SSS StorageDOCK Batteries & Victron Energy

This page describes how to set up Victron Energy systems with StorageDOCK batteries. StorageDOCK batteries communicate with the Victron GX device over BMS-Can. When correctly connected, the battery BMS transmits Charge Voltage Limit (CVL), Charge Current Limit (CCL), Discharge Current Limit (DCL), State of Charge (SOC), cell voltages, and temperature data to the GX device. The GX device then distributes these limits to all connected Victron inverter/chargers and solar chargers via DVCC.

StorageDOCK batteries are available in two product ranges:

- **ES Range** – Residential systems (5.4 kWh to 24 kWh)
- **LV-Com Range** – Commercial systems (16.4 kWh to 98.4 kWh)

Always ensure that both Victron and StorageDOCK firmware are updated to the minimum required versions before commissioning. Firmware versions used during official Victron R&D testing are listed in Section 3.

1. Supported Battery Models

1.1 ES Range (Residential)

Model	Total Energy (kWh)	Usable Energy @ 80% DOD (kWh)	Nominal Voltage	Nominal Capacity	Max Charge (A)	Max Discharge (A)	Rec. Inverter
ES5.4K	5.4	4.32	51.2V	106 Ah	100	125	5 kVA
ES7.4K	7.4	5.9	51.2V	—	100	125	—
ES9.4K	9.4	7.5	51.2V	—	160	200	—
ES12K	12.0	9.6	51.2V	—	160	200	—
ES18K	18.0	14.4	51.2V	352 Ah	320	400	15 kVA
ES24K	24.0	19.2	51.2V	—	320	400	—

Nominal voltage for all ES Range models is **51.2V** (16 cells × 3.2V per cell). “48V” is the conventional system voltage designation used in Victron and inverter sizing. Usable energy is calculated at 80% DOD. Capacity in Ah and recommended inverter size are confirmed for ES5.4K and ES18K; refer to individual datasheets for remaining models.

1.2 LV-Com Range (Commercial)

Model	Capacity (kWh)	Nominal Voltage
LV-Com16.4/300	16.4	51.2V
LV-Com32.8/600	32.8	51.2V
LV-Com49.2/900	49.2	51.2V
LV-Com65.6/1000	65.6	51.2V
LV-Com82/1000	82.0	51.2V

Model	Capacity (kWh)	Nominal Voltage
LV-Com98.4/1000	98.4	51.2V

2. Victron Device Compatibility

StorageDOCK batteries are compatible with the following Victron product categories when connected via BMS-Can to a supported GX device:

- **GX Devices:** Cerbo GX, Cerbo-S GX, Ekrano GX
- **Inverter/Chargers:** VE.Bus Inverter/Chargers, & RS range, (minimum firmware: see Section 3)
- **Solar Chargers:** SmartSolar MPPT (minimum firmware: see Section 3)
- **Monitoring:** Victron VRM Portal (SOC, cell voltages, temperatures, alarms)

Only 48V Victron inverter/charger models are compatible with StorageDOCK batteries. 12V and 24V models are not supported.

3. Minimum Firmware Requirements

The following firmware versions were used during compatibility testing. It is always recommended to install the latest available firmware on all devices during commissioning.

Device	Minimum Firmware Version	Notes
StorageDOCK ES Range BMS	**v1.11**	All ES Range residential models
StorageDOCK LV-Com BMS	**v10.4**	All LV-Com commercial models
Victron GX Device (Venus OS)	**v3.70**	Cerbo GX, Cerbo-S GX, Ekrano GX
VE.Bus Inverter/Charger	**556**	
SmartSolar MPPT VE.Can	**v3.16**	

4. Hardware Requirements

The following hardware is required to connect StorageDOCK batteries to a Victron system:

1. A compatible Victron GX device (see Section 2)
2. **VE.Can to CAN-bus BMS cable – Type B** (Victron part number: ASS030520200)
   This cable is required for the pinout conversion between the GX device VE.Can port and the StorageDOCK CAN connector.
3. StorageDOCK batteries include **built-in CAN bus termination** — no external terminator is required on the battery end.

If other VE.Can devices (e.g., VE.Can MPPT solar chargers) are also connected to the GX device's VE.Can bus, ensure the last device in the VE.Can chain has a terminator fitted. The StorageDOCK CAN port connects to a VE.Can port configured for **BMS-Can** 500kbps on GX device, which is a separate bus from Victron VE.Can (250kbps) on supported GX devices.

