AEC

MODULAR ONLINE UPS · INTERNAL BATTERIES · 480/277 V

CIRRO-IB 30–150 kVA

Quick Installation Guide

From delivery to normal mode, for the 150 kVA cabinet. The installer prepares the site, the cabinet and the wiring; an engineer approved by AEC commissions the UPS. Qualified electricians only. Read every safety message.



150 kVA cabinet · 5 slots | CIRIB150-1X30 … -5X30 | CIRIB-PWR-30 module

AEC-QG-CIRIB-US · REV. B · NOVEMBER 2026

i NOTE **Who does what.** The installer (a qualified electrician) does steps 1 to 6: site, placing, power modules, breakers and cables to the NEC, terminals, battery trays and control cables — with every breaker open and no power applied. **An engineer approved by AEC commissions the UPS** (steps 7 and 8): do not apply power before the AEC engineer is on site. Book the commissioning with AEC support when the wiring is finished.

1 Safety first

⚠ DANGER

Hazardous voltage. The utility inputs and the internal battery are lethal. The cabinet holds 240 VRLA blocks in six strings of ±240 V DC (480 V DC between BAT+ and BAT−); the battery stays live when the UPS is off. Before you move or reconnect any cable, open all input breakers and the battery breaker, wait at least 10 minutes and check with a multimeter that the terminals are below 36 V DC (30 V AC).

⚠ WARNING

- Only qualified electricians install and wire the UPS. Do not put the UPS into operation until an engineer approved by AEC has commissioned it: otherwise there is a risk to people, the equipment may malfunction and the warranty is void.
- Ground the UPS and size every conductor and breaker according to the National Electrical Code (NFPA 70, 2023) and local codes. Connect the protective earth (PE) first.
- Work on live parts is electrical work under NFPA 70E: a shock and arc-flash risk assessment sets the PPE. Lock out and tag the upstream breakers, test for absence of voltage, and remember that the internal battery stays live behind the Battery breaker.
- Battery work: remove rings, watches and metal jewelry, wear rubber gloves and eye protection, and use tools with insulated handles. Reversed battery polarity can cause explosion and fire.
- In case of fire, use a dry-chemical (powder) extinguisher only.

2 Check the delivery and the site

1. Check the packing for damage. If there is any, notify the carrier and AEC.
2. Move the crate to the site with a forklift rated for the weight: up to 2,400 lb (1,089 kg) with batteries.
3. Open the top plate of the crate, then the side boards. Remove the protective foam.
4. Check the cabinet for damage and the contents: the 150 kVA cabinet with the bypass & monitoring module, the touchscreen and the breakers, on four anchor bolts (no casters: moved with a pallet truck or forklift); the power modules ordered and the 24 battery trays (fitted, or packed separately); the user manual.

5 Remove the bolts that hold the cabinet to the pallet. Move the cabinet with a pallet truck or forklift, carefully to avoid scratching it.

TABLE 2-1 Site

Item	Requirement
Location	Indoors; dry, clean, ventilated; away from water, heat sources, flammable, explosive or corrosive substances, conductive dust, salt air and direct sunlight
Temperature · humidity	32–104 °F (0–40 °C), 68–77 °F (20–25 °C) for maximum battery life · 0–95 % RH, non-condensing
Altitude	Full power up to 4,900 ft (1,500 m); up to 6,560 ft (2,000 m) derate 1 % per 490 ft (150 m); above it consult AEC
Floor	Rated for up to 2,400 lb (1,089 kg) on a 23.6 × 39.4 in (600 × 1,000 mm) footprint: about 371 lb/ft² (1,809 kg/m²), 598 lb (271 kg) per anchor bolt (calculated); no vibration, less than 5° inclination. No seismic qualification is published: ask AEC
Heat at full load	About 4,270 BTU/h at 30 kVA to 21,330 BTU/h at 150 kVA (calculated at 96 % efficiency; more while the battery recharges)
Ventilation	According to NFPA 70 Article 480 and IEEE 1635: the batteries give off hydrogen at the end of charging

