

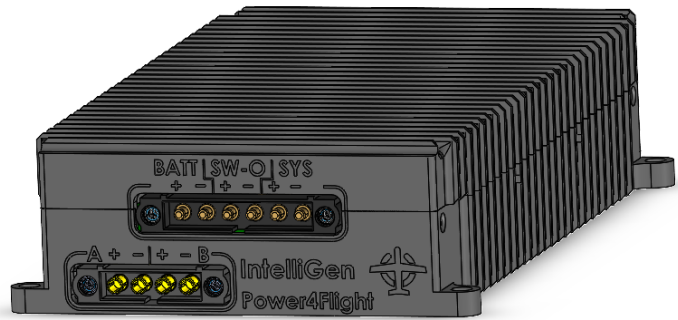
INTELLIGEN DATASHEET

A. Overview

IntelliGen is a Starter/Generator controller with power distribution and battery charging designed by Power4Flight specifically for use in small engine aerospace applications.

Hardware features

- 60V active 3-phase boost rectification for BLDC generators
- Switched high voltage output for battery charging or high-power loads
- 28.5 / 25V (8S LiFePO4 or 6S LiPo) 30A regulator with battery-backed input and output
- Real time adjustable current limit for the 28.5 / 25V regulator to manage generator load
- 12V and 6V 8A regulated outputs with battery-backed inputs (optional dual 12V or dual 6V)
- 28.5 / 25V 15A switched output for heaters or other loads
- Hall sensor inputs for robust commutation and engine starting
- Generator, high voltage, regulator, and battery current and voltage measurements
- Generator and high voltage battery temperature inputs
- Two internal temperature measurements
- Shore power / high voltage battery input
- CAN and Serial communications
- **Weight: 300g (10.6oz)**
- **Size: 126mm x 78mm x 28 mm (5.0" x 3.1" x 1.2")**



Software features

- **Configurable charging output for high voltage eVTOL lift packs**
- **Engine starting via backup or high voltage batteries**
- **Power augmentation using high voltage battery to increase engine shaft power**
- Sophisticated and robust firmware designed for aerospace applications
- Configurable for a variety of use cases and generator designs
- Automatic load shedding to protect the engine and/or generator
- Thermal derating to protect generator and/or IntelliGen
- Choice of hall sensors and/or sensorless commutation with automatic failover
- Free communications specification and software developer's kit
- Free user interface for testing and configuration development
- Interoperates with IntelliJect ECU

B. Specifications

Table 1. Absolute maximum ratings.

Sub-system	Specification	Max	Unit
Motor controller (Gen)	Max rectified voltage	60	V
	PWM frequency	128	kHz
	Max indicated operating temp.	100	deg C
High voltage (HV)	Max voltage	60	V
Main regulator	Input voltage	20-60	V
	Output voltage	28.5 or 25	V
	Max indicated operating temp.	100	deg C
Backup Battery (Batt)	Max voltage	28.5 or 25	V
Switched Output (SW-O)	Output Voltage	28.5 or 25	V
System Output (SYS)	Output voltage	28.5 or 25	V
Regulator A (A)	Output voltage	12	V
Regulator B (B)	Output voltage	6 or 12	V
Global Enable	Max Voltage	12	V
Crank Enable	Max Voltage	12	V
Crank command	Max Voltage	6	V

Table 2 Peak current limits of sub-systems.

Sub-system	Specification	Value	Unit
Motor controller (Gen)	Steady state input/output	30	A
High voltage (HV)	Steady state input/output	30	A
Main regulator	Steady state output (with >40V input)	30*	A
Backup Battery (Batt)	Steady state discharge	20	A
Switched output (SW-O)	Steady state output	15**	A
System output (SYS)	Steady state output	30	A
Regulator A (A)	Steady state output	8	A
Regulator B (B)	Steady state output	8	A

*REV 03 Main Regulator current limit is 15A.

