

# UPSL — Manual

Kanardia d.o.o.

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Revision 1.2

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A lot of useful and recent information can be also found on the Internet. See <http://www.kanardia.eu> for more details.

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Some open source code is used in the Nesis software:

- <https://angusj.com/clipper2/>
- <https://flatbuffers.dev/>
- <https://www.oberhumer.com/opensource/lzo/>
- <https://rapidxml.sourceforge.net/>
- <https://www.sqlite.org/index.html>
- <https://www.nayuki.io/page/free-small-fft-in-multiple-languages>
- <https://rapidjson.org/>
- <https://design.ubuntu.com/font>

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## WEEE Statement



Disposal of Waste Electrical and Electronic Equipment. This electrical item cannot be disposed of in normal waste. Check with your local authority for kerbside collection, or recycle them at a recycling centre.

## EU Battery Directive



This product contains a battery that is used to provide power when the primary source of power is unavailable and is designed to last the life of the product. Any attempt to service or replace this battery should be preformed by a qualified service technician.

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## Revision History

The following table shows the revision history of this document.

Rev.	Date	Description
1.0	June 2016	Initial release
1.1	March 2018	New hardware version
1.2	November 2024	The blue wire for the switch can also be of a different color.

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# 1 Introduction

First of all, we would like to thank you for purchasing our device. UPSL is uninterruptible power supply for Kanardia devices<sup>1</sup>. The device provides electrical power to connected instruments in case of electrical system malfunction (low battery, generator fault, etc.) so that the pilot can safely land the aircraft.

This manual describes the technical description of the unit, installation and operation.

## 1.1 Safety Precautions

UPSL device consists of Li-Ion battery. Same safety principals as with the Li-Ion battery applies to the device (extracted from battery datasheet).

### 1.1.1 Warning

- Do not immerse the device in water or any other liquid.
- Do not place the device near any heat source or direct sunlight.
- Do not connect the device to voltages other than specified in the manual.
- Do not discard the device in fire or heater.
- Do not strike, throw or trample the device.

### 1.1.2 Caution

- Do not use or leave the device at very high temperature conditions (for example, strong direct sunlight, extremely hot conditions). Otherwise it can overheat, fire or its performance will degenerate and its service life will be decreased.
- Do not place it in a location near strong electrostatic and magnetic field sources, otherwise the battery internal safety mechanisms might be damaged.
- If the battery leaks and the electrolyte gets into the eyes do not wipe eyes, instead rinse the eyes with clean running water and immediately seek medical attention. Otherwise, eyes injury can result.

## 1.2 General Description

UPSL is an electronic device. It consists of single-cell Lithium-Ion battery, charge control electronics and step-up output voltage converter. Electronics has three primary functions; charging the internal battery, monitoring the input voltage level and boosting output voltage level. If input voltage level drops below 11.5 V the electronics automatically switches output to internal battery without disrupting the electrical power to connected devices.

## 1.3 Technical Specification

Table 1 shows some basic technical specification of UPSL.

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<sup>1</sup> Not suitable for NESIS, AETOS and SERU.

Description	Value
Weight	176 g (cca 230 g with cables and switch)
Size	81 x 47 x 32 mm
Input voltage	6 to 32 V
Input power (max)	6 W
Input current (max)	500 mA at 12 V 250 mA at 24 V
Output voltage	11 V
Output power (max)	3.85 W
Output current (max)	350 mA at 11 V
Operating temperature	-5 °C ~ +60 °C
Humidity	30 ~ 90 %, non condensing
Battery	Li-Ion, 3.7 V, 2250 mAh 8.33 Wh

Table 1: Basic technical specifications.

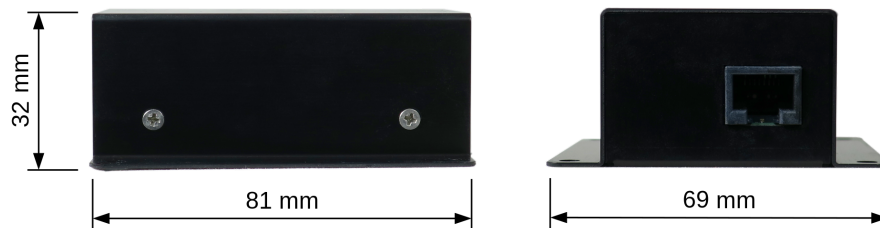


Figure 1: Front and side view of the UPSL with its principal dimensions.

## 1.4 Operation

Device operates in four modes: standby, charging, idle and emergency. Transition between modes is automatical, depending on various parameters.

