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The Synenergy™ Measurement Concept

Scientech, the industry leader in accurate laser power and energy measurement systems, introduces the potent Synenergy™ laser measurement concept. The foundation for this progressive design consists of the desktop S310 and hand-held H410 power and energy indicators, featuring combined digital and analog meter movement displays, and the desktop D200 dual channel power and energy indicator. Capable of performing multifaceted laser measurements, these versatile readouts are pivotal to the concept of using only one meter to embrace your choice of numerous Astral calorimeters and photodiode detectors, Vector pyroelectric detectors, and Ultra high power calorimeters. These various multiple detector combinations empower you to customize your laser measurements. The result is Scientech's Synenergy concept, a greater total effect than the sum of separate laser measurement systems. The quality of this new concept is demonstrated by the CE mark of conformity and Scientech's ISO 9000 certification.

ISO 9000 REGISTERED

ALL VECTOR SYNENERGY INDICATORS FEATURE:

- Large custom 4-digit LCD display
- Both power & energy measurement
- Statistics mode
- Advanced EMI / RFI protection
- Autoranging
- RS-232 bidirectional interface (S310 & D200 Models)
- IEEE 488 interface (D200, optional on S310)
- Analog output (S310 & D200 Models)
- Selectable attenuation correction
- User selectable 115 / 220 VAC power input selector switch (S310 & D200 Models)
- Display backlighting (S310 & D200 Models)
- Selectable scientific notation display (S310 & D200 Models)
- LabVIEW™ drivers (S310 & D200 Models)
- N.I.S.T. traceable calibration



Boasting a large backlit display, the S310 is a versatile

Synenergy readout. It is the first Synenergy meter that is capable of handling the Ultra high power detectors as well as Astral calorimeters or Vector pyroelectric detectors. In addition, the S310 possesses a unique user selectable analog display which contains two separate analog scales. These separate analog scales make laser tuning an easy task with no possibility of scale misinterpretation. Or you may choose the S310D which is the digital only version of the S310. Both of these indicators contain a distinct internal calibration mode. Just turn on the meter and an internal recalibration automatically occurs ensuring the most accurate readings possible. With the S310, you can calibrate pyroelectric detectors using the optical transfer calibration mode with a laser, a calibration transfer standard, and a beam splitter. This procedure yields a power calibration standard which is then entered manually. Both the S310 and S310D can be connected to all of the Astral calorimeters, Vector, and Ultra detectors and contain 14 selectable ranges from 3.000 µJ or µW to 30.00 J or 150.0 W full scale depending on the detector being used.

Extended capabilities of the S310 include a powerful conversion feature. Multipliers as fine as 0.0001 and as large as 9999 can be entered into memory and then applied to the reading in order to yield a converted displayed value. This is particularly useful when using beam attenuators. Another commanding trait is the group configuration feature. This handy tool gives you the ability to save four different detector settings into the S310's internal memory. Each detector setup includes indicator configurations and communication options desired for different detector operations. Any of the four setups can be recalled at the touch of a button, making detector changeovers a snap.



FULL DISPLAY OF S310

VECTOR™ S310 SPECIFICATIONS

Model No.	S310	S310D
Display	4-Digit LCD With Selectable Analog Meter Movement	4-Digit LCD
Ranges [Watts & Joules Full Scale] (when connected to 25 mm calorimeter)	10.00 m, 100.0 m, 1.000, 10.00, AUTO (W only)	
Ranges [Watts & Joules Full Scale] (when connected to 50 mm calorimeter)	300.0 m, 3.000, 30.00, AUTO (W only)	
Ranges [Watts and Joules Full Scale] (when connected to pyroelectric detectors)	3.000 m, 30.00 m, 300.0 m, 3.000, 30, AUTO	
Ranges [Watts & Joules Full Scale] (when connected to high resolution pyroelectric detectors)	3.000 µ, 30.00 µ, 300.0 µ, 3.000 m, 30.00 m, AUTO	
Ranges [Watts Full Scale] (when connected to Ultra calorimeters)	150.0	
Maximum Rep. Rate with Calorimeters [Joules Mode]	Calorimeter Dependent (1 pulse every 60 to 90 seconds)	
Maximum Rep. Rate with Calorimeters [Watts Mode]	Unlimited	
Maximum Rep. Rate for Collecting Data (in Statistics Mode with pyroelectric sensor)	750 pps	
Response Time [Watts Mode] (when connected to calorimeter)	Calorimeter Dependent (3 to 10 seconds)	
Response Time with Ultra Calorimeters	40 seconds	
Response Time [Joules Mode] (when connected to calorimeter)	Calorimeter Dependent (1 to 3 seconds)	
Dimensions [H x W x D] (cm.)	11.89 x 22.43 x 19.89	
Power Requirement	115, 220 VAC +/- 10%	

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H410

The rugged H410 is a small, portable hand-held meter. Like the S310, the versatile H410 display contains a unique analog meter with two separate analog scales. The appropriate analog scale is automatically selected depending on which detector is being utilized. These separate analog scales make laser tuning a cinch with no possible scale misinterpretation. Or you may choose the H410D which is the digital only version of the H410. Both of these meters can be connected to any Astral or Vector sensor (excluding the Vector HR detectors).

