

Electrical Fuse Schedule (Implementation - Lynx Topology)

As-of date: 2026-02-18

Purpose: define each required fuse by circuit, protected conductor/device, holder/housing method, physical placement, and linked wire gauge assumptions for the approved Phase 1 Lynx architecture with a battery-backed 12V bus.

Related docs:

- Canonical electrical/system baseline: [docs/SYSTEMS.md](#)
- Implementation topology and conductor map: [docs/ELECTRICAL_overview_diagram.md](#)
- Battery and trunk recalculation record: [docs/ELECTRICAL_battery_fuse_wire_recalc_2026-02-18.md](#)
- Decisions/open items tracker: [docs/TRACKING.md](#)
- BOM source of truth: [bom/bom_estimated_items.csv](#)

Sweep Findings (2026-02-12)

Finding ID	Finding	Impact	Resolution status
FS-001	BB1248120 was modeled in planning docs as 120A on the 48V output.	Alternator-recovery math was materially overstated.	Corrected in bom/bom_estimated_items.csv row 18 and docs/SYSTEMS.md (~1500W, about 26A at 57.6V).
FS-002	Fuse schedule listed fuse values but not a complete housing/holder definition for every fuse family.	Install path and procurement freeze were ambiguous.	Resolved below with explicit holder/housing method and location per fuse ID.
FS-003	Fuse schedule did not tie each fuse to a conductor gauge plan.	Hard to verify "fuse protects conductor" rule at install time.	Resolved below with gauge mapping and assumptions.

Design Basis

- Topology: Victron Lynx Distributor M10 (LYN060102010) with 4 fused 48V branches.
- Battery bank assumption: 3x 48V 100Ah batteries in parallel (3 separate battery-positive conductors leaving batteries).
- 12V distribution assumption: 12V fuse block used as the shared junction device (main + stud = source combine, integrated negative bus/main - = return), fed by Orion-Tr Smart 48/12-30 charger and a 12V 100Ah LiFePO4 buffer battery branch.
- Parallel-bank safety rule: use one Class T fuse per battery-positive conductor leaving the battery. A single shared "bank fuse" does not protect the individual battery leads and does not prevent cross-feed faults between parallel batteries.
- Branch devices on Lynx:

1. MultiPlus-II 48/3000
2. SmartSolar 150/45
3. Sterling BB1248120 output
4. Orion-Tr 48/12-30 input

- 12V buffer battery protection and switching baseline: F-11 (100A class) on battery positive within ~7" of source, then SW-12V-BATT manual disconnect for service isolation.
- Phase 1 complexity lock: no automatic low-voltage disconnect (LVD) layer in this revision.
- SmartShunt control/power lead note: retain the Victron-supplied fused positive sense/power lead assembly (small-current harness), and avoid substituting lower-voltage automotive fuse components on the 48V system.
- Sterling rating basis used for this revision: BB1248120 output ceiling about 1500W (~26A at 57.6V), with 150A input fuse and 40A output fuse guidance.

Manufacturer References Used

- Victron MultiPlus-II 120V installation page (recommends 125A DC fuse for 48/3000 ; cable table includes AWG 1 to AWG 2/0 by length): https://www.victronenergy.com/media/pg/MultiPlus-II_120V/en/installation.html
- Victron SmartSolar MPPT 150/45 installation/spec pages (50A-63A battery fuse range, terminal limit 16 mm² / AWG 6): https://www.victronenergy.com/media/pg/Manual_SmartSolar_MPPT_150-35__150-45/en/installation.html and https://www.victronenergy.com/media/pg/Manual_SmartSolar_MPPT_150-35__150-45/en/technical-specifications.html
- Victron Orion-Tr Smart isolated DC-DC charger product page, manual, and datasheet (48V models require external input fuse per manual; 48/12-30 output rating and terminal limits per datasheet): <https://www.victronenergy.com/dc-dc-converters/orion-tr-dc-dc-converters-isolated>
- Victron Lynx Distributor manual (MEGA fuse carrier format): https://www.victronenergy.com/media/pg/Lynx_Distributor/en/installation.html
- Victron Orion-Tr Smart isolated DC-DC installation page (external input fuse guidance): https://www.victronenergy.com/media/pg/Orion-Tr_Smart_DC-DC_Charger_-Isolated/en/installation.html
- Victron fuse datasheet (for 48V systems use 58V -class fuses): <https://www.victronenergy.com/upload/documents/Datasheet-Fuses-EN.pdf>
- Sterling BB12V->48V charger references (model list includes BB1248120 , fuse/cable guidance): <https://sterling-power.com/products/battery-to-battery-chargers-12v-to-48v>
- Sterling BB12V->48V charger installation manual PDF (fuse/cable guidance): https://sterling-power.com/cdn/shop/files/bb1230_1240_1260_12120_122430_241230_241240_241260_241280_242430_124810_1248120_241280_242430_b2b_installation_manual.pdf

