

# INDU RPM — Manual

Kanardia d.o.o.

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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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## Revision History

The following table shows the revision history of this document.

| Rev. | Date      | Description     |
|------|-----------|-----------------|
| 1.0  | June 2016 | Initial release |
|      |           |                 |
|      |           |                 |
|      |           |                 |

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# 1 Introduction

First of all, we would like to thank you for purchasing our device. Indu RPM is an electronic device, which mimics classical RPM instrument construction and combines it with the state of the art electronics. This results in the best of both worlds; a perfect and intuitive analogue reading combined with high precision of modern electronics.

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

## 1.1 General Description

The Indu RPM is an electromechanical device. It consists of special analogue input stage electronics which in combination of microcontroller converts input electrical signal into RPM value. The electronics reads the electrical signal from RPM sensor and drives stepper motor turning a needle. RPM information is also shown on a colour LCD display. When connected to a CAN bus instrument outputs RPM and engine hours <sup>1</sup> data which can be used by other Kanardia devices.

Display is divided linearly in 230° scale with colour LCD display in the center. Scale is user configurable and must be specified when ordering the device.

The instrument is available<sup>1</sup> in 57 mm and 80 mm size.

## 1.2 Technical Specification

Table 1 shows some basic technical specification of Indu RPM.

| Description                       | Value                                                                                |
|-----------------------------------|--------------------------------------------------------------------------------------|
| Weight                            | 57 mm: 150 g<br>80 mm: 201 g                                                         |
| Size                              | 57 mm : 62 × 62 × 45 mm<br>80 mm : 82 × 82 × 45 mm                                   |
| Operational voltage               | 6 to 32 V                                                                            |
| Power consumption                 | 1.26 W                                                                               |
| Current                           | 105 mA at 12 V<br>53 mA at 24 V                                                      |
| Operating temperature             | -30 °C to +85 °C                                                                     |
| Humidity                          | 30 % to 90 %, non condensing                                                         |
| Panel hole                        | 57 mm (2.24 inch) diameter, standard fit<br>80 mm (3.15 inch) diameter, standard fit |
| Engine RPM input signal frequency | 0 to 1000 Hz                                                                         |
| Rotor RPM input signal frequency  | 0 to 1000 Hz                                                                         |
| Communication                     | CAN bus, 29 bit header, 500 kbit, Kanardia protocol                                  |

Table 1: Basic technical specifications.

<sup>1</sup> Must be specified at the time of order. Please refer to “INDU RPM Ordering Form” for more details.