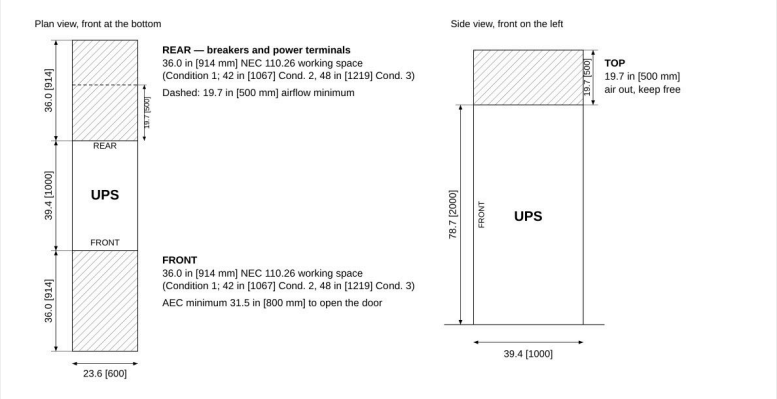


FIGURE 2-1 Working space and clearances, in inches [mm]: plan view (left) and side view (right); hatched areas keep free

- **Front and rear:** NEC 110.26(A) working space, because the breakers and the power terminals are at the rear and are operated while energized: 3 ft (914 mm) deep for Condition 1, 3.5 ft (1.07 m) for Condition 2, 4 ft (1.22 m) for Condition 3; at least 30 in (762 mm) wide or the width of the equipment, and 6.5 ft (2.0 m) high. At the front this governs over the AEC minimum of 31.5 in (800 mm) to open the door and replace modules.
- **Rear, for air only:** 19.7 in (500 mm) is the cooling minimum, not a working space. **Top:** at least 19.7 in (500 mm).

3 Place the cabinet and fit the power modules

⚠ WARNING

The cabinet is heavy and tall: 616 lb (279.4 kg) empty, plus 50.7 lb (23 kg) per module and 63.5 lb (28.8 kg) per battery tray. It has no casters: move it with a pallet truck or forklift rated for the weight. Fit the modules and trays only after the cabinet is in its final place. On a floor that is not strong enough, spread the load with steel plates or larger supports under the anchor bolts.

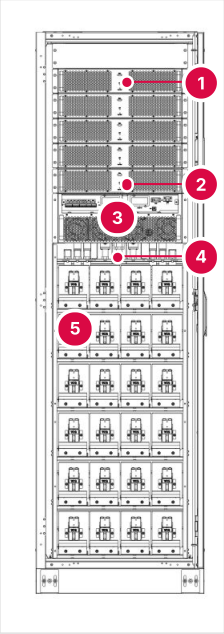
1 Retract the anchor bolts: turn them counterclockwise with a wrench, so the pallet truck can set the cabinet down without catching them.

2 Set the cabinet down in its final place, over the floor opening for the cables.

3 Lower the anchor bolts: turn them clockwise until the cabinet rests on them (support points 21.1 in / 535 mm apart side to side, 29.5 in / 750 mm front to back). Check that the cabinet is level and does not move.

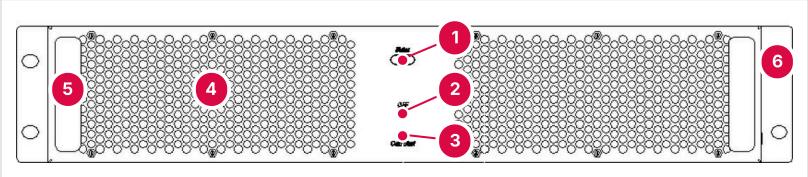
4 Remove the slot covers for the number of modules ordered.

5. Insert the modules from the bottom slot upward (No. 1 at the bottom, Figure 3-1).
6. Push each module fully in and tighten the fixing screws on both sides (Figure 3-2, item 6). Leave the empty slots closed.



1. 5 power-module slots (No. 1 at the bottom, No. 5 at the top)
2. Power module No. 1, bottom slot
3. Bypass & monitoring module: communication panel
4. Battery connection row
5. Battery trays, 4 per row × 6 rows = 24

FIGURE 3-1 The 150 kVA cabinet with the front door open



1. Status LED, green: the module runs
2. OFF pinhole
3. Cold Start pinhole
4. Fan grilles: air in, front to back
5. Handles
6. Mounting ears with the fixing screws

FIGURE 3-2 Front of a 30 kVA power module (CIRIB-PWR-30)

4 Wire the power

The breakers and the power terminals are at the rear, behind the two rear doors (Figure 4-1). Install the external breakers in the distribution panel.

