

Flux Power LiFT Pack M36 Service and Parts Manual





Service and Parts

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.



WARNING – Risk of Fire – No User Serviceable Parts



Consider all direct current (DC) battery pack 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 pack 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.

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1 Introduction

The LiFT Pack M36 is a lithium-ion battery specialized for the material handling industry. This User Guide is intended to provide basic information on how to service a Flux Power LiFT Pack M36 and its service kits. A more detailed and interactive troubleshooting process can be found in the *Online Troubleshooting Guide* that is accessible on the Flux Power website in the Product Support section.

2 Basic Troubleshooting

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 green push button and push it to turn OFF the battery.



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



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.

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

The first step in troubleshooting the battery is observing the State of Charge (SOC) off of the battery's SOC gauge. In normal operation, the SOC gauge will display the battery's current state in as a percentage with no DTCs present. If a DTC is present then the SOC gauge will indicate so with a specific LED flashing. DTCs let the user or technician quickly assess why a battery may be disrupting 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	DTC LED Number	Service Required?	Fault Resolution
0% State of Charge	<5% State of Charge, Immediate	Buzzer Sounds Periodically	1	No	Connect appropriate charger
Hardware Failure	Electronic component failure for more than 10 seconds	Contactor opens	3	Yes	Service
Over-temperature discharge	> 131F, 60 seconds > 133F, Immediate	Contactor opens	4	No	Allow pack to cool, then cycle the circuit breaker OFF, then ON
Under temperature discharge	< -2F, 60 seconds < -4F, Immediate	Contactor opens	4	No	Allow pack to warm, then cycle the circuit breaker OFF, then ON
Current Exceeded	Discharge current is <(-1000A), 10 seconds Discharge current is <(-800A), 2 minutes	Contactor opens	5	No	Cycle the battery OFF, then ON through the battery's green push button
Current Exceeded	Current is >1000A, 10 seconds	Contactor opens	5	No	Cycle the battery OFF, then ON through the battery's green push button

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	Current is >800A, 2 minutes				
High Cell	At least one cell is >3.65V, Immediate	Contactor opens	6	No	Cycle the battery OFF, then ON through the battery's green push button. If fault occurred while charging, allow cells to settle
Low Cell	Fixed threshold of <2.8V for cell temp >25C	Contactor opens	6	No	Connect the appropriate charger and cycle the battery through the battery's green push button

2.3 Temperature (DTC 4)

Flux Power lithium batteries without the heater option have an operational ambient temperature range of -20°C / -4°F to 56°C / 133°F when discharging. The BMS2 will prevent operation outside these temperatures. Batteries subjected to low temperatures (0°C / 32°F or lower) may experience decreased performance. A Flux Power lithium battery 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.

2.4 No Lights on SOC Gauge and No Power to the Truck

If there are no lights on the SOC gauge, and there is no power to the truck, it may be in storage mode. Storage mode prevents the electronics from draining the battery and increases storage time.

- 1) Check the battery's green push button. Cycle the battery by pressing the button to turn it off and again to turn it on. If the battery does not power up, continue to step 2. If the battery does power up, but there is no power to the truck, continue to step 3.
- 2) First remove the battery from the truck and follow the proper controls of hazardous energy. The front panel of the battery can be removed by unscrewing the X bolts holding it onto the front face of the battery.
 - a. Blown Automotive Fuses – There are 3 automotive style fuses inside a fuse block. The fuse block is located in the battery to right of the BMS board. Check the top 2 fuses for continuity. If needed, the bottom third fuse is a spare.
 - b. Faulty DCDC Converter – There is a dark gray and labeled DCDC converter on the bottom right of the battery. There are 2 labeled inputs on the bottom (+Vin and -Vin) and 4 labeled outputs on top (-Vo, -Vo, +Vo, and +Vo). A properly functioning DCDC converter will have a blue light illuminating from the inside. The light can be from the manufactured slots on the top of the component. It will have a voltage output from both +Vo outputs. It will also be grounded from both -Vo outputs.
- 3) The battery has a signal being sent out and returned through its external harness. Ensure that all connections to the external harness are properly established and that the harness itself is properly inserted into the battery. Once the integrity of the external harness has been reviewed, cycle the battery through its green push button.

