



Flux Power S8 Service and Parts Manual



Safety Precautions

The Flux Power Lithium-ion Battery is composed of lithium-ion cells and is classified as Class 9 miscellaneous hazardous material.

Precautions to correctly handle the Flux Power lithium-ion battery include:

- The battery shall only be handled by Flux Power authorized personnel familiar with handling, storing, and the installation of a lithium-ion battery.
- Do not open the battery. – Only Flux Power authorized technicians shall perform service on a lithium-ion battery.
- Do not tamper with the main power Anderson connector.
- Do not mount or store the battery upside down or on its side.
- Upon receipt, check the battery for damage during transportation.
- Always use a lifting device when installing a battery.
- Never recycle lithium-ion batteries with lead-acid batteries, please consult Flux Power or your local recycler for more information on how to recycle a Lithium-ion Battery.
- WARNING – Risk of Fire – No User Serviceable Parts
-  Consider all DC battery cells and circuits to be energized, shorting of circuits may cause a hazardous condition. Remove all metallic jewelry from hands and arms before working on battery cells or circuits.
-  SAFETY - Follow Safety Standards as required; review and follow all Safety Data Sheets “SDS” for chemical use. Follow instructions for the proper use of PPE as required.

For technical assistance on the Flux Power lithium-ion battery, contact your local Flux Power dealer at www.fluxpower.com.

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1 Introduction

The LiFT Pack S8 battery is a lithium-ion battery specialized for the material handling industry. This User Guide is intended to provide general information on how to service a Flux Power LiFT Pack S8. The *Online Troubleshooting Guide* for this battery is an online tool that further details every potential issue for the battery and details how to resolve them. That tool can be found on the Flux Power website.

2 Basic Troubleshooting

Before performing any work on the battery, make sure to follow the Control of Hazardous Energy Procedure.

2.1 Flux Power Battery Control of Hazardous Energy Procedure

1. Disconnect the DC battery cable.



2. Disconnect the AC battery charger power cord.



3. Locate the circuit breaker in the cable storage box and push in the red button on the circuit breaker



4. Use a DMM to test for voltage at the battery connector contacts. The voltage must be approximately zero volts.



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5. Install a lockout device and “do not operate” tag on the battery discharge connector with a lock or a nylon wire tie. Sign and date the “do not operate” tag.



6. Install a lockout device and a “do not operate” tag on the AC power cord with a lock or a nylon wire tie. Sign and date the “do not operate” tag.



2.2 State of Charge Gauge and Device Trouble Codes (DTCs)

The first step in troubleshooting the battery is observing the State of Charge (SOC) gauge on top of the battery. Under normal operation, the gauge’s LED lights will be solid, showing the SOC. If the battery is charging, the lights will display a scrolling pattern. A single LED blinking indicates a Device Trouble Code (DTC). DTCs let the user or technician quickly assess why the battery is causing a disruption of operation. The following list details each DTC.

Table 1: Situations where the Flux Power lithium battery will cut power and display a DTC

Fault Description	Cause and Required Duration to Trigger	Fault Protection	LED Indicator	Service Required?	Fault Resolution
0% state of charge	At least one cell has reached a voltage value of 2.80V	Contactor opens Buzzer Sounds Periodically	LED 1	No	Plug battery in to charge
Electronics Hardware Failure	Electronic component failure for more than 10 seconds	Contactor Opens	LED 3	Yes	Service
Over-temperature	Discharge temperature > 129F, 60 seconds Discharge temperature > 131F, Immediate Charge temperature >130F, 60 seconds	Contactor opens	LED 4	No	Allow pack to cool, then cycle the circuit breaker OFF, then ON

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	Charge temperature > 131°F, Immediate				
Under-temperature	Discharge temperature < 33°F, 60 seconds Discharge temperature < 32°F, Immediate Charge temperature < 35°F, 60 seconds Charge temperature < 34°F, Immediate	Contactor opens	LED 4	No	Allow pack to warm up, then cycle the circuit breaker OFF, then ON
Current exceeded	Discharge current < (-1000A), 10 seconds Discharge current < (-200A), 2 minutes Charge current > 1000A, 10 seconds Charge current > 200A, 2 minutes	Contactor opens	LED 5	No	Cycle the circuit breaker OFF, then ON
Low cell Imminent	At least one cell has reached a voltage value of 2.95V	None	LED 6	No	Plug battery in to charge

2.3 Temperature (DTC 4)

Flux Power lithium-ion batteries without the heater option have an operational ambient temperature range of 32°F to 131°F when discharging. The BMS2 will prevent operation outside these temperatures, but a heater option is available for cold storage and freezing weather applications. Batteries subjected to low temperatures (0°C / 32°F or lower) may experience decreased performance if not equipped with the heater option. A Flux Power lithium-ion battery, without heaters, experiencing an LED 4 DTC should be approached with either the following:

- 1) If the temperature outside the battery is cold, then the battery should be taken to a warmer environment to warm up.
- 2) If the temperature outside the battery is warm, then the battery should be taken to a cooler environment to cool down.

