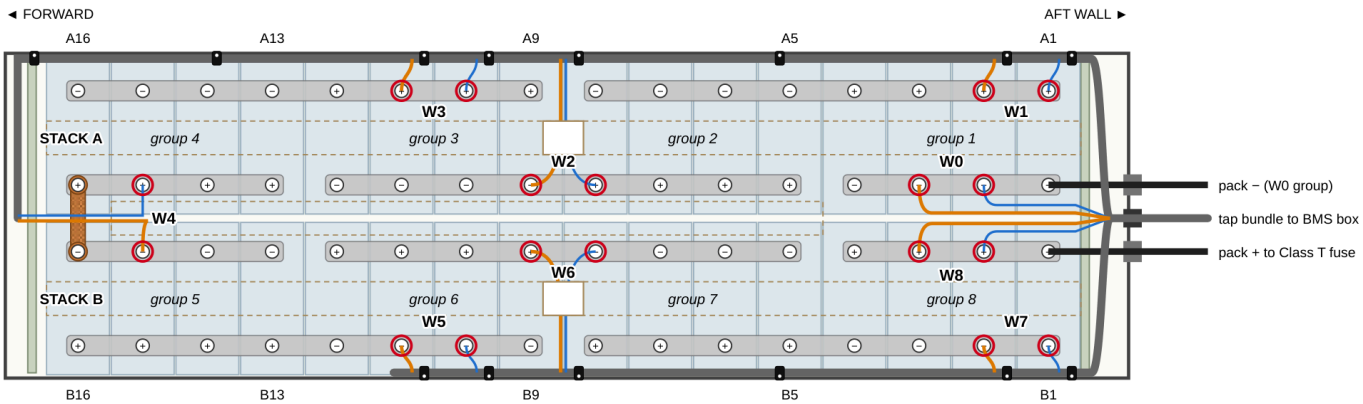
Battery monitor wiring: SBMS0 and balancer

Workbench and boat reference, 2026-10-03; updated 2026-11-01. Two boards in the BMS box, bolted to the battery box's aft wall: the **SBMS0** (reads the 8 group voltages, the two shunts and the pack temperature; sends them to Pi A by USB; controls nothing) and the **JK balancer** (keeps the 8 groups level; talks to nothing).

> **Each board has its own 9 wires to the battery,** each on its own ring on its own post. Never join an SBMS0 wire to a balancer wire anywhere. Blue in the drawings = SBMS0. Orange = balancer.

> **Color guide: the wire's number is its color** (the resistor color code): 0 black, 1 brown, 2 red, 3 orange, 4 yellow, 5 green, 6 blue, 7 violet, 8 gray, 9 white. So W0 is black and W8 is gray, in **both** battery cables (the 12-core for the SBMS0, the 10-core for the balancer). If a cable has no core of some color, use a leftover core and wrap colored tape at both ends. Write the real color in the table if you swap one.

1. At the battery: which post each ring goes on



Copper braid at the forward end (A16 to B16, inner posts) = the jumper between stacks: one of the copper braid links. Black bands on the gray branches = nylon cable clamps. Dashed boxes = the lid battens. The center batten stops short at both ends to leave room for the W0, W4 and W8 wires.

Cells are counted from the aft end: A1 to A16 and B1 to B16. The jumper between stacks is one of the copper braid links, across the center gap at the forward end. The main cables take A1 and B1 on the inner rows.

Joint	Wire color (both cables)	SBMS0 ring on	Balancer ring on	Row	SBMS0 done	Bal. done
W0 (pack −)	black	A2	A3	Stack A inner	☐	☐
W1	brown	A1	A2	Stack A outer	☐	☐
W2	red	A8	A9	Stack A inner	☐	☐
W3	orange	A10	A11	Stack A outer	☐	☐
W4	yellow	A15	B15	center, both inner rows	☐	☐
W5	green	B10	B11	Stack B outer	☐	☐
W6	blue	B8	B9	Stack B inner	☐	☐
W7	violet	B1	B2	Stack B outer	☐	☐
W8 (pack +)	gray	B2	B3	Stack B inner	☐	☐