Although the H410 is a hand-held device, it includes the same robust statistics mode as the S310. Perfect as a field service unit and as a laboratory standard, this small meter utilizes Ni-Cad rechargeable batteries and comes with a battery charger. A low battery annunciator will appear in the display when recharging is necessary. A protective soft case is also included as standard equipment. Available optional accessories include a laboratory stand for lab use and a small carrying case which will embrace two sensors, the H410, cables, charger, base, and extra batteries.



FULL DISPLAY OF H410

VECTOR™ H410 SPECIFICATIONS

Model No.	H410	H410D
Display	4-Digit LCD With Selectable Analog Meter Movement	4-Digit LCD
Ranges [Watts & Joules Full Scale] (when connected to 25 mm calorimeter)	10.00 m, 100.0 m, 1.000, 10.00, AUTO (W only)	
Ranges [Watts & Joules Full Scale] (when connected to 50 mm calorimeter)	300.0 m, 3.000, 30.00, AUTO (W only)	
Ranges [Watts and Joules Full Scale] (when connected to pyroelectric detector)	3.000 m, 30.00 m, 300.0 m, 3.000, AUTO	
Ranges [Watts] (when connected to photodiode detector)	30.00 µ, 300.00 µ, 3.000 µ, 30.00 m, AUTO	
Maximum Rep. Rate for Collecting Data (in Statistics Mode with pyroelectric detector)	300 pps	
Dimensions [H x W x D] (cm.)	20.96 x 10.16 x 3.81	
Power Requirement	4 each AA NiCad 750 ma rechargeable batteries	
AC Charger Input Requirements	120 Volt, 60 Hz ± 10% or 220 Volt, 50 Hz ± 10%	
Operating Temperature Range	5°C to 40°C	
Relative Humidity	80% for temperatures up to 31°C decreasing linearly to 50% at 40°C	

D200

The powerful dual channel D200 indicator comes in three different models which are configured at the factory. The D200P has both channels configured to accept any Vector pyroelectric detector. The D200C, the first dual channel calorimeter indicator, has both channels configured to accept any Astral calorimeter. The D200PC is configured with one pyroelectric channel which will accept any Vector detector and with one calorimeter channel which will accept any Astral calorimeter.

All D200 dual channel ratiometers display measurements of channel A or B or the ratio of measurements of A / B or B / A. In addition, you may select either linear or log units of measure at the push of a button (ratio mode only). With the D200P and D200PC, you can calibrate pyroelectric detectors using the optical transfer calibration mode with a laser, a calibration transfer standard, and a beam splitter. This procedure yields a power calibration standard which you then enter manually. Each meter has a large dynamic graphical tuning bar which immediately depicts any measured change in power which is ideal for laser tuning.



FULL DISPLAY OF D200

VECTOR™ D200 SPECIFICATIONS

Display	4-Digit LCD With Selectable Analog Bar Graph
Ranges [Watts & Joules Full Scale] (when connected to 25 mm calorimeter)	10.00 m, 100.0 m, 1.000, 10.00, AUTO (W only)
Ranges [Watts & Joules Full Scale] (when connected to 50 mm calorimeter)	300.0 m, 3.000, 30.00, AUTO (W only)
Ranges [Watts & Joules Full Scale] (when connected to pyroelectric detector)	2.000 m, 20.00 m, 200.0 m, 2.000, 20, AUTO
Ranges [Watts & Joules Full Scale] (when connected to high resolution pyroelectric detector)	2.000 µ, 20.00 µ, 200.0 µ, 2.000 m, 20.00 m, AUTO
Maximum Rep. Rate for Collecting Data (in Statistics Mode with pyroelectric detector)	200 pps
Maximum Rep. Rate with Calorimeters [Joules Mode]	Calorimeter Dependent (1 pulse every 60 to 90 secs)
Maximum Rep. Rate with Calorimeters [Watts Mode]	Unlimited
Response Time [Watts Mode] (when connected to calorimeter)	Calorimeter Dependent (3 to 10 seconds)
Response Time [Joules Mode] (when connected to calorimeter)	Calorimeter Dependent (1 to 3 seconds)
Dimensions [H x W x D] (cm.)	10.2 x 28.8 x 24.7
Power Requirement	115, 220 VAC +/- 10%

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Astral CALORIMETERS

CALORIMETERS

The premier Astral™ Series

is the "star" in a long line of calorimeters bearing the name of Scientech. Since 1968, Scientech has been the standard in laser measurement for accuracy and quality. Now new heights have been reached in features as well as performance in the exclusive Astral Series. These dynamic calorimeters bring accuracy and precision into your measuring environment while empowering you with superb features.