If a temperature DTC is continuously being seen, contact a Product Support representative.

2.4 Solid Red Light on SOC, No Power to Truck

If the SOC shows a solid red light and there is no power to the truck, the battery is in Sleep Mode. It is protecting itself from over discharge. If the battery has been left idle for more than 3 days or it is at <20% SOC, and is idle for more than 4 hours, it will go into a sleep mode to cut power consumption and reduce the risk of over discharge. To wake the battery up you must:

- 1) Cycle the breaker.
 - a. If the red light starts flashing and you hear an alarm, the pack must be plugged in for charging. The SOC is too low to power the truck.
 - b. If the state of charge gauge lights up and shows the SOC, the battery can be used. If it has been in storage, it should be plugged in and allowed to fully charge. Charging may take up to 5 minutes to start once the battery is plugged in.
- 2) Plug the battery in. It may take up to five minutes for charging to begin.

2.5 No Lights on SOC, No Power to Truck

If there are no lights on the SOC and there is no power to the truck, the battery may be in storage mode. Storage mode prevents the electronics from draining the battery and increases storage time. It is recommended the battery be plugged in and fully charged every four months when being stored.

- 1) Check the breaker in the cable storage box on the lid of the battery. Cycle the breaker by firmly pressing the red button in (OFF), and then folding in the yellow tab on the side of the breaker (ON). If the battery does not power up, continue to step 2.
- 2) First, remove the battery from the truck and follow the proper controls of hazardous energy. Unscrew the 16 top bolts to remove the top of the battery. Lift off the lid and lay it on the top edge of the battery.
 - a. Failed Breaker – Check the breaker in the closed position for continuity. The lid must be removed to access the back of the breaker where the posts are located. Check these for continuity.
 - b. Blown Fuse – There are two fuses inside the battery, the main fuse (200A), and the inline blade fuse (3A). The inline blade fuse is part of the cord box harness. It will be encased in the fuse holder which will have the label “Fuse” on its outside. The fuse locations are shown in the figure below. Check the fuses for continuity and replace if blown.

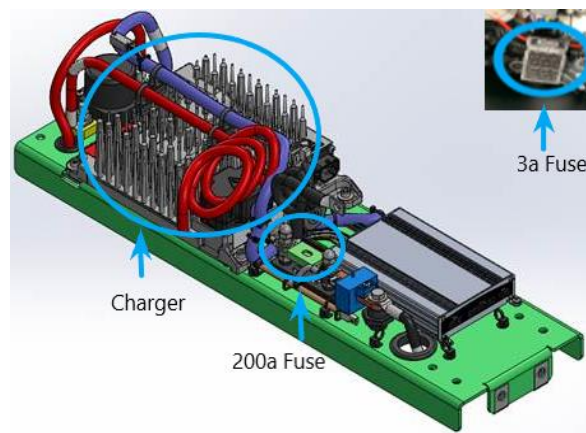


Figure 1: Pack internals viewed from the side. Note the fuse location and charger location.

2.6 Overdischarged

The battery pack contains advanced electronics which will slowly drain the battery if it is not charged up regularly. If a pack drains below 22.4V, the contactor opens. A battery with an overall voltage of 20V or less is severely overdischarged. Recovering a battery from this state requires the following:

- Computer with the proper Flux Power GUI.
- Cables to properly connect a computer to the battery.
- An approved power supply with controllable voltage output and varying current output that can go down to 1.5A for every 100Ah of the battery.

The *Online Troubleshooting Guide* for this battery thoroughly describes how to carry out a recovery process for this battery. It also allows a user to order the required parts to recover the battery. That tool can be found on the Flux Power website.

2.7 Charger Troubleshooting

If the battery has lights on the SOC but does not show a scrolling pattern on the SOC when plugged in to charge, it is possible that the charger has malfunctioned. To check the charger, observe the base of the charger. A lit blue LED indicates the charger is connected and receiving signal from the BMS2. A lit lightning bolt indicates the charger is operating at 28 V.

- 1) Charger has a blue light but there is an error code on the internal charger's display.
 - a. Use the charger error and fault codes from the chart below to find a solution based on the error code.
- 2) Charger has a blue light, lit lightning bolt, and no error code on the internal charger's display.
 - a. The charger will need to be replaced.
- 3) Charger has no lights on
 - a. Check that the battery is receiving 110-120V AC from its power source to its 3-pronged AC inlet.
 - b. If the battery is receiving the proper voltage, then the charger will need to be replaced.