2.5 Overdischarged

If a battery drains below 33.6V, or if at least one cell reaches 2.80V, then the discharge contactor will open so that the truck will turn OFF. The battery can still be plugged into an external charger to charge. A battery with an overall voltage of 30V or less, or if a cell reaches 2.50V or lower, is severely overdischarged. At this point the charge and discharge contactor will open, and the battery will not charge when connected to the external charger. The reason the charge contactor remains opened when connected to a charger at this low voltage is to control the amount of current that is inputted into the battery. When a cell reaches 2.50V or lower the input current must be low and controlled. The battery will need to be recovered through an approved trickle charge process. The trickle charge process to recover this battery can be found in the *Online Troubleshooting Guide* that is accessible on the Flux Power website in the Product Support section.

3 Safety and Reliability

Flux Power LiFT Packs are completely sealed and require no watering. No electrolyte must be added and there is no danger of acid spills or explosive vapors during normal use. In addition, the Flux Power LiFT Pack M36 is designed to pass the UL 2580 standard.

- **WARNING:** Do Not Disconnect the power cables under load.
- Not Suitable for water exposure.
- Not intended for use in a marine environment.
- For indoor use only.
- ALWAYS use proper lifting techniques and equipment when installing the battery.
- The battery does not require regular maintenance but should be plugged in overnight once per week to allow the cells to balance.
- Do NOT attempt to open the battery, unless authorized by a Flux Power representative.
- Do NOT tamper with the main power connector.

3.1 Hazardous Material Information

Lithium-ion batteries are considered HazMat Class 9 - Miscellaneous. There are no reporting regulations required for Flux Power LiFT Packs federally (specifically under the Resource Conservation and Recovery Act of 1976 (RCRA) and the Emergency Planning and Community Right-to-Know Act (EPCRA)). There are hazmat regulations when shipping lithium-ion batteries.

There are sometimes state or city regulations which differ from federal law, however generally speaking, a Flux Power LiFT Pack M36 under normal use has no danger of leakage, spilling, outgassing, or presenting any danger to the end user. Federal regulations are very strict when dealing with lead-acid batteries due to the environmental impacts of heavy metals (lead) and inherent dangers present: acid spills, explosive gases, and lead poisoning.

For more information on local regulations, contact your local EPA and fire department or contact FLUX Power and we will do our best to assist you.

3.2 Cell Exposure

Flux Power battery packs meet tough internationally recognized safety standards to provide one of the safest industrial lithium-ion products available. In the case of an emergency, there are a few types of exposure to be aware of:

- **Inhalation:** when someone inhales fumes or smoke from a battery, remove the exposed person to fresh air as gas may be corrosive to the respiratory tract.

- **Electrolyte on skin** : wash off skin for 30 minutes thoroughly with soap and water.
- **Electrolyte in eyes** : thoroughly flush eyes with water for a minimum of 15 minutes.
- **Ingestion** : rinse out mouth thoroughly with water and give plenty of water to drink.

Proper procedures to each exposure type, and proper PPE per incident, is detailed further in the *Lithium Ion (LFP) Battery Emergency Procedures*.

3.3 Heavy Water Spray

The M36 Battery Pack should not be used in equipment where there is water spray, such as applications that require power washing. If an M36 Battery Pack is exposed to heavy rainfall or water spraying, then do not attempt to use or charge the pack. Instead contact Flux Power Product Support representative.

4 Recycling/Disposal

4.1 Recycle

Lithium-ion batteries are recyclable and there are lithium-ion recycling plants nationwide. **Do not include lithium-ion batteries in shipments of lead-acid batteries being sent for recycling.** Sending a lithium-ion battery to a lead-acid recycler could endanger people and damage equipment. [Contact Flux Power Product Support](#) if you need assistance. If you are unable to locate a lithium-ion recycler in your area, Flux Power agrees to take back any battery that is at its end of life (does condition matter?).

