

SCIENTECH®



ISO 9001
REGISTERED

The **MEASURE**
of Confidence

THE *Synenergy*TM Measurement CONCEPT

Scientech is the only manufacturer to offer the potent SynenergyTM laser measurement concept. The foundation for this progressive design consists of the Vector handheld H410 or the desktop S310 power and energy indicators. These readouts, which are capable of performing multifaceted laser measurements, feature combined digital and

analog meter displays and are pivotal to the concept of using only one meter to embrace your choice of numerous thermal, photodiode, pyroelectric, and large aperture calorimeters. The result is Scientech's Synenergy concept, a greater total effect than the sum of separate laser measurement systems.

ALL VECTOR SYNERGY INDICATORS FEATURE:

- Large custom 4-digit LCD display
- Both power & energy measurement
- Statistics mode
- Advanced EMI/RFI protection
- Autoranging
- RS-232 bidirectional interface (S310 & S310D Models)
- IEEE 488 interface (optional on S310 and S310D Models)
- Analog output (S310 & S310D Models)
- Selectable attenuation correction
- User selectable 115/220 VAC power input selector switch (S310 & S310D Models)
- Display backlighting (S310 & S310D Models)
- Selectable scientific notation display (S310 & S310D Models)
- LabVIEWTM drivers (S310 & S310D Models)
- N.I.S.T. traceable calibration



S310

Boasting a large backlit display, the S310 is a versatile Synenergy readout. It is the only Synenergy meter that is capable of handling the Ultra high power detectors as well as Astral calorimeters, Vector pyroelectric detectors and large aperture calorimeters. In addition, the S310 possesses a unique user selectable analog needle 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, large aperture calorimeters, and contain 14 selectable ranges.

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.



H410

The rugged H410 is a small, portable hand-held meter. Like the S310, the versatile H410 display contains a unique analog needle 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) or large aperture calorimeters.

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.



CALORIMETERS

Astral calorimeter thermal detectors 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 “FX” and “ACX” models, power densities up to 48 kW/cm², peak pulse power densities up to 100 GW/cm² and energy densities up to 42.5 J/cm² are handled by various models.

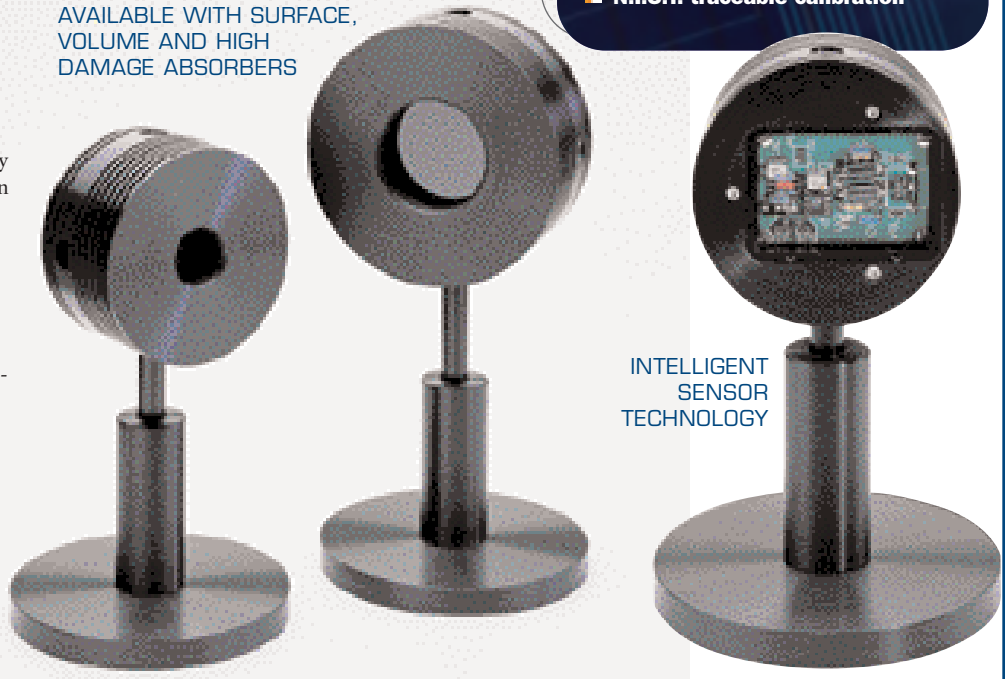
Volume absorbing calorimeters are ideal for measuring the single pulse energy or average power level of high peak pulse power lasers. Since the volume absorbers are designed to allow absorption through their volume instead of damaging heat at the surface, these hardy models can handle peak pulse powers of up to 100 gigawatts/cm². 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.