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- Blue Sea Systems guidance (fuse close to source): <https://www.bluesea.com/resources/1437>
- Blue Sea Class T holder-family compatibility (110A-200A vs 225A-400A):
https://www.bluesea.com/support/articles/Fuse_Blocks/1438>Selecting_Class_T_Fuses

Battery Branch Re-Baseline (2026-02-18)

- This schedule now uses a gated battery-branch baseline of 200A Class T per battery (F-01A/B/C) as a provisional default.
- Re-baseline method and calculations are documented in `docs/ELECTRICAL_battery_fuse_wire_recalc_2026-02-18.md`.
- Final lock gate for F-01A/B/C : capture a true 51.2V battery datasheet/manual with validated current and terminal limits before permanent fuse lock.
- Holder-family constraint: battery branch values below 225A require the 110A-200A Class T holder family. Do not pair <225A fuse targets with 225A-400A holder-only hardware.
- If validated battery or terminal limits are lower than current provisional assumptions, move F-01A/B/C to 175A and update BOM row 7 accordingly.

Required Fuse Map (Start-to-Finish, With Housing)

Fuse ID	Circuit (source -> load)	Protected wire/device	Fuse type and voltage class	Amperage	Holder or housing method	Physical location	Planned conductor gauge
F-01A	Battery A + -> bank positive combine/disconnect input	Battery A positive cable leaving battery	Class T (>=125VDC)	200A provisional	Blue Sea Class T fuse block (covered stud mount, 110A-200A family)	Battery compartment, within ~7" of Battery A positive post	2/0 AWG
F-01B	Battery B + -> bank positive combine/disconnect input	Battery B positive cable leaving battery	Class T (>=125VDC)	200A provisional	Blue Sea Class T fuse block (covered stud mount, 110A-200A family)	Battery compartment, within ~7" of Battery B positive post	2/0 AWG
F-01C	Battery C + -> bank positive combine/disconnect input	Battery C positive cable leaving battery	Class T (>=125VDC)	200A provisional	Blue Sea Class T fuse block (covered stud mount, 110A-200A family)	Battery compartment, within ~7" of Battery C positive post	2/0 AWG
F-02	Lynx Slot 1 -> MultiPlus DC+	Main inverter positive feeder	MEGA, 58V or 80V	125A	Integrated Lynx Distributor fuse slot	Lynx Distributor, Slot 1	2/0 AWG planned (AWG 1 minimum on short run)
F-03	Lynx Slot 2 -> SmartSolar BAT+	MPPT battery-side positive feeder	MEGA, 58V or 80V	60A	Integrated Lynx Distributor fuse slot	Lynx Distributor, Slot 2	6 AWG
F-04	Lynx Slot 3 -> Sterling BB1248120 output +	Sterling output feeder to house 48V bus	MEGA, 58V or 80V	40A	Integrated Lynx Distributor fuse slot	Lynx Distributor, Slot 3	6 AWG planned (10 AWG minimum per Sterling table)
F-05	Lynx Slot 4 -> 48v auxiliary feeder (Orion branch)	Aux feeder from Lynx to Orion-branch fuse point	MEGA, 58V or 80V	30A	Integrated Lynx Distributor fuse slot	Lynx Distributor, Slot 4	6 AWG
F-06	48v aux feeder -> Orion 48v input +	Orion input lead (device protection)	Inline MIDI/AMI/ANL family rated >=58VDC	20A target (23A if using Victron MIDI family)	Sealed inline fuse holder mounted on backplate	Electrical cabinet, mounted at source end of Orion input lead	6 AWG planned (8 AWG minimum per Orion cable table)
F-07	Orion 12v output + -> 12V fuse block main + stud	Main 12v feeder from Orion into shared source-combine point	MEGA, 58V or 80V	60A	Victron MEGA fuse holder (external, non-Lynx)	Electrical cabinet, within ~7" of Orion 12V output stud	6 AWG planned (8 AWG minimum per Orion cable table)
F-08	Starter battery + -> Sterling BB1248120 input +	Vehicle-side charger input cable	MEGA/ANL equivalent rated >=32VDC	150A	Sealed engine-bay fuse holder with high-temp cover	Engine bay, within ~7" of starter battery positive post	2/0 AWG planned (2 AWG minimum per Sterling table)

