

SPIRE

SUBJECT: ICD 1.1/1.2 Structure-Optics

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0.1	August 1999	New document
0.2	May 2000	Update due to revised optical lay-out , change in mirror dimensions and interface definition.
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Glossary

BSM	Beam Steering Mechanism
C.G.	Centre of Gravity
NA	Not Applicable
PDBX	Photometer Detector Box
SDBX	Spectrometer Detector Box
SMEC	Spectrometer Mechanism
SOB	SPIRE Optical Bench
SPIRE	Spectral and Photometric Imaging REceiver

References

Applicable Documents

AD1 Instrument Requirements Document, issue 0.30, May 2000 (FIRST/SPIRE)

REFERENCE DOCUMENTS

RD1 SPIRE Mirrors: Mass estimate. LAM.PJT.SPI.OPT.990001 ind 3, 20 May 2000

1. INTRODUCTION

1.1 Purpose of Document

The purpose of this document is to define the interface between the SPIRE structure and the mirrors. Within this document the mechanical, thermal, optical and electrical requirements are given.

This issue is a draft issue. The purpose of this issue is to define the interface, such that an agreed baseline interface is available at the beginning of the final design process. During the final design process the definitions may be refined and possibly changed, however at the end of the final design process the interface definition is frozen.

The design of the instrument and its subsystems obeys the requirements as stated in RD1.

1.2 SCOPE

The interfaces between the structure and the mirrors are divided into three different groups. The interfaces considered are between the SPIRE Optical Bench Panel, Photometer Detector Box, Spectrometer Detector Box and the mirrors. Throughout the whole document the SPIRE Optical Bench Panel will be referred to as OBP, the Photometer Detector Box as PDBX and the Spectrometer Detector Box as SDBX.

The document is divided into 5 parts.

The first part gives the status and description of the document itself

The second part gives the functional description.

The third part deals with the mechanical, thermal and optical interfaces.

The fourth part gives the electrical interfaces. (obsolete)

The fifth part defines the data interfaces. (obsolete)

The following interfaces are considered:

- OBP-CM3
- OBP-CM5
- OBP-PM6
- OBP-PM7
- OBP-PM8
- OBP-PM9
- OBP-PM10 (fold mirror)
- OBP-PM11 (fold mirror)
- OBP-SM6
- OBP-SM7
- OBP-SM8 (A & B)
- OBP-SM9 (A & B)
- OBP-SM10 (A & B)
- OBP-SM11 (A & B)
- OBP-SM12 (A & B) (Fold mirrors)

In the below presented figures the topology of the instrument its optic parts is given.

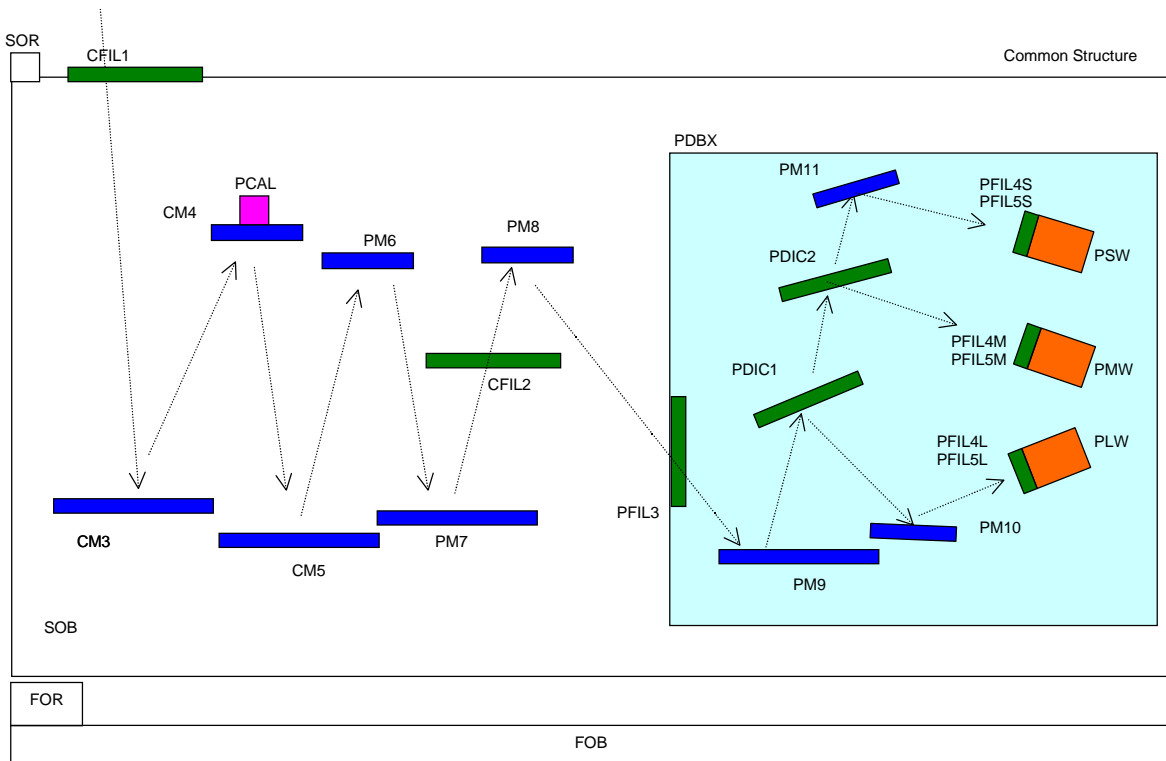


Figure 1.2-1: Topology of the photometer side of the instrument

Where:

