LITHIONICS BATTERY®

Lithium-ion iron phosphate battery systems

NEVERDIE® BATTERY MANAGEMENT SYSTEM

2021

The World's Widest Range of Advanced Battery Systems Using NeverDie®, miniBMS® & OptoLoop® Technology

Table of Contents

NEVERDIE®

LITHIUM+ELECTRONICS = LITHIONICS BATTERY

1. NeverDie® Battery Management System (BMS)

Lithionics Battery's NeverDie® Battery Management System is a proprietary design featuring UL tested protective safety features, as well as state-of-health (status & fault codes), and state-of-charge monitoring. Our patent-pending BMS utilizes custom microprocessors and in-house controlled firmware that enables the customization of the BMS to perform as a Programmable Logic Controller (PLC.) The NeverDie® Battery Management System is standard on all Lithionics Battery® systems to ensure your lithium batteries are operated within their rated specifications. This increases the lifespan of your battery system and protects your valuable investment. Unlike many competitors, Lithionics Battery® uses a military grade proprietary contactor (UL508 tested to 6,000 hot-switching cycles) for BMS on/off switching. This allows for continuous current ratings of up to 400A to match the high performance of your lithium battery module.

Internal NeverDie® BMS
200A or 400A Rating

Standard NeverDie® BMS
12V to 51V 400A Rating

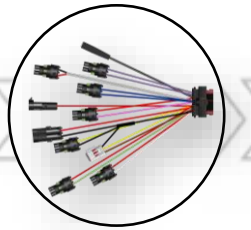
Advanced NeverDie® BMS
12V to 96V 400A Rating

High Voltage NeverDie® BMS
102V to 512V 400A Rating

Available Features:

- **Ampseal I/O Connector**
- **Round SOC Display***
- **Bluetooth® Transmitter**
- **Status & Fault Code Reader**

***Available on Advanced Series Only**



2. NeverDie® BMS Features

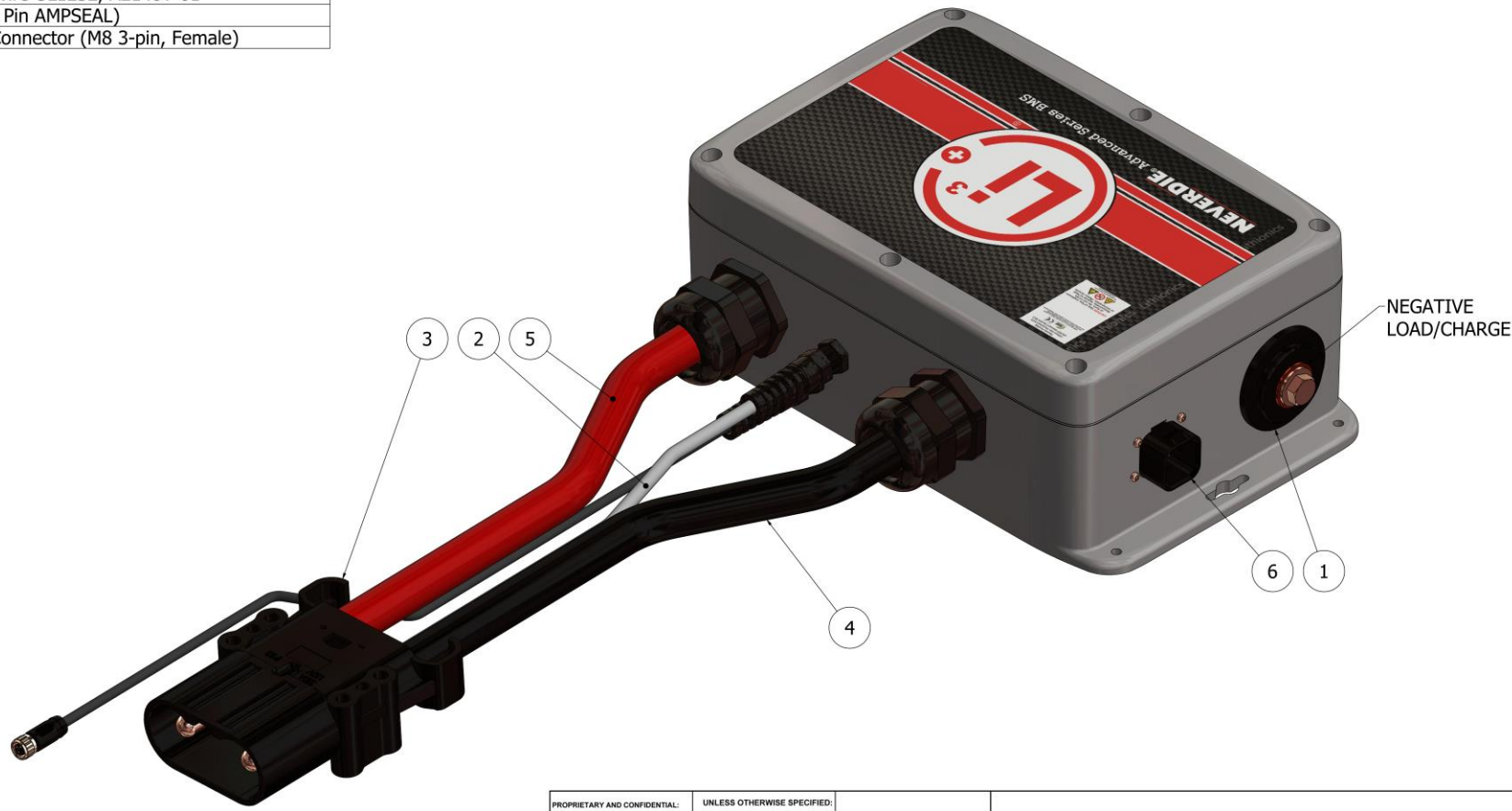
Standard and Advanced features apply to both Internal and External BMS.