**20A transient limit

C. Electro-mechanical ICD

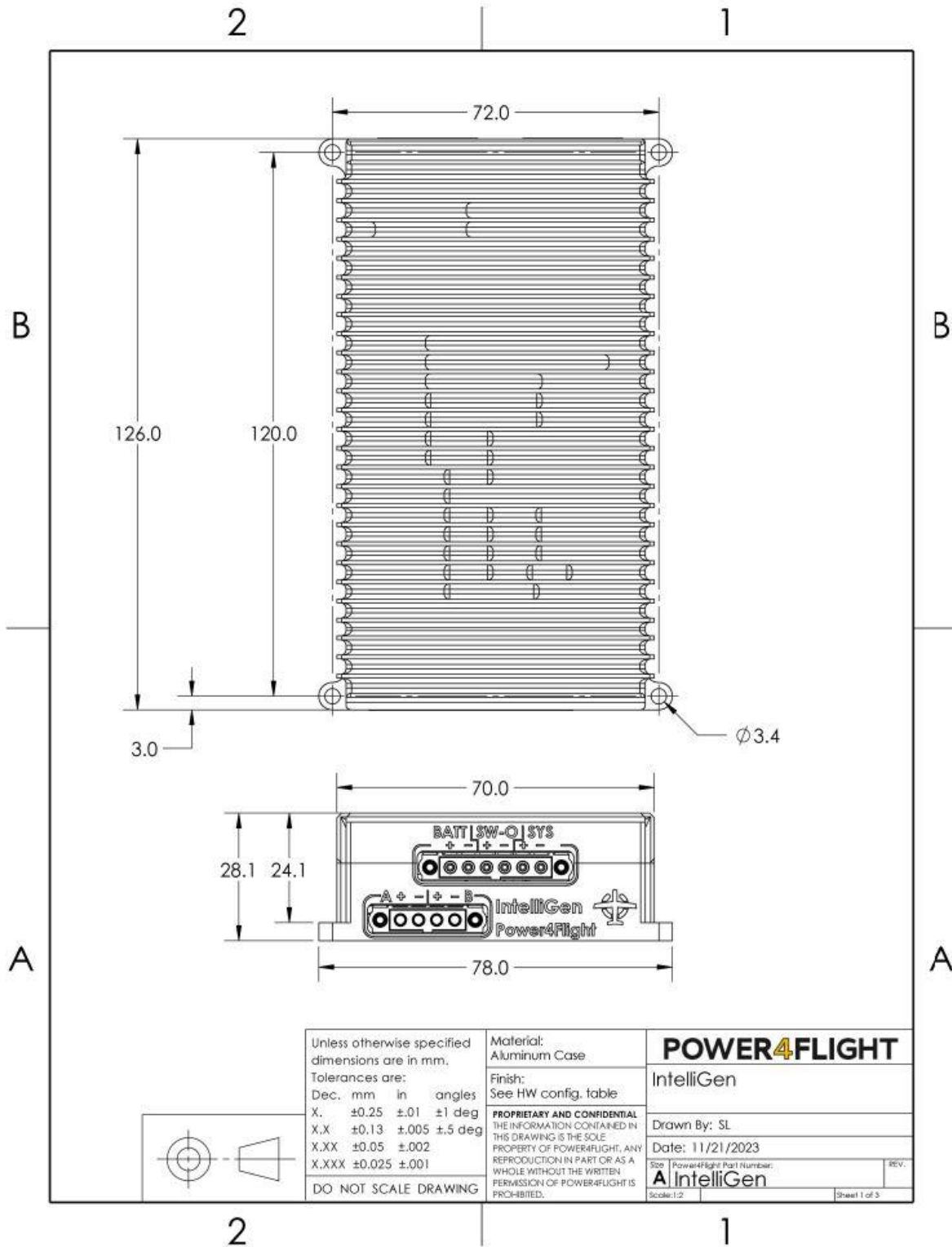


Figure 1: IntelliGen enclosure dimensions.