Astral calorimeters are available in both surface absorbing and volume absorbing models with either 10 watt or 30 watt capabilities. The broadband surface absorbing models are ideal for measuring CW lasers. With the addition of the new high damage threshold "HD" and "ACX" models, power densities up to 12 kW / cm^2, peak pulse power densities up to 100 GW / cm^2 and energy densities up to 42.5 J / cm^2 are handled by various models.

Volume absorbing calorimeters

are ideal for measuring the single pulse energy or average power level of high peak pulse power lasers. Since the volume absorbers are designed to allow absorption through their volume instead of damaging heat at the surface, these hardy models can handle peak pulse powers of up to 100 gigawatts / cm^2. Although designed primarily for measuring the average power or single pulse energy of pulsed lasers, volume absorbing calorimeters can also be used for CW measurements particularly with the high damage "ACX" volume absorbing models.

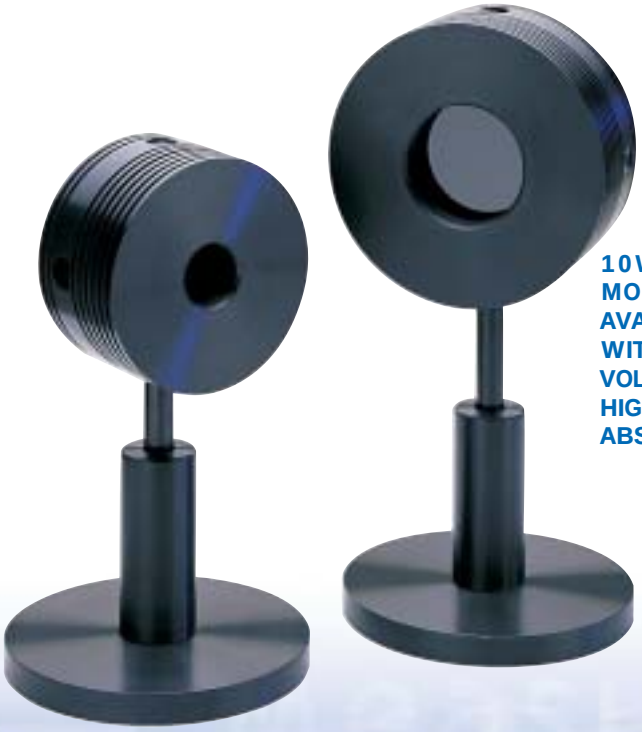
FEATURES:

- Intelligent sensor technology
  - The calorimeter automatically identifies itself to the indicator
  - Different calorimeter models are easily interchanged with the indicator
  - Low signal to noise ratio enhances accuracy
  - Improved EMI / RFI protection is ensured
- Slim 5.6 cm long silhouette
- Ability to resolve to 10 µW and 10 µJ
- N.I.S.T. traceable calibration

The Astral calorimeters

come with a 1.27 cm diameter x 8.89 cm long post for mounting to an optical table. Bases (Model 301-019) for holding the calorimeter / mounting post assembly upright are also available. The slim profile silhouette of the calorimeters saves precious optical table space. For measuring low power and energy (less than 30 mW or 30 mJ), Scientech recommends the optional Isoperibol™ Enclosure accessory (Model 36-0203A) which minimizes environmental thermal interference.

The Astral calorimeters are powered up by the Vector Synenergy Indicators to provide precise watt or joule readings. Choose between the digital / analog indicator Models S310 or H410, the digital only Models S310D or H410D, or one of the dual channel Models D200C or D200PC.



10W AND 30W MODELS AVAILABLE WITH SURFACE, VOLUME AND HIGH DAMAGE ABSORBERS



INTELLIGENT SENSOR TECHNOLOGY

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Astral PHOTODIODE DETECTORS

The Astral™ Series photodiode detectors are perfect for microwatt to 30mW cw power measurements. The AP30 and AP30UV photodiode detectors are powered by the Vector Synenergy Indicators Models H410 and H410D to provide optimum performance with ease of use including automatic wavelength correction. These detectors come with an aperture extension for blocking out unwanted light sources. The slip-fit aperture extension is easily removed allowing close proximity to the absorbing surface for measuring diverging beams. Removing the aperture extension also permits the detectors to fit into tight spaces. The detectors also come with a standard sized 1.27 cm diameter x 8.89 cm long mounting post for mounting to optical tables. Optional bases (Model 301-019) are available for holding the detector / post assembly upright on a tabletop.