NeverDie® BMS Features	Standard Series (12V to 51V)	Advanced Series (12V to 96V)	Dual Channel Series (12V to 51V)	High Voltage Series (102V to 512V)
OptoLoop® Cell Monitoring	✓	✓	✓	✓
MiniBMS® Cell Balancing	✓	✓	✓	✓
NeverDie Reserve (Reset/Power Switch)	✓	✓	✓	✓
Low-Voltage Cutoff Protection (Over-Discharge)	✓	✓	✓	✓
High-Voltage Cutoff Protection (Over-Charge)	✓	✓	✓	✓
Short Circuit Protection	✓	✓	✓	✓
Current Direction Based Temperature Intervention Sensor	✓	✓	✓	✓
UL Approved Fully Redundant Protective Safety Circuits	✓	✓	✓	✓
Military Grade Latching Contactor with Aux Contact Monitoring	✓	✓	✓	✓
Coulomb Based State-of-Charge Meter	✓	✓	✓	✓
Programmable NeverDie Reserve & AGSR		✓	✓	✓
State of Health Monitoring (Status & Fault Codes)	✓	✓	✓	✓
BMS Data Telemetry – CANBus	✓	✓	✓	✓
BMS Data Telemetry – Bluetooth or Serial Port	Bluetooth Only	Order Option	Order Option	Order Option
BMS Data Telemetry – Ethernet TCP/IP		Optional	Optional	Optional
Dual Channel (Independent Charge/Discharge Channels)			✓	
Redundant Coil-Driven Contactor		Optional		
Internal Pre-Charge Circuit (Programmable)		Optional for 48V to 96V		✓

Ampseal I/O Features	Standard (8-Pin)	Advanced (23-Pin)	Advanced (23-Pin)2	Advanced (23-Pin)3
Alternator Field Control Circuit (FCC)	✓	✓	✓	✓
CANBus (Supports RV-C BMS Data & NCC Charger Series)	✓	✓	✓	✓
Remote Power Switch	✓	✓	✓	✓
Serial UART BMS Data Telemetry (Alternate: Serial RS232)		✓	✓	✓
Automatic Generator Start/Restart (AGSR)		✓	✓	✓
External Pre-Charge Circuit Control (Alternate: Heater Power)		✓	✓	✓
BMS Auxiliary Power Input (AC Sense)		✓	✓	✓
High Voltage Charger Interlock		✓	✓	✓
Tri-Color LED Pod (Alternate: LED for Remote Reset Switch)		✓	✓	✓
Alarm Circuit		✓	✓	✓
Battery Percent (0-5V Signal)		✓	✓	✓
Emergency Stop Input (E-Stop Circuit)		✓	✓	✓

3. External NeverDie® Standard BMS – Plug & Play

PARTS LIST		
ITEM	QTY	DESCRIPTION
1	1	Negative Power Terminal (5/16-18 Thead, Plated Copper)
2	1	OptoLoop® Communication Cable
3	1	Module Power Connector (Anderson Euro DIN Male, 4/0 Lug)
4	1	4/0AWG Black X-FLEX Wire UL1232, A2140T-07
5	1	4/0AWG Red X-FLEX Wire UL1232, A2140T-01
6	1	BMS I/O Connector (8 Pin AMPSEAL)
7	1	Temperature Sensor Connector (M8 3-pin, Female)



*UL RATINGS	AVAILABLE VOLTAGES - 400A RATED
UL508	12.8V*
UL991	25.6V*
UL1973	48.0V*
UL1998	51.2V*

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TOLERANCES:
FRACTIONAL +/- 1/32
ANGULAR +/- .25° BEND +/-
TWO PLACE DECIMAL +/- .020
THREE PLACE DECIMAL +/- .005

DRAWN	James Bowling	7/5/2018
CHECKED	T. Clock	8/9/2018
QA	C. Hakimian	8/9/2018
MFG	A. Silberhorn	8/9/2018
APPROVED	S. Tartaglia	8/9/2018
DWG NO.		

LITHIONICS BATTERY

PART NO. AP017 SERIES

V8 STANDARD BMS PLUG-AND-PLAY

REV 0

PARTS LIST		
ITEM	QTY	DESCRIPTION
1	1	Positive Power Terminal (5/16-18 Thread, Plated Copper)
2	1	Plug-n-Play Standard Enclosure with Lithionics Graphic Lid Label
3	1	On/Off/Reset Button, Momentary Lighted