- **Standby Mode** – Switch is set to ‘inactive/off’ position. Internal battery is disconnected from electronics. Both indication LEDs are unilluminated.
- **Charging Mode** – Switch is set to ‘active/on’ position, input voltage level is higher than 11.5 V. Electronics charges internal battery, input voltage is switched directly to output. Charge status LED is illuminated red, output status LED is unilluminated.
- **Idle Mode** – Switch is set to ‘active/on’ position, internal battery is fully charged and input voltage level is above 11.5 V. Electronics switches input voltage directly to output and monitors internal battery voltage level. Charge status LED is illuminated green, output status LED is unilluminated.
- **Emergency Mode** – Switch is set to ‘active/on’ position, input voltage level is below 11.5 V. Electronics switches the output to internal voltage booster, supplied from internal battery. Charge status LED is unilluminated, output status LED is illuminated green.

## 1.5 Battery Characteristic

Figure 2 shows battery characteristic for different loads. Table 2 shows minimal autonomy time for some Kanarda devices. Note: all measurements were performed at 20 °C and 50 %

humidity level. When device is used in environments with temperature below 5 °C or above 40 °C, battery performance and autonomy time might be reduced significantly.

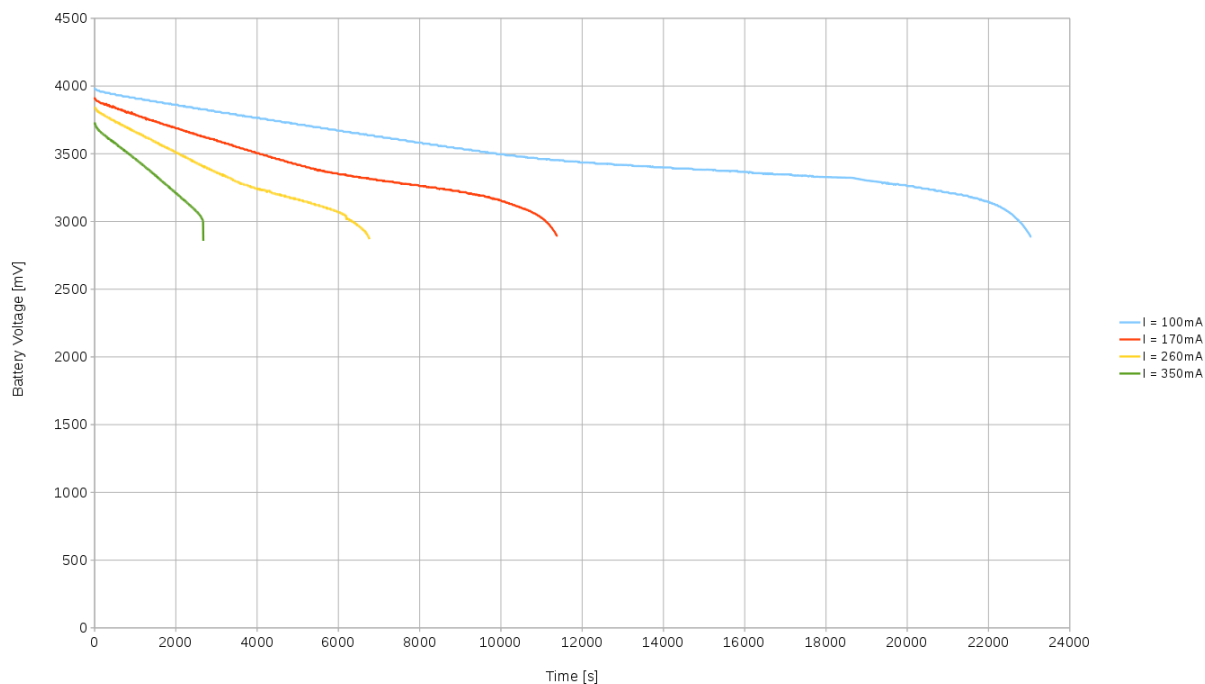


Figure 2: UPSL battery characteristic.

Device	Autonomy <sup>2</sup>
INDU (one unit)	270 min
INDU DIGI with DAQU	100 min
INDU kit	45 min
EMSIS 3.5 AHRS	170 min
EMSIS 80 mm AHRS	230 min
EMSIS 3.5 with DAQU	110 min
EMSIS 80 mm with DAQU	130 min
Horis 57 mm	190 min
Horis 80 mm	110 min

Table 2: Minimal autonomy time for Kanardia devices.

