SOLAR STIK®

SETUP, OPERATION, AND MAINTENANCE GUIDE FOR THE 24VDC LI BOS 500-120

P/N: 20-0205205

May 2023

SS20230607

Specifications

General	
Nominal Operating Voltage	24 VDC
Battery Chemistry	Lithium Ion
Storage Capacity	28 Ah
Energy Storage	672 Wh
Cycle Life*	3000 cycles (80% depth of discharge)
Battery Voltage Range	19.25 - 29.4 VDC
Internal cooling	Forced cooling (1) air intake fan
User Interface	E-Ink display with push button refresh
Case	Pelican 1600
Transportation	UN3481 Lithium-ion battery contained in equipment
Warranty	1-year materials and workmanship

@ 77 °F (25 °C)

Solar Charge Controller Specifications @ 77 °F (25 °C)	
Maximum PV V_{oc}	100 VDC
Maximum PV I_{sc}	15 A
Nominal PV Power	440 W
Charge Control Method	Maximum Power Point Tracking (MPPT)
Charging Voltage	29.0 VDC
Charging Current	15 A
Charging Stages	Multi-stage adaptive

AC Charger Specifications (@77 °F/25 °C)	
AC Input Frequency	50-60 Hz
AC Input Voltage	100-240 VAC
DC Output Voltage	29.0
Continuous Output Current	150-300 W/200-440 W (derived)

Connections	
Inputs	• (1) Universal AC (Schurter 6100-3300-32) (100-230 VAC) • (1) Solar (Cannon CB2-22-2SC)
Outputs	• (2) 12 VDC (Amphenol MS3470W14-4S)
Inputs/ Outputs	• (1) ESM Expansion, 24 VDC, 100 A • (1) ITT Cannon CB2-20-19SC • (1) DATA port for battery firmware updates

Environmental	
Operating Temperature	-24 °F to 110 °F (-31 °C to 43 °C)
Storage Temperature	-28 °F to 145 °F (-33 °C to 63 °C)

Weights and Dimensions (L x W x H)	
Weight	36.9 lb (16.7 kg)
Dimensions	21.51 x 16.54 x 7.99 in (54.61 x 41.99 x 20.29 cm)

Safety	
Breaker(s)	• 30 A internal battery disconnect • 30 A ESM input/output breaker • 5 A AC input breaker • 20 A solar input breaker • 10 A 12 VDC output breaker

Connectors and Specifications

*Custom Cable Required

Operating Specifications

AC Input
Voltage: 90–305 VAC Universal Input
Frequency: 50–70 Hz
Charging Voltage: 29.2 VDC

Solar Input
Voltage: 33–100 VDC
Maximum Power: 440 W
Charging Voltage: 29.2 VDC

DC Output
Voltage: 12.0 VDC (Regulated)
Maximum Power: 150 W
Efficiency: 86%

ESM Only
Voltage: 24.4–29.2 VDC
Current: 30 ADC

Internal Battery
Chemistry: Li-Ion (NMC)
Nominal Voltage: 25.6 VDC
Operating Voltage: 20.0–29.2 VDC
Capacity: 28 Ah (672 Wh)

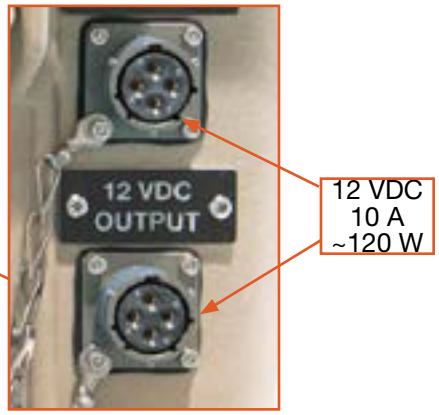
Connected to a Solar Array

Solar Cable

BOS Connectors and Ventilation

Power Output

Front



12 VDC Output: Pin D (+), Pin B (-), Pin C (unused)DC output voltage is equal to DC bus voltage.

Data

DATA: CAN data and comms from internal battery. Solar Stik use only.

Custom cable required.

