Traceability and service identification	Model and serial recorded in the project file

### 3.7 Unpacking and inspection



**Before the battery enters service, complete the receiving check below and retain the results with the project file.**

- Verify model identifier, serial number, quantity, and accessory pack against the project record.
- Inspect the enclosure, terminals, meter, ports, seals, and protective covers for cracks, deformation, loose hardware, or missing parts.
- Confirm that labels remain legible and that service points are clean and dry.
- Photograph the battery as received and retain shipping-condition photos with the project file.
- Do not install a unit showing impact damage, leakage, unexplained odor, damaged seals, or loose terminal hardware until the condition has been evaluated and cleared.

## 4. Specifications

Chapter 4 is the only chapter in this manual that contains model-specific ratings, dimensions, configuration values, and related limits.

### 4.1 Governing values

The values in this chapter are planning and installation values for the models covered by this edition. When a product label or datasheet differs, the governing source is the label or datasheet released for the installed battery.

### 4.2 Technical, electrical, and temperature ratings

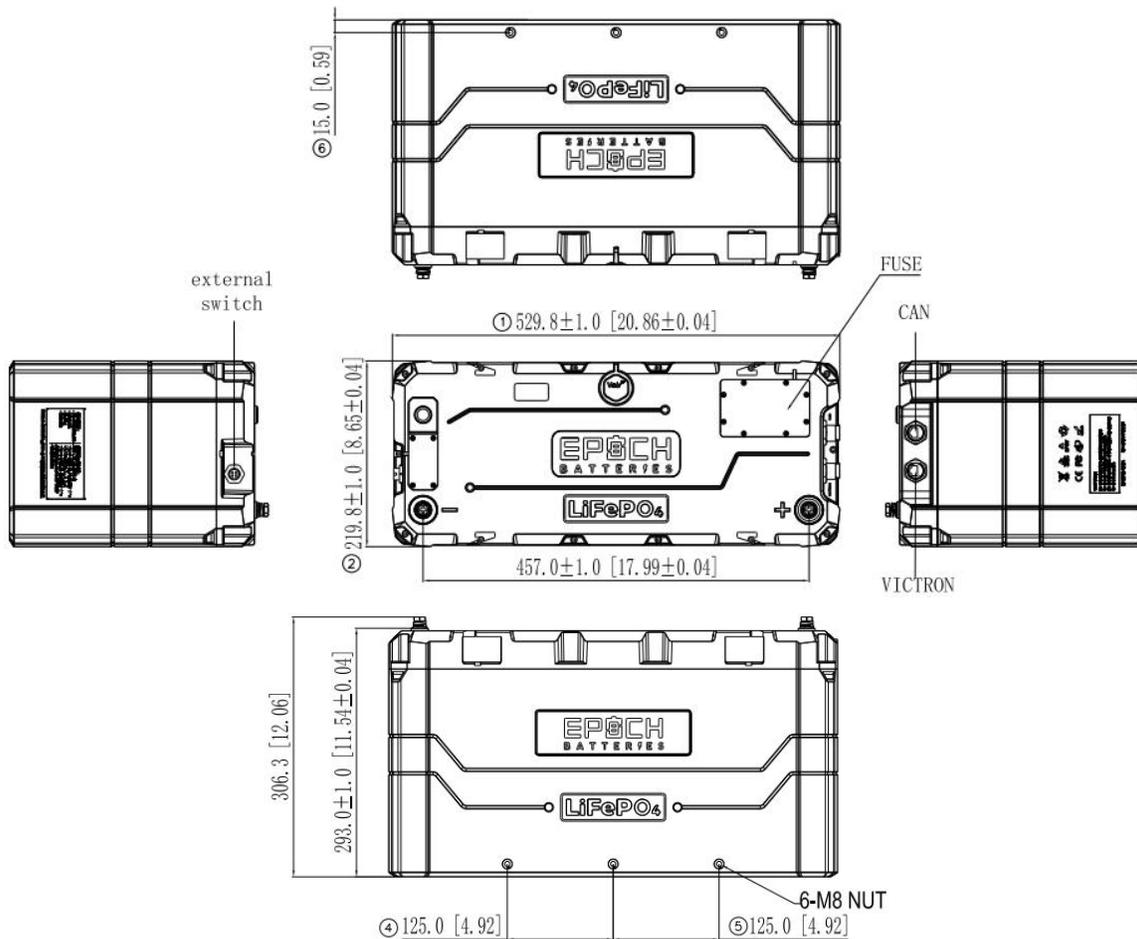
Specification	C12460A-A	C24230A-A	C48100A-A
<b>Rated capacity</b>	460Ah (230Ah cells)	230Ah (230Ah cells)	100Ah (100Ah cells)
<b>Configuration</b>	4S2P	8S1P	16S1P
<b>Charge temp. range</b>	0~50°C	0~50°C	0~50°C
<b>Discharge temp. range</b>	-20~50°C	-20~50°C	-20~50°C
<b>Storage temp. range (≤month)</b>	-20~45°C	-20~45°C	-20~45°C
<b>Storage temp. range (≤year)</b>	0~35°C	0~35°C	0~35°C
<b>Rated voltage</b>	12.8V (3.2V/cell)	25.6 V (3.2V/cell)	51.2V (3.2V/cell)
<b>Maximum voltage</b>	14.52V (3.63V/cell)	29 V (3.63V/cell)	58V (3.63V/cell)
<b>Minimum voltage</b>	10.4V (2.6V/cell)	20.8 V (2.6V/cell)	41.6V (2.6V/cell)
<b>Standard capacity</b>	5.888 kWh (@ 0.5C, 25°C)	5.888 kWh (@ 0.5C, 25°C)	5.12 kWh (@ 0.5C, 25°C)
<b>Internal resistance</b>	≤8mΩ	≤16mΩ	≤30mΩ
<b>Maximum discharge current</b>	300A (5s)	250A (5s)	100A (5s)
<b>Max charge current</b>	300A (5s)	180A (5s)	100A (5s)
<b>Continuous discharge current</b>	≤230A (0.5C)	≤115A (0.5C)	≤50A (0.5C)
<b>Continuous charge current</b>	≤230A (0.5C)	≤115A (0.5C)	≤50A (0.5C)
<b>Charge profile</b>	CC/CV (no equalization) Constant Current: ≤0.5C, Constant Voltage: 3.60V, Cut off: ≥0.02C		
<b>Shipped SOC</b>	30%±3%	30%±3%	30%±3%
<b>Self-discharge rate</b>	≤3%/month	≤3%/month	≤3%/month
<b>Insulation resistance</b>	>20MΩ/1000VDC (@25±5 °C, RH50%)		
<b>Cooling method</b>	Passive (convection)	Passive (convection)	Passive (convection)
<b>Operational SOC</b>	0–100%	0–100%	0–100%
<b>Ingress protection</b>	IP67	IP67	IP67
<b>Communications</b>	Bluetooth 4.0; CAN-bus 500kbit/s		
<b>Supported configurations</b>	Series: up to 4 units Parallel: up to 16 units Series-parallel: not supported	Series: up to 2 units Parallel: up to 16 units Series-parallel: not supported	Series: not supported Parallel: up to 16 units Series-parallel: not supported
<b>Cycle life</b>	>3500 (25°C, 0.5C charge, 1C discharge, DOD 70%)		
<b>End of life capacity</b>	70%	70%	70%

### 4.2.1 Heater specification

Specification	C12460A-A	C24230A-A	C48100A-A
Power	180.67 W	153.6 W	181 W
Voltage	14.6 VDC	29.2 VDC	51.2 VDC

### 4.3 Mechanical data

Parameter	C12460A-A	C24230A-A	C48100A-A
Weight	44.25 kg (97.55 lb)	45.86 kg (98.9 lb)	44 kg (97 lb)
Dimensions (L × W × H)	529.8 × 219.8 × 306.3 mm (20.86 × 8.65 × 12.06 in)	529.8 × 219.8 × 306.3 mm (20.86 × 8.65 × 12.06 in)	529.8 × 219.8 × 306.3 mm (20.86 × 8.65 × 12.06 in)
Case material	PC+ABS (UL94 V-0)		
Terminals	M8 bolts		
Terminal torque	12 N·m (8.85 lb·ft)		
Ingress protection	IP67 (dust-tight; immersion ≤ 1 m for ≤ 30 min with all seals/glands installed)		
Rated pressure	86–106 kPa		



