Biospherical Instruments Inc

CALIBRATION CERTIFICATE

UNDERWATER PAR SENSOR WITH LOG AMPLIFIER

Calibration Date: 01/17/14
Model Number: QSP200L
Serial Number: 4516
Operator: TPC
Standard Lamp: V-032(3/7/12)
Operating Voltage Range: 6 to 15 VDC (+)

Job No.: R11794

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:	**1.21E+13**	**quanta/cm²·sec/"amps"**	**2.00E-05**	**µEinsteins/cm²·sec/"amps"**
Wet Calibration Factor:	**2.13E+13**	**quanta/cm²·sec/"amps"**	**3.53E-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:	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%	2.887	100.00%		7.70E-08	7.70E-08	2.887	0.001	0.0	9.26E+15
0.3	36.10%	2.447	36.23%		2.79E-08	2.78E-08	2.446	-0.001	-0.3	3.36E+15
0.5	27.60%	2.326	27.36%		2.11E-08	2.13E-08	2.330	0.005	0.9	2.53E+15
1	9.27%	1.868	9.41%		7.25E-09	7.14E-09	1.862	-0.006	-1.5	8.72E+14
2	1.11%	1.005	1.13%		8.74E-10	8.55E-10	0.997	-0.008	-2.2	1.05E+14
3	0.05%	0.297	0.08%		5.89E-11	4.11E-11	0.256	-0.041	-30.2	7.09E+12

Dark Before:	0.144	Volts				
Light - No Filter Hldr.:	2.886	Volts	I_{Ref} =	1.00E-10	Amps	
Dark After - NFH:	0.144	Volts	I_{Dark} =	1.39E-10	Amps	RG780 **0.156**
Average Dark	0.144	Volts	10^{VDark} =	1.393157	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.