

Intelligent Power System

iPS1500



Key Features



One primary output (28 V) and two adjustable secondary outputs (12 V-14 V and 5 V-8 V)



High efficiencies of up to 93.5%, load dependent



Status reporting via software API and CAN bus



Software and hardware alerts to system controller



Overcurrent and short circuit protection



Onboard battery charging



Configurable EES parameters for different internal combustion engines



Real-time data monitoring for all voltages, currents, and temperatures



LED indicators provide status for each output voltages and current

Fly Higher. Fly Longer. Fly Smarter.

Unmanned aerial vehicle (UAV) electronics continue to evolve as mission profiles become more demanding. System power designers are being challenged to provide more innovative power supply systems to improve efficiency, ensure reliability, reduce weight, minimize heat dissipation, and lower overall cost. New levels of energy and system-level efficiencies are also required to meet tomorrow's aviation needs.

Intelligent Power Systems

ePropelled intelligent power systems (iPS) are a complete power management solution for aviation applications. They convert the 3-phase sinusoidal AC voltage produced by a starter generator to tightly regulated DC voltage that can be used to power onboard avionics, servos, and payloads.

Designed to operate over a wide input range that varies with the speed of the starter generator or alternator, the iPS uses active rectification and switching regulation to supply the required steady DC output voltages.

These smart power systems also provide a wide array of real-time performance and operational data for a range of useful applications and analytics. The iPS monitors all input and output voltage, as well as current levels, and collects and reports that data via an integrated controller area network (CAN) interface. Custom applications can be created via our open application programming interface (API) and thresholds can be set for alerts and alarms based on specific applications and mission profiles.

Additionally, the iPS provides onshore DC power for all features including EES function, output power, and onboard battery charging.

ePropelled electronic engine starter (EES) feature is optional and can be used to drive the starter generator during the engine start sequence. Once the engine is up to speed, the iPS delivers the regulated voltages. If, for any reason, the starter generator stops working, an onboard battery (if connected) automatically engages to provide the required voltage for a limited time, dependent on the onboard battery size.

iPS1500 SPECIFICATIONS

Parameter	INPUT		
	Min	Max	Notes
Input voltage range	25 V @ no load 50 V @ full load	95 V	RMS line-to-line
Maximum total input power	831 W		At 40°C ambient
Onboard battery voltage range	24 V	28 V	Battery type: 8S LiFePo4 or 7S LiPo
Onshore DC voltage range	24 V	58 V	Input voltage below 33 V will not regulate the primary output
Engine starter voltage range*	24 V	58 V	Supplied from onshore DC or onboard battery. (see note below)
Engine starter current range	0A	125 A	Peak/phase
Start trigger voltage	2.3 V	5 V	
Start duration	0.25 s	10 s	5 seconds between attempts
Parameter	OUTPUT		
	Min	Max	Notes
Maximum total output power (continuous)	1500 W		DC at 40°C ambient
Primary output voltage	28V		DC, max power = 1500 W (53.6 A at 28 V)
Secondary output voltage 1	12 V	14 V	DC, max current = 20 A
Secondary output voltage 2	5 V	8 V	DC, max current = 20 A
Voltage regulation	±500 mV		
Voltage ripple P-P	500 mV		
Peak efficiency	93.5%		At 60% full load
Onboard battery charging voltage	29.4 V		Battery type: 8S LiFePo4 or 7S LiPo
Onboard battery charge current	3.33 A		Max
Protection	Input undervoltage warning Output overvoltage warning *Output short circuit protection Output overcurrent protection Over temperature warning Onboard battery switchover		
Parameter	MECHANICAL		
	Notes		
Dimensions	8.06" x 6.11" x 1.97" [204.8 mm x 155.2 mm x 50.0 mm]		
Weight	2.46 pounds (1115 grams)		
Cooling	Fan cooled		
Ambient operating temperature	-26°F(-32°C) to 104°F (40°C) at 1500 W		
Storage temperature	-40°F (-40°C) to 185°F (85°C)		
Ingress protection	IP20		

*Depending on the characteristics of the engine, the effective engine starter voltage range may be in a narrower range than specified. This value is only provided as an indication of the range possible and will be dependent on the specific internal combustion engine (ICE) the customer has specified.