- The UPS is a continuous load: every overcurrent device is at least **125 % of the continuous current** (NEC 210.20(A), 215.3), rounded up to the next standard rating (NEC 240.6(A)). All AC breakers are 3-pole; the neutral is not switched.
- The bypass input has **no breaker in the cabinet**. With a single feed (copper link fitted) the main input breaker feeds both inputs. With a separate bypass feed, each input needs its own breaker, fed from sources with the same neutral.
- **Source and grounding:** 4-wire supply, the main input neutral (mN) is required; solidly grounded 480Y/277 V wye only (not high-resistance-grounded, ungrounded or corner-grounded delta). The neutral passes through the UPS: do not bond neutral to ground at the UPS or in the panel it feeds (NEC 250.24(A)(5), 250.142(B)).
- **Ground-fault protection:** residual-current (RCD/GFCI-type) devices are not recommended on the UPS feeds. GFPE is required only on 1,000 A and larger service and feeder disconnects (NEC 230.95, 215.10, 240.13); where the upstream switchgear has it, set its time delay to at least 0.2 s and its pickup above the leakage current, with neutral sensing.
- If modules will be added later, size the breakers and conductors for the final build.

TABLE 4-1 Currents and external breakers for each build — 480 V

Build	Modules	Max. input current	Rated bypass / output current	Max. battery current	Main input breaker	Bypass / output breaker	Battery breaker (DC)
30 kVA	1	45 A	36 A	64 A	60 A	45 A	90 A
60 kVA	2	90 A	72 A	128 A	125 A	90 A	175 A
90 kVA	3	135 A	108 A	187 A	175 A	150 A	250 A
120 kVA	4	180 A	144 A	257 A	225 A	200 A	350 A
150 kVA	5	225 A	180 A	321 A	300 A	225 A	450 A

Currents at 480 V; battery current at the nominal 480 V DC. Breakers: 125 % of the current, next standard rating (150 kVA: 225 A × 1.25 = 281 A → 300 A). The battery breaker column applies only where AEC specifies an external DC circuit on the BATT terminals: a DC-rated device for at least 588 V DC (600 V DC rating). The maintenance bypass breaker in the cabinet is 225 A, 3-pole.

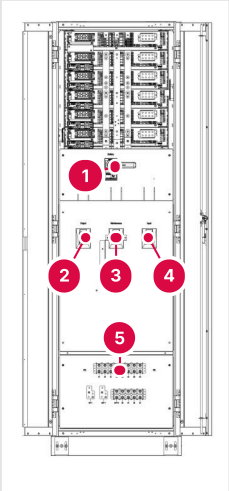
TABLE 4-2 Minimum copper conductors — 75 °C, NEC Table 310.16

Build	Main input A, B, C	Bypass input and output A, B, C	Neutral: mN, bN, oN	Battery +, N, – (external DC only)
30 kVA	6 AWG [13.3 mm²]	8 AWG [8.4 mm²]	6 AWG [13.3 mm²]	3 AWG [26.7 mm²]
60 kVA	1 AWG [42.4 mm²]	3 AWG [26.7 mm²]	1 AWG [42.4 mm²]	2/0 AWG [67.4 mm²]
90 kVA	2/0 AWG [67.4 mm²]	1/0 AWG [53.5 mm²]	3/0 AWG [85 mm²]	250 kcmil [127 mm²]
120 kVA	4/0 AWG [107 mm²]	3/0 AWG [85 mm²]	250 kcmil [127 mm²]	500 kcmil or 2 × 3/0 AWG [253 or 2 × 85 mm²]
150 kVA	350 kcmil [177 mm²]	4/0 AWG [107 mm²]	350 kcmil [177 mm²]	2 × 4/0 AWG [2 × 107 mm²]

TABLE 4-3 Minimum equipment grounding conductors (EGC), copper — NEC Table 250.122

Build	Main input	Bypass input · output	Battery DC (external only)
30 kVA	10 AWG [5.3 mm²]	10 AWG [5.3 mm²]	8 AWG [8.4 mm²]
60 kVA	6 AWG [13.3 mm²]	8 AWG [8.4 mm²]	6 AWG [13.3 mm²]
90 kVA	6 AWG [13.3 mm²]	6 AWG [13.3 mm²]	4 AWG [21.2 mm²]
120 kVA	4 AWG [21.2 mm²]	6 AWG [13.3 mm²]	3 AWG [26.7 mm²]
150 kVA	4 AWG [21.2 mm²]	4 AWG [21.2 mm²]	2 AWG [33.6 mm²]

