PRODUCT GUIDE

LASER BEAM MEASUREMENT

2012

LASER BEAM MEASUREMENT 40 ANNIVERSARY 1972-2012

gentec-eo

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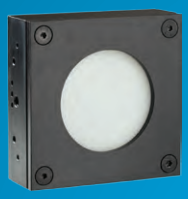
NEW IN 2012

See page 30

M-LINK - Universal Power & Energy Meter

This new PC-Based monitor is compatible with ALL types of detectors - including thermopiles, pyroelectrics and photo detectors - for both power and energy measurements. The device is available as a single channel unit that directly interfaces with a computer using a USB2.0 connection. The M-LINK also presents a unique digital method of suprressing the noise that allows to read very low energy levels (down to the pJ).



See page 78

UP55N-VR - Large Aperture Volume Absorber Power Detector

This very special detector is based on our unique Volume Absorber technology designed to sustain the high peak powers combined to the high energy per pulse that is characteristic of high energy solid state lasers. The new UP55N(M)-VR family has a 55 mm a#perture and is available with 4 different cooling modules, to measure continuous average powers ranging from 50 W to 200 W.

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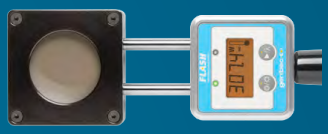

FLASH-IPL - Handheld Laser Probes for IPL Sources

We have extended the FLASH Handheld Laser Probes family of products with the addition of the new FLASH-IPL Probes, specially designed for IPL sources. The FLASH-IPL is configured to measure intense light pulses at slow repetition rates up to 350 J/pulse with its unique single shot calibration. Thanks to the calibrated apertures of 1 cm^2, the user will get a direct measurement of the FLUENCE (J/cm^2).

See page 84

HP Series - Custom Size High Power Detectors

Our unique power detector technology offers FULL FLEXIBILITY on both POWER and SIZE: Very High Average Powers (Up to 30 kW, more on request), NO Limitations on Aperture Size and Shape, High Damage Thresholds and Direct USB Output to PC. The custom sized HP detectors can be built for any kind of laser (CO2, YAG, Fiber Laser, Diode Arrays, etc.).

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ABOUT GENTEC-EO

Photo courtesy of Lawrence Livermore National Laboratory

Located in the heart of the Quebec Optical Hub, in beautiful Quebec City, Canada, Gentec Electro-Optics (Gentec-EO) has a long history in the laser measurement field. With a 40 year track record of innovation and providing quality solutions for laser power and energy measurement applications from the factory to the hospital and laboratory, Gentec-EO stands ready to serve you now and in the future.

ABOUT GENTEC-EO

A LONG HISTORY

The first laser energy meter in the world has been initially developed for internal use as Gentec Inc. were putting the first high repetition rate TEA CO_2 lasers on the market in 1970. Gentec, Inc. introduced the first pyroelectric joulemeters shortly after that. They were also the first to manufacture both thermopile wattmeters and pyroelectric joulemeters. In the mid 1990's, Gentec introduced the WB series with an average power density damage threshold of 100 kW/cm² that is still unrivalled today. In 2000, Gentec Electro-Optics, Inc. was formed from Gentec, Inc. so that the focus was entirely on laser measurement. And in 2010, the acquisition of Spectrum Detector Inc. allowed Gentec-EO to cover new markets, like THz Detectors, Ultra-Fast Pyroelectric Detectors and Highly Sensitive Photo Detectors, to name a few.

ACQUIRED IN 2010

Spectrum Detector Inc.

ABOUT SPECTRUM DETECTOR

Established in 2006, Spectrum Detector Inc. has developed a large number of unique Photonics Instruments that include Photo Detectors and Pyro-Based Laser Power Meters, Pulsed Laser Energy Meters, High Speed 130 kHz Joulemeters, Broadband Pyroelectric Detectors and Radiometers, and a unique, industry leading line of THz Sensors and Instruments for power and energy measurements from 0.1 to 30 THz. Many of their instruments are designed for use while powered over a USB connection to a computer and feature unique LabView Applications Software. The company was established by Don Dooley, the former founder of Molectron Detector, and employs a number of Senior Technical Staff that have worked with Mr. Dooley over the past 30 years. They have designed and built many custom Pyroelectric Sensors and Electronics for the National Standards Labs which are used as calibration transfer standards.

WORLDWIDE PRESENCE

Gentec-EO has an evergrowing presence everywhere around the world. Each year, we keep adding new partners in various countries. Our latest additions are Thailand, Singapore and Vietnam. We also have a strong presence in most of the European and Asian countries and, following the acquisition of Spectrum Detector this year, we now have an office in the US. When you send a unit to us for repair or recalibration, you are entitled to expect your unit back in as short a time as possible.

With calibration centers on 2 continents, and offices both in Canada and the US Gentec-EO has a solid presence and fast turnaround times, just what you need to keep pace with today's rapid market

CALIBRATION

Gentec-EO offers its customers state-of-the-art calibration, traceable to the NIST. Each detector is calibrated precisely to your chosen wavelengths. Furthermore, we include measured, not typical, calibration data in nm steps outside these wavelengths. Treat your laser with the most accurate detectors on the market!

CALIBRATION

THE TERMS

ACCURACY

The accuracy of a measurement is defined as the closeness of the agreement between the result of a measurement and the true value.

UNCERTAINTY

Uncertainty is a measure of the "goodness" of a result. The definition and concept of uncertainty is a quantitative attribute to the final result of measurement, considering all systematic and random components of all known input quantities.

ERROR

The error on a measurement is the difference between the measurement result and the true value.

REPEATABILITY

The repeatability is the closeness of the agreement between the results of successive measurements under the same conditions of measurements.

REPRODUCIBILITY

The reproducibility is the closeness of the agreement between the results of successive measurements under changed conditions of measurements. This is also defined as "precision under reproducibility conditions".

PRECISION

The precision of a measurement is defined as the closeness of agreement between independent test results obtained under stipulated conditions.

The above definitions come from the Technical Note #1297 of the NIST.

THE TECHNIQUE

HOW NIST CALIBRATES OUR GOLD STANDARDS

Gentec-EO's gold laser power detector heads are compared to NIST standard calorimeters at different wavelengths, in accordance to the different lasers used to calibrate your own detector heads. The laser beam has a nominal diameter appropriate for the detector, and is centered on the detector's absorbing surface. The laser energy impinging upon the test instrument is measured concurrently using a NIST standard calorimeter and a calibrated beam splitter. The beam splitter ratio is measured using NIST standard calorimeters. Before the measurements are performed, the test instrument is allowed to reach equilibrium with the laboratory environment. The calibration factor is found by dividing the instrument output reading by the calculated average incident laser power. The calculation is based on the output reading of the NIST standard calorimeters.

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CALIBRATION

ELECTRICAL INSTRUMENTS

All of our electrical instruments are calibrated by certified calibration suppliers. They certify that, at the time of calibration, the instruments used for calibration meet or exceed all published specifications and have been calibrated using standards whose calibrations are traceable to the NIST and/or other recognized international standards. The electrical and physical properties of their laboratories meet the highest requirements for ambient temperature, relative humidity and cleanliness. Their equipment is maintained by procedures that meet the requirements of ISO 9001:2000 and ISO 10012:2003.

THE FACTS

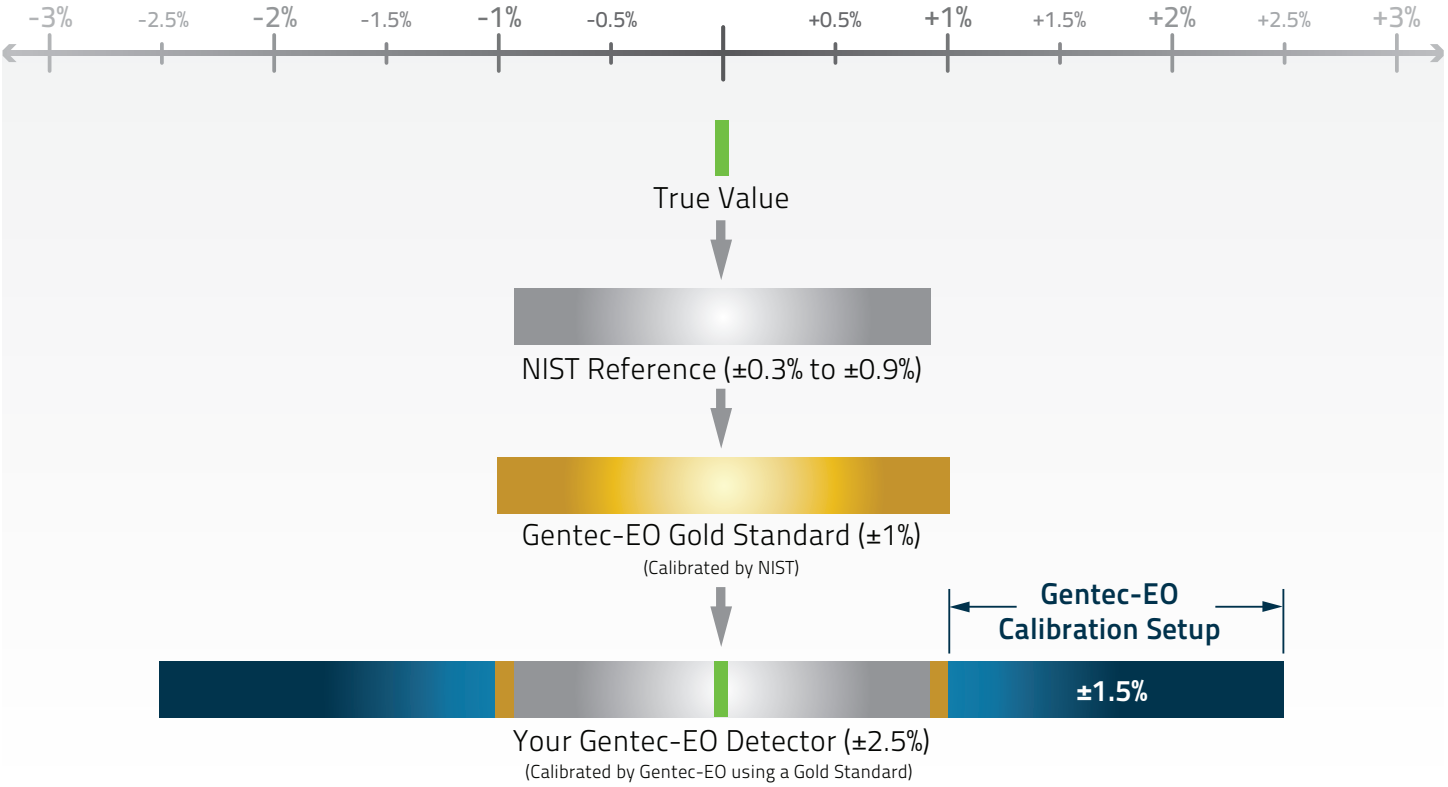
HOW GENTEC-EO CALIBRATES YOUR DETECTOR

Every detector is individually calibrated to the best possible accuracy traceable to NIST standards. Stable laser sources at various wavelengths are used in our calibration process.

UNCERTAINTY

One very common misconception is the absolute value of calibration uncertainty. Be aware that this value is made using a complex statiscal method that takes in account ALL the sources of uncertainty that are present in the process. Figure 1 below shows these steps and their respective contribution to the value of uncertainty. As you can see, the manufacturer itself is only one of these sources.

Figure 1. Sources of uncertainty in the calibration of a detector



CALIBRATION

CALIBRATION WAVELENGTHS

Another misconception is that any wavelength can be NIST calibrated: this is not true. The NIST only supplies distinct wavelengths in the range comprised between 193 nm (ArF excimer laser) to 10.6 mm (CO_2 laser). Any wavelength outside this range or other than the ones supplied within the range is subject to an additional error on the calibration value. You can refer to table 1 for the list of wavelengths from the NIST and the related calibration uncertainties.

Table 1. NIST Calibration Wavelengths as listed in document 42110C-42111C (Laser Power and Energy Meter (or Detectors Used with Lasers) Calibrations)

Primary Standard	Wavelength	Power Range	Typical Relative Expanded Uncertainty (%)
C-series	325 nm	100 nW to 10 mW	1 to 2
	488 nm	1 nW to 1 W	0.5 to 1
	514 nm	1 nW to 2 W	0.5 to 1
	532 nm	1 nW to 20 mW	0.5 to 1
	633 nm	1 nW to 20 mW	0.5 to 1
	830 nm	1 nW to 20 mW	0.5 to 1
	1064 nm	1 nW to 2 W	0.5 to 1
	1319 nm	1 µW to 10 mW	0.5 to 1
	1550 nm	1 µW to 10 mW	0.5 to 1
Q-series (Q-switched)	1.06 µm (pulsed)	1 µJ/pulse to 300 mJ/pulse 200 µW to 6 W	1.1 to 1.5
K-series	1.06 µm	2 W to 300 W	1.6 to 2.0
	10.6 µm	2 W to 900 W	1.6 to 2.0
QUV-series	248 nm (pulsed)	0.05 mJ/pulse to 150 mJ/pulse 3 mW to 7.5 W	1 to 3
	193 nm (pulsed)	0.02 mJ/pulse to 150 mJ/pulse 3 mW to 3 W	1 to 3

For your information only. The above content was taken from document 42110C-42111C as last updated in December 2010 by NIST. For more information on these wavelentgths, please contact the NIST directly.

PERSONNAL WAVELENGTH CORRECTION™

To fill the gaps between the NIST references, Gentec-EO offers you the only NIST traceable calibration in nm steps, from 250 nm to 2.5 mm. We achieve this using our proprietary setup that is based on a NIST traceable spectrophotometer. This way, instead of supplying you with typical values, we offer you a NIST traceable calibration. What you get is an overall accuracy that is not more than ±1% away from the original calibration accuracy, in the spectrum of 300 to 2200 nm.

This data is stored in the Smart Interface so all you need to do is enter your wavelength in your Gentec-EO monitor and you are ready for accurate and precise laser measurements. This wavelength correction is based on measurements of your individual detector instead of a general curve for the absorber material. That means you have the best wavelength correction available anywhere.

ENERGY DETECTORS

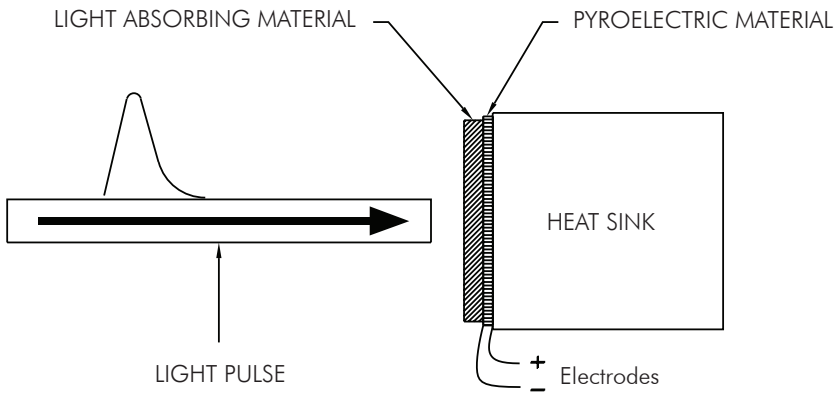
ENERGY DETECTORS AT GENTEC-EO

Gentec Electro Optics provides a full range of products to meet your pulse energy measurement needs. They range from the lean and portable QE12 and QE25 series, the large aperture QE50, QE65 and QE95 series to our large world class custom calorimeters. Having introduced the first pyroelectric joulemeter over 30 years ago Gentec-EO is well established as an experienced source of energy measurement expertise. Be it in the laboratory or an OEM application Gentec-EO will have a solution.

HOW THEY WORK

In the simplest terms, a pulse of light is absorbed by the surface of the detector and heats it up. That in turn, changes the temperature in a pyroelectric material underneath. This separates electrical charges in the pyroelectric which creates a voltage as the pulse of heat energy passes through it to a heat sink. The heat sink removes the heat energy to allow the pyroelectric to be ready for another pulse and to prevent it from over heating. The electrical voltage read by the measuring instrument is proportional to the energy. Figure 1 sketches out the basic structure of a pyroelectric joulemeter.

Figure 1. Joulemeter Construction



THE ABSORBER

The business end of the detector is the absorber that coats the side of the pyroelectric that is exposed to the laser. That material absorbs most of the light energy from the laser and converts it to heat. A small fraction is reflected. How much is shown by the spectral response curve for the material. The thermal mass of the absorber and its thickness determine how quickly the heat can flow to the pyroelectric detector and hence its response time.

Lowering the thermal impedance by using an absorber with a lower thermal mass or reducing the thickness of the absorber will increase its speed. The metallic MT coating is a good example. It allows for a measurement of each pulse up to 4000-6000 Hz.

