



Calibration Laboratories Located in:
Winter Park, Florida, USA
Ostfildern, Germany
Shanghai, China

Certificate of Radiometric Calibration

Certificate Number: 33494

Date: 10/11/2022

Calibration Performed By:

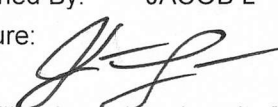
OOI WP-CAL LAB

For:

OPTOSIRIUS CORPORATION
MY BILD 3F1-2-14 AKABANE-NISHI
TOKYO 115-0055 JAPAN

Calibrated Equipment Information

Description: SPECTROMETER
Model Number: USB2000+
Serial Number: USB2+U06381
Nomenclature: SPECTROMETER
Temp. / RH: 72 F / 56 % RH
Cal Date [MM/DD/YYYY]: 10/11/2022

Manufacturer: OCEAN OPTICS INC.
Performed By: JACOB L
Signature: 

The calibration values in units [uJoule/counts] are stored on USB provided with this certificate. As Found and As Left data are the same unless indicated otherwise in Calibration Notes

Calibration Notes

Calibration is void if any of the above attachments are removed.

Standards Used To Calibrate Equipment

ID	Model Number	Description	Last Cal.	Cal. Due Date
19 228320010E	LSN121 / 120.26A	POWER SUPPLY, DEUTERIUM	1/11/2022	1/11/2023
20604	CS-10	CS-SERIES PRECISION CURRENT SHUNTS, RATE	12/6/2021	12/6/2022
F-1401	OL FEL-C	STANDARD OF SPECTRAL IRRADIANCE, 1000W G	7/8/2021	
L47043	LSK211	STANDARD LAMP, L.O.T. ORIEL 30W DEUTERIUM		

Procedures Used In This Event

Procedure	Title	Revision	Revision Date
MET.009	CAL OF SPECTROMETERS	11	12/13/2021

Ocean Insight Inc. is an ISO9001:2015 certified company. All radiometric calibrations were performed in compliance with National Institute of Standards & Technology practices recommended in NIST Handbook 150-2E, Technical Guide for Optical Radiation Measurements. All standards used are traceable to the International System of Units (SI) through National Institute of Standards & Technology; or an equivalent national organization, if the standard was calibrated outside the US; or have been derived from accepted values of naturally occurring physical constants. Ocean Insight Inc. responsibilities shall in no event, nor for cause whatsoever exceed the cost of the service represented. This report applies only to the item(s) identified above, at the time of calibration. This report shall not be reproduced, except in full, without written permission