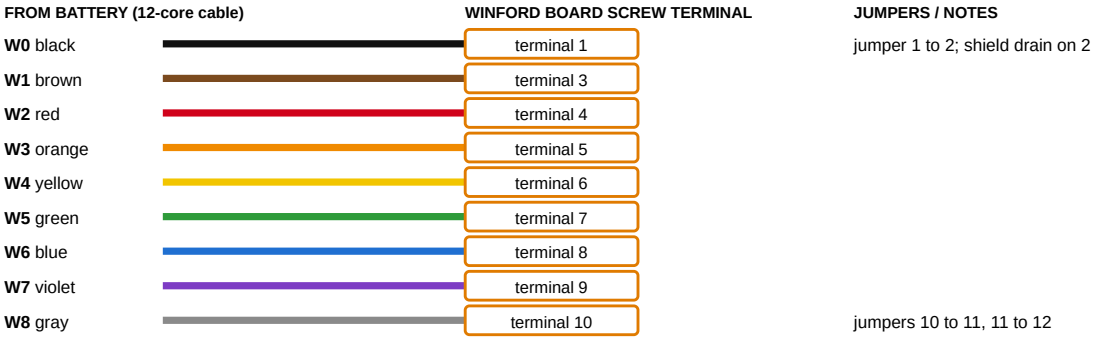
Every ring

- A 30 AWG fuse link right at the ring, then the ring on the stud: busbar, ring, washer, Loctite 242, locking nut, 37 in-lb. NO-OX-ID on the ring face. Witness stripe after final torque.
- A small S-bend of slack before the ring. Label both ends of every wire.
- Nothing over a busbar, a stud top or a cell vent (the spot midway between a cell's two posts).
- Nylon cable clamps on short wood screws into the long wall, just above the cell tops: screws no longer than 1/2 in, dipped in epoxy; a clamp at every spot where a wire leaves the run, never more than 18 in apart. Never tie anything to the cells.
- W2 and W6 cross the outer row in the gap between cells 8 and 9, then through a 3/8 in notch in that stack's lid batten. W4 goes around the forward end.

2. SBMS0

Cell wires: battery cable to the Winford breakout board

The SBMS0's own ribbon is **not cut**. A new 12-pin ribbon with a plug on each end runs from the SBMS0's cell socket to the Winford BRK2X6 board, which snaps on the DIN rail. Terminal number = ribbon wire number. The 22 AWG battery cores go under the screws bare: strip about 1/4 in, no ferrule. Never more than two wires under one screw. Before use: check the new ribbon pin 1 to pin 1 with a meter, and check the SBMS0's socket is two rows of 6 pins about 1/10 in apart.



XT1 probe: white + the 11th color go straight to the green plug, pins 15 and 16. 12th core: spare, taped both ends.

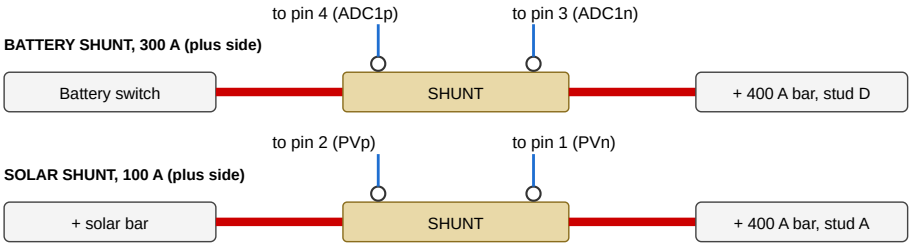
Shield: the 12-core's drain wire goes on terminal 2 (with the jumper from 1) at this end only. At the battery end, cut it short and tape it. Tie both ribbons flat to the plate; a dab of removable silicone on each ribbon plug.

The green 16-pin plug (push-in)

Strip about 1/4 in (5 to 6 mm). **Each of the four shunt sense wires gets a ferrule** crimped on its end, so the strands cannot fray or break. Twist the XT1 cores' strands tight. Press the button beside the hole with a small screwdriver, push the wire in to the stop, let go, tug. The same button releases it.

