Biospherical Instruments Inc

CALIBRATION CERTIFICATE

UNDERWATER PAR SENSOR WITH LOG AMPLIFIER

Calibration Date: 01/17/14 **Job No.:** R11793
Model Number: QSP200L
Serial Number: 4497
Operator: TPC
Standard Lamp: V-032(3/7/12)
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:	**8.72E+12**	**quanta/cm²·sec/"amps"**	**1.45E-05**	**µEinsteins/cm²·sec/"amps"**
Wet Calibration Factor:	**1.54E+13**	**quanta/cm²·sec/"amps"**	**2.56E-05**	**µEinsteins/cm²·sec/"amps"**

Sensor Test Data and Results[4)]

Sensor Supply Current (Dark):	74.2	mA				
Supply Voltage:	6	Volts				
Lamp Integrated PAR Irradiance:	9.26E+15	quanta/cm²·sec	0.01538	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%	3.027	100.00%		1.06E-07	1.06E-07	3.028	0.001	0.0	9.26E+15
0.3	36.10%	2.584	35.94%		3.82E-08	3.84E-08	2.586	0.003	0.5	3.33E+15
0.5	27.60%	2.461	27.08%		2.88E-08	2.94E-08	2.470	0.009	1.9	2.51E+15
1	9.27%	1.999	9.24%		9.84E-09	9.86E-09	2.001	0.002	0.3	8.56E+14
2	1.11%	1.116	1.09%		1.16E-09	1.18E-09	1.124	0.008	2.0	1.01E+14
3	0.05%	0.352	0.07%		7.62E-11	5.68E-11	0.313	-0.039	-25.5	6.64E+12

Dark Before:	0.171	Volts				
Light - No Filter Hldr.:	3.024	Volts	I_{Ref} =	1.00E-10	Amps	
Dark After - NFH:	0.174	Volts	I_{Dark} =	1.49E-10	Amps	RG780 **0.261**
Average Dark	0.173	Volts	10^{VDark} =	1.487647	Amps	

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.