- Copper, 75 °C (NEC 110.14(C)); ampacity at least the breaker rating (NEC 240.4, without the next-size-up rule of 240.4(B)); up to three current-carrying conductors in a raceway, 86 °F (30 °C) ambient: correct for other conditions (NEC 310.15). Final sizing is by the electrical engineer of record.
- **Neutral:** rated 1.7 × the rated output current for mainly non-linear loads (NEC 215.2(A)(2)); one size for every neutral. It then counts as a current-carrying conductor (NEC 310.15(E)(3)): with four in a raceway, adjust every conductor to 80 % (NEC 310.15(C)(1)).
- **Parallel sets** are 1/0 AWG or larger (NEC 310.10(G)), each in its own raceway with its own full-size EGC (NEC 250.122(F)).
- Keep the voltage drop below 3 % on AC runs (over about 164 ft / 50 m use larger conductors, and enlarge the EGC in proportion, NEC 250.122(B)).
- All terminals take M10 bolts, two per pole: torque **133 lb-in (15 N·m)**. Use crimped ring (OT) lugs. The largest conductor and lug per terminal are not published: ask AEC before you plan larger conductors.



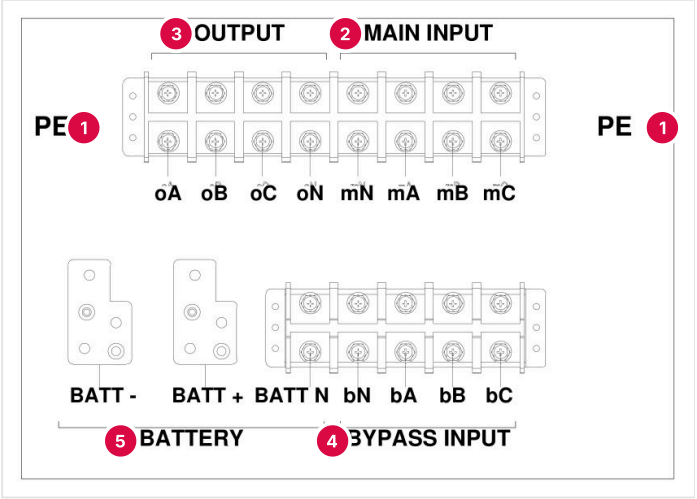
1. Battery breaker
2. Output breaker
3. Maintenance bypass breaker
4. Input breaker
5. Power terminals, behind the lower cover

FIGURE 4-1 Rear doors open — the 150 kVA cabinet



1. Battery breaker
2. Output, Maintenance, Input breakers
3. Power terminals

FIGURE 4-2 Rear, doors open, cover removed (3D render)



1. **PE** — protective earth, two places: connect first
2. **Main input** — mN, mA, mB, mC
3. **Output** — oA, oB, oC, oN
4. **Bypass input** — bN, bA, bB, bC (separate bypass feed only)
5. **Battery** — BATT –, BATT +, BATT N: only for a DC circuit specified by AEC

FIGURE 4-3 Power terminals, cover removed — numbers in wire order

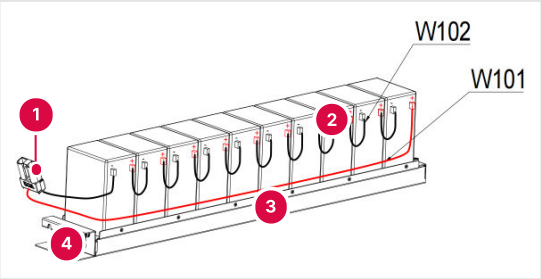
TABLE 4-4 Wire order

Terminal group	Marking, left to right	Notes
Main input	mN · mA (L1) · mB (L2) · mC (L3)	Clockwise phase rotation A-B-C.
Output	oA (L1) · oB (L2) · oC (L3) · oN	480 V line to line, 277 V line to neutral.
Bypass input	bN · bA (L1) · bB (L2) · bC (L3)	Same phase rotation and neutral as the main input (else alarm Bypass Sequence Error).
Battery	BATT – · BATT + · BATT N	The internal trays connect through the battery breaker. Use only for a DC circuit specified by AEC.
PE	PE · PE	First on and last off.