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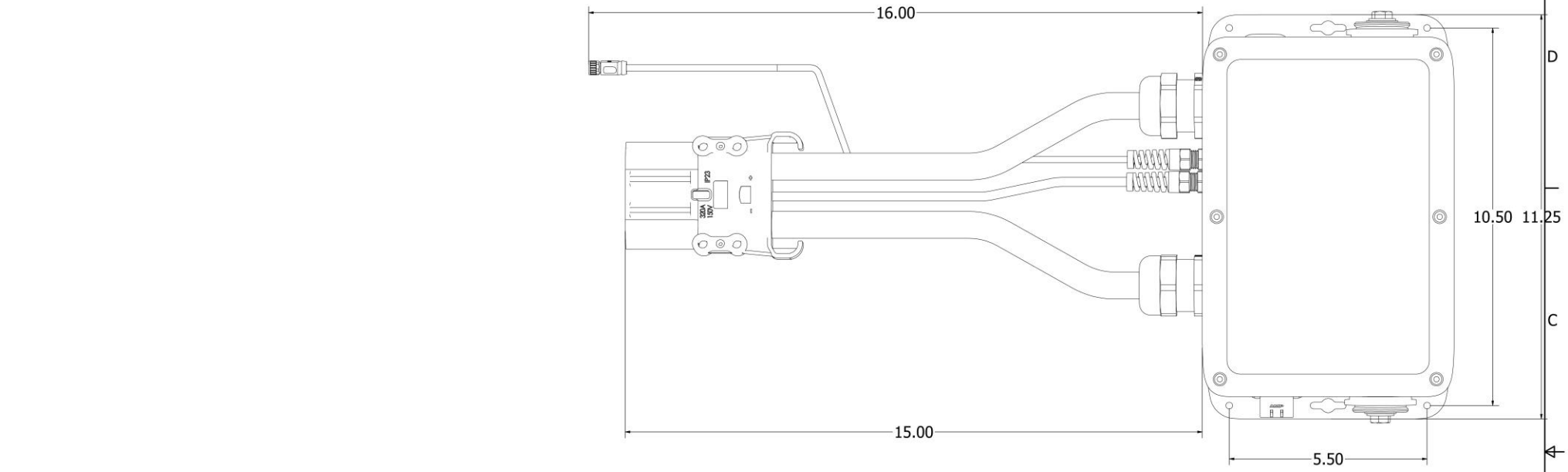
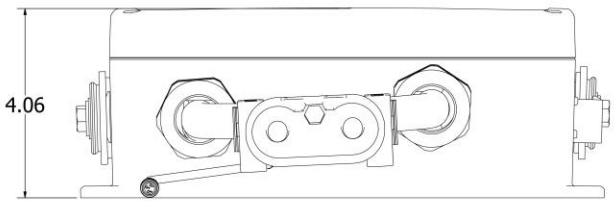
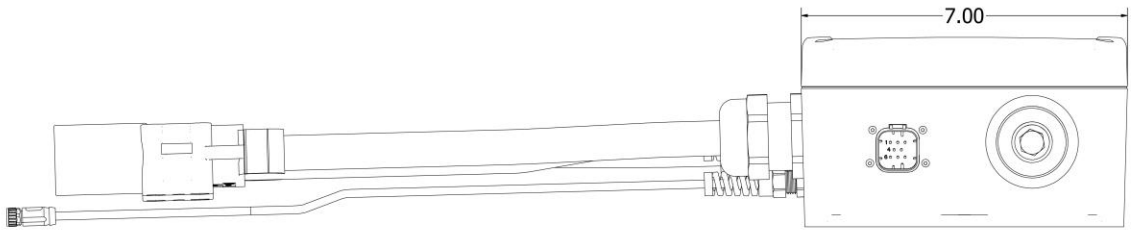
REV 0

SHEET 2 OF 4







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LITHIONICS BATTERY

PART NO.

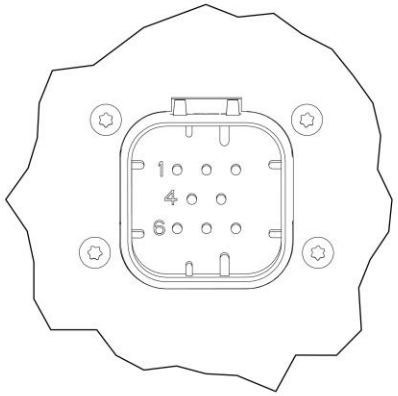
AP017 SERIES

V8 STANDARD BMS
PLUG-AND-PLAY

REV 0

SHEET 3 OF 4

BMS I/O Connector Functions	
#	FUNCTION
1	On/Off/Reset Button
2	Contactor State LED Indicator
3	CANbus
4	Alternator Field Control Circuit (FCC)



DETAIL A
SCALE 3 : 1

BMS I/O Connector Function's Pinouts		
PIN	FUNCTION	PIN DEFINITION
1	Reset Button	Reset Button wire 1
2	Remote LED +	Contactor LED Signal
3	Can Low	Isolated CANbus Low signal
4	Remote LED Neg.	LED return, tied to battery negative
5	Can High	Isolated CANbus High signal
6	Reset Button	Reset Button wire 2
7	FCC 1	Alternator Field Control Circuit wire 1
8	FCC 2	Alternator Field Control Circuit wire 2