## 4.4 Protection and BMS behavior

Specification	C12460A-A	C24230A-A	C48100A-A
Self-discharge current (active)	≤50mA	≤50mA	≤50mA
Self-discharge current (error)	≤50mA	≤50mA	≤50mA
Self-discharge current (shutdown)	≤400μA	≤400μA	≤400μA
Max charge/discharge current	250A/250A	150A/230A	80A/80A
Overcharge protection voltage	3.63±0.02V	3.63±0.02V	3.63±0.02V
Overcharge release voltage	3.45±0.01V	3.45±0.01V	3.45±0.01V
Overdischarge protection voltage	2.6±0.01V	2.6±0.01V	2.6±0.01V
Overdischarge release voltage	2.8±0.01V	2.8±0.01V	2.8±0.01V
Charge overcurrent protection current	300±2A	180±2A	100±2A
Charge overcurrent protection delay	5s	5s	5s
Charge overcurrent protection release	Power-off release	Power-off release	Power-off release
Discharge overcurrent protection current	300±2A	250±2A	100±2A
Discharge overcurrent protection delay	5s	5s	5s
Discharge overcurrent protection release	ON/OFF release	ON/OFF release	ON/OFF release
Short circuit protection current	Fuse: 400A	Fuse: 270A	Fuse: 270A
Short circuit protection release	Replace fuse	Replace fuse	Replace fuse
Charge high temperature protection	55°C	55°C	55°C
Charge high temperature release	53°C	53°C	53°C
Charge low temperature protection	0°C (with heating)	0°C (with heating)	0°C (with heating)
Charge low temperature release	5°C (heating)	5°C (heating)	5°C (heating)
Discharge high temperature protection	55°C	55°C	55°C
Discharge high temperature release	53°C	53°C	53°C
Discharge low temperature protection	-20°C	-20°C	-20°C
Discharge low temperature release	-17°C	-17°C	-17°C
Heater activation (charge)	5°C	5°C	5°C
Heater deactivation (charge)	10°C	10°C	10°C
Heater deactivation (discharge)	5°C	5°C	5°C
Communication method	CAN-bus 500kbit/s	CAN-bus 500kbit/s	CAN-bus 500kbit/s

### 4.4.1 Class T fuse ratings

Specification	C12460A-A	C24230A-A	C48100A-A
Fuse model	Eaton JJN-500	Eaton JJN-300	Eaton JJN-250
Amperage rating	500A	300A	250A
Interrupt rating	20kAIC @ 160VDC	20 kAIC @ 160VDC	20 kAIC @ 160VDC
Voltage rating	300VAC, 160VDC	300VAC, 160VDC	300VAC, 160VDC

## 5. Pre-installation planning checklist

Complete the planning checklist before mounting or making any electrical connection.

Topic	What to verify	Record in project file
<b>Application fit</b>	The battery is being used for supported house-power or energy-storage duty.	Application summary and equipment list
<b>Location</b>	Compartment is dry, protected, serviceable, and suitable for the environment.	Photos of location and service access
<b>Securement</b>	Mounting hardware and restraint approach are defined before wiring starts.	Mounting sketch or bracket detail
<b>Topology</b>	Standalone, parallel, or series arrangement is selected and documented.	One-line diagram
<b>Disconnect and source OCP</b>	Main disconnect and source protection locations are planned.	Protection layout and routing photos
<b>Branch protection</b>	Every feeder and branch run has a downstream protection plan.	Branch protection schedule
<b>Conductors</b>	Conductor size, route, insulation, termination method, and labels are planned.	Cable schedule and termination notes
<b>Charging sources</b>	All chargers and regulators can be configured to Chapter 4 values.	Settings worksheet or device screenshots
<b>Monitoring</b>	Managed battery, shunt, remote monitoring, and alarm strategy are defined.	Monitoring plan and screenshots
<b>Documentation</b>	Torque log, commissioning log, and as-built record are ready for use.	Project file template

### Planning rule

- Do not use the internal source fuse as a substitute for a complete system protection design.
- Do not rely on memory for charger settings, DIP roles, or monitoring configuration; write them into the job file before energizing.

## 6. Installation

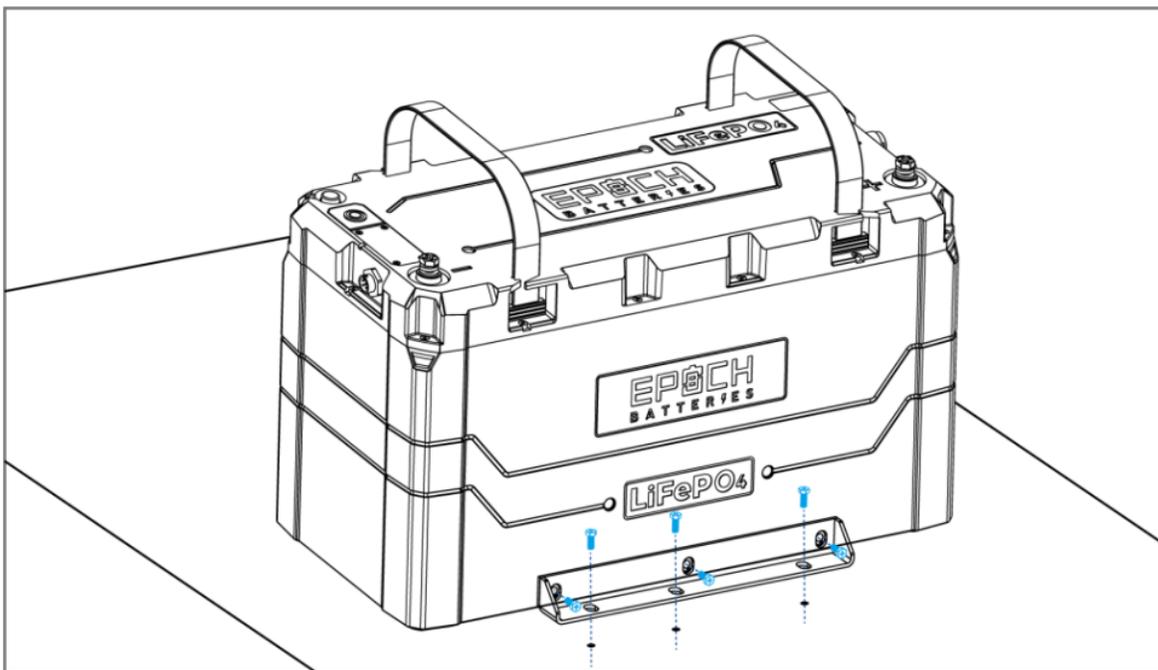
*Install the battery mechanically before routing or landing conductors.*

### 6.1 Location and orientation

Install the battery on a flat, rigid surface in a dry, protected area with clear service access to terminals, disconnecting means, and inspection points. Keep the battery away from exhaust heat, sharp edges, and locations where routine contact with conductive objects is likely.

### 6.2 Mounting and securement

Complete securement before any conductor is landed. Restrain the enclosure against movement in all expected directions and verify that straps, brackets, and hardware do not bear against cable insulation, covers, or service access points.



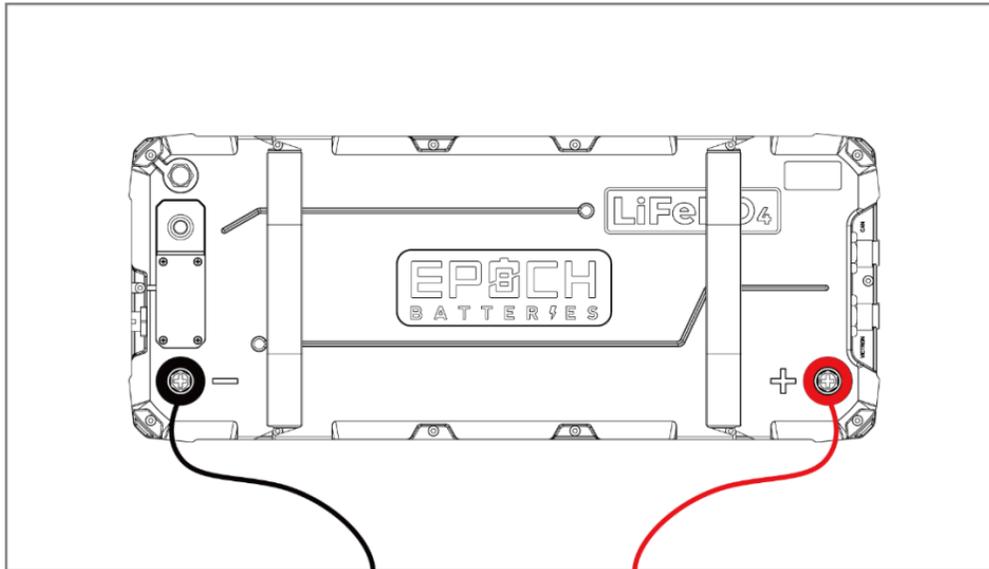
*Illustrative mounting arrangement: secure the enclosure first, then route and protect conductors.*

### 6.3 Disconnecting means and source protection

Install the main battery disconnect and source protection as close to the source as the design allows. Keep unfused conductor length short, mechanically protected, and documented in the project record. The internal source fuse reduces fault energy at the battery outlet, but it does not eliminate the need for downstream protection.