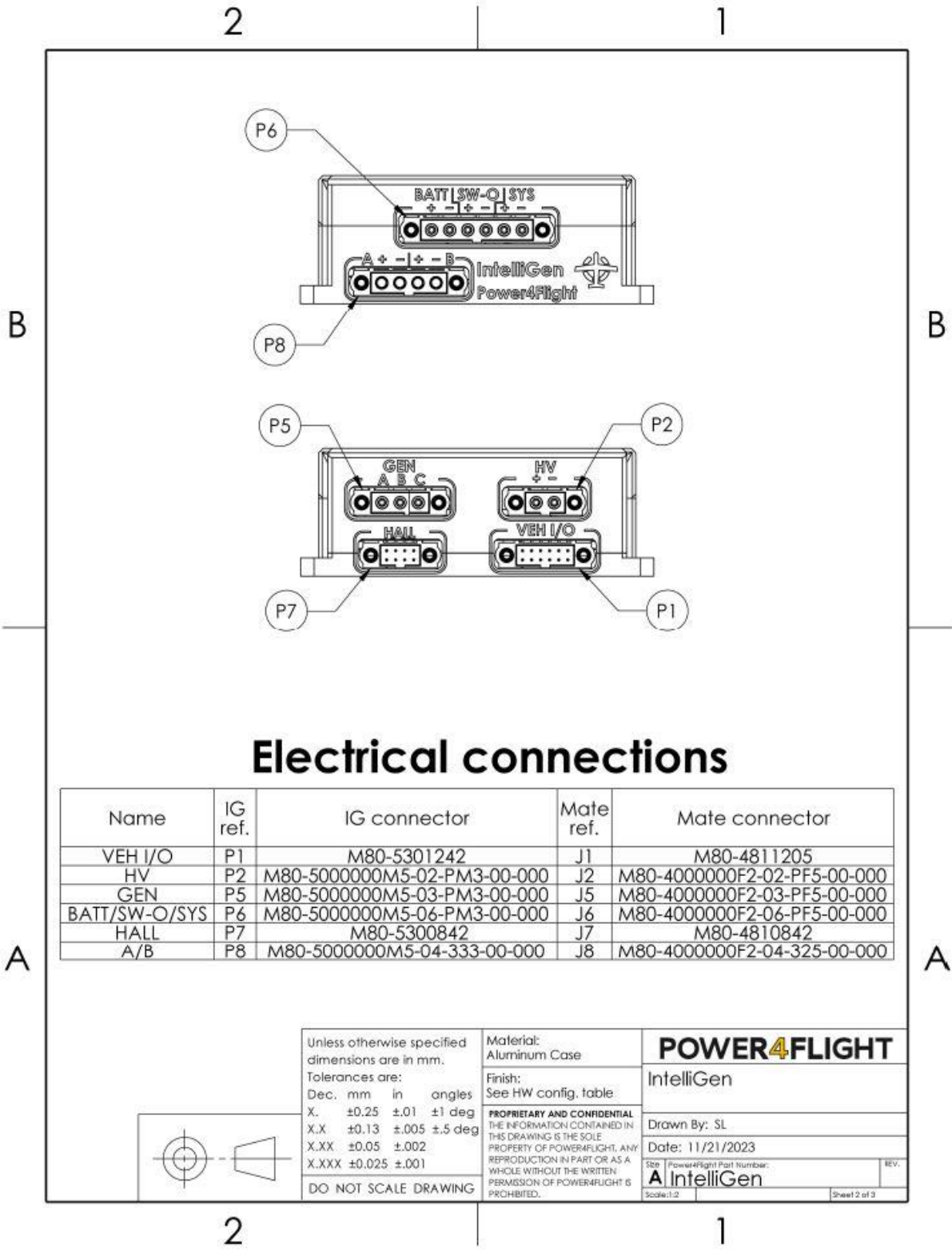


Figure 2: IntelliGen electrical connections.