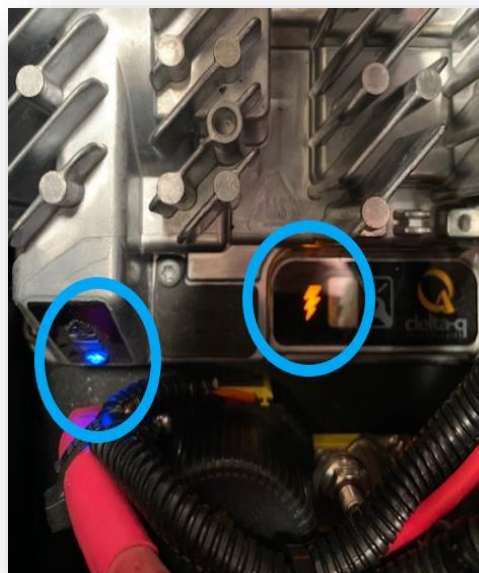


Figure 5: Delta-Q lightning bolt and error code display seen through the upper electronics deck.

The *Online Troubleshooting Guide* for this battery thoroughly describes how to further troubleshoot an internal charger in this battery. That tool can be found on the Flux Power website.

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Table 2: Charger Error and Fault Codes

Code	Description	Solution
E-0-0-1 E-0-2-1	Battery high voltage	Possible causes: wrong battery voltage for charger, other charger also attached, resistive battery. Possible solutions: Check the battery voltage and cable connections. Check the battery size and condition. This error will automatically clear once the voltage is in range.
E-0-0-2 E-0-2-2	Battery low voltage	Possible causes: battery disconnected, battery over discharged. Possible solutions: Check the battery voltage and cable connections. Check battery size and condition. This error will automatically clear once the voltage is in range.
E-0-0-3	Charge timeout caused by battery pack not reaching required voltage within safe time limit (charge profile dependent)	Possible causes: Charger output reduced due to high temperatures, poor battery health, very deeply discharged battery, and /or poorly connected battery. Possible solutions: Operate at lower ambient temperature. Replace the battery pack. Check the DC connections. This error will clear once the charger is reset by cycling DC or AC.
E-0-0-4	Battery could not meet minimum voltage (charge profile dependent)	Possible causes: Check for shorted or damaged cells. Possible solutions: Replace battery pack. Check DC connections. This error will automatically clear once the charger is reset by cycling DC or AC.
E-0-0-7	Battery amp hour limit exceeded	Possible causes: Poor battery health, very deeply discharged battery, poorly connected battery, and / or high parasitic loads on battery while charging. Possible solutions: Replace the battery pack. Check the DC connections. Disconnect parasitic loads. This error will automatically clear once the charger is reset by cycling DC or AC.
E-0-0-8	Battery temperature is out of range	Possible battery temperature sensor error. Check the temperature sensor and connections. Reset the charger. This error will clear once the condition is corrected.
E-0-1-2	Reverse polarity error	Battery is connected to the charger incorrectly. Check the battery connections. This error will clear once the condition is corrected.
E-0-1-6 E-0-1-8 E-0-2-6	USB operation failed (software)	Software upgrade failure or script operation failure. Ensure the USB flash drive is properly formatted and reinsert the USB flash drive.
E-0-1-7	USB operation failed (hardware)	Remove and reinsert the USB drive. If condition persists, cycle AC and retry by reinserting the USB drive.
E-0-2-3	High AC voltage error (>270VAC)	Connect charger to an AC source that provides stable AC between 85 - 270 VAC / 45-65 Hz. This error will clear once the condition is corrected.
E-0-2-4	Charger failed to initialize	The charger has failed to turn on properly. Disconnect AC input and battery for 30 seconds before retrying.
E-0-2-5	Low AC voltage oscillation error	AC source is unstable. Could be caused by undersized generator and /or severely undersized input cables. Connect charger to an AC source that provides stable AC between 85 - 270 VAC / 45-65 Hz. This error will clear once the condition is corrected.
F-0-0-1, F-0-0-2, F-0-0-3, F-0-0-4, F-0-0-6		Internal charger fault. Remove AC and battery for minimum 30 seconds and retry charger. If it fails again, please contact the manufacturer of your vehicle or machine.

