

**Sciencetech, Inc.**  
**High Resolution (HR™ Series)**  
**Pyroelectric Detectors**

**Instruction Manual**

**Model No.**

\_\_\_\_\_

**Serial No.**

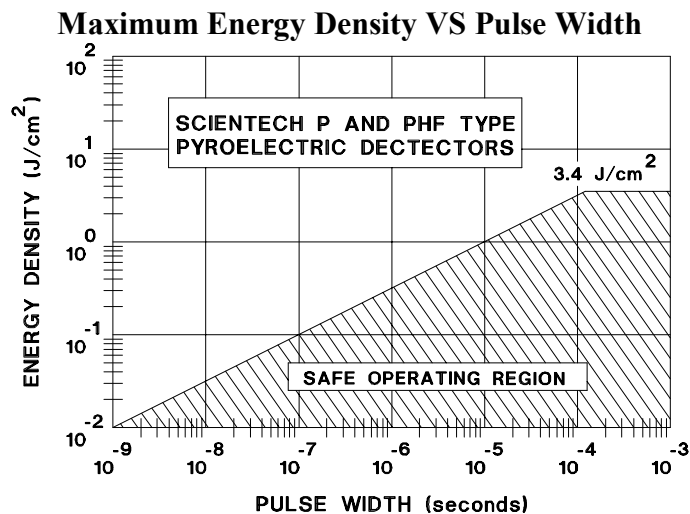
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## SPECIFICATIONS

Model No.	PHF02	PHF05	PHF09	P05	P09
Active Dia. (mm)	2	5	9	5	9
Voltage Response (V/mJ)				3	0.8
S,I	15	2.5	1		
L	0.15	0.025	0.01		
Electrical Decay Time (msec.) (RC Time Constant)				2	2
S	0.05	0.05	0.05		
I	0.5	0.5	0.5		
L	2.5	2.5	2.5		
Noise Equivalent Energy (nJ)				15	35
S,I	3	15	35		
L	150	750	3500		
Maximum Rep Rate (pps)				400	200
S	4000	4000	4000		
I	400	400	400		
L	80	80	80		
Maximum Pulse Width (µsec) (For Calibrated Response)				50	100
S	5	5	5		
I	50	50	50		
L	250	250	250		
Maximum Voltage Output (V)	4	4	4	4	4
Maximum Average Power (W)	1	2	2	2	2
Calibration Uncertainty (%) (0.19 to 20 µm)	±7	±7	±7	±5	±5



**CALIBRATION DATA**

**PHF02, PHF05, and PHF09 Models**

Model No. \_\_\_\_\_

Serial No. \_\_\_\_\_

Date \_\_\_\_\_

Calibration Wavelength \_\_\_\_\_

**Output Sensitivity (V/mJ)**

Short Pulse \_\_\_\_\_

Intermediate Pulse \_\_\_\_\_

Long Pulse \_\_\_\_\_

**P05 and P09 Models**

Model No. \_\_\_\_\_

Serial No. \_\_\_\_\_

Date \_\_\_\_\_

Calibration Wavelength \_\_\_\_\_

Output Sensitivity (V/mJ) \_\_\_\_\_

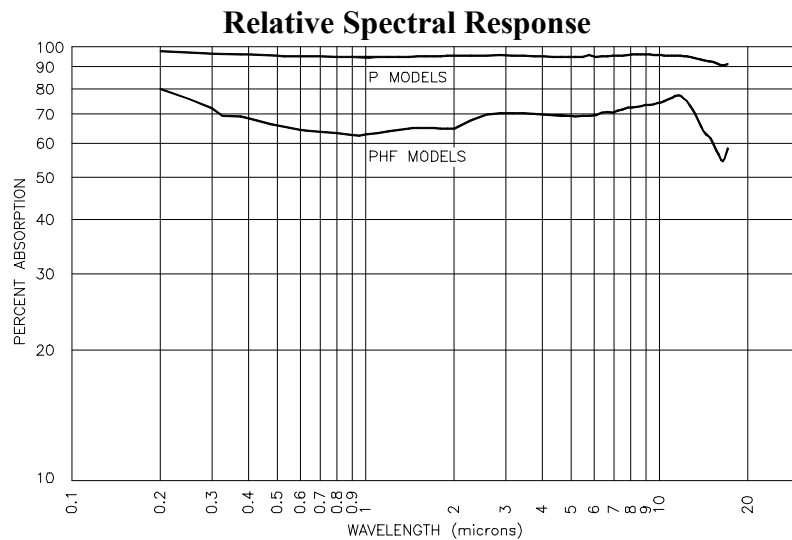
## GENERAL DESCRIPTION

The HR pyroelectric detectors measure individual pulse energies with resolution (noise equivalent energy) of 3 nanojoules and average power levels up to a maximum of 2 watts. Available in both highly absorbing or high repetition rate models, these detectors can handle pulse widths as long as 250  $\mu$ sec. and rep rates up to 4 kHz.

The highly absorbing **P05**, **P09** models utilize a unique black coating with a flat spectral response from the UV through the mid IR regions. These detectors can measure energy levels at rep rates up to 400 HZ and 200 HZ, respectively.