With an aperture diameter of 7.9 mm (an area of 0.5 cm2), power density (intensity) determinations are made easy.



SHOWN WITH REMOVABLE APERTURE EXTENSION IN PLACE

FEATURES:

- Intelligent sensor technology
  - The photodiode detector automatically identifies itself to the indicator
  - Different detector models are easily interchanged with the indicator
  - Low signal to noise ratio enhances accuracy
  - Improved EMI / RFI protection is ensured
- Slim 2.8 cm long silhouette
- Ability to resolve to 1 nW
- N.I.S.T. traceable calibration

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Ultra CALORIMETERS

CALORIMETERS

The accuracy and quality standard in Scientech's laser power and energy measurement systems follows through with the revolutionary Ultra™ Series. Designed to handle higher powers while embracing air cooling and light weight in a compact size, the unique Ultra calorimeters possess a potent new heat sensing element. This energetic element empowers an Ultra calorimeter with greater rates of heat flow which yields higher power measurements up to 150 watts with only air cooling.

The Ultra calorimeters are available in surface absorbing, high damage threshold, and ultra-violet volume absorbing models. The surface absorbing Model UC150 has a flat spectral response from 250 nm to 35 µm. The high damage threshold Models UC150HD and UC150HD40 can handle power densities of 1500 W/cm^2. The UV volume absorbing Model UC150UV measures the average power levels of high power pulsed lasers operating in the spectral region from 190 nm to 360 nm. The robust UC150UV can handle energy densities up to 15 J/cm^2. The Ultra calorimeters team up with the multifaceted Vector Synenergy Model S310 indicators to provide accurate high power measurement.

As one of the lowest priced, higher power laser measurement systems available, this vigorous high power series transcends all other approaches and empowers the users who need an advanced, dependable, accurate high power measurement system.

FEATURES:

- Forced air cooling
- Compact size
- High damage threshold models
- N.I.S.T. traceable calibration



UC150UV, UC150HD40 MODELS



UC150, UC150HD MODELS

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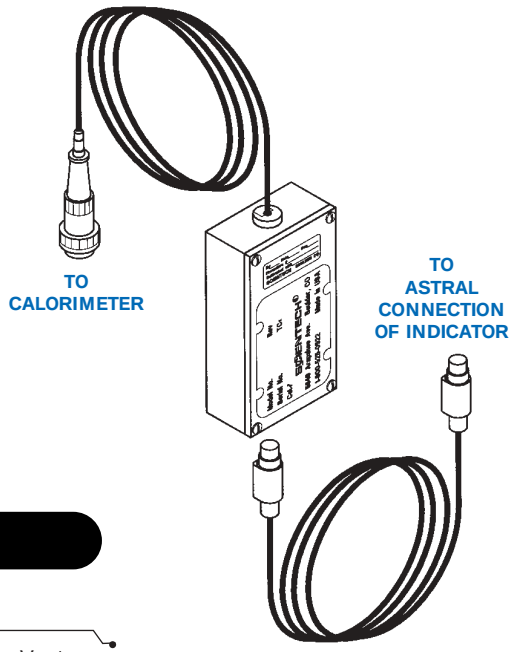
LARGE APERTURE CALORIMETERS

For large area (diameter) or diverging laser beams, Scientech 100 mm and 200 mm diameter disc calorimeters are ideal. Available in both surface and volume absorbing models, these calorimeters can handle both cw and pulsed lasers with average power levels to 100 watts and peak pulse power fluence levels to 100 GW / cm^2. These calorimeters have found extensive service in scientific research, measuring single pulse energy levels to 1 kilojoule, in measuring laser range finders and Lidar systems, and measuring laser diode arrays and metal vapor lasers. These calorimeters will operate with the Vector indictors with an interface module (see below).





INTERFACE MODULE



100 mm AND 200 mm DISC CALORIMETER INTERFACE MODULES FOR INDICATORS

Part Number	Description
10735	Interface Module for 100 mm Calorimeter Hookup to Vector Indicators for power and energy readings up to 30 W, 30 J
10747	Interface Module for 200 mm Calorimeter Hookup to Vector Indicators for power and energy readings up to 30 W, 30 J
10748	Interface Module for 100 mm Calorimeter Hookup to Vector Indicators with 10X electrical attenuator. The indicator will display 1 / 10 the actual value thereby allowing readings up to the calorimeters maximum power and energy capacities
10769	Interface Module for 200 mm Calorimeter Hookup to Vector Indicators with 10X electrical attenuator. The indicator will display 1 / 10 the actual value thereby allowing readings up to the calorimeters maximum power and energy capacities

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Vector PYROELECTRIC DETECTORS

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 12.6 J/cm^2 respectively. High resolution HR detectors can measure repetition rates up to 4 kHz and resolve energy readings to 3 nJ.