Power Input

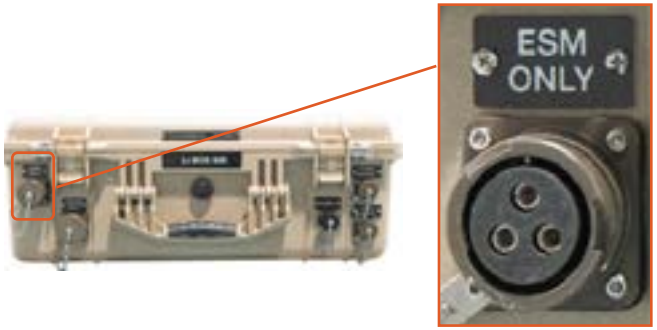
Left

100–230 VAC, 50-60 Hz
5 A max
500-1200 W

33–100 VDC
20 A max
580 W max

Front

Power Input/Output



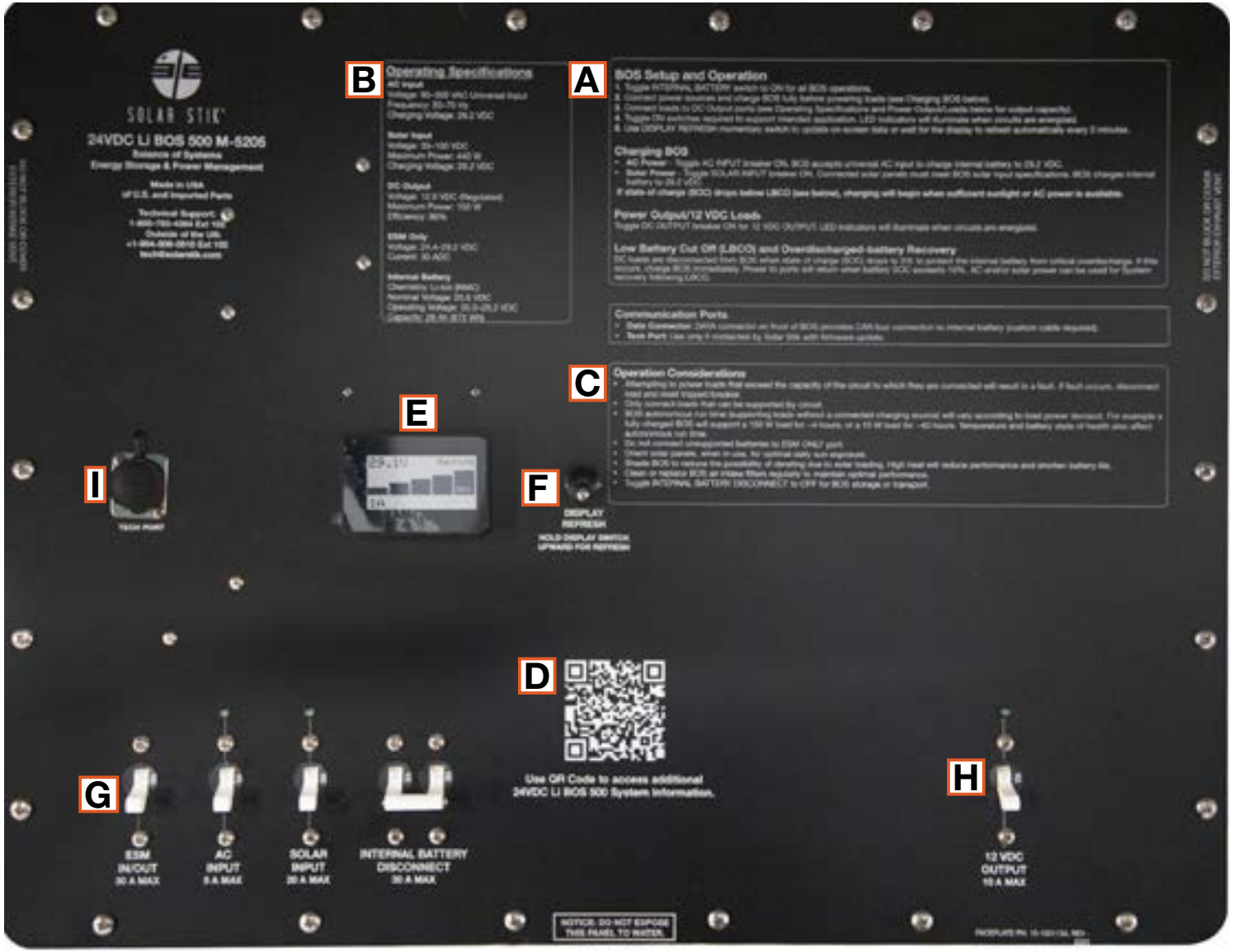
Ventilation

Right

Left

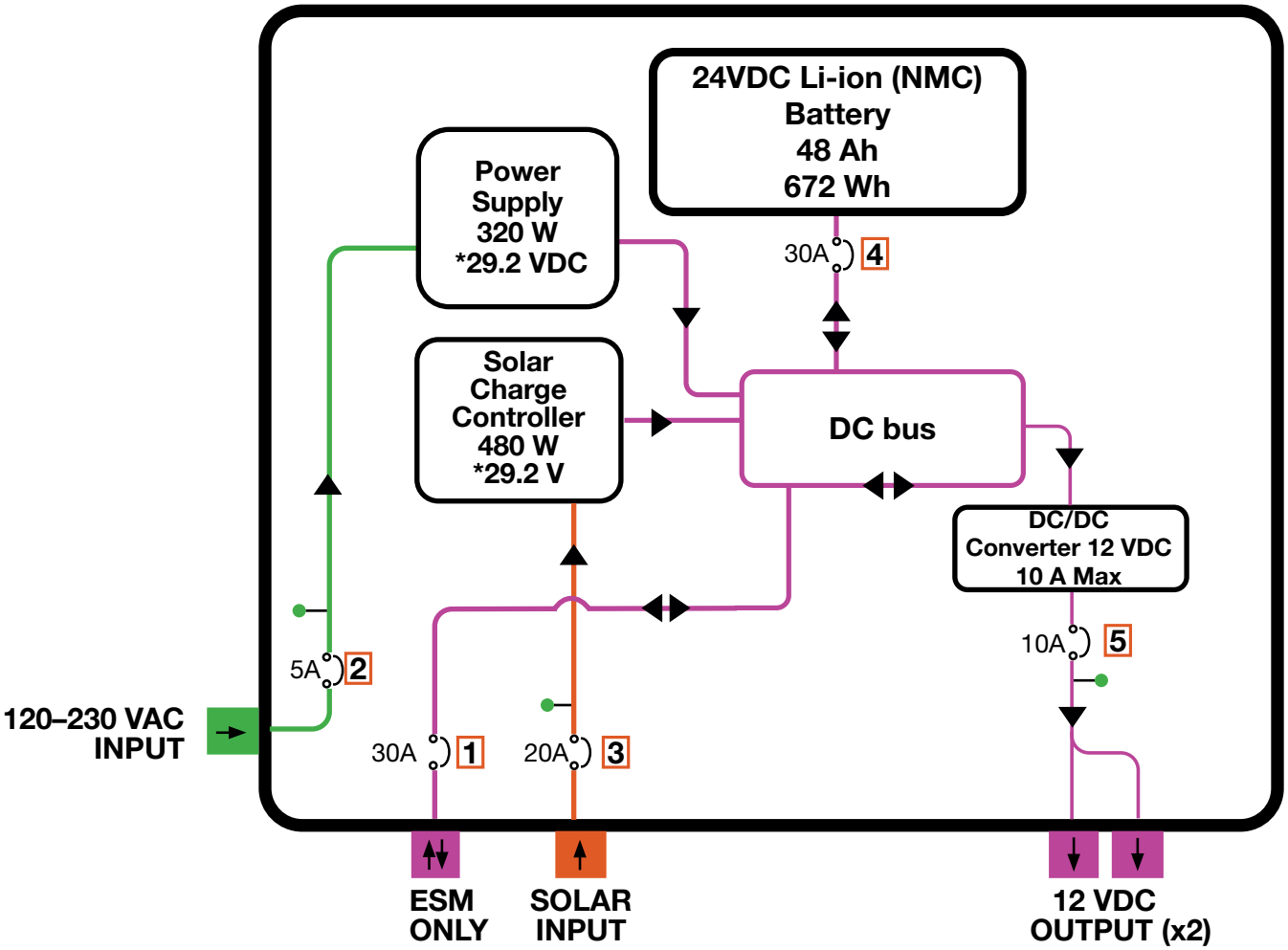
I = Air intake (vent has filter); E = Air exhaust (vent has no filter)

BOS 500-120 Faceplate



A. BOS setup and operation instructions.
B. Operational specifications. Provides limits for AC and DC BOS circuits and internal battery specifications.
C. Operational considerations.
D. QR Code that links to this document.
E. Internal battery status display reports voltage, current (A), state of charge, status (fault or OK).
F. Battery status DISPLAY REFRESH toggle switch
G. Breaker switches and circuit-activity LEDs.
H. Breaker switch for 12 VDC output.
I. The TECH port for use by Solar Stik use only. Contact Solar Stik for further information.