CFIL1	Common Filter 1
CFIL2	Common Filter 2
CM3-5	Common Mirror 3-5
FOB	First Optical Bench Panel
FOR	First Optical Reference
PCAL	Photometer CALibrationsource
PDBX	Photometer DetecToR BoX
PDIC1	Photometer DIChroic 1
PDIC2	Photometer DIChroic 2
PFIL3	Photometer FILter 3 (entrance PDBX)
PFIL4L/5L	Photometer FILter 4 and 5 at nose PLW
PFIL4M/5M	Photometer FILter 4 and 5 at nose PMW
PFIL4S/5S	Photometer FILter 4 and 5 at nose PSW
PLW	Photometer Long Wave detector
PM6-11	Photometer Mirror 6 to 11
PMW	Photometer Medium Wave detector
PSW	Photometer Short Wave detector
SOB	Spire Optical Bench Panel
SOR	Spire Optical Reference

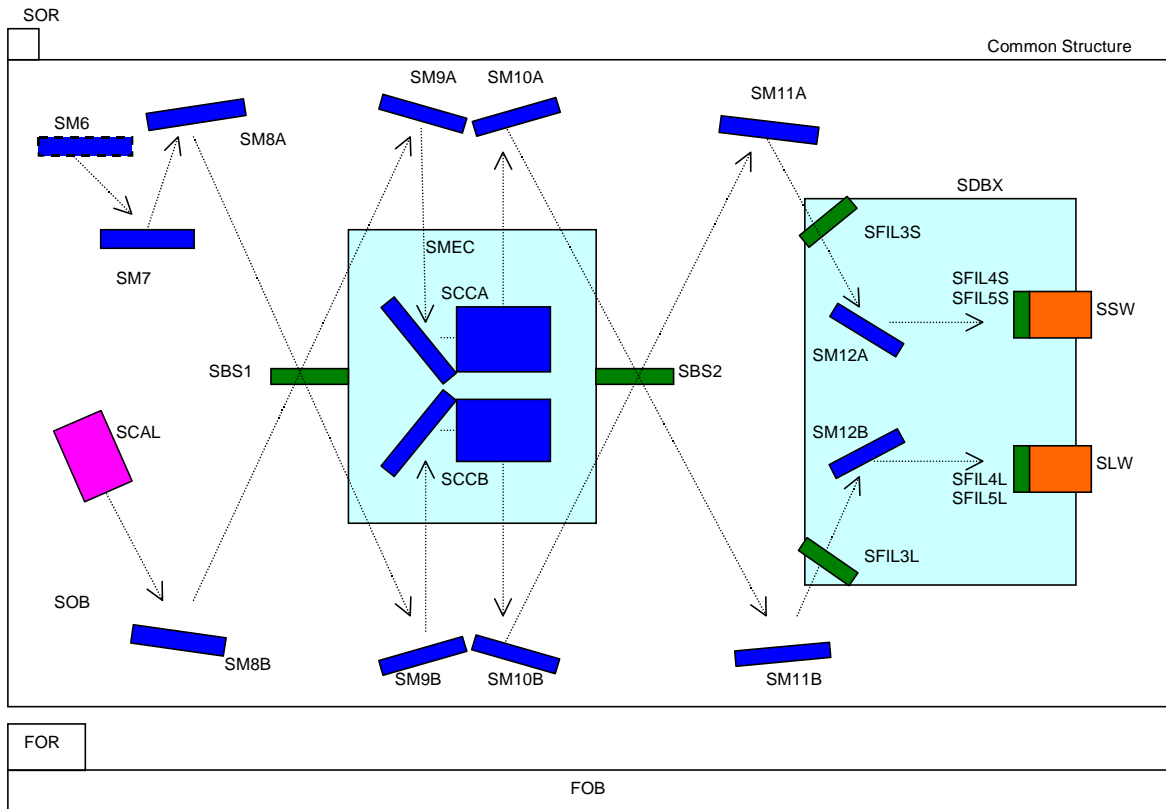


Figure 1.2-1: Topology of the spectrometer side of the instrument

FOB	First Optical Bench Panel
FOR	Firs Optical Reference
SBS1	Spectromter Beam Splitter 1
SBS2	Spectromter Beam Splitter 2
SCCA	Spectrometer Corner Cube +X
SCCB	Spectrometer Corner Cube -X
SCAL	Spectrometer CALibration source
SDBX	Spectrometer Detector BoX
SFIL3L	Spectrometer FILter 3 (long wave)
SFIL3S	Spectrometer FILter 3 (short wave)
SFIL4L/5L	Spectrometer FILter at nose SLW
SFIL4S/5S	Spectrometer FILter at nose SSW
SM6-7	Spectrometer Mirror6-7
SM8A-12A	Spectrometer Mirror 8-12 +X chain
SM8B-12B	Spectrometer Mirror 8-12 -X chain
SMEC	Spectrometer MEChanism
SOB	Spire Optical Bench Panel
SOR	Spire Optical Rerference

2. FUNCTIONAL INTERFACE

2.1 Functional Description and Block Diagram

The mirrors fold and focus the far infrared rays on the detector surfaces. The sequence of mirrors consist of three parts. The first part folds the incoming rays from the secondary mirror to the BSM. The BSM reflects the rays to either the spectrometer or the photometer part of the structure via CM5 (forming the second and third part of the mirror sequence)

Mirror Interface with other components

- SPIRE optical bench panel
- Photometer detector box
- Spectrometer detector box
- BSM (not listed in this document)
- SMEC (not listed in this document)

The function of the OBP (reviewing the interface between the OBP and the mirrors) is to support the mirrors and their mounts. The mechanical interface should provide for a precise defined and accurately machined mounting surface. The mechanical interface should provide for sufficient stiffness, such that the mechanical loads on the mirrors are minimised. The same holds for the interfaces with the detector boxes.



Figure 2.1-1: Block diagram

The mirror mounts are provided by MSSL and the mirrors by LAM.

2.2 Inputs

No inputs

2.3 Outputs

No outputs

3. MECHANICAL, THERMAL AND OPTICAL INTERFACES

3.1 Mechanical and thermal interface data sheets

The following holds for all interfaces considered in section 3.1.1 up to 3.1.15 unless otherwise specified..

Mechanical environment

The sine and random input at the interfaces considered in this document will be updated after the coupled analysis. The input spectra hold for all interfaces.

Quasi-Static

The qualification levels are **provisional**, copied from the qualification loads of ISO.

