



HERSCHEL / PLANCK

**Herschel grounding diagrams
H-P-2-ASPI-TN-0199**

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1. SCOPE

The purpose of a grounding diagram is to be a reference document allowing to :

- check the compliance of the design with the grounding requirements
- help to anticipate and/or solve common impedance coupling problems

The present document summarises Herschel spacecraft grounding philosophy and implementation, that is driven by two specific kinds of constraints :

Thermal constraints :

Because of the thermal constraints leading to unusual ground reference continuity design, this document not only deals with the grounding of circuits (anyway covered on more detail in some of the Instruments documents), but also with the bonding of structure parts.

Because of the high thermal decoupling required between the Service Module (SVM) where the platform electronics and the three Instruments (SPIRE, PACS, HIFI) warm electronics are installed, and the cryostat where the Instrument cold sensitive electronics are set, the structure electrical continuity between SVM and CVV (cryostat vacuum vessel) is limited to what is absolutely necessary, i.e. HIFI coaxial cables, and the cryoharness overshields.

Concerning the inside of the cryostat, the electrical continuity between the optical bench and the CVV is only ensured by the venting pipe.

Instruments sensitivity :

Additionally because of the low level low frequency analogue signals to be detected by SPIRE and PACS, isolation of the high impedance parts of the detection chains from the structure may be needed. In particular, SPIRE have required to have their FPU isolated from the optical bench, by isolating feet, and from the cryogenic piping by sapphire in series on the thermal straps.

A detailed A2+ grounding diagram showing the SVM and the three Instruments is given in Annex. It is not meant to be complete at this stage, especially as far as PACS and SPIRE Instruments are concerned.

2. DOCUMENTS

2.1 Applicable documents

[AD-1] : IID Part B, Bolometer Instrument, SCI-PT-IIDB/SPIRE-02124, [Issue 3.2](#)

[AD-2] : IID Part B, Heterodyne Instrument, SCI-PT-IIDB/HIFI-02125, [Issue 3.2](#)

[AD-3] : IID Part B, Photoconductor Instrument, SCI-PT-IIDB/PACS-02126, [Issue 3.2](#)

[\[AD-4\] : SVVM Grounding and Bonding, H-P-TN-AI-0079, Issue 1.0\(draft\)](#)

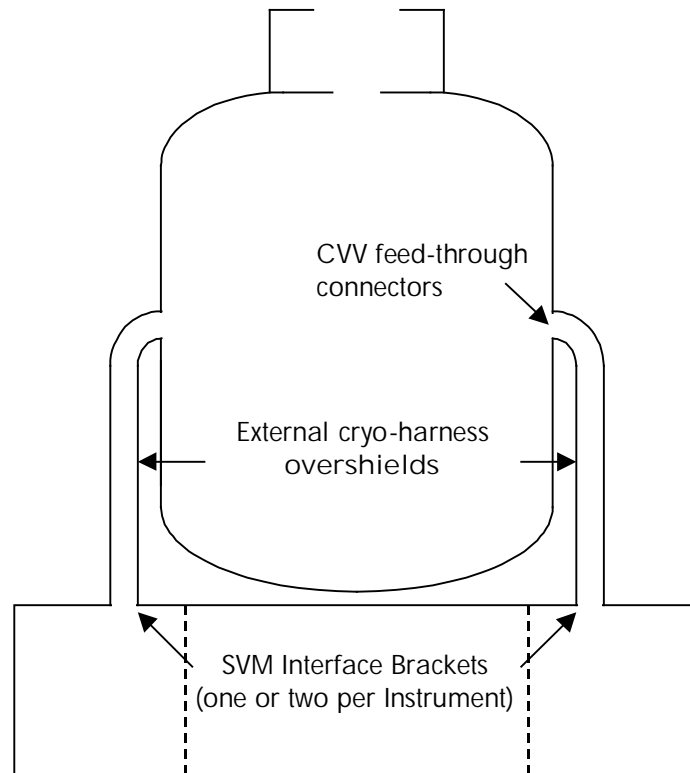
[\[AD-5\] : HERSCHEL PLM Grounding Scheme, H-P-2-ASED-DW-0001, Issue 1.0](#)

2.2 Reference documents

- (PACS) System Grounding Diagrams, PACS-ME-LI-006, [Issue 2.0](#)
- (PACS) EMC Control Plan & Frequency Plan, PACS-ME-PL-015, [Issue 2.0](#)
- (SPIRE) Grounding and Screening Philosophy, SPIRE-RAL-PRJ-00624, 24/09/01, [Issue 1.0](#)
- [HERSCHEL General Design and Interface Requirements, H-P-1-ASPI-SP-0027, Issue 4.2](#)

3. OVERVIEW OF SVM-PLM STRUCTURES CONNECTIONS

The general concept is to have the CVW continuity with the SVM structure ensured by the cryo-harness overshields.



Symbolic representation of the ground continuity concept

This concept has been chosen in order to :

- provide a ground plane extension around each cryoharness bundle resulting in minimum loop surfaces
- protection the interface components on either side against ESD
- protect the detection chains against field to cable coupling

The connection between the CVW and SVM structures is also ensured by HIFI IF coaxial cables.

Concerning HIFI LOU, its structure is isolated from the CVW and connected to the SVM by :

- the waveguides from the LSU
- the overshield of the cryo-harness from the LCU

4. ANNEX 1 – HERSCHEL GROUNDING DIAGRAM

(Attached Visio File: Herschel_grounding_diagram_1_2

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