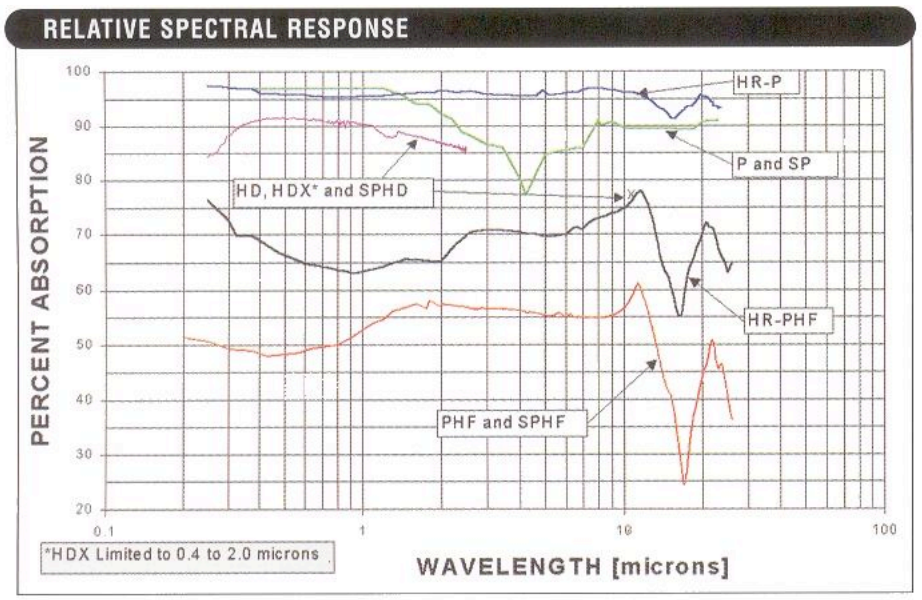
Vector Pyroelectric Detectors

Vector Pyroelectric Detectors, as with all Scientech detectors, have our traditional quality built in and offer futuristic features and performance. A variety of detectors are available including the unique high damage threshold HD and HDX models which can withstand energy densities up to 1.4 J/cm^2 and 12 J/cm^2 respectively. High resolution HR detectors can measure repetition rates up to 4 kHz and resolve energy readings to 3 nJ.



SPECTRAL RESPONSE OF
VECTOR PYROELECTRIC DETECTORS

FIGURE 1

SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE.

The heart of the pyroelectric joulemeter, a sensitive detector of pulsed radiation, is the pyroelectric element. This element contains a temperature sensitive crystal which exhibits spontaneous electric polarization when exposed to the sensible heat generated by absorbed modulated radiation. The polarization is measured as a voltage at the electrodes which are attached to the crystal. This voltage is proportional to the laser energy level being absorbed. Since no power is required to drive the joulemeters, they can be directly connected to an oscilloscope as well as a Vector Synenergy Indicator. Futuristic Vector detectors are available with normal and slim profiles in highly absorbing, high rep rate, and high damage threshold models.