Pin	Label	Goes to	Wire color
1	PVn	Solar shunt, small screw on the bus side	white/orange
2	PVp	Solar shunt, small screw on the solar side	orange
3	ADC1n	Battery shunt, small screw on the bus side	white/brown
4	ADC1p	Battery shunt, small screw on the battery side	brown
5 to 14	ADC2, ADC3, EXTIO6 to EXTIO3	**Nothing.** Leave empty	
15	XT1−	Temperature probe, either wire (a thermistor has no polarity)	white (12-core)
16	XT1+	Temperature probe, the other wire	the 11th color (12-core)

The two shunts: both on the PLUS side



- Each shunt: two big bolts for the current, two small screws for the thin wires.
- One twisted pair per shunt, from a stranded Cat6 patch cord with the plugs cut off: **brown pair** for the battery shunt, **orange pair** for the solar shunt (the solid color on the battery or solar side, the white-striped one on the bus side). Stranded, never solid: solid wire cracks under vibration. A ferrule on each wire at the green plug.
- A 30 AWG fuse link at the shunt end of each thin wire: these wires sit at battery voltage.
- Keep a cover over each shunt. It is live. Nothing else goes on the shunts: sense leads only.

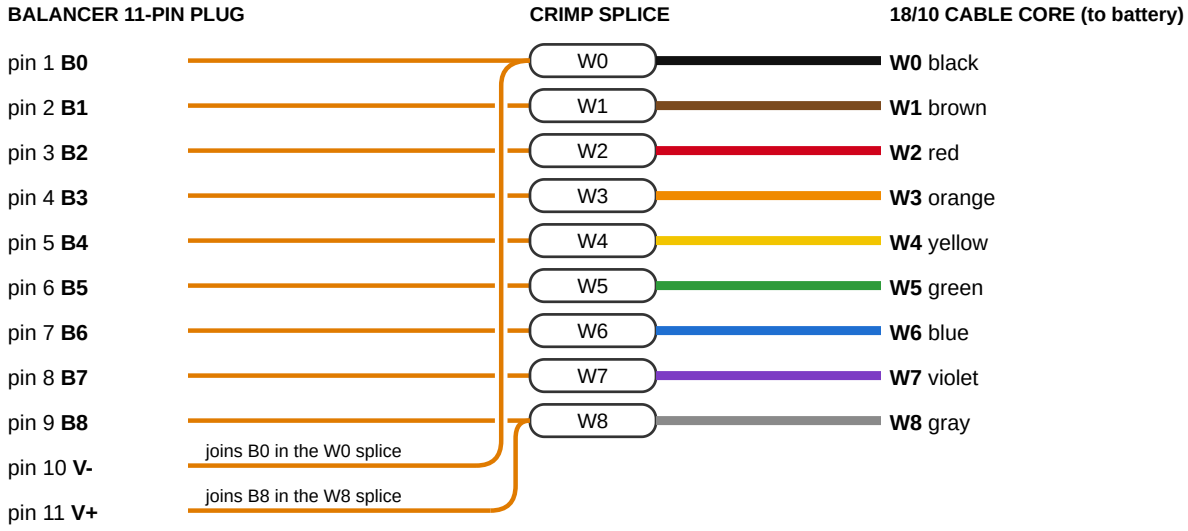
> Plus side, never minus: the SBMS0's shunt chips need 4 to 76 V on the shunt and read nothing on the minus side. The battery switch, then the 300 A shunt, then the + 400 A bar at stud D; the + solar bar, then the 100 A shunt, then stud A. **Before the first power-up, check both shunts sit on the + side: nothing but plain cable on the - side.**

USB

Micro USB end into the add-on board on the SBMS0's back. Out of the BMS box by its split gland (an Altelix 4-port; the plug passes whole, the other three ports plugged), to the USB hub box beside Pi A, in by its side-wall split gland, port c. 16 ft at most. Zip-tie it down right outside each plug.

3. Balancer (JK-B2A8S)

Its harness plug has 11 wires: B0 to B8 (the 9 joints) plus V− and V+ (its own power, 10 to 40 V). Join each harness wire to a core of the 18 AWG 10-core cable with an adhesive heat-shrink crimp butt splice, sized to the wires. The board still unplugs at its own 11-pin plug.