4.2 Re-Use

There are options for re-use when an M-Series battery pack no longer holds enough charge, including:

- Deploy cells into an alternate second life usage, such as grid storage or emergency power.
- Refurbish the steel case and electronics into a new battery pack.

4.3 Disposal

Flux Power is committed to the environment. Lithium-ion batteries are not specifically discussed in the Federal Resource Conservation and Recovery Act (RCRA). However, given the federal requirements for hazardous materials, a *completely discharged lithium iron phosphate cell is considered **non-hazardous** material.* States and cities may have more stringent regulations in place, some of which blanket all lithium-ion batteries as hazardous waste, while others classify them as normal waste. The Flux Power *End Of Life and Guarantee* ensures full compliance with laws and the highest environmental standards. The guide is available on the Flux Power website at www.fluxpower.com.

5 Shipping Information

When shipping Flux Power LiFT Packs, the products are classified as *UN 3480 Dangerous goods - Part II - Class 9 (miscellaneous)* and can only be shipped ground. The battery must be secured to a pallet or in a wooden crate. There must be nonconductive material between multiple batteries, and they cannot be stacked. If it is being shipped in equipment it must be securely installed and protected against heat, short circuit, movement, and accidental activation of the equipment. Shipping declarations, hazmat shipping documentation, and hazmat shipping training are all required. Please see the *Shipping and Reporting Guide* for more information. It is the responsibility of the shipper to obey all regulations when shipping a Flux Power LiFT Pack M36.

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This guide is available on the Flux Power website at www.fluxpower.com.

6 Warranty

Thank you for purchasing a Flux Power M-Series Lithium-ion Battery Pack. Please take a few moments to complete the registration form at <https://www.fluxpower.com/warranty-registration>. Your registration allows us to update you on product information.

6.1 Important Warranty Notice

Failure to properly maintain the battery pack's state of charge voids the battery pack's warranty. Allowing the battery pack to discharge below the 0% threshold, or $\leq 2.8V$ per cell in the battery pack (for example: battery pack model M36 $\approx 33.6V$) can cause an overdischarged condition. Refer to the *Best Practices Guide* for more information.

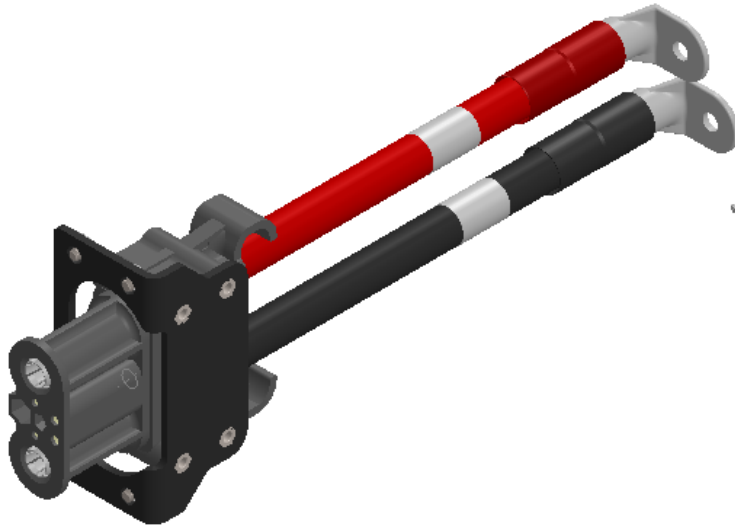
7 Parts

7.1 List of Parts and Service Kits

Part No.	Part Name	Appendix	Page No.
131115	M36 Charge Port -01 Service Kit	A-1	12
131117	M36 Charge Port -03 Service Kit	A-2	12
131118	M36 Charge Port -04 Service Kit	A-3	13
131124	Accessory Kit PCAN Dongle	A-4	13
131125	PCAN Diagnostics Connection Cable	A-5	14
131126	M36 Discharge Contactor Service Kit	A-6	14
131127	M36 Charge Contactor Service Kit	A-7	15
131128	M36 BMS2.0 Service Kit	A-8	15
131129	M36 Main Fuse Service Kit	A-9	16
131130	M36 Small Fuse Service Kit	A-10	16
131131	M36 DCDC Converter Kit	A-11	17
131132	M36 Current Sensor Service Kit	A-12	17
500347	M36 Communications Port	A-13	18
670041	Push Button	A-14	18
670042	Push Button Contact Block	A-15	18