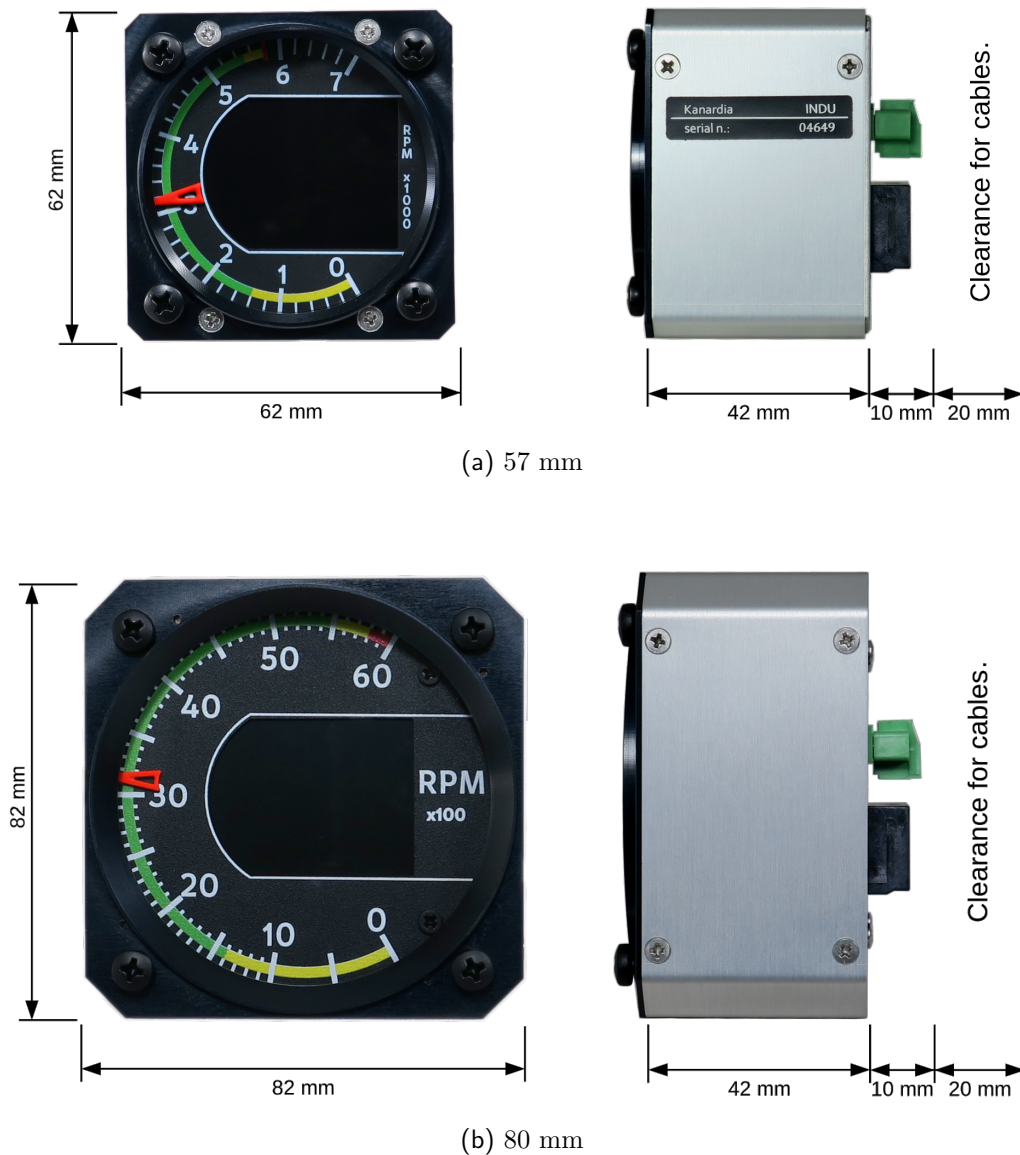


Figure 1: Front and side view of the RPM with its principal dimensions.

## 1.3 Options

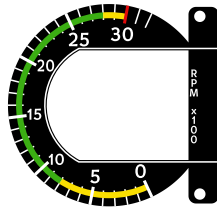
### 1.3.1 Scale

Figures 2 and 3 show three standard scale configurations for each size of instrument: D-motor, Lycoming and Rotax. Custom scale is also available on request.

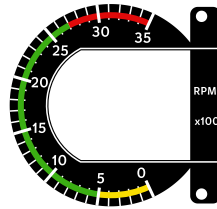
Scale holds color-coded markings in order to give the pilot immediate reference. The following markings are possible:

- Engine limit – **Red arc between D and E**. This mark/arc designates the engine max RPM limits. The engine shall never operate in this area.
- Engine high-RPM range – **Upper yellow arc between C and D**. This designates the range of RPM, which should not be used for longer period and should be generally avoided.

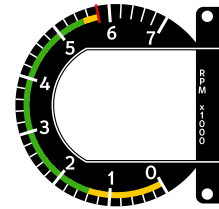
- Recommended range of RPM – **Green arc between B and C.** This designates the recommended range of RPM.
- Engine low-RPM range – **Lower yellow arc between A and B.** This designates the range of RPM, which should not be used for longer period and should be generally avoided.