3 Parts

3.1 Service Kits

Part No.	Part Name	Appendix
131004	Circuit Breaker Replacement Kit	A-1
131015	S8 Accessory Kit w/o PCAN Dongle	A-2
131015-001	S8 Accessory Kit including PCAN Dongle	A-3
131051	Current Sensor Replacement Kit	A-4
131052	Main Fuse Replacement Kit	A-5
131053	External Cables Replacement Kit	A-6
131055	Main Harness Replacement Kit	A-7
131056	Power Inlet Replacement Kit	A-8
131057	LED Board Replacement Kit	A-9
131061	BMS2 Service Kit BMS FX 100Ah	A-11
131063	Cord Box Harness Replacement Kit	A-13
131064	Charger Replacement Kit	A-14
131065	Contactor Replacement Kit	A-15
131066	Cord Box Gasket	A-16
160004	24V Power Jumper	A-17
500040	CAN Connection Cable	A-18

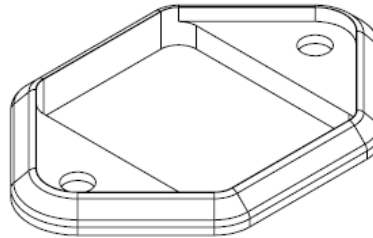
4 Appendix

Appendix A-1: Circuit Breaker Replacement Kit

Flux Power part number: 131004



P/N 660072
CIRCUIT BREAKER - 150 AMP
QTY: 1



P/N 660076
CIRCUIT BREAKER PANEL MOUNT ADAPTER
QTY: 1



P/N 810020
WASHER #10, 0.203" ID,
0.438" OD, SS
QTY: 2



P/N 810026
WASHER, W NEOPRENE, 1/4 SCREW,
.275 ID x .625 OD, SS
QTY: 16



P/N 810028
WASHER, FLAT, M6, STAINLESS STEEL,
ID 6.4MM X OD 12.0MM, THK 1.6MM
QTY: 1



P/N 830066
SCREW, 1/4-20x.75L,
BTNHD, ALLEN, 18-8 SS
QTY: 16



P/N 830076
SCREW-10-32x.875L PHPHIL ZN.SLDPR
QTY: 2

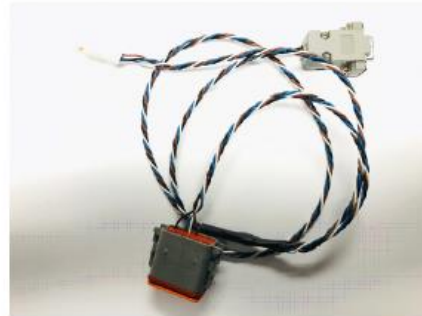
Service and Parts

Appendix A-2: S8 Accessory Kit w/o PCAN Dongle

Flux Power part number: 131015



P/N 500126
ASSY, CABLE, 24V POWER JUMPER
QTY: 1



P/N 500040
ASSY, CAN CONNECTION CABLE
QTY: 1

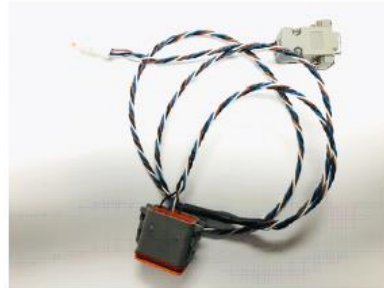
Service and Parts

Appendix A-3: S8 Accessory Kit PCAN Dongle Included

Flux Power part number: 131015-001



P/N 500126
ASSY, CABLE, 24V POWER JUMPER
QTY: 1



P/N 500040
ASSY, CAN CONNECTION CABLE
QTY: 1

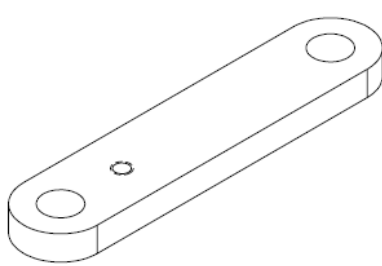


P/N 160001
PCAN DONGLE
QTY: 1

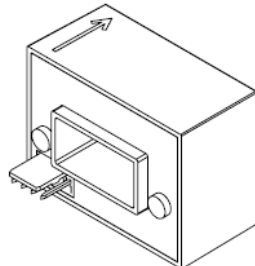
Service and Parts

Appendix A-4: Current Sensor Replacement Kit

Flux Power part number: 131051



P/N 400030
BUSBAR - CURRENT SENSOR, .25 THK
QTY: 1



P/N 600000
TRANSDUCER (HALL EFFECT SENSOR 200-S)
QTY: 1



P/N 810013
WASHER, 5/16, 18-8 SS
QTY: 2



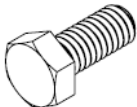
P/N 810026
WASHER, W NEOPRENE,
1/4 SCREW, .275 ID x .625 OD, SS
QTY: 16