## 6.4 Conductors and terminals

Use conductors and lugs suited to the duty, environment, and routing path. Support conductors against chafe, vibration, and heat. Label both ends. Use the torque value in Chapter 4 at the battery terminals, then reinstall terminal protection immediately after the connection is complete.



*Terminal orientation and polarity reference. Keep terminal protection installed except during controlled connection work.*

## 6.5 Precharge for capacitive loads

Large inverter/chargers and other capacitive DC equipment may require controlled precharge. Use the equipment's built-in precharge or soft-start function, or an approved external precharge method. Never create a precharge path by touching conductors together.

## 6.6 Pre-energization check

- Verify polarity at every termination.
- Confirm terminal covers and boots are installed.
- Verify source OCP and branch OCP are in the intended state for commissioning.
- Confirm service access for later re-torque, inspection, or fuse replacement.

### **Regulated installations**

- If the installation environment is subject to additional compartment, fuel-vapor, fire, or protected-equipment rules, complete the Chapter 14 review before energizing the system.

## 6.7 Energize and commission

After the mechanical and wiring inspections are complete, close source protection as designed, close the battery disconnect, energize chargers first, then bring loads online in a controlled sequence. Record torque values, observed voltages and currents, monitor screenshots, and any commissioning notes in the project file.

## 7. System integration

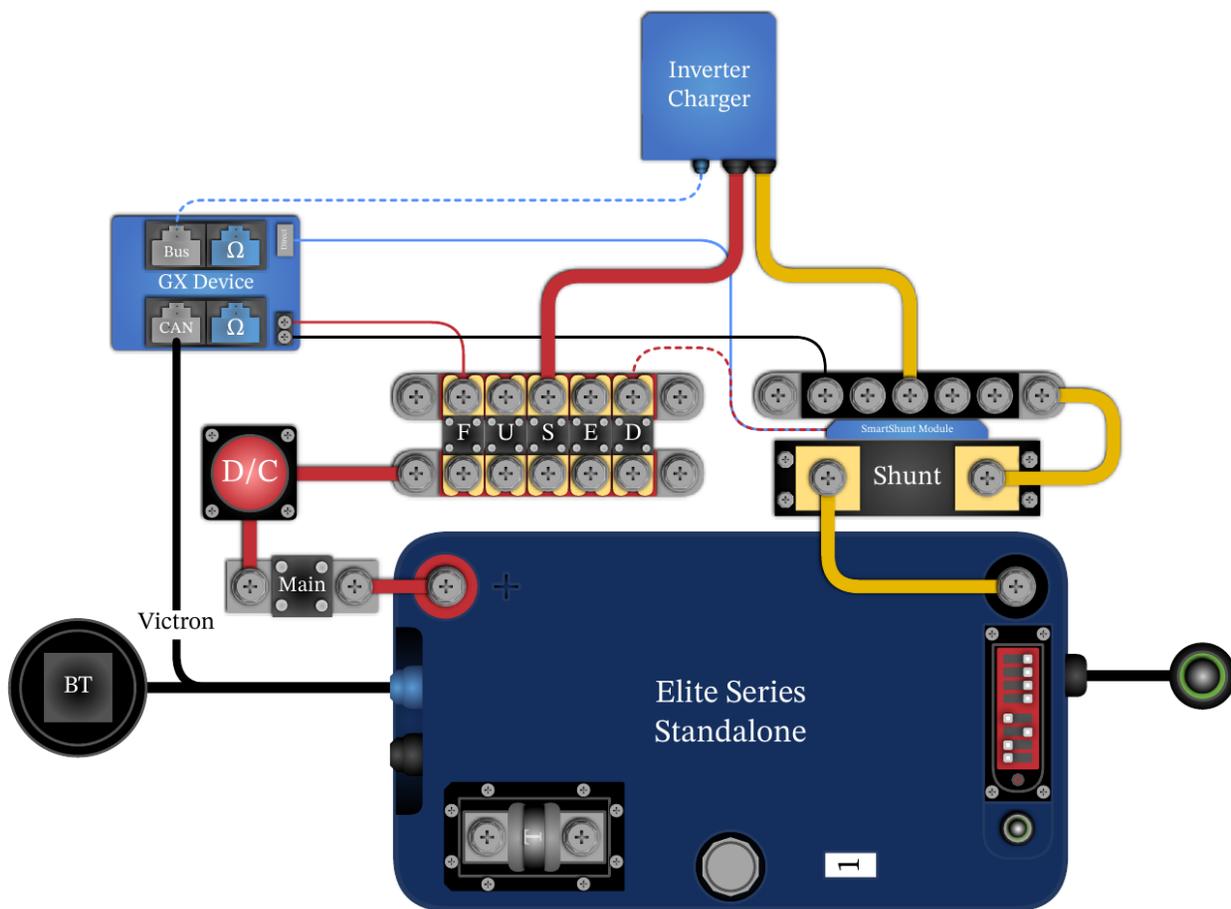
*This chapter shows the core DC topologies and the communications practices that keep monitoring and control stable.*

### 7.1 Topology selection

Use only one of the supported arrangements: a standalone battery, a supported parallel bank, or a supported series string. Keep all units identical within a bank or string and document the final topology before the first power-up.

