

PRODUCT DATASHEET

RML-MAG – Space Magnetometer

1st 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 (1st 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 ⁵ Pa...10 ⁻⁴ 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 ⁻³ 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 ^{RMS}
	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 $\leq 150\text{pT}_{\text{rms}}/\sqrt{\text{Hz}}$ 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

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

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8 References

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]	-	-	-

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