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LITHIONICS BATTERY

PART NO.
AP017 SERIES

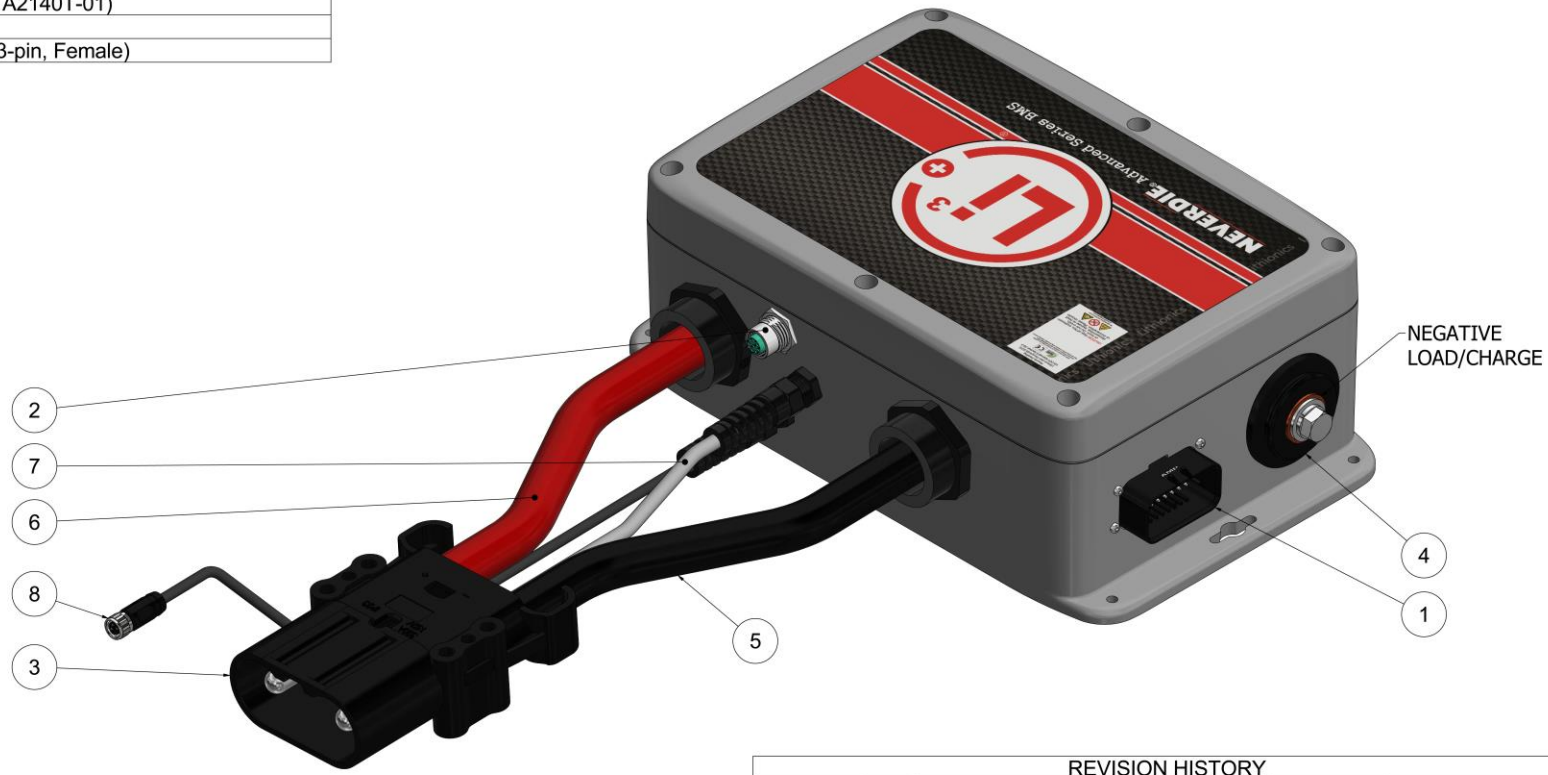
V8 STANDARD BMS
PLUG-AND-PLAY

REV
0

SHEET 4 OF 4

4. External NeverDie® Advanced BMS – Plug & Play

PARTS LIST		
ITEM	QTY	DESCRIPTION
1	1	BMS I/O Connector (23 Pin AMPSEAL)
2	1	LCD Pod Connector (M12 8-pin, Female)
3	1	Module Power Connector (Anderson Euro DIN Male, 4/0 Lug)
4	1	Negative Power Terminal (5/16-18 Thead, Plated Copper)
5	1	4/0AWG Black X-FLEX Wire (UL1232, A2140T-07)
6	1	4/0AWG Red X-FLEX Wire (UL1232, A2140T-01)
7	1	OptoLoop® Communication Cable
8	1	Temperature Sensor Connector (M8 3-pin, Female)



REVISION HISTORY				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	1	Voltage update	10/5/2018	James Bowling
	2	Add Bluetooth BLE output Option	1/2/2019	James Bowling

*UL RATINGS	AVAILABLE VOLTAGES - 400A RATED
UL508	12.8V*
UL991	25.6V*
UL1973	48.0V*
UL1998	51.2V*
	60-96V

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CHECKED	T. Clock	1/2/2019
QA	C. Hakimian	1/2/2019
MFG	A. Silberhorn	1/2/2019
APPROVED	S. Tartaglia	1/2/2019
DWG NO.		