The PHF02, PHF05, and PHF09 models are uncoated and reflect approximately 35% of the incident beam. **CARE SHOULD BE TAKEN TO DIRECT THE REFLECTED BEAM TO AN APPROPRIATE BEAM DUMP.** These uncoated detectors can measure the energy levels at rep rates up to 4 kHz.

The relative spectral response versus percent absorption of the HR detectors is shown below:



For optimal measurements, you can connect the **HR** detectors to one of Scientech's numerous **Vector** Series indicators: Models S310, D200P, D200PC, S200. The D200 Models are premium dual channel ratiometers and come standard with RS232 and IEEE488 interfaces. The S310 single channel **Synenergy™** meter is unique in that it can connect to any of the **HR** models as well as any of Scientech's **Astral™** calorimeters, **Vector™** pyroelectrics, and **Ultra™** high power detectors. Operation of these systems is detailed in the indicator manuals.

## UNPACKING AND SETUP

All Scientech equipment is packed in custom fit packing materials. All packing materials should be saved for future damage free shipments. Carefully unpack the equipment and visually examine for damage. Scientech ships with terms of FOB origin. Damage which occurred during transit from Scientech should be reported to the freight carrier.

Do not touch the delicate pyroelectric crystals in the **HR** Series detectors. They should only be cleaned with a stream of clean air; nitrogen or CO<sub>2</sub>.

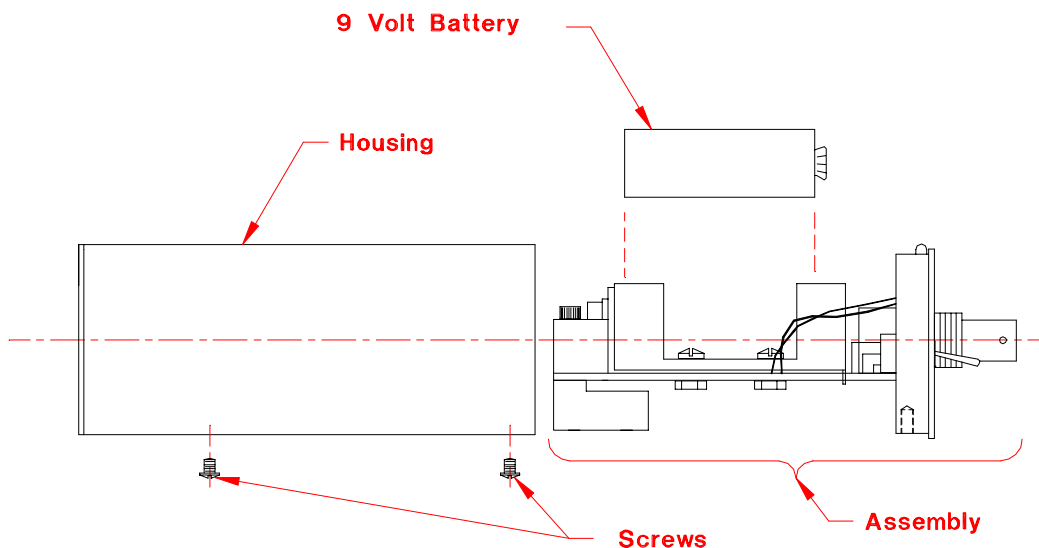
A 1/2 inch diameter mounting post is included with each detector for mounting to an optical bench. The post can be threaded into the 1/4-20 mounting hole located on the underside of the detector. An optional base (Model 301-019) may be purchased for holding the detectors upright during table-top usage.

## BATTERY INSTALLATION - Refer to the diagrams given below

A 9 volt alkaline battery comes installed with all **HR** Series detectors. Always select the OFF position of the power switch when the detector is not in use to spare the lifetime of the battery. Replace the battery when the low battery LED indicator lights up.

Remove the two slotted 4-40 binder head screws located on the underside of the detector. Pull off the outer housing to expose the battery. Remove the used battery from the battery holder and snap in the new battery. Slide the outer housing back in to place and secure with the screws.