All Astral calorimeters come with a 1.27 cm diameter x 8.89 cm long post for mounting to an optical table. Bases (Models 301-019 and 11788) 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 Isoperibo!™ 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 and H410 or the digital only Models S310D and H410D.

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



INTELLIGENT SENSOR TECHNOLOGY

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



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 (Models 301-019 and 11788) 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.

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



SHOWN WITH REMOVABLE APERTURE EXTENSION IN PLACE

Ultra 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 fan 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 fan 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/cm². 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 14 J/cm². 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.



UC150,
UC150HD
MODELS



UC150UV,
UC150HD40
MODELS

FEATURES:

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

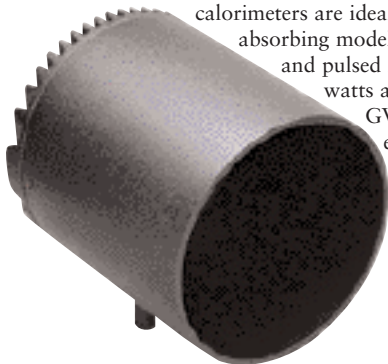
Astral

Large Aperture CALORIMETERS

For large area (diameter) or diverging

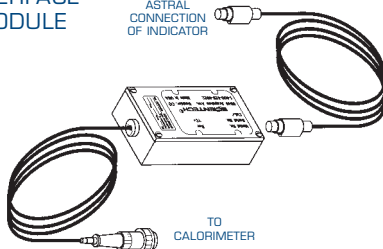
laser beams, Scientech 100 mm and 200 mm diameter disc calorimeters are ideal. Available in both surface and volume absorbing models, these calorimeters can handle both cw and pulsed lasers with average power levels to 100 watts and peak pulse power fluence levels to 100 GW/cm². These calorimeters have 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 indicators with an interface module (see below).



INTERFACE
MODULE

TO
ASTRAL
CONNECTION
OF INDICATOR



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 which are 50 W or 150 J.
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 which are 100W or 300 J.



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/cm² and 12.6 J/cm² 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 7. 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 (Models 301-019 and 11788) 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 the specifications page 7 for safe operating limits. If your calculated specifications exceed those provided, 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



SP, SPHF, SPHD MODELS

P, PHF, PHD MODELS

HDX, HR MODELS

Specifications

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%	

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 m, 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	