Quasi Static levels	Case 1	Case 2	Case 3	Case 4
x-direction	22.5 g (TBC)	22.5 g (TBC)	-	-
y-direction	3 g (TBC)	-	6 (TBC)	-
z-direction	-	3 g (TBC)	-	6 (TBC)

Table 3.1-1: Qualification levels for quasi static vibration

Sine

The qualification levels are **provisional** copied from the qualification loads of ISO.

Sine vibration levels	Frequency range	Input at base (QUAL)
X-direction	5-18 Hz	22 mm (peak-peak)
	18-100 Hz	40 g
Y-direction	5-18 Hz	22 mm (peak-peak)
	18-100 Hz	60 g
Z-direction	5-18 Hz	22 mm (peak-peak)
	18-100 Hz	60 g

Table 3.1-2: Qualification levels for sine vibration (2 oct/min)

Random

The qualification levels are **provisional**, copied from the qualification loads of ISO.

Random vibration levels	Frequency range	Input at base (QUAL.)
X-direction	5 – 150 Hz	+6 dB Hz
	150-700 Hz	1.44 g ² /Hz
	700 – 2000 Hz	-3 dB
Y-direction	5 – 150 Hz	+6 dB Hz
	150-700 Hz	1.44 g ² /Hz
	700 – 2000 Hz	-3 dB
Z-direction	5 – 150 Hz	+6 dB Hz
	150-700 Hz	1.44 g ² /Hz
	700 – 2000 Hz	-3 dB

Table 3.1-3: Qualification levels for random vibration (45 g_{rms})

Alignment

The following requirements hold for the alignment of the I/F lane between the mirror mounts and the structure.
Off centre 0.1 mm all directions simultaneously (TBC)

Tilt 1 arcminute (TBC)

Allowable interface loads

The mirror will not add significantly to the rigid body inertia's of the mirrors themselves. That is the eigenfrequency of the mirrors will be above the minimum value specified hereafter in the stiffness section.

Stiffness

The first eigenfrequency of the mirror without mount shall be higher than 350 Hz against a rigid interface. With a mount, mounted against a rigid interface shall be higher than 250 Hz.

Mass

The nominal mass listed in the datasheets below is taken from RD1 and 20% contingency is added to allow for the uncertainty in the design in the pre-PDR phase. After the PDR the interfaces are frozen and the mass uncertainty will drop to less than 2%.

Contact area between mirror and support structure

Surface properties contact area:

Total contact area: 250 mm² (TBC)

Surface roughness of contact area: Ra=1.5 (TBC).

Thermal properties

Surface properties:

Optical surface: $\epsilon = 0.8$ (TBC), $\alpha = 0.1$ (TBC) Effective emmissivity >TBD (do we need this?)

Non-optical surface: $\epsilon = 0.2$ (TBC), $\alpha = 0.4$ (TBC) Effective emmissivity >TBD (do we need this?)

Interface drawing

Since the mirrors interface both with their mounting and the infra red beams, which they reflect, the relative position of the mounting in the instrument depends both on the interface with the mounting as well as the thickness of the mirror. Baseline are two different mirror thicknesses. The mounting spigot will be the same for all the mirrors. As a result of this there are only two different interface drawings required. Hereafter these drawings are presented and the datasheet for each mirror will refer to one of these drawings. In the drawings the dimension H-height refers to the thickness of the mirror at its mounting interface. This is either 15 or 7 mm. In principle each mirror has a rotational degree of freedom, since each mirror mount is rotationally symmetrical. This degree of freedom will be suppressed by means of a dowel pin. The location of this pin, indicated on each drawing, is between the mirror mount spigot and the mirror mount bracket interface with the structure. If in case of possible confusion, the position of the dowel pin will be defined explicitly.

Hereafter a draft interface drawing is included, outlining the generic interface. In the drawing (Figure 3.1-1) Th should be replaced by 15 (mm) for CM3, CM5, PM7 and PM9. And should read 7 (mm) for the other mirror interfaces.

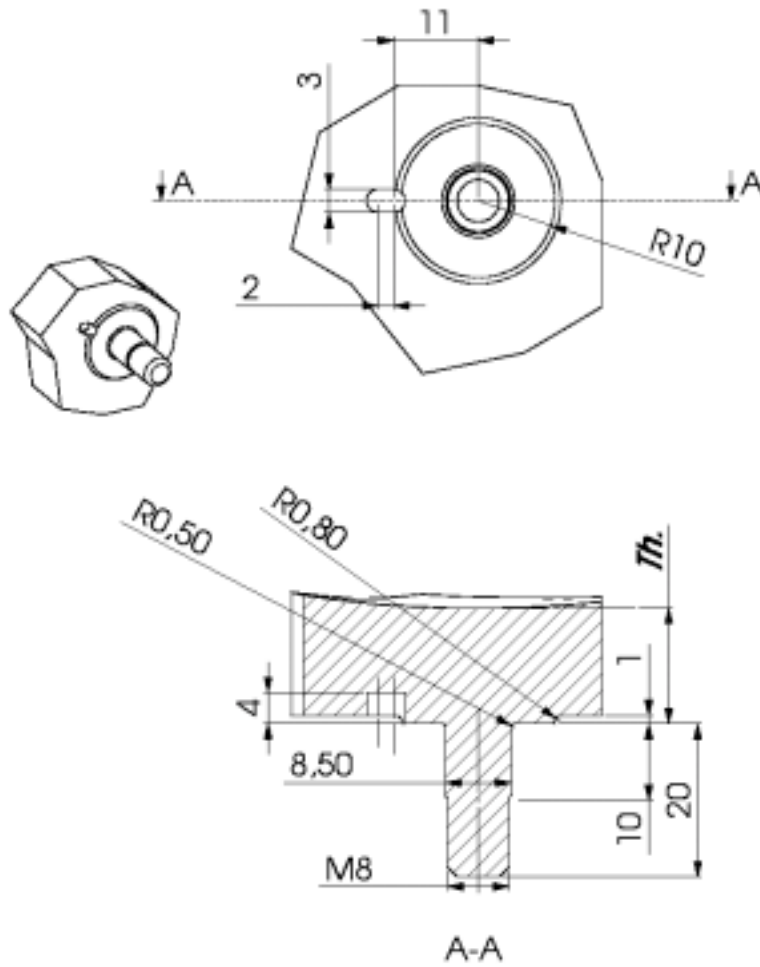


Figure 3.1-1: Draft interface drawing.