### Battery Installation



## HR Series Outline

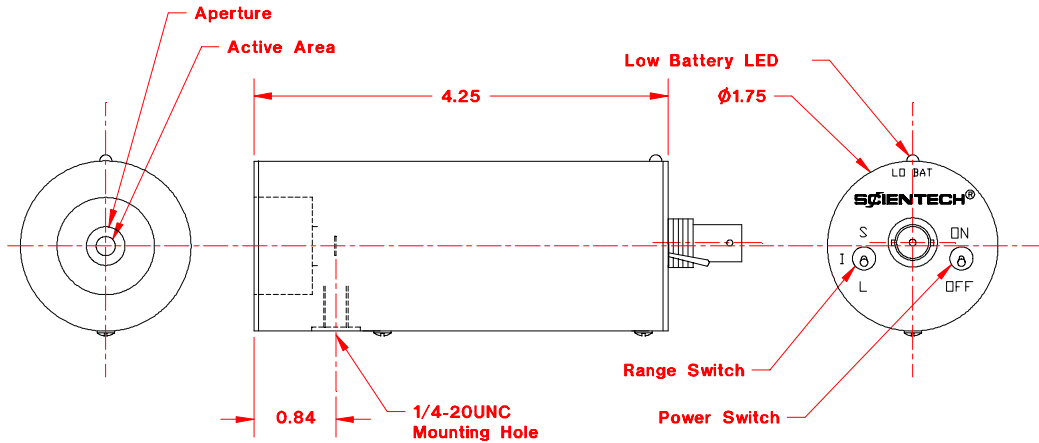


Figure 2. PHF Outline

## OPERATION

### Damage Test Slide

A damage test slide is provided with each **HR** detector. The test slide should be placed in the beam at the energy level to be measured prior to using the detector. This will reveal excessive energy density levels or safe operating conditions. The maximum energy density vs. pulse width specifications should be observed as shown on page 1.

### Set Electrical Time Constants for Model PHF02, PHF05 and PHF09

The range switch located on the rear of the PHF02, PHF05, and PHF09 detectors selects one of three electrical time constants and should be set as follows:

- S (Short Pulses):** Select for pulse durations of 5  $\mu\text{sec.}$  or less. Repetition rates up to 4 kHz can be measured.
- I (Intermediate Pulses):** Select for pulse durations of 50  $\mu\text{sec.}$  or less. Repetition rates of up to 400 HZ can be measured.
- L (Long Pulses):** Select for pulse durations of 250  $\mu\text{sec.}$  or less. Repetition rates of up to 80 HZ can be measured.

There are no range settings on the P05 and P09 detectors which utilize a highly absorbing material on the crystal. The pulse duration considerations merely function in the

determination of damage thresholds. Repetition rates up to 100 HZ using the P05 and 50 HZ using the P09 can be measured.

### **Connecting to Readout**

Each detector comes with a 3 meter BNC cable for connection to readouts. The HR detectors can be connected to the input BNC connector located on the Scientech indicator Models S310, S200, D200P, or D200PC. Follow procedures in the indicator instruction manual for proper usage with the indicators.

You can also use an oscilloscope as a readout by connecting the HR detector to the 50 ohm input of the scope. The peak voltage (V) out of the detector divided by the output sensitivity ( $V/mJ$ ) = energy (mJ) of the input laser pulse.

## HR HF Pyroelectric Detector Absorbtion

HR Pyroelectric detectors are calibrated at a wavelength 1064nm. To convert to another wavelength the table below can be used.

For example: Your PHF02,05,09 is calibrated at 1064nm (54.1% absorption). Your wavelength is 2400 nm (57.1% absorption). Therefore, you must change the sensitivity (V/mJ) of the detector by the ratio of the absorption at the new wavelength versus the absorption at the calibration wavelength times the original calibration sensitivity. (ie:  $(0.571/0.541) \times \text{original calibration sensitivity} = \text{new detector sensitivity at the new wavelength}$ )

Wavelength ( $\mu\text{m}$ )	% Reflectance	% Absorption	Wavelength (nm)
0.200	48.4	51.6	200
0.250	49.2	50.8	250
0.300	50.7	49.3	300
0.375	50.9	49.1	375
0.400	51.4	48.6	400
0.425	51.9	48.1	425
0.500	51.6	48.4	500
0.575	51.3	48.7	575
0.600	51.0	49.0	600
0.650	50.5	49.5	650
0.700	50.3	49.7	700
0.800	49.9	50.1	800
0.900	48.6	51.4	900
1.000	47.2	52.8	1000
1.100	45.9	54.1	1100
1.200	45.3	54.7	1200
1.300	43.8	56.2	1300
1.400	43.4	56.6	1400
1.500	42.9	57.1	1500
1.600	42.5	57.5	1600
1.700	43.0	57.0	1700
1.750	43.3	56.7	1750
1.800	41.9	58.1	1800
1.900	42.5	57.5	1900
2.000	43.1	56.9	2000
2.003	42.5	57.5	2003
2.006	42.4	57.6	2006

<b>Wavelength (um)</b>	<b>% Reflectance</b>	<b>% Absorption</b>	<b>Wavelength (nm)</b>
2.009	42.4	57.6	2009
2.012	42.5	57.5	2012
2.016	42.5	57.5	2016
2.019	42.5	57.5	2019
2.022	42.5	57.5	2022
2.025	42.5	57.5	2025
2.028	42.5	57.5	2028
2.031	42.5	57.5	2031
2.034	42.5	57.5	2034
2.038	42.5	57.5	2038
2.041	42.6	57.4	2041
2.044	42.6	57.4	2044
2.047	42.5	57.5	2047
2.051	42.5	57.5	2051
2.054	42.5	57.5	2054
2.057	42.5	57.5	2057
2.060	42.6	57.4	2060
2.064	42.6	57.4	2064
2.067	42.6	57.4	2067
2.070	42.6	57.4	2070
2.073	42.6	57.4	2073
2.077	42.6	57.4	2077
2.080	42.6	57.4	2080
2.083	42.6	57.4	2083
2.087	42.6	57.4	2087
2.090	42.6	57.4	2090
2.094	42.6	57.4	2094
2.097	42.6	57.4	2097
2.100	42.6	57.4	2100
2.104	42.6	57.4	2104
2.107	42.6	57.4	2107
2.111	42.6	57.4	2111
2.114	42.6	57.4	2114
2.117	42.6	57.4	2117
2.121	42.6	57.4	2121
2.124	42.6	57.4	2124
2.128	42.6	57.4	2128
2.131	42.6	57.4	2131
2.135	42.6	57.4	2135
2.138	42.6	57.4	2138
2.142	42.6	57.4	2142
2.145	42.7	57.3	2145