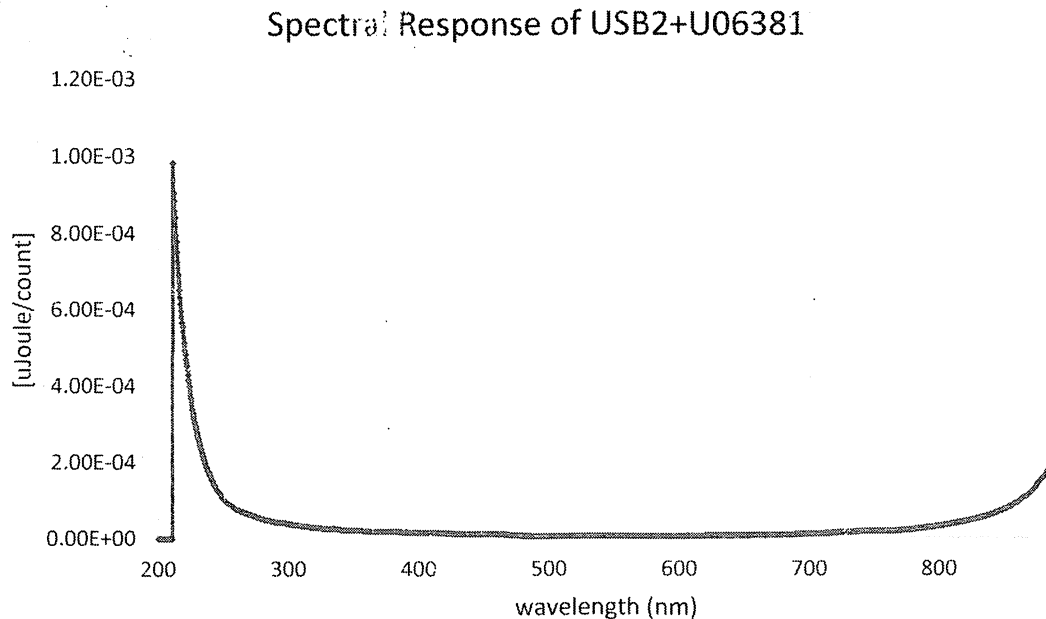
USB2+U06381 Calibration Results

The figure below provides the spectral response of the spectrometer s/n USB2+U06381 from the wavelength range 200 nm to 888 nm. The calibrated system configuration that includes the spectrometer and front-end optics, is as described at the page 1 of the report. The calibration was performed by positioning the front-end optics at the specified distance from the standard spectral irradiance source, s/n: F1401-06(PTB). Details of mounting, orientation and alignment performed during the calibration are described in the calibration procedures, the document no. of which is listed also at the page 1 of the report.

Calibration of the standard source, s/n: F1401-06(PTB) was traceable to FEL 1000-watt Standard of Spectral Irradiance, s/n F-1583 and F-1585, which were traceable to SI units through NIST certified FEL 1000-watt Standard of Spectral Irradiance, s/n: F-708 and F-709, at a range of 250 nm to 2400 nm. F1401-06(PTB) has operated for 47.7 hours since last calibration.

Two software packages utilized in the acquisition of spectral data and the calculation of spectral responsivity, are

- Acquisition software: SPC v03c1
- Processing software: SS v1.68



USB2+U06381 Calibration Uncertainty

The uncertainty calculation was performed in accordance to the following international standards which are describing how the uncertainty should be derived:

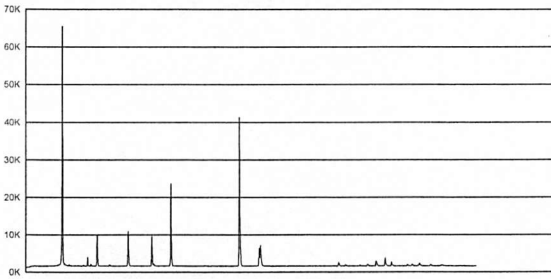
- JCGM100:2008: GUM 1995 with minor corrections (see also ISO/IEC Guide 98-3)

Wavelength (nm)	Spectral Responsivity ($\mu\text{Joule} / \text{cnt}$)	Expanded Uncertainty (%)
210	1.1447E-03	16
250	1.0731E-04	11
300	3.8907E-05	10
350	2.1560E-05	12
400	1.5944E-05	8.0
450	1.2336E-05	5.8
500	5.6092E-06	4.6
550	5.0560E-06	4.0
600	6.0780E-06	3.4
650	7.7078E-06	3.0
700	1.1493E-05	2.8
750	1.9309E-05	2.8
800	3.1907E-05	2.8
850	7.4932E-05	2.9



Wavelength Calibration Data Sheet

Test Spectrum



Built for:
Order Number: 1432419
Model: USB2000+
Grating: GRATING_#1 - 600 Lines Blazed at 300 nm
Bandwidth: 200 - 888 nm
Options: DET2B-200-850 Detector, NoneLens, SLIT-25 Slit,

Serial Number: USB2+U06381

Table with 4 columns: lambda, Pixel #, Predicted lambda, and Delta lambda. It lists 30 calibration peaks with their corresponding pixel numbers and wavelength errors.

This is a sample of calibration peaks used as there were more than can be shown on this page

Calibration Coefficients

First Coefficient: 0.3801790178
Second Coefficient: -1.34529e-005
Third Coefficient: -2.79309e-009
Intercept: 190.08195496
Regression Fit: 0.9999990463

Stray Light Measurements (AU)

Holmium Oxide (444nm): 1.68
Yellow Dye: 2.18
Blue Dye: 3.00
Molybdate: 2.62
OG550 Filter: 2.34
RG850 Filter: 3.44
FG3 Filter: 1.30

Travis Bolt

Linearity Test

Serial Number **USB2+U06381**

Tech Rosa.Nunez

Intercept 0.836727
Coefficient 1 7.67874e-006
Coefficient 2 4.44537e-011
Coefficient 3 -2.01421e-014
Coefficient 4 1.04914e-018
Coefficient 5 -2.62567e-023
Coefficient 6 3.2656e-028
Coefficient 7 -1.62264e-033