VECTOR™ PYROELECTRIC DETECTOR SPECIFICATIONS

Model No.	SP25	SPHF25	SPHD25	SP50	SPHF50	SPHD50	P25	PHF25	PHD25	PHDX25	PHDX25UV	PHDX50	PHDX50UV	P50	PHF50	PHD50
Aperture Size (dia.)	25.4 mm	25.4 mm	25.4 mm	50.8 mm	50.8 mm	50.8 mm	25.4 mm	25.4 mm	25.4 mm	7 mm	7mm	15 mm	15 mm	50.8 mm	50.8 mm	50.8 mm
Spectral Response	See Fig. 1	See Fig. 1	See Fig. 1	See Fig. 1	See Fig. 1	See Fig. 1	See Fig. 1	See Fig. 1	See Fig. 1	See Fig. 1	See Fig. 1	See Fig. 1	See Fig. 1	See Fig. 1	See Fig. 1	See Fig. 1
Average Power (max.)	5 W*	5 W*	5 W*	10 W*	10 W*	10 W*	5 W*	5 W*	5 W*	5 W*	5 W*	10 W*	10 W*	10 W*	10 W*	10 W*
Minimum Energy	7%**	7%**	7%**	7%**	7%**	7%**	7%**	7%**	7%**	7%**	7%**	7%**	7%**	7%**	7%**	7%**
Noise Equivalent Energy	4 µJ	4 µJ	4 µJ	16 µJ	16 µJ	16 µJ	4 µJ	4 µJ	4 µJ	4 µJ	4 µJ	16 µJ	16 µJ	16 µJ	16 µJ	16 µJ
Energy Density (max.)	See Note 25	See Note 25	See Note 26	See Note 25	See Note 25	See Note 26	See Note 25	See Note 25	See Note 26	See Note 27	See Note 28	See Note 27	See Note 28	See Note 25	See Note 25	See Note 26
Accuracy	5%	5%	8%†	5%	5%	8%†	5%	5%	8%†	8%†	8%†	8%†	8%†	5%	5%	8%†
Output Sensitivity	8 V/J	8 V/J	2 V/J	2 V/J	2 V/J	2 V/J	8 V/J	8 V/J	2 V/J	2 V/J	2 V/J	2 V/J	2 V/J	2 V/J	2 V/J	2 V/J
Maximum Rep Rate	100 pps	400 pps	40 pps	50 pps	400 pps	20 pps	100 pps	400 pps	40 pps	40 pps	40 pps	20 pps	20 pps	50 pps	400 pps	20 pps
Maximum Pulse Duration	0.2 msec	0.045 msec	0.2 msec	0.4 msec	0.045 msec	0.4 msec	0.2 msec	0.045 msec	0.2 msec	0.2 msec	0.2 msec	0.4 msec	0.4 msec	0.4 msec	0.045 msec	0.4 msec
Dimensions (DxL) (cm.) (WxHxL SP Models)	5.8 x 5.8 x 1.4	5.8 x 5.8 x 1.4	5.8 x 5.8 x 1.4	7.6 x 7.6 x 1.5	7.6 x 7.6 x 1.5	7.6 x 7.6 x 1.5	6.12 x 5.77	6.12 x 5.77	6.12 x 5.77	6.12 x 9.88	6.12 x 9.88	8.76 x 9.88	8.76 x 9.88	8.76 x 5.77	8.76 x 5.77	8.76 x 5.77
Weight (kgs.)	0.14	0.14	0.14	0.18	0.18	0.18	0.41	0.41	0.41	0.5	0.5	0.77	0.77	0.68	0.68	0.68

*Full Illumination of sensor †Beam centered on absorber **of selected range

VECTOR HR PYROELECTRIC DETECTOR SPECIFICATIONS

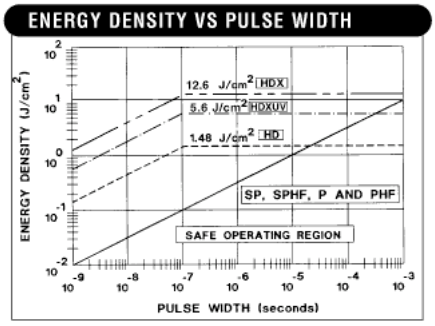
Model No.	PHF02	PHF05	PHF09	P05	P09
Aperture Size (dia.)	2 mm	5 mm	9 mm	5 mm	9 mm
Spectral Response	See fig. 1	See fig.1	See fig. 1	See fig.1	See fig. 1
Voltage Response (V/mJ) S,I L	 15 0.15	 2.5 0.025	 1 0.01	3.0	0.8
Electrical Decay Time (msec) (RC Time Constant) S - pulse width ≤ 5 µsec I - pulse width ≤ 50 µsec L - pulse width ≤ 250 µsec	 0.05 0.5 2.5	 0.05 0.5 2.5	 0.05 0.5 2.5	2.0	2.0
Noise Equivalent Energy (nJ) S,I L	 3.0 150	 15 750	 35 3500	15	35
Maximum Energy (µJ) S, I L	 0.3 15	 1.5 75	 3.5 350	1.5	3.5
Maximum Rep Rate (pps) S I L	 4000 400 80	 4000 400 80	 4000 400 80	400	200
Maximum Pulse Width (µsec) (For calibrated Response) S I L	 5 50 250	 5 50 250	 5 50 250	50	100
Maximum Voltage Output (V)	4.5	4.5	4.5	4.5	4.5
Maximum Average Power (W)	1	2	2	2	2
Accuracy	7%	7%	7%	5%	5%
Maximum Energy Density	See Note 25				
Dimension (D x L) (cm.)	4.45 x 10.8				
Weight (kgs.)	0.21				
Indicator Compatibility	S310, S310D				