LITHIONICS BATTERY

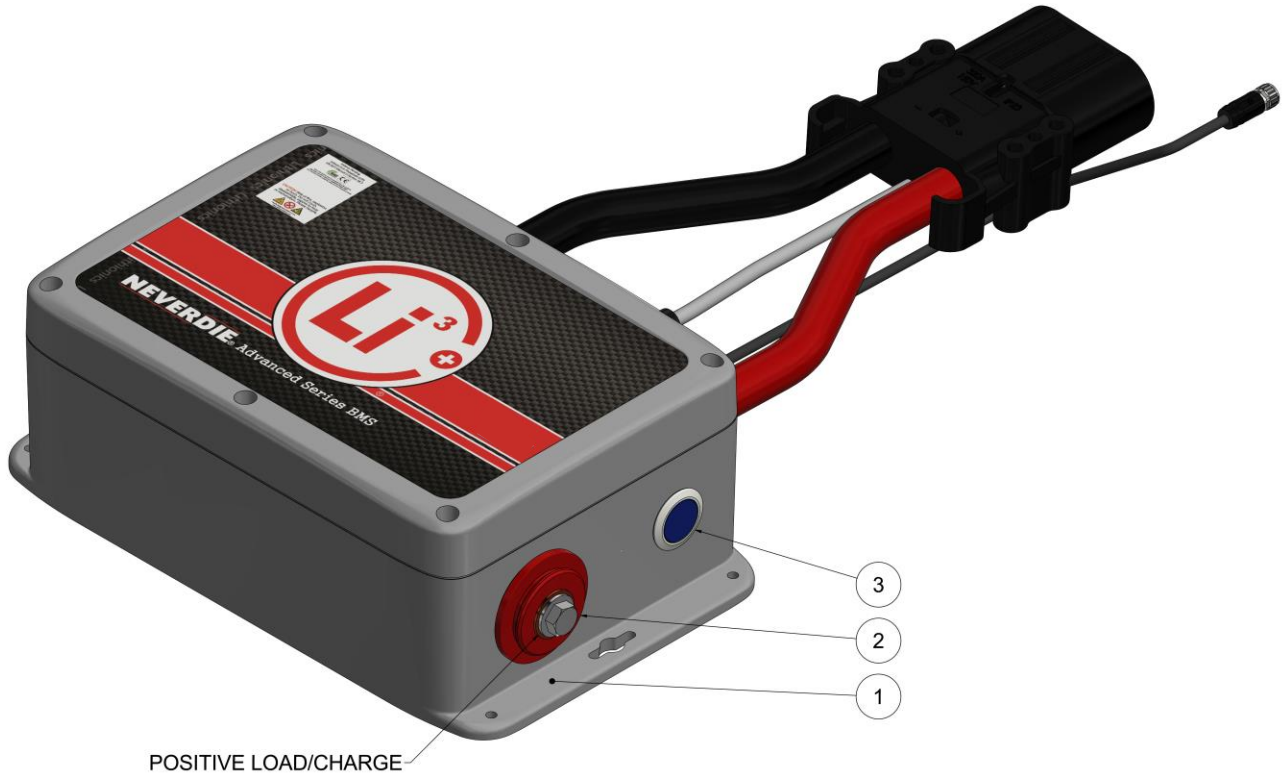
PART NO.
AP037 SERIES

V8 ADVANCED BMS
PLUG-AND-PLAY

REV 2

SHEET 1 OF 4

PARTS LIST		
ITEM	QTY	DESCRIPTION
1	1	Plug-n-Play Advanced Enclosure with Lithionics Graphic Lid Label
2	1	Positive Power Terminal (5/16-18 Thread, Plated Copper)
3	1	IDEC CW4LM1E10Q3S Momentary Lighted Switch



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APPROVED	S. Tartaglia	1/2/2019

LITHIONICS BATTERY

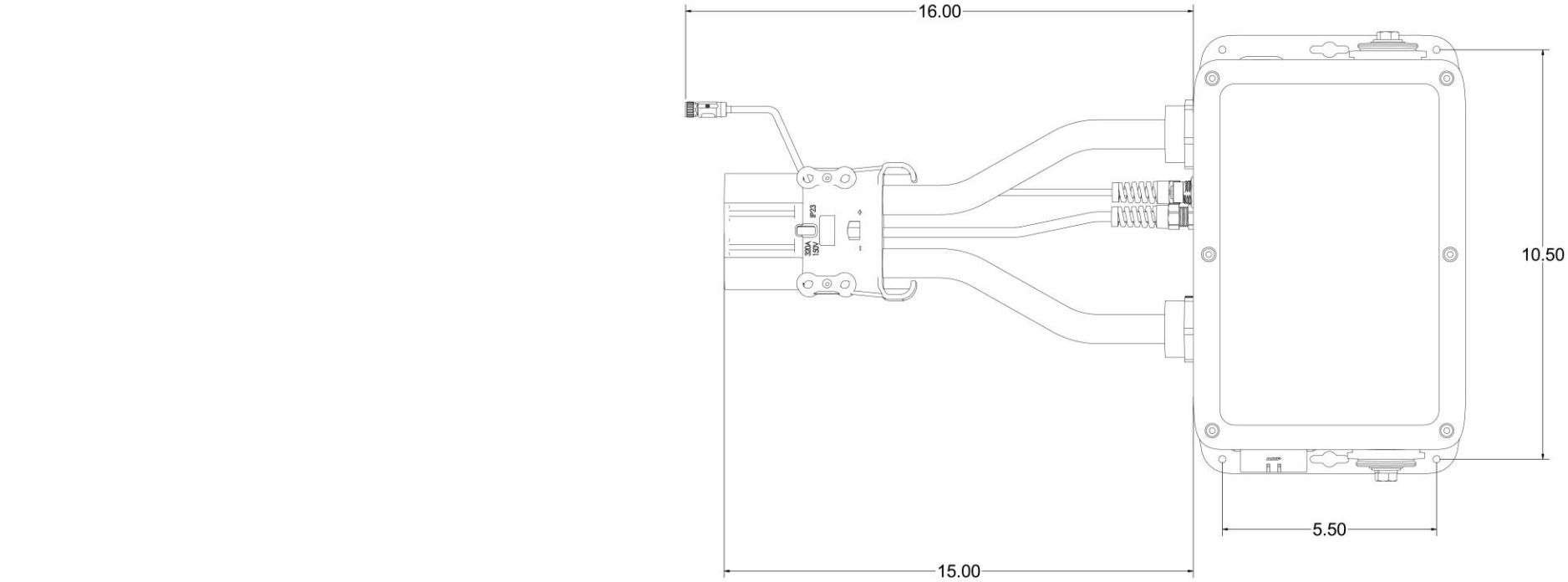
PART NO. AP037 SERIES

V8 ADVANCED BMS PLUG-AND-PLAY

DWG NO.