5. CAN Bus Wiring

5.1 Protocol Specification

Parameter	Value
Baud Rate	500 kbps
Termination	VE.Can Terminator required on Victron GX end, No external terminator required on battery end
Required Cable Type	VE.Can to CAN-bus BMS **Type B**

5.2 Cable Pinout

StorageDOCK batteries require the **VE.Can to CAN-bus BMS Type B** cable (ASS030520200).

5.3 Connecting Multiple Batteries

When multiple StorageDOCK batteries are installed in parallel:

- Only **one CAN cable** connection to the GX device is required — connect to the designated master battery unit.
- See SSS StorageDOCK documentation for details how to configure additional battery units for parallel operation.
- The master BMS aggregates CCL and DCL values across all paralleled units and reports the combined limits to the GX device.
- A maximum of **8 units** may be connected in parallel per StorageDOCK system.

Parallel Charge and Discharge Current Limits by Model:

Due to internal BMS and bus-bar design, aggregate current limits are not simply a linear multiple of single-unit ratings. The BMS transmits the combined CCL and DCL values shown below to the GX device. Maximum parallel units for all ES Range models is **8**.

ES5.4K:

Units in Parallel	Max Discharge Current (DCL)	Max Charge Current (CCL)
1 unit	125A	100A
2 units	250A	200A
3 units	325A	280A
4 units	400A	360A

ES18K:

Units in Parallel	Max Discharge Current (DCL)	Max Charge Current (CCL)
1 unit	400A	320A
2 units	800A	640A
3 units	1000A	800A

Units in Parallel	Max Discharge Current (DCL)	Max Charge Current (CCL)
4 units	1200A	1000A

Parallel aggregate current limits plateau at 3+ units on both models, additional units do not proportionally increase CCL or DCL. For ES7.4K through ES24K parallel limits, refer to the individual product datasheets.

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6. GX Device Configuration

6.1 Selecting the CAN-bus Profile

On the Victron GX device, navigate to:

Settings → Services → CAN-bus profile

Select: **CAN-bus BMS (500 kbit/s)**

6.2 Setting the Battery Monitor

After the GX device reboots and detects the StorageDOCK battery, navigate to:

Settings → System Setup → Battery monitor

Select the StorageDOCK battery from the list of detected devices. This ensures the GX device uses the BMS-provided SOC, voltage, and current data as the primary battery monitoring source.

7. DVCC Settings

DVCC (Distributed Voltage and Current Control) is the mechanism by which the GX device distributes the BMS-provided charge and discharge limits to connected Victron devices. DVCC **must** be active for StorageDOCK batteries to function correctly in a Victron system.

The following DVCC settings are required and are enforced automatically by Venus OS upon detection of a StorageDOCK battery via CAN-bus:

DVCC Setting	Required Value	Enforcement
DVCC	**ON**	Forced ON
SVS – Shared Voltage Sense	**ON**	Forced ON
SCS – Shared Current Sense	**OFF**	Forced OFF
STS – Shared Temperature Sense	Do not touch	Not enforced — left at user setting

Refer to the Victron DVCC manual for a detailed explanation of each DVCC parameter and how they interact with a CAN-bus BMS.

8. Charge and Discharge Limits

The StorageDOCK BMS transmits CVL, CCL, and DCL to the Victron GX device over the BMS-Can. The GX device distributes these values to all connected inverter/chargers and solar chargers via DVCC.

8.1 ES Range (Residential) – CVL, CCL and DCL

Model	CVL (V)	CCL (A)	DCL (A)
ES5.4K	56	100	125
ES7.4K	56	100	125
ES9.4K	56	160	200
ES12K	56	160	200
ES18K	56	320	400
ES24K	56	320	400

8.2 LV-Com Range (Commercial) – CVL, CCL and DCL

Model	CVL (V)	CCL (A)	DCL (A)
LV-Com16.4/300	56	300	355
LV-Com32.8/600	56	600	710
LV-Com49.2/900	56	900	1065
LV-Com65.6/1000	56	1000	1300
LV-Com82/1000	56	1000	1300
LV-Com98.4/1000	56	1000	1300

CVL transmitted by the BMS over CAN-bus is **56V** for all StorageDOCK models. This corresponds to a maximum cell charge voltage of 3.50V per cell across the 16-cell pack. The recommended VEConfigure/VictronConnect bulk and absorption charge voltage setting is **56.4V** (see Section 13) - this is slightly above the BMS CVL and will not override it, since the BMS CVL takes precedence when DVCC is active.