(a) D-motor

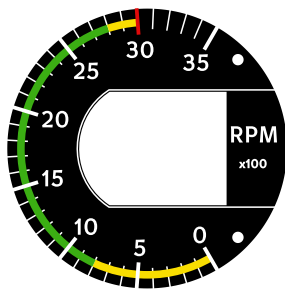


(b) Lycoming

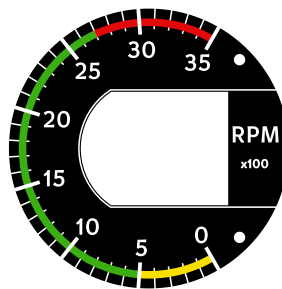


(c) Rotax

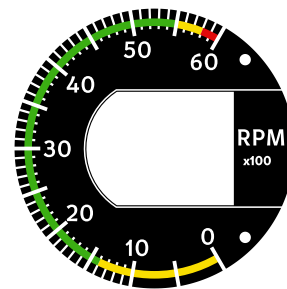
Figure 2: Standard 57 mm scales.



(a) D-motor



(b) Lycoming



(c) Rotax

Figure 3: Standard 80 mm scales.

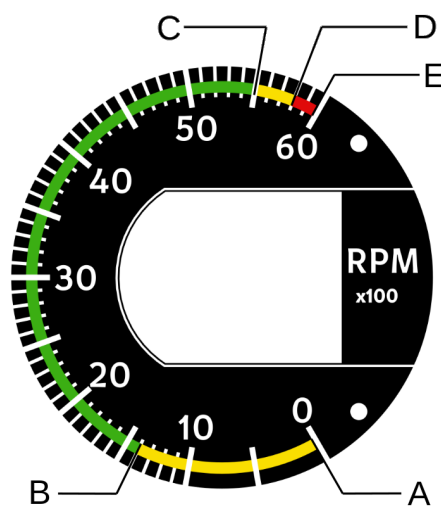


Figure 4: A scale example with the markings.

### 1.3.2 Display

By default instrument displays engine RPM information on LCD display. Instruments with engine time recorder option displays also engine time information. Figure 5 shows all possible display configurations. Display configuration must be specified at the time of order.

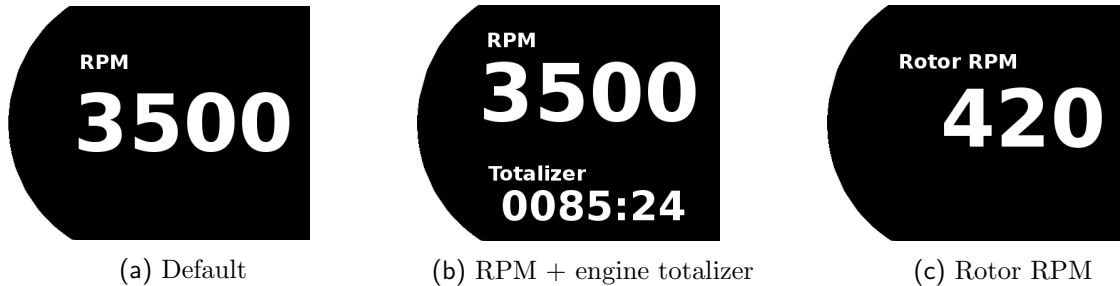


Figure 5: Display configurations.

### 1.3.3 Visual Warnings

RPM can be configured<sup>1</sup> to show two types of warnings on LCD display:

- **RPM yellow zone.** Yellow RPM value designates that the engine operates in yellow zone, which was defined at the time of order (Figure 6a).
- **RPM red zone.** Red RPM value designates that the engine operates in red zone, which was defined at the time of order (Figure 6b).

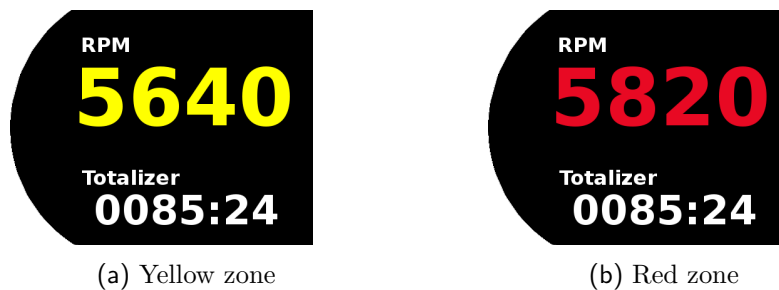


Figure 6: Visual warnings.