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 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.

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 on the specifications page 11. 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 diameter x 8.89 cm 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 N.I.S.T. certified as the transfer standard. The energy of Scientech's YAG laser is accurately measured by the N.I.S.T. 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.

Excessive energy or peak power density can damage any Vector pyroelectric detector. See figure 2 on the specifications page 11 for safe operating limits. If your calculated specifications exceed those provided in figure 2, optical attenuation is required. Scientech provides a damage test slide with each detector (except HD and HDX models) for preoperation damage testing.

Pyroelectric detectors to measure the energy of long pulse durations are now available. Scientech can configure the 25 mm and 50 mm pyroelectric detectors to give calibrated responses when used to measure laser pulses of 400 µsec. to 5 msec. If your application involves these kinds of measurements, please contact an application engineer at Scientech for details on products we can offer.

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



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Optional Accessories

ACCESSORIES

Model 301-LCCA Carrying Case



The Model 301-LCCA carrying case is designed to embrace the S310 or D200 indicators along with Astral calorimeters, Vector pyroelectric detectors, and Ultra calorimeters as well as bases, cables, and power cords.

Model VH STAND

The VH STAND holds the H410 indicator upright on a table top.



Fiberoptic Holder and Adapters

The fiberoptic holder and adapters provide direct fiber hookup to the Astral calorimeter and Vector pyroelectric detectors (except the SP and HR models). Adapters that accept SMA, ST, FC, DIN, E2000 connectors or any 2.5 mm ferrule are available.



Model VH LCC Carrying Case



The Model VH LCC carrying case handles the H410 indicators along with Astral calorimeters and Vector pyroelectric detectors as well as bases, cables, charger, and standard protective soft case.

Model 301-019 Base

The base holds the calorimeters and pyroelectric detectors upright on a table top.



Model 36-0203A Isoperibol™ Enclosure



The 36-0203A isolates the 25 mm Astral calorimeters from environmental thermal disturbances which affect the stability of the calorimeter output when attempting low power and energy measurements. Scientech recommends using this enclosure when attempting power measurements below 30 mW and single pulse energy measurements below 30 mJ.

Model 301-020R Photodiode Detector

The high speed photodiode detector is designed for use with the 25 mm Astral calorimeters as an attachment to the calorimeter aperture. Energy scattered back from the calorimeter's absorber when struck by an energetic pulse provides an attenuated sample of the incident laser pulse sufficient to activate the silicon diode. This provides a temporal profile of the laser pulse when viewed on an oscilloscope. An internal battery eliminates all wires except the coaxial cable to the sampling oscilloscope.



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SPECIFICATIONS

ASTRAL™ CALORIMETER SPECIFICATIONS

Model No.	AC2500	AC25HD	ACX25HD	AC2501	ACX2501	AC25UV	AC2504	AC5000	AC50HD	ACX50HD	AC5001	ACX5001	AC50UV	AC5004
Type Absorber	Surface	Surface	Surface	Volume	Volume	Volume	Volume	Surface	Surface	Surface	Volume	Volume	Volume	Volume
Aperture size (dia.)	25.4 mm	25.4 mm	8 mm	25.4 mm	8 mm	25.4 mm	25.4 mm	50.8 mm	50.8 mm	16 mm	50.8 mm	16 mm	50.8 mm	50.8 mm
Spectral Response	.25 - 35 µm	.19 - 12 µm	.4 - 2 µm	.266 - 1.2 µm	.4 - 1.2 µm.	.19 - .36 µm	.85 - 4.2 µm	.25 - 35 µm	.19 - 12 µm	.4 - 2 µm	.266 - 1.2 µm	.4 - 1.2 µm	.19 - .36 µm	.85 - 4.2 µm
Average Power (max.)	10 W	10 W	10 W	10 W	10 W	10 W	10 W	30 W	30 W	30 W	30 W	30 W	30 W	30 W
Noise Level	10 µW or µJ*	10 µW or µJ*	10 µW or µJ	10 µW or µJ*	10 µW or µJ	10 µW or µJ*	10 µW or µJ*	0.1 mW or mJ	0.1 mW or mJ	0.1 mW or mJ	0.1 mW or mJ	0.1 mW or mJ	0.1 mW or mJ	0.1 mW or mJ
Power Density (max.)	200 W/cm^2	1.5 kW/cm^2	12 kW/cm^2	See Note 13	See Note 14	See Note 17	See Note 16	200 W/cm^2	1.5 kW/cm^2	12 kW/cm^2	See Note 13	See Note 14	See Note 17	See Note 16
Peak Power Density (max.)	1 MW/cm^2	100 MW/cm^2	800 MW/cm^2	See Note 18	8.5 GW/cm^2	See Note 21	See Note 20	1 MW/cm^2	100 MW/cm^2	800 MW/cm^2	See Note 18	8.5 GW/cm^2	See Note 21	See Note 20
Single Pulse Energy (max.)	10 J	10 J	10 J	10 J	10 J	10 J	10 J	30 J	30 J	30 J	30 J	30 J	30 J	30 J
Energy Density (max.)	See Note 5	See Note 6	See Note 7	See Note 8	See Note 9	See Note 12	See Note 11	See Note 5	See Note 6	See Note 7	See Note 8	See Note 9	See Note 12	See Note 11
Precision	<1%	<1%	<1%	<1%	<1%	<1%	<1%	<1%	<1%	<1%	<1%	<1%	<1%	<1%
Accuracy	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Response Time (With Indicator in Watts Mode)	3 sec.	3 sec.	3 sec.	3 sec.	3 sec.	3 sec.	3 sec.	5 sec.	5 sec.	5 sec.	5 sec.	5 sec.	5 sec.	5 sec.
Dimensions (D x L) (cm.) D=Out. Dia. L=Length	9.53 x 5.6	9.53 x 5.6	9.53 x 9.70	9.53 x 5.6	9.53 x 9.70	9.53 x 5.6	9.53 x 5.6	12.07 x 5.8	12.07 x 5.8	12.07 x 9.96	12.07 x 5.8	12.07 x 9.96	12.07 x 5.8	12.07 x 5.8
Weight (kgs.)	0.68	0.68	0.77	0.68	0.77	0.68	0.68	1.3	1.3	1.4	1.3	1.4	1.3	1.3