⚠️ *WARNING: When operating without an onboard battery, the unit has output short circuit protection. However, if a battery or a power supply is connected to the onboard battery terminals, the short circuit protection will force the unit into a switchover state when the output is shorted. **This will cause damage to the circuit that is responsible for handling the switchover and it will void the warranty.**

⚠️ *WARNING The onboard battery must be fused with a **60 A fast blow inline fuse**. **Failure to add the specified inline fuse will result in damage to the unit and void the warranty.**

Battery Features

- ▶ Onboard battery can provide power to outputs if 3-phase generator power is lost
- ▶ Onboard battery is charged when the unit is connected to 3-phase power or onshore DC power
- ▶ Onboard battery can be used to power EES function
- ▶ Onshore DC power for all features including EES function, output power, and onboard battery charging

Temperatures Monitored and Logged

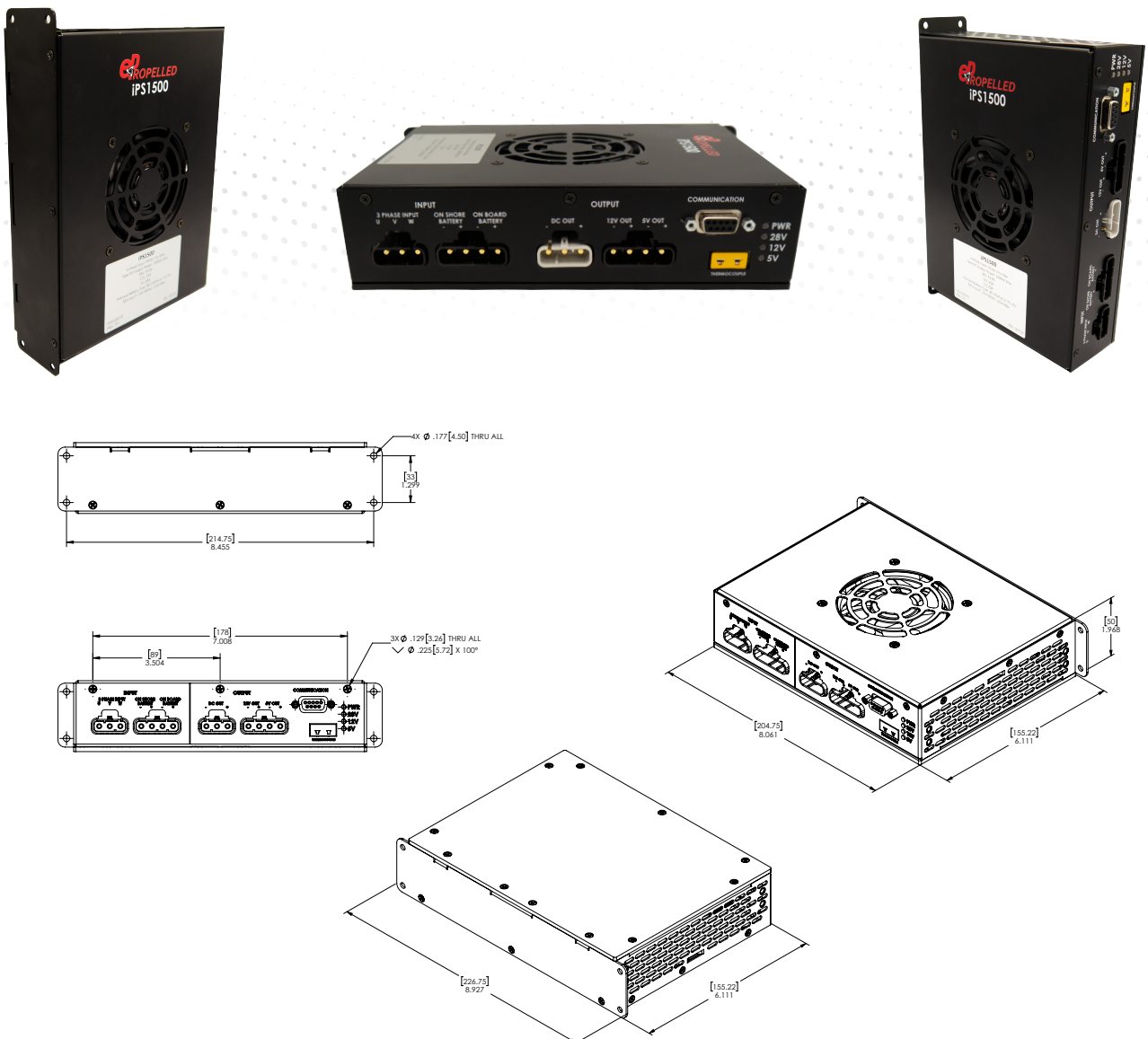
- ▶ Synchronous rectifier FETs
- ▶ DC converter FETs
- ▶ Output OR-ing FETs
- ▶ Starter generator via thermocouple