THE PYROELECTRIC

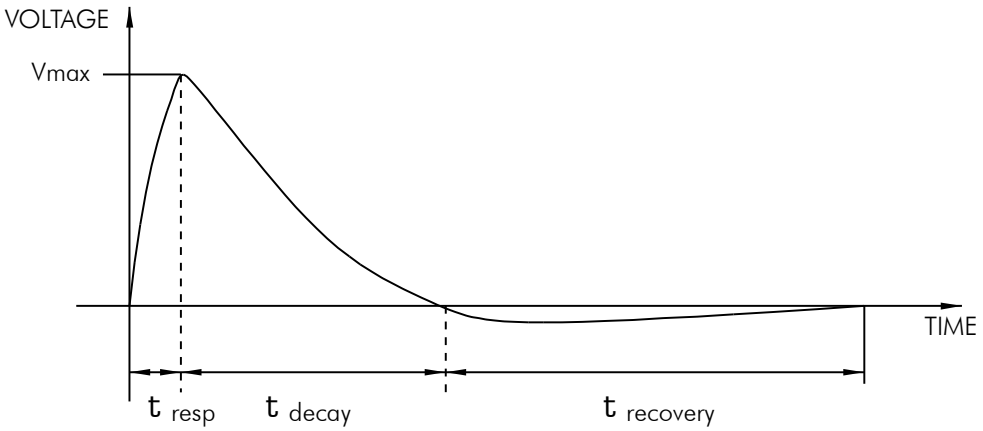
The heart of every Gentec-EO energy detector is a fast response pyroelectric material. It acts as a source of electrical current when subjected to changes in temperature provided by the absorber. Essentially it contains permanent electrical dipoles that are oriented in a specific direction. A rapid temperature change in the material will alter the orientation of these dipoles. That changes the internal electric field and causes an imbalance in electrical charge between the 2 large sides of the device. There are thin metal electrodes on these surfaces. They allow the charge to flow from one electrode into a circuit with a load resistor and then back to the crystal via the other electrode to eliminate the imbalance. The electrical current is converted into a voltage signal by the load resistor.

ENERGY DETECTORS

THE VOLTAGE RESPONSE

The result is a voltage pulse that rises quickly with the response time of the device to a level proportional to the laser energy (Figure 2). It then decays exponentially over a longer period of time that is a function of the pyroelectric device and load impedance. Figure 2 also shows that there is a longer recovery time to return to the initial state of the detector. This is a function of thermal phenomena and is not affected by the load impedance as are the rise and decay times. The integrated pulse energy over this period is proportional to the peak voltage.

Figure 2. Typical voltage response of a Gentec-EO energy detector



THE MEASUREMENT

The laser energy is given by the change in voltage divided by the sensitivity (in Volts/Joule) of the detector. The measured voltage is the change from the initial reference voltage to the maximum voltage of the pulse. The sensitivity is provided by Gentec-EO on our NIST-traceable calibration certificate. We measure this with extreme care with a well known laser energy provided by an NIST standard. This sensitivity is for the specific load impedance that is requested. The user can measure the voltage on an oscilloscope or computer data acquisition system and use the sensitivity value to make the energy measurement. An easier option is to read it directly in Joules from a Gentec-EO MAESTRO or S-LINK-2 monitor.

THERMALLY ROBUST

The energy detector will make accurate measurements in spite of changing temperature in the environment or heating of the detector as long as the maximum voltage does not saturate. This is because it is the difference between the initial and peak voltages that measure the pulse energy. This relative measurement is good until the peak voltage is prevented from reaching its natural value by the maximum voltage available in the electronics.

DAMAGE THRESHOLDS

Excessive pulse energy that is concentrated into to a small area can damage energy detectors. For the most demanding laser beams we offer the broadband MB coating which has pulse energy density thresholds that are among the best in the world. Slight discoloration from short pulses is due to a modification of the organic material in the absorber that does not affect the detector calibration. If enough of the coating is removed by ablation to expose the metal electrode underneath, then the output voltage may be affected too much for the application. Too much average power, (that is above the manufacturer's specification) can cause the detector to overheat. Contamination on the absorber surface can also interfere with the measurement or damage the detector by concentrating too much energy in one spot. Grease, dust, and fingerprints are some of the common contaminants to avoid.

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POWER DETECTORS

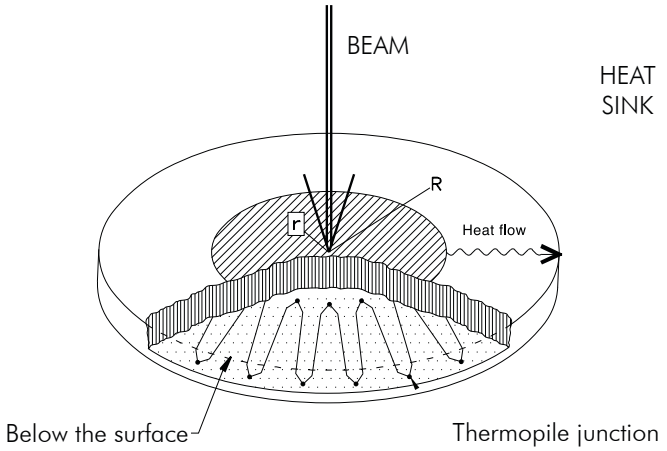
POWER DETECTORS AT GENTEC-EO

Well established in this field for over 40 years Gentec Electro Optics has been a leader in the field of laser power and energy measurement. The average power density damage threshold of 100 kW/cm^2 that we introduced with the WB series in the mid 1990's is still unsurpassed. Gentec-EO also offers you broadband spectrally flat power detectors for general use in the UP12E-H5 & UP19K-H series, high peak power pulse damage resistance for specific UV and IR bands with the UP19K-VR series, and high average power detectors in the air and water cooled High Power UP25N(M)-H, UP55N(M)-H & UP55G for the big jobs. All our detectors are available in OEM version and different size disks as well. Whatever your need Gentec Electro Optics has a solution.

HOW THEY WORK

The basic laser power detector is essentially a thermopile. The more familiar application for thermopiles, in fact where the common name "thermo electric cooler" comes from, is when a voltage is applied to cool one side of the thermopile and whatever it is bonded to. Thermopiles for laser power measurement however are used in the opposite fashion. That is, a temperature difference is used to create a voltage. On one side is material heated by the laser and on the other is a heat sink. The laser energy absorbed by that material is converted to heat. With the hot absorber on one surface and the cold heat sink on the other, there is a temperature difference across the thermo electric device as the heat flows through it. This temperature difference causes the thermopile to generate a voltage. That voltage is proportional to the temperature difference which in turn is proportional to the laser power. The monitor measures this voltage to provide the laser power reading in watts. Figure 1 shows the fundamentals of the thermopile-based power detectors.

Figure 1.
Disk type thermopile



r = radius of beam
R = Radius of disk

THE ABSORBER

The optically absorbing material is one of the most important parts of the detector. That is because its properties define much of the performance of the detector, especially its resistance to pulse damage. This material absorbs most of the light energy from the laser and converts it to heat. A fraction is reflected that can vary from a few percent to 50 percent of the total optical power, depending on the material and intended application. How much is shown by the spectral absorptivity response curve for the material. With an absorber like our broadband H coating, around 90% of the power may be absorbed across a very wide range of wavelengths (190 nm to 20 microns) with small variations. This is called a spectrally flat absorber. It is efficient and because of its low thermal mass it transfers the heat quickly.

POWER DETECTORS

THE HUMBLE BEGINNING

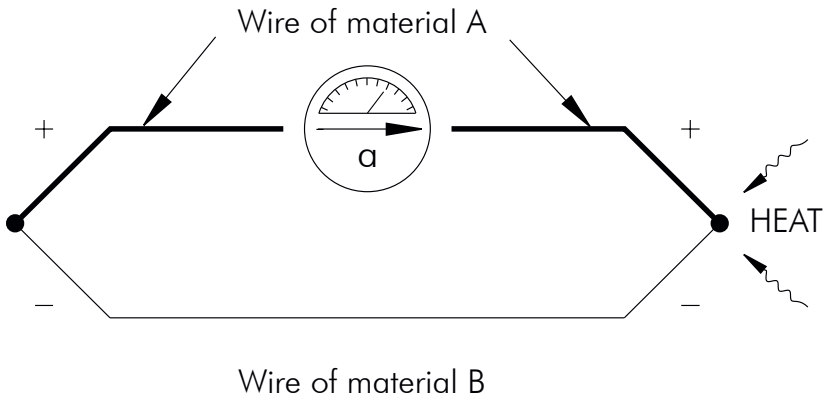
A thermopile is simply an array of thermocouples connected in series and close together. The fundamental technology of all state-of-the-art thermal laser power detectors actually goes back to 1821! That is when Thomas Seebeck joined two wires of dissimilar materials together at both ends and discovered electrical current flowing when he heated one end. Moreover, he found that the voltage between junctions was proportional to the temperature difference between them. That is called the Seebeck voltage and became the basis for the thermocouple. Years later Lord Kelvin (William Thomson) explained it. Essentially, the heat causes electrons to diffuse away from one end of a wire to the other. Since the effect is different for different metals, there is a net difference in voltage where the metals join, hence Seebeck's voltage. Peltier made his contribution in 1834 by observing that heat could be made to flow into, or out of, the junction depending on which way you make the current flow. Modern thermocouples are made by the joining of specially formulated metal alloys and even specially doped semiconductor materials.

Figure 2.
Seebeck's thermopile

THE THERMOCOUPLE

A practical view of a thermocouple is essentially 2 wires of different metals attached at both ends like in Figure 3. One junction goes to the "hot" side of the device and the other goes to the "reference" or cold side of the device. In laser power measurement, the hot junction is placed next to the absorber and the other next to the heat sink. Any temperature difference between the two junctions causes a voltage difference between them. That electrical voltage is proportional to the temperature difference, therefore to laser power. This is the voltage that is measured by the power monitor to provide the power reading.

Figure 3.
The thermocouple



POWER DETECTORS

THE THERMOPILE

The amount of voltage that can be produced by one thermocouple is small, so an array of thermocouples is connected in series to increase sensitivity and multiply the output. In the array, instead of the two wires being joined twice to each other, each wire is joined to two wires of the other type, but a different one at each end. The junctions alternate back and forth so that each wire has a junction on the hot side, and another on the cold side. This is easier to visualize in Figure 1. The more numerous and closer together the junctions are, the more sensitive the thermopile will be. So it gives more voltage for the same laser power.

THERMOPILE CONFIGURATIONS

DISK THERMOPILE

Two kinds of thermopiles are used in laser power measurment. One is the disk thermopile shown in Figure 1 and the other is the wafer-type thermopile. The disk is made of one set of junctions laid out radially. One set of junctions is arrated under the aperture while the alternate set is near the edge of the disk which is attached to a massive heat sink. The laser power heats the absorber in the center and creates a temperature difference between the center and the edge. The thermocouples generate a voltage corresponding to this difference.

The primary difference with the second type is that the heat flows radially through the disk which can handle more average power, especially with blown air or water cooling. The disk thermopile also has a much faster natural response time. Gentec-EO offers a complete line that combined a new technology disk with different cooling ways like heat-sink, fan or water cooling module.

WAFER-TYPE THERMOPILE

The second one resembles a wafer, or sandwich, with thermocouples running between the two sides. One rectangular face of the wafer thermopile receives the heat. That creates a large temperature gradient across the small distance to the other face that is in contact with the massive heat sink. The array of solid state thermocouples in the thermopile generates a voltage proportional to this gradient just like in the disk thermopile. Because of the close spacing of the thermocouples to each other, the resulting large number of thermocouples in the wafer, and the large temperature gradient across the two surfaces, the output voltage of this thermopile is the most sensitive to laser power and the least sensitive to beam position and size.

ANTICIPATION

The voltage response of a thermopile to the incoming power is predictable. It can be modeled. All Gentec-EO monitors have circuitry and software that model the incoming pulse and accurately predict its peak value before it actually occurs. This “anticipation” circuitry allows the wafer type thermopiles to have a much faster accelerated response time when used with a Gentec-EO monitor than the natural response time of the device.

DAMAGE THRESHOLDS

THE THERMOCOUPLE

An average power that is too high simply overheats the detector until it damages the thermocouple junctions. As a consequence, the thermopile itself and the cooling system determine the average power capacity of the detector. This is also what you risk if you exceed the manufacturer’s specification for too long. To avoid overheating, we offer the UP series which can, with its newest design, take a lot more heat than the usual thermopile.

POWER DETECTORS

AVERAGE POWER DENSITY

Concentrating too much energy into too small an area can damage the absorber. Hence, the absorber determines how much energy and power density the detector can take. There are two fundamental types of damage. The first is from slow thermal effects and the second from short pulse impacts. The slow thermal damage is due to local heating when the average power density is too high. The result is melting, vaporizing and/or cracking of the absorber. CW, QUASI-CW and lasers with high repetition rates, such as used in micromachining can create high average power density, especially with small beam diameters. For these demanding laser beams we offer the W5 and W9 Series which have, at 100 kW/cm^2, the highest average power density threshold available today. For the most challenging cases, expanding the beam is often the easiest way to reduce the power density to something manageable.

PEAK POWER DENSITY (PULSED)

When the pulse energy is concentrated into too short a time, as well as space, it explosively vaporizes some of the absorber material at the surface. That ablates or knocks away some of the absorber. When the thermopile underneath is eventually exposed, the sensitivity may be affected too much for the application. The VM and VH series (volume absorbers) are designed to take the concentrated pulse energy by distributing it through a volume instead of just on the absorber surface. Unlike the broader band materials which absorb the energy right on the surface, the energy is absorbed throughout the thickness of the material. That spreads the energy throughout a cylindrical volume rather than just over an area of the beam diameter. Energy densities greater than 30 J/cm^2 and peak power densities above 100 GW/cm^2 can be handled this way depending on the wavelength. If damaged by excessive pulse energy density or peak pulse power density our absorbers can be easily replaced in the field.

WAVELENGTH

The other important consideration is wavelength. Energy from the longer wavelengths, like Mid and Far IR tends to penetrate deeper into the absorber. Damage from exceeding the specification may occur first at the absorber-thermopile interface and work its way up to the surface. In the shorter wavelengths the energy is concentrated closer to the absorber surface. In the case of UV the photons are so energetic and concentrated on the surface that they cause electronic as well as optical-thermal damage. Essentially, they knock electrons out of atoms in the absorber material. Gentec-EO offers broadband absorbers for all kind of wavelength as well as absorber for specific wavelength. In practice, a combination of the two mechanisms is often at play and both may be visible. If your application is pushing the limits pay attention to the damage thresholds provided by the manufacturer and the spectral absorptivity curve for the material to adjust for wavelength where necessary.

THE BOTTOM LINE

Damage to the absorber surface, whatever the mechanism (even if you scratch it), is only an issue when it changes the ratio of power reflected versus absorbed at your laser wavelength. Visible discolorations may not mean much at our wavelength of your laser if it is outside of the visible light spectrum. Then again they might. If more power is reflected, less will be absorbed so the detector will be less sensitive than when it was calibrated. When this damage is severe enough, and covers enough of the area under the beam to affect the accuracy required by the application, you should send the detector for recalibration, and possibly service. For many applications an annual recalibration is good policy.

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PRESENTATION

OVERVIEW OF THE DIFFERENT MODELS

The Gentec-EO monitors come is various sizes and types to cover all applications. We have monitors with or without display (PC-based) and for power or energy readings, or both. We also offer the fastest digital needle display on the market.

See page 18

MAESTRO

Gentec Electro-Optics is proud to present the new MAESTRO Power & Energy Meter, with extra-large 5.6in color LCD display and fully touch screen controls. With a completely revised user interface and faster electronics, it will do more, in less time, and with less effort than any other meter on the market!

TOUCH SCREEN **COLOR LCD** **MULTIPLE LANGUAGES ***

* Every language may not be available yet

See page 22

TUNER

This Power Meter presents both a large LCD display and an ultrafast needle, up to 10X faster than anything else on the market. It comes with more features than the competition, like min and max holds for both displays, comet tail needle and bargraph function. The TUNER comes in Gentec-EO's ergonomic design, with a large LCD display and easy to use direct access keys.

ULTRA-FAST TUNING NEEDLE

See page 24

UNO

The UNO is a simple Power Meter, with larghe contrast fields and direct access buttons. Its extremely low power consumption allows it to work on standard alkaline batteries, making it the monitor of choice for service technicians working in the field. With the lowest price for a display meter, the UNO is the perfect choice when looking for a reliable, entry-level power meter.

ECONOMICAL POWER METER

See pages 26 and 28

S-LINK-2 & P-LINK

The S-LINK-2 and P-LINK are PC-Based Power or Energy monitors that both come with unique software applications. The S-LINK-2 has 2 channels and measures energy detectors at a fast rate; up to 10 kHz per channel. It comes with a USB interface, Ethernet being available in option. The P-LINK is a small power meter, available with either a USB or RS-232 interface.

PC-BASED POWER OR ENERGY METERS

COMPARISON TABLE

See page 30

M-LINK

New in 2012, the M-LINK is a Universal Power & Energy Meter with PC-Interface through a USB connection. This meter measures ALL the detectors in our product range, including the pyroelectrics, thermopiles and photo detectors (in both power or energy mode). Also, it features a unique digital method of suppressing the noise that allows readings at very low energy levels (down in the picojoules!).

