Biospherical Instruments Inc

CALIBRATION CERTIFICATE

UNDERWATER PAR SENSOR WITH LOG AMPLIFIER

Calibration Date: 01/11/16 **Job No.:** R12471
Model Number: QSP200L4S
Serial Number: 4497
Operator: TPC
Standard Lamp: V-032(3/3/15)
Operating Voltage Range: 6 to 15 VDC (+)

Note: The QSP200L4S 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:	**8.83E+12**	**quanta/cm²·sec/"amps"**	**1.47E-05**	**µEinsteins/cm²·sec/"amps"**
Wet Calibration Factor:	**1.56E+13**	**quanta/cm²·sec/"amps"**	**2.59E-05**	**µEinsteins/cm²·sec/"amps"**

Sensor Test Data and Results[4)]

Sensor Supply Current (Dark):	74.4	mA			
Supply Voltage:	6	Volts			
Lamp Integrated PAR Irradiance:	9.28E+15	quanta/cm²·sec	0.01541	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%	3.022	100.00%	1.05E-07	1.05E-07	3.023	0.001	0.0	9.28E+15
0.3	36.10%	2.581	36.13%	3.80E-08	3.80E-08	2.581	0.000	-0.1	3.35E+15
0.5	27.60%	2.467	27.74%	2.92E-08	2.90E-08	2.465	-0.002	-0.5	2.57E+15
1	9.27%	1.996	9.29%	9.77E-09	9.75E-09	1.996	0.000	-0.2	8.62E+14
2	1.11%	1.115	1.10%	1.15E-09	1.17E-09	1.120	0.005	1.2	1.02E+14
3	0.05%	0.354	0.07%	7.56E-11	5.62E-11	0.315	-0.039	-25.7	6.67E+12

Dark Before: 0.178 Volts
Light - No Filter Hldr.: 3.023 Volts
Dark After - NFH: 0.177 Volts
Average Dark 0.178 Volts

I_{Ref} = 1.00E-10 Amps
I_{Dark} = 1.50E-10 Amps
10^{VDark} = 1.504874 Amps

RG780 **0.264**

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.