* Calorimeter installed in isoperibol Enclosure

ASTRAL PHOTODIODE DETECTOR SPECIFICATIONS

Model No.	AP30	AP30UV
Type Absorber	Silicon	Silicon
Aperture Size (dia.)	7.9 mm	7.9 mm
Spectral Response	400 nm – 1.1 µm	200 nm – 1.1 µm
Max. Power	30 mW	30 mW
Min. Power	100 nW	100 nW
Max. Power Density	170 mW/cm^2	5 mW/cm^2
Noise Level	1 nW	1 nW
Accuracy	5%	5%
Response Time	1 sec.	1 sec.
Dimensions D x L (cm.)	6.35 x 2.79	6.35 x 2.79
Weight (kgs.)	0.114	0.114
Indicator Compatibility	H410, H410D	H410, H410D

ULTRA™ CALORIMETER SPECIFICATIONS

Model No.	UC150	UC150UV	UC150HD	UC150HD40
Type Absorber	Surface	Volume	Surface	Surface
Aperture Size	25.4 mm dia.	40 mm x 40 mm	25.4 mm dia.	40 mm x 40 mm
Spectral Response	.25 - 35 µm	.19 - .36 µm	.19 - 12 µm	.19 - 12 µm
Average Power (max.)	150 W	150 W	150 W	150 W
Resolution (min.)	0.1 W	0.1 W	0.1 W	0.1 W
Power Density (max.)	200 W/cm^2	See Note 17	1.5 kW/cm^2	1.5 kW/cm^2
Peak Power Density (max.)	1 MW/cm^2	See Note 21	100 MW/cm^2	100 MW/cm^2
Energy Density (max.)	See Note 5	See Note 12	See Note 6	See Note 6
Precision	<1%	<1%	<1%	<1%
Accuracy	5%	5%	5%	5%
Response Time	Sensor Dependent	Sensor Dependent	Sensor Dependent	Sensor Dependent
Dimensions (H x W x D)(cm.)	12.5 x 8.6 x 10.2	12.5 x 8.6 x 10.2	12.5 x 8.6 x 10.2	12.5 x 8.6 x 10.2
Weight (kgs.)	1.2	1.2	1.2	1.2
Indicator Compatibility	S310, S310D	S310, S310D	S310, S310D	S310, S310D

100 mm CALORIMETER SPECIFICATIONS

Model No.	36-0401	38-0401	38-0402	38-4UV5
Type Absorber	Surface	Volume	Volume	Volume
Aperture Size (dia.)	100 mm	100 mm	100 mm	100 mm
Spectral Response	250 nm - 35 µm	266 nm - 1.2 µm	9 µm - 11 µm	190 nm - 360 nm
Average Power[1] (max.)	50 W	50 W	50 W	50 W
Resolution (min.)	10 mW - mJ	10 mW - mJ	10 mW - mJ	10 mW - mJ
Power Density (max.)	200 W/cm^2	See Note 15	4 W/cm^2	See Note 17
Peak Power Density (max.)	1 MW/cm^2	See Note 19	100 MW/cm^2	See Note 21
Single Pulse Energy[1] (max.)	150 J	150 J	150 J	150 J
Energy Density (max.)	See Note 5	See Note 10	4 J/cm^2	See Note 12
Precision	<1%	<1%	<1%	<1%
Accuracy	5%	5%	5%	5%
Response Time[2]	5 seconds	5 seconds	5 seconds	5 seconds
Dimensions (D x L) (cm.)	15.24 x 20.32	15.24 x 20.32	15.24 x 20.32	15.24 x 20.32
Weight (kgs.)	2.72	2.72	2.72	2.72
Indicator Compatibility	S310, S310D H410, H410D	S310, S310D H410, H410D	S310, S310D H410, H410D	S310, S310D H410, H410D