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Appendix A-1: M36 Charge Port -01 Service Kit

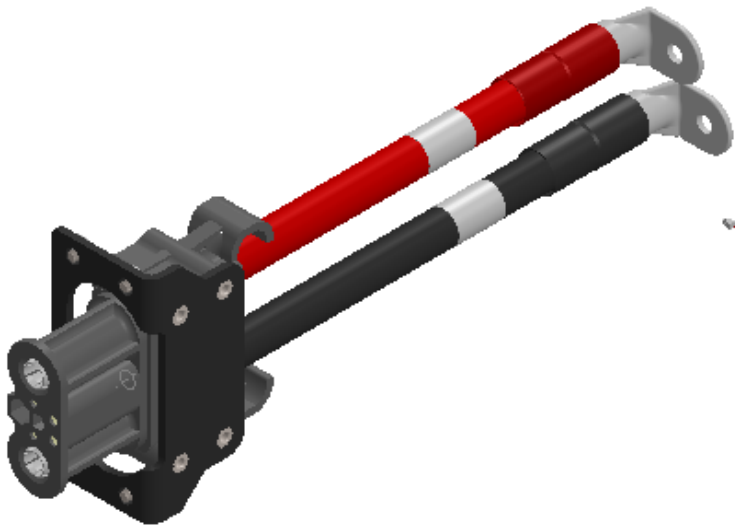


P/N 200306
ASM_SUB_EURO_CONN_MB6



P/N 500344-01
ASM_CABLE_A320_AUX_CONTACTS

Appendix A-2: M36 Charge Port -03 Service Kit



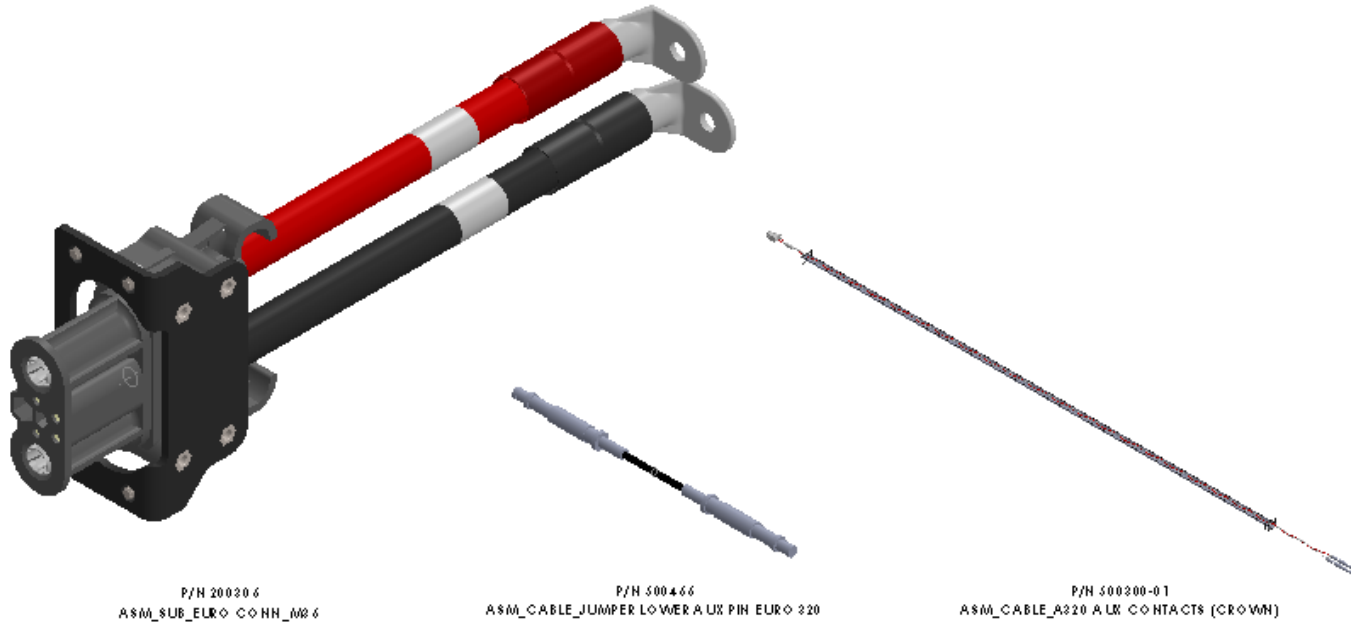
P/N 200306
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P/N 500200-01
ASM_CABLE_A320_AUX_CONTACTS (CROWN)