3.1.1 OBP – CM3

INTERFACE DATA SHEET

SUBSYSTEM: **OBP – CM3** UNIT CODE: 1.1/1.2

UNIT DESIGNATION

TOTAL NUMBER: 1 IN OPERATION: IN REDUNDANCY: *NA*

MECHANICAL CHARACTERISTICS

DIMENSIONS [mm]: Rectangular L : 132 W : 54 H : 15

MASS (including fasteners) 183 gr + 37 gr contingency

C.G.LOCATION [mm] (wrt reference hole R)

X: Y: Z: Uncertainty:

INERTIA (wrt C.G.) [m²kg]: Ixx: Iyy: Izz Uncertainty:

MATERIAL OF HOUSING: *NA*

THERMAL CHARACTERISTICS OBP – CM3

FOOT MATERIAL AND THICKNESS:

Thermal capacity: J/°K

Conductive coupling: W/°K

QUALIFICATION TEMPERATURE LIMIT (°C) OBP – CM3

GROUND STORAGE &TRANS		OPERATING MODE		NON OPERATING MODE		START UP
MIN	MAX	MIN	MAX	MIN	MAX	MIN
10	40	-271	40	-271	40	-271

HEAT DISSIPATION (W) OBP – CM3

MODE	AVERAGE	MIN	MAX
OFF	<i>NA</i>	<i>NA</i>	<i>NA</i>
STAND-BY	<i>NA</i>	<i>NA</i>	<i>NA</i>
OPERATING	<i>NA</i>	<i>NA</i>	<i>NA</i>

SUBSYSTEM:

UNIT CODE: 1.1/1.2 1.1/1.2

MECHANICAL INTERFACE CONTROL DRAWING OBP – CM3

Change control sheet		
Drawing Number		
Issue	Date	Change
A		

SUBSYSTEM: OBP – CM3

UNIT CODE: 1.1/1.2 1.1/1.2

MECHANICAL INTERFACE CONTROL DRAWING OBP – CM3

Drawing gives details of the *optical bench panel* to mirror mechanical interface.

3.1.2 OBP - CM5**INTERFACE DATA SHEET**SUBSYSTEM: **OBP - CM5**

UNIT CODE: 1.1/1.2 1.1/1.2

UNIT DESIGNATION

TOTAL NUMBER: 1

IN OPERATION:

IN REDUNDANCY: *NA***MECHANICAL CHARACTERISTICS OBP - CM5**

DIMENSIONS [mm]: Rectangular L : 161 W : 85 H : 15

MASS (including fasteners) 360 gr + 72 gr contingency

C.G.LOCATION [mm] (wrt reference hole R)

X:

Y:

Z: Uncertainty:

INERTIA (wrt C.G.) [m²kg]:

Ixx:

Iyy:

Izz

Uncertainty:

MATERIAL OF HOUSING: *NA***THERMAL CHARACTERISTICS OBP - CM5**

FOOT MATERIAL AND THICKNESS:

Thermal capacity: J/°K

Conductive coupling: W/°K

QUALIFICATION TEMPERATURE LIMIT (°C) OBP - CM5

GROUND STORAGE & TRANS		OPERATING MODE		NON OPERATING MODE		START UP
MIN	MAX	MIN	MAX	MIN	MAX	MIN
10	40	-271	40	-271	40	-271

HEAT DISSIPATION (W) OBP - CM5

MODE	AVERAGE	MIN	MAX
OFF	<i>NA</i>	<i>NA</i>	<i>NA</i>
STAND-BY	<i>NA</i>	<i>NA</i>	<i>NA</i>
OPERATING	<i>NA</i>	<i>NA</i>	<i>NA</i>

SUBSYSTEM:

UNIT CODE: 1.1/1.2

MECHANICAL INTERFACE CONTROL DRAWING OBP - CM5

Change control sheet

Drawing Number

Issue	Date	Change
A		

SUBSYSTEM: **OBP - CM5**

UNIT CODE: 1.1/1.2

MECHANICAL INTERFACE CONTROL DRAWING OBP - CM5Drawing gives details of the *optical bench panel* to mirror mechanical interface.

3.1.3 OBP - PM6

INTERFACE DATA SHEET

SUBSYSTEM: **OBP - PM6**

UNIT CODE: 1.1/1.2

UNIT DESIGNATION

TOTAL NUMBER: 1

IN OPERATION:

IN REDUNDANCY: *NA*

MECHANICAL CHARACTERISTICS **OBP - PM6**

DIMENSIONS [mm]: Rectangular L : 46 W : 27 H : 7

MASS (including fasteners) 27 gr + 5 gr contingency

C.G.LOCATION [mm] (wrt reference hole R)

X:

Y:

Z: Uncertainty:

INERTIA (wrt C.G.) [m²kg]:

Ixx:

Iyy:

Izz

Uncertainty:

MATERIAL OF HOUSING: *NA*

THERMAL CHARACTERISTICS **OBP - PM6**

FOOT MATERIAL AND THICKNESS:

Thermal capacity: J/°K

Conductive coupling: W/°K

QUALIFICATION TEMPERATURE LIMIT (°C) **OBP - PM6**

GROUND STORAGE & TRANS		OPERATING MODE		NON OPERATING MODE		START UP
MIN	MAX	MIN	MAX	MIN	MAX	MIN
10	40	-271	40	-271	40	-271

HEAT DISSIPATION (W) **OBP - PM6**

MODE	AVERAGE	MIN	MAX
OFF	<i>NA</i>	<i>NA</i>	<i>NA</i>
STAND-BY	<i>NA</i>	<i>NA</i>	<i>NA</i>
OPERATING	<i>NA</i>	<i>NA</i>	<i>NA</i>

SUBSYSTEM:

UNIT CODE: 1.1/1.2

MECHANICAL INTERFACE CONTROL DRAWING OBP - PM6

Change control sheet

Drawing Number

Issue	Date	Change
A		

SUBSYSTEM: **OBP - PM6**

UNIT CODE: 1.1/1.2

MECHANICAL INTERFACE CONTROL DRAWING OBP - PM6Drawing gives details of the *optical bench panel* to mirror mechanical interface.