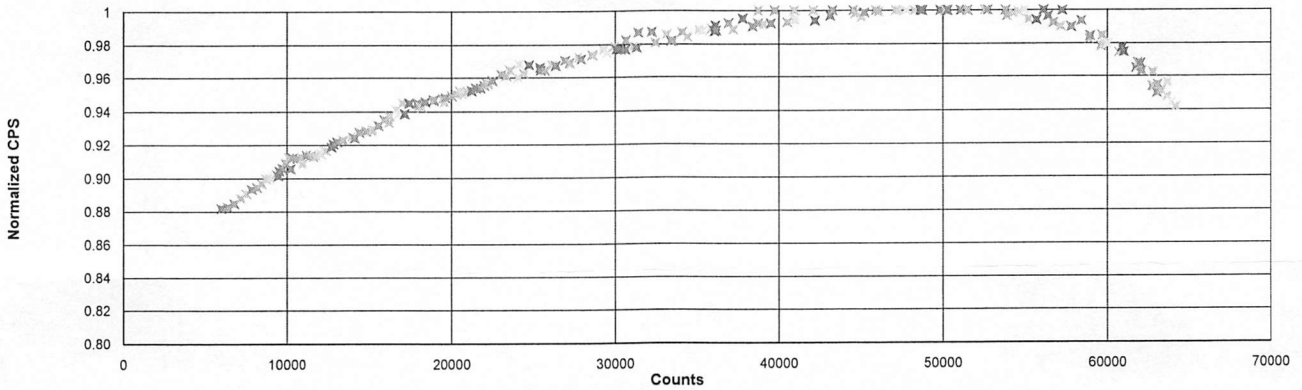
Linearity: **99.75506**

Tested 10/10/22

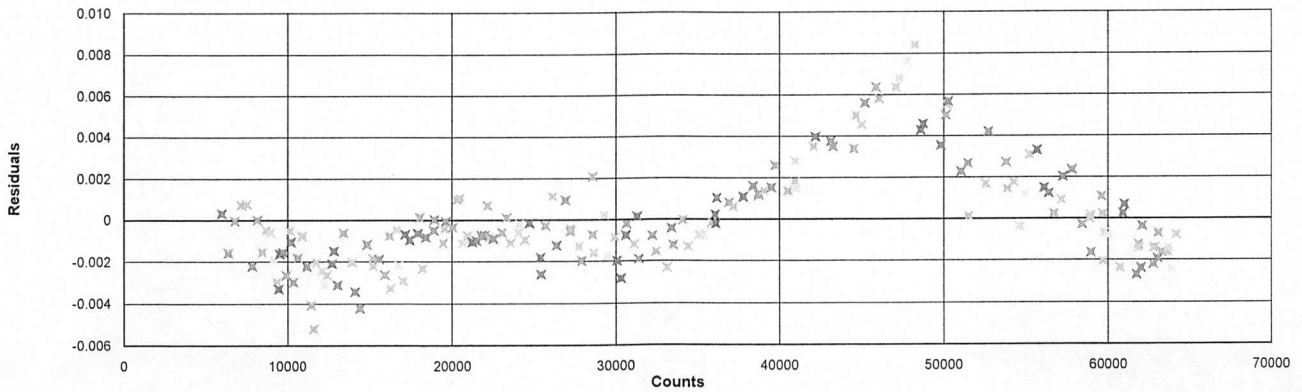
Test # 314,258.00



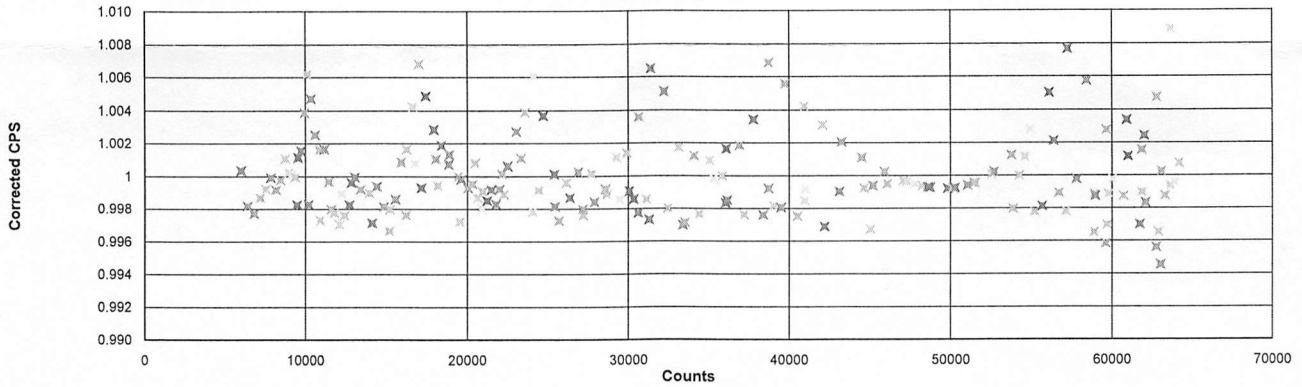
Normalized Output



Residuals



Linearized Output



Max 1.00886900

Min 0.99454250



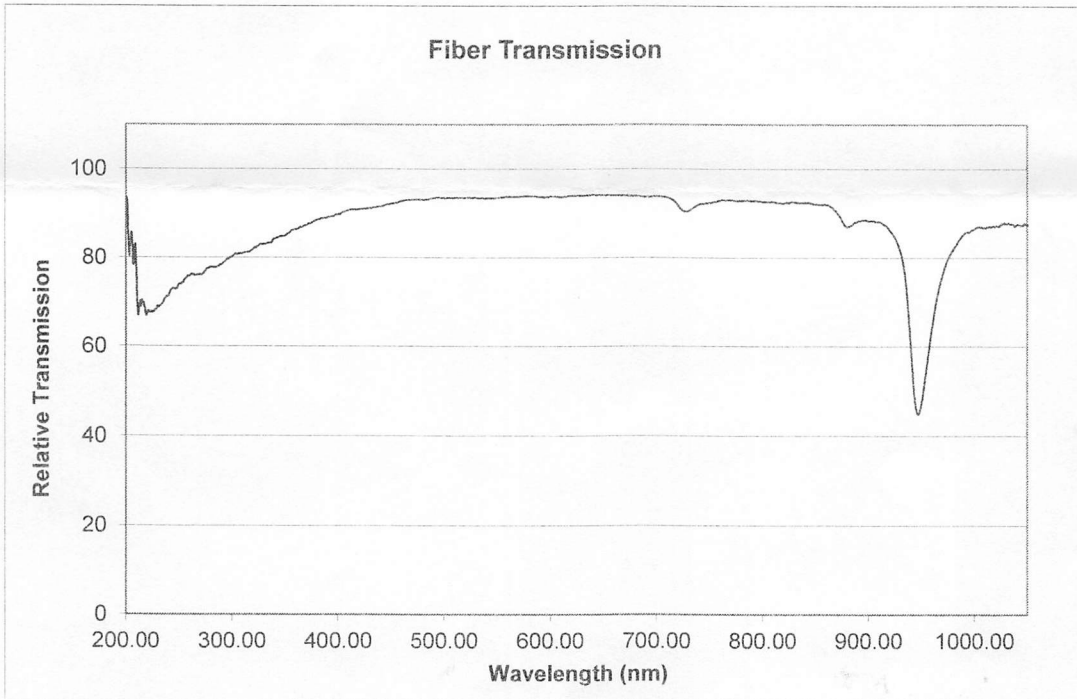
Part #: P600-2-SR
Date: June 13, 2022
Assembly #: OOS-009494-12
Connector 1 #: SMA-905
Connector 2 #: SMA-905
Sales Order #: STOCK

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Dunedin, FL 34698

Ask about our custom line of Optical Probes and Assemblies.

Fiber Type: SR
Fiber Core Diameter:(um) 600um

Jacketing: Zip Tube
Length (meters): 2.00



Inspection Checklist X
Polish: X
Concentricity: X
Cap Placement: X
Labeling: X
Color Coding: X
Ferrule length: X

Inspected by: Lu qiaomei
Qiaomei Lu

PRODUCT OF OCEAN INSIGHT SHANGHAI PRC



RoHS - Compliant