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Appendix A-3: M36 Charge Port -04 Service Kit

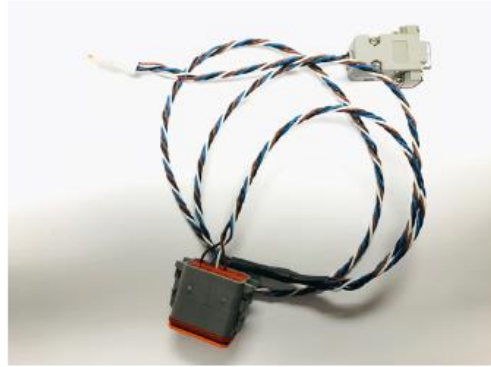


Appendix A-4: Accessory Kit PCAN Dongle



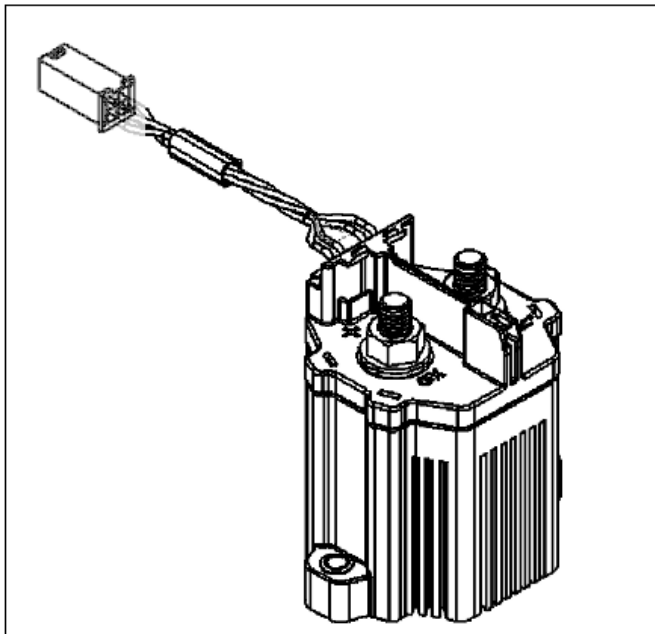
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Appendix A-5: PCAN Diagnostics Connection Cable