- **W0 splice:** B0 and V− go together into one end, the cable core into the other. **W8 splice:** B8 and V+ the same way. With two wires in one end, that end may need the next splice size up.
- Stagger the splices so the bundle stays slim. Shrink each, then tie the bundle to the plate.
- The 10th core (white) is spare: tape both ends. The harness wires' own colors don't matter: follow the pin numbers.
- Its temperature plug (P2) and data plug (P3): leave empty.

Pin	Name	Joint	Battery post	18/10 core color	Done
1	B0	W0	A3	black	☐
2	B1	W1	A2	brown	☐
3	B2	W2	A9	red	☐
4	B3	W3	A11	orange	☐
5	B4	W4	B15	yellow	☐
6	B5	W5	B11	green	☐
7	B6	W6	B9	blue	☐
8	B7	W7	B2	violet	☐
9	B8	W8	B3	gray	☐
10	V−	W0	(in the B0 splice)	harness wire, joins black	☐
11	V+	W8	(in the B8 splice)	harness wire, joins gray	☐

Setup, by phone

Jikong BMS app over Bluetooth (Android 7 or newer). Battery type **LiFePO4**, **8 cells**. Leave the rest at factory values: balancing starts above 3.0 V and when two groups differ by more than 0.01 V, at up to 2 A. It draws up to 1.2 W by its sheet; its real idle draw is not published.

4. Order of work

1. Calibrate the XT1 probe in stirred ice water first (2 minutes). Note what the SBMS0 shows; that number becomes parameter 29.
2. Build the BMS box end first, with both board plugs unplugged: the Winford board, splices, the green plug wires.
3. Land the battery rings last. Taped tools, no rings on your fingers, a towel over the busbars you are not working on.
4. Check every wire with a meter (below) before plugging in either board.
5. Plug in the balancer, then the SBMS0 cell plug, then the green plug.

5. Checks before plugging in

Measure between	Should read	SBMS0 set	Balancer set
W0 and W1	about 3.3 V	☐	☐
W1 and W2	about 3.3 V	☐	☐
W2 and W3	about 3.3 V	☐	☐
W3 and W4	about 3.3 V	☐	☐
W4 and W5	about 3.3 V	☐	☐
W5 and W6	about 3.3 V	☐	☐
W6 and W7	about 3.3 V	☐	☐
W7 and W8	about 3.3 V	☐	☐
W0 and W8	about 26 V	☐	☐

Any odd reading means two wires are swapped. Fix it before plugging in. SBMS0 set: measure at the Winford board terminals. Balancer set: measure at the harness plug pins.

6. SBMS0 settings

Setting	Value
Cell type / number of cells / capacity	LiFePO4 / 8 / 1256 Ah (4 x 314 Ah rated). Store Parameters, then unplug and replug the 12-pin cell plug so they take.
Battery shunt value	0.2500 milliohm (300 A / 75 mV)
Solar shunt value	0.7500 milliohm (100 A / 75 mV)
EXTIO4 / EXTIO3 (Automation menu)	Type 1 / Type 2. Nothing is wired to either
Parameter 30	1182 (131 F). Display only
Parameter 29	Your ice-water reading. Display only
UART (Device settings)	ON. Speed: open; one number chosen for the software and the System Settings Sheet settles it
Save device settings	**Required**, or everything is lost at the next power-up

7. After it is running

- The SBMS0 screen and the balancer app both show 8 groups near 3.3 V, and they agree within a few hundredths.
- Solar shunt reads zero in full sun: its pair is swapped.
- Battery current sign: switch on a known load and check the SBMS0 shows current going out.
- Unplug XT1 and write down what the SBMS0 shows. Plug it back.
- Unplug the SBMS0 entirely: charging and every load must carry on. Plug it back.

Sources: SBMS0 v03d manual and JK-B2A8S manual (Reference folder); Battery Box Building Guide v10.2, Parts 7 and 8; System Settings Sheet sec 1.