### 1.3.4 Special Versions

Special versions of Indu RPM instrument are available with engine time recorder and/or additional rotor RPM input. This special functionality must be specified at the time of order.

- **Engine time recorder.** Instrument measures and stores engine running time on integrated memory module. The engine time value is displayed on LCD display (Figure 5b).
- **Rotor RPM.** Instrument is modified to support two RPM sensors. Engine RPM value is presented by the mechanical needle while the rotor RPM value is displayed on LCD display (Figure 5c). The engine time value can also be displayed on LCD display.

## 2 Installation & Maintenance

The Indu RPM requires a standard size 57/80 mm hole in the instrument panel. The position of the hole must ensure that the instrument is always visible from the pilot's perspective.

### 2.1 Mounting Dimensions

The mounting screw holes are located on a circle of 66.5/89 mm diameter. The instrument is mounted using four screws type M4. To prevent internal stresses, please make sure that the instrument panel is flat. It is highly recommended that the instrument panel is mounted using rubber shocks, which reduce the vibrations. Figure 7 illustrates the mounting hole for both sizes of instrument.

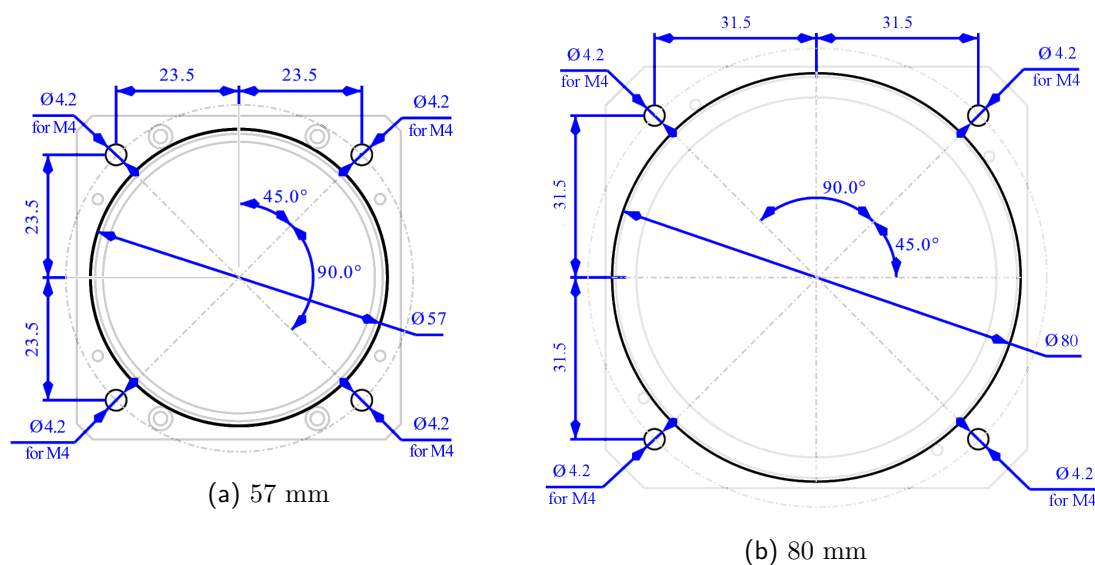


Figure 7: Instrument panel cutout and mounting hole. Note: Figures are not in scale.

### 2.2 Connections

Figure 8 illustrates all connections at the back side of the instrument.

#### 2.2.1 RPM Signal Input

The RPM signal is obtained from RPM sensor. Most of the engines are already equipped with such sensor. Refer to your engine manual for wiring. If your engine is not equipped with RPM sensor, refer to engine manual for supported sensors and sensor installation.

Section 2.3 provides some wiring examples of most common RPM sensor types.

#### 2.2.2 CAN Bus - CAN

Connection to the CAN bus is optional and is not required for the normal operation. When connected to the bus, instrument will transmit engine RPM, rotor RPM<sup>1</sup> and engine time<sup>1</sup> data to other units connected to the bus.