3.1.4 OBP - PM7

INTERFACE DATA SHEET

SUBSYSTEM: **OBP - PM7**

UNIT CODE: 1.1/1.2

UNIT DESIGNATION

TOTAL NUMBER: 1

IN OPERATION:

IN REDUNDANCY: *NA*

MECHANICAL CHARACTERISTICS **OBP - PM7**

DIMENSIONS [mm]: Rectangular L : 118 W : 101 H : 15

MASS (including fasteners) 300 gr + 60 gr contingency

C.G.LOCATION [mm] (wrt reference hole R)

X:

Y:

Z: Uncertainty:

INERTIA (wrt C.G.) [m²kg]:

Ixx:

Iyy:

Izz

Uncertainty:

MATERIAL OF HOUSING: *NA*

THERMAL CHARACTERISTICS **OBP - PM7**

FOOT MATERIAL AND THICKNESS:

Thermal capacity: J/°K

Conductive coupling: W/°K

QUALIFICATION TEMPERATURE LIMIT (°C) **OBP - PM7**

GROUND STORAGE &TRANS		OPERATING MODE		NON OPERATING MODE		START UP
MIN	MAX	MIN	MAX	MIN	MAX	MIN
10	40	-271	40	-271	40	-271

HEAT DISSIPATION (W) **OBP - PM7**

MODE	AVERAGE	MIN	MAX
OFF	<i>NA</i>	<i>NA</i>	<i>NA</i>
STAND-BY	<i>NA</i>	<i>NA</i>	<i>NA</i>
OPERATING	<i>NA</i>	<i>NA</i>	<i>NA</i>

SUBSYSTEM:

UNIT CODE: 1.1/1.2

MECHANICAL INTERFACE CONTROL DRAWING OBP - PM7

Change control sheet

Drawing Number

Issue	Date	Change
A		

SUBSYSTEM: **OBP - PM7**

UNIT CODE: 1.1/1.2

MECHANICAL INTERFACE CONTROL DRAWING OBP - PM7

Drawing gives details of the *optical bench panel* to mirror mechanical interface.

3.1.5 OBP - PM8**INTERFACE DATA SHEET**SUBSYSTEM: **OBP - PM8**

UNIT CODE: 1.1/1.2

UNIT DESIGNATION

TOTAL NUMBER: 1

IN OPERATION:

IN REDUNDANCY: *NA***MECHANICAL CHARACTERISTICS OBP - PM8**

DIMENSIONS [mm]: Circle L : 60 W : 60 H : 7

MASS (including fasteners) 56 gr + 11 gr contingency

C.G.LOCATION [mm] (wrt reference hole R)

X:

Y:

Z: Uncertainty:

INERTIA (wrt C.G.) [m²kg]:

Ixx:

Iyy:

Izz

Uncertainty:

MATERIAL OF HOUSING: *NA***THERMAL CHARACTERISTICS OBP - PM8**

FOOT MATERIAL AND THICKNESS:

Thermal capacity: J/°K

Conductive coupling: W/°K

QUALIFICATION TEMPERATURE LIMIT (°C) OBP - PM8

GROUND STORAGE & TRANS		OPERATING MODE		NON OPERATING MODE		START UP
MIN	MAX	MIN	MAX	MIN	MAX	MIN
10	40	-271	40	-271	40	-271

HEAT DISSIPATION (W) OBP - PM8

MODE	AVERAGE	MIN	MAX
OFF	<i>NA</i>	<i>NA</i>	<i>NA</i>
STAND-BY	<i>NA</i>	<i>NA</i>	<i>NA</i>
OPERATING	<i>NA</i>	<i>NA</i>	<i>NA</i>

SUBSYSTEM:

UNIT CODE: 1.1/1.2

MECHANICAL INTERFACE CONTROL DRAWING OBP - PM8

Change control sheet

Drawing Number

Issue	Date	Change
A		

SUBSYSTEM: **OBP - PM8**

UNIT CODE: 1.1/1.2

MECHANICAL INTERFACE CONTROL DRAWING OBP - PM8

Drawing gives details of the *optical bench panel* to mirror mechanical interface.

3.1.6 PDBX-PM9

INTERFACE DATA SHEET

SUBSYSTEM: **PDBX-PM9**

UNIT CODE: 1.1/1.2

UNIT DESIGNATION

TOTAL NUMBER: 1

IN OPERATION:

IN REDUNDANCY: *NA*

MECHANICAL CHARACTERISTICS **PDBX-PM9**

DIMENSIONS [mm]: Circle L : 112 W : 112 H : 15

MASS (including fasteners) 223 gr + 45 gr contingency

C.G.LOCATION [mm] (wrt reference hole R)

X:

Y:

Z: Uncertainty:

INERTIA (wrt C.G.) [m²kg]:

Ixx:

Iyy:

Izz

Uncertainty:

MATERIAL OF HOUSING: *NA*

THERMAL CHARACTERISTICS **PDBX-PM9**

FOOT MATERIAL AND THICKNESS:

Thermal capacity: J/°K

Conductive coupling: W/°K

QUALIFICATION TEMPERATURE LIMIT (°C) **PDBX-PM9**

GROUND STORAGE & TRANS		OPERATING MODE		NON OPERATING MODE		START UP
MIN	MAX	MIN	MAX	MIN	MAX	MIN
10	40	-271	40	-271	40	-271

HEAT DISSIPATION (W) **PDBX-PM9**

MODE	AVERAGE	MIN	MAX
OFF	<i>NA</i>	<i>NA</i>	<i>NA</i>
STAND-BY	<i>NA</i>	<i>NA</i>	<i>NA</i>
OPERATING	<i>NA</i>	<i>NA</i>	<i>NA</i>

SUBSYSTEM:

UNIT CODE: 1.1/1.2

MECHANICAL INTERFACE CONTROL DRAWING PDBX-PM9

Change control sheet

Drawing Number

Issue	Date	Change
A		

SUBSYSTEM: **PDBX-PM9**

UNIT CODE: 1.1/1.2

MECHANICAL INTERFACE CONTROL DRAWING PDBX-PM9

Drawing gives details of the *optical bench panel* to mirror mechanical interface.