PC-BASED UNIVERSAL POWER & ENERGY METER

	MAESTRO	TUNER	UNO	S-LINK-2	P-LINK	M-LINK	MACH 5/6
Detector Compatibility							
Power (Thermopiles)	✓	✓	✓	✓	✓	✓	
Power (Pyroelectrics -B)	✓			✓		✓	
Power (Photo Detector)	✓	✓	✓		✓	✓	
Power (Photo Detector -B)	✓			✓		✓	
Energy (Pyroelectrics)	✓			✓		✓	
Energy (Pyroelectrics -B)	✓			✓		✓	
Energy (Thermopiles)	✓			✓	✓	✓	
Energy (Photo Detector -B)	✓			✓		✓	
Energy (Ultrafast Pyros)							✓
Display	5.6in LCD Touch Screen 18bit Color	3.8in LCD With Tuning Needle	3.8in 32 mm Digits High Contrast	None	None	None	None
PC Interface	✓			✓	✓	✓	✓
Outputs							
USB	✓			✓	Standard	✓	✓
USB Key Port	✓						
RS-232	✓			Optional	Optional		
Analog Output	✓	✓			✓	✓	✓
Ethernet	✓			Optional			
External Trigger	✓			✓		✓	✓
Full Statistical Functions	✓			✓	✓	✓	
Max Repetition Rate	2 kHz (10 kHz sampling)			10 kHz/Channel		1 kHz	200 kHz
Number of Channels	1	1	1	2	1	1	1
Product Page	18	22	24	26	28	30	130

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MAESTRO

Touch Screen, Single Channel, Power & Energy Monitor

* Every language may not be available yet

CONNECTIVITY

KEY FEATURES

1. Reads ALL Heads:
   - Power: Thermopiles, Photo Detectors and Pyroelectrics
   - Energy: Thermopiles (in single shot mode) , Photo Detectors and Pyroelectrics

2. **Large TOUCH SCREEN Color LCD Display**
   - 5.6in Diagonal
   - 640 x 480 Resolution
   - 18bit Color
   - FULLY Touch Screen Controls

3. **Unique Ergonomic Design**
   Great for both handheld and tabletop use, with improved rubber bands and quick stand for better stability

4. **Intuitive User Interface**
   Easy to navigate interface, with many display features:
   - Single or Dual Graph Display
   - Instant access to the main functions
   - Function Search tool
   - Interface available in multiple languages

5. **USB Key Access**
   Store data directly on a USB key

6. **Real-Time Statistical Functions**
   Max, Min, Average, Standard Deviation, RMS and PTP Stability, Pulse # and Repetition Rate

7. **Available Outputs**
   USB Key, Analog Output, RS-232, PC-USB, Ethernet

ACCESSORIES

Additional 9V Power Supply
(Model Number: 200960)

Battery Pack
(Model Number: 201013)

USB, RS-232, External Trigger & Analog Out Cables

Protective Pouch
(Model Number: 200128)

Pelican Carrying Case

SEE ALSO

ENERGY DETECTORS	34
POWER DETECTORS	54
PHOTO DETECTORS	94
OEM DETECTORS	116
LIST OF ALL ACCESSORIES	174

WATCH THE INTRODUCTION VIDEO AVAILABLE ON OUR WEBSITE AT www.gentec-eo.com

MAESTRO

SPECIFICATIONS

*Also traceable to NRC-CNRC

MODEL	MAESTRO
DETECTOR TYPES	ALL MODELS: Thermopiles, Pyroelectrics, Photo Detectors
DISPLAY	Touch Screen 5.6in Color LCD

POWER METER SPECIFICATIONS	
Power Range	
Thermopile	1 µW to 30 kW
Photo Detector	4 pW to 3 W
Monitor Accuracy	0.25 % ± 5 µV best scale
Statistics	Current Value, Max, Min, Average, Standard Deviation, RMS & PTP Stability, Time
ENERGY METER SPECIFICATIONS	
Energy Range	30 fJ to 30 kJ
Monitor Accuracy	±1 % best scale
Software Trigger Level	0.1 to 99.9 %, 0.1 % resolution, default 2 %
Repetition Rate	2 000 Hz / 10 000 Hz in sampling
Real Time Data Transfer (To USB key)	2 000 Hz
Statistics	Current Value, Max, Min, Average, Std Dev., RMS & PTP Stability, Pulse #, Rep. Rate and Avg Power
DETECTOR COMPATIBILITY	
Thermopile	Average Power & Single Shot Energy
Photo Detector	Average Power & Pulse Energy
Pyroelectric	Pulse Energy & Average Power
GENERAL SPECIFICATIONS	
Interface Languages	English, German, French (Chinese and Japanese to come)
Digital Display Size	112.9 x 84.7 mm LCD - 640 x 480 pixels
Data Display	Real Time, Scope, Statistics, Digital Tuning Needle and Averaging
Analog Output	0-1 Volt, Full Scale, ±0.5 %
Rising Edge External Trigger	TTL Compatible, 2-25 V @ 0.4 mA
Serial Commands Via	USB (standard), Ethernet or RS-232 (cable in option)
Internet Upgrades Via	USB key
Data Storage Via	USB key
Dimensions	210W x 122H x 45D mm
Weight (With Batteries)	0.67 kg
Battery Type	4 x Rechargeable 1.2 V Ni-MH AA
Battery Life	6.5 hours
External Power Supply	100/240 VAC 50-60 Hz to 9 VDC 1.66 A
ORDERING INFORMATION	
Full Product Name	MAESTRO
Product Number	201235

Specifications are subject to change without notice

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MAESTRO

HOME

- **Set Device**: Set the device's Language, the Number of Digits to be displayed, choose your Serial Commands and Ethernet Configuration and Save your Settings.
- **Set Measure**: Use this menu to change the Wavelength, the Range, the Measuring Mode, the Trigger Level or add Correction Factors.
- **Display**: Set the device in Dual or Full Screen display mode and choose the display(s) you want.
- **Acquisition**: Set all your acquisition parameters (time, sample rate, etc.).
- **About**: View the main parameters and update your MAESTRO

SET DEVICE

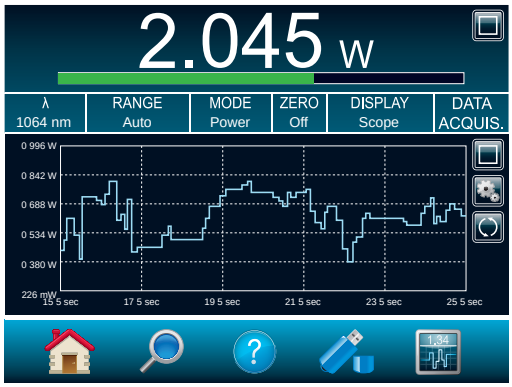
Use the elements in this menu to set the parameters related to your MAESTRO:

- **Number of Digits**: Use this menu to set the precision of the measurement.
- **Serial Commands**: Set compatibility with SOLO2 and use the RS-232 output.
- **Save & Load Settings**: Save the current settings or load the saved settings after reboot.
- **Ethernet**: Configure the Ethernet communication protocol.
- **Language**:s Select the display language (English, German or French).

SET MEASURE

Use the elements in this menu to set everything related to your measurements:

- **Wavelength**: Select one of the standard wavelengths offered, enter a custom value and create your own list of standard wavelengths.
- **Range**: Set the measuring range to autoscale or a fixed scale.
- **Measure Mode**: Use this menu to decide what type of measurements will be displayed: average power, single shot energy, pulse-to-pulse energy, etc.
- **Corrections**: Enter multipliers and offsets.
- **Trigger Level**: Set the trigger level in 0.1% steps, from 0.1% and 99.9%.



DUAL SCREEN DISPLAY (SHOWN WITH SCOPE DISPLAY)

With the Dual Screen mode, the MAESTRO really takes full advantage of its extra-large screen! Any display mode can be used in both single or dual display mode. In dual display mode, the Real Time display takes the upper portion of the screen, while any of the other displays (Scope, Needle, Averaging or Statistics) is set on the lower portion. The display in the lower portion can be easily changed using the parameters bar with drop-down menus in the center of the screen. You can also expand one of the displays to have it in Full Screen mode using the maximize button. Just as easily, you can go back to Dual Screen display by using the minimize button.

MAESTRO

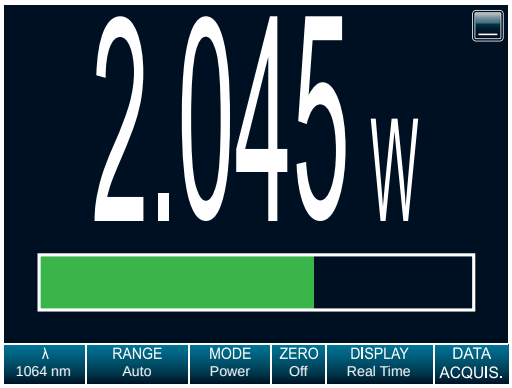
CE NIST* Traceable WEEE RoHS COMPLIANT

*Also traceable to NRC-CNRC

REAL TIME DISPLAY

This display shows the measured value in real time, with a corresponding bar graph below. The large size of the digits and high contrast of the graphics allow to see the measurement from a good distance. This mode is also always present in dual screen mode, in the upper portion of the screen.

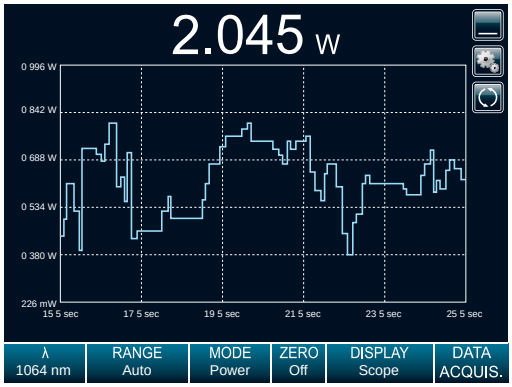
- Very Large Digits
- Bargraph



SCOPE DISPLAY

With its line filling from the right of the screen, in a first-in/first-out manner, this display mode is a good approximation of an actual oscilloscope reading. Settings include time (x-axis) and range (y-axis). Basic statistics (can also be displayed directly on the screen.

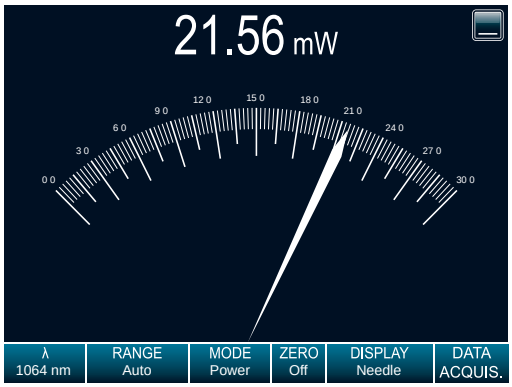
- Oscilloscope-type graph
- Display basic statistics (min, max and average)
- Fully customizable x and y axis



NEEDLE DISPLAY

Exactly like an analog needle, only faster! This mode is particularly useful when tuning a laser. The Real Time value is also displayed at the top of the screen.

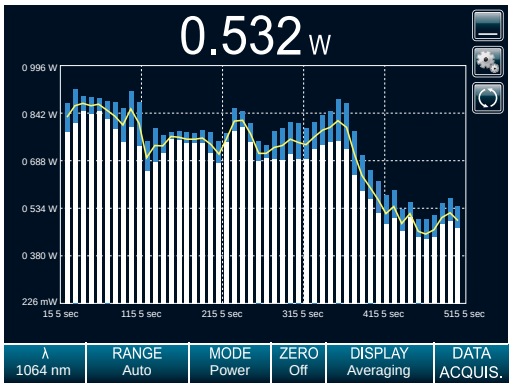
- Ultra-fast readings
- Great for tuning
- Real Time value at the top of the screen



AVERAGING DISPLAY

This very unique mode is perfect to show the trend of a laser over time. Set the number of points per batch and let the MAESTRO identify the minimum and maximum values of every batch. A yellow curve then follows the average of each batch, displayed as bars on the screen. The wider the difference between the white and blue portions of a bar (corresponding to the min and max values), the more unstable your laser is.

- Calculates the min, max and average values of batches of measurements
- Perfect to check laser stability over time



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TUNER

Single Channel, Power Monitor with Tuning Needle

KEY FEATURES

1 Ultra-Fast Needle
Less than 1 second response time

2 Reads ALL Power Detectors
Thermopiles and photo detectors of the PH100 and PH20 Series

3 Large LCD Display
- 77 x 58 mm
- 17.5 mm digits
- Backlight (with AC adaptor)

4 3 Display Functions for the Needle
- Normal
- Tail Mode (indicates speed)
- Bargraph

Also HIGH and LOW values hold

5 Single-Button Navigation
Direct access and long press access to the main functions

6 Low Consumption
Lasts 300 hours with 4 AA alkaline batteries

DISPLAY MODES

TAIL

BARGRAPH

HIGH/LOW

- TAIL: Follows the speed of the power change. The comet tail is longer for faster reading changes and shorter for slower reading changes.
- BARGRAPH: Fills the needle display up to the real time value (best mode when viewing from a distance).
- HIGH/LOW: When activated, indicates the highest and lowest powers since activation. The high and low needles blink to help distinguish them from the real time value.

ACCESSORIES

Additional 9V Power Supply
(Model Number: 200960)

Wall Support
(Model Number: 201241)

Protective Pouch
(Model Number: 200128)

Pelican Carrying Case

SEE ALSO

POWER DETECTORS	54
PH SERIES PHOTO DETECTORS	98
OEM DETECTORS	116
LIST OF ALL ACCESSORIES	174

TUNER

SPECIFICATIONS

*Also traceable to NRC-CNRC

MODEL	TUNER
DETECTOR TYPES	Thermopiles, Photo Detectors (PH100 and PH20 Series)
DISPLAY	LCD with Tuning Needle and Backlight

POWER METER SPECIFICATIONS	
Power Range	10 pW to 10 kW
Digital Resolution	
PH Series	10 pW
XLP Series	1 µW
UP Series	1 mW
HP Series	100 mW (HP60A), 1 W (HP100A)
Monitor Accuracy	±1 %, full scale
Statistics	Min, Max
DETECTOR COMPATIBILITY	
Thermopiles	Average Power (W, dBm)
Photo Detectors (PH Series)	Average Power (W, dBm)
GENERAL SPECIFICATIONS	
Digital Display Size	77 x 58 mm LCD
Needle Display	Ultrafast Tuning Needle
Needle Accuracy	0.9 %
Refresh Rate	4 Hz
Analog Output	0-1 Volt, Full Scale, ±1 %
Dimensions (Without Stand)	210W x 122H x 44D mm
Weight (With Batteries)	0.47 kg
Battery Type	4 x AA Alkaline
Battery Life (Estimated)	300 hours with detector
External Power Supply	100/240 VAC 50-60 Hz to 9 VDC 1.66 A
ORDERING INFORMATION	
Full Product Name	TUNER
Product Number	201207

Specifications are subject to change without notice

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UNO

Single Channel, Power Monitor

KEY FEATURES

1. **Reads ALL Power Detectors**
   Thermopiles and photo detectors of the PH Series
2. **Large LCD Display**
   - 76 x 57 mm
   - 32 mm digits
3. **Unique Ergonomic Design**
   Great for both handheld and tabletop use
4. **Accurate**
   24 bit A/D converter for high resolution measurements
5. **Single-Button Navigation**
   Direct access and long press access to all the functions
6. **eXtremely Low Consumption**
   Lasts 670 hours with 4 AA alkaline batteries
7. **Economical**
   Get the best value for your money with this inexpensive and simple to use power monitor

NOW AVAILABLE

W/dBm You can now toggle your display between Watts or dBm units

ACCESSORIES

Optional 9V Power Supply
(Model Number: 200960)

Wall Support
(Model Number: 201241)

Protective Pouch
(Model Number: 200128)

Pelican Carrying Case

SEE ALSO

POWER DETECTORS	54
PHOTO DETECTORS	94
OEM DETECTORS	116
LIST OF ALL ACCESSORIES	174

UNO

SPECIFICATIONS

*Also traceable to NRC-CNRC

MODEL	UNO
DETECTOR TYPES	Thermopiles, Photo Detectors (PH Series)
DISPLAY	LCD

POWER METER SPECIFICATIONS	
Power Range	5 pW to 10 kW
Thermopile	Autoscale
Photo Detector	Autoscale
Monitor Accuracy	±1 %
Statistics	None
DETECTOR COMPATIBILITY	
Thermopiles	Average Power (W, dBm)
Photo Detectors	Average Power (W, dBm)
GENERAL SPECIFICATIONS	
Digital Display Size	76 x 57 mm LCD
Digit Height	32 mm
Digit Type	High Contrast Fields
Data Display	Real Time
Dimensions (Without Stand)	210W x 122H x 44D mm
Weight (With Batteries)	0.47 kg
Battery Type	4 x AA Alkaline
Battery Life (Estimated)	670 hours with detector
External Power Supply (Optional)	100/240 VAC 50-60 Hz to 9 VDC 1.66 A
ORDERING INFORMATION	
Full Product Name	UNO
Product Number	200982

Specifications are subject to change without notice

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S-LINK-2

Dual Channel, PC-Based Power and Energy Monitor

KEY FEATURES

1. **Reads Both Power and Energy**
   Thermopiles and pyroelectrics
2. **PC-Based**
   Connects to your PC with included software
3. **Serial Commands**
   Serial commands are available on all versions to let you take full control
4. **Fastest Data Transfer Rate**
   Get all the points transferred directly into your PC at 10 kHz/Channel
5. **USB or Ethernet**
   Choose your favourite communications port. The USB version is port-powered
6. **External Trigger**
   Every model comes standard with a 2.4 V to 24 V external trigger

AVAILABLE MODELS

S-LINK-2 (USB)

S-LINK-2 (Ethernet)

ACCESSORIES

Additional 9V Power Supply
(Ethernet version only)

USB Cable
(Model Number: 100776)

Protective Pouch
(Model Number: 200128)

Pelican Carrying Case

SEE ALSO

ENERGY DETECTORS	34
POWER DETECTORS	54
OEM DETECTORS	116
LIST OF ALL ACCESSORIES	174

S-LINK-2

SPECIFICATIONS

*Also traceable to NRC-CNRC

MODEL	S-LINK-2
DETECTOR TYPES	Thermopiles, Pyroelectrics
DISPLAY	PC-Based

POWER METER SPECIFICATIONS	
Power Range	1 µW to 10 kW
Monitor Accuracy	±0.75 % for 25 % to full scale
Statistics	Current Value, Max, Min, Average, Std Dev., RMS & PTP Stability, Time
ENERGY METER SPECIFICATIONS	
Energy Range	30 fJ to 20 kJ
Resolution (Digital)	Normal Mode: Current scale/4096
Monitor Accuracy	
<500 Hz (MB), <1200 Hz (MT)	1 %
500 to 1 200 Hz (MB)	2 %
1 200 to 6 000 Hz (MT)	3 %
6 000 to 10 000 Hz (MT)	6 %
Real Time Data Transfer	10 kHz/Channel in normal mode, no missing point
Statistics	Current Value, Max, Min, Average, Std Dev., RMS & PTP Stability, Pulse #, Repetition Rate, Average Power
DETECTOR COMPATIBILITY	
Thermopile	Average Power & Single Shot Energy
Pyroelectric	Pulse Energy
GENERAL SPECIFICATIONS	
Number of Channels	2
Digital Display	Computer Screen
Data Display	Real Time, Ratio, Line Plot, Histogram, Statistics and 3D Histogram
Serial Commands and Data Transfer Via	USB (standard) or Ethernet (option) [a]
Real Time Data Transfer Rate	10 kHz/Channel in normal mode, no missing point (for pyroelectrics only) [b]
Rising Edge External Trigger	3-24 V @ 13 mA, optically isolated
Dimensions	106W x 34H x 147D mm
Weight	0.424 kg
Ext. Power Supply (Ethernet version only)	100/240 VAC 50-60 Hz to 9 VDC 1.66 A

ORDERING INFORMATION		
Full Product Name	S-LINK-2	S-LINK-2 (Ethernet) [a]
Product Number	201030	201170

a. The Ethernet version also includes the USB output.
b. Actual rate may depend on the computer.