## 2 Installation & Maintenance

### 2.1 Before Installation

UPSL is shipped with semi-charged internal battery. Before installation, the device shall be connected to external 13.0–24 V power supply or battery for 8 hours to fully charge it's internal battery (refer to section 2.6 for detailed procedure).

<sup>2</sup> Autonomy at maximum brightness settings.

## 2.2 Installation Considerations

Some extra care shall be considered when installing the UPSL into the aircraft due to it's specific characteristics.

Do not mount UPSL and it's cables near:

- Any heat source
- Radio, transponder or other EMI sensitive device
- Antenna or antenna cable

## 2.3 Mounting Dimensions

The device is mounted using four screws type M4. It is highly recommended that the device is mounted using rubber shocks (rubber washers), which reduce the vibrations. Figure 3 illustrates the mounting holes for the device.

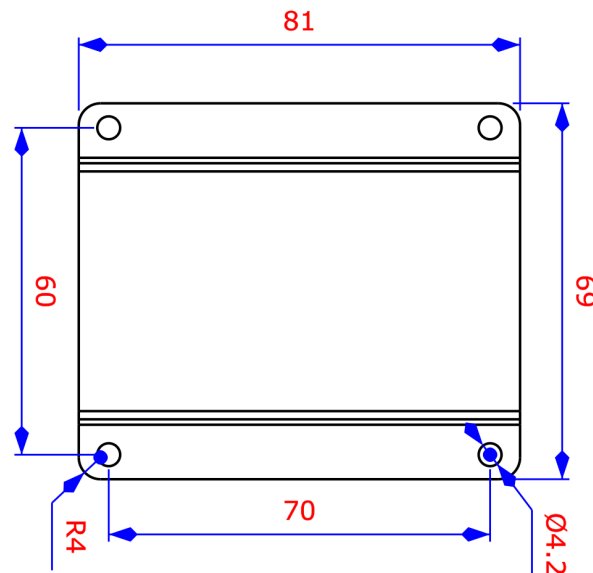


Figure 3: Device mounting holes. Note: Figure is not in scale.

## 2.4 Connections

Figure 4 illustrates all connections, located on left and right sides of the device.

### 2.4.1 Power Input (1)

Connect the supplied input cable and switch to 'Power Input' connector (refer to Figure 5). Connect the blue lead to negative (ground) terminal and red lead to positive (+12 to +24 V) terminal via 1.5 A slow fuse.

Route power cables away from antennas and antenna cables.



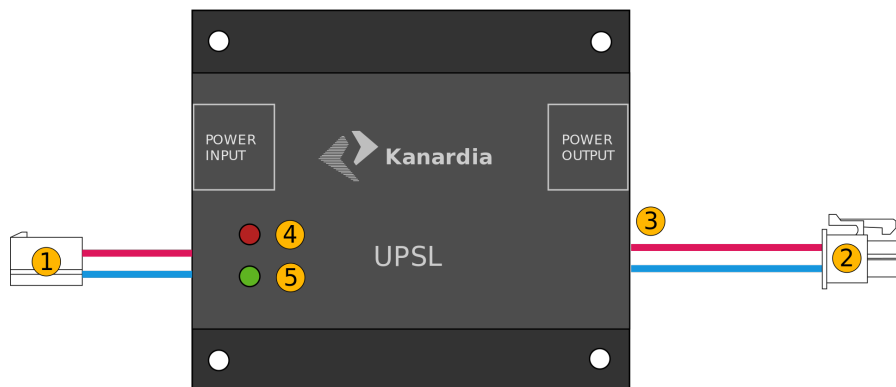


Figure 4: Connections and indications.

### 2.4.2 Power Output (2)

Connect the Kanardia devices to 'Power Output' connector with supplied cable. The connector has a notch on one side, which protects from wrong orientation.

Route power cables away from antennas and antenna cables.

### 2.4.3 Switch (3)

Connect the switch and UPSL with supplied cable. Refer to Figure 5 for proper connection.