F-09A/B/C	PV string + leads -> MPPT PV combiner	Each solar string positive conductor and reverse-current path	gPV string fuse (>=150VDC)	15A each (provisional)	10x38 touch-safe PV fuse holders in weatherproof combiner enclosure	Roof-entry combiner near gland/pass-through	10 AWG PV wire
F-10	12v fuse block branch circuits -> each 12v load	Individual 12v branch conductors and load circuits	ATO/ATC blade fuses (32v class)	Per-circuit	Integrated sockets in generic marine 12v fuse block	12v fuse block in electrical cabinet	Per branch (table below)
F-11	12V buffer battery + -> 12V fuse block main + stud via SW-12V-BATT	Buffer battery source cable and downstream junction fault exposure	Inline MIDI/AMI/ANL family rated >=32VDC	100A class baseline	Sealed inline holder mounted close to battery positive	Within ~`7" of 12V buffer battery positive post	4 AWG planned
OEM-SHUNT	Lynx positive tap -> SmartShunt positive sense/power lead	SmartShunt electronics lead	Victron OEM inline low-current fuse (factory harness)	OEM value (small-current harness fuse)	Integrated inline holder in supplied harness	Electrical cabinet near Lynx positive tap	OEM harness lead

Notes:

- Victron Orion fuse table is keyed by side voltage (`input` or `output`). For `48/12-30` : `F-06` tracks the `48V` input side (`20A / 23A` family), and `F-07` tracks the `12V` output side (`60A`).

12V Buffer Battery Switching Requirement

- `SW-12V-BATT` is a manual service disconnect in the 12V buffer battery positive path, installed downstream of `F-11`.
- Operational default:
 1. `SW-12V-BATT` closed (`NORMAL`) for battery-backed shared-junction operation.
 2. `SW-12V-BATT` open (`SERVICE`) for battery isolation or Orion-only validation mode.
- Service-path note: the Orion `12V` output remains connected to the fuse-block main + stud through `F-07` even when `SW-12V-BATT` is open.
- Maintenance-path note: when `SW-12V-BATT` is closed, Orion output can maintain/charge the buffer battery through the shared fuse-block main + stud path.
- Do not solder-splice high-current source conductors; use crimped lugs on rated studs/junction hardware.
- Keep always-on safety branch (`12V-05`) unswitched at branch level; isolation is handled at source path controls.

12V Branch Fuse + Gauge Assignments (Initial Build)

Circuit	Planned load	Fuse	Planned wire gauge	Notes
12V-01	Starlink DC power supply	10A	14 AWG duplex	Remote-work load path
12V-02	Fridge (35-50qt)	15A	14 AWG duplex	Current estimate pass flags this as a voltage-drop warning at ~12 ft; hold <=8 ft or move to 12 AWG
12V-03	Diesel heater electrical	15A	14 AWG duplex	Startup surge expected; estimate pass flags tight margin at ~8 ft
12V-04	Water pump	10A	14 AWG duplex	Intermittent duty
12V-05	CO + propane detector	3A	18/2	Always-on safety load
12V-06	LED strips	5A	18/2	Estimate pass flags voltage-drop warning at ~8 ft; shorten run/load or upsize
12V-07	Cerbo GX power feed (assumed via 12V panel)	3A	18/2	Assumption until final harness lock
12V-08	USB PD station branch (office zone)	20A	12 AWG duplex	Keep <=5 ft (estimate-pass assumption) or upsize
12V-09	USB PD station branch (galley zone)	15A	14 AWG duplex	Current estimate pass assumes ~8 ft and ~8A expected load; move to 12 AWG if sustained current rises

Length-Validation Sync (2026-02-18)

- `docs/ELECTRICAL_overview_diagram.md` now carries one-way estimated lengths and voltage-drop screening for `C-01` through `C-35`.
- Lynx Orion-feeder branch fuse (`F-05`) is locked to `30A MEGA` for BOM sync in this pass.
- USB branch baseline is synchronized across docs/BOM: office branch `12 AWG` (`C-34`), galley branch `14 AWG` (`C-35`).

Holder Ecosystem Standard (Procurement Guidance)

Fuse family	Preferred holder style	Why
Class T (F-01A/B/C)	Covered stud-mounted marine block (110A-200A family for current baseline)	High interrupt capacity and robust battery-compartment mounting; holder family must match chosen Class T range
MEGA (58v/80v) in Lynx (F-02 to F-05)	Lynx integrated holders only	Eliminates separate branch fuse block and keeps topology locked
Inline 48v Orion input (F-06)	Sealed MIDI/AMI-compatible holder on interior backplate	Keeps source-end protection near branch takeoff
Orion output (F-07) 60A MEGA	Victron external MEGA holder at Orion output	Standardizes 60A spare pool with MPPT fuse family
12V buffer battery main (F-11)	Sealed MIDI/AMI/ANL holder near battery	Protects shared 12V source-junction path from battery fault current
12V battery disconnect (SW-12V-BATT)	Sealed rotary DC switch near distribution cabinet access	Provides simple service isolation without adding LVD complexity
Engine-bay Sterling input (F-08)	Sealed MEGA/ANL holder, high-temp/engine-bay suitable	Environmental robustness and source-proximate protection
PV string fuses (F-09)	DIN-rail 10x38 gPV holders in weatherproof combiner	Proper PV-voltage insulation and serviceable string isolation
12V branches (F-10)	Integrated blade sockets in marine fuse block	Fast field service and clear branch labeling
SmartShunt positive lead (factory harness)	Keep Victron-supplied inline fused lead assembly	Preserves vendor-qualified low-current protection path for shunt electronics