Specifications are subject to change without notice

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P-LINK

Single Channel, PC-Based Power Monitor

KEY FEATURES

1. **Reads ALL Power Detectors Types**
   Thermopiles and photo detectors of the PH Series
2. **PC-Based**
   Connects to your PC with included software
3. **Small Size**
   Only 91 mm (L) x 57 mm (W) x 36 (H)
4. **Serial Commands**
   Serial commands are available on both versions to let you take full control
5. **Real-Time Statistical Functions**
   Max, Min, Average, Standard Deviation, RMS and PTP Stability, Pulse # and Repetition Rate
6. **USB or RS-232**
   Choose your favourite communications port. The USB version is port-powered

AVAILABLE MODELS

P-LINK (USB)

P-LINK (RS-232)

ACCESSORIES

Additional 9V Power Supply
(RS-232 version only)

USB & RS-232 Cables

Protective Pouch
(Model Number: 200128)

Pelican Carrying Case

SEE ALSO

POWER DETECTORS	54
PHOTO DETECTORS	94
OEM DETECTORS	116
LIST OF ALL ACCESSORIES	174

P-LINK
SPECIFICATIONS

*Also traceable to NRC-CNRC

MODEL	P-LINK
DETECTOR TYPES	Thermopiles, Photo Detectors
DISPLAY	PC-Based

POWER METER SPECIFICATIONS	
Power Range	
Thermopile	1 µW to 30 kW
Photo Detector	5 pW to 3 W
Monitor Accuracy	±0.5 % full scale
Statistics	Current Value, Max, Min, Average, Std Dev., RMS & PTP Stability, Time, Repetition Rate

DETECTOR COMPATIBILITY	
Thermopile	Average Power & Single Shot Energy
Photo Detector	Average Power (mW, dBm)

GENERAL SPECIFICATIONS	
Digital Display	Computer Screen
Data Display	Real Time, Histogram, Statistics, Digital Tuning Needle
Analog Output	0 - 2 Volt, Adjustable, Full Scale, ±1 %
Serial Commands and Data Transfer Via	USB (standard) or RS-232 (option)
Real Time Data Transfer Rate	10 Hz
Dimensions	57W x 26H x 91D mm
Weight	0.12 kg
External Power Supply (RS-232 version only)	100/240 VAC 50-60 Hz to 12 VDC 200 mA

ORDERING INFORMATION		
Full Product Name	P-LINK (USB)	P-LINK (RS-232)
Product Number	200439	200440

Specifications are subject to change without notice

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M-LINK

Single Channel, PC-Based Universal Power and Energy Monitor

KEY FEATURES

1 The Universal Meter
Reads ALL Heads:
- Power: Thermopiles, Photo Detectors and Pyroelectrics
- Energy: Thermopiles (in single shot mode) , Photo Detectors and Pyroelectrics

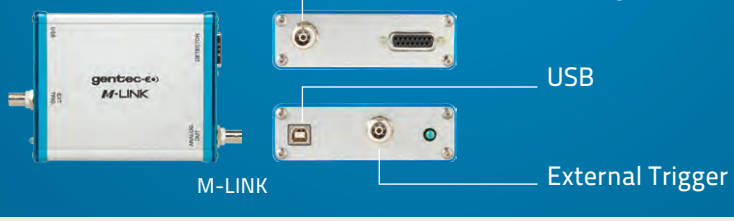
2 Measure fJ Energy Levels
Thanks to a unique digital method for suppressing the noise on the lower ranges

3 External Trigger
Synchronize you M-LINK to your pulsed laser or digital chopper

4 Digital (USB) Output
Connect the M-LINK module directly to your PC

5 Powerful LabView Software
Features include:
- Complete instrument controls: Range, Trigger, Wavelength, etc.
- Live display in J and J/cm² or W and W/cm²
- Full Statistics: Min, Max, Mean, Standard Deviation, RMS Stability , Repetition Rate, etc.
- Graphic Displays: Strip Chart, Histogram, Tuning Needle and more
- Data File Collection and Analysis

CONNECTIVITY



M-LINK

ACCESSORIES

USB Cable
(Model Number: 100776)

Pelican Carrying Case

SEE ALSO

ENERGY DETECTORS	34
POWER DETECTORS	54
PHOTO DETECTORS	94
LIST OF ALL ACCESSORIES	174

M-LINK

SPECIFICATIONS

Approved or in the process of being approved*

MODEL	M-LINK
DETECTOR TYPES	ALL MODELS: Thermopiles, Pyroelectrics, Photo Detectors
DISPLAY	PC-Based

POWER METER SPECIFICATIONS	
Power Range	4 pW to 30 kW
Resolution (Digital)	Current Scale/3000
Monitor Accuracy	±0.5 % ± 2 digits
Statistics	Current Value, Max, Min, Average, Std Dev., RMS & PTP Stability, Time
ENERGY METER SPECIFICATIONS	
Energy Range	30 fJ to 30 kJ
Resolution (Digital)	Current Scale/3000
Monitor Accuracy	1 % ± 2 digits (<1 kHz)
Software Trigger Level	0.1 to 99.9 %, 0.1 % resolution, default 2 %
Repetition Rate [a]	1 000 Hz
Real Time Data Transfer	1 000 Hz with time stamp, no missing point
Statistics	Current Value, Max, Min, Average, Std Dev., RMS & PTP Stability, Pulse #, Repetition Rate, Average Power
DETECTOR COMPATIBILITY	
Thermopile	Average Power & Single Shot Energy
Pyroelectric	Pulse Energy & Average Power
Photo Detectors	Average Power & Pulse Energy
GENERAL SPECIFICATIONS	
Digital Display	Computer Screen
Data Display	Real Time, Scope, Averaging, Statistics and Digital Tuning Needle
Serial Commands and Data Transfer Via	USB
Real Time Data Transfer Rate	1 000 Hz with time stamp, no missing point (for pyroelectrics only)
Analog Output	0-2 Volts, Full Scale, ± 0.5%
Rising or Falling Edge External Trigger	4.5 to 10 V @ 20 mA, optically isolated
Dimensions	106W x 34H x 147D mm
Weight	0.424 kg
External Power Supply (Ethernet version only)	100/240 VAC 50-60 Hz to 9 VDC 1.66 A
ORDERING INFORMATION	
Full Product Name	M-LINK
Product Number	201850

a. Maximum repetition rate may vary with PC and detector speeds.

Specifications are subject to change without notice

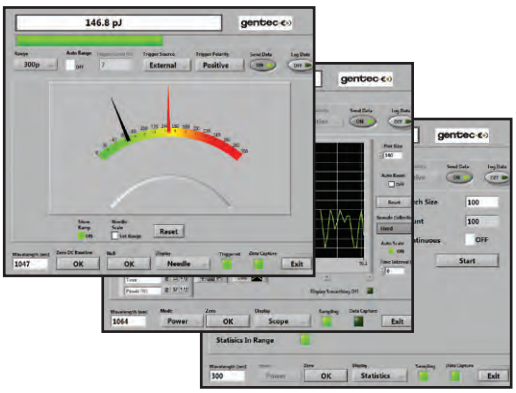
* For details, contact your Gentec-EO representative

T 418.651.8003 1888 5GENTEC F 418.651.1174 www.gentec-eo.com info@gentec-eo.com

M-LINK

PC-BASED UNIVERSAL POWER/ENERGY MONITOR

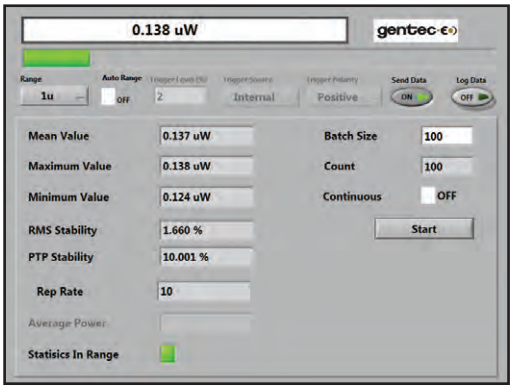
This new PC-Based monitor is compatible with ALL types of detectors - including thermopiles, pyroelectrics and photo detectors - for both power and energy measurements. The device is available as a single channel unit that directly interfaces with a computer using a USB2.0 connection. The LabView software is included and comes with all the necessary features. The M-LINK also presents a unique digital technique of suppressing the noise, thereby extending the measurement range all the way down to the fJ level.



VERSATILE SOFTWARE FOR THE UNIVERSAL M-LINK

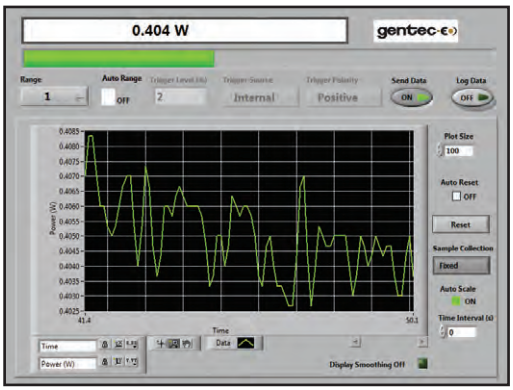
What makes the M-LINK so universal is its compatibility with every detector type and model we make, and our smart software that recognizes the type of detector attached, and configures itself accordingly. Some of the basic software features include:

- Live Digital Reading
- Full Statistics
- Strip Chart
- Histogram
- Analog Tuning
- Data Logging



MEASURE POWER WITH A PHOTO DETECTOR

If you need to measure low power levels, from pW to mW, then we recommend one of our PH or PH-B detectors. In the software screen shown on the left, we have taken a data set working in the "**STATS**" display mode. We have set the batch size to 100 data points in the manual reset mode. You can see the live power (138 nW) and full complement of statistics: mean, max, min, RMS and PTP stability. In the bottom left hand corner you will note that a wavelength of 300 nm is displayed. This is where you will enter the wavelength of your laser and engage the wavelength correction factor.



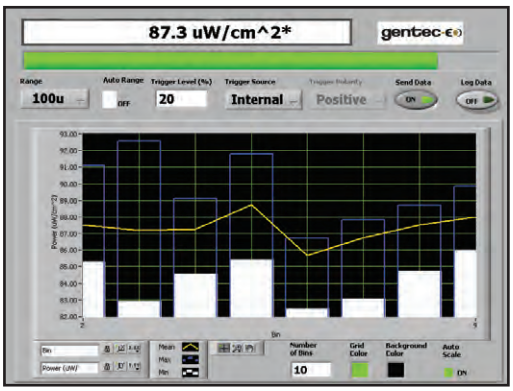
MEASURE POWER WITH A THERMOPILE DETECTOR

You can select any of our Thermal Detectors to measure your laser power from a few µW up to 30 kW. We used one of our most sensitive thermopile detectors, model XLP12-3S-H2, to generate the software screen shown on the left. We have selected the "**SCOPE**" mode, where you can view the live power reading (0.404 W), a bar graph and a strip chart while monitoring the power. This high level screen also provides access to range, trigger, auto scale, and many other monitor functions.

M-LINK

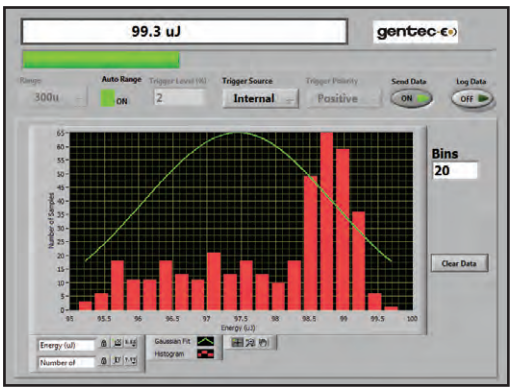
MEASURE POWER WITH A PYROELECTRIC DETECTOR

Need to measure the Radiant Flux (Watts) or Irradiance (W/cm²) of a broadband source like the sun, a lamp, a temperature controlled black body and/or a mid or far-IR laser? Our broadband pyroelectric detectors of the UM-B Series would be a great choice. To make the measurement that is displayed at the right, we set up our UM9B-BL detector with M-LINK, an SDC-5000 Chopper running 10 Hz and our 725 °C Black Body Source. The M-LINK recognizes the UM9B-BL detector, sets the wavelength to 633 nm where it is calibrated and prepares it to measure the voltage square wave it generates. We have engaged the area correction as the 9 mm detector is over filled with radiation. We are therefore measuring Irradiance in W/cm².



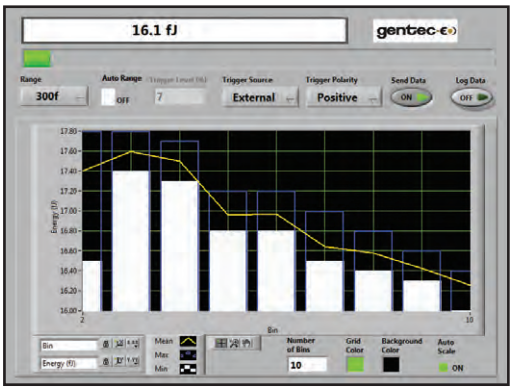
MEASURE ENERGY WITH A PYROELECTRIC DETECTOR

You can select one of our many large area Pyroelectric Detectors of the QE Series for energy measurements ranging from 50 nJ to 250 J and from DUV to Far IR. To demonstrate this capability, we have selected our QE8SP-B-BL and the M-LINK. We are looking at the "**HISTOGRAM**" screen, where you can continue to view the live measurement and a histogram that shows the energy distribution of your data set, along with a best-fit Gaussian curve. Note that you still have access to the instrument controls, like range, trigger, wavelength, etc.



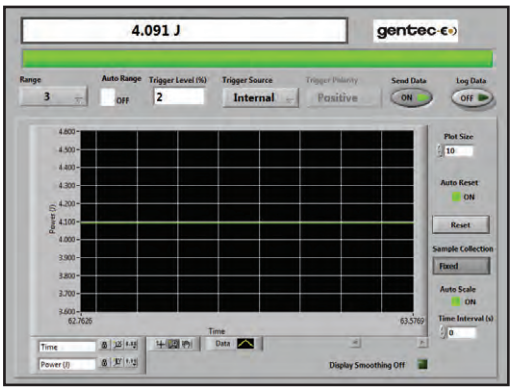
MEASURE AT THE fJ LEVEL WITH A PE-B DETECTOR

For measurements in the fJ to µJ range, and from UV to Near-IR we suggest our PE3B-Si detector. It represents the state-of-the-art in low-end energy detector technology. Take advantage of our proprietary pulse averaging, noise reduction techniques available with M-LINK. In the example shown at the right, we have captured a data set while running in the "**AVERAGING**" mode. The bars represent minimum (white) and maximum (blue) energy values. The strip chart is based on the average energy value. You get to select the number of "BINS" represented here. "Pulse Averaging" is available in the Statistics screen.



MEASURE A HIGH ENERGY PULSE WITH A UP DETECTOR

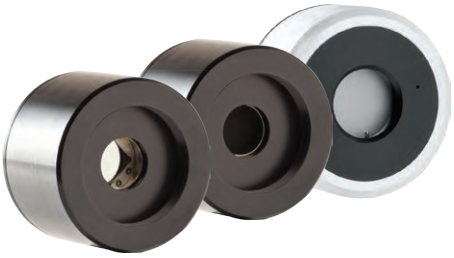
If you are trying to measure a relatively high energy (Joules) single pulse (up to 300 msec long), you will select one of our Thermopile Power detectors (like the UP50N-W9), have it calibrated in single shot mode and use the M-LINK to make the measurement. In the screen at the right, we have captured a long pulse that had a duration of a few hundred milliseconds and are displaying the energy in the "**SCOPE**" screen. Using a variety of our thermopile detectors, you can measure from 12 µJ to 500 J in a single pulse.