ASTRAL™ CALORIMETER SPECIFICATIONS

Model	AC2500	AC25HD	ACX25HD	AC25FX	ACX25FX	AC2501	ACX2501	AC2504	AC25UV	AC5000	AC50HD	ACX50HD	AC50FX	AC50FX	AC5001	ACX5001	AC5004	AC50UV
Type of Absorber	Surface	Surface	Surface	Surface	Surface	Volume	Volume	Volume	Volume	Surface	Surface	Surface	Surface	Surface	Volume	Volume	Volume	Volume
Aperture Dia.	25.4 mm	25.4 mm	8 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	16 mm	50.8 mm	50.8 mm
Spectral Response	25-35 μm	.193-12 μm	4-2 μm	.193-26 μm	4-2 μm	.266-1.2 μm	4-1.2 μm	.85-4.2 μm	.193-.36 μm	.25-35 μm	.193-12 μm	4-2 μm	.193-26 μm	4-2 μm	.266-1.2 μm	4-1.2 μm	.85-4.2 μm	.193-.36 μm
Max Avg. Power	10W	10W	10W	10W	10W	10W	10W	10W	10W	30W	30W	30W	30W	30W	30W	30W	30W	30W
Min Avg. Power	1mW*	1mW*	1mW*	1mW*	1mW*	1mW*	1mW*	1mW*	1mW*	40mW	40mW	40mW	40mW	40mW	40mW	40mW	40mW	40mW
Noise Level	10μW or μJ	10μW or μJ	10μW or μJ	10μW or μJ	10μW or μJ	10μW or μJ	10μW or μJ	10μW or μJ	10μW or μJ	400μW or μJ	400μW or μJ	400μW or μJ	400μW or μJ	400μW or μJ	400μW or μJ	400μW or μJ	400μW or μJ	400μW or μJ
Max P.D.	200W/cm ²	1.5KW/cm ²	12KW/cm ²	6KW/cm ²	48KW/cm ²	Note 1	Note 2	Note 2	Note 3	200 W/cm ²	1.5KW/cm ²	12KW/cm ²	6 kW/cm ²	48 kW/cm ²	Note 1	Note 2	Note 4	Note 3
Max P.P.D.	1 MW/cm ²	100MW/cm ²	800MW/cm ²	Note 15	Note 16	Note 5	8.5 GW/cm ²	Note 7	Note 6	1 MW/cm ²	100MW/cm ²	800MW/cm ²	Note 15	Note 16	Note 5	8.5 GW/cm ²	Note 7	Note 6
Max Single Pulse	10J	10J	10J	10J	10J	10J	10J	10J	10J	30J	30J	30J	30J	30J	30J	30J	30J	30J
Max E.D.	Note 8	Note 23	Note 24	Note 9	Note 10	Note 11	Note 12	Note 14	Note 13	Note 8	Note 23	Note 24	Note 9	Note 10	Note 11	Note 12	Note 14	Note 13
Precision	< 1%	< 1%	< 1%	< 1%	< 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%	± 3%	± 3%	± 3%	± 3%
Response Time	3 secs**	3 secs**	3 secs**	3 secs**	3 secs**	3 secs**	3 secs**	3 secs**	3 secs**	3 secs**	3 secs**	3 secs**	3 secs**	3 secs**	3 secs**	3 secs**	3 secs**	3 secs**
Dims Dxl. - In.	3.8 x 2.2	3.8 x 2.2	3.8 x 3.8	3.8 x 2.2	3.8 x 3.8	3.8 x 2.2	3.8 x 3.8	3.8 x 2.2	3.8 x 2.2	4.8 x 2.3	4.8 x 2.3	4.8 x 3.9	4.8 x 2.3	4.8 x 3.9	4.8 x 2.3	4.8 x 3.9	4.8 x 2.3	4.8 x 2.3
Dims Dxl. - In/cm	9.5 x 5.6	9.5 x 5.6	9.5 x 9.7	9.5 x 5.6	9.5 x 9.7	9.5 x 5.6	9.5 x 9.7	9.5 x 5.6	9.5 x 5.6	12.1 x 5.8	12.1 x 5.8	12.1 x 10.0	12.1 x 5.8	12.1 x 10.0	12.1 x 5.8	12.1 x 10.0	12.1 x 5.8	12.1 x 5.8
Weight - lbs/kg	1.5 / 0.7	1.5 / 0.7	1.7 / 0.8	1.5 / 0.7	1.7 / 0.8	1.5 / 0.7	1.7 / 0.8	1.5 / 0.7	1.5 / 0.7	2.9 / 1.3	2.9 / 1.3	3.1 / 1.4	2.9 / 1.3	3.1 / 1.4	2.9 / 1.3	3.1 / 1.4	2.9 / 1.3	2.9 / 1.3

*when installed in an Isoperibol Enclosure

**when connected to a Scientech indicator in watts mode

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
Average Power (min.)	10 W	10 W	10 W	10 W
Resolution (min.)	0.1 W	0.1 W	0.1 W	0.1 W
Power Density (max.)	200 W/cm ²	See Note 3	1.5 kW/cm ²	1.5 kW/cm ²
Peak Power Density (max.)	1 MW/cm ²	See Note 6	100 MW/cm ²	100 MW/cm ²
Energy Density (max.)	See Note 8	See Note 13	See Note 23	See Note 23
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