<b>Wavelength (um)</b>	<b>% Reflectance</b>	<b>% Absorption</b>	<b>Wavelength (nm)</b>
2.149	42.7	57.3	2149
2.153	42.7	57.3	2153
2.156	42.7	57.3	2156
2.160	42.7	57.3	2160
2.163	42.7	57.3	2163
2.167	42.7	57.3	2167
2.171	42.7	57.3	2171
2.174	42.7	57.3	2174
2.178	42.7	57.3	2178
2.182	42.7	57.3	2182
2.185	42.7	57.3	2185
2.189	42.7	57.3	2189
2.193	42.7	57.3	2193
2.196	42.7	57.3	2196
2.200	42.7	57.3	2200
2.204	42.7	57.3	2204
2.208	42.7	57.3	2208
2.211	42.7	57.3	2211
2.215	42.7	57.3	2215
2.219	42.7	57.3	2219
2.223	42.7	57.3	2223
2.226	42.7	57.3	2226
2.230	42.8	57.2	2230
2.234	42.8	57.2	2234
2.238	42.8	57.2	2238
2.242	42.8	57.2	2242
2.246	42.8	57.2	2246
2.250	42.8	57.2	2250
2.254	42.8	57.2	2254
2.257	42.8	57.2	2257
2.261	42.8	57.2	2261
2.265	42.8	57.2	2265
2.269	42.8	57.2	2269
2.273	42.8	57.2	2273
2.277	42.8	57.2	2277
2.281	42.8	57.2	2281
2.285	42.8	57.2	2285
2.289	42.8	57.2	2289
2.293	42.8	57.2	2293
2.297	42.8	57.2	2297
2.301	42.8	57.2	2301
2.306	42.9	57.1	2306

<b>Wavelength (um)</b>	<b>% Reflectance</b>	<b>% Absorption</b>	<b>Wavelength (nm)</b>
2.310	42.9	57.1	2310
2.314	42.9	57.1	2314
2.318	42.9	57.1	2318
2.322	42.9	57.1	2322
2.326	42.9	57.1	2326
2.330	42.9	57.1	2330
2.335	42.9	57.1	2335
2.339	42.9	57.1	2339
2.343	42.9	57.1	2343
2.347	42.9	57.1	2347
2.352	42.9	57.1	2352
2.356	42.9	57.1	2356
2.360	42.9	57.1	2360
2.364	42.9	57.1	2364
2.369	42.9	57.1	2369
2.373	42.9	57.1	2373
2.377	42.9	57.1	2377
2.382	42.9	57.1	2382
2.386	42.9	57.1	2386
2.390	42.9	57.1	2390
2.395	42.9	57.1	2395
2.399	42.9	57.1	2399
2.404	43.0	57.0	2404
2.408	43.0	57.0	2408
2.413	43.0	57.0	2413
2.417	43.0	57.0	2417
2.422	43.0	57.0	2422
2.426	43.0	57.0	2426
2.431	43.0	57.0	2431
2.435	43.0	57.0	2435
2.440	43.0	57.0	2440
2.445	43.0	57.0	2445
2.449	43.0	57.0	2449
2.454	43.0	57.0	2454
2.458	43.0	57.0	2458
2.463	43.0	57.0	2463
2.468	43.0	57.0	2468
2.472	43.0	57.0	2472
2.477	43.0	57.0	2477
2.482	43.0	57.0	2482
2.487	43.0	57.0	2487
2.491	43.0	57.0	2491

<b>Wavelength (um)</b>	<b>% Reflectance</b>	<b>% Absorption</b>	<b>Wavelength (nm)</b>
2.496	43.0	57.0	2496
2.501	43.0	57.0	2501
2.506	43.0	57.0	2506
2.511	43.1	56.9	2511
2.516	43.1	56.9	2516
2.520	43.1	56.9	2520
2.525	43.1	56.9	2525
2.530	43.1	56.9	2530
2.535	43.1	56.9	2535
2.540	43.1	56.9	2540
2.545	43.2	56.8	2545
2.550	43.2	56.8	2550
2.555	43.2	56.8	2555
2.560	43.3	56.7	2560
2.565	43.3	56.7	2565
2.570	43.3	56.7	2570
2.575	43.3	56.7	2575
2.581	43.3	56.7	2581
2.586	43.4	56.6	2586
2.591	43.4	56.6	2591
2.596	43.4	56.6	2596
2.601	43.4	56.6	2601
2.607	43.4	56.6	2607
2.612	43.3	56.7	2612
2.617	43.3	56.7	2617
2.622	43.3	56.7	2622
2.628	43.3	56.7	2628
2.633	43.3	56.7	2633
2.638	43.2	56.8	2638
2.644	43.2	56.8	2644
2.649	43.2	56.8	2649
2.655	43.3	56.7	2655
2.660	43.4	56.6	2660
2.665	43.6	56.4	2665
2.671	43.6	56.4	2671
2.676	43.5	56.5	2676
2.682	43.4	56.6	2682
2.687	43.3	56.7	2687
2.693	43.3	56.7	2693
2.699	43.3	56.7	2699
2.704	43.3	56.7	2704
2.710	43.4	56.6	2710