3.1.7 PDBX - PM10

INTERFACE DATA SHEET

SUBSYSTEM: **OBP – PM10**

UNIT CODE: 1.1/1.2

UNIT DESIGNATION

TOTAL NUMBER: 1

IN OPERATION:

IN REDUNDANCY: *NA*

MECHANICAL CHARACTERISTICS PDBX - PM10

DIMENSIONS [mm]: Rectangular L : 78 W : 40 H : 7

MASS (including fasteners) 65 gr + 13 gr contingency

C.G.LOCATION [mm] (wrt reference hole R)

X:

Y:

Z: Uncertainty:

INERTIA (wrt C.G.) [m²kg]:

Ixx:

Iyy:

Izz

Uncertainty:

MATERIAL OF HOUSING: *NA*

THERMAL CHARACTERISTICS PDBX - PM10

FOOT MATERIAL AND THICKNESS:

Thermal capacity: J/°K

Conductive coupling: W/°K

QUALIFICATION TEMPERATURE LIMIT (°C) PDBX - PM10

GROUND STORAGE & TRANS		OPERATING MODE		NON OPERATING MODE		START UP
MIN	MAX	MIN	MAX	MIN	MAX	MIN
10	40	-271	40	-271	40	-271

HEAT DISSIPATION (W) PDBX - PM10

MODE	AVERAGE	MIN	MAX
OFF	<i>NA</i>	<i>NA</i>	<i>NA</i>
STAND-BY	<i>NA</i>	<i>NA</i>	<i>NA</i>
OPERATING	<i>NA</i>	<i>NA</i>	<i>NA</i>

SUBSYSTEM:

UNIT CODE: 1.1/1.2

MECHANICAL INTERFACE CONTROL DRAWING PDBX - PM10

Change control sheet

Drawing Number

Issue	Date	Change
A		

SUBSYSTEM: **OBP - CIPM**

UNIT CODE: 1.1/1.2

MECHANICAL INTERFACE CONTROL DRAWING PDBX - PM10

Drawing gives details of the *optical bench panel* to mirror mechanical interface.

3.1.8 PDBX - PM11

INTERFACE DATA SHEET

SUBSYSTEM: **PDBX - PM11**

UNIT CODE: 1.1/1.2

UNIT DESIGNATION

TOTAL NUMBER: 1

IN OPERATION:

IN REDUNDANCY: *NA*

MECHANICAL CHARACTERISTICS **PDBX - PM11**

DIMENSIONS [mm]: Rectangular L : 56 W : 53 H : 7

MASS (including fasteners) 60 gr + 12 gr contingency

C.G.LOCATION [mm] (wrt reference hole R)

X:

Y:

Z: Uncertainty:

INERTIA (wrt C.G.) [m²kg]:

Ixx:

Iyy:

Izz

Uncertainty:

MATERIAL OF HOUSING: *NA*

THERMAL CHARACTERISTICS **PDBX - PM11**

FOOT MATERIAL AND THICKNESS:

Thermal capacity: J/°K

Conductive coupling: W/°K

QUALIFICATION TEMPERATURE LIMIT (°C) **PDBX - PM11**

GROUND STORAGE & TRANS		OPERATING MODE		NON OPERATING MODE		START UP
MIN	MAX	MIN	MAX	MIN	MAX	MIN
10	40	-271	40	-271	40	-271

HEAT DISSIPATION (W) **PDBX - PM11**

MODE	AVERAGE	MIN	MAX
OFF	<i>NA</i>	<i>NA</i>	<i>NA</i>
STAND-BY	<i>NA</i>	<i>NA</i>	<i>NA</i>
OPERATING	<i>NA</i>	<i>NA</i>	<i>NA</i>

SUBSYSTEM:

UNIT CODE: 1.1/1.2

MECHANICAL INTERFACE CONTROL DRAWING PDBX - PM11

Change control sheet

Drawing Number

Issue	Date	Change
A		

SUBSYSTEM: **PDBX - PM11**

UNIT CODE: 1.1/1.2

MECHANICAL INTERFACE CONTROL DRAWING PDBX - PM11

Drawing gives details of the *optical bench panel* to mirror mechanical interface.

3.1.9 OBP – SM6

INTERFACE DATA SHEET

SUBSYSTEM: **OBP - SM6**

UNIT CODE: 1.1/1.2

UNIT DESIGNATION

TOTAL NUMBER: 1

IN OPERATION:

IN REDUNDANCY: *NA*

MECHANICAL CHARACTERISTICS **OBP - SM6**

DIMENSIONS [mm]: Rectangular L : 51 W : 27 H : 7

MASS (including fasteners) 29 gr + 6 gr contingency

C.G.LOCATION [mm] (wrt reference hole R)

X:

Y:

Z: Uncertainty:

INERTIA (wrt C.G.) [m²kg]:

Ixx:

Iyy:

Izz

Uncertainty:

MATERIAL OF HOUSING: *NA*

THERMAL CHARACTERISTICS **OBP - SM6**

FOOT MATERIAL AND THICKNESS:

Thermal capacity: J/°K

Conductive coupling: W/°K

QUALIFICATION TEMPERATURE LIMIT (°C) **OBP - SM6**

GROUND STORAGE & TRANS		OPERATING MODE		NON OPERATING MODE		START UP
MIN	MAX	MIN	MAX	MIN	MAX	MIN
10	40	-271	40	-271	40	-271

HEAT DISSIPATION (W) **OBP - SM6**

MODE	AVERAGE	MIN	MAX
OFF	<i>NA</i>	<i>NA</i>	<i>NA</i>
STAND-BY	<i>NA</i>	<i>NA</i>	<i>NA</i>
OPERATING	<i>NA</i>	<i>NA</i>	<i>NA</i>

SUBSYSTEM:

UNIT CODE: 1.1/1.2

MECHANICAL INTERFACE CONTROL DRAWING OBP - SM6

Change control sheet

Drawing Number

Issue	Date	Change
A		

SUBSYSTEM: **OBP - SM6-A/B**

UNIT CODE: 1.1/1.2

MECHANICAL INTERFACE CONTROL DRAWING OBP - SM6Drawing gives details of the *optical bench panel* to mirror mechanical interface.