P/N 810045
WASHER, DISC SPRING,
.625OD x .32ID x .088THK x .096H
QTY: 2



P/N 820021
NUT, M8 X 1.25, SS
QTY: 2



P/N 830195
SCREW, 5/16-18 X 3/4,
HEX HEAD, SS
QTY: 1



P/N 830057
NUT, ACORN, NYLON, 5/16-18
QTY: 2



P/N 830066
SCREW, 1/4-20x.75L,
BTNHD, ALLEN
QTY: 16



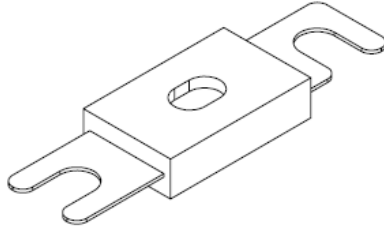
P/N 830091
SCREW, 8-32 X 5/16L_INT SEMS_PH_PHIL_SS
QTY: 1



P/N 850085
SPACER, NYLON, FOR #8 SCREW,
3/8" OD, 3/16" LONG
QTY: 1

Appendix A-5: S8 BMS2 Kit Service Fuse

Flux Power part number: 131052



P/N 600084
FUSE, 200A, 48VDC, FLAT, LIFT TRUCK TYPE
QTY: 1



P/N 810013
WASHER, 5/16, 18-8 SS
QTY: 2



P/N 810026
WASHER, W NEOPRENE,
1/4 SCREW, .275 ID x .625 OD, SS
QTY: 16



P/N 810045
WASHER, DISC SPRING,
.625OD x .32ID x .088THK x .096H
QTY: 2



P/N 820021
NUT, M8 X 1.25, SS
QTY: 2



P/N 830057
NUT, ACORN, NYLON, 5/16-18
QTY: 2

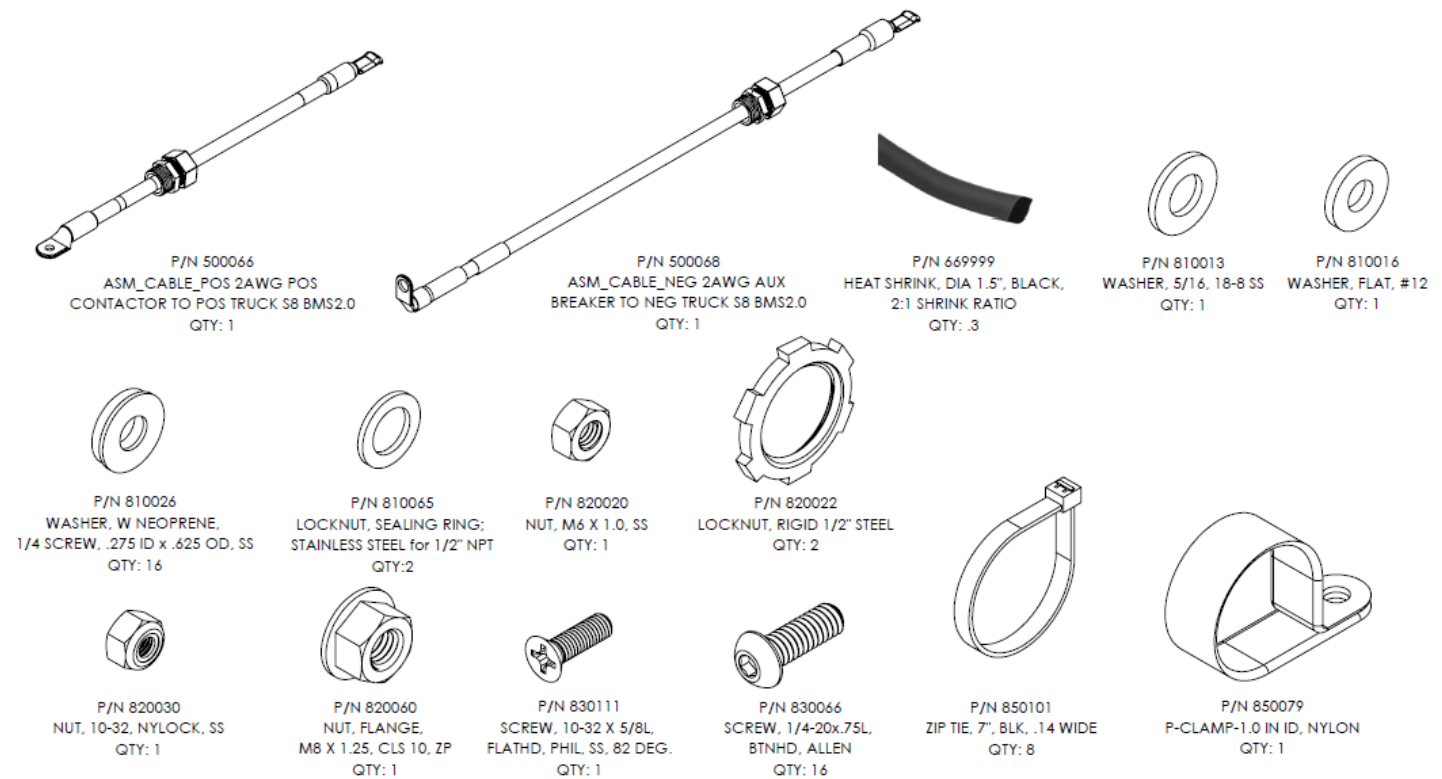


P/N 830066
SCREW, 1/4-20x.75L,
BTNHD, ALLEN
QTY: 16

Service and Parts

Appendix A-6: S8 BMS2 Kit Service External Power Cables

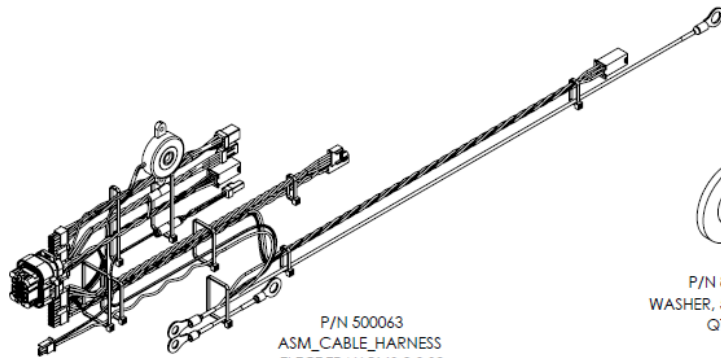
Flux Power part number: 131053



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Appendix A-7: S8 BMS2 Kit Service Main Harness