### 7.2 Standalone battery integration

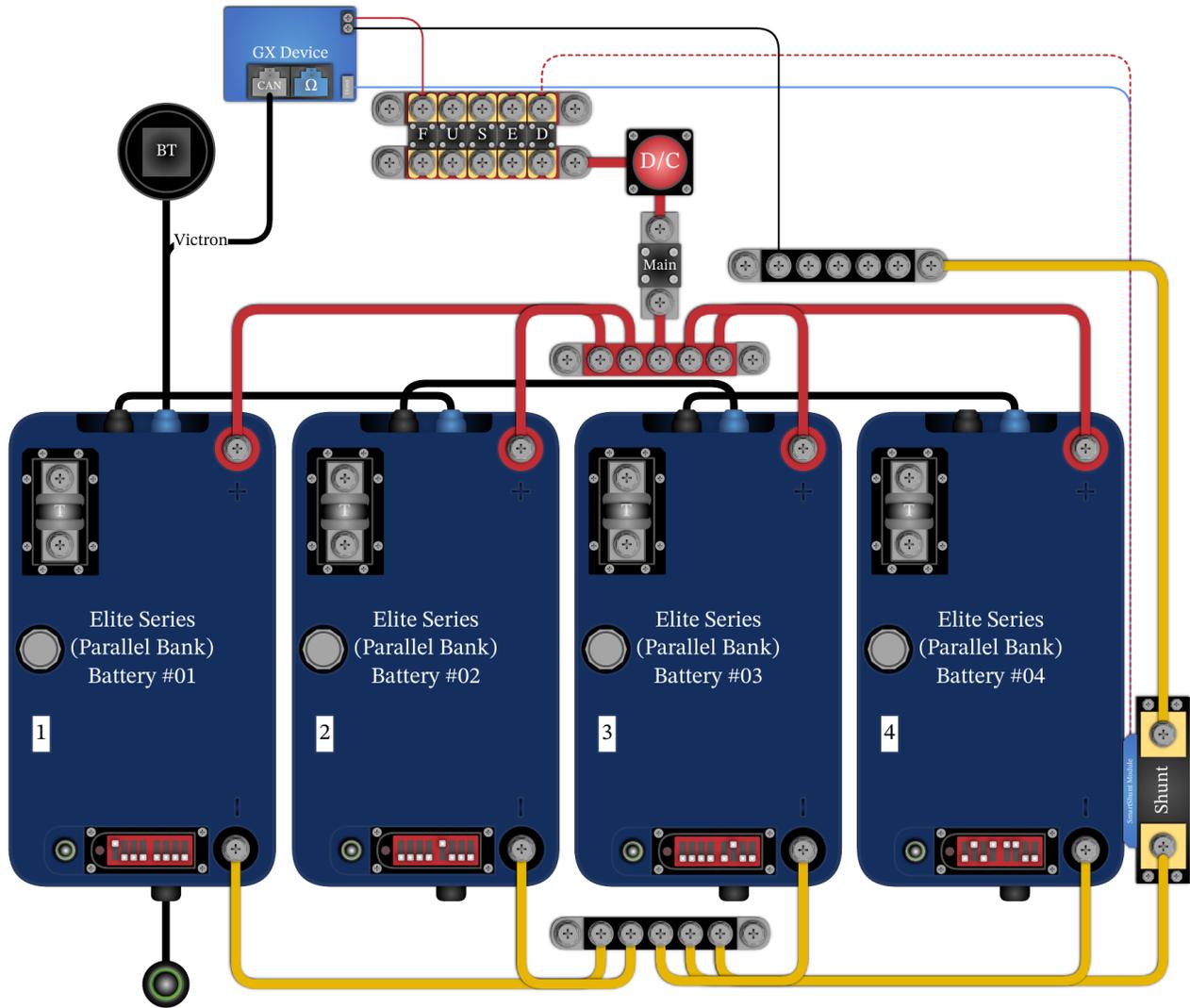
In a standalone arrangement, the battery feeds the main disconnect, the positive distribution path, and the downstream branch-protected loads and chargers. Verify that the monitor sees one managed battery and that the installation record identifies the battery as a single unit.



*Example standalone integration layout.*

### 7.3 Parallel bank integration

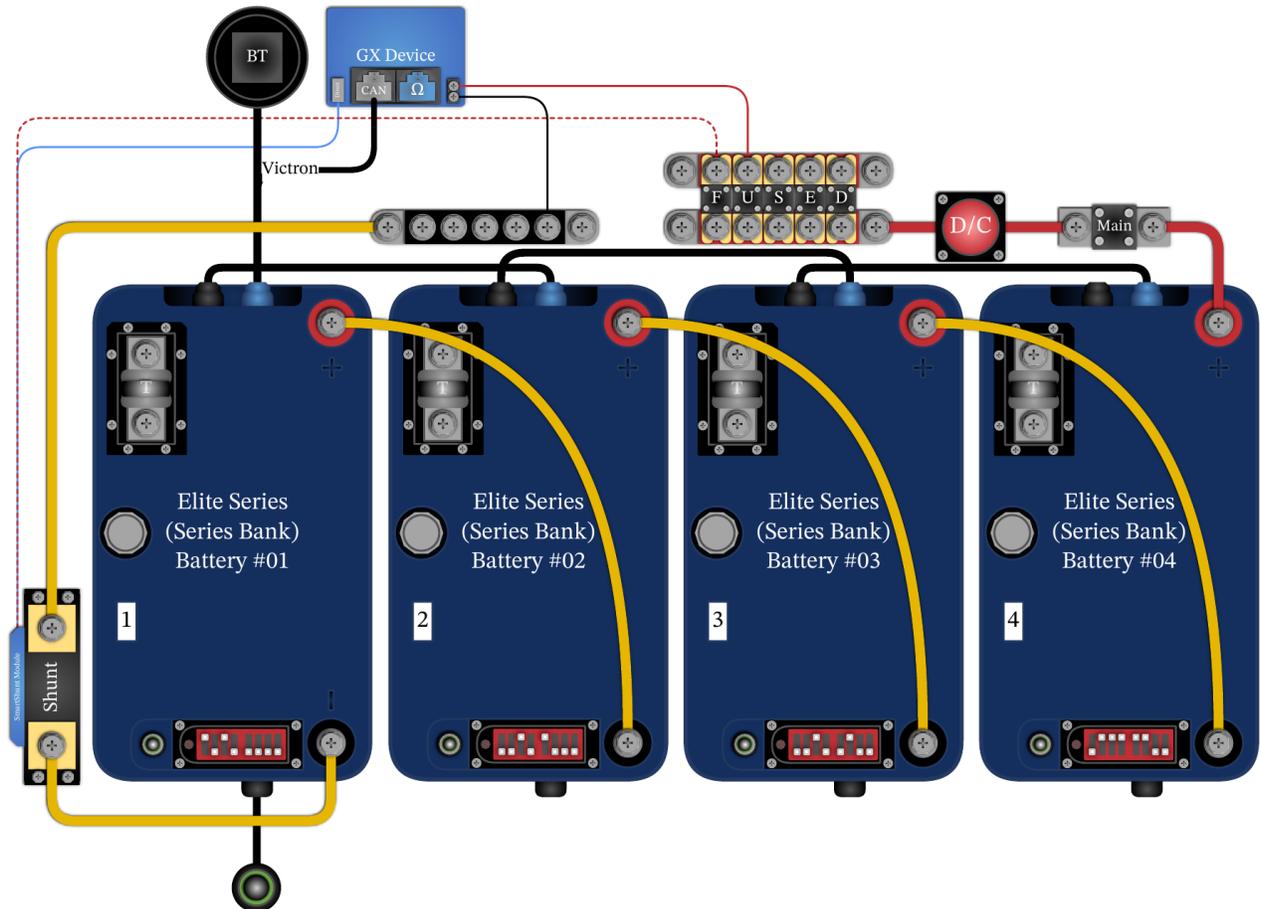
In a parallel bank, each battery output conductor is its own source and must be protected accordingly. Use equal-length positive and negative conductors from each battery to the common busbars, bring all units to closely matched open-circuit voltage before connection, and designate exactly one Master on the communications chain.



*Example parallel-bank integration layout.*

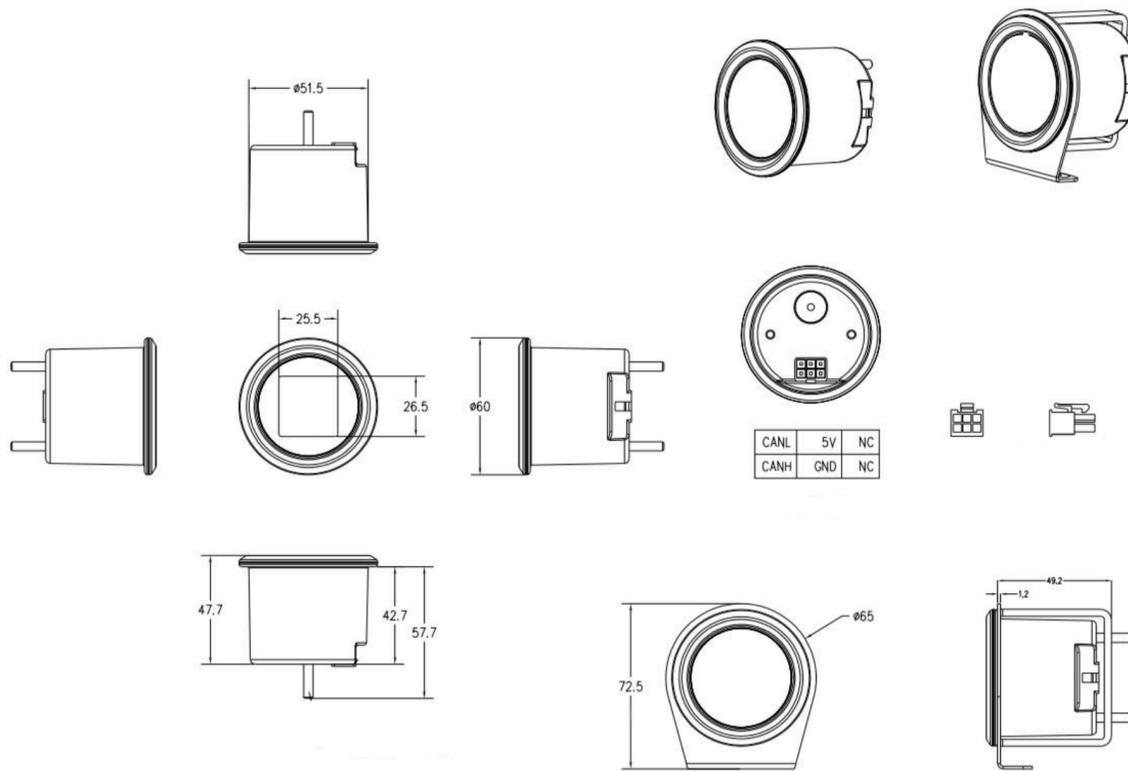
## 7.4 Series string integration

In a series string, system voltage increases while the reported amp-hour value remains that of one unit. Use equipment rated for the full string voltage, label the final system voltage at service points, bring units to closely matched open-circuit voltage before connection, and designate exactly one Master on the communications chain.