REV 2

SHEET 2 OF 4



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LITHIONICS BATTERY		
PART NO. AP037 SERIES	V8 ADVANCED BMS PLUG-AND-PLAY	REV 2
SHEET 3 OF 4		

BMS I/O Connector Functions

#	DEFAULT FUNCTION	ALTERNATE FUNCTION*
1	Alternator Field Control Circuit (FCC)	
2	Automatic Generator Start/Restart (AGSR)	
3	Precharge Control	Heater Power Supply
4	External Power Input	
5	CANbus	
6	Serial UART	Serial RS232 or Bluetooth BLE output
7	Contactor State LED Indicator	TRI-Color LED Pod
8	Battery Low LED Indicator	TRI-Color LED Pod
9	On/Off/Reset Button	
10	High Voltage Cutoff/Charger Interlock (HVC)	
11	Alarm	
12	Battery Percent 0-5V (Fuel)	

*Alternate functions must be specified at time of ordering.
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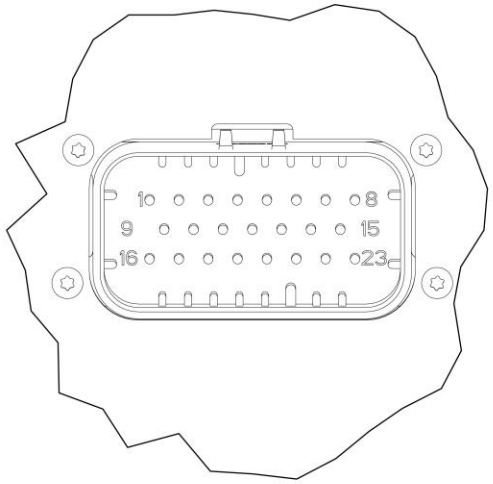
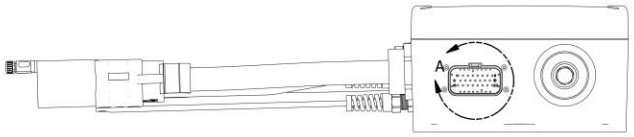


DETAIL A
SCALE 3 : 1

BMS I/O Connector Function's Pinouts

PIN	PIN DEFINITION	ALTERNATE PIN DEFINITION*
1	FCC wire 1	
2	AGSR wire 2	
3	AGSR wire 1	
4	Precharge/Alarm output +12V supply positive	
5	Precharge output negative wire	Heater Power Supply Positive input
6	Alarm output negative wire	
7	External Power Input positive 12-24V	
8	Common Ground for all non-isolated circuits	
9	FCC wire 2	
10	Isolated CANBus High Signal	
11	Isolated Serial UART TX Signal	Isolated Serial RS232 TX signal
12	Analog 0-5V Fuel Output Signal	
13	Contactor LED Signal	Tri-Color LED Pod-Green signal
14	Charger relay wire 2	
15	Reset Button return wire	
16	Isolated CANBus/Serial 5V Power	Isolated CANbus/Serial 5V power
17	Isolated CANBus low Signal	
18	Isolated Serial UART RX Signal	Isolated Serial RS232 RX signal
19	Isolated CANBus/Serial ground	Isolated CANbus/Serial ground
20	Battery Low LED Signal	Tri-Color LED Pod - Red Signal
21	Aux1 input Signal	
22	Charger relay wire 1	
23	Reset Button out wire	



REVISION HISTORY

ZONE	REV	DESCRIPTION	DATE	APPROVED
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	2	Add Bluetooth BLE output Option	1/2/2019	James Bowling

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QA	C. Hakimian	1/2/2019
MFG	A. Silberhorn	1/2/2019
APPROVED	S. Tartaglia	1/2/2019
DWG NO.		