Flux Power part number: 131055



P/N 500063
ASM_CABLE_HARNESS
ELECT TRAY BMS 2.0 S8
QTY: 1



P/N 810013
WASHER, 5/16, 18-8 SS
QTY: 1



P/N 810026
WASHER, W NEOPRENE,
1/4 SCREW, .275 ID x .625 OD, SS
QTY: 16



P/N 810045
WASHER, DISC SPRING,
.625OD x .32ID x .088THK x .096H
QTY: 1



P/N 820021
NUT, M8 X 1.25, SS
QTY: 1



P/N 820060
NUT, FLANGE,
M8 X 1.25, CLS 10, ZP
QTY: 1



P/N 830057
NUT, ACORN, NYLON, 5/16-18
QTY: 1



P/N 830066
SCREW, 1/4-20x.75L,
BTNHD, ALLEN
QTY: 16

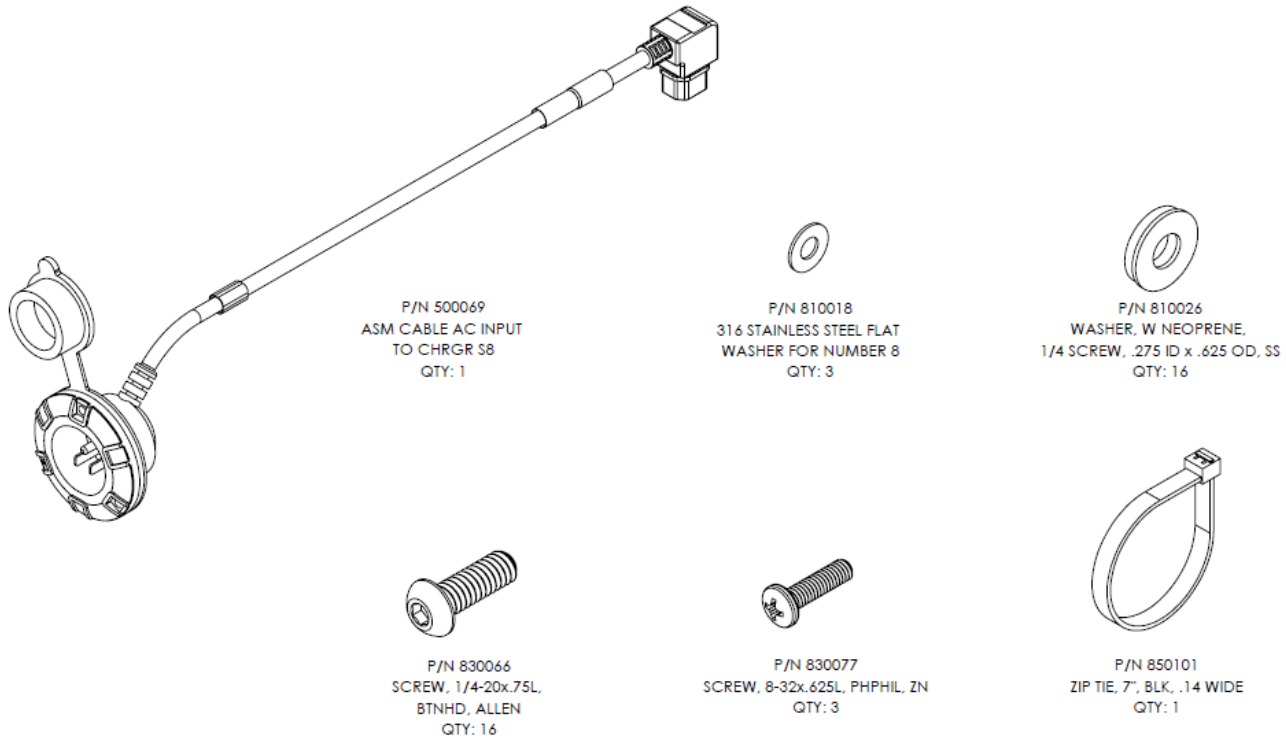


P/N 830283
SCREW, M6 X 1.0 X 8MM,
BTN HD, ALLEN, SS
QTY: 2

Service and Parts

Appendix A-8: S8 BMS2 Kit Service Power Inlet

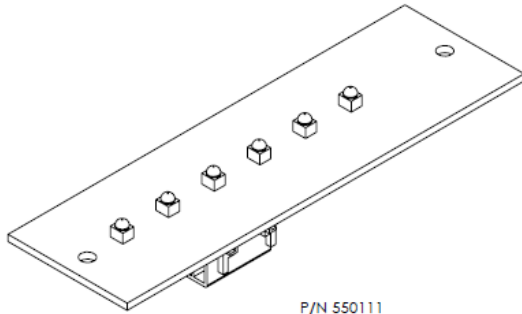
Flux Power part number: 131056



Service and Parts

Appendix A-9: S8 BMS2 Kit Service LED Board

Flux Power part number: 131057