[1] Full illumination of absorber
[2] With indicator in watts mode

200 mm CALORIMETER SPECIFICATIONS

Model No.	36-0801	38-0801	38-0802	38-8UV5
Type Absorber	Surface	Volume	Volume	Volume
Aperture Size (dia.)	200 mm	200 mm	200 mm	200 mm
Spectral Response	250 nm - 35 µm	266 nm - 1.2 µm	9 µm - 11 µm	190 nm - 360 nm
Average Power[1] (max.)	100 W	100 W	100 W	100 W
Resolution (min.)	100 mW - mJ	100 mW - mJ	100 mW - mJ	100 mW - mJ
Power Density (max.)	200 W/cm^2	See Note 15	4 W/cm^2	See Note 17
Peak Power Density (max.)	1 MW/cm^2	See Note 19	100 MW/cm^2	See Note 21
Single Pulse Energy[1] (max.)	300 J	300 J	300 J	300 J
Energy Density (max.)	See Note 5	See Note 10	4 J/cm^2	See Note 12
Precision	<1%	<1%	<1%	<1%
Accuracy	5%	5%	5%	5%
Response Time[2]	5 seconds	5 seconds	5 seconds	5 seconds
Dimensions (D x L) (cm.)	22.86 x 25.4	22.86 x 25.4	22.86 x 25.4	22.86 x 25.4
Weight (kgs.)	7.26	7.26	7.26	7.26
Indicator Compatibility	S310, S310D H410, H410D	S310, S310D H410, H410D	S310, S310D H410, H410D	S310, S310D H410, H410D

[1] Full illumination of absorber
[2] With indicator in watts mode

ANOTHER FINE ODYSSEY PRODUCTS

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VECTOR™ PYROELECTRIC DETECTOR SPECIFICATIONS

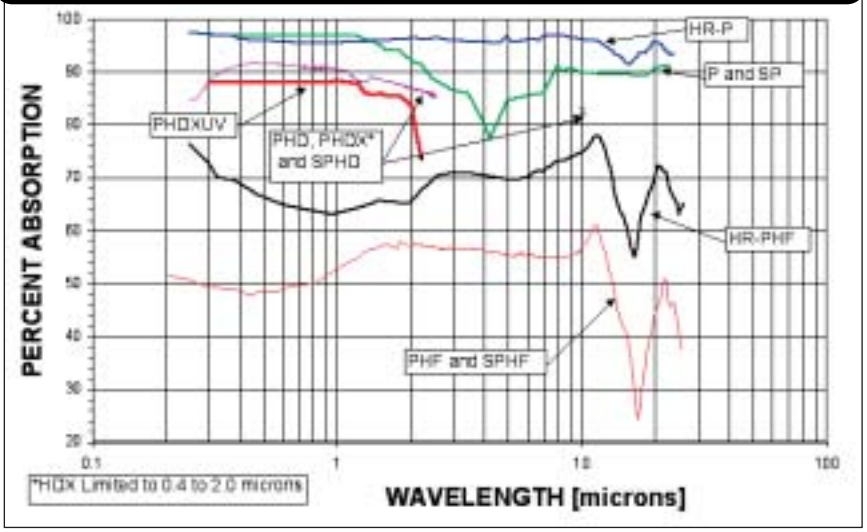
Model No.	SP25	SPHF25	SPHD25	SP50	SPHF50	SPHD50	P25	PHF25	PHD25	PHDX25	PHDX25UV	PHDX50	PHDX50UV	P50	PHF50	PHD50
Aperture Size (dia.)	25.4 mm	25.4 mm	25.4 mm	50.8 mm	50.8 mm	50.8 mm	25.4 mm	25.4 mm	25.4 mm	7 mm	7mm	15 mm	15 mm	50.8 mm	50.8 mm	50.8 mm
Spectral Response	See Fig. 1	See Fig. 1	See Fig. 1	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*
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 1	See Note 1	See Note 2	See Note 1	See Note 1	See Note 2	See Note 1	See Note 1	See Note 2	See Note 3	See Note 4	See Note 3	See Note 4	See Note 1	See Note 1	See Note 2
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

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
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 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 1				
Dimension (D x L) (cm.)	4.45 x 10.8				
Weight (kgs.)	0.21				
Indicator Compatibility	S310, S310D, D200				