*Illustrative topology only. Supported series count depends on the installed model; see Chapter 4.*

## 7.5 Communications and Network layout



**Note: Bluetooth communications are located in the State of Charge meter.**

- Use a daisy-chained battery-to-battery network layout rather than branching or tee connections.
- Terminate the network correctly for the installed platform and connect the monitor to the designated Master.
- Document the monitoring platform, the authoritative state-of-charge source, and the final network topology in the commissioning record.

## 7.6 Commissioning verification

Check	Expected result
<b>Topology</b>	Installed arrangement matches the one-line diagram and Chapter 4 support limits
<b>Protected state</b>	Source and branch protection are present, labeled, and in the intended commissioning state
<b>Monitor view</b>	One managed battery is visible and alarms are clear
<b>Reported values</b>	Voltage and capacity reporting match the topology and Chapter 4 values
<b>Records</b>	Photos, monitor screenshots, and final notes are saved

## 8. Operation

*The system should already be installed, configured, and documented before this chapter is used in the field.*

### 8.1 Normal power-up

Before energizing, confirm that terminations are protected, the monitor is ready, and connected sources are in a safe state. Close the battery disconnect, energize chargers or controlled sources first, then bring loads online in a deliberate sequence.

### 8.2 Normal shutdown and isolation

When shutting the system down for service, reduce or isolate active loads and sources, open the battery disconnect, and place protection devices in the service state required for the work. Confirm that stored energy in connected equipment has dissipated before touching conductors.

### 8.3 In-use checks

- Check state of charge, pack voltage, charge or discharge current, and active alarms on the primary monitor.
- Investigate rapid unexplained state-of-charge changes, repeated current limiting, or persistent temperature alarms.
- Keep the compartment dry, clean, and accessible for inspection.

### 8.4 Storage and layup

For long layups, isolate the battery from loads and charge sources as appropriate, store it in a clean and dry environment, and keep it within the temperature limits in Chapter 4. Check state of charge periodically and top up as required for the storage plan.

### 8.5 Return to service after storage

Inspect the compartment, re-check terminal protection and torque, power the system up in a controlled sequence, and complete a normal full-charge event so the monitor and balancing logic can re-synchronize correctly.

### 8.6 After a protection event

If the battery has been limited or disconnected by a protection event, correct the underlying cause before attempting to resume normal use. Repeated resets without diagnosis can hide unsafe configuration, wiring, or charging problems.

### 8.7 Routine operator checks

During normal use, the operator should confirm that state of charge, pack voltage, and current behavior are plausible for the known loads and charge sources. Unexpected current limiting, repeated low-state-of-charge events, or persistent temperature alarms are service indicators and should be recorded rather than ignored.

Operator check	Normal expectation	Escalate when
State of charge	Changes in a direction consistent with charging or load	Drops rapidly without explanation or disagrees across displays
Voltage behavior	Stable for the present operating state	Collapses unexpectedly under modest load or rises abnormally during charging
Alarm state	No recurring active alarms	The same alarm returns repeatedly after reset
Compartment condition	Dry, clean, and accessible	Water, corrosion, heat damage, or loose hardware is observed

## **9. Charging guidance**

*All charge sources must be configured to the approved profile in Chapter 4 and coordinated so they do not fight the battery-management system.*

### **9.1 Use the approved charge profile**

Configure every connected charger, regulator, inverter/charger, and bench charger to the approved profile listed in Chapter 4. Do not enable disabled modes or alternate chemistries in an attempt to force faster charging or top-end hold time.

### **9.2 Managed and unmanaged charging**

When a managed battery is connected to a compatible monitoring and control platform, allow the battery-management system to remain the controlling authority for charge acceptance and related limits. Avoid manual overrides that cause the charger to ignore battery-published limits.

### **9.3 Multiple charge sources**

When more than one charge source can operate at the same time, confirm that the combined output remains within the bank limit defined in Chapter 4 and that conductors, switches, busbars, and protection devices are rated for the combined current path.

### **9.4 Alternator and engine-driven charging**

Use a regulated charging path between an alternator and the house bank. The charging system must remain stable and safe if the battery-management system reduces current or disconnects the battery from charging.

### **9.5 Commissioning charge**

After installation or service, perform a full commissioning charge using the approved profile. Confirm that the monitor shows plausible state of charge, stable current behavior, and no active alarms. Record the settings and final result in the commissioning log.

### **9.6 Cold-weather charging**

Where charging may occur near the low-temperature lockout threshold, plan for controlled warming of the installation environment and do not attempt to bypass protective functions. Use Chapter 4 as the single source for temperature limits.

### **9.7 Charger modes to keep disabled**

Do not enable equalization, desulfation, recondition, forced absorption extension, chemistry auto-detect, or other recovery modes intended for another battery chemistry unless a released project instruction specifically approves them. Disable automatic behaviors that repeatedly force charging after the battery-management system has reduced or stopped charge acceptance.

## 10. Monitoring

*Monitoring is most useful when one source of truth is selected and every installer records the same core evidence.*

### 10.1 Monitoring goals

- Visible state of charge, pack voltage, current, and alarm state.
- Clear identification of the authoritative state-of-charge source.
- A repeatable record of commissioning screens, alarm settings, and any later service changes.

### 10.2 Managed battery integration

Configure the monitoring platform to use the manufacturer-approved managed-battery profile for the connected system. If the platform can receive battery-published charge and discharge limits, do not create competing manual control paths unless the system design specifically requires it.

### 10.3 Shunt as a secondary reference

A shunt is valuable for redundancy and forensic diagnostics, but when a managed battery is present it should remain a secondary reference. Route every load and charge-source return through the shunt when a shunt is used; otherwise the calculated state of charge will be misleading.

### 10.4 Alarm design

At minimum, set alarms for low state of charge, elevated temperature, communication loss, and repeated current-limiting or protection events. Alarm actions should direct the operator to the affected equipment, not only to the monitor.

### 10.5 Remote monitoring and records

When remote monitoring is used, record the portal or system identifier, confirm online status, enable alerting, and keep screenshots or exports with the commissioning record. Operators should know which screen is authoritative when multiple displays exist.

### 10.6 Commissioning evidence to retain

Evidence item	What to save
Primary monitor screen	State of charge, voltage, current, and alarm status
Battery detail screen	Managed-battery identity and final bank view
Charger / controller settings	Profile, control mode, current limit, and communication status
Remote monitoring proof	Online status, portal or device identifier, and alerting enabled
As-built photos	Disconnect, source protection, shunt, busbars, and network terminations

### 10.7 Communication-loss first checks

If the monitor loses battery communications, first confirm power is present to the monitoring platform, then inspect the battery-to-battery chain, Master assignment, controller port selection, and any required endpoint handling or common reference. Correct only one suspected fault at a time, allow the system to re-establish the link, and then save a fresh screenshot once normal reporting returns.

## 11. Maintenance

*Routine maintenance should preserve safety, performance, and traceability without introducing unnecessary disturbance to the installation.*

### 11.1 Safety before maintenance

Before maintenance, isolate every charge source, open the battery disconnect, place protection devices in the service state required for the work, and verify zero energy at the work point with a meter.

### 11.2 Periodic inspection schedule

Perform maintenance as a controlled inspection rather than a casual visual glance. Use the interval table below as the minimum trigger for review, and shorten the interval where vibration, salt exposure, dust, heat, or high cycling duty justify it.