P/N 550111
PCA, SOC, 6 LED, UNIVERSAL, COMMON VCC
QTY: 1



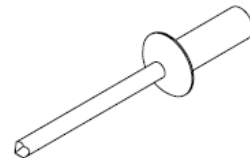
P/N 810026
WASHER, W NEOPRENE,
1/4 SCREW, .275 ID x .625 OD, SS
QTY: 16



P/N 830066
SCREW, 1/4-20x.75L,
BTNHD, ALLEN
QTY: 16



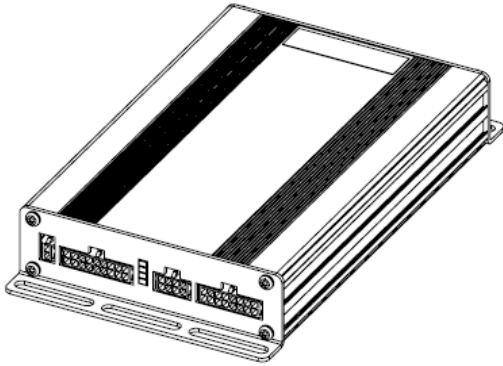
P/N 860002
EPOXY, PRO-DOME (LED POTTING)
QTY: 1



P/N 880013
RIVET, AL, STEEL MANDREL, DOMED,
1/8 OD, .126-.187 GRIP, SEALED
QTY: 2

Appendix A-11: S8 BMS2 Service Kit BMS FX 100Ah

Flux Power part number: 131061



P/N 810026
WASHER, W NEOPRENE, 1/4 SCREW,
.275 ID x .625 OD, SS
QTY: 16



P/N 830066
SCREW, 1/4-20x.75L, BTNHD, ALLEN
QTY: 16

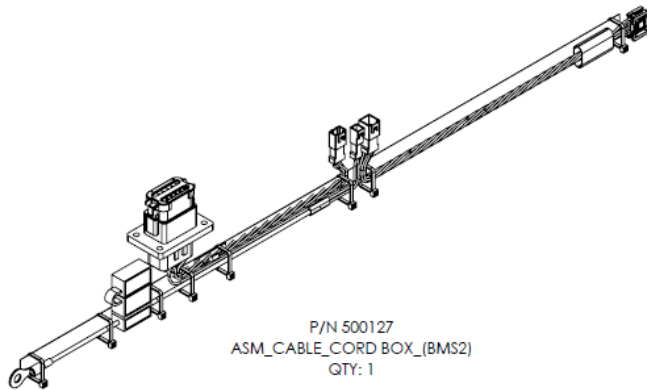


P/N 830091
SCREW, 8-32 X 5/16L, INT SEMS_PH_PHIL_SS
QTY: 4

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Appendix A-13: S8 BMS2 Cord Box Harness Replacement Kit