ASTRAL™ LARGE APERTURE CALORIMETER SPECIFICATIONS

Model	380401	380401	380402	384UV5	380801	380801	380802	388UV5
Type of Absorber	Surface	Volume	Volume	Volume	Surface	Volume*	Volume	Volume
Aperture Dia.	100mm	100mm	100mm	100mm	200mm	200mm	200mm	200mm
Min Beam Dia.	5cm	5cm	5cm	5cm	7.5cm	7.5cm	7.5cm	7.5cm
Spectral Response	25 - 35μm	.266 - 1.2μm	9 - 11μm	.193 - .36μm	25 - 35μm	.266 - 1.2μm	9 - 11μm	.193 - .36μm
Max Avg. Power		50W**	150mW		100W**	700mW		
Min Avg. Power		1.5mW or mJ			7mW or mJ			
Noise Level								
Max P.D.	200W/cm ²	Note 17	4W/cm ²	Note 3	200W/cm ²	Note 18	4W/cm ²	Note 3
Max P.P.D.	1MW/cm ²	Note 19	100MW/cm ²	Note 6	1MW/cm ²	Note 20	100MW/cm ²	Note 6
Max Single Pulse		150J			300J			
Max E.D.	Note 8	Note 21	4J/cm ²	Note 13	Note 8	Note 22	4J/cm ²	Note 13
Precision		<1%				<1%		
Accuracy		±5%				±5%		
Response Time		5 seconds when connected to a Scientech indicator in watts mode				5 seconds when connected to a Scientech indicator in watts mode		
Dims Dxl. - In/cm		6.0 x 8.0 / 15.2 x 20.3				9.0 x 10.0 x 22.9 x 25.4		
Weight - lbs/kg		6 / 2.7				16.3 / 7.3		

* This is a segmented absorber

**full illumination of absorbing surface

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	2 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

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	7 mm	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.) (WxHd, 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

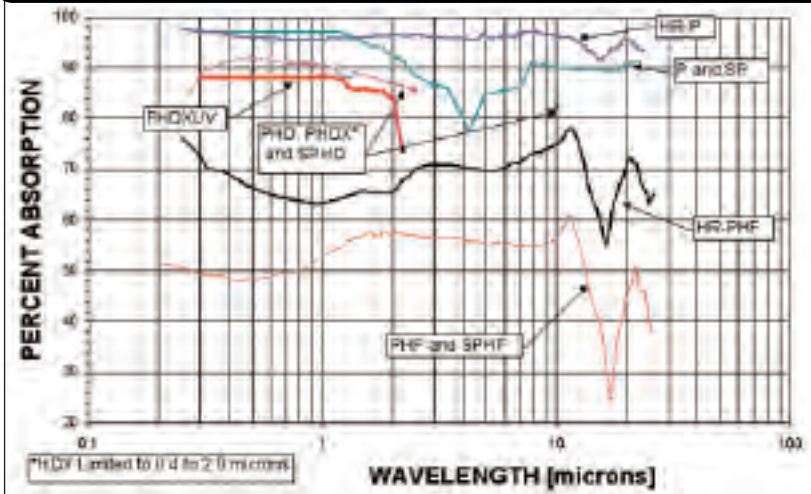
VECTOR HR PYROELECTRIC DETECTOR SPECIFICATIONS

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	15	2.5	1	3.0	0.8
I	0.15	0.025	0.01		
L					
Electrical Decay Time (msec) (RC Time Constant)				2.0	2.0
S - pulse width < 5 µsec	0.05	0.05	0.05		
I - pulse width < 50 µsec	0.5	0.5	0.5		
L - pulse width < 250 µsec	2.5	2.5	2.5		
Noise Equivalent Energy (nJ)				15	35
S	3.0	15	35		
I	150	750	3500		
L					
Maximum Energy (µJ)				1.5	3.5
S	0.3	1.5	3.5		
I	15	75	350		
L					
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)	4.5	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				

NOTES

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

RELATIVE SPECTRAL RESPONSE



SPECTRAL RESPONSE OF VECTOR PYROELECTRIC DETECTORS

FIGURE 1

Optional ACCESSORIES

Model 301-LCCA Carrying Case

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



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 STAND

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



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.



Coils

Electric substitution heater coils for electrical calibrations on Astral Calorimeters

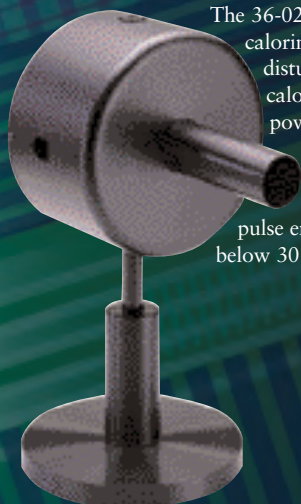


Bases

These bases will hold the Astral, Ultra, and Vector detectors upright on your working surface. Base 11788, which is a slotted base, will bolt down to your optical bench. Base 301019 will work on any surface.

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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