BOS 500-120-5205 Electrical Circuits



LED circuit activity indicator

Circuit breaker location

DC bus circuit

AC input

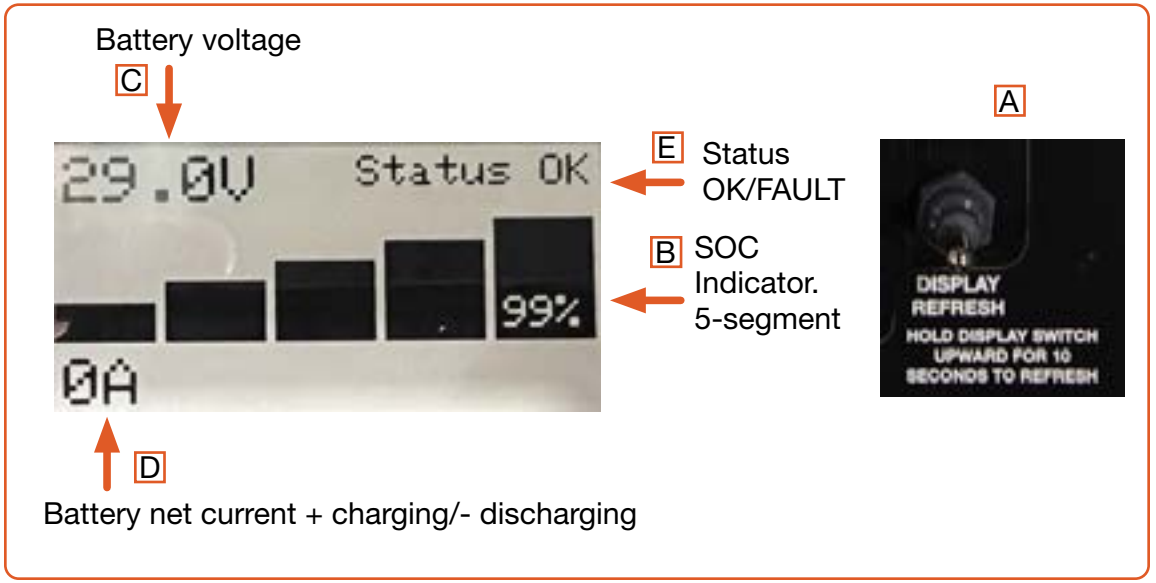
Solar input

*Programmed charging voltages

Circuit Breakers

Numbers over breakers correspond to numbered breaker locations on diagram above.

Battery Status Display Home Screen



A. The DISPLAY REFRESH momentary toggle switch can be pressed and held to update the display during normal operation. During normal operation, the display is updated automatically at intervals of three (3) minutes. The SOC is reported visually by a five-segment “fuel gauge”. Each segment represents 20% increments up to 100%.

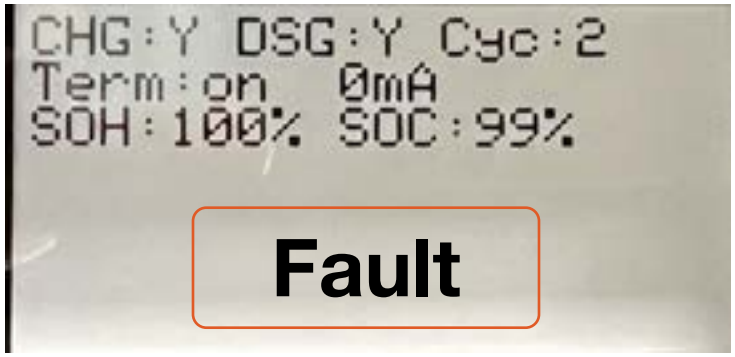
B. Nominal voltage = 26.4 VDC; voltage @ 100% SOC ≈ 30.4 VDC; voltage @ 0% SOC ≈ 20.0 VDC.

C. The net current (A) with respect to the battery is positive when the BOS internal battery is charging and negative when discharging.

D. If/when a battery fault occurs, the word “FAULT” appears in the upper right corner of the display. If the fault is unattended for three (3) minutes, “FAULT” appears in large font, filling the screen. If the fault is not corrected within 60 minutes, the BOS will enter storage mode even with the POWER switch in the ON position.

E. Batery Status report. OK=normal operating conditions, FAULT, is a prompt to find additional information about the fault on the second “page” of the Battery Status Display, which is accessed by toggling the Display Refresh switch twice.