1. Open every external breaker, and open all four breakers in the cabinet — **Battery**, **Output**, **Maintenance** and **Input** (Figure 7-3, state A). Lock them out and hang warning signs on them.
2. Open the rear doors and remove the lower cover (Figure 4-1, item 5). Cables enter from the bottom only, up through the plinth to the rear compartment (the roof has no cable entry); close any remaining opening against rodents.
3. Connect the protective earth (PE) conductors first (Figure 4-3, item 1).
4. Connect the main input cables to mA, mB, mC, mN (item 2) and the load cables to oA, oB, oC, oN (item 3).
5. Separate bypass feed only: remove the copper link between the main input and the bypass input, then connect the bypass cables to bA, bB, bC, bN (item 4).
6. BATT +, BATT –, BATT N (item 5): connect cables only if AEC has specified an external DC circuit.
7. Tighten every lug to 133 lb-in (15 N·m), check the phase rotation and the wiring, then refit all covers.

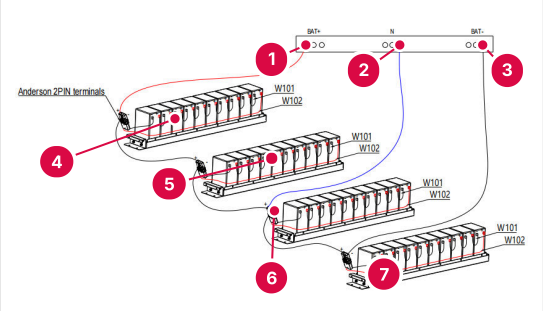
5 Fit and connect the battery trays

The battery is inside: 240 VRLA blocks of 12 V, 9 Ah, in 24 trays of ten. Four trays in series make one string of 40 blocks, with the neutral between the second and the third tray; six strings run in parallel on the battery busbar. The battery breaker is at the rear (Figure 4-1, item 1).



1. Anderson 2-pin connector
2. Block-to-block jumpers
3. Tray cable back to the connector
4. Tray rail and front plate with its fixing screw

FIGURE 5-1 One battery tray — ten 12 V blocks in series



1. BAT+ busbar
2. N busbar
3. BAT– busbar
4. Tray 1
5. Tray 2
6. Tray 3: the neutral joins here
7. Tray 4

FIGURE 5-2 One string: four trays in series, BAT+ from tray 1, N between trays 2 and 3, BAT– from tray 4

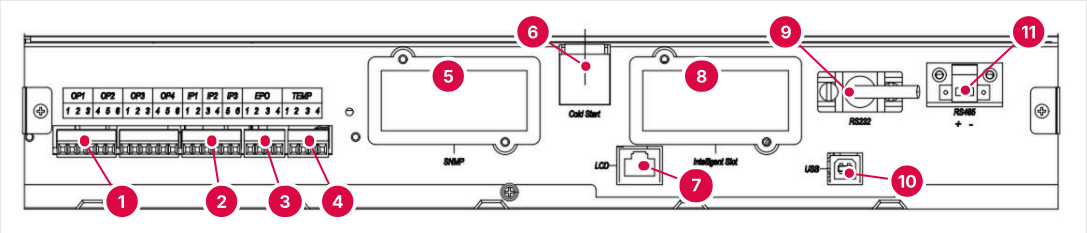
1. Check that the **Battery** breaker at the rear is open.
2. Slide the 24 battery trays into their places (Figure 3-1, item 5).
3. Connect the trays string by string, four trays per string (Figure 5-2): connect each tray with its Anderson connector (Figure 5-1, item 1), then the BAT+, N and BAT– cables of each string to the battery busbar.
4. Check the polarity and measure each string: about 480 V DC between BAT+ and BAT−, about 240 V DC from each end to N.
5. Leave the **Battery** breaker **open**: only the AEC engineer closes it.

6 Connect the control cables

The communication panel is on the front of the bypass & monitoring module (Figure 3-1, item 3). Use shielded, double-insulated signal cable, 20–16 AWG (0.5–1.5 mm²), at most 82–164 ft (25–50 m), apart from the power cables.