Spare Fuse Inventory

Fuse type	Installed qty	Spare qty to carry	Notes
Class T 200A (provisional installed)	3	3	One spare per installed battery fuse while 200A baseline is active
Class T 175A (alternate pending final battery datasheet lock)	0	3 optional	Optional non-regret alternate set if budget allows; install only if final lock gate requires lower value
MEGA 125A (58V/80V)	1	4	MultiPlus branch; BOM lock is x5 total
MEGA 60A (58V/80V)	2	4	Shared pool for MPPT (F-03) + Orion output (F-07); target 6 total
MEGA 40A (58V/80V)	1	2	Sterling branch; BOM lock is x3 total
MEGA 30A (58V)	1	2	Orion feeder branch; BOM lock is x3 total
Orion input fuse (20A target / 23A MIDI)	1	2	Match installed holder family
12V buffer battery main fuse (100A class)	1	2	Keep exact spare value matched to final F-11 holder family
Sterling input fuse 150A (32V+)	1	1	Vehicle-side charger input
PV string fuse 15A gPV	3	3	One spare per string
SmartShunt OEM harness fuse	1	1	Keep OEM-equivalent spare if the fuse is field-replaceable on final harness
ATO/ATC branch fuses	variable	2 each used value	Keep mixed kit onboard

BOM Row Mapping

Fuse scope	BOM row(s)
Main battery Class T protection (F-01A/F-01B/F-01C) + Class T spares	bom/bom_estimated_items.csv row 7
Lynx branch MEGA fuses (F-02 to F-05) installed + spare set	bom/bom_estimated_items.csv row 10
Orion/Sterling installed fuse-holder hardware (F-06, F-07, F-08)	bom/bom_estimated_items.csv row 11
12V buffer battery and main fuse (F-11)	bom/bom_estimated_items.csv row 21
12V branch panel and blade fuses (F-10)	bom/bom_estimated_items.csv row 16

SmartShunt OEM fused lead (OEM-SHUNT)	bom/bom_estimated_items.csv row 23 (included with SmartShunt kit)
High-current spare fuse kit (non-Lynx spares, if retained)	bom/bom_estimated_items.csv row 105
PV string fuses + holder (F-09A/B/C) and spares	bom/bom_estimated_items.csv row 106

Lynx MEGA Procurement Lock (BOM Sync)

- Updated row 10 fuse-family lock: 125A x5 , 60A x6 (shared F-03 + F-07 pool), 40A x3 , 30A x3 .
- Updated row 10 estimate tracks the added 60A pack for 6 total 60A MEGA fuses.

Assumptions and Open Items

1. Wire sizing above assumes copper conductors, enclosed vehicle routing, and the one-way run-length estimate set in [docs/ELECTRICAL_overview_diagram.md](#) (2026-02-18 pass).
2. F-09A/B/C remains provisional at 15A pending final solar module datasheet max-series-fuse confirmation.
3. Final SKU lock is still required for inline holders used by F-06 , F-08 , and F-11 , plus the external Victron MEGA holder for F-07 and SW-12V-BATT .
4. If Orion run lengths exceed the short/medium assumption, keep F-06 / F-07 and upsize conductors before energizing.
5. Do not use 32V automotive MEGA fuses on 48V house circuits; use 58V / 80V DC-rated fuses only.
6. Keep the SmartShunt fused lead as an OEM harness item unless an equivalent voltage-rated replacement is fully validated.
7. SW-12V-BATT is manual-only in Phase 1; no automatic LVD behavior is assumed in this schedule.
8. Battery listing data (<=200A current limit) is currently treated as provisional because the provided screenshot includes 14.6V/14.2V values that are not a 51.2V profile; final lock requires validated 51.2V battery documentation.
9. If final battery current or terminal limits are lower than current assumptions, down-select F-01A/B/C to 175A and keep fuse-to-conductor coordination synchronized with [docs/ELECTRICAL_overview_diagram.md](#) and [bom/bom_estimated_items.csv](#) .
10. Orion fuse selection is side-voltage based per Victron table (input or output), not just converter model number. Keep F-06 and F-07 aligned to 48V input / 12V output sides.