Biospherical Instruments Inc

CALIBRATION CERTIFICATE

UNDERWATER PAR SENSOR WITH LOG AMPLIFIER

Calibration Date: 06/30/15 **Job No.:** R12303
Model Number: QSP200L
Serial Number: 4516
Operator: TPC
Standard Lamp: V-031(3/3/15)
Operating Voltage Range: 6 to 15 VDC (+)

Note: The QSP200L uses a log amplifier to measure the detector signal current with V = log I (Amps) / IRef
To calculate irradiance, use this formula:

Irradiance = Calibration factor * (10^Light Signal Voltage - 10^Dark Voltage)

With the appropriate (solar corrected) Irradiance Calibration Factor:

Dry Calibration Factor:	**8.71E+12**	**quanta/cm²·sec/"amps"**	**1.45E-05**	**µEinsteins/cm²·sec/"amps"**
Wet Calibration Factor:	**1.54E+13**	**quanta/cm²·sec/"amps"**	**2.55E-05**	**µEinsteins/cm²·sec/"amps"**

Sensor Test Data and Results[4)]

Sensor Supply Current (Dark):	63.0	mA			
Supply Voltage:	6	Volts			
Lamp Integrated PAR Irradiance:	1.05E+16	quanta/cm²·sec	0.01750	µEinsteins/cm²sec	
SC3 Immersion Coefficient:	0.5664	Scalar Correction:	1	PAR Solar Correction:	1.0000

Nominal Filter OD	Calibrated Trans.	Sensor Voltage	Measured Trans.	Measured Signal (Amps)	Estimated Signal (Amps)	Calc. Output (Volts)	Error (Volts)	Error (%)	Test Irrad. (quanta/ cm²·sec)
No Filter	100.00%	3.083	100.00%	1.21E-07	1.21E-07	3.084	0.001	0.0	1.05E+16
0.3	36.10%	2.644	36.28%	4.39E-08	4.37E-08	2.642	-0.002	-0.5	3.82E+15
0.5	27.60%	2.528	27.78%	3.36E-08	3.34E-08	2.526	-0.002	-0.6	2.93E+15
1	9.27%	2.065	9.49%	1.15E-08	1.12E-08	2.055	-0.010	-2.3	1.00E+15
2	1.11%	1.186	1.15%	1.40E-09	1.34E-09	1.172	-0.014	-3.7	1.21E+14
3	0.05%	0.372	0.08%	9.47E-11	6.46E-11	0.313	-0.059	-31.7	8.24E+12

Dark Before: 0.149 Volts
Light - No Filter Hldr.: 3.083 Volts
Dark After - NFH: 0.149 Volts
Average Dark 0.149 Volts

I_{Ref} = 1.00E-10 Amps
I_{Dark} = 1.41E-10 Amps
10^{VDark} = 1.409127 Amps

RG780 **0.171**

Notes:
1. Annual calibration is recommended.
2. The collector should be cleaned frequently with alcohol.
4) This section is for internal use and for more advanced analysis.