TABLE 6-1 Control connections

Connection	How to wire it
Remote EPO	In normal operation EPO-3 and EPO-4 are linked and EPO-1/EPO-2 open. Opening EPO-3/EPO-4, or closing EPO-1/EPO-2, triggers the EPO. Use a voltage-free normally-open or normally-closed switch.
Generator	Normally-open auxiliary contact of the generator between IP3-5 (GEN CONNECTED) and IP3-6 (+24 V).
Temperature sensors	TEMP-1 ambient, TEMP-4 battery, TEMP-2 · TEMP-3 common. Optional sensors, specific to the UPS: order them from AEC.
Battery breaker (BCB)	IP1 and IP2 read the auxiliary contacts of a battery breaker; OP4-4 BCB DRV (+24 V, max. 150 mA) and OP4-6 to its trip coil.
Alarm relays	OP1 battery low, OP2 general alarm, OP3 utility failure: NC · NO · common.



1. OP1 · OP2 · OP3 · OP4: alarm relays and battery breaker trip
2. IP1 · IP2 · IP3: BCB status, BCB online, generator input
3. EPO: remote emergency power off input
4. TEMP: ambient and battery temperature sensors
5. SNMP slot: SNMP-M network card
6. Red cold-start button (battery start, hold 3 s)
7. LCD: cable to the touchscreen (RJ45) — not a network port
8. Intelligent slot: dry-contact card
9. RS-232 port (DB9)
10. USB port
11. RS-485 port (terminal, + and –)

FIGURE 6-1 Communication panel on the front of the bypass & monitoring module

Parallel cabinets (up to three) need parallel cables, an external maintenance bypass and settings: follow the user manual, section "Parallel system".

7 Start the UPS — with the AEC engineer

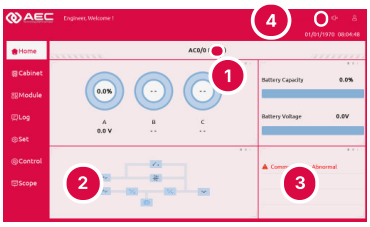
NOTICE

The AEC commissioning engineer performs steps 7 and 8, or directs them on site. Before the engineer arrives, check: cabinet level on its four anchor bolts; modules fitted from the bottom up; 24 trays connected string by string, polarity and string voltages checked, battery breaker open; breakers, conductors, neutral and EGC as in Table 4-1, Table 4-2 and Table 4-3, PE first, 133 lb-in; no neutral-to-ground bond at the UPS; phase rotation of both inputs; EPO, sensors and cards connected.

⚠ WARNING

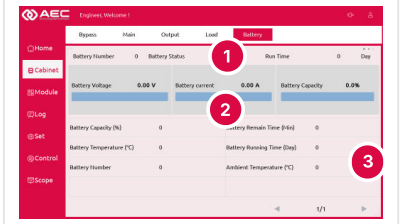
The output terminals become live. If loads are connected, check with their users that it is safe to apply power; otherwise isolate them from the UPS output.

1. Check that all breakers are open (Figure 7-3, state A).
2. Close the **Output** breaker and the **Input** breaker in the cabinet (Figure 7-3, state B), then the external main input breaker and, with a separate bypass feed, the external bypass input breaker. You see: the touchscreen lights and shows the home page (Figure 7-1); the indicators of the power modules turn green.
3. Wait: after about 30 s the rectifiers start and the static bypass closes; after about 90 s the UPS transfers from bypass to inverter. You see: green indicator; on the home page the energy flow runs from the utility through rectifier and inverter to the load (Figure 7-1, item 2): normal mode.
4. Close the **Battery** breaker (Figure 7-3, state C). The UPS starts charging the batteries. You see: **Cabinet › Battery** shows the battery connected and charging (Figure 7-2).
5. Close the external output breaker, then the branch breakers one by one.



1. Status bar: capacity, number of modules (N = ...), single (S) or parallel (P)
2. Energy flow: bypass, maintenance bypass, main input, rectifier, inverter, battery, output
3. Warnings: red = serious alarm, orange = general alarm
4. Speaker icon: mute the alarm

FIGURE 7-1 Home page



1. Battery number per string, status (boost / float), run time
2. Battery voltage, current and capacity, positive and negative half
3. Capacity, remaining time, battery and ambient temperature