It is normal for these values to vary during the charge cycle as the BMS signals to the Victron system if it needs to increase or decrease charging, and discharging.

9. BMS Protection Thresholds

StorageDOCK batteries implement hardware-level BMS protection independently of Victron. Under normal DVCC operation, Victron devices will respect the CVL/CCL/DCL limits transmitted by the BMS and will not reach the hardware protection thresholds below. These thresholds act as a last-resort safety layer.

Voltage Protection:

Protection Parameter	Threshold	Notes
Cell Minimum Voltage	**2.600V**	BMS cutout threshold
Cell Maximum Voltage	**3.750V**	BMS DSG MOSFET switches off
Cell Over-voltage Breaker	**3.900V**	Hardware breaker trips if MOSFET fails to respond
Pack Minimum Voltage	46V	Monitored for reference; not used as primary cutoff
Pack Maximum Voltage	57V	Monitored for reference; not used as primary cutoff

Temperature Operating Limits (ES18K):

Condition	Minimum	Maximum
Charging	5°C	45°C
Discharging	0°C	50°C

The BMS will limit or halt charging if cell temperature falls outside the recommended charge temperature range (5°C – 45°C). Operation outside the recommended temperature range will affect cycle life and may void warranty. The installation must be indoors, dry, clean, and temperature-regulated with a minimum of 200mm ventilation clearance around the unit.

Primary over/under-voltage protection is based on **individual cell voltages**, not pack voltage. Pack voltage thresholds are monitored for reference only and do not trigger cutouts independently.

9.1 Overcharge Protection Behaviour

As the battery approaches full charge, the BMS continues active balancing. If a runaway cell condition is detected:

1. The BMS switches off the DSG MOSFET when any cell reaches **3.750V**
2. If the MOSFET fails to switch off, the hardware breaker trips at **3.900V** per cell

9.2 Overdischarge Protection Behaviour

- The BMS monitors individual cell voltages continuously throughout discharge
- When the battery reaches 0% SOC, the BMS shuts down to protect the cells
- **No manual intervention is required to recover** — the battery self-recovers automatically when AC or PV power is available (see Section 11)

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10. Active Balancing

StorageDOCK batteries incorporate active cell balancing with the following parameters:

Parameter	Value
Balancing Start Voltage	3,380 mV per cell
Balancing Current	2A
Balancing Stop Condition	Cell-to-cell voltage delta < 10 mV

11. Auto Recovery and Black Start

StorageDOCK batteries support fully automatic black start recovery from both PV and AC sources. No manual intervention such as pressing reset, toggling a switch, or resetting a breaker is required during normal operational ranges.

11.1 Keepalive Message

Parameter	Value
Keepalive Timeout	10 minutes

Keepalive timeout behaviour:

- If the GX device does not send the keepalive message within the 10-minute timeout window, the StorageDOCK battery will remain operational provided the minimum cell voltage stays above **2,800 mV**
- If the keepalive message is not received **and** the minimum cell voltage drops to or below **2,800 mV**, the hardware breaker will trip to protect the battery cells

11.2 Black Start Test Results

Black start testing was conducted in accordance with the four official testing protocols provided by Victron R&D. The StorageDOCK ES5.4K passed all required tests.

Black Start from PV Input

ESS Mode during test: **Keep batteries charged** | Grid feed-in DC-coupled PV: **OFF**

Parameter	Value
PV Input at Test Start	120V @ 8A
Battery SOC at Start	0% (full BMS shutdown had occurred)
SOC at Inverter Boot	6%
SOC When Next Test Commenced	11%

VRM telemetry – at 0% SOC (pre-recovery):

Measurement	Value
Battery Voltage	47.67V
Min Cell Voltage	2.62V
Max Cell Voltage	3.09V

VRM telemetry – at 11% SOC (post-recovery):

Measurement	Value
Battery Voltage	51.92V
Min Cell Voltage	3.21V
Max Cell Voltage	3.25V