Interval	Tasks
Quarterly	Inspect compartment cleanliness, cable support, terminal protection, visible corrosion, and abnormal heat or odor.
Annual	Re-check torque, inspect restraints and routing, review monitoring logs, and update the service file.
After abnormal event	Inspect immediately after a protection event, water exposure, heavy impact, or repeated nuisance tripping.

#### 11.2.1 Visual inspection

Inspect the enclosure, restraints, cable support, boots, labels, seals, and surrounding compartment for water, contamination, corrosion, abrasion, heat damage, deformation, or mechanical interference.

#### 11.2.2 Mechanical and electrical inspection

Confirm terminations remain protected, verify accessible hardware is secure, compare monitor readings to expected operating behavior, and look for repeated current limiting, unexplained reporting changes, or nuisance protection events in the service record.

#### 11.2.3 Record review

Review alarm history, remote-monitor records, recent firmware or settings changes, and any operator comments since the last service event. Add fresh photos, torque notes, and corrective actions to the project file before returning the system to service.

#### 11.2.4 Criteria for escalation

Escalate the service event when loose hardware, damaged insulation, moisture intrusion, abnormal heat, repeated alarms, or unexplained reporting changes are observed. Do not restore the system to normal use until the cause has been identified and the installation record updated.

### 11.3 Cleaning and corrosion control

Keep the battery compartment clean and dry. Use cleaning methods that do not flood connectors or drive moisture into seals. After re-torque and inspection, apply only a light protective treatment to exposed external hardware if the environment requires it.

### 11.4 Firmware or software updates

Perform updates only on a stable system with moderate state of charge and no large changing loads. Keep the update device near the battery or controller, do not interrupt power during the update, and record the new version in the service file after confirming normal operation.

## 12. Troubleshooting

Use a repeatable diagnostic sequence and compare every setting against the single-source values in Chapter 4.

### 12.1 Diagnostic sequence

- Make the installation safe before investigating an active fault.
- Confirm the actual topology, disconnect state, source OCP state, and DIP roles.
- Verify monitor communication, the authoritative state-of-charge source, and alarm history.
- Compare charger and system settings to Chapter 4 values.
- Inspect conductor routing, connection torque, protection sizing, and the condition of fuse and bus hardware.
- Document the observed state before making multiple changes at once.

### 12.2 Common symptoms and first actions

Symptom	Likely cause	First actions
<b>No battery visible on monitor</b>	Network chain incomplete, wrong profile, missing reference, or wrong Master	Verify wiring order, profile, termination, and Master assignment.
<b>Two different SoC values</b>	Managed-battery SoC and shunt SoC are both treated as primary	Keep one authoritative SoC source and re-synchronize the secondary reference.
<b>Battery ignores charger settings</b>	Managed battery is publishing its own limits or the profile does not match Chapter 4	Check the control path and confirm the approved profile is selected.
<b>Charger stops early or current is limited</b>	Battery-management system is limiting charge, or source settings are conservative	Review alarms, temperature, and source settings before changing hardware.
<b>Inverter trips on startup</b>	Inrush or surge demand is too high, or cable-path resistance is excessive	Use soft-start where available, shorten and upsize the DC path, or expand the bank within Chapter 4 limits.
<b>One unit is not sharing current in a parallel bank</b>	Unequal cable resistance, loose lug, unmatched voltage, or role error	Correct cable symmetry, re-check torque, and verify unit role assignment.
<b>Warm cables or repeated fuse operation</b>	Undersized conductors, poor terminations, or misapplied protection	Inspect the whole current path and compare conductor and protection choices to the design basis.
<b>Intermittent communications faults</b>	Poor daisy-chain practice, bad termination, or unstable reference connection	Inspect network routing, terminations, crimp quality, and common reference continuity.
<b>Moisture or corrosion</b>	Ingress path, missing protection, or environmental contamination	Dry and clean the area, correct the ingress source, and replace damaged protection or hardware.

### 12.3 Information to capture before support

- Model and serial number, bank topology, install date, and recent changes
- Photos of source protection, disconnecting means, busbars, suspect connections, and any visible damage
- Monitor screens showing voltage, current, state of charge, and alarms
- Charge-source settings and a short timeline of what happened before the fault appeared

## 13. DIP switch configuration

*This chapter keeps the core role and sequencing procedure in one place and avoids spreading bank-reporting values across multiple pages.*

### 13.1 Purpose

DIP settings tell the battery network which unit acts as Master, which units act as Members, and which topology the bank is intended to report. Correct setup keeps monitor reporting consistent and reduces false troubleshooting paths.

### 13.2 Prerequisites

- Complete the mechanical installation, DC wiring, and communications chain before setting DIP roles.
- Verify polarity and topology physically before applying power to the finished bank.
- Power all units so the communications chain is fully awake before final verification.

### 13.3 Core rules

- Exactly one unit is the Master in each supported bank or string.
- All remaining units are Members.
- Select only one topology for the installed bank: standalone, supported parallel bank, or supported series string.
- Do not build mixed series-parallel configurations unless an approved release explicitly authorizes them.

### 13.4 Recommended setup sequence

Step	Action
1	Confirm that the wired topology matches the one-line diagram.
2	Power the bank so every unit is awake on the communications chain.
3	Assign one Master and set all remaining units as Members.
4	Select the installed topology on the applicable unit or units.
5	Allow time for the network handshake, then verify the monitor view.
6	Record roles, topology, screenshots, and any service notes in the project file.

**When connecting to a GX device via VE.CAN port, ensure that the port speed is set to 500kbit/s BMS for battery communications.**

## 13.5 DIP Switch Map

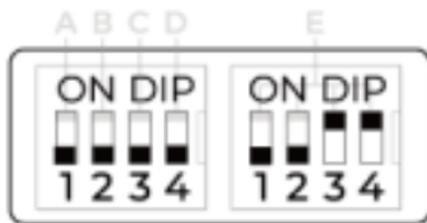
*How to use the DIP map*

### Use the map in the following order:

1. Confirm the physical topology from the one-line diagram and the installed wiring.
2. Go to Chapter 4 and verify that the requested bank size or series count is supported by the installed model.
3. Find the matching map for the installed bank size or string size.
4. Assign exactly one Master and set all remaining units as Members.
5. Power the bank, allow the network to handshake, and verify that the monitor shows one managed battery with plausible voltage and capacity.
6. Save the final role assignment and monitor screenshots in the project file.

### Quick interpretation rules

- Standalone maps describe one-battery reporting.
- Parallel maps scale bank reporting while preserving one bank identity.
- Series maps scale system voltage while capacity remains that of one unit.
- Chapter 4 remains the governing source for supported bank sizes and supported series count.
- When the monitor view disagrees with the physical wiring, correct the role or topology setting before changing charger settings or replacing hardware.

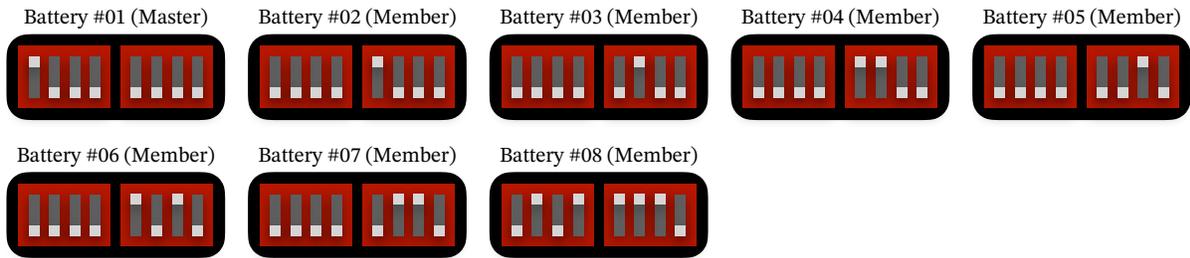


*Example setting:  
Battery #13 in parallel bank*

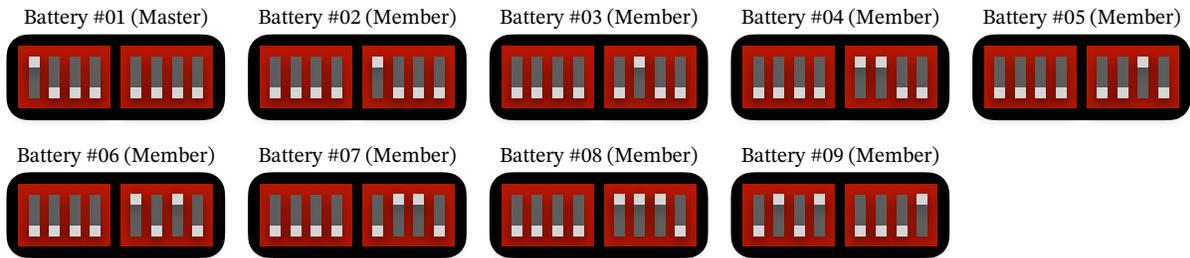
**The switch-position examples on the following pages describe role and topology encoding only. Supported bank sizes and model-specific limits are defined in Chapter 4 and govern all installations.**