FIGURE 7-2 Cabinet — Battery

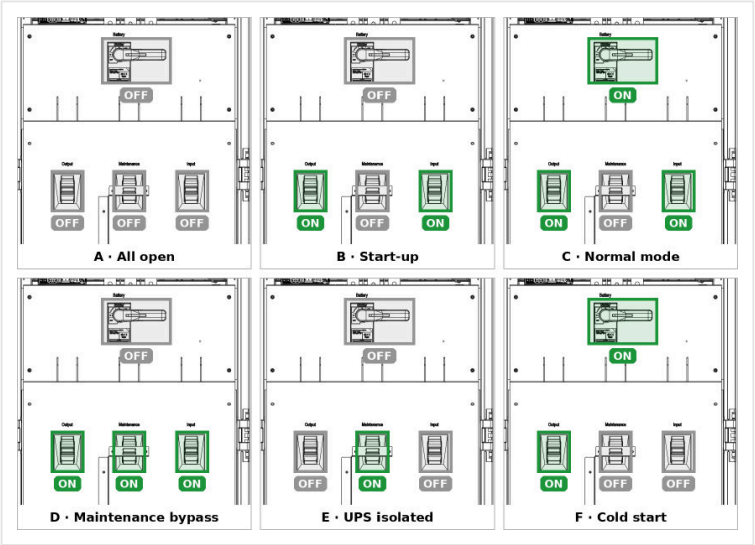


FIGURE 7-3 Breaker states A to F at the rear — green ON, gray OFF. External breakers: see the text.

8 Set and check

Settings are protected by login. The AEC engineer makes the battery settings from the battery maker's values.

1. **Set › BATT Set**: Battery Type VRLA; Battery Number **40** blocks per string; Battery Capacity **54 Ah** (9 Ah × 6 strings; 42 Ah with 7 Ah blocks); float 2.25 V/cell, boost 2.30 V/cell, end of discharge 1.65 V/cell at 0.6 C and 1.75 V/cell at 0.15 C, or the battery maker's values.
2. **Set › Sys Set**: System Mode **Single** for one cabinet (parallel cabinets: see the user manual); **Redundant Modules Qty** (N+X), so that the UPS alarms when redundancy is lost.
3. **Set › Sys Func**: system date and time. **Set › Language**: display language.

Checks — the UPS is in normal mode when:

- the status indicator is steady green and the home page shows no warning (Figure 7-1, item 3);
- the energy flow runs through rectifier and inverter to the output; the status bar shows the right number of modules (N = ...);
- **Module** lists every fitted module, **Log** shows no fault, and **Cabinet › Battery** shows 40 blocks per string, the battery connected and charging (Figure 7-2).

Do not rely on the full runtime until **Cabinet › Battery** shows float charge (the UPS boost-charges first).

9 Maintenance bypass and shutdown

From normal mode to maintenance bypass — check first on the touchscreen that the bypass is normal and the inverters are synchronized with it.

1. **Control › Function › Manual Bypass**. The inverters stop, the buzzer sounds and the static bypass feeds the load. Silence the alarm with the speaker icon (Figure 7-1, item 4).
2. Open the **Battery** breaker and close the **Maintenance** breaker (Figure 7-3, state D). The maintenance bypass and the static bypass feed the load together.
3. To isolate the power section, open the **Input** and **Output** breakers (Figure 7-3, state E). The load runs on the maintenance bypass alone.

From maintenance bypass to normal mode

1. Close the **Output** and **Input** breakers (Figure 7-3, state D). After about 30 s the static bypass closes.
2. Check on the touchscreen that the static bypass feeds the load, then open the **Maintenance** breaker.
3. After about 30 s the rectifiers start, then the inverters; after one more minute the UPS transfers to inverter. If it stays on bypass, select **Control › Function › Ecs Manual Bypass**.
4. Close the **Battery** breaker (Figure 7-3, state C).

> ⚠ ***WARNING***
>
> Open the Maintenance breaker only while the static bypass feeds the load, or the load drops. In maintenance bypass, dangerous voltage stays on the terminals and the internal busbars.

Shutting the UPS down

1. Shut the loads down correctly.
2. Open the **Battery** breaker, then the **Input** breaker and the external main input and bypass input breakers, one by one. The touchscreen goes dark.
3. Open the **Output** breaker (Figure 7-3, state A). In maintenance bypass, also open the **Maintenance** breaker.

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Parallel systems, settings, alarms, maintenance and every detail: **CIRRO-IB 30–150 kVA User Manual, AEC-UM-CIRIB-US** (aecups.com · AEC app › Support › Downloads).