<b>Wavelength (um)</b>	<b>% Reflectance</b>	<b>% Absorption</b>	<b>Wavelength (nm)</b>
2.716	43.4	56.6	2716
2.721	43.4	56.6	2721
2.727	43.3	56.7	2727
2.733	43.3	56.7	2733
2.739	43.4	56.6	2739
2.744	43.3	56.7	2744
2.750	43.3	56.7	2750
2.756	43.4	56.6	2756
2.762	43.4	56.6	2762
2.768	43.4	56.6	2768
2.774	43.3	56.7	2774
2.780	43.4	56.6	2780
2.786	43.4	56.6	2786
2.792	43.3	56.7	2792
2.798	43.3	56.7	2798
2.804	43.4	56.6	2804
2.810	43.3	56.7	2810
2.816	43.3	56.7	2816
2.822	43.3	56.7	2822
2.828	43.3	56.7	2828
2.834	43.3	56.7	2834
2.840	43.3	56.7	2840
2.847	43.3	56.7	2847
2.853	43.2	56.8	2853
2.859	43.2	56.8	2859
2.866	43.1	56.9	2866
2.872	43.1	56.9	2872
2.878	43.2	56.8	2878
2.885	43.2	56.8	2885
2.891	43.3	56.7	2891
2.897	43.3	56.7	2897
2.904	43.3	56.7	2904
2.910	43.3	56.7	2910
2.917	43.3	56.7	2917
2.924	43.3	56.7	2924
2.930	43.3	56.7	2930
2.937	43.3	56.7	2937
2.943	43.3	56.7	2943
2.950	43.3	56.7	2950
2.957	43.3	56.7	2957
2.964	43.3	56.7	2964
2.970	43.3	56.7	2970

<b>Wavelength (um)</b>	<b>% Reflectance</b>	<b>% Absorption</b>	<b>Wavelength (nm)</b>
2.977	43.3	56.7	2977
2.984	43.3	56.7	2984
2.991	43.3	56.7	2991
2.998	43.3	56.7	2998
3.005	43.3	56.7	3005
3.012	43.3	56.7	3012
3.019	43.3	56.7	3019
3.026	43.3	56.7	3026
3.033	43.3	56.7	3033
3.040	43.3	56.7	3040
3.047	43.3	56.7	3047
3.054	43.3	56.7	3054
3.062	43.3	56.7	3062
3.069	43.3	56.7	3069
3.076	43.3	56.7	3076
3.083	43.3	56.7	3083
3.091	43.3	56.7	3091
3.098	43.3	56.7	3098
3.105	43.3	56.7	3105
3.113	43.3	56.7	3113
3.120	43.3	56.7	3120
3.128	43.3	56.7	3128
3.135	43.3	56.7	3135
3.143	43.3	56.7	3143
3.151	43.3	56.7	3151
3.158	43.3	56.7	3158
3.166	43.3	56.7	3166
3.174	43.3	56.7	3174
3.182	43.3	56.7	3182
3.189	43.3	56.7	3189
3.197	43.3	56.7	3197
3.205	43.3	56.7	3205
3.213	43.3	56.7	3213
3.221	43.3	56.7	3221
3.229	43.3	56.7	3229
3.237	43.3	56.7	3237
3.245	43.3	56.7	3245
3.253	43.3	56.7	3253
3.262	43.3	56.7	3262
3.270	43.3	56.7	3270
3.278	43.3	56.7	3278
3.286	43.3	56.7	3286

