

PRODUCT DATASHEET

SPACE-GM – Geiger-Müller Counter System for Sounding Rocket Research

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1 Purpose and Scope

The present document provides detailed technical information about the SPACE-GM Geiger-Müller Counter System for Sounding Rocket Research applications. The definitions and glossary of terms from ECSS-S-ST-00-01C [AD 1] apply to this document.

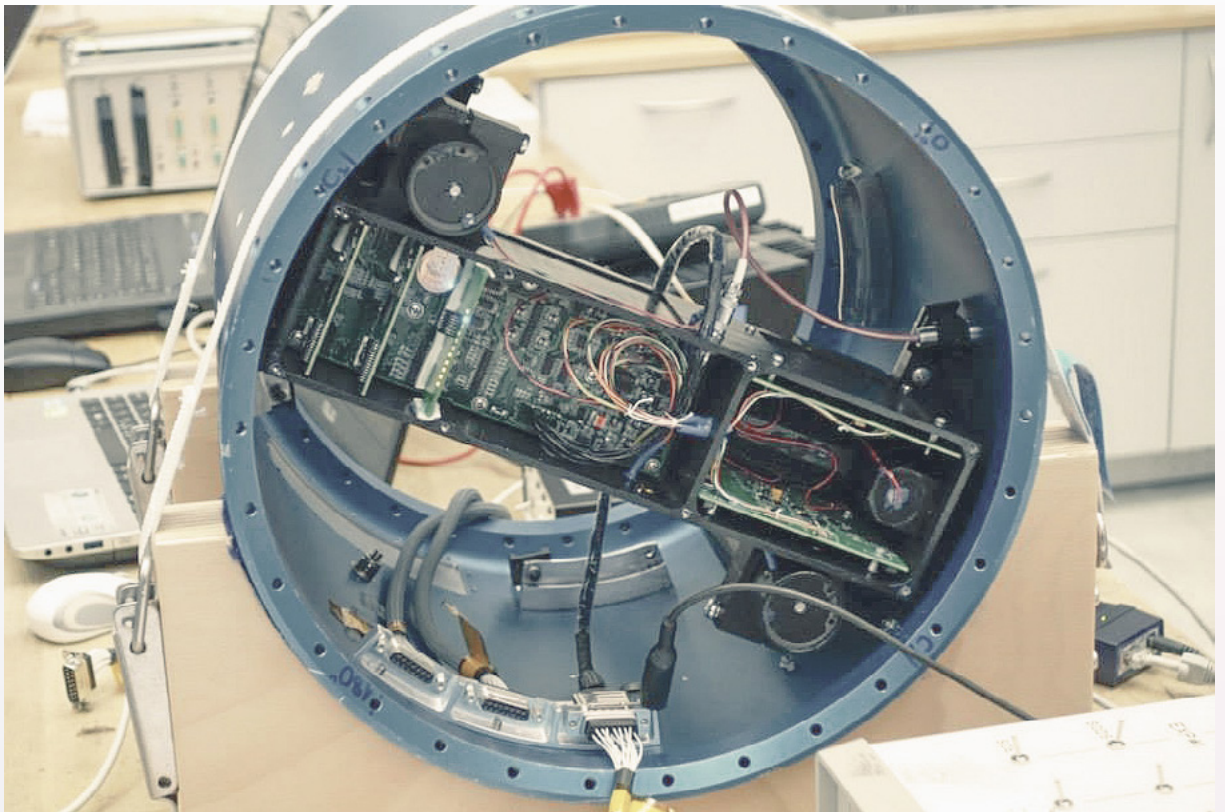


Figure 1 – SPACE-GM System

2 Application and Key Features

2.1 APPLICATION

- ✓ **Cosmic Ray Research**
 - Proven cosmic ray research equipment for stratospheric missions (ballons, sounding rockets)
 - To determine the cosmic ray flux profiles
 - To study shielding effects of the surrounding environment
 - To generate cosmic ray event alerts
 - Operated on-board REXUS-17 sounding rocket
- ✓ **Nuclear Environment Monitoring**
 - To map contaminated areas
 - To localise radiation sources
 - To protect humans from radiation
 - Operated on-board drones for radiation mapping

2.2 KEY FEATURES

- ✓ **GM-counter based cosmic ray instrument for harsh environments**
- ✓ **GM counters can be used in stratospheric balloon flights or on-board sounding rocket missions**
- ✓ **2-dimensional sensitive measurement system**
- ✓ **Configurable system**
 - Different type of GM-counters
 - Up to a maximum number of 6 GM-counters
- ✓ **Fully autonomous operation**
- ✓ **Controlled via graphical user interface or TM/TC**
- ✓ **Available detector interfaces: CAN, RS-422**

3 Specification

3.1 GENERAL SPECIFICATION

Table 1 – General specification

Parameters	Values
Power	1.9 W
Mass	3.5 kg
Dimensions	349 mm; 180 mm; 249 mm
Operational temperature range	-40°C...+70°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 rate	1 kbit/s

3.2 ENVIRONMENTAL SPECIFICATION

Table 2 – Environmental specification

Parameters	Values	
Thermal	Temperature environment	-40°C...+85°C
	Pressure environment	Up to 1.2·10 ⁵ Pa
	Humidity environment	20...65%relH
Thermal-vacuum	Temperature environment	-40°C...+85°C
	Vacuum environment	<10 ⁻³ Pa
	Max. depressurisation rate	5.0 kPa/s
Vibration	Sine vibration environment for 3-axis	10...700 Hz, 4.0 g
	Random vibration environment for 3-axis	5...2000 Hz, 6.0 g ^{RMS}
	Shock pulse for 3-axis	±20 g, 2.0 ms
EMC	EMC environment	Tailored ECSS-E-ST-20-07C Rev.1 [AD 2]

3.3 INTERFACES

Table 3 – Interfaces

Parameters	Values
Input power bus	24.0 V...36.0 V (redundant)
TM/TC interface	CAN Bus / RS-422 (redundant)

3.4 MEASUREMENT CAPABILITIES

Table 4 – Measurement capabilities

Parameters	Values
GM types	Centronic ZP1210, ZP1200
Particle types	photons, charged particles
Dose rate range	1 μ Gy...100 mGy
Counting rate at 10 ⁻² mGy/h	28 cps (for ZP1200) 110 cps (for ZP1210)
Dead time	90 μ s (for ZP1200) 200 μ s (for ZP1210)
Noise level	<0.2 cps (for ZP1200) <1.2 cps (for ZP1210)

4 Flight Heritage

Table 5 – Flight heritage

Mission name	Hosting platform	Orbit details	Duration	Remarks
REXUS-17	REM-RED experiment	88 km maximum altitude (N68°)	10 minutes	With 6 GM-tubes

5 List of Abbreviations

AD	Applicable Documents
ECSS	European Cooperation for Space Standardization
GM	Geiger-Müller counter
RD	Reference Documents
REXUS	Rocket Experiments for University Students
TC	Telecommand
TM	Telemetry

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8 References

8.1 APPLICABLE AND NORMATIVE DOCUMENTS

Table 6 – 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

Table 7 – Reference Documents

RD	Title	Reference	Version
[RD 1]	-	-	-