The P and SP models utilize a unique, durable, highly absorbing black coating which yields the flattest spectral response from the UV to the mid IR with reflection limited over the entire spectral region as indicated in Figure 1 (above) for the specifications. The high damage HD and HDX models are unique in pyroelectric measurement since they yield unsurpassed damage specifications. The HF high rep rate models have an energetic, partially absorbing, partially reflecting chromium coating. This coating is inherently fast and detects individual pulse energies at high repetition rates. The high resolution HR models are capable of low energy detection with noise equivalent energy levels down to 3 nJ on the most sensitive model. To accomplish accurate readings at such low energy levels, each HR detector contains a preamplifier powered by a 9 volt battery. This internal battery supplies noise-free power to the amplifying circuit. Inaccurate readings caused by low battery conditions are immediately and clearly recognized by a low battery warning LED light located on the top of the detector. All detectors come with a 1.27 cm (0.5") diameter x 8.89 cm (3.5") long post for mounting to an optical table and a BNC interconnect cable. A base (Model 301-019) for holding the detector/mounting post assembly upright is also available.

An optimum calibration of each detector is ensured by Scientech's highly trained and skilled service team. These experts use an electrically calibrated Scientech calorimeter/indicator system which has been NIST certified as the transfer standard. The energy of Scientech's YAG laser is accurately measured by the NIST certified calorimeter system and transferred to each Vector pyroelectric detector. This dependable calibration procedure generates a reliable certificate of calibration which accompanies each Vector joulemeter system and detector.

ENERGY DENSITY FOR PYROELECTRIC DETECTORS

Note 1	Max. J/cm^2 = 316 x (pulse width)$^{1/2}$ Maximum pulse width of the pyroelectric detector must be observed
Note 2	**HD Models** Max. J/cm^2 = 4500 x (pulse width)$^{1/2}$ to a maximum of 1.4 J/cm^2 Maximum pulse width of the pyroelectric detector must be observed
Note 3	**HDX Models** Max. J/cm^2 = 36,000 x (pulse width)$^{1/2}$ to a maximum of 12.6 J/cm^2 Maximum pulse width of the pyroelectric detector must be observed
Note 4	**HDXUV Models** Max. J/cm^2 = 36,000 x (pulse width)$^{1/2}$ to a maximum of 5.6 J/cm^2 Maximum pulse width of the pyroelectric detector must be observed



MAXIMUM ENERGY DENSITY OF VECTOR PYROELECTRIC DETECTORS FIGURE 2

Excessive energy or peak power density can damage any Vector pyroelectric detector. See Figure 2 (above) for safe operating limits. If your calculated specifications exceed those provided in Figure 2 and the specification table, optical attenuation is required. Scientech provides a damage test slide with each detector (except HD and HDX models) for preoperation damage testing.

Features:

- Joulemeter single pulse energy measurements at rep rates up to 4 kHz
- Advanced EMI/RFI protection
- High damage threshold models
- Slim profile models
- Easy connection to oscilloscope
- N.I.S.T. traceable calibration