<b>Wavelength (um)</b>	<b>% Reflectance</b>	<b>% Absorption</b>	<b>Wavelength (nm)</b>
3.295	43.3	56.7	3295
3.303	43.3	56.7	3303
3.312	43.3	56.7	3312
3.320	43.3	56.7	3320
3.328	43.3	56.7	3328
3.337	43.3	56.7	3337
3.346	43.3	56.7	3346
3.354	43.4	56.6	3354
3.363	43.4	56.6	3363
3.372	43.4	56.6	3372
3.381	43.4	56.6	3381
3.389	43.4	56.6	3389
3.398	43.4	56.6	3398
3.407	43.4	56.6	3407
3.416	43.4	56.6	3416
3.425	43.4	56.6	3425
3.434	43.4	56.6	3434
3.443	43.4	56.6	3443
3.452	43.4	56.6	3452
3.462	43.4	56.6	3462
3.471	43.4	56.6	3471
3.480	43.4	56.6	3480
3.490	43.4	56.6	3490
3.499	43.4	56.6	3499
3.508	43.4	56.6	3508
3.518	43.4	56.6	3518
3.528	43.4	56.6	3528
3.537	43.4	56.6	3537
3.547	43.4	56.6	3547
3.557	43.4	56.6	3557
3.566	43.4	56.6	3566
3.576	43.4	56.6	3576
3.586	43.4	56.6	3586
3.596	43.4	56.6	3596
3.606	43.4	56.6	3606
3.616	43.4	56.6	3616
3.626	43.4	56.6	3626
3.636	43.4	56.6	3636
3.646	43.4	56.6	3646
3.657	43.5	56.5	3657
3.667	43.5	56.5	3667
3.677	43.5	56.5	3677

<b>Wavelength (um)</b>	<b>% Reflectance</b>	<b>% Absorption</b>	<b>Wavelength (nm)</b>
3.688	43.5	56.5	3688
3.698	43.5	56.5	3698
3.709	43.5	56.5	3709
3.720	43.5	56.5	3720
3.730	43.5	56.5	3730
3.741	43.5	56.5	3741
3.752	43.5	56.5	3752
3.763	43.5	56.5	3763
3.774	43.5	56.5	3774
3.785	43.5	56.5	3785
3.796	43.5	56.5	3796
3.807	43.6	56.4	3807
3.818	43.6	56.4	3818
3.829	43.6	56.4	3829
3.841	43.6	56.4	3841
3.852	43.6	56.4	3852
3.864	43.6	56.4	3864
3.875	43.6	56.4	3875
3.887	43.6	56.4	3887
3.898	43.6	56.4	3898
3.910	43.6	56.4	3910
3.922	43.6	56.4	3922
3.934	43.6	56.4	3934
3.946	43.7	56.3	3946
3.958	43.7	56.3	3958
3.970	43.7	56.3	3970
3.982	43.7	56.3	3982
3.994	43.7	56.3	3994
4.007	43.7	56.3	4007
4.019	43.7	56.3	4019
4.032	43.7	56.3	4032
4.044	43.7	56.3	4044
4.057	43.7	56.3	4057
4.070	43.7	56.3	4070
4.082	43.7	56.3	4082
4.095	43.8	56.2	4095
4.108	43.8	56.2	4108
4.121	43.8	56.2	4121
4.134	43.8	56.2	4134
4.148	43.8	56.2	4148
4.161	43.8	56.2	4161
4.174	43.8	56.2	4174

<b>Wavelength (um)</b>	<b>% Reflectance</b>	<b>% Absorption</b>	<b>Wavelength (nm)</b>
4.188	43.9	56.1	4188
4.201	44.0	56.0	4201
4.215	44.1	55.9	4215
4.229	44.2	55.8	4229
4.242	44.1	55.9	4242
4.256	44.1	55.9	4256
4.270	44.2	55.8	4270
4.284	44.2	55.8	4284
4.299	44.1	55.9	4299
4.313	44.0	56.0	4313
4.327	44.0	56.0	4327
4.342	44.0	56.0	4342
4.356	44.0	56.0	4356
4.371	44.0	56.0	4371
4.386	44.0	56.0	4386
4.401	44.0	56.0	4401
4.416	44.1	55.9	4416
4.431	44.1	55.9	4431
4.446	44.1	55.9	4446
4.461	44.1	55.9	4461
4.477	44.1	55.9	4477
4.492	44.1	55.9	4492
4.508	44.1	55.9	4508
4.523	44.1	55.9	4523
4.539	44.1	55.9	4539
4.555	44.1	55.9	4555
4.571	44.1	55.9	4571
4.587	44.2	55.8	4587
4.604	44.2	55.8	4604
4.620	44.2	55.8	4620
4.636	44.2	55.8	4636
4.653	44.2	55.8	4653
4.670	44.2	55.8	4670
4.687	44.2	55.8	4687
4.704	44.3	55.7	4704
4.721	44.3	55.7	4721
4.738	44.3	55.7	4738
4.755	44.3	55.7	4755
4.773	44.3	55.7	4773
4.791	44.4	55.6	4791
4.808	44.4	55.6	4808
4.826	44.4	55.6	4826