Use standard RJ45 ethernet cable to connect it with other Kanardia equipment.

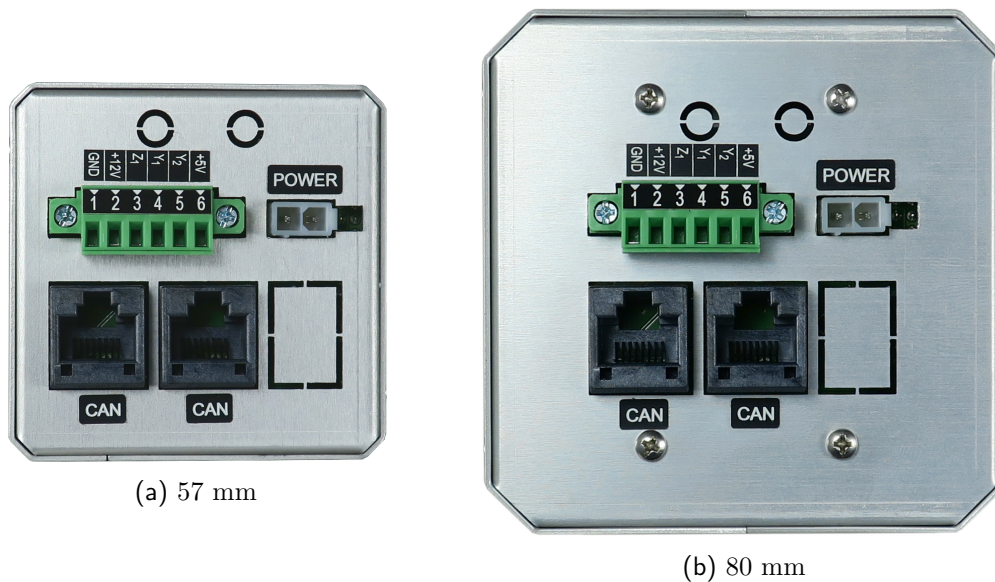


Figure 8: Back view of the instrument with connections.

### 2.2.3 Power - POWER

Connect supplied connector at the back of the instrument. The connector has a notch on one side, which protects from wrong orientation.

Connect blue lead to negative (ground) terminal and red lead to positive (+6 to +32 V) terminal.

## 2.3 Sensors

Most of the engines come with factory installed RPM sensors. This section describes most commonly used sensor types and provides wiring example for each type. Refer to your engine manual for identifying RPM sensor type and wiring.

### 2.3.1 Variable-Reluctance (Magnetic) Pickup.

Two wires are used. One wire is connected to “Z1” pin and the other is connected to “GND” pin on RPM connector. Refer to figure 9a for proper connection schema.

### 2.3.2 Trigger Coil.

Rotax (912) engines usually come equipped with a trigger coil for monitoring engine RPM. One wire is connected to “Z1” pin and the other wire is connected to “GND” pin on RPM connector. Refer to figure 9a for proper connection schema.

### 2.3.3 Active Inductive RPM Sensors.

- NPN (Open Collector Output)

Connect sensor +5/+12 V input with appropriate +5/+12 V pin according to sensor specifications. Sensor ground is connected to “GND” pin. Signal must be connected to “Y1” pin. Refer to figure 9b for proper connection schema.

- PNP (Open Emitter Output)

Sensor wiring is the same as for NPN sensor, but you have to connect 10kOhm resistor between “Y1” and “GND” pin. Refer to figure 9c for proper connection schema.

