

## PRODUCT DATASHEET

# RML-MAG – Space Magnetometer

*1<sup>st</sup> generation*

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# 1 Purpose and Scope

The present document provides detailed technical information about RML-MAG Space Magnetometer.

The definitions and glossary of terms from ECSS-S-ST-00-01C [AD 1] apply to this document.



1. Figure – RML-MAG Space Magnetometer (1<sup>st</sup> generation)

## 2 Application and Key Features

### 2.1 APPLICATION

- ✓ **Magnetic Field and Space Weather Research & Forecast (Service)**
  - Space Magnetic Field related research and service provision
    - Research
    - Service data production
    - Forecast
    - Data models validation
  - Measuring space weather related space magnetic field data products as defined by the European Space Agency (ESA)
    - Vector components
    - Field strength
  - Measuring long-term behaviour

### 2.2 KEY FEATURES

- ✓ **Space magnetic field and space weather research and forecast**
  - Cost and time effective monitoring solution for constellations
  - Extremely low budgets with relatively high performance
- ✓ **High performance measurement specification**
  - Utilising internally located miniaturised fluxgate sensor
    - SpaceMag-Lite provided by Bartington Ltd.
  - Specification following the data product definitions of ESA
- ✓ **Possibility for optional extension with additional external sensors**
  - Capable to operate up to 2 external magnetic field sensors
- ✓ **Fully autonomous operation**
- ✓ **Controlled via TM/TC**
- ✓ **Available interfaces: CAN, M-LVDS, RS-422**

# 3 Specification

## 3.1 GENERAL SPECIFICATION

1. Table – General specification

Parameters	Values
Power	1.5 W
Mass	0.6 kg
Dimensions (H,W,L)	49 mm, 100 mm, 110 mm
Operational temperature range	-40°C...+65°C
Non-operational temperature range	-40°C...+85°C
Operational pressure range	10 <sup>5</sup> Pa...10 <sup>-4</sup> Pa
Outgassing rate	<1% TML <0.1% CVCM
Data range	15 MB/day
Handling environment humidity	20...65% relH

## 3.2 ENVIRONMENTAL SPECIFICATION

2. Table – Environmental specification

Parameters	Values	
Thermal vacuum	Temperature environment	-40°C...+85°C
	Vacuum environment	<10 <sup>-3</sup> Pa
	Max. depressurization rate	5.0 kPa/s
Vibration	Sine vibration environment for 3-axis	20...100 Hz, 16.0 g
	Random vibration environment for 3-axis	5...2000Hz, 17.0g <sup>RMS</sup>
	Shock pulse for 3 axis	100 g, 0.25 ms
EMC	EMC environment	Tailored ECSS-E-ST-20-07C Rev.1 [AD 2]
Radiation	Used components	COTS
	Proven lifetime	Demonstration is planned at LEO



## 3.3 INTERFACES

3. Table – Interfaces

Parameters	Values
Input power bus	5V regulated ( $\pm 5\%$ ) 12V unregulated (9.0 V...20.0 V)
TM/TC interface	CAN Bus / M-LVDS / RS-422/485/232

## 3.4 MEASUREMENT CAPABILITIES

4. Table – Measurement capabilities

Parameters	
Sensor type	3-axis fluxgate
Sensor Supplier / Product	Bartington Ltd. / SpaceMag-Lite
Range	$\pm 60\mu\text{T}$
Noise floor	10 to $\leq 150\text{pTrms}/\sqrt{\text{Hz}}$ at 1Hz
Orthogonality error	$<0.5^\circ$

# 4 Flight Heritage

**5. Table – Flight heritage**

Mission name	Hosting platform	Orbit details	Duration	Remarks
Under selection	SmallSat	LEO	7+ years	planned



## 5 List of Abbreviations

<b>AD</b>	Applicable Documents
<b>Astorika</b>	Astorika Sp. z.o.o.
<b>COTS</b>	Commercial Off-The-Shelf
<b>ECSS</b>	European Cooperation for Space Standardization
<b>ESA</b>	European Space Agency
<b>ICL</b>	Imperial College London
<b>LEO</b>	Low Earth Orbit
<b>LET</b>	Linear Energy Transfer
<b>RD</b>	Reference Documents
<b>TC</b>	Telecommand
<b>TID</b>	Total Ionising Dose
<b>TM</b>	Telemetry

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### 8.1 APPLICABLE AND NORMATIVE DOCUMENTS

**6. Table – Applicable and Normative Documents**

AD	Title	Reference	Version
[AD 1]	ECSS system - Glossary of terms	ECSS-S-ST-00-01C	1 Oct 2012
[AD 2]	Space engineering – Electromagnetic compatibility	ECSS-E-ST-20-07C Rev.1	7 Feb 2012

### 8.2 REFERENCE DOCUMENTS

**7. Table – Reference Documents**

RD	Title	Reference	Version
[RD 1]	-	-	-

**END OF DOCUMENT**