<b>Wavelength (um)</b>	<b>% Reflectance</b>	<b>% Absorption</b>	<b>Wavelength (nm)</b>
4.844	44.4	55.6	4844
4.862	44.5	55.5	4862
4.881	44.5	55.5	4881
4.899	44.5	55.5	4899
4.918	44.5	55.5	4918
4.936	44.5	55.5	4936
4.955	44.6	55.4	4955
4.974	44.6	55.4	4974
4.993	44.6	55.4	4993
5.013	44.6	55.4	5013
5.032	44.6	55.4	5032
5.052	44.6	55.4	5052
5.071	44.6	55.4	5071
5.091	44.6	55.4	5091
5.111	44.6	55.4	5111
5.131	44.7	55.3	5131
5.152	44.7	55.3	5152
5.172	44.7	55.3	5172
5.193	44.7	55.3	5193
5.214	44.7	55.3	5214
5.235	44.7	55.3	5235
5.256	44.7	55.3	5256
5.278	44.7	55.3	5278
5.299	44.6	55.4	5299
5.321	44.6	55.4	5321
5.343	44.7	55.3	5343
5.365	44.6	55.4	5365
5.387	44.6	55.4	5387
5.410	44.6	55.4	5410
5.432	44.6	55.4	5432
5.455	44.5	55.5	5455
5.478	44.4	55.6	5478
5.501	44.3	55.7	5501
5.525	44.3	55.7	5525
5.548	44.3	55.7	5548
5.572	44.2	55.8	5572
5.596	44.2	55.8	5596
5.620	44.2	55.8	5620
5.645	44.2	55.8	5645
5.669	44.1	55.9	5669
5.694	44.2	55.8	5694
5.719	44.2	55.8	5719

<b>Wavelength (um)</b>	<b>% Reflectance</b>	<b>% Absorption</b>	<b>Wavelength (nm)</b>
5.745	44.3	55.7	5745
5.770	44.3	55.7	5770
5.796	44.4	55.6	5796
5.822	44.5	55.5	5822
5.848	44.7	55.3	5848
5.875	44.8	55.2	5875
5.901	44.8	55.2	5901
5.928	44.8	55.2	5928
5.956	44.8	55.2	5956
5.983	44.8	55.2	5983
6.011	44.8	55.2	6011
6.039	44.9	55.1	6039
6.067	44.8	55.2	6067
6.095	44.7	55.3	6095
6.124	44.6	55.4	6124
6.153	44.6	55.4	6153
6.183	44.5	55.5	6183
6.212	44.4	55.6	6212
6.242	44.4	55.6	6242
6.272	44.4	55.6	6272
6.303	44.5	55.5	6303
6.333	44.6	55.4	6333
6.365	44.8	55.2	6365
6.396	44.9	55.1	6396
6.428	44.9	55.1	6428
6.460	45.0	55.0	6460
6.492	45.0	55.0	6492
6.525	45.0	55.0	6525
6.557	45.0	55.0	6557
6.591	45.0	55.0	6591
6.624	45.0	55.0	6624
6.658	44.9	55.1	6658
6.693	44.8	55.2	6693
6.727	44.8	55.2	6727
6.762	44.9	55.1	6762
6.798	45.0	55.0	6798
6.834	45.0	55.0	6834
6.870	44.9	55.1	6870
6.906	44.9	55.1	6906
6.943	44.9	55.1	6943
6.981	45.0	55.0	6981
7.018	45.0	55.0	7018

<b>Wavelength (um)</b>	<b>% Reflectance</b>	<b>% Absorption</b>	<b>Wavelength (nm)</b>
7.057	44.9	55.1	7057
7.095	44.9	55.1	7095
7.134	45.0	55.0	7134
7.174	45.0	55.0	7174
7.214	44.9	55.1	7214
7.254	44.9	55.1	7254
7.295	45.0	55.0	7295
7.336	44.9	55.1	7336
7.378	44.9	55.1	7378
7.420	44.9	55.1	7420
7.462	45.0	55.0	7462
7.506	44.9	55.1	7506
7.549	45.0	55.0	7549
7.593	45.0	55.0	7593
7.638	44.9	55.1	7638
7.683	44.9	55.1	7683
7.729	45.0	55.0	7729
7.775	45.0	55.0	7775
7.822	45.0	55.0	7822
7.870	45.0	55.0	7870
7.918	45.0	55.0	7918
7.966	45.0	55.0	7966
8.015	45.0	55.0	8015
8.065	45.0	55.0	8065
8.116	45.0	55.0	8116
8.167	45.0	55.0	8167
8.218	45.0	55.0	8218
8.271	45.0	55.0	8271
8.324	45.0	55.0	8324
8.378	44.9	55.1	8378
8.432	44.9	55.1	8432
8.487	44.9	55.1	8487
8.543	44.9	55.1	8543
8.600	44.9	55.1	8600
8.657	44.8	55.2	8657
8.715	44.8	55.2	8715
8.774	44.8	55.2	8774
8.834	44.7	55.3	8834
8.894	44.7	55.3	8894
8.956	44.7	55.3	8956
9.018	44.6	55.4	9018
9.081	44.5	55.5	9081