Notes	
Note 1	AC2501, AC5001 30W/cm2@1064nm, 23W/cm2@532nm, 8.5W/cm2@355nm, 175mW/cm2@266nm
Note 2	ACX2501, ACX5001 Note 1 specs x 8 for 400nm to 1.2µm
Note 3	AC25UV, AC50UV, 384UV5, 388UV5, UC150UV 50W/cm2@355nm
Note 4	AC2504, AC5004 35W/cm2@1064nm
Note 5	AC2501, AC5001 100GW/cm2@1064nm, 78GW/cm2@532nm, 29GW/cm2@355nm, 580MW/cm2@266nm
Note 6	AC25UV, AC50UV, 384UV5, 388UV5, UC150UV Repetitive pulses: 101MW/cm2@355nm; Single pulses: 3.5GW/cm2@355nm
Note 7	AC2504, AC5004 125GW/cm2@1064nm
Note 8	AC2500, AC5000, 360401, 360801, UC150 Max J/cm2 = 1,000 x (pulse width)1/2 to a max of 200J/cm2
Note 9	AC250FX, AC50FX Max J/cm2 = 4,950 x (pulse width)1/2 to a max of 12.3J/cm2
Note 10	ACX25FX, ACX50FX Max J/cm2 = 39,600 x (pulse width)1/2 to a max of 36.9J/cm2
Note 11	AC2501, AC5001 Repetitive pulses: 4.1J/cm2@1064nm, 3.2J/cm2@532nm, 1.2J/cm2@355nm, 24mJ/cm2@266nm Single pulses: 8J/cm2@1064nm, 6.2J/cm2@532nm, 2.3J/cm2@355nm, 46mJ/cm2@266nm
Note 12	ACX2501, ACX5001 Note 11 specs x 8 for 400nm to 1.2µm
Note 13	AC25UV, AC50UV, 384UV5, 388UV5, UC150UV Repetitive pulses: 1.1J/cm2@355nm; Single pulses: 40J/cm2@355nm
Note 14	AC25004, AC5004 Repetitive pulses: 4.8J/cm2@1064nm; Single pulses: 10J/cm2@1064nm
Note 15	AC25FX, AC50FX Max p.p.d.: 70MW/cm2@1064nm pulse
Note 16	ACX25FX, ACX50FX Max p.p.d.: 560MW/cm2@1064nm pulse
Note 17	380401 27W/cm2@1064nm, 21W/cm2@532nm, 7.7W/cm2@355nm, 158mW/cm2@266nm
Note 18	380801 13.5W/cm2@1064nm, 10.5W/cm2@532nm, 3.85W/cm2@355nm, 79mW/cm2@266nm
Note 19	380401 90GW/cm2@1064nm, 71GW/cm2@532nm, 27GW/cm2@355nm, 530MW/cm2@266nm
Note 20	380801 45GW/cm2@1064nm, 35.5GW/cm2@532nm, 13.5GW/cm2@355nm, 265MW/cm2@266nm
Note 21	380401 Repetitive pulses: 3.7J/cm2@1064nm, 2.9J/cm2@532nm, 1J/cm2@355nm, 20mJ/cm2@266nm Single pulses: 7J/cm2@1064nm, 5.6J/cm2@532nm, 2.1J/cm2@355nm, 41mJ/cm2@266nm
Note 22	380801 Repetitive pulses: 1.85J/cm2@1064nm, 1.45J/cm2@532nm, 0.5J/cm2@355nm, 10mJ/cm2@266nm Single pulses: 3.5J/cm2@1064nm, 2.8J/cm2@532nm, 1.05J/cm2@355nm, 20.5mJ/cm2@266nm
Note 23	AC25HD, AC50HD, UC150HD, UC150HD40 Max J/cm_ = 4,500 x (pulse width)1/2 to a max of 14J/cm2
Note 24	ACX25HD, ACX50HD Max J/cm2 = 36,000 x (pulse width)1/2 to a max of 42.5J/cm2
Note 25	SP25, SPHF25, SP50, SPHF50, P25, PHF25, P50, PHF50, PHF02, PHF05, PHF09, P05, P09 Max J/cm2 = 316 x (pulse width)1/2
Note 26	SPHD25, SPHD50, PHD25, PHD50 Max J/cm2 = 4,500 x (pulse width)1/2 to a max of 1.4J/cm2
Note 27	PHDX25, PHDX50 Max J/cm2 = 36,000 x (pulse width)1/2to a max of 12.6J/cm2
Note 28	PHDX25UV, PHDX50UV Max J/cm2 = 18,000 x (pulse width)1/2to a max of 5.6J/cm2

Back To Top