



# **FLORIS Calibration Unit**

## **Export Regulation**

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## **Approval Sheet**

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## Distribution List

Internal reference: ALM-PRO-3883

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A = Approval  
C = Copy  
I = Information  
O = Original  
R = Review

## Change Record

Modification	Page	Iss.	Rev.	Date
First Issue	all	1	0	31.08.2018
Updated following PDR RID TC-08 to change Positronic connectors and replace them by C&K ones.	10	2	0	17.01.2019

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## **1 Introduction**

### **1.1 Project Overview**

The Earth Explorer - Fluorescence Explorer (FLEX) mission will map vegetation fluorescence to quantify photosynthetic activity.

The conversion of atmospheric carbon dioxide and sunlight into energy-rich carbohydrates through photosynthesis is one of the most fundamental processes on Earth – and one on which we all depend.

Information from FLEX will improve our understanding of the way carbon moves between plants and the atmosphere and how photosynthesis affects the carbon and water cycles.

In addition, information from FLEX will lead to better insight into plant health and stress. This is of particular relevance since the growing global population is placing increasing demands on the production of food and animal feed. At the moment, photosynthetic activity cannot be measured from space, but FLEX's novel sensor will observe this faint glow.

The FLEX satellite will orbit in tandem with one of the Copernicus Sentinel-3 satellites, taking advantage of its optical and thermal sensors to provide an integrated package of measurements.

Mission objectives can therefore summarized as follows:

- To assess the quality of fluorescence-derived photosynthesis data against classical optically-based methods (i.e. from fraction of absorbed photosynthetically active radiation times Light Use Efficiency).
- To address in more detail temporal and spatial scaling issues (from towers to satellite footprints).
- To identify and characterize the effects of different types of stress on fluorescence and photosynthesis (especially drought and freezing air temperatures).
- To indicate potential applications of the novel fluorescence observations.

Mission orbit:

- Orbit: Sun-synchronous
- Measurement altitude: 815 km

The FLEX Space Segment consists of a single satellite carrying the FLuORescence Imaging Spectrometer (FLORIS) push-broom instrument. This high-resolution imaging spectrometer will acquire data in the 500– 780 nm spectral range, with a sampling of 0.1 nm in the oxygen bands (759–769 nm and 686–697 nm) and 0.5–2.0 nm in the red edge, chlorophyll absorption and Photochemical Reflectance Index bands.

The monthly global maps will have an on-ground spatial resolution of 300 × 300 m<sup>2</sup> with a swath width of 150 km.

## **1.2      Scope of the Document**

This document is the Export regulation item list of the project.

## **2 Applicable and Reference Documents**

### **2.1 Applicable Documents**

<b>Ref.</b>	<b>Title</b>	<b>Reference</b>	<b>Iss.</b>
AD 105	Cover Letter	FLX-LET-FNM-INS-0003	3
AD 106	Special Condition of Tender	FLX-OF-FNM-INS-0001	4
AD 100	Contract for FLEX Unit/sub-system	Draft Contract	
AD 101	Generic Statement of Work for FLEX Unit/sub-system	FLX-SOW-FNM-INS-0001	2
AD 102	Specific Statement of Work	FLX-SOW-FNM-INS-0005	2
AD 103	Floris Calibration Unit User Requirement Specification	FLX-RS-FNM-INS-0006	5
AD 201	FLORIS Radiation Environment RS	FLX-RS-FNM-INS-0016	4
AD 202	FLEX FEMM Requirements Specification	FLX-RS-FNM-INS-0023	1
AD 203	FLEX GMM &TMM Requirements Specification	FLX-RS-FNM-INS-0024	1
AD 204	FLEX CAD Model Requirements Specification	FLX-RS-FNM-INS-0025	1
AD 205	FLEX Cleanliness Requirements for Sub-contractors	FLX-RS-FNM-INS-0028	3
AD 206	FLEX Instrument General Design Interface Requirements	FLX-RS-FNM-INS-0029	3
AD 208	FLEX PA Requirements for Subcontractors	FLX-RS-FNM-INS-0021	2
AD 209	FLEX PA SW Requirements for Subcontractors	FLX-RS-FNM-INS-0022	1
AD 210	FLEX Configuration Control and Documentation Management Plan	FLX-PL-FNM-INS-0001	3
AD 211	FLEX List of Acronyms and Abbreviations	FLX-LI-FNM-INS-0003	2



## 2.2 Reference Documents

Ref.	Title	Reference	Iss.	Date
[RD01]	FLORIS Calibration Unit Almatech Proposal	17-10S-225	1.0	15.06.2017
[RD02]	Leonardo Clarification Letter	FLX-LET-FNM-INS-0009	--	18.10.2017
[RD03]	Floris CU Negotiation Meeting #1 between Leonardo and Almatech	FLX-MIN-FNM-INS-0041		15.11.2017

## 2.3 Acronyms and Abbreviations

The abbreviations and acronyms used in this document are in accordance with [AD 211].

### 3 Export regulation List

Item	description	type	Export control
<b>Harmonic drive</b>	harmonic drive gear	CPL-17-2A	No
<b>Bearing assembly</b>	super duplex bearing with integrated preload device	super duplex bearing ADR WKSP20018 HTA4DOK6819	No
<b>Drive motor</b>	phytron stepper motor, space qualified	physpace 42-2	
<b>Sun Diffuser</b>	Spectralon CSTM-FLEX-SG Manufacturer: Labsphere	Space Grade Sphere and Spectralon part-#: CA-14020-MB0	No
<b>Black Target</b>	aluminum, Black anodizing		No
<b>Position sensors</b>	Hall Effect Sensor, Uni-Polar, non-latching, space grade Manufacturer: OPTEK	OMH090S	EAR99
<b>Microswitch</b>	Baumer Spacegrade switch by RUAG	MY-COM B75/80	No
<b>Thermistors</b>	Thermal sensor	Pt1000	No
<b>Mirror cube</b>	Removable aluminium cube. 1x1x1in Manufacturer: Kugler-Precision TBC	1-9-182-00-001-k.1	No
<b>Fight connectors</b>	C&K	DAM15P, DBM44S with savers & caps	No
<b>Wiring</b>	wiring for CU & TVAC harness	Axon	No
<b>Screws (flight)</b>	Titanium fastners and washers	different types	No
<b>Helicoils</b>		different types	No