Biospherical Instruments Inc

CALIBRATION CERTIFICATE

UNDERWATER PAR SENSOR WITH LOG AMPLIFIER

Calibration Date: 06/01/16 **Job No.:** R12591
Model Number: QSP200L4S
Serial Number: 4242
Operator: TPC
Standard Lamp: V-035(3/4/15)
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:	**1.37E+13**	**quanta/cm²·sec per volt**	**2.27E-05**	**µEinsteins/cm²·sec per volt**
Wet Calibration Factor:	**2.42E+13**	**quanta/cm²·sec per volt**	**4.01E-05**	**µEinsteins/cm²·sec per volt**

Sensor Test Data and Results[4)]

Sensor Supply Current (Dark):	71.4	mA			
Supply Voltage:	6	Volts			
Lamp Integrated PAR Irradiance:	1.03E+16	quanta/cm²·sec	0.01713	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%	2.878	100.00%		7.55E-08	7.55E-08	2.879	0.001	0.0	1.03E+16
0.3	36.10%	2.441	36.43%		2.75E-08	2.73E-08	2.438	-0.003	-0.9	3.76E+15
0.5	27.60%	2.327	27.98%		2.11E-08	2.08E-08	2.322	-0.005	-1.3	2.89E+15
1	9.27%	1.862	9.46%		7.14E-09	7.00E-09	1.854	-0.008	-2.0	9.76E+14
2	1.11%	1.003	1.14%		8.60E-10	8.38E-10	0.994	-0.009	-2.5	1.17E+14
3	0.05%	0.316	0.08%		5.82E-11	4.03E-11	0.277	-0.039	-30.7	7.95E+12

Dark Before: 0.173 Volts
Light - No Filter Hldr.: 2.878 Volts
Dark After - NFH: 0.173 Volts
Average Dark 0.173 Volts

I_{Ref} = 1.00E-10 Amps
I_{Dark} = 1.49E-10 Amps
10^{VDark} = 1.489361

RG780 **0.199**

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.