3.1.10 OBP – SM7**INTERFACE DATA SHEET**SUBSYSTEM: **OBP - SM7**

UNIT CODE: 1.1/1.2

UNIT DESIGNATION

TOTAL NUMBER: 1

IN OPERATION:

IN REDUNDANCY: *NA***MECHANICAL CHARACTERISTICS OBP - SM7**

DIMENSIONS [mm]: Rectangular L : 40 W : 57 H : 7

MASS (including fasteners) 44 gr + 9 gr contingency

C.G.LOCATION [mm] (wrt reference hole R)

X:

Y:

Z: Uncertainty:

INERTIA (wrt C.G.) [m²kg]:

Ixx:

Iyy:

Izz

Uncertainty:

MATERIAL OF HOUSING: *NA***THERMAL CHARACTERISTICS OBP - SM7**

FOOT MATERIAL AND THICKNESS:

Thermal capacity: J/°K

Conductive coupling: W/°K

QUALIFICATION TEMPERATURE LIMIT (°C) OBP - SM7

GROUND STORAGE &TRANS		OPERATING MODE		NON OPERATING MODE		START UP
MIN	MAX	MIN	MAX	MIN	MAX	MIN
10	40	-271	40	-271	40	-271

HEAT DISSIPATION (W) OBP - SM7

MODE	AVERAGE	MIN	MAX
OFF	<i>NA</i>	<i>NA</i>	<i>NA</i>
STAND-BY	<i>NA</i>	<i>NA</i>	<i>NA</i>
OPERATING	<i>NA</i>	<i>NA</i>	<i>NA</i>

SUBSYSTEM:

UNIT CODE: 1.1/1.2

MECHANICAL INTERFACE CONTROL DRAWING OBP - SM7

Change control sheet

Drawing Number

Issue	Date	Change
A		

SUBSYSTEM: **OBP – SM7**

UNIT CODE: 1.1/1.2

MECHANICAL INTERFACE CONTROL DRAWING OBP - SM7Drawing gives details of the *optical bench panel* to mirror mechanical interface.

3.1.11 OBP – SM8 (A and B)**INTERFACE DATA SHEET**SUBSYSTEM: **OBP - SM8**

UNIT CODE: 1.1/1.2

UNIT DESIGNATION

TOTAL NUMBER: 2

IN OPERATION:

IN REDUNDANCY: *NA***MECHANICAL CHARACTERISTICS OBP - SM8**

DIMENSIONS [mm]: Circle L : 60 W : 60 H 7:

MASS (including fasteners) 56 gr + 11 gr contingency

C.G.LOCATION [mm] (wrt reference hole R)

X:

Y:

Z: Uncertainty:

INERTIA (wrt C.G.) [m²kg]:

Ixx:

Iyy:

Izz

Uncertainty:

MATERIAL OF HOUSING: *NA***THERMAL CHARACTERISTICS OBP - SM8**

FOOT MATERIAL AND THICKNESS:

Thermal capacity: J/°K

Conductive coupling: W/°K

QUALIFICATION TEMPERATURE LIMIT (°C) OBP - SM8

GROUND STORAGE &TRANS		OPERATING MODE		NON OPERATING MODE		START UP
MIN	MAX	MIN	MAX	MIN	MAX	MIN
10	40	-271	40	-271	40	-271

HEAT DISSIPATION (W) OBP - SM8

MODE	AVERAGE	MIN	MAX
OFF	<i>NA</i>	<i>NA</i>	<i>NA</i>
STAND-BY	<i>NA</i>	<i>NA</i>	<i>NA</i>
OPERATING	<i>NA</i>	<i>NA</i>	<i>NA</i>

SUBSYSTEM:

UNIT CODE: 1.1/1.2

MECHANICAL INTERFACE CONTROL DRAWING OBP - SM8

Change control sheet

Drawing Number

Issue	Date	Change
A		

SUBSYSTEM: **OBP - SM8**

UNIT CODE: 1.1/1.2

MECHANICAL INTERFACE CONTROL DRAWING OBP - SM8

Drawing gives details of the *optical bench panel* to mirror mechanical interface.

SUBSYSTEM:

UNIT CODE: 1.1/1.2

MECHANICAL INTERFACE CONTROL DRAWING OBP-SM9

Change control sheet

Drawing Number

Issue	Date	Change
A		

SUBSYSTEM: **OBP - SM8**

UNIT CODE: 1.1/1.2

MECHANICAL INTERFACE CONTROL DRAWING OBP-SM9Drawing gives details of the *optical bench panel* to mirror mechanical interface.