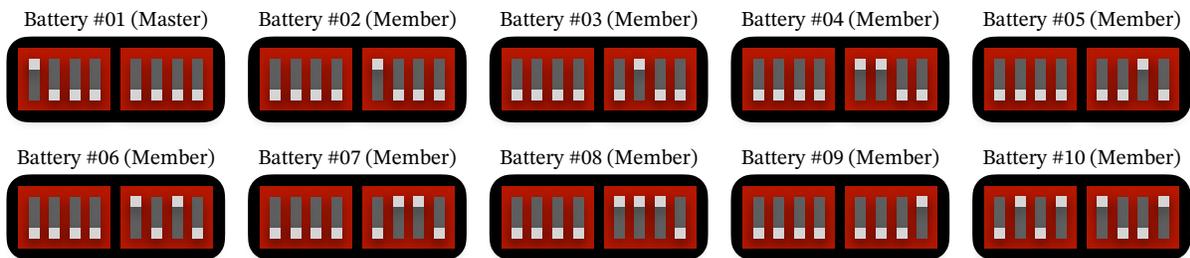
### 8 Parallel



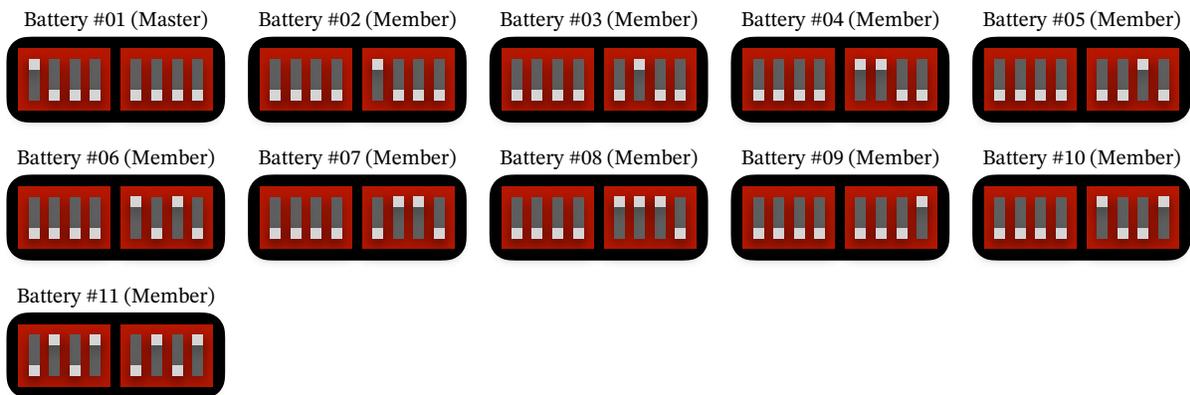
### 9 Parallel



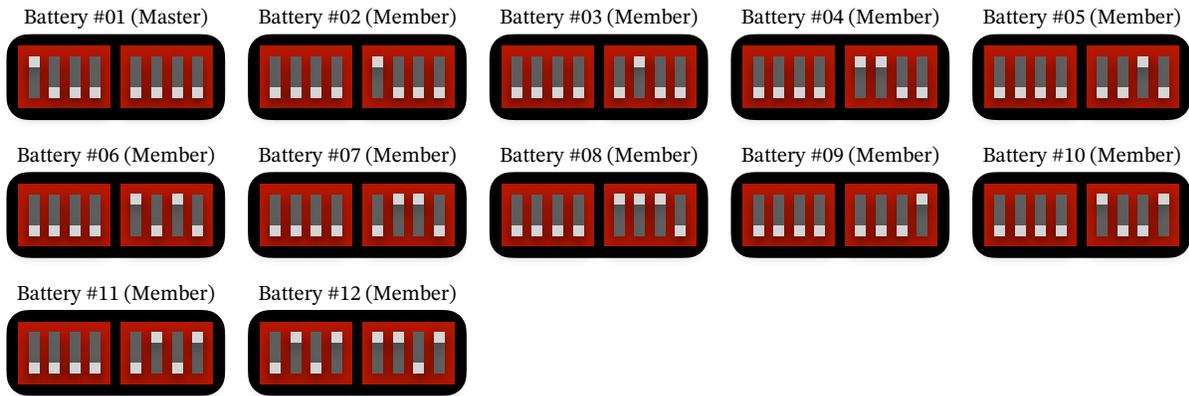
### 10 Parallel



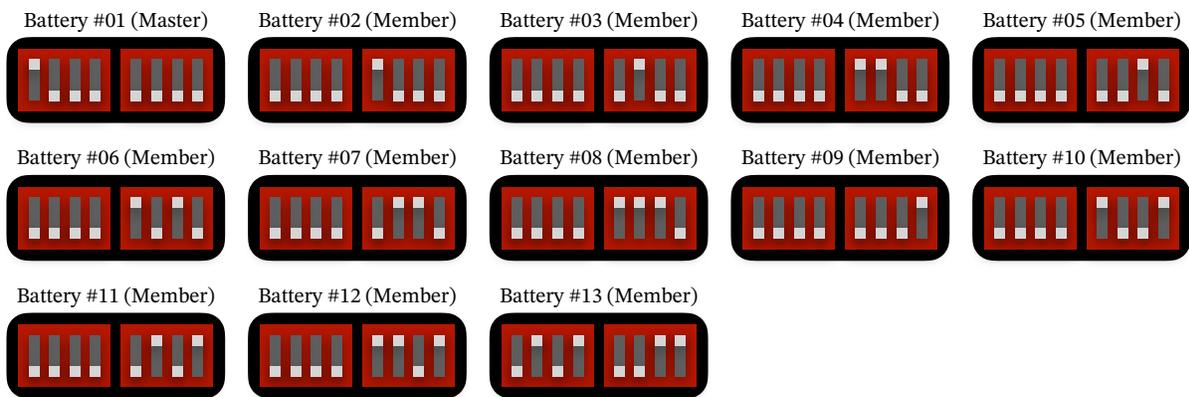
### 11 Parallel



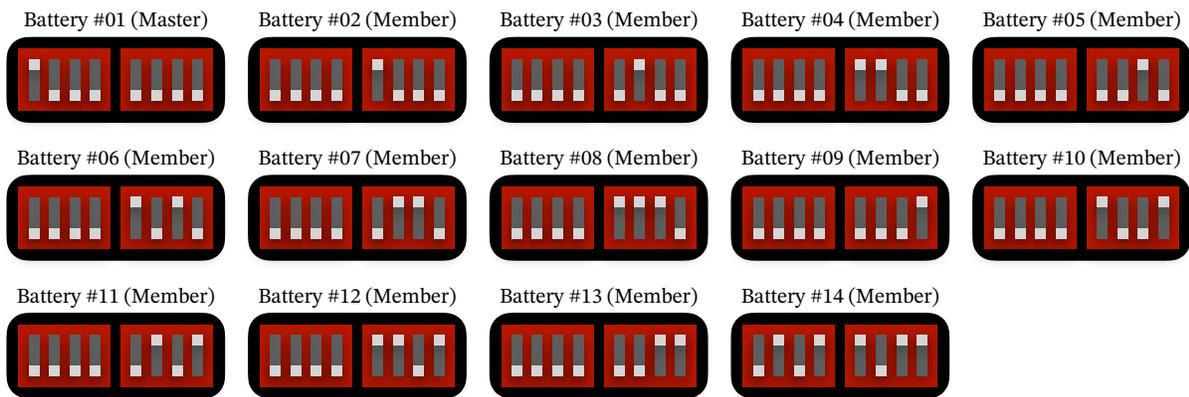
### 12 Parallel



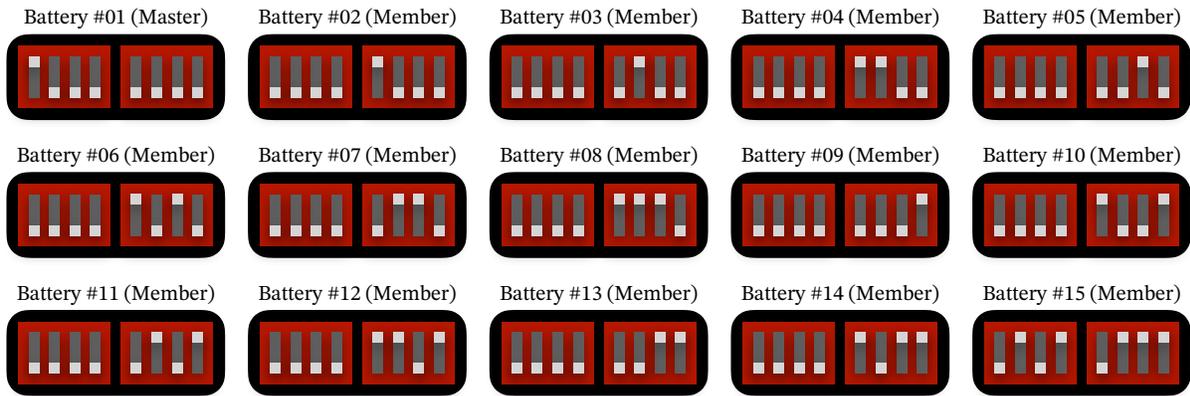
### 13 Parallel



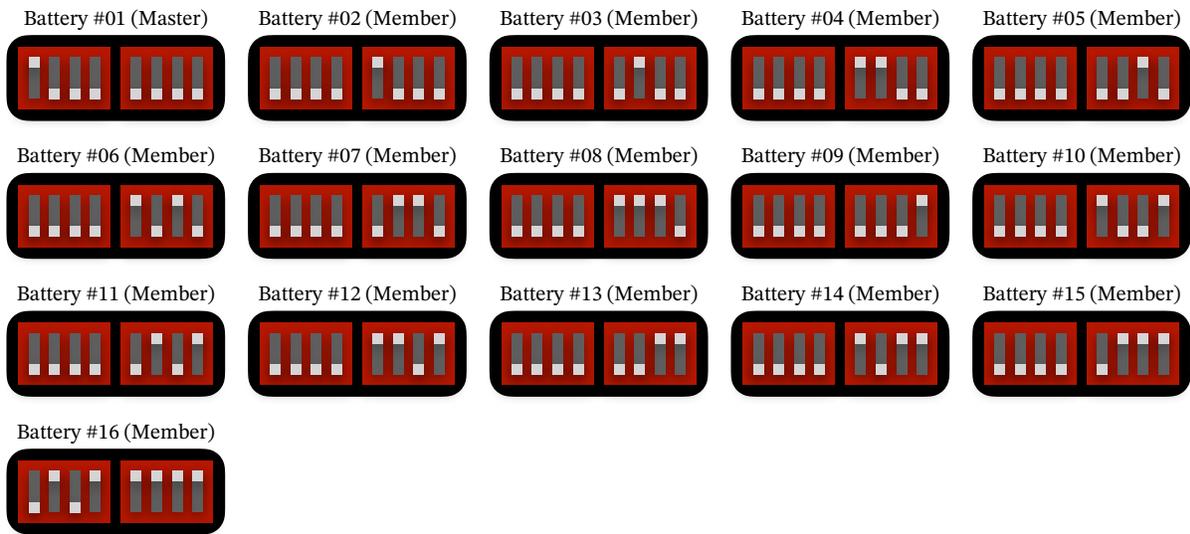
### 14 Parallel



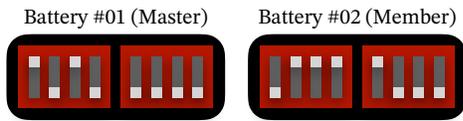
**15 Parallel**



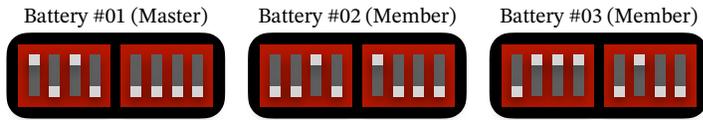
**16 Parallel**



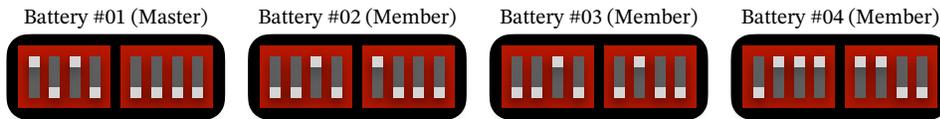
**2 Series – Refer to § 4.2 for configuration limits.**



**3 Series – Refer to § 4.2 for configuration limits.**



**4 Series – Refer to § 4.2 for configuration limits.**



**13.6 Verification checklist**

- The monitor shows one managed battery, not multiple duplicate batteries.
- Reported voltage matches the installed topology.
- Reported capacity and energy match the Chapter 4 values for the installed bank.
- No communication alarms, implausible SoC values, or duplicate Masters are present.

**13.7 Common faults after setup**

What you see	Most likely cause	First correction
<b>Large parallel bank reports one-unit capacity</b>	Master left in standalone or bank size not set correctly	Correct the topology and role assignment, then re-check the monitor.
<b>Multiple batteries shown on the monitor</b>	More than one Master or broken network chain	Leave one Master, set the rest to Members, and inspect the daisy-chain.
<b>Series system reports one-battery voltage</b>	Units left in standalone or parallel mode	Correct the topology selection and verify again after the handshake.
<b>Monitor does not see the bank</b>	Wrong port, incomplete chain, missing termination, or no common reference	Correct the network path and inspect the physical terminations.

## 14. Regulatory, standards, and references

Chapter 14 is the only chapter in this manual that names regulations, standards, and reference families.

### 14.1 How to use this chapter

Treat this chapter as the compliance map for the installation. Always apply the current adopted edition required by the authority having jurisdiction, insurer, surveyor, or customer contract, and record the edition used in the project file. Keep named standards, code articles, CFR citations, and listing references in this chapter only.