PRESENTATION

OVERVIEW OF THE DIFFERENT MODELS

Our pyroelectric energy meters cover a very wide range, going from nanojoules to several tens of joules per pulse. We also have them either in standalone formats, where the electronics are integrated in the device, or as standard sensors that you hook up to an energy meter.



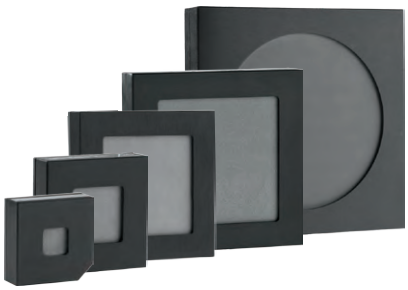
See page 38

QE-B

- Small Compact Detectors
- 8 and 23 mm Ø Apertures
- Organic Black or Metallic Coatings with Spectral Ranges from DUV to Far-IR
- Noise Levels as low as 50 nJ, without the need of a photo detector.

COMPACT PYROELECTRIC DETECTORS

NOISE LEVEL AS LOW AS 50 nJ



See pages 40 to 48

QE-MB

- Standard (Broadband) Coating
- Available in 5 sizes:
  - 12 x 12 mm
  - 25 x 25 mm
  - 50 x 50 mm
  - 65 x 65 mm
  - 95 mm Ø
- Low Noise Levels and Possibility to Extend the Response for Long (ms) Pulses

STANDARD COATING, LONG PULSE CAPABILITY

See pages 40 to 44

QE-MT

- Metallic (High Repetition Rate) Coating
- Available in 3 sizes:
  - 12 x 12 mm
  - 25 x 25 mm
  - 50 x 50 mm
- Pulse-to-Pulse Response up to 6000 Hz

METALLIC COATING, HIGH REP RATES

See our Special Products Section at page 130 for more details.

MACH SERIES

- High Speed Digital Joulemeters:
  - Mach 5: Measures EVERY PULSE at 130 kHz
  - Mach 6: Measures EVERY PULSE at 200 kHz
- Capture and Store up to 4 Million Pulses at the Maximum Repetition Rate
- Track Missing Pulses and Pulses below Threshold
- Wide Energy Range: Measure from pJ to mJ

130 & 200 KHZ ENERGY METERS

QED ATTENUATOR

DESCRIPTION

The QED attenuators increase the energy, energy density, average power and average power density capabilities of the QE Series detectors. They are engineered to typically transmit 35% (@1.064µm) of the incident radiation to the detector in a near Lambertian pattern (very wide diffusion pattern). Their slide-in casing make them easy to install and remove and they are held securely in place with the use of simple set screws. Since they become part of the detector, it is important to understand how they will affect the calibration.

Calibration with a QED Attenuator

3 options are available in terms of calibration:

1. Typical calibration is performed on the QE detector alone and an extra calibration is done with the QED Attenuator in place. This extra calibration is done at one wavelength only, either 532 nm or 1064 nm.

2. The QE detector is calibrated with the QED Attenuator only, offering the full range of sensitivities between 532 nm and 1064 nm. This option is favored when you intend to always use the QE with the QED Attenuator in place and never remove it.

3. Typical calibration is performed on the QE detector alone and the QED calibration is performed by the user (not factory calibrated), using the calibration method described in the user manual.

For more detailed information about the calibration with a QED Attenuator, please contact us at info@gentec-eo.com.

SPECIFICATIONS

OPTICAL CHARACTERISTICS	QED-12	QED-25	QED-50	QED-65	QED-95
Spectral Range			0.19 – 2.5 µm		
Transmittance (Typical) [a]					
1064 nm			35%		
266 nm			30%		
Reflectance (Typical)					
1064 nm			45%		
266 nm			50%		
DAMAGE THRESHOLDS					
Maximum Energy Density					
1064 nm, 7 ns, Single Shot			16 J/cm²		
1064 nm, 7 ns, 10 Hz			8 J/cm²		
532 nm, 7 ns, 10 Hz			6 J/cm²		
266 nm, 7 ns, 10 Hz			1 J/cm²		
PHYSICAL CHARACTERISTICS					
Effective Aperture	9 X 9 mm	22 X 22 mm	47 X 47 mm	62 X 62 mm	90 mm Ø
Dimensions	30.5H x 41W x 12.5D mm	44H x 55W x 12.5D mm	69H x 80W x 12.5D mm	85H x 97W x 12.5D mm	115H x 127 x 12.5D mm
For use with	QE12	QE25	QE50	QE65	QE95
ORDERING INFORMATION					
Full Product Name	QED-12	QED-25	QED-50	QED-65	QED-95
Product Number	201200	201199	201198	201282	201323

a. See the full transmittance curve on page 52.

COMPARISON TABLE

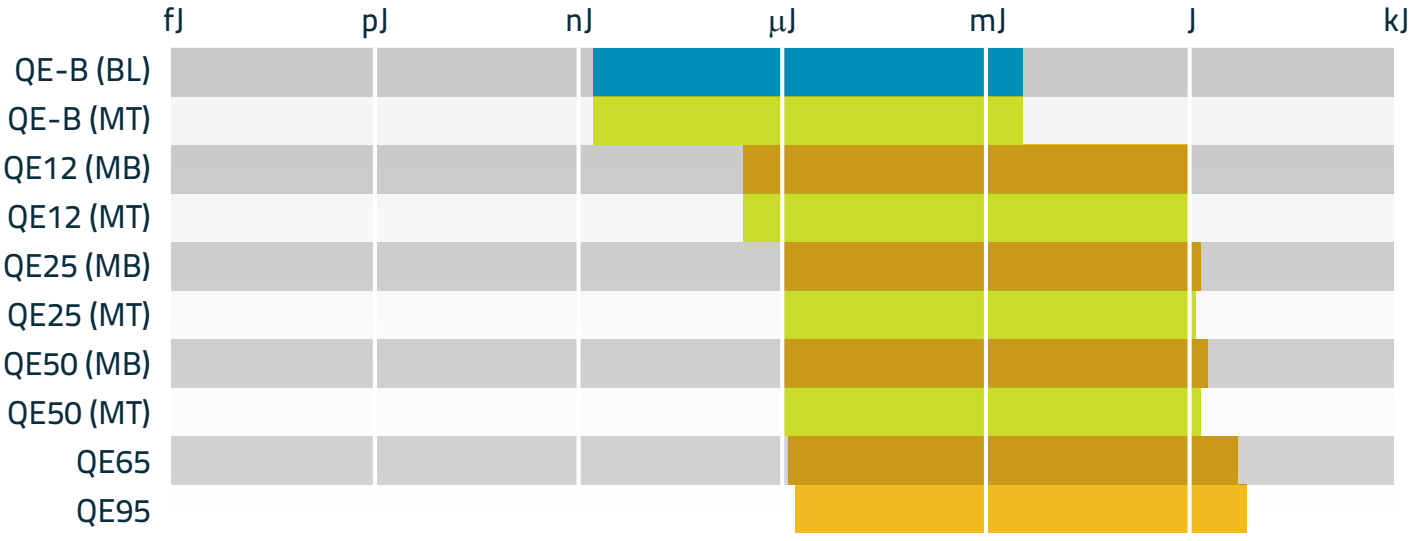
MODEL	Emax ^	Noise Level	Pmax	λmin	λmax	MAX REP RATE	ABSORBER TYPE	APERTURE	SEE PAGE
QE8SP-B-BL	20 mJ	200 nJ	500 mW	100 nm	20 µm	400 Hz	Black	7.8 x 7.8 mm	38
QE8SP-B-MT	20 mJ	50 nJ	500 mW	100 nm	20 µm	1000 Hz	Metallic	7.8 x 7.8 mm	38
QE23SP-B-MT	200 mJ	100 nJ	15 W	100 nm	20 µm	1000 Hz	Metallic	23 mm Ø	38
QE12SP-S-MT	700 mJ	800 nJ	3 W	190 nm	20 µm	6000 Hz	Metallic	12 x 12 mm	40
QE12SP-H-MT	700 mJ	800 nJ	5 W	190 nm	20 µm	6000 Hz	Metallic	12 x 12 mm	40
QE12LP-S-MB	850 mJ	700 nJ	3 W	190 nm	20 µm	300 Hz	Broadband	12 x 12 mm	40
QE12LP-H-MB	850 mJ	700 nJ	5 W	190 nm	20 µm	300 Hz	Broadband	12 x 12 mm	40
QE12SP-S-MT + QED-12	1.6 J	25 µJ	7.5 W	190 nm	2.5 µm	6000 Hz	Metallic	9 x 9 mm	40
QE12SP-H-MT + QED-12	1.6 J	25 µJ	12.5 W	190 nm	2.5 µm	6000 Hz	Metallic	9 x 9 mm	40
QE25SP-S-MT	3 J	2 µJ	5 W	190 nm	20 µm	6000 Hz	Metallic	25 x 25 mm	42
QE25SP-H-MT	3 J	2 µJ	10 W	190 nm	20 µm	6000 Hz	Metallic	25 x 25 mm	42
QE25LP-S-MB	3.8 J	4 µJ	5 W	190 nm	20 µm	300 Hz	Broadband	25 x 25 mm	42
QE25LP-H-MB	3.8 J	4 µJ	10 W	190 nm	20 µm	300 Hz	Broadband	25 x 25 mm	42
QE12LP-S-MB + QED-12	3.9 J	3 µJ	7.5 W	190 nm	2.5 µm	300 Hz	Broadband	9 x 9 mm	40
QE12LP-H-MB + QED-12	3.9 J	3 µJ	12.5 W	190 nm	2.5 µm	300 Hz	Broadband	9 x 9 mm	40
QE25SP-S-MT + QED-25	10 J	6 µJ	15 W	190 nm	2.5 µm	6000 Hz	Metallic	22 x 22 mm	42
QE25SP-H-MT + QED-25	10 J	6 µJ	30 W	190 nm	2.5 µm	6000 Hz	Metallic	22 x 22 mm	42
QE50SP-S-MT	13 J	10 µJ	10 W	190 nm	20 µm	4000 Hz	Metallic	50 x 50 mm	44
QE50SP-H-MT	13 J	10 µJ	20 W	190 nm	20 µm	4000 Hz	Metallic	50 x 50 mm	44
QE50LP-S-MB	15 J	10 µJ	10 W	190 nm	20 µm	200 Hz	Broadband	50 x 50 mm	44
QE50LP-H-MB	15 J	10 µJ	20 W	190 nm	20 µm	200 Hz	Broadband	50 x 50 mm	44
QE25LP-S-MB + QED-25	23 J	15 µJ	15 W	190 nm	2.5 µm	300 Hz	Broadband	22 x 22 mm	42
QE25LP-H-MB + QED-25	23 J	15 µJ	30 W	190 nm	2.5 µm	300 Hz	Broadband	22 x 22 mm	42
QE65ELP-S-MB	25 J	20 µJ	12 W	190 nm	20 µm	20 Hz	Broadband	65 x 65 mm	46
QE65ELP-H-MB	25 J	20 µJ	40 W	190 nm	20 µm	20 Hz	Broadband	65 x 65 mm	46
QE95LP-S-MB	35 J	15 µJ	20 W	190 nm	20 µm	40 Hz	Broadband	95 mm Ø	48
QE95LP-H-MB	35 J	15 µJ	40 W	190 nm	20 µm	40 Hz	Broadband	95 mm Ø	48
QE50SP-S-MT + QED-50	44 J	30 µJ	25 W	190 nm	2.5 µm	4000 Hz	Metallic	47 x 47 mm	44
QE50SP-H-MT + QED-50	44 J	30 µJ	45 W	190 nm	2.5 µm	4000 Hz	Metallic	47 x 47 mm	44
QE65LP-S-MB	50 J	10 µJ	12 W	190 nm	20 µm	100 Hz	Broadband	65 x 65 mm	46
QE65LP-H-MB	50 J	10 µJ	40 W	190 nm	20 µm	100 Hz	Broadband	65 x 65 mm	46
QE95ELP-S-MB	70 J	30 µJ	20 W	190 nm	20 µm	10 Hz	Broadband	95 mm Ø	48
QE95ELP-H-MB	70 J	30 µJ	40 W	190 nm	20 µm	10 Hz	Broadband	95 mm Ø	48
QE50LP-S-MB + QED-50	85 J	30 µJ	25 W	190 nm	2.5 µm	200 Hz	Broadband	47 x 47 mm	44
QE50LP-H-MB + QED-50	85 J	30 µJ	45 W	190 nm	2.5 µm	200 Hz	Broadband	47 x 47 mm	44
QE65LP-S-MB + QED-65	125 J	30 µJ	30 W	190 nm	2.5 µm	100 Hz	Broadband	62 x 62 mm	46
QE65LP-H-MB + QED-65	125 J	30 µJ	90 W	190 nm	2.5 µm	100 Hz	Broadband	62 x 62 mm	46
QE95LP-S-MB + QED-95	150 J	45 µJ	45 W	190 nm	2.5 µm	40 Hz	Broadband	90 mm Ø	48
QE95LP-H-MB + QED-95	150 J	45 µJ	90 W	190 nm	2.5 µm	40 Hz	Broadband	90 mm Ø	48
QE65ELP-S-MB + QED-65	200 J	60 µJ	30 W	190 nm	2.5 µm	20 Hz	Broadband	62 x 62 mm	46
QE65ELP-H-MB + QED-65	200 J	60 µJ	90 W	190 nm	2.5 µm	20 Hz	Broadband	62 x 62 mm	46
QE95ELP-S-MB + QED-95	250 J	90 µJ	45 W	190 nm	2.5 µm	10 Hz	Broadband	90 mm Ø	48
QE95ELP-H-MB + QED-95	250 J	90 µJ	90 W	190 nm	2.5 µm	10 Hz	Broadband	90 mm Ø	48

COMPARISON TABLE

ENERGY RANGES

You can use the graph below to compare the energy ranges of our pyroelectric energy detectors. Ranges go from the noise level to the maximum energy reading (including attenuator when available).

Table 1. Comparison of the energy ranges of the pyroelectric energy detectors



Black Absorber
(Low Rep Rates, Up to 400 Hz)

Metallic Absorber
(High Rep Rates, Up to 6000 Hz)

Broadband Absorber
(Low Rep Rates, Up to 300 Hz + Long Pulses, Up to 5 ms)

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QE-B

50 nJ - 200 mJ, Ultra-Low Energy Measurements

KEY FEATURES

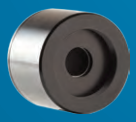
1 Very Low Noise Levels
Noise levels of a photo detector, but with the high energies of a pyroelectric:
- 50 nJ with the QE8 Series
- 100 nJ with the QE23SP-B-MT

2 Measure at up to 40 000 Hz
With the metallic coated (MT) versions, using the analog power module (APM)

3 2 Sizes Available
- QE8SP-B: 8 x 8 mm pyroelectric sensor, with black or metallic coating
- QE23SP-B-MT: 23 mm Ø pyroelectric sensor with metallic coating

4 Smart Interface
Containing all the calibration data

AVAILABLE MODELS


QE8SP-B-BL
(8 mm-Organic Black)

QE8SP-B-MT
(8 mm-Metallic)

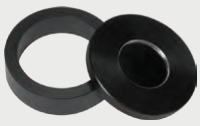
QE23SP-B-MT
(23 mm-Metallic)

BNC IN OPTION

Available in option: QE8-BNC model with a BNC output for direct measurements with an oscilloscope. To get the specifications of this model, please ask a Gentec-EO representative or check the user manual.

ACCESSORIES

Stand with Delrin Post
(Model Number: 200428)


Removable IR Windows
(Various types available)

APM Analog Power Supply
(Model Number: 201495)

Pelican Carrying Case

SEE ALSO

TECHNICAL DRAWINGS 50
COMPATIBLE MONITORS
MAESTRO 18
S-LINK-2 26
M-LINK 30
LIST OF ALL ACCESSORIES 174

APPLICATION NOTES
MEASUREMENT LIMITS USING JOULEMETERS
121D-201932

QE-B
SPECIFICATIONS

Approved or in the process of being approved*

MODELS	QE8SP-B-BL	QE8SP-B-MT [a]	QE23SP-B-MT
MAX MEASURABLE ENERGY	20 mJ	20 mJ	200 mJ
MAX REPETITION FREQUENCY	400 Hz	1000 Hz	1000 Hz
EFFECTIVE APERTURE	7.8 x 7.8 mm	7.8 x 7.8 mm	23 mm Ø
MEASUREMENT CAPABILITY [b]			
Spectral Range	0.1 - 20 µm	0.1 - 20 µm	0.1 - 20 µm
Max Measurable Energy	20 mJ	20 mJ	200 mJ
Noise Equivalent Energy	200 nJ	50 nJ	100 nJ
Sensitivity	N/A	N/A	500 V/J
Max Repetition Frequency	400 Hz	1000 Hz	1000 Hz
Max Pulse Width	10 µs	10 µs	10 µs
Rise Time (0-100%)	15 µs	15 µs	15 µs
Calibration Uncertainty	± 3.0%	± 3.0%	± 3.0%
Repeatability	± 0.5%	± 0.5%	± 0.5%
DAMAGE THRESHOLDS			
Maximum Average Power	0.5 W	0.5 W	15 W
Maximum Average Power Density			
1064 nm, 7 ns, 10 Hz	1 W/cm^2	1 W/cm^2	N/A
Maximum Energy Density			
1064 nm, 7 ns, 10 Hz	50 mJ/cm^2	50 mJ/cm^2	50 mJ/cm^2
PHYSICAL CHARACTERISTICS			
Effective Aperture	7.8 x 7.8 mm	7.8 x 7.8 mm	23 mm Ø
Sensor	Pyroelectric	Pyroelectric	Pyroelectric
Absorber	BL	MT	MT
Connector	DB-15	DB-15	DB-15
Dimensions	38.1 Ø X 27.4D mm	38.1 Ø X 27.4D mm	63.5 Ø X 33.8D mm
Weight	80 g	80 g	227 g
ORDERING INFORMATION			
Full Product Name	QE8SP-B-BL	QE8SP-B-MT	QE23SP-B-MT
Product Number	202017	201968	202112

a. This model is available in option with a BNC output.
Model name: QE8SP-B-MT-C0
Model number: 202084
For more information, including technical specifications, please ask your Gentec-EO representative or check the user manual.

b. Specifications may vary with the monitor used.