Additional Battery Details



Toggle the DISPLAY REFRESH switch twice to view additional battery metrics.

CHC: Y/N: Charge FET on Yes / No, meaning yes the battery can be charged. No meanin**g** the battery cannot be charged.

DSG: Y/N: Discharge FET on Yes / No, meaning yes the battery is discharged or No meaning the battery cannot be discharged.

Cyc: Number of complete charge / discharge cycles battery has experienced.

Term: CAN bus Termination is ON.

XX mA: Quiescent load on battery when not in use.

SOH = Internal battery state of health which is the remaining storage capacity as a percentage of the rated storage capacity when battery was new.

SOC = Internal battery state of charge. 100% SOC is a fully charged battery.

Fault (not shown)-If a fault occurs, details about the fault will be reported on this screen.

Operation Instructions

BOS Connections and Activation

1. Ensure all breakers are OFF before connecting anything to BOS.
2. Connect solar array (if applicable) and load(s).
   Note: Do not exceed ~120 W for both of the 12 VDC output ports combined or the 10 A breaker switch may trip.
3. Turn on INTERNAL BATTERY DISCONNECT breaker to activate the BOS.
   Note: INTERNAL BATTERY DISCONNECT breaker must be ON for BOS to operate properly.
4. After the battery startup info has finished, toggle Battery DISPLAY REFRESH switch to update Battery Status Monitor.
5. Toggle ON 12 VDC OUTPUT breaker switch to support loads. Green LED above breaker will illuminate when circuit is powered.

Notice

- For information on expanding BOS 500 energy storage capacity, contact Solar Stik.
- Do not connect lead-acid batteries to BOS.
- The BOS should be shaded from direct sun exposure and sheltered from the elements as much as possible during operation.
- Keep the case lid and connector covers closed when not in use to prevent water and dust intrusion.
- Check the integrity of electrical connectors on a monthly basis.
- Do not block air vents on case exterior. Clean or replace air filters form optimum cooling.

BOS Charging and Discharging

Battery-only Run Times

The BOS internal battery stores 672 Wh of energy when fully charged. Starting with a brand new battery, fully charged, the BOS can support a 120 W load for ~5.6 hours, a 60 W load for ~11.2 hours. These times will decrease as the internal battery ages and loses storage capacity. This is normal for all batteries.

Low-battery Cut Off (LVCO)

Power to loads will be disconnected by the internal battery when SOC drops to 5%. Charging the internal battery back up to 10% will allow power to loads to resume.

BOS Charging

Connect active universal AC and/or DC (solar) power source(s). Toggle ON corresponding power input breakers.
120–240 VAC Charging: 320 W; minimum charge time from empty is ~ 2.15 h.
Solar Charging: 440 W max; minimum charge time from empty is ~ 1.5 h. Charging will begin when sufficient sunlight is present. Solar power charging speed is a function of connected solar array power output.

Energy Storage Expansion

Additional compatible batteries may be connected to the ESM ONLY port. Contact Solar Stik Technical Support for information regarding battery compatibility. Connecting incompatible batteries can result in damage to equipment and may cause injury to personnel.

MAINTENANCE CHARGING INSTRUCTIONS

In-storage BOS Internal Battery Status Information

The Battery Status Monitor will display the last status acquired before the POWER switch was turned OFF. However, battery voltage will decrease during storage due to self-discharge. Toggle ON the POWER switch to update in-storage battery status.

Never store BOS in a discharged state! Charge BOS fully before placing in storage.

Never store a BOS with the BATTERY switch in the ON position.

Temperature-dependent Self-discharge

The self-discharge rate increases as storage temperature increases. If the BOS is stored at temperatures above 90 °F (32 °C), then intervals between maintenance checks and/or charges should be reduced to three (3) months.

In-storage Battery Status Refresh: Voltage, SOC, and SOH

When the BOS BATTERY switch is OFF, the Battery Status Monitor will continue to report the last-recorded battery status; it does not refresh automatically during storage. The Battery Status Monitor must be refreshed to report the current status while in storage.

1. Toggle ON BOS BATTERY DISCONNECT switch.
2. The Battery Status Monitor Screen will populate with up-to-date information. This will take ~ one (1) min. with the several startup tests/results displayed before the Status Monitor is populated.
3. Check voltage and SOC on Home screen.
4. Toggle the REFRESH DISPLAY switch again to move to the Diagnostic Screen to check SOH.