Flux Power part number: 131063



P/N 810018
316 STAINLESS STEEL FLAT
WASHER FOR NUMBER 8
QTY: 3



P/N 810026
WASHER, W NEOPRENE,
1/4 SCREW, .275 ID x .625 OD, SS
QTY: 16



P/N 830066
SCREW, 1/4-20x.75L,
BTNHD, ALLEN
QTY: 16



P/N 830091
SCREW, 8-32 X 5/16L_INT SEMS_PH_PHIL_SS
QTY: 4



P/N 850180
LANYARD, CONNECTOR CAP, 3/16 EYELETS
QTY: 1

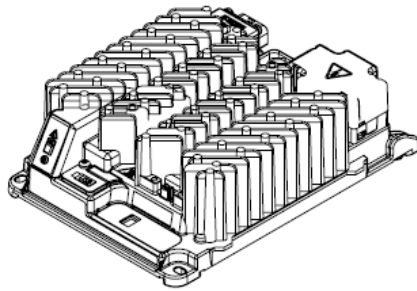


P/N 860005
SILICONE SEALANT
QTY: 1

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Appendix A-14: S8 BMS2 Kit Service Charger

Flux Power part number: 131064



P/N 600101-1
CHARGER, DELTA Q IC650
QTY: 1



P/N 800022
BLT,FLT,SDW,
5/16-18,1.000,SS
QTY: 8



P/N 800024
BOLT, 5/16-18 BUTTON
HEAD STAINLESS STEE
QTY: 4



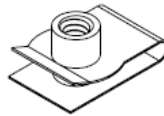
P/N 810016
WASHER, FLAT, #12
QTY: 1



P/N 810025
WASHER, FLAT, MIL SPEC,
.500OD x .265ID, CAD
QTY: 4



P/N 810026
WASHER, W NEOPRENE,
1/4 SCREW, .275 ID x .625 OD, SS
QTY: 16



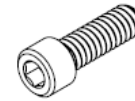
P/N 820015
CLIP-NUT, 1/4-20, .531 CENTER
HOLE TO ED
QTY: 4



P/N 820024
NUT - NYLOC 12-24
QTY: 1



P/N 820022
LOCKNUT, RIGID 1/2" STEEL
QTY: 1



P/N 830065
1/4-20 X 3/4 SOC
CAP SCREW ALLOY
QTY: 4



P/N 830066
SCREW, 1/4-20x.75L,
BTNHD, ALLEN, 18-8 SS
QTY: 16



P/N 890022
CAULK SAVER POLYFOAM
GRAY 350' ROLL
QTY: 25 INCHES

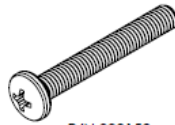
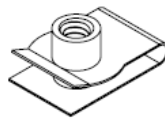
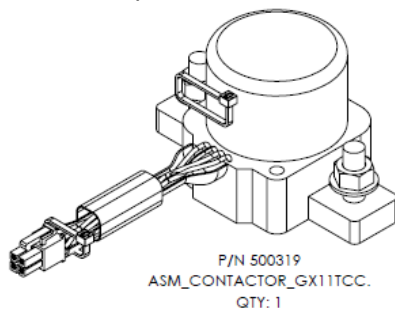


P/N 860005
SILICONE SEALANT
QTY: 1

Service and Parts

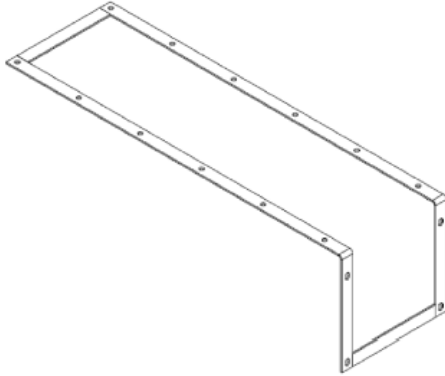
Appendix A-15: S8 BMS2 Kit Service Contactor

Flux Power part number: 131002



Appendix A-16: Gasket, Cord Box

Flux Power part number: 131066



P/N 250190
GASKET, CORD BOX
QTY: 1



P/N 810026
WASHER, W NEOPRENE, 1/4 SCREW,
.275 ID x .625 OD, SS
QTY: 16



P/N 830066
SCREW, 1/4-20x.75L, BTNHD, ALLEN
QTY: 16

Service and Parts

Appendix A-17: Assy, Cable, 24V Power Jumper

Flux Power part number: 160004



P/N 500126
ASSY, CABLE, 24V POWER JUMPER
QTY: 1

Appendix A-18: Assy, CAN Connection Cable

Flux Power part number: 500040



P/N 500040
ASSY, CAN CONNECTION CABLE
QTY: 1

5 Flux Power Contact Details

Flux Power Inc.

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Vista, CA 92081

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Fax: 760-741-3535

Email: Support@fluxpower.com

Web: www.fluxpower.com

WARNING – Risk of Fire – No User Serviceable Parts

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