<b>Wavelength (um)</b>	<b>% Reflectance</b>	<b>% Absorption</b>	<b>Wavelength (nm)</b>
9.145	44.5	55.5	9145
9.210	44.4	55.6	9210
9.276	44.4	55.6	9276
9.343	44.3	55.7	9343
9.410	44.2	55.8	9410
9.479	44.2	55.8	9479
9.549	44.1	55.9	9549
9.620	44.0	56.0	9620
9.691	43.9	56.1	9691
9.764	43.7	56.3	9764
9.838	43.6	56.4	9838
9.913	43.5	56.5	9913
9.990	43.3	56.7	9990
10.067	43.1	56.9	10067
10.146	42.9	57.1	10146
10.226	42.7	57.3	10226
10.307	42.5	57.5	10307
10.390	42.3	57.7	10390
10.473	42.0	58.0	10473
10.559	41.7	58.3	10559
10.645	41.4	58.6	10645
10.733	41.0	59.0	10733
10.823	40.7	59.3	10823
10.914	40.3	59.7	10914
11.006	40.0	60.0	11006
11.100	39.5	60.5	11100
11.196	39.0	61.0	11196
11.294	38.8	61.2	11294
11.393	38.8	61.2	11393
11.494	39.2	60.8	11494
11.596	39.7	60.3	11596
11.701	40.4	59.6	11701
11.807	41.1	58.9	11807
11.916	41.6	58.4	11916
12.026	42.0	58.0	12026
12.139	42.6	57.4	12139
12.253	43.3	56.7	12253
12.370	44.1	55.9	12370
12.489	45.0	55.0	12489
12.611	45.8	54.2	12611
12.734	46.6	53.4	12734
12.860	47.4	52.6	12860

<b>Wavelength (um)</b>	<b>% Reflectance</b>	<b>% Absorption</b>	<b>Wavelength (nm)</b>
12.989	48.2	51.8	12989
13.120	49.1	50.9	13120
13.254	50.0	50.0	13254
13.391	50.9	49.1	13391
13.531	51.9	48.1	13531
13.673	52.9	47.1	13673
13.819	53.9	46.1	13819
13.968	54.9	45.2	13968
14.120	55.8	44.2	14120
14.275	56.6	43.4	14275
14.434	57.4	42.6	14434
14.596	58.1	41.9	14596
14.762	58.6	41.4	14762
14.932	58.9	41.1	14932
15.106	59.3	40.7	15106
15.284	60.3	39.7	15284
15.466	61.7	38.3	15466
15.652	63.4	36.6	15652
15.843	65.2	34.8	15843
16.039	67.2	32.8	16039
16.240	69.5	30.5	16240
16.446	71.8	28.2	16446
16.657	74.1	25.9	16657
16.873	75.5	24.5	16873
17.095	75.1	24.9	17095
17.324	73.0	27.0	17324
17.558	70.1	29.9	17558
17.799	67.4	32.6	17799
18.046	65.1	34.9	18046
18.301	63.3	36.7	18301
18.563	62.0	38.0	18563
18.832	60.8	39.2	18832
19.109	59.5	40.5	19109
19.395	58.1	41.9	19395
19.689	56.7	43.3	19689
19.992	55.5	44.5	19992
20.305	54.5	45.5	20305
20.628	53.4	46.6	20628
20.961	52.1	47.9	20961
21.305	50.3	49.7	21305
21.661	49.0	51.0	21661
22.028	49.7	50.3	22028

<b>Wavelength (um)</b>	<b>% Reflectance</b>	<b>% Absorption</b>	<b>Wavelength (nm)</b>
22.409	52.5	47.5	22409
22.802	54.4	45.6	22802
23.210	53.8	46.2	23210
23.633	53.5	46.5	23633
24.071	55.1	44.9	24071
24.526	57.5	42.5	24526
24.998	60.1	39.9	24998
25.489	62.2	37.8	25489
26.000	63.7	36.3	26000

## **FACTORY RE-CALIBRAION**

Scientech recommends that a complete calibration be performed annually to verify system accuracy. Please contact our Product Service Department at (800)525-0522 or (303)444-1361 or Fax (303)444-9229 to arrange for a NIST traceable, factory calibration.

## **LIMITED WARRANTY**

All Scientech Laser Power and Energy Measurement Systems are warranted against defects in materials and workmanship for two (2) years from date of delivery. During the warranty period, Scientech will repair, or at its option replace at no charge, components that prove to be defective. The equipment must be returned, shipping prepaid, to Scientech's product service facility. This limited warranty does not apply if the equipment is damaged by accident or misuse or as a result of service or modification by other than a Scientech service facility. The foregoing warranty is in lieu of all other warranties expressed or implied including but not limited to any implied warranty of merchantability, fitness, or adequacy for any special incidental or consequential damages whether in contract, tort, or otherwise.

## **RETURNED GOODS PROCEDURE**

Should it become necessary to return any item to Scientech for any reason, please contact our Product Service Department at (800)525-0522 or (303)444-1361 or Fax (303)444-9229. When you call, please be ready to provide model number, serial number, and a description of the problem. Frequently we can provide self-help information which will eliminate the need for returning the unit(s).

If equipment return is required, please pack the items in the original box and packing material. As an alternate, place the equipment in a snug-fitting box, then pack that box in a larger box with at least four inches of packing material. Scientech does not assume responsibility for underpacked items.

Please include the name and phone number of the person we should contact regarding repair questions.

Normally, products are repaired and shipped within 5 working days after their arrival at the product service facility. This is an average time and could vary depending on the workload.

Shipping Address:

Scientech, Inc.  
Product Service Department  
5649 Arapahoe Ave.  
Boulder, Colorado 80303