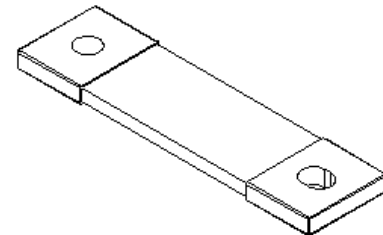


P/N 500040
ASSY, CAN CONNECTION CABLE
QTY: 1

Appendix A-6: M36 Discharge Contactor Service Kit



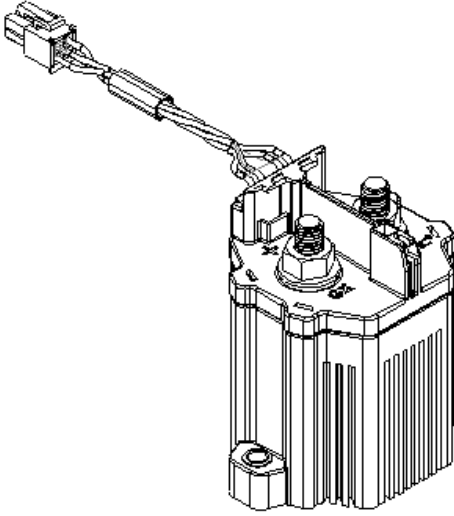
P/N 500333-01
ASM, CONTACTOR, GX26 CAD



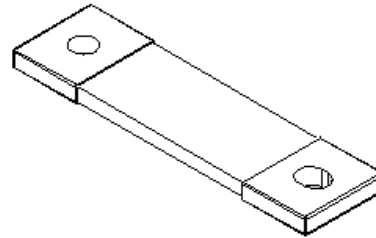
P/N 400046-01
BUSBAR_2POSN_FLEXIBLE_100AH_POS INSULN

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Appendix A-7: M36 Charge Contactor Service Kit

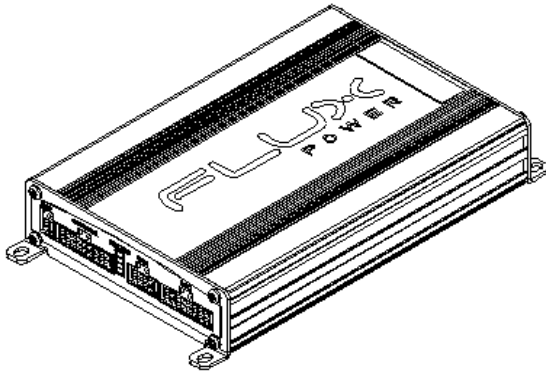


P/N 500333-02
ASM, CONTACTOR, G226 CAD

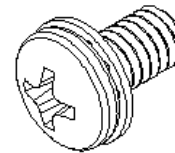


P/N 400046-01
BUS BAR_2POSN_FLEXIBLE_100AH_P05 INSULN

Appendix A-8: M36 BMS2.0 Service Kit



P/N 100105-03
ASM_BMS_2.0_MB6



P/N 830091
SCREW_8-32 X 5/16L_INTSEWB_PH_PHIL_SS

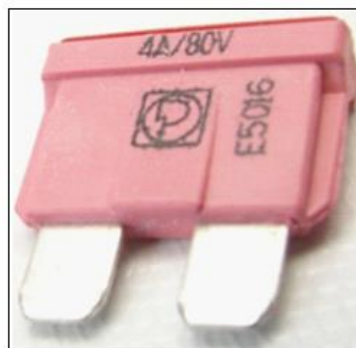
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Appendix A-9: M36 Main Fuse Service Kit



P/N 600213
FUSE 600A, CLASS T, 160 VDC FAST ACTING

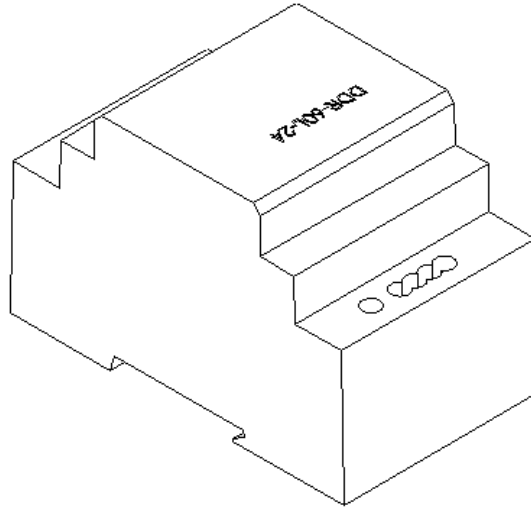
Appendix A-10: M36 Small Fuse Service Kit