Specifications are subject to change without notice

* For details, contact your Gentec-EO representative

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QE12

12 x 12 mm, 0.7 µJ - 3.9 J

KEY FEATURES

1 Modular Concept
Increase the power capability of your detector: 2 different cooling modules

2 Low Noise Level
0.7 µJ for the MB coating

3 QED Attenuator Available
- Measure up to 5X higher energies
- Available with optional calibration, all wavelengths between 532 & 1064 nm, or single wavelength

5 Available with Metallic Absorber
High Repetition Rate (6000 Hz)

6 Test Target Included
With the MB models

7 Smart Interface
Containing all the calibration data

AVAILABLE MODELS

QE12LP-S-MB
(Broadband-Convection)

QE12LP-H-MB
(Broadband-Heatsink)

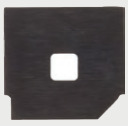
QE12SP-S-MT
(Metallic-Convection)

QE12SP-H-MT
(Metallic-Heatsink)

ACCESSORIES

Stand with Delrin Post
(Model Number: 200428)

DB-15 to BNC Adaptor
(Model Number: 200036)


QED-12 Attenuator
(Model Number: 201200)

Pelican Carrying Case

SEE ALSO

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QE12
SPECIFICATIONS

CE NIST* Traceable WEEE/RoHS COMPLIANT

*Also traceable to NRC-CNRC

MODELS	QE12LP-S-MB	QE12LP-H-MB	QE12SP-S-MT	QE12SP-H-MT
MAX MEASURABLE ENERGY (WITH ATTENUATOR)	3.9 J	3.9 J	1.6 J	1.6 J
MAX REPETITION FREQUENCY	300 Hz	300 Hz	6000 Hz	6000 Hz
EFFECTIVE APERTURE	12 x 12 mm	12 x 12 mm	12 x 12 mm	12 x 12 mm

MEASUREMENT CAPABILITY

Spectral Range [a]	0.19 – 20 µm		0.19 – 20 µm		0.19 – 20 µm [b]		0.19 – 20 µm [b]	
Maximum Measurable Energy [c]	Alone	Attenuator	Alone	Attenuator	Alone	Attenuator	Alone	Attenuator
1064 nm, 7 ns, 10 Hz [d]	0.85 J	3.9 J	0.85 J	3.9 J	0.70 J	1.60 J	0.70 J	1.60 J
266 nm, 7 ns, 10 Hz	0.70 J	0.81 J	0.70 J	0.81 J	0.10 J	0.25 J	0.10 J	0.25 J
Noise Equivalent Energy [e]	0.7 µJ		0.7 µJ		0.8 µJ		0.8 µJ	
Sensitivity [f, g]	60 V/J		60 V/J		100 V/J		100 V/J	
Max Repetition Frequency	300 Hz		300 Hz		6000 Hz		6000 Hz	
Maximum Pulse Width (typical)	400 µs *		400 µs *		10 µs		10 µs	
Rise Time (typical 0-100 %)	550 µs		550 µs		20 µs		20 µs	
Calibration Uncertainty [h]	±3 %		±3 %		±3 %		±3 %	
Repeatability	<0.5 %		<0.5 %		<0.5 %		<0.5 %	

DAMAGE THRESHOLDS

Maximum Average Power	Alone	Attenuator	Alone	Attenuator	Alone	Attenuator	Alone	Attenuator
All Wavelengths	3 W	7.5 W	5 W	12.5 W	3 W	7.5 W	5 W	12.5 W
Maximum Energy Density	Alone	Attenuator	Alone	Attenuator	Alone	Attenuator	Alone	Attenuator
1064 nm, 7 ns, single shot	0.6 J/cm²	16 J/cm²	0.6 J/cm²	16 J/cm²	0.50 J/cm²	4 J/cm²	0.50 J/cm²	4 J/cm²
1064 nm, 7 ns, 10 Hz	0.6 J/cm²	8 J/cm²	0.6 J/cm²	8 J/cm²	0.50 J/cm²	2 J/cm²	0.50 J/cm²	2 J/cm²
532 nm, 7 ns, 10 Hz	0.6 J/cm²	6 J/cm²	0.6 J/cm²	6 J/cm²	0.07 J/cm²	0.35 J/cm²	0.07 J/cm²	0.35 J/cm²
266 nm, 7 ns, 10 Hz	0.5 J/cm²	1 J/cm²	0.5 J/cm²	1 J/cm²	0.07 J/cm²	0.30 J/cm²	0.07 J/cm²	0.30 J/cm²
Maximum Average Power Density	10 W/cm²	600 W/cm²	10 W/cm² [i]	600 W/cm²	10 W/cm²	600 W/cm²	10 W/cm² [i]	600 W/cm²

PHYSICAL CHARACTERISTICS

Effective Aperture (with Attenuator)	12 X 12 mm (9 X 9 mm)			
Absorber	Multi-Band	Multi-Band	Metallic	Metallic
Dimensions	36H x 36W x 14D mm	36H x 36W x 33D mm	36H x 36W x 14D mm	36H x 36W x 33D mm
Weight	87 g	117 g	87 g	117 g

ORDERING INFORMATION

Full Product Name	QE12LP-S-MB	QE12LP-H-MB	QE12SP-S-MT	QE12SP-H-MT
Product Number (Including stand)	200508	200510	200511	200512

*Also available on special order: The Extra Long Pulse Series QE12ELP-MB for pulse widths up to 2 msec, custom-tuned for rep. rate, sensitivity, and pulse width.

a. 0.19 - 2.5 µm with QED Attenuator.
b. Detectors with the MT coating can be used within the range 0.19 to 20 µm, however the absorption in the IR wavelengths decreases significantly. This, in turn, reduces the sensitivity and increases the noise level.
c. Not exceeding Maximum Average Power.
d. Increasing pulse width increases the maximum measurable energy.
e. Nominal value, actual value depends on electrical noise in the measurement system.
f. Load: 1 MΩ and ≤ 30 pF.
g. Maximum output voltage = sensitivity x maximum energy.
h. Excludes non-linearities.
i. At 3 W. Maximum Average Power Density is 10 W/cm² @ 5 W for -H versions.

Specifications are subject to change without notice

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QE25

25 x 25 mm, 2 µJ - 23 J

KEY FEATURES

1 Modular Concept
Increase the power capability of your detector:
2 different cooling modules

2 Low Noise Level
2 µJ for the MT coating

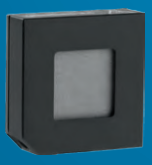
3 QED Attenuator Available
- Measure up to 5X higher energies
- Available with optional calibration, all wavelengths between 532 & 1064 nm, or single wavelength

4 Available with Metallic Absorber
High Repetition Rate (6000 Hz)

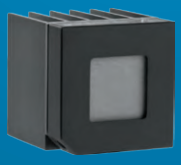
5 Test Target Included
With the MB models

6 Smart Interface
Containing all the calibration data

AVAILABLE MODELS



QE25LP-S-MB
(Broadband-Convection)



QE25LP-H-MB
(Broadband-Heatsink)

QE25SP-S-MT
(Metallic-Convection)

QE25SP-H-MT
(Metallic-Heatsink)

ACCESSORIES

Stand with Delrin Post
(Model Number: 200428)

DB-15 to BNC Adaptor
(Model Number: 200036)

QED-25 Attenuator
(Model Number: 201199)

Pelican Carrying Case

SEE ALSO

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QE25
SPECIFICATIONS

CE NIST* Traceable WEEE/RoHS COMPLIANT

*Also traceable to NRC-CNRC

MODELS	QE25LP-S-MB	QE25LP-H-MB	QE25SP-S-MT	QE25SP-H-MT
MAX MEASURABLE ENERGY (WITH ATTENUATOR)	23 J	23 J	10 J	10 J
MAX REPETITION FREQUENCY	300 Hz	300 Hz	6000 Hz	6000 Hz
EFFECTIVE APERTURE	25 x 25 mm	25 x 25 mm	25 x 25 mm	25 x 25 mm

MEASUREMENT CAPABILITY

Spectral Range [a]	0.19 – 20 µm		0.19 – 20 µm		0.19 – 20 µm [b]		0.19 – 20 µm [b]	
Maximum Measurable Energy [c]	Alone	Attenuator	Alone	Attenuator	Alone	Attenuator	Alone	Attenuator
1064 nm, 7 ns, 10 Hz [d]	3.8 J	23 J	3.8 J	23 J	3.0 J	10 J	3.0 J	10 J
266 nm, 7 ns, 10 Hz	3.1 J	4.8 J	3.1 J	4.8 J	0.44 J	1.5 J	0.44 J	1.5 J
Noise Equivalent Energy [e]	4 µJ		4 µJ		2 µJ		2 µJ	
Sensitivity [f, g]	10 V/J		10 V/J		20 V/J		20 V/J	
Max Repetition Frequency	300 Hz		300 Hz		6000 Hz		6000 Hz	
Maximum Pulse Width (typical)	400 µs *		400 µs *		10 µs		10 µs	
Rise Time (typical 0-100 %)	550 µs		550 µs		20 µs		20 µs	
Calibration Uncertainty [h]	±3 %		±3 %		±3 %		±3 %	
Repeatability	<0.5 %		<0.5 %		<0.5 %		<0.5 %	

DAMAGE THRESHOLDS

Maximum Average Power	Alone	Attenuator	Alone	Attenuator	Alone	Attenuator	Alone	Attenuator
All Wavelengths	5 W	15 W	10 W	30 W	5 W	15 W	10 W	30 W
Maximum Energy Density	Alone	Attenuator	Alone	Attenuator	Alone	Attenuator	Alone	Attenuator
1064 nm, 7 ns, single shot	0.6 J/cm²	16 J/cm²	0.6 J/cm²	16 J/cm²	0.50 J/cm²	4 J/cm²	0.50 J/cm²	4 J/cm²
1064 nm, 7 ns, 10 Hz	0.6 J/cm²	8 J/cm²	0.6 J/cm²	8 J/cm²	0.50 J/cm²	2 J/cm²	0.50 J/cm²	2 J/cm²
532 nm, 7 ns, 10 Hz	0.6 J/cm²	6 J/cm²	0.6 J/cm²	6 J/cm²	0.07 J/cm²	0.35 J/cm²	0.07 J/cm²	0.35 J/cm²
266 nm, 7 ns, 10 Hz	0.5 J/cm²	1 J/cm²	0.5 J/cm²	1 J/cm²	0.07 J/cm²	0.30 J/cm²	0.07 J/cm²	0.30 J/cm²
Maximum Average Power Density	10 W/cm²	600 W/cm²	10 W/cm² [i]	600 W/cm²	10 W/cm²	600 W/cm²	10 W/cm² [i]	600 W/cm²

PHYSICAL CHARACTERISTICS

Effective Aperture (with Attenuator)	25 X 25 mm (22 X 22 mm)			
Absorber	Multi-Band	Multi-Band	Metallic	Metallic
Dimensions	50H x 50W x 14D mm	50H x 50W x 52.5D mm	50H x 50W x 14D mm	50H x 50W x 52.5D mm
Weight	120 g	187 g	120 g	187 g

ORDERING INFORMATION

Full Product Name	QE25LP-S-MB	QE25LP-H-MB	QE25SP-S-MT	QE25SP-H-MT
Product Number (Including stand)	200312	200313	200310	200311

*Also available on special order: The Extra Long Pulse Series QE25ELP-MB for pulse widths up to 4 msec, custom-tuned for rep. rate, sensitivity, and pulse width.

a. 0.19 - 2.5 µm with QED Attenuator.
b. Detectors with the MT coating can be used within the range 0.19 to 20 µm, however the absorption in the IR wavelengths decreases significantly. This, in turn, reduces the sensitivity and increases the noise level. Nevertheless, each detector is individually scanned and the wavelength correction factor (PWC) is NIST traceable in the range of 248 nm to 2.5 µm.
c. Not exceeding Maximum Average Power.
d. Increasing pulse width increases the maximum measurable energy.
e. Nominal value, actual value depends on electrical noise in the measurement system.
f. Load: 1 MΩ and ≤ 30 pF.
g. Maximum output voltage = sensitivity x maximum energy.
h. Excludes non-linearities.
i. At 5 W. Maximum Average Power Density is 10 W/cm² @ 10 W for -H versions.

Specifications are subject to change without notice

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QE50

50 x 50 mm, 10 µJ - 85 J

KEY FEATURES

1 Modular Concept
Increase the power capability of your detector:
2 different cooling modules

2 Low Noise Level
10 µJ for both coatings

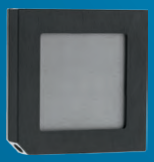
3 QED Attenuator Available
- Measure up to 5X higher energies
- Available with optional calibration, all wavelengths between 532 & 1064 nm, or single wavelength

4 Available with Metallic Absorber
High Repetition Rate (4000 Hz)

5 Test Target Included
With the MB models

6 Smart Interface
Containing all the calibration data

AVAILABLE MODELS


QE50LP-S-MB
(Broadband-Convection)

QE50LP-H-MB
(Broadband-Heatsink)

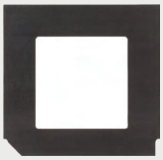
QE50SP-S-MT
(Metallic-Convection)

QE50SP-H-MT
(Metallic-Heatsink)

ACCESSORIES

Stand with Delrin Post
(Model Number: 200428)

DB-15 to BNC Adaptor
(Model Number: 200036)


QED-50 Attenuator
(Model Number: 201198)

Pelican Carrying Case

SEE ALSO

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QE50
SPECIFICATIONS

CE NIST* Traceable WEEE/RoHS COMPLIANT

*Also traceable to NRC-CNRC

MODELS	QE50LP-S-MB	QE50LP-H-MB	QE50SP-S-MT	QE50SP-H-MT
MAX MEASURABLE ENERGY (WITH ATTENUATOR)	85 J	85 J	44 J	44 J
MAX REPETITION FREQUENCY	200 Hz	200 Hz	4000 Hz	4000 Hz
EFFECTIVE APERTURE	50 x 50 mm	50 x 50 mm	50 x 50 mm	50 x 50 mm

MEASUREMENT CAPABILITY

Spectral Range [a]	0.19 – 20 µm		0.19 – 20 µm		0.19 – 20 µm [b]		0.19 – 20 µm [b]	
Maximum Measurable Energy [c]	Alone	Attenuator	Alone	Attenuator	Alone	Attenuator	Alone	Attenuator
1064 nm, 7 ns, 10 Hz [d]	15 J	85 J	15 J	85 J	13 J	44 J	13 J	44 J
266 nm, 7 ns, 10 Hz	12.5 J	22 J	12.5 J	22 J	1.8 J	6.5 J	1.8 J	6.5 J
Noise Equivalent Energy [e]	10 µJ		10 µJ		10 µJ		10 µJ	
Sensitivity [f, g]	3 V/J		3 V/J		4 V/J		4 V/J	
Max Repetition Frequency	200 Hz		200 Hz		4000 Hz		4000 Hz	
Maximum Pulse Width (typical)	675 µs *		675 µs *		10 µs		10 µs	
Rise Time (typical 0-100 %)	900 µs		900 µs		20 µs		20 µs	
Calibration Uncertainty [h]	±3 %		±3 %		±3 %		±3 %	
Repeatability	<0.5 %		<0.5 %		<0.5 %		<0.5 %	

DAMAGE THRESHOLDS

Maximum Average Power	Alone	Attenuator	Alone	Attenuator	Alone	Attenuator	Alone	Attenuator
All Wavelengths	10 W	25 W	20 W	45 W	10 W	25 W	20 W	45 W
Maximum Energy Density	Alone	Attenuator	Alone	Attenuator	Alone	Attenuator	Alone	Attenuator
1064 nm, 7 ns, single shot	0.6 J/cm²	16 J/cm²	0.6 J/cm²	16 J/cm²	0.50 J/cm²	4 J/cm²	0.50 J/cm²	4 J/cm²
1064 nm, 7 ns, 10 Hz	0.6 J/cm²	8 J/cm²	0.6 J/cm²	8 J/cm²	0.50 J/cm²	2 J/cm²	0.50 J/cm²	2 J/cm²
532 nm, 7 ns, 10 Hz	0.6 J/cm²	6 J/cm²	0.6 J/cm²	6 J/cm²	0.07 J/cm²	0.35 J/cm²	0.07 J/cm²	0.35 J/cm²
266 nm, 7 ns, 10 Hz	0.5 J/cm²	1 J/cm²	0.5 J/cm²	1 J/cm²	0.07 J/cm²	0.30 J/cm²	0.07 J/cm²	0.30 J/cm²
Maximum Average Power Density	10 W/cm²	600 W/cm²	10 W/cm² [i]	600 W/cm²	10 W/cm²	600 W/cm²	10 W/cm² [i]	600 W/cm²

PHYSICAL CHARACTERISTICS

Effective Aperture (with Attenuator)	50 X 50 mm (47 X 47 mm)			
Absorber	Multi-Band	Multi-Band	Metallic	Metallic
Dimensions	75H x 75W x 15D mm	75H x 75W x 44D mm	75H x 75W x 15D mm	75H x 75W x 44D mm
Weight	209 g	338 g	209 g	338 g

ORDERING INFORMATION

Full Product Name	QE50LP-S-MB	QE50LP-H-MB	QE50SP-S-MT	QE50SP-H-MT
Product Number (Including stand)	200307	200308	200305	200306

*Also available on special order: The Extra Long Pulse Series QE50ELP-MB for pulse widths up to 4 msec, custom-tuned for rep. rate, sensitivity, and pulse width.

a. 0.19 - 2.5 µm with QED Attenuator.
b. Detectors with the MT coating can be used within the range 0.19 to 20 µm, however the absorption in the IR wavelengths decreases significantly. This, in turn, reduces the sensitivity and increases the noise level. Nevertheless, each detector is individually scanned and the wavelength correction factor (PWC) is NIST traceable in the range of 248 nm to 2.5 µm.
c. Not exceeding Maximum Average Power.
d. Increasing pulse width increases the maximum measurable energy.
e. Nominal value, actual value depends on electrical noise in the measurement system.
f. Load: 1 MΩ and ≤ 30 pF.
g. Maximum output voltage = sensitivity x maximum energy.
h. Excludes non-linearities.
i. At 5 W. Maximum Average Power Density is 10 W/cm² @ 10 W for -H versions.