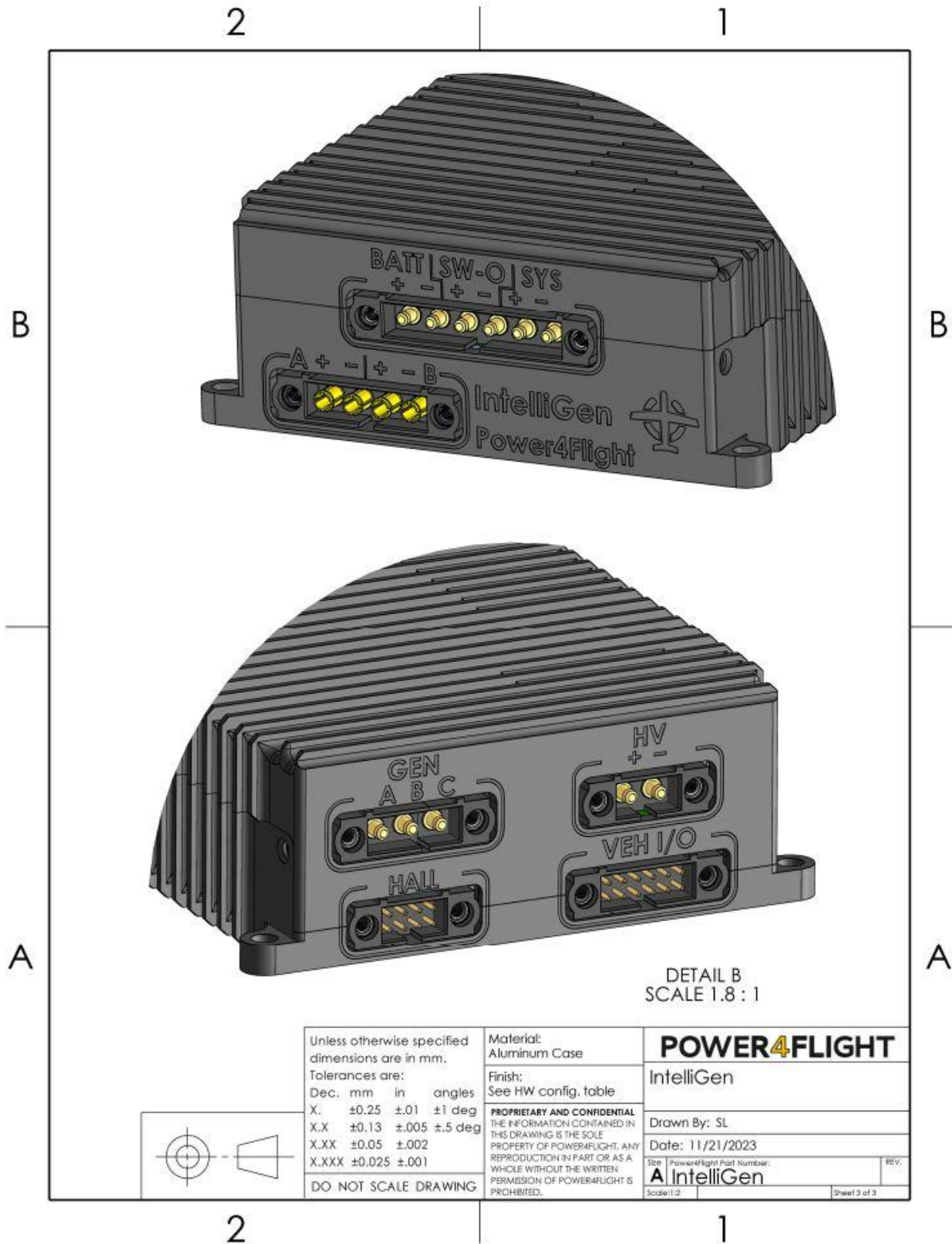


Figure 3: IntelliGen connections and labels.

D. Connector Pin Outs

Table 3 Pin outs for electrical connections to IntelliGen.