LITHIONICS BATTERY

PART NO.
AP037 SERIES

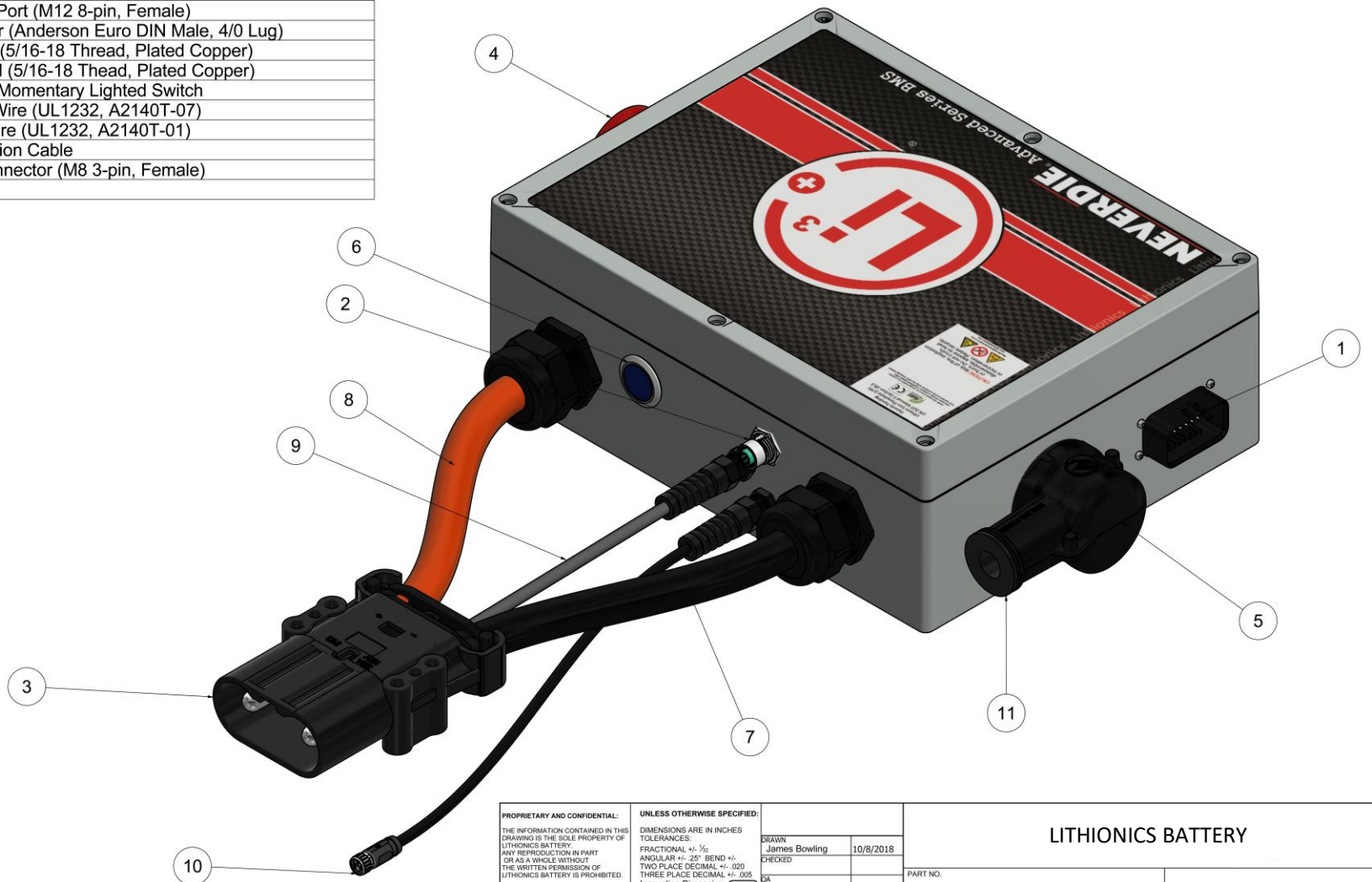
V8 ADVANCED BMS
PLUG-AND-PLAY

REV 2

SHEET 4 OF 4

5. External NeverDie® Advanced BMS – High Voltage

PARTS LIST		
ITEM	QTY	DESCRIPTION
1	1	BMS I/O Connector (23 Pin AMPSEAL)
2	1	State of Charge Display Port (M12 8-pin, Female)
3	1	Module Power Connector (Anderson Euro DIN Male, 4/0 Lug)
4	1	Positive Power Terminal (5/16-18 Thread, Plated Copper)
5	1	Negative Power Terminal (5/16-18 Thead, Plated Copper)
6	1	IDEC CW4LM1E10Q3S Momentary Lighted Switch
7	1	4/0AWG Black X-FLEX Wire (UL1232, A2140T-07)
8	1	4/0AWG Red X-FLEX Wire (UL1232, A2140T-01)
9	1	OptoLoop® Communication Cable
10	1	Temperature Sensor Connector (M8 3-pin, Female)
11	1	Rebling Terminal Boot



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Inspection Dimension:

DRAWN	James Bowling	10/8/2018
CHECKED		
QA		
MFG		
APPROVED		
DWG NO.		

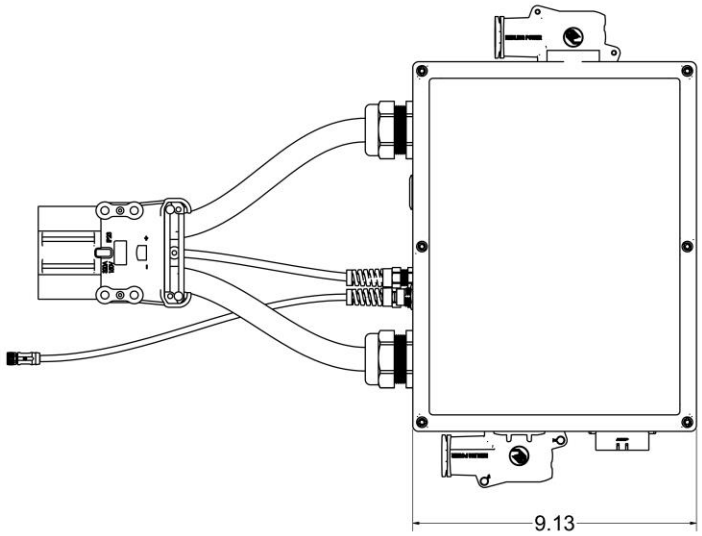
LITHIONICS BATTERY

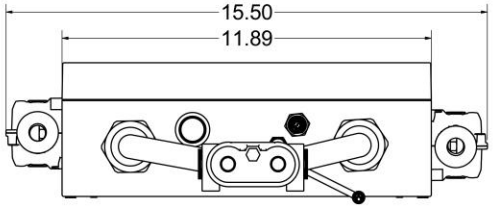
PART NO.
AP036 SERIES

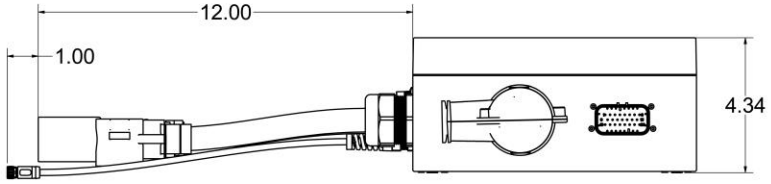
HIGH VOLTAGE BMS
102-512 VOLTS

REV
1

SHEET 1 OF 3







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Inspection Dimension:

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CHECKED		
QA		
MFG		
APPROVED		

LITHIONICS BATTERY

PART NO.
AP036 SERIES

HIGH VOLTAGE BMS
102-512 VOLTS

DWG NO.