RELATIVE SPECTRAL RESPONSE



SPECTRAL RESPONSE OF VECTOR PYROELECTRIC DETECTORS

FIGURE 1

MAXIMUM POWER AND ENERGY DENSITIES

ENERGY DENSITY FOR PYROELECTRIC DETECTORS

Note 1 Max. J/cm² = 316 x (pulse width)$^{1/2}$
Maximum pulse width of the pyroelectric detector must be observed

Note 2 **HD Models**
Max. J/cm² = 4500 x (pulse width)$^{1/2}$ to a maximum of 1.4 J/cm²
Maximum pulse width of the pyroelectric detector must be observed

Note 3 **HDX Models**
Max. J/cm² = 36,000 x (pulse width)$^{1/2}$ to a maximum of 12.6 J/cm²
Maximum pulse width of the pyroelectric detector must be observed

Note 4 **HDXUV Models**
Max. J/cm² = 18,000 x (pulse width)$^{1/2}$ to a maximum of 5.6 J/cm²
Maximum pulse width of the pyroelectric detector must be observed

ENERGY DENSITY FOR CALORIMETERS

Note 5 **Surface Absorbing -**
Models AC2500, AC5000, 36-0401, 36-0801, UC150
Max. J/cm² = 1000 x (pulse width)$^{1/2}$ to a maximum of 200 J/cm²

Note 6 **HD Models**
Max. J/cm² = 4500 x (pulse width)$^{1/2}$ to a maximum of 14 J/cm²

Note 7 **XHD Models**
Max. J/cm² = 36,000 x (pulse width)$^{1/2}$ to a maximum of 42.5 J/cm²

Note 8 **AC2501 and AC5001**
For repetitive pulses: 4.1 J/cm² @ 1064 nm, 3.2 J/cm² @ 532 nm, 1.2 J/cm² @ 355 nm, 24 mJ/cm² @ 266 nm
For single pulse: 8J/cm² @ 1064 nm, 6.2 J/cm² @ 532 nm, 2.3 J/cm² @ 355 nm, 46 mJ/cm² @ 266 nm

Note 9 **ACX2501 and ACX5001** = Note 8 specs. x 8 for 400 nm to 1.2 µm

Note 10 **38-0401 and 38-0801**
For repetitive pulses: 3.7 J/cm² @ 1064 nm, 2.9 J/cm² @ 532 nm, 1 J/cm² @ 355 nm, 20 mJ/cm² @ 266 nm
For single pulse: 7 J/cm² @ 1064 nm, 5.6 J/cm² @ 532 nm, 2.1 J/cm² @ 355 nm, 41 mJ/cm² @ 266 nm

Note 11 **AC2504 and AC5004**
For repetitive pulses: 4.8 J/cm² @ 1064 nm
For single pulse: 10 J/cm² @ 1064 nm

Note 12 **AC25UV, AC50UV, UC150UV, 38-4UV5, 38-8UV5**
For repetitive pulses: 1.1 J/cm² @ 355 nm,
For single pulse: 40 J/cm² @ 355 nm

POWER DENSITY FOR VOLUME ABSORBING CALORIMETERS

Note 13 **AC2501 and AC5001**
30 W/cm² @ 1064 nm, 23 W/cm² @ 532 nm, 8.5 W/cm² @ 355 nm
175 mW/cm² @ 266 nm

Note 14 **ACX2501 and ACX5001** = Note 13 specs. x 8 for 400 nm to 1.2 µm

Note 15 **38-0401 and 38-0801**
27 W/cm² @ 1064 nm, 21 W/cm² @ 532 nm,
7.7 W/cm² @ 355 nm, 158 mW/cm² @ 266 nm

Note 16 **AC2504 and AC5004**
35 W/cm² @ 1064 nm

Note 17 **AC25UV, AC50UV, UC150UV, 38-4UV5,38-8UV5**
50 W/cm² @ 355 nm

PEAK POWER DENSITY FOR VOLUME ABSORBING CALORIMETERS

Note 18 **AC2501 and AC5001**
100 GW/cm² @ 1064 nm, 78 GW/cm² @ 532 nm,
29 GW/cm² @ 355 nm, 580 MW/cm² @ 266 nm

Note 19 **38-0401 and 38-0801**
90 GW/cm² @ 1064 nm, 71 GW/cm² @ 532 nm,
27 GW/cm² @ 355 nm, 530 MW/cm² @ 266 nm

Note 20 **AC2504 and AC5004**
125 GW/cm² @ 1064 nm

Note 21 **AC25UV, AC50UV, UC150UV, 38-4UV5, 38-8UV5**
For repetitive pulses: 101 MW/cm² @ 355 nm
For single pulse: 3.5 GW/cm² @ 355 nm

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