3.1.13 OBP-SM10 (A and B)

INTERFACE DATA SHEET

SUBSYSTEM: **OBP-SM10** UNIT CODE: 1.1/1.2

UNIT DESIGNATION
 TOTAL NUMBER: 2 IN OPERATION: IN REDUNDANCY: *NA*

MECHANICAL CHARACTERISTICS OBP-SM10
 DIMENSIONS [mm]: Circle L : 60 W : 60 H : 7
 MASS (including fasteners) 56 gr + 11 gr contingency
 C.G.LOCATION [mm] (wrt reference hole R)
 X: Y: Z: Uncertainty:
 INERTIA (wrt C.G.) [m²kg]: Ixx: Iyy: Izz Uncertainty:
 MATERIAL OF HOUSING: *NA*

THERMAL CHARACTERISTICS OBP-SM10
 FOOT MATERIAL AND THICKNESS:
 Thermal capacity: J/°K Conductive coupling: W/°K

QUALIFICATION TEMPERATURE LIMIT (°C) OBP-SM10

GROUND STORAGE &TRANS		OPERATING MODE		NON OPERATING MODE		START UP
MIN	MAX	MIN	MAX	MIN	MAX	MIN
10	40	-271	40	-271	40	-271

HEAT DISSIPATION (W) OBP-SM10

MODE	AVERAGE	MIN	MAX
OFF	<i>NA</i>	<i>NA</i>	<i>NA</i>
STAND-BY	<i>NA</i>	<i>NA</i>	<i>NA</i>
OPERATING	<i>NA</i>	<i>NA</i>	<i>NA</i>

SUBSYSTEM:

UNIT CODE: 1.1/1.2

MECHANICAL INTERFACE CONTROL DRAWING OBP-SM10

Change control sheet

Drawing Number

Issue	Date	Change
A		

SUBSYSTEM: **OBP - SM8**

UNIT CODE: 1.1/1.2

MECHANICAL INTERFACE CONTROL DRAWING OBP-SM10Drawing gives details of the *optical bench panel* to mirror mechanical interface.

3.1.14 OBP-SM11 (A and B)

INTERFACE DATA SHEET

SUBSYSTEM: **OBP-SM11**

UNIT CODE: 1.1/1.2

UNIT DESIGNATION

TOTAL NUMBER: 2

IN OPERATION:

IN REDUNDANCY: *NA*

MECHANICAL CHARACTERISTICS **OBP-SM11**

DIMENSIONS [mm]: Circle L : 74 W : 74 H : 7

MASS (including fasteners) 97 gr + 19 gr contingency

C.G.LOCATION [mm] (wrt reference hole R)

X:

Y:

Z: Uncertainty:

INERTIA (wrt C.G.) [m²kg]:

Ixx:

Iyy:

Izz

Uncertainty:

MATERIAL OF HOUSING: *NA*

THERMAL CHARACTERISTICS **OBP-SM11**

FOOT MATERIAL AND THICKNESS:

Thermal capacity: J/°K

Conductive coupling: W/°K

QUALIFICATION TEMPERATURE LIMIT (°C) **OBP-SM11**

GROUND STORAGE &TRANS		OPERATING MODE		NON OPERATING MODE		START UP
MIN	MAX	MIN	MAX	MIN	MAX	MIN
10	40	-271	40	-271	40	-271

HEAT DISSIPATION (W) **OBP-SM11**

MODE	AVERAGE	MIN	MAX
OFF	<i>NA</i>	<i>NA</i>	<i>NA</i>
STAND-BY	<i>NA</i>	<i>NA</i>	<i>NA</i>
OPERATING	<i>NA</i>	<i>NA</i>	<i>NA</i>

SUBSYSTEM:

UNIT CODE: 1.1/1.2

MECHANICAL INTERFACE CONTROL DRAWING OBP-SM11

Change control sheet

Drawing Number

Issue	Date	Change
A		

SUBSYSTEM: **OBP – SM11**

UNIT CODE: 1.1/1.2

MECHANICAL INTERFACE CONTROL DRAWING OBP-SM11Drawing gives details of the *optical bench panel* to mirror mechanical interface.

3.1.15 OBP-SM12 (A and B)**INTERFACE DATA SHEET**SUBSYSTEM: **OBP-SM12**

UNIT CODE: 1.1/1.2

UNIT DESIGNATION

TOTAL NUMBER: 2

IN OPERATION:

IN REDUNDANCY: *NA***MECHANICAL CHARACTERISTICS OBP-SM12**

DIMENSIONS [mm]: Ellipse L : 21 W : 16 H : 7

MASS (including fasteners) 25 gr + 5 gr contingency

C.G.LOCATION [mm] (wrt reference hole R)

X:

Y:

Z: Uncertainty:

INERTIA (wrt C.G.) [m²kg]:

Ixx:

Iyy:

Izz

Uncertainty:

MATERIAL OF HOUSING: *NA***THERMAL CHARACTERISTICS OBP-SM12**

FOOT MATERIAL AND THICKNESS:

Thermal capacity: J/°K

Conductive coupling: W/°K

QUALIFICATION TEMPERATURE LIMIT (°C) OBP-SM12

GROUND STORAGE & TRANS		OPERATING MODE		NON OPERATING MODE		START UP
MIN	MAX	MIN	MAX	MIN	MAX	MIN
10	40	-271	40	-271	40	-271

HEAT DISSIPATION (W) OBP-SM12

MODE	AVERAGE	MIN	MAX
OFF	<i>NA</i>	<i>NA</i>	<i>NA</i>
STAND-BY	<i>NA</i>	<i>NA</i>	<i>NA</i>
OPERATING	<i>NA</i>	<i>NA</i>	<i>NA</i>

SUBSYSTEM:

UNIT CODE: 1.1/1.2

MECHANICAL INTERFACE CONTROL DRAWING OBP-SM12

Change control sheet

Drawing Number

Issue	Date	Change
A		

SUBSYSTEM: **OBP – SM12**

UNIT CODE: 1.1/1.2

MECHANICAL INTERFACE CONTROL DRAWING OBP-SM12Drawing gives details of the *optical bench panel* to mirror mechanical interface.

3.2 Harness interface data sheets (NA)

NA

3.3 Optical interface data sheets (NA)

4. ELECTRICAL INTERFACES.

4.1 Electrical interface definition and characterisation (NA)

NA

4.2 Electrical interface data sheets

GROUNDING SCHEME

The mounting surface of the mirror ensures enough electrical contact to make separate grounding unnecessary.

4.3 Pin allocation for interface connectors (cables)

NA

5. DATA INTERFACES

NA