Connector label	Connector designator	Pin	Name	Type	Description
VEH I/O	P1	1	CRANK EN	INPUT	Enable for cranking the engine. Pull up to 5V to enable.
		3	CRANK CMD	INPUT	Command starter to crank the engine. 5V rising edge to send command.
		5	GND	PASSIVE	Ground for external enables and start
		7	BATT TEMP*	INPUT	Battery temperature sensor signal
		9	GND	PASSIVE	Ground for battery temperature
		11	GLOBAL EN	INPUT	Global enable for high power rails
		2	RS232 TX	INPUT	RS232 transmit
		4	RS232 RX	OUTPUT	RS232 receive
		6	GND	PASSIVE	Ground for RS232
		8	CAN H	I/O	CAN High signal (optional 120 Ohm termination resistor to CAN Low)
		10	CAN L	I/O	CAN Low signal
		12	GND	PASSIVE	Ground for CAN bus
HV	P2	1	HIGH VOLTAGE +	I/O	High voltage positive terminal
		2	HIGH VOLTAGE -	PASSIVE	High voltage negative terminal
GEN	P5	1	GEN PHASE A	I/O	Generator Phase A input
		2	GEN PHASE B	I/O	Generator Phase B input
		3	GEN PHASE C	I/O	Generator Phase C input
BATT SW-O SYS	P6	1	BACKUP BATTERY +	I/O	Backup battery positive terminal
		2	BACKUP BATTERY -	PASSIVE	Backup battery negative terminal
		3	SWITCHED OUTPUT +	OUTPUT	Main switched output positive terminal
		4	SWITCHED OUTPUT -	PASSIVE	Main switched output negative terminal
		5	SYSTEM OUTPUT +	OUTPUT	Main system output positive terminal
		6	SYSTEM OUTPUT -	PASSIVE	Main system output negative terminal
Hall	P7	1	HALL POWER +	OUTPUT	5V output positive terminal for hall sensor power
		3	5V POWER +	OUTPUT	5V power general purpose output
		5	GND	PASSIVE	Ground connection for the generator temp sensor
		7	GND	PASSIVE	Ground connection for the hall sensor
		2	HALL U	INPUT	Hall sensor U input
		4	HALL V	INPUT	Hall sensor V input
		6	HALL W	INPUT	Hall sensor W input
		8	GEN TEMP IN*	INPUT	Generator temp sensor input
A/B	P8	1	A OUT +	OUTPUT	Regulator A positive terminal
		2	A OUT -	PASSIVE	Regulator A negative terminal
		3	B OUT +	OUTPUT	Regulator B positive terminal
		4	B OUT -	PASSIVE	Regulator B negative terminal

* The generator and HV battery temperature sensors are connected to factory configurable resistor networks. Each has a pull up resistor to 5V (2000 Ω typical), and a resistor in parallel with the sensor (4020 Ω typical).

E. Development harness schematics

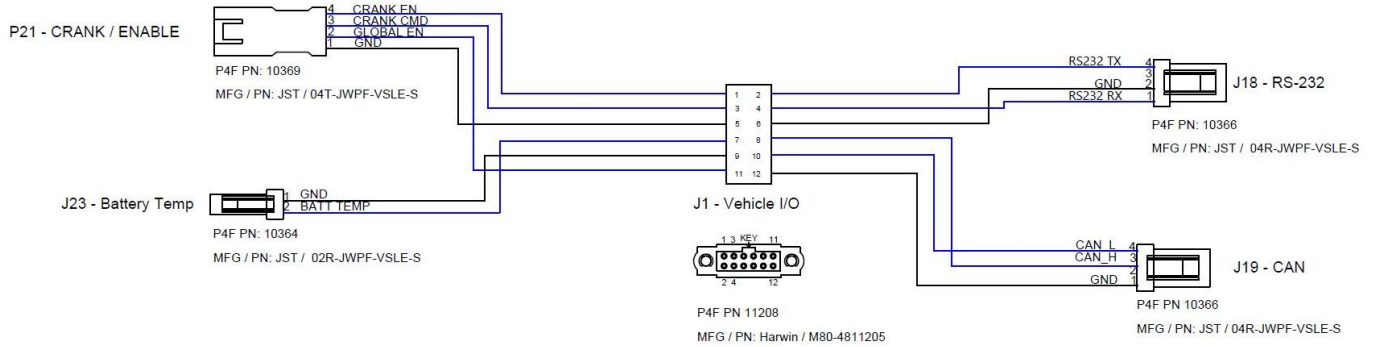


Figure 4: Vehicle I/O connector harness schematic.