User-Configurable Parameters

- ▶ Conductor compensation voltage boost
- ▶ Alert and threshold settings
- ▶ RTDM settings
- ▶ CAN bus settings

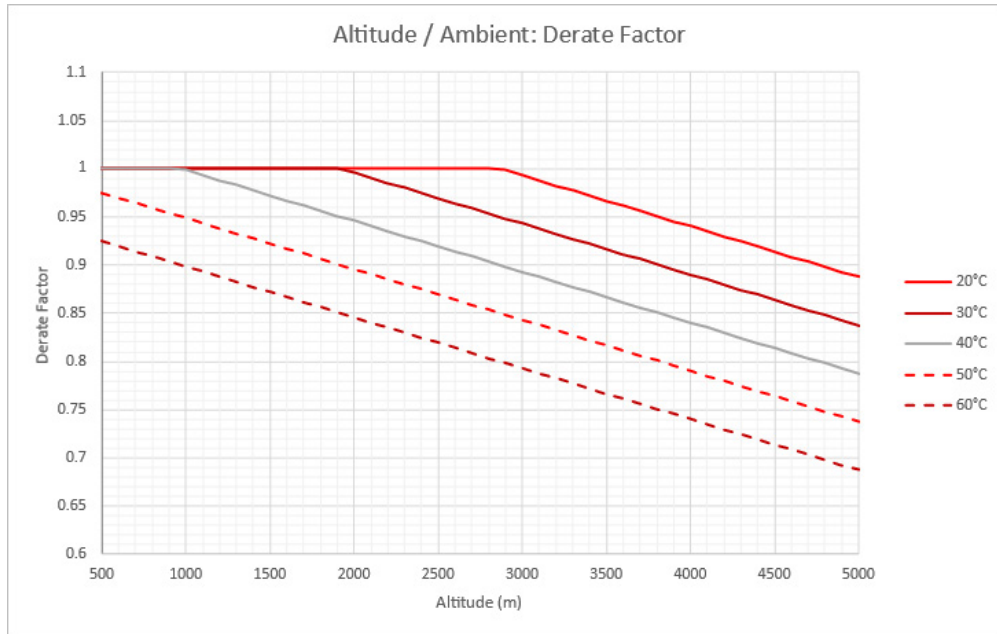
Mounting Instructions

The figure below depicts the overall dimensions of the iPS chassis. Four holes are used for mounting the unit. Please note that weight and other details are provided in the technical specification table.



Derating with increased altitude

The derating factor for altitude is based on the loss of dielectric strength of the air as the density decrease with the altitude. The diagram below shows how the cooling efficiency changes with high altitude and ambient temperatures.



iPS1500 PINOUT

3 Phase Input Connector (Molex - 2018431030) Mating Cable - 681-00011 (Molex - 2018410030)

Pin	Label	Description
1	U-LEG	3 Phase connection U-LEG
2	V-LEG	3 Phase connection V-LEG
3	W-LEG	3 Phase connection W-LEG

DC Input Connector (Molex - 2018431040) Mating Cable - 681-00012 (Molex - 2018410040)