### 14.2 Common reference sets by installation type

Environment	Common reference set	Typical focus	Keep in file
<b>Marine</b>	ABYC E-11, ABYC E-13, and U.S. Coast Guard requirements where applicable	Wiring practice, conductor protection, securement, ignition protection, labeling, and lithium system design	One-line diagram, protection basis, securement photos, ignition-protection evidence
<b>RV and conversion</b>	NFPA 1192, NEC Article 551, and ANSI/RVIA low-voltage practices where applicable	Vehicle electrical installation, conductor routing, protection, labeling, and owner handoff records	One-line diagram, equipment settings, routing photos, owner handoff record
<b>Stationary / solar / ESS</b>	NEC Articles 690 and 706, NFPA 855, and adopted fire or building provisions such as IRC R328 or IFC 1207	PV integration, energy-storage placement, system labeling, shutdown planning, and inspection evidence	One-line diagram, equipment listings, photos, commissioning log
<b>Transport / disposal</b>	UN3480, 49 CFR 173.185, and local recycling or disposal rules	Packaging, markings, documentation, carrier acceptance, and damaged-battery handling	Shipping file, package photos, disposal record

### 14.3 Product and system standards frequently referenced

- UL 1973, UL 9540, and UL 9540A are commonly referenced in stationary battery and energy-storage projects, depending on jurisdiction and system scope.
- Ignition-protection markings may reference standards such as SAE J1171, UL 1500, or ISO 8846 when used in gasoline-vapor environments.
- Vendor documentation for the installed monitoring platform should be kept with the project file whenever communications, managed-battery control, or remote monitoring are used.

### 14.4 Evidence to retain

- As-built one-line diagram and equipment schedule
- Conductor sizing basis, overcurrent-protection basis, and AIC basis
- Photos of securement, OCP placement, terminal protection, labels, and communications terminations
- Commissioning results, screenshots, exported settings, and later service records