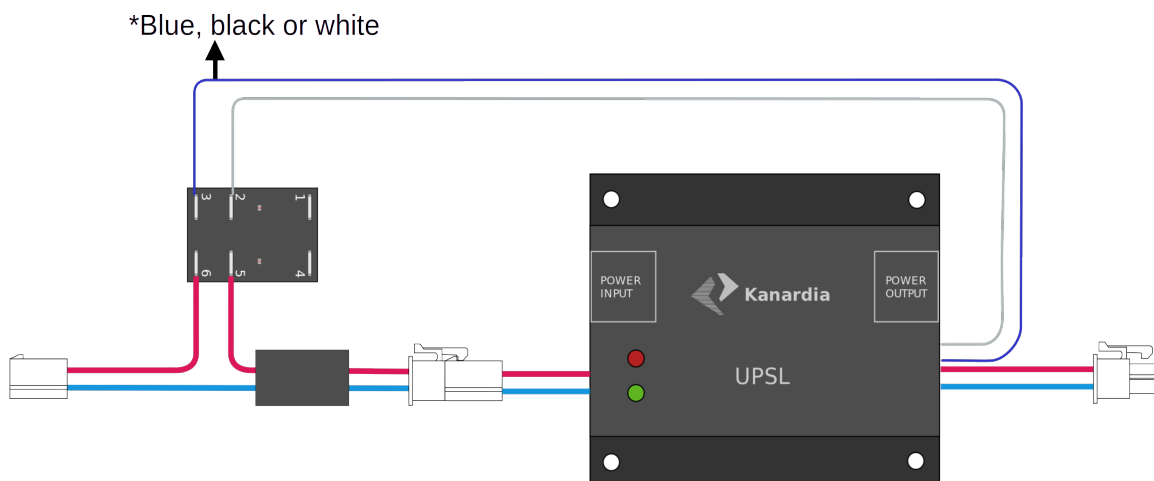


Figure 5: Wiring diagram.

\*The blue wire, marked in Figure 5, next to the white one, can be supplied in blue, black, or white variations.

## 2.5 Operation Indication

Device consists of two indication LEDs (refer to figure 4).

### 2.5.1 Charge Status (4)

Charge status LED indicates backup battery charger status:

- Red: Charging.
- Green: Charge complete.
- Amber: Charging fault.

### 2.5.2 Output Status (5)

Output status LED (green) is illuminated when the output power is delivered from UPSL internal backup battery. When aircraft system bus power is in use (normal operation), the LED is not illuminated.

## 2.6 Maintenance

In order to extend UPSL internal battery service life its charging current is limited. Due to that limitation it takes about 8 hours to fully charge discharged internal battery.

The device shall be connected to external 13–24 V power supply or battery to charge it on following occasions:

- Before installation.
- When aircraft was not operated for more than 60 days.
- After electrical system failure event (generator failure, battery failure, etc.)

The charging process always starts with a very small current (about 0.035A at 13.8V) and only after a few minutes it continues with normal charging current (0.2A at 13.8V).

## 2.7 Repair

UPSL has no serviceable parts inside. In the case of malfunction, it must be sent to Kanardia for a repair.

## 3 Limited Conditions

Although a great care was taken during the design, production, storage and handling, it may happen that the Product will be defective in some way. Please read the following sections about the warranty and the limited operation to get more information about the subject.

### 3.1 Two Years Warranty

Kanardia d.o.o. warrants the Product manufactured by it against defects in material and workmanship for a period of twenty-four (24) months from retail purchase.

#### Warranty Coverage

Kanardia's warranty obligations are limited to the terms set forth below:

Kanardia d.o.o. warrants the Kanardia-branded hardware product will conform to the published specification when under normal use for a period of twenty-four months (24) from the date of retail purchase by the original end-user purchaser ("Warranty Period"). If a hardware defect arises and a valid claim is received within the Warranty Period, at its option and as the sole and exclusive remedy available to Purchaser, Kanardia will either (1) repair the hardware defect at no charge, using new or refurbished replacement parts, or (2) exchange the product with a product that is new or which has been manufactured from new or serviceable used parts and is at least functionally equivalent to the original product, or, at its option, if (1) or (2) is not possible (as determined by Kanardia in its sole discretion), (3) refund the purchase price of the product. When a refund is given, the product for which the refund is provided must be returned to Kanardia and becomes Kanardia's property.

#### Exclusions and Limitations

This Limited Warranty applies only to hardware products manufactured by or for Kanardia that have the "Kanardia" trademark, trade name, or logo affixed to them at the time of manufacture by Kanardia. The Limited Warranty does not apply to any non-Kanardia hardware products or any software, even if packaged or sold with Kanardia hardware. Manufacturers, suppliers, or publishers, other than Kanardia, may provide their own warranties to the Purchaser, but Kanardia and its distributors provide their products *AS IS*, without warranty of any kind.

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### **3.2 TSO Information — Limited Operation**

This product is not TSO approved as a flight instrument. Therefore, the manufacturer will not be held responsible for any damage caused by its use. The Kanardia is not responsible for any possible damage or destruction of any part on the airplane caused by default operation of instrument.