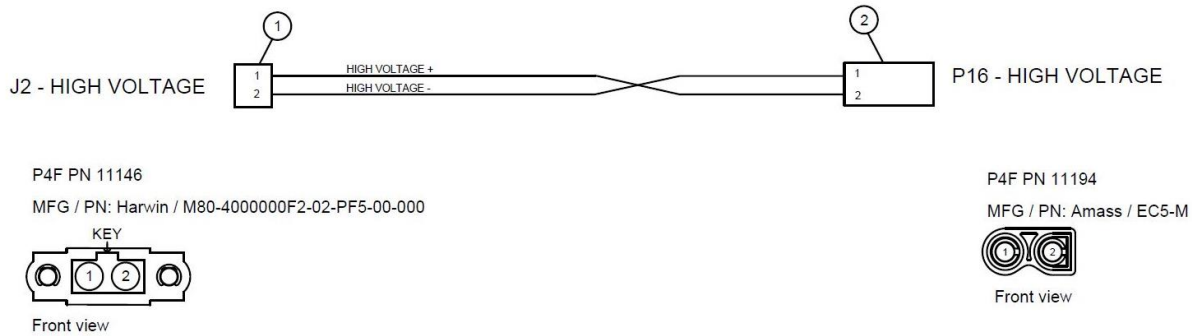


Figure 5: High voltage battery connector harness schematic.

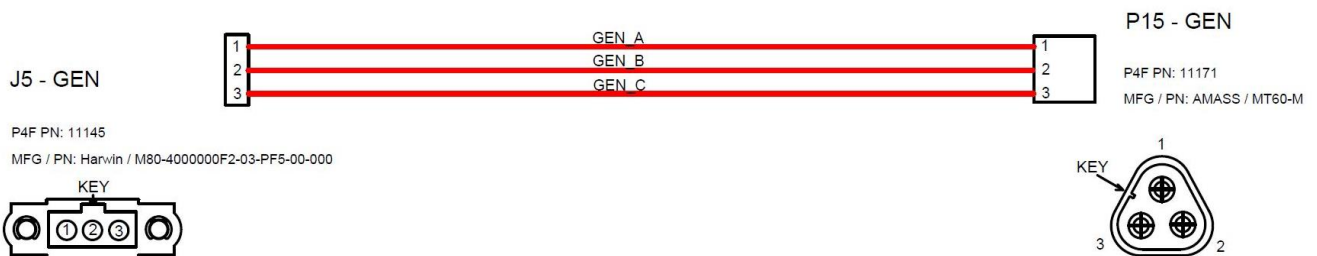
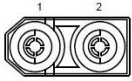


Figure 6: Generator connector harness schematic.

P20 - BACKUP BATTERY

P4F PN 11195
MFG / PN: Amass / XT90H-M



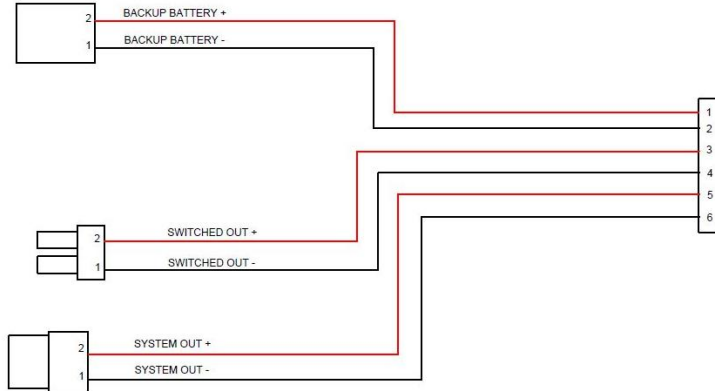
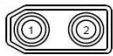
J21 - SWITCHED OUT

P4F PN 11166
MFG / PN: Amass / EC3-F



J22 - SYSTEM OUT

P4F PN 11165
MFG / PN: Amass / XT60-F



J6 - BATT|SW-O|SYS

P4F PN 11143
MFG / PN: Harwin / M80-400000F2-06-PF5-00-000

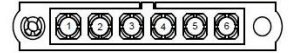


Figure 7: Backup battery, Switched output, System output harness schematic.