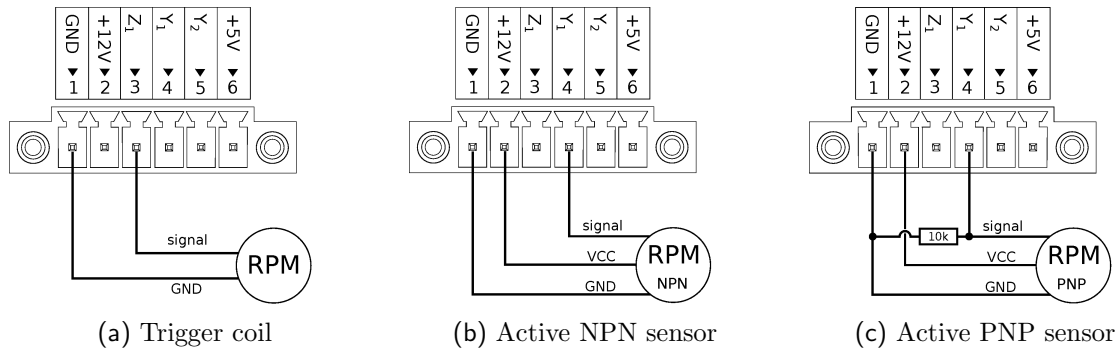


Figure 9: Wiring diagram for most commonly used RPM sensor types.

## 2.4 Maintenance

No special maintenance is required.

## 2.5 Repair

The Indu airspeed has no serviceable parts inside. In the case of malfunction, it must be sent to factory for a repair.

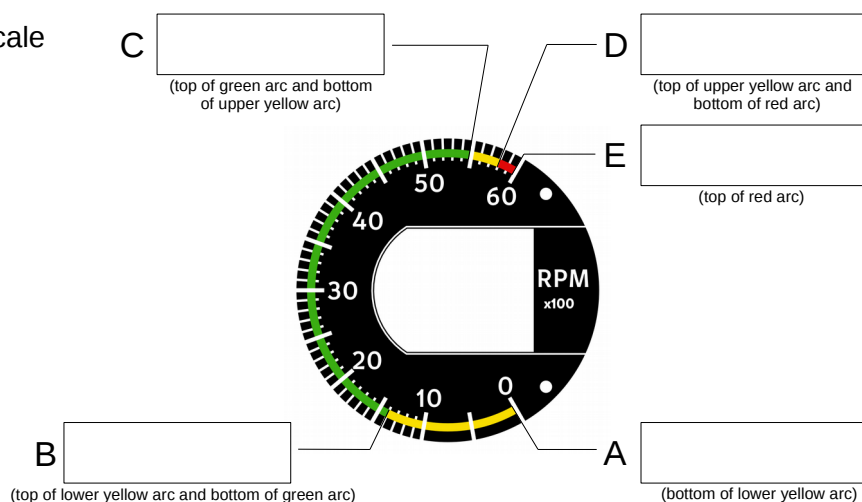
# INDU RPM Ordering Form



## 1. Size (select one)

☐ 57 mm☐ 80 mm

## 2. Scale (refer to section 1.3.1 of INDU RPM Manual)

☐ D-motor☐ Lycoming☐ Rotax☐ Custom scale

## 3. Optional features

☐ Engine time recorder☐ Rotor RPM input

## 4. Display configuration (select one)

☐

RPM  
**3500**

**Engine RPM:**  
Default configuration.

☐

RPM  
**3500**  
Totalizer  
0085:24

**Engine RPM + engine time recorder:**  
Supported only when ordered with engine time recorder option.

☐

Rotor RPM  
**420**

**Rotor RPM:**  
Supported only when ordered with rotor RPM option.

☐

Rotor RPM  
**420**  
Totalizer  
0085:24

**Rotor RPM + engine time recorder:**  
Supported only when ordered with rotor RPM and engine time recorder options.

## 5. Visual warnings (optional)

☐

RPM  
**5820**  
Totalizer  
0085:24

**Red zone:**  
RPM value on LCD display is colored in red if the value is between \_\_\_\_\_ and \_\_\_\_\_ RPM.

☐

RPM  
**5640**  
Totalizer  
0085:24

**Yellow zone:**  
RPM value on LCD display is colored in yellow if the value is between \_\_\_\_\_ and \_\_\_\_\_ RPM.

Engine RPM sensor type: \_\_\_\_\_ Filled by: \_\_\_\_\_  
(name and signature)

## 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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