Specifications are subject to change without notice

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QE65

65 x 65 mm, 10 µJ - 200 J

KEY FEATURES

1 Modular Concept
Increase the power capability of your detector: 2 different cooling modules

2 Large Aperture
Effective aperture of 65 x 65 mm

3 QED Attenuator Available
- Measure up to 5X higher energies
- Available with optional calibration, all wavelengths between 532 & 1064 nm, or single wavelength

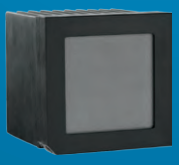
4 Low Noise Level
10 µJ for the MB coating

5 Test Target Included
With the MB models

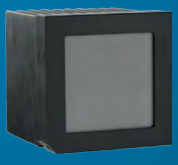
6 Smart Interface
Containing all the calibration data

AVAILABLE MODELS

QE65LP-S-MB
(Broadband-Convection)


QE65LP-H-MB
(Broadband-Heatsink)

QE65ELP-S-MB
(XLong Pulse-Convection)


QE65ELP-S-MB
(XLong Pulse-Heatsink)

ACCESSORIES

Stand with Delrin Post
(200428, For -S Model)

Stand with Delrin Post
(201284, For -H Model)

DB-15 to BNC Adaptor
(Model Number: 200036)

QED-65 Attenuator
(Model Number: 201282)

Pelican Carrying Case

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QE65
SPECIFICATIONS

CE NIST* Traceable WEEE RoHS COMPLIANT

*Also traceable to NRC-CNRC

MODELS	QE65LP-S-MB	QE65LP-H-MB	QE65ELP-S-MB	QE65ELP-H-MB
MAX MEASURABLE ENERGY (WITH ATTENUATOR)	200 J	200 J	200 J	200 J
MAX REPETITION FREQUENCY	100 Hz	100 Hz	20 Hz	20 Hz
EFFECTIVE APERTURE	65 x 65 mm	65 x 65 mm	65 x 65 mm	65 x 65 mm

MEASUREMENT CAPABILITY

Spectral Range [a]	0.19 – 20 µm		0.19 – 20 µm		0.19 – 20 µm		0.19 – 20 µm	
Maximum Measurable Energy [b, c]	Alone	Attenuator	Alone	Attenuator	Alone	Attenuator	Alone	Attenuator
1064 nm, 150 µs pulse, Single shot [d]	50 J	200 J	50 J	200 J	50 J	200 J	50 J	200 J
1064 nm, 7 ns, 10 Hz	25 J	125 J	25 J	125 J	25 J	125 J	25 J	125 J
266 nm, 7 ns, 10 Hz	20 J	35 J	20 J	35 J	20 J	35 J	20 J	35 J
Noise Equivalent Energy [e]	10 µJ		10 µJ		20 µJ		20 µJ	
Sensitivity [f, g]	4 V/J		4 V/J		1.5 V/J		1.5 V/J	
Max Repetition Frequency	100 Hz		100 Hz		20 Hz		20 Hz	
Maximum Pulse Width (typical)	0.7 ms		0.7 ms		5 ms		5 ms	
Rise Time (typical 0-100 %)	1 ms		1 ms		6 ms		6 ms	
Calibration Uncertainty [h]	±3 %		±3 %		±3 %		±3 %	
Repeatability	<0.5 %		<0.5 %		<0.5 %		<0.5 %	

DAMAGE THRESHOLDS

Maximum Average Power	Alone	Attenuator	Alone	Attenuator	Alone	Attenuator	Alone	Attenuator
All Wavelengths	12 W	30 W	40 W	90 W	12 W	30 W	40 W	90 W
Maximum Energy Density	Alone	Attenuator	Alone	Attenuator	Alone	Attenuator	Alone	Attenuator
1064 nm, 150 µs, 10 Hz	1.2 J/cm²	14 J/cm²	1.2 J/cm²	14 J/cm²	1.2 J/cm²	14 J/cm²	1.2 J/cm²	14 J/cm²
1064 nm, 7 ns, single shot	0.6 J/cm²	16 J/cm²	0.6 J/cm²	16 J/cm²	0.6 J/cm²	16 J/cm²	0.6 J/cm²	16 J/cm²
1064 nm, 7 ns, 10 Hz	0.6 J/cm²	8 J/cm²	0.6 J/cm²	8 J/cm²	0.6 J/cm²	8 J/cm²	0.6 J/cm²	8 J/cm²
532 nm, 7 ns, 10 Hz	0.6 J/cm²	6 J/cm²	0.6 J/cm²	6 J/cm²	0.6 J/cm²	6 J/cm²	0.6 J/cm²	6 J/cm²
266 nm, 7 ns, 10 Hz	0.5 J/cm²	1 J/cm²	0.5 J/cm²	1 J/cm²	0.5 J/cm²	1 J/cm²	0.5 J/cm²	1 J/cm²
Maximum Average Power Density (@12 W)	10 W/cm²	600 W/cm²	10 W/cm² [i]	600 W/cm²	10 W/cm²	600 W/cm²	10 W/cm² [i]	600 W/cm²

PHYSICAL CHARACTERISTICS

Effective Aperture (with Attenuator)	65 X 65 mm (62 X 62 mm)			
Absorber	Multi-Band	Multi-Band	Multi-Band	Multi-Band
Dimensions	90H x 90W x 20D mm	90H x 90W x 94D mm	90H x 90W x 20D mm	90H x 90W x 94D mm
Weight	440 g	900 g	440 g	900 g

ORDERING INFORMATION

Full Product Name	QE65LP-S-MB	QE65LP-H-MB	QE65ELP-S-MB	QE65ELP-H-MB
Product Number (Including stand)	201255	201256	201324	201325

a. 0.19 - 2.5 µm with QED Attenuator.
b. Not exceeding Maximum Average Power.
c. Maximum measurable energy depends on the monitor.
d. Increasing pulse width increases the maximum measurable energy.
e. Nominal value, actual value depends on electrical noise in the measurement system.
f. Load: 1 MΩ and ≤ 30 pF.
g. Maximum output voltage = sensitivity x maximum energy.
h Excludes non-linearities.
i. At 12 W. Maximum Average Power Density is 5 W/cm² @ 40 W

Specifications are subject to change without notice

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QE95

95 mm Ø, 15 µJ - 250 J

KEY FEATURES

1 Modular Concept
Increase the power capability of your detector: 2 different cooling modules

2 Extra Large Aperture
Effective aperture of 95 mm Ø

3 QED Attenuator Available
- Measure up to 5X higher energies
- Available with optional calibration, all wavelengths between 532 & 1064 nm, or single wavelength

4 Low Noise Level
15 µJ for the MB coating

5 Test Target Included
With the MB models

6 Smart Interface
Containing all the calibration data

AVAILABLE MODELS

QE95LP-S-MB
(Broadband-Convection)

QE95LP-H-MB
(Broadband-Heatsink)

QE95ELP-S-MB
(Long Pulse-Convection)

QE95ELP-H-MB
(Long Pulse-Heatsink)

ACCESSORIES

Stand with Delrin Post
(200428, For -S Model)

Stand with Delrin Post
(201284, For -H Model)

DB-15 to BNC Adaptor
(Model Number: 200036)

QED-95 Attenuator
(Model Number: 201323)

Pelican Carrying Case

SEE ALSO

HOW IT WORKS	10
CALIBRATION	6
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QED ATTENUATOR	35
COMPATIBLE MONITORS	
MAESTRO	18
S-LINK-2	26
M-LINK	30
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QE95
SPECIFICATIONS

CE NIST* Traceable WEEE/RoHS COMPLIANT

*Also traceable to NRC-CNRC

MODELS	QE95LP-S-MB	QE95LP-H-MB	QE95ELP-S-MB	QE95ELP-H-MB
MAX MEASURABLE ENERGY (WITH ATTENUATOR)	150 J	150 J	250 J	250 J
MAX REPETITION FREQUENCY	40 Hz	40 Hz	10 Hz	10 Hz
EFFECTIVE APERTURE	95 mm Ø	95 mm Ø	95 mm Ø	95 mm Ø

MEASUREMENT CAPABILITY

Spectral Range [a]	0.19 – 20 µm		0.19 – 20 µm		0.19 – 20 µm		0.19 – 20 µm	
Maximum Measurable Energy [b, c]	Alone	Attenuator	Alone	Attenuator	Alone	Attenuator	Alone	Attenuator
1064 nm, 150 µs pulse, Single shot [d]	70 J	250 J	70 J	250 J	70 J	250 J	70 J	250 J
1064 nm, 7 ns, 10 Hz	35 J	150 J	35 J	150 J	35 J	150 J	35 J	150 J
266 nm, 7 ns, 10 Hz	30 J	50 J	30 J	50 J	30 J	50 J	30 J	50 J
Noise Equivalent Energy [e]	15 µJ		15 µJ		30 µJ		30 µJ	
Sensitivity [f, g]	2 V/J		2 V/J		0.6 V/J		0.6 V/J	
Max Repetition Frequency	40 Hz		40 Hz		10 Hz		10 Hz	
Maximum Pulse Width (typical)	1.5 ms		1.5 ms		5 ms		5 ms	
Rise Time (typical 0-100 %)	2 ms		2 ms		6 ms		6 ms	
Calibration Uncertainty [h]	±3 %		±3 %		±3 %		±3 %	
Repeatability	<0.5 %		<0.5 %		<0.5 %		<0.5 %	

DAMAGE THRESHOLDS

Maximum Average Power	Alone	Attenuator	Alone	Attenuator	Alone	Attenuator	Alone	Attenuator
All Wavelengths	20 W	45 W	40 W	90 W	20 W	45 W	40 W	90 W
Maximum Energy Density	Alone	Attenuator	Alone	Attenuator	Alone	Attenuator	Alone	Attenuator
1064 nm, 7 ns, single shot	0.6 J/cm²	16 J/cm²	0.6 J/cm²	16 J/cm²	0.6 J/cm²	16 J/cm²	0.6 J/cm²	16 J/cm²
1064 nm, 7 ns, 10 Hz	0.6 J/cm²	8 J/cm²	0.6 J/cm²	8 J/cm²	0.6 J/cm²	8 J/cm²	0.6 J/cm²	8 J/cm²
532 nm, 7 ns, 10 Hz	0.6 J/cm²	6 J/cm²	0.6 J/cm²	6 J/cm²	0.6 J/cm²	6 J/cm²	0.6 J/cm²	6 J/cm²
266 nm, 7 ns, 10 Hz	0.5 J/cm²	1 J/cm²	0.5 J/cm²	1 J/cm²	0.5 J/cm²	1 J/cm²	0.5 J/cm²	1 J/cm²
Maximum Average Power Density (@12 W)	10 W/cm²	600 W/cm²	10 W/cm² [i]	600 W/cm²	10 W/cm²	600 W/cm²	10 W/cm² [i]	600 W/cm²

PHYSICAL CHARACTERISTICS

Effective Aperture (with Attenuator)	95 mm Ø (90 mm Ø)			
Absorber	Multi-Band	Multi-Band	Multi-Band	Multi-Band
Dimensions	122H x 122W x 20D mm	122H x 122W x 98D mm	122H x 122W x 20D mm	122H x 122W x 98D mm
Weight	0.78 kg	1.2 kg	0.78 kg	1.2 kg

ORDERING INFORMATION

Full Product Name	QE95LP-S-MB	QE95LP-H-MB	QE95ELP-S-MB	QE95ELP-H-MB
Product Number (Including stand)	201315	201316	201317	201318

a. 0.19 - 2.5 µm with QED Attenuator.
b. Not exceeding Maximum Average Power.
c. maximum depends on monitor.
d. Increasing pulse width increases the maximum measurable energy.
e. Nominal value, actual value depends on electrical noise in the measurement system.
f. Load: 1 MΩ and ≤ 30 pF.
g. Maximum output voltage = sensitivity x maximum energy.
h. Excludes non-linearities.
i. At 12 W. Maximum Average Power Density is 5 W/cm² @ 40 W

Specifications are subject to change without notice

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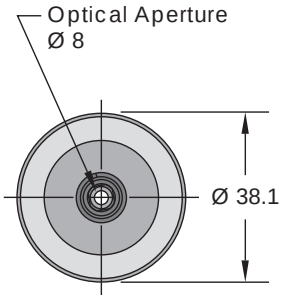
TECHNICAL DRAWINGS

QE8-B

FRONT



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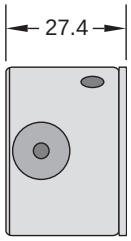

QE23-B

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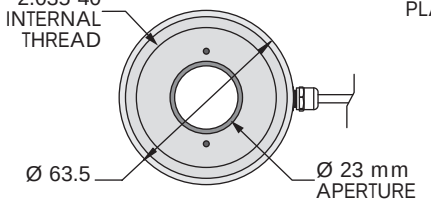

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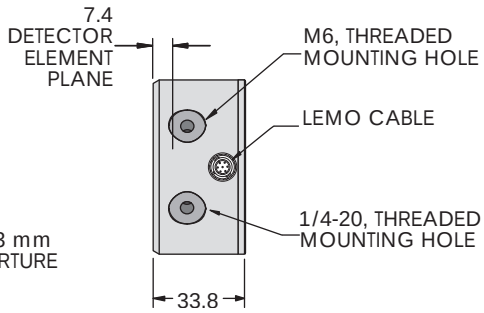
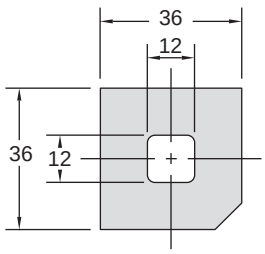
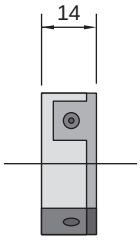