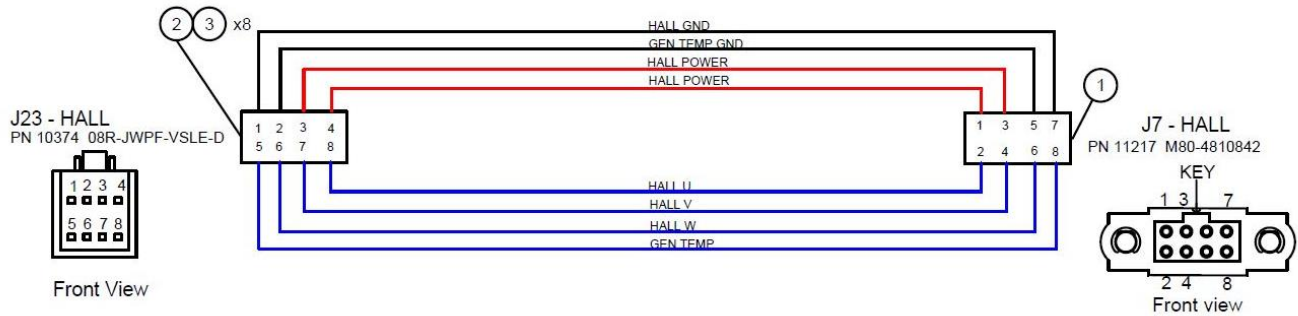


Figure 8: Hall sensor connector harness schematic.

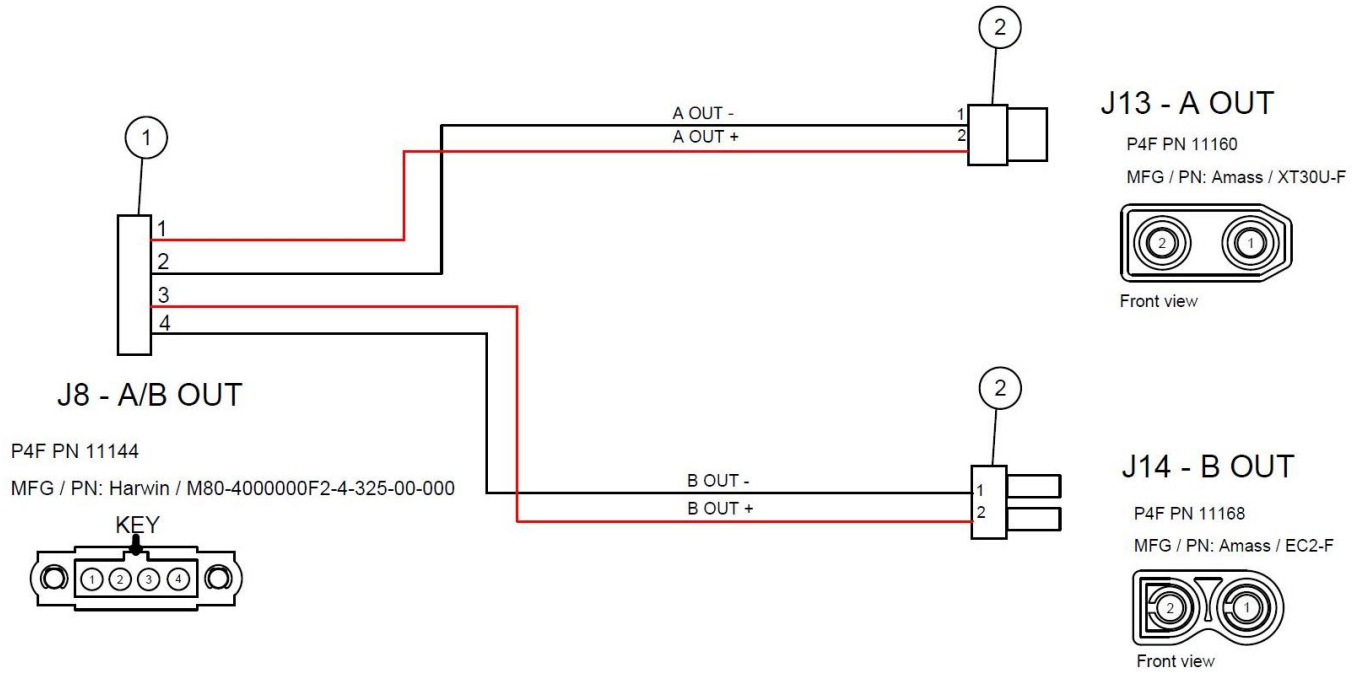


Figure 9: A and B outputs connector harness schematic.