



Biospherical Instruments Inc.

System Calibration Certificate

THE INSTRUMENTS REFERENCED BELOW WERE FACTORY TESTED AND CALIBRATED BY

BIOSPHERICAL INSTRUMENTS INC.

5340 Riley Street

San Diego, California 92110 USA

Instrument: C-OPS S/N 000412

Pressure Testing:

The housing for this instrument has been tested to 125 meters.

NIST-traceable Optical Calibrations:

The instrument was calibrated using a 1000 Watt FEL lamp with serial number V-031 . This lamp was calibrated on 3/3/15 against the NIST Standard of Spectral Irradiance F-616 . Traceability of lamps, the calibration set up (e.g., shunts, voltmeters, power supplies) and calibration procedures follow recommendations published by the National Bureau of Standards (US), specifically “NBS Special Publication 250-20 Spectral Irradiance Calibrations (1987)” and “NBS Publication 594–13 Optical Radiation Measurements: The 1973 Scale of Spectral Irradiance (1977).”

All calibration information provided on the following pages is a subset of calibration information stored internally in the instrument.



C-OPS

Serial Number: 000412

Date of Certificate 6/26/2015

Optical Channels, Irradiance (EdZ) Calibration

Acquisition Rate	5Hz	Aggregator Vin (Avg)	6.44 V	Date of Calibration	6/25/2015
		Aggregator Iin (Avg)	91.79 mA	Calibration Engineer	TPC
Internal Temperature (Max)	27.079 °C	Aggregator Internal Temperature (Avg)	25.33 °C		
Internal Temperature (Min)	25.798 °C	Aggregator Internal Pressure (Avg)	13.97 psi	Standard of Spectral Irradiance	V-031

Channel	Wavelength (nm)	Tag	Firmware Version	Offset High Gain (mV)	Offset Medium Gain (mV)	Offset Low Gain (mV)	Signal/Noise Ratio	Immersion Coefficient	Responsivity in Water 1	Calibrated Units
EdZ320	320	A	v:2.003 03/04/11 3Gain	-0.064	0.058	0.059	2671.36	0.6371	0.11135	μW/(cm² nm)
EdZ340	340	B	v:2.003 03/04/11 3Gain	-0.225	-0.095	-0.095	2998.00	0.6404	0.08673	μW/(cm² nm)
EdZ380	380	C	v:2.003 03/04/11 3Gain	-0.059	0.056	0.055	2874.60	0.6471	0.03503	μW/(cm² nm)
EdZ395	395	D	v:2.003 03/04/11 3Gain	-0.201	-0.073	-0.074	3552.85	0.6496	0.13185	μW/(cm² nm)
EdZ412	412	E	v:2.003 03/04/11 3Gain	-0.317	-0.190	-0.191	3549.13	0.6525	0.24878	μW/(cm² nm)
EdZ443	443	F	v:2.003 03/04/11 3Gain	-0.042	0.087	0.087	3614.58	0.6576	0.17200	μW/(cm² nm)
EdZ465	465	G	v:2.003 03/04/11 3Gain	0.031	0.136	0.136	3589.65	0.6613	0.16684	μW/(cm² nm)
EdZ490	490	H	v:2.003 03/04/11 3Gain	-0.095	0.039	0.039	3372.27	0.6655	0.44027	μW/(cm² nm)
EdZ510	510	I	v:2.003 03/04/11 3Gain	-0.187	-0.052	-0.053	3327.03	0.6688	0.48225	μW/(cm² nm)
EdZ532	532	J	v:2.003 03/04/11 3Gain	-0.087	0.023	0.023	3215.53	0.6725	0.46939	μW/(cm² nm)
EdZ555	555	K	v:2.003 03/04/11 3Gain	-0.039	0.074	0.074	3567.30	0.6763	0.89856	μW/(cm² nm)
EdZ560	560	L	v:2.003 03/04/11 3Gain	-0.069	0.061	0.062	3605.79	0.6771	0.54908	μW/(cm² nm)
EdZ625	625	M	v:2.003 03/04/11 3Gain	-0.016	0.116	0.116	3766.32	0.6880	1.08268	μW/(cm² nm)
EdZ665	665	N	v:2.003 03/04/11 3Gain	-0.431	-0.281	-0.282	3671.64	0.6946	1.30407	μW/(cm² nm)
EdZ670	670	O	v:2.003 03/04/11 3Gain	-0.138	-0.019	-0.020	4167.43	0.6955	0.51890	μW/(cm² nm)
EdZ683	683	P	v:2.003 03/04/11 3Gain	-0.184	-0.076	-0.077	3798.93	0.6976	1.52401	μW/(cm² nm)
EdZ710	710	Q	v:2.003 03/04/11 3Gain	-0.375	-0.241	-0.241	3729.01	0.7021	1.70908	μW/(cm² nm)
EdZ780	780	R	v:2.003 03/04/11 3Gain	-0.246	-0.136	-0.136	3734.31	0.7138	1.67475	μW/(cm² nm)
EdZPAR	400-700	S	v:2.003 03/04/11 3Gain	0.066	0.210	0.210	3709.94	0.6822	12236.42625	μE/(cm² s)

1: Volts/Calibrated Units



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Optical Channels, Irradiance (EdZ) Calibration

The values listed in the section below are common for all optical microradiometers

Date of Calibration 6/25/2015

Calibration Engineer TPC

Model Number uRv2:3G	Adc Rate Rate_125_Hz	Ranging Mode Auto	Switch Point High 31000
Firmware Version v:2.003 03/04/11 3Gain	Adc Buffer Enabled False	Ranging Delay High 3	Switch Point Low 7782400
	Adc Channel Type Primary Input	Ranging Delay Medium 3	
	Adc Gain Gain_1	Ranging Delay Low 3	

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Angle Channels, Irradiance (EdZ) Calibration

Pitch and roll sensors zeroed according to manufacturer's specifications.

Date of Calibration 6/25/2015

Calibration Engineer TPC