Black Start from AC Input

Parameter	Value
Starting SOC	11%
SOC at BMS Shutdown	5%
SOC at Inverter Boot (after AC connected)	6%
Final SOC Achieved	99%

VRM telemetry – at 5% SOC (pre-recovery):

Measurement	Value
Battery Voltage	46.93V
Min Cell Voltage	2.55V
Max Cell Voltage	3.07V

VRM telemetry – at 99% SOC:

Measurement	Value
Battery Voltage	54.22V
Min Cell Voltage	3.38V
Max Cell Voltage	3.40V

VRM telemetry – at 100% SOC (30 minutes after reaching 99%):

Measurement	Value
Battery Voltage	55.62V
Min Cell Voltage	3.46V
Max Cell Voltage	3.50V

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12. Cell Identification in the GX Device

The StorageDOCK BMS reports the **highest** and **lowest** voltage cells to the Victron GX device and VRM portal. Only these two cells are displayed in the Victron interface.

12.1 Cell Naming Convention – ES Range (Residential)

Identifier	Meaning
M[n]	Module number (e.g., M1 = Module 1)
B[n]	Bank number (e.g., B2 = Bank 2)
C[n]	Cell number (e.g., C17 = Cell 17)

Example: M1B2C17 = Module 1, Bank 2, Cell 17

12.2 Cell Naming Convention – LV-Com Range (Commercial)

Identifier	Meaning
S[n]	Stack number (e.g., S3 = Stack 3)
M[n]	Module number (e.g., M1 = Module 1)
C[n]	Cell number (e.g., C17 = Cell 17)

Example: `S3:M1C17` = Stack 3, Module 1, Cell 17

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13. Inverter/Charger and MPPT Settings

With DVCC active and the BMS transmitting CVL over CAN-bus, the GX device respects this limitation, even if higher voltage settings are set in VEConfigure or VictronConnect. The BMS CVL of **56V** takes precedence during normal operation. It is still essential to configure VEConfigure / VictronConnect with charge voltages that are **equal to or slightly above** the BMS CVL, this prevents spurious warnings.

13.1 Recommended VEConfigure / VictronConnect Charge Voltage Settings

The following charge voltage settings should be configured in VEConfigure or VictronConnect (for MultiPlus/Quattro) or VictronConnect (for MPPT solar chargers):

Setting	Recommended Value	Notes
Charge Voltage – Bulk	**56.4V**	Slightly above BMS CVL of 56V; BMS CVL overrides during DVCC operation
Charge Voltage – Absorption	**56.4V**	Set equal to bulk for $LiFePO_4$
Charge Voltage – Float	**55.2V**	Reduces cell stress during float; BMS still controls CVL

$LiFePO_4$ batteries do not require a traditional bulk/absorption/float charge cycle. With DVCC active, the BMS manages the charge voltage ceiling via CVL.

13.2 Recommended Inverter Size

For ES Range and LV-Com models, refer to the individual product datasheets for recommended inverter sizing.

14. Troubleshooting

Battery does not appear on the GX device

1. Confirm that **VE.Can & CAN-bus BMS (500 kbit/s)** is selected under Settings → Services → CAN-bus profile

2. Reboot the GX device after changing the CAN-bus profile — detection does not occur without a reboot
3. Verify the CAN cable is a **Type B** VE.Can to CAN-bus BMS cable and is securely seated at both ends
4. Confirm that StorageDOCK BMS firmware is at or above the minimum required version (v1.11 for ES Range; v10.4 for LV-Com)
5. Confirm the battery is powered on and the BMS is active

Unexpected charging behaviour or DVCC warnings

1. Verify DVCC is **ON** and SVS is **ON** in Settings → DVCC on the GX device
2. Verify SCS is **OFF** — enabling SCS alongside a CAN-bus BMS can produce conflicting current limits
3. Confirm the Battery Monitor is set to the StorageDOCK battery under Settings → System Setup → Battery monitor
4. Check that no other battery monitor (e.g., SmartShunt) is selected as the primary battery monitor

Battery does not recover after full discharge

1. Verify that at least one AC or PV charge source is connected and active
2. Check that the minimum cell voltage has not fallen to or below **2.800V** — if the keepalive signal was lost and a cell reached this level, the hardware breaker will have tripped
3. If the hardware breaker has tripped, refer to the StorageDOCK installation manual for the breaker reset procedure and root cause investigation before restarting