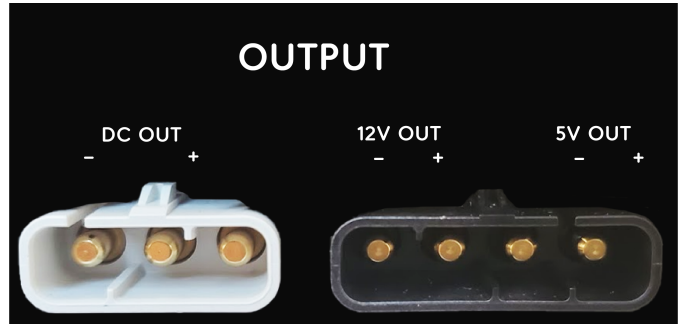
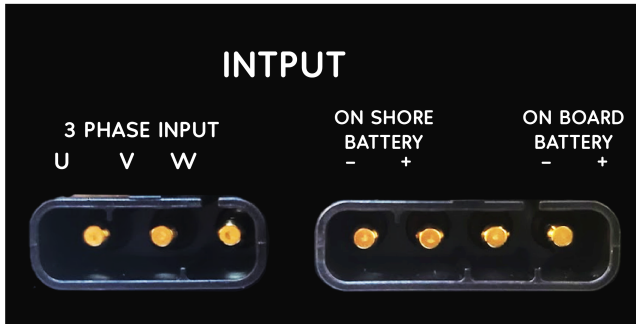
Pin	Label	Description
1	On-shore battery -	Ground. Return connection for the on-shore battery
2	On-shore battery +	Positive connection for the on-shore battery
3	Onboard battery -	Ground. Return connection for the onboard battery
4	Onboard battery +	Positive connection for the onboard battery

Primary Output Connector (Molex - 2018431031) Mating Cable - 681-00013 (Molex - 2018410031)

Pin	Label	Description
1	DC Out -	Ground. Return for 28 V primary output
2	N/A	Pin not used
3	DC Out +	Positive 28 V primary output.

Secondary Output Connector (Molex -2018431041) Mating Cable - 681-00014 (Molex - 2018410041)

Pin	Label	Description
1	12V Out -	Ground. Return for 12 V secondary output
2	12V Out +	Positive 12 V secondary output
3	5V Out -	Ground. Return for 5 V secondary output
4	5V Out +	Positive 5 V econdary output



Communications Connector (DB9-F)

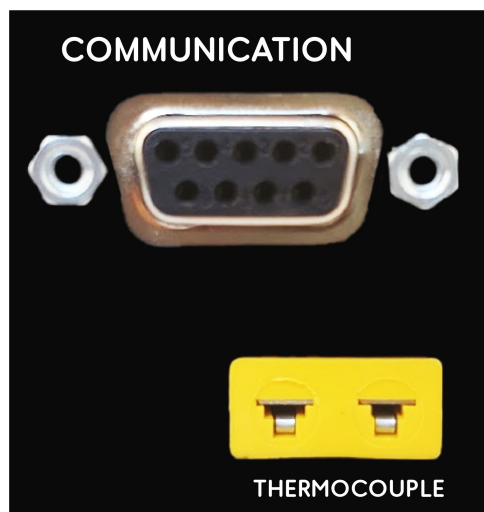
Pin	Label	Description
1	CAN-	CAN low
2	GND	Signal ground [for signals only]
3	START, INPUT	Input trigger pin used to initiate a start attempt [see figure 2]
4	GND	Signal ground [for signals only]
5	TMS	Used only when reprogramming device firmware
6	CAN+	CAN high
7	STARTER ENABLE	+3.3 V Output used for triggering the starter [see figure 2]
8	BB SIGNAL, OUTPUT	Output signal indicating that the unit is operating on on-board battery power
9	TCK	Used only when reprogramming device firmware

Thermocouple Input

Pin	Label	Pin Description
+	TC+	Positive K-Type thermocouple input
-	TC-	Negative K-Type thermocouple input

* +3.3 V output used for triggering the EES

**Not currently supported



Recommended Applications

- ▶ Aircraft power systems
- ▶ Unmanned vehicle power systems
- ▶ Power conditioning
- ▶ Stand-alone power systems (SAPS) for remote area power supply
- ▶ Voltage regulation in the renewable power generation system

Assembled in USA

Errors and omissions excepted. All specifications subject to change without notice. For more information, including ordering product, please contact us at info@ePropelled.com.

Warnings and Labels



ePropelled © 2021. ePropelled designs intelligent motors, motor controllers, generators, and power management systems. Our technology helps reduce energy consumption and improve system efficiency at a lower cost in the aerospace, manned and unmanned aerial vehicles, electric vehicles, and pump markets. We are a leader in magnetics engineering, and our patented technology innovations are used in the air, on the road, and on water, defining the future of electric propulsion.