REV
1

SHEET 2 OF 3

BMS I/O Connector Functions		
#	DEFAULT FUNCTION	ALTERNATE FUNCTION*
1	Alternator Field Control Circuit (FCC)	
2	Automatic Generator Start/Restart (AGSR)	
3	Precharge Control	Heater Power Supply
4	External Power Input	
5	CANbus	
6	Serial UART	Serial RS232
7	Contactor State LED Indicator	TRI-Color LED Pod
8	Battery Low LED Indicator	TRI-Color LED Pod
9	On/Off/Reset Button	
10	High Voltage Cutoff/Charger Interlock (HVC)	
11	Alarm	
12	Battery Percent 0-5V (Fuel)	
13	E-Stop Function	

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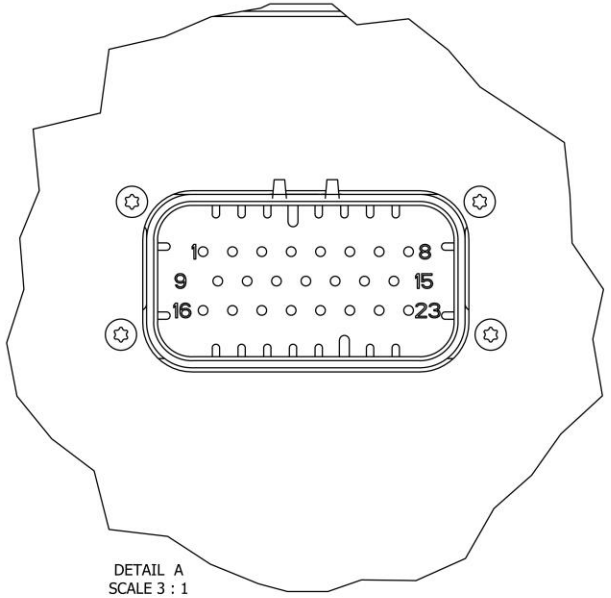
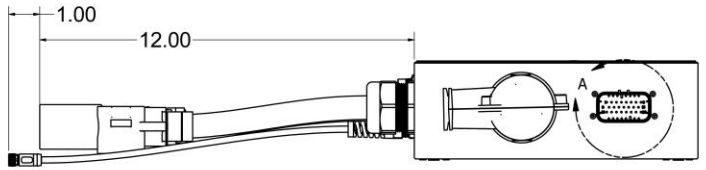


DETAIL A
SCALE 3 : 1

BMS I/O Connector Function's Pinouts		
PIN	PIN DEFINITION	ALTERNATE PIN DEFINITION*
1	FCC wire 1	
2	AGSR wire 2	
3	AGSR wire 1	
4	Precharge/Alarm output +12V supply positive	
5	Precharge output negative wire	Heater Power Supply Positive input
6	Alarm output negative wire	
7	External Power Input positive 12-24V	
8	Common Ground for all non-isolated circuits	
9	FCC wire 2	
10	Isolated CANBus High Signal	
11	Isolated Serial UART TX Signal	Isolated Serial RS232 TX signal
12	Analog 0-5V Fuel Output Signal	
13	Contactor LED Signal	Tri-Color LED Pod-Green signal
14	Charger relay wire 2	
15	Reset Button return wire	
16	Isolated CANBus/Serial 5V Power	Isolated CANbus/Serial 5V power
17	Isolated CANBus low Signal	
18	Isolated Serial UART RX Signal	Isolated Serial RS232 RX signal
19	Isolated CANBus/Serial ground	Isolated CANbus/Serial ground
20	Battery Low LED Signal	Tri-Color LED Pod - Red Signal
21	E-Stop, Switched N.C.	
22	Charger relay wire 1	
23	Reset Button out wire	



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ANGULAR +/- .25° BEND +/-
TWO PLACE DECIMAL +/- .020
THREE PLACE DECIMAL +/- .005
Inspection Dimension:

DRAWN	James Bowling	10/8/2018
CHECKED		
QA		
MFG		
APPROVED		
DWG NO.		

LITHIONICS BATTERY

PART NO.
AP036 SERIES

HIGH VOLTAGE BMS
102-512 VOLTS

REV
1

SHEET 3 OF 3

6. Internal NeverDie® Compact Series BMS

Compact Series using our Economy-Version 100 Amp Rated BMS (CS100) & 200 Amp Rated BMS (CS200)

Internal NeverDie® Compact Series Features

- miniBMS® Cell/Module Sensors and Microprocessors with Automatic Cell Balancing
- 100A or 200A Continuous Discharge Current Rating
- Over-Charge, Over-Discharge and Short-Circuit Protection (LVC, HVC, SCC)
- Pushbutton Storage Operation
- NeverDie® Power Reserve (Spare Fuel) for Hotel Loads and Worry-Free Power for Engine Cranking
- Optional Bluetooth®: Monitor Battery Voltage, State-of-Charge, Temperature, Current & Status Code from your mobile device

Optional Bluetooth® Features

- Live Telemetry Data Feed (voltage, current, temperature)
- Accurate State of Charge Reporting
- State of Health Monitoring (Status & Fault Codes)
- Free App Available for Download on Google Play & Apple App Store

State of Charge Monitoring

Status & Fault Code Reader

with NEVERDIE® Technology

7. Lithionics Battery® Now with Bluetooth® Telemetry

Lithionics Battery® Monitor

GET IT ON Google Play

Download on the App Store