P/N 600209
FUSE FKS ATO STYLE, 4 AMP, 80 VDC RATED

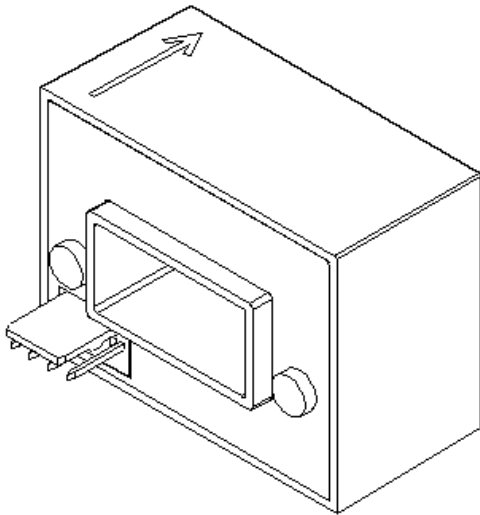
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Appendix A-11: M36 DCDC Converter Kit

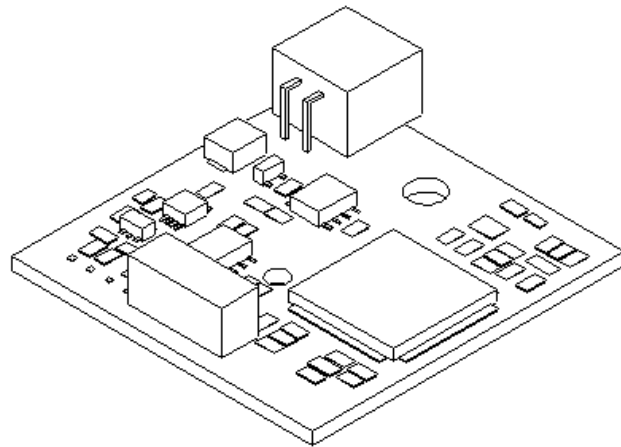


P/N 670060
CONVERTER, D C / D C, 18-75 V D C IN, 24 V D C OUT, D I N R A I L

Appendix A-12: M36 Current Sensor Service Kit

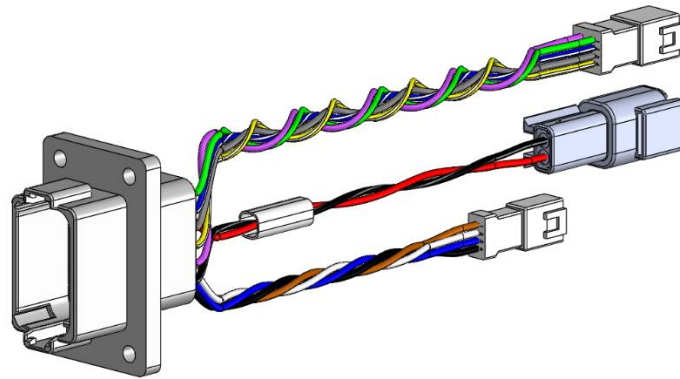


P/N 400086
SENS OR C CURRENT 500A

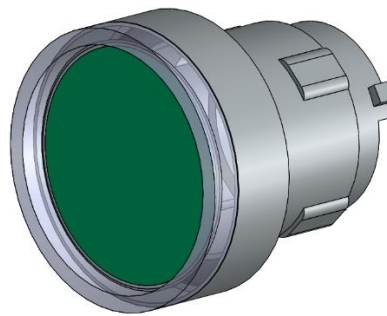


P/N 550105
P C A _ C U R R E N T S E N S O R S I G N A L C O N D I T I O N E R

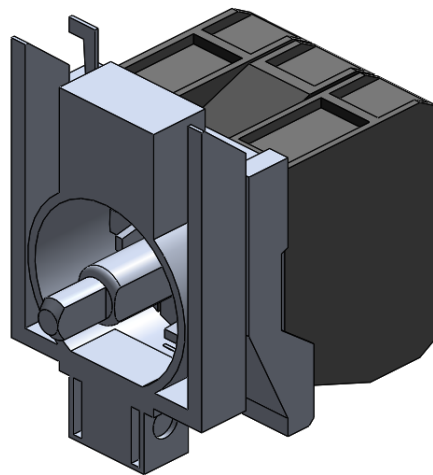
Appendix A-13: M36 Communications Port



Appendix A-14: Push Button



Appendix A-15: Push Button Contact Block



8 Flux Power Contact Details

Flux Power Inc.

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WARNING – Risk of Fire – No User Serviceable Parts

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