QE12

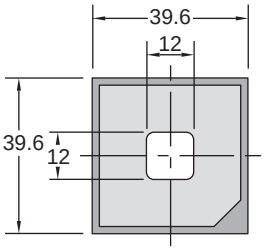
S-FRONT



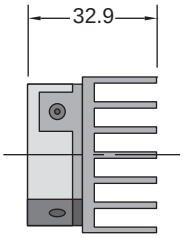
S-SIDE



H-FRONT

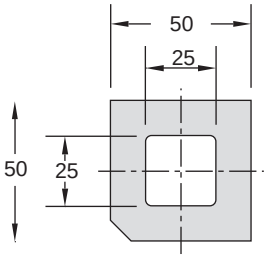


H-SIDE

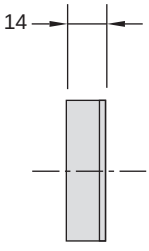


QE25

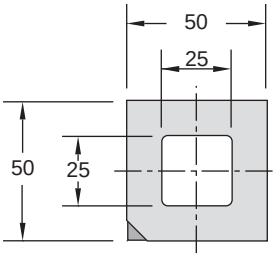
S-FRONT



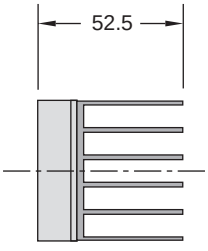
S-SIDE



H-FRONT



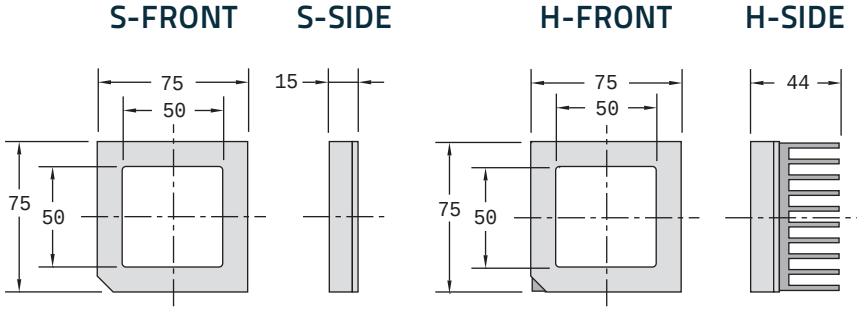
H-SIDE



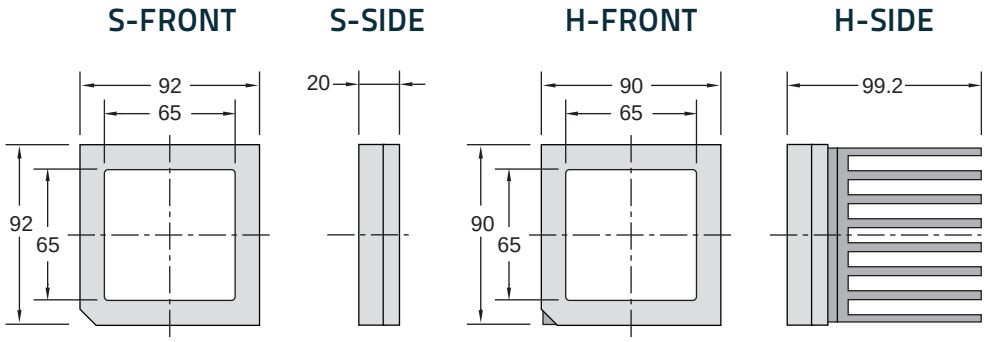
All dimensions in mm

TECHNICAL DRAWINGS

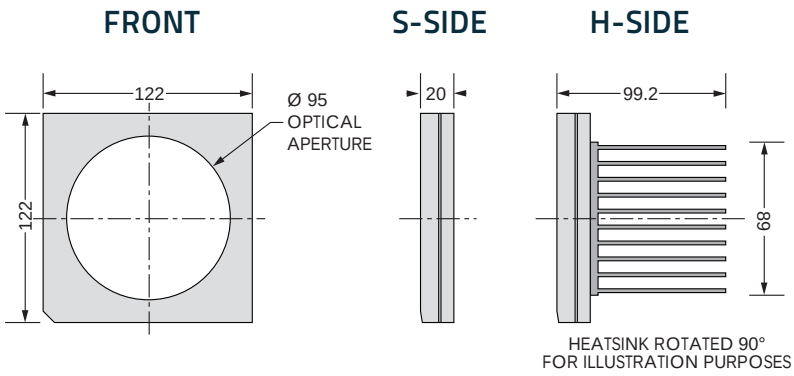
QE50



QE65



QE95



All dimensions in mm

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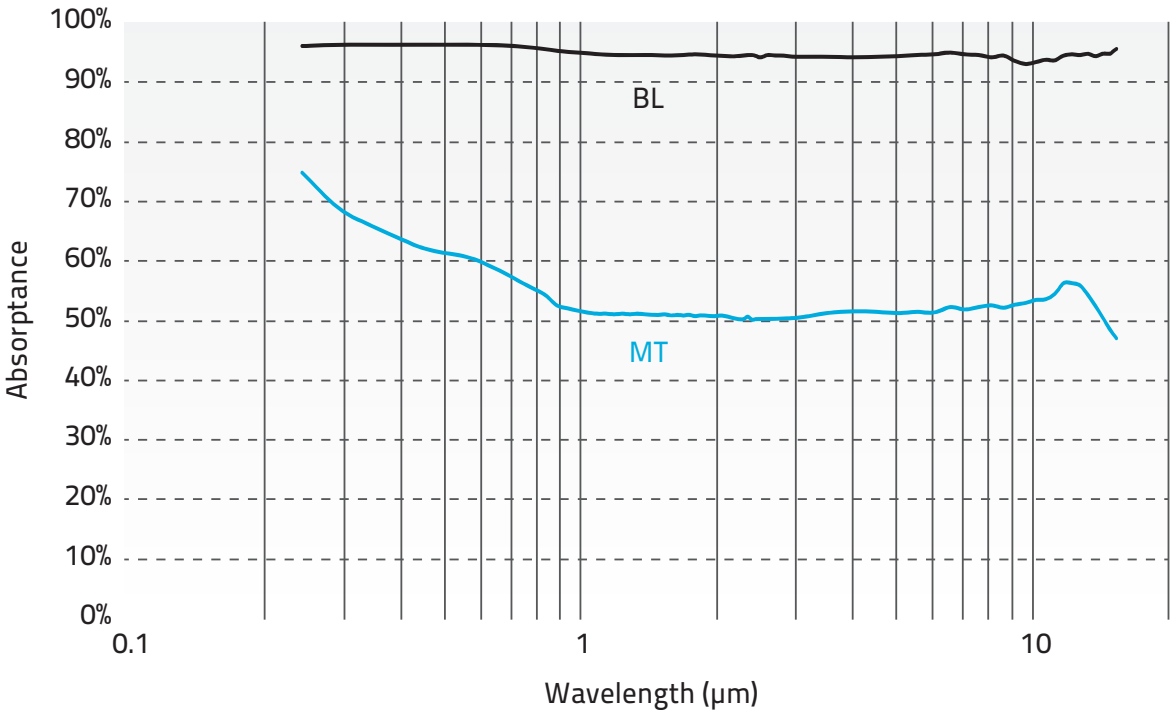
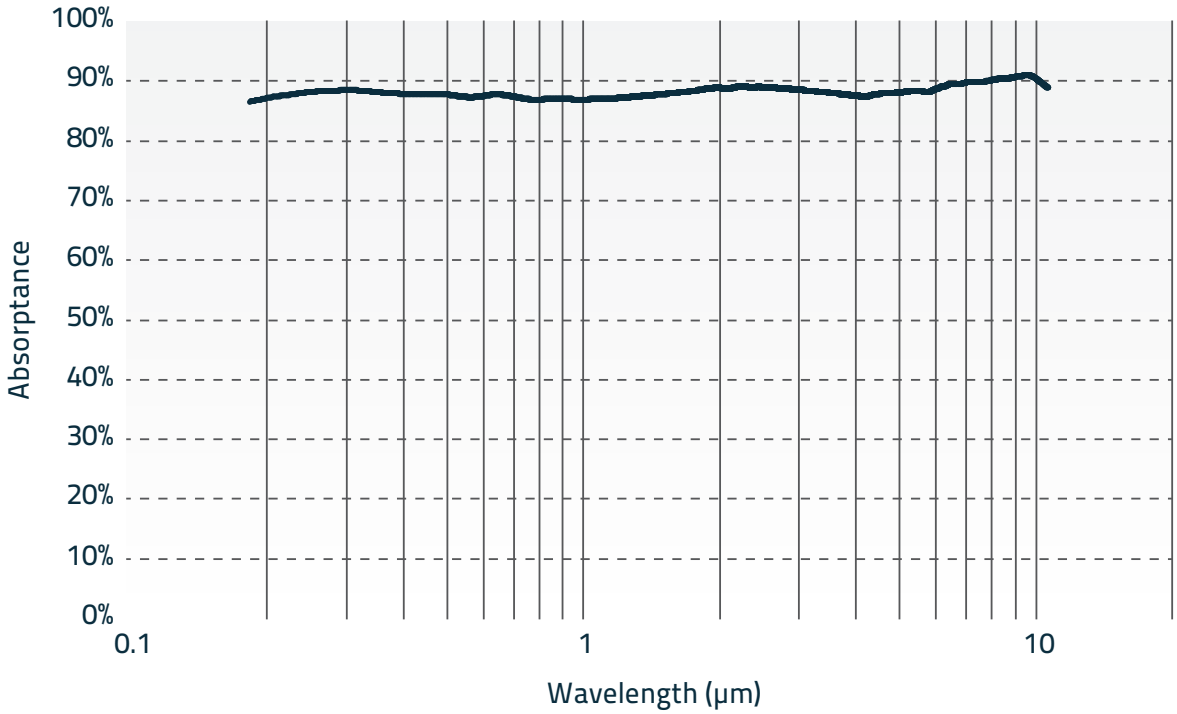
ABSORPTION CURVES

QE-B

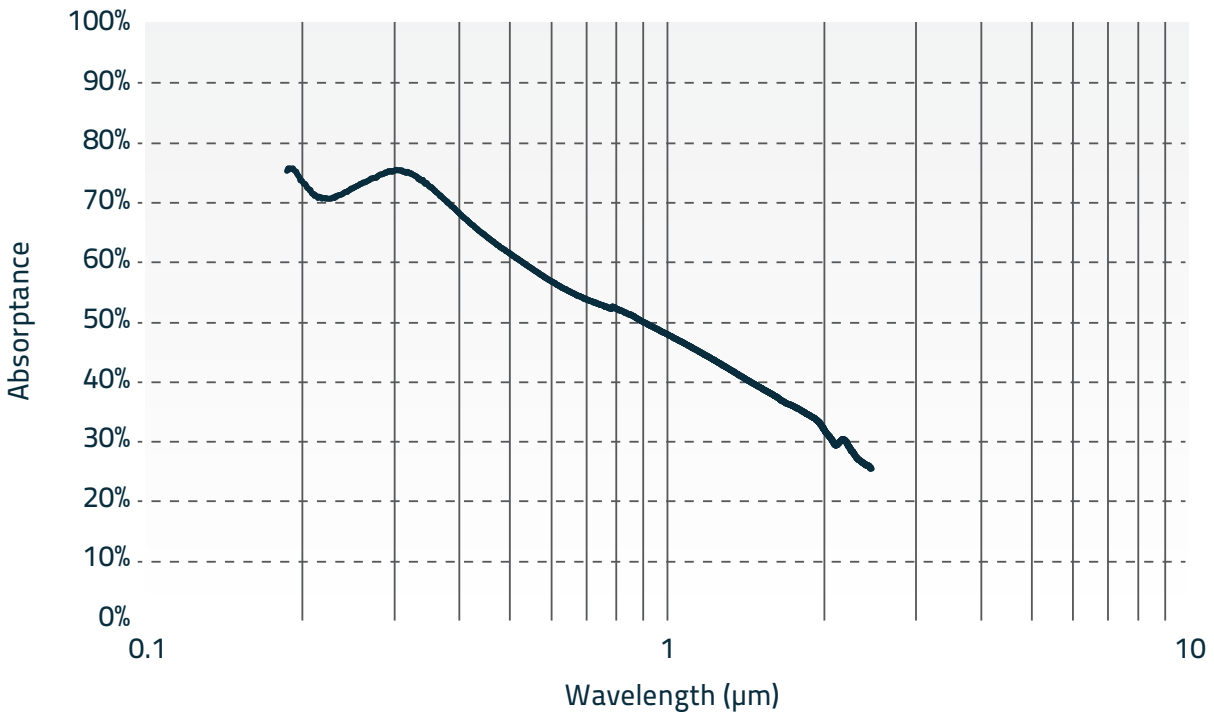


QE-MB

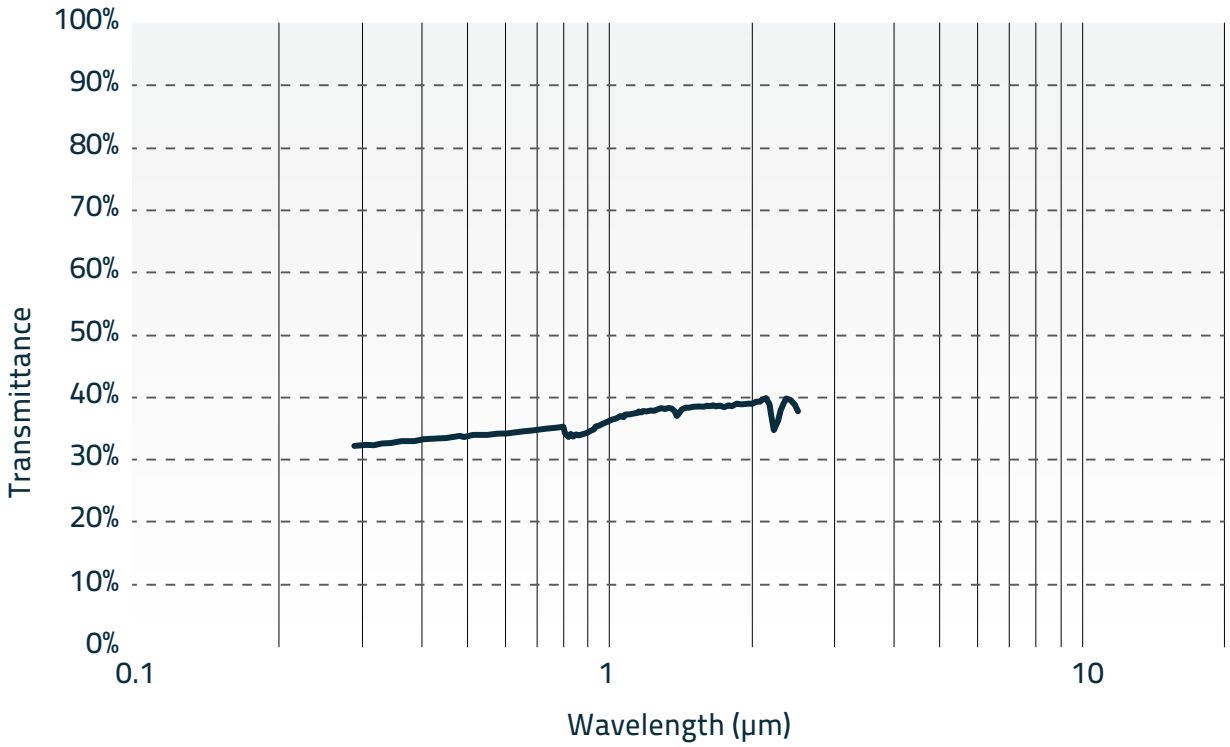


ABSORPTION CURVES

QE-MT



QED ATTENUATOR



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PRESENTATION

OVERVIEW OF THE DIFFERENT MODELS

Get accurate measurements with fast response times with our thermopile or pyroelectric power meters. Available with various absorbers, with the highest damage thresholds you can find in their category, our power meters cover a wide range going from the nanowatts to multi-kilowatts.

See page 58

XLP12

- Low Power Thermopile
  - Sensitivity of 200 mV/W
  - Noise Level of ±0.5 µW
- Minimal Thermal Drift of 6 µW/°C
- IR Filter Available

LOW POWER THERMOPILE
1 µW NOISE LEVEL

See pages 60 to 68

UP-H

- Standard (Broadband) Coating
- Available in 4 sizes:
  - 12 mm Ø
  - 19 mm Ø
  - 25 mm Ø
  - 55 mm Ø
- Available with 5 Cooling Modules:
  - Convection (S, H or L)
  - Fan (F)
  - Water (W)

STANDARD COATING
4 SIZES
5 COOLING MODULES
UP TO 500 W

See pages 72 and 74

UP-W

- High Damage Threshold Coating (100 kW/cm²)
- 17 or 50 mm Ø Aperture

PERFECT FOR:
UV LASERS, VERY FAST LASERS
AND SMALL BEAMS

HIGH AVG OR PEAK POWER DENSITIES

See pages 76 and 78

UP-VR

- High Peak Power Volume Absorbers
- 18 or 55 mm Ø Aperture

SPECIFICALLY DESIGNED FOR
HIGH ENERGY SOLID STATE LASERS

HIGH AVG OR PEAK POWER DENSITIES

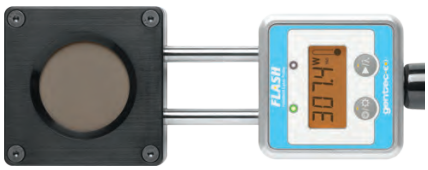
PRESENTATION

See page 80

HP

- High Average Powers:
  - HP100A-3KW-HE 3 kW, 100 mm Ø Aperture
  - HP100A-12KW-HD 12 kW, 100 mm Ø Aperture
  - HP60A-10KW-GD 10 kW, 35 mm Ø reflective cone for high power densities
- Thermally Stable
- 2 Outputs per head: USB and DB-15

HIGH POWERS UP TO 12 KW

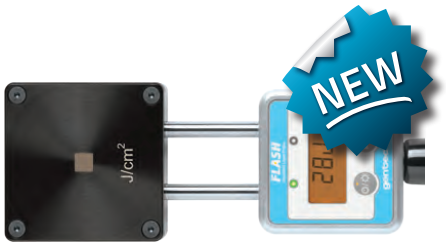


See page 82

FLASH

- Handheld Laser Probes: 500 W, 3 kW, 6 kW and 10 kW
- Fast Responses: 5 sec measurement times with most of the models
- Optional Window: For measurements with gel-coupled IPL heads

HANDHELD LASER PROBES
MODELS FROM 500 W TO 10 KW
FIXED HANDLE OR SOFT CABLE



See page 84

FLASH-IPL

- For sources up to 350 J
- Fast Responses: 5 sec measurement times with most of the models
- Rugged Devices: All-metal body, High Damage Thresholds

HANDHELD LASER PROBES
IPL: FOR SOURCES UP TO 350 J
FIXED HANDLE OR SOFT CABLE

See page 86

UM-B

- Small Compact Detector
- 9 mm Ø Aperture
- Very Low Noise Level, down to 5 nW using a pyroelectric sensor *

ULTRA-LOW POWER PYROELECTRIC
5 nW NOISE LEVEL

* Chopper needed for CW lasers.

COMPARISON TABLE

MODEL	Pmax ^	Pmax (1 min)	Noise Level	Emax	λmin	λmax	ABSORBER TYPE	APERTURE	SEE PAGE
UM9B-BL	200 mW	200 mW	5 nW	N/A	100 nm	20 µm	Radiometer	9 mm Ø	86
XLP12-3S-H2	3 W	3 W	1 µW	5 J	190 nm	20 µm	Broadband	12 mm Ø	58
XLPF12-3S-H2	3 W	3 W	1 µW	5 J	280 nm	2.1 µm	Broadband	12 mm Ø	58
UP17P-6S-H5	6 W	7 W	1 mW	15 J	190 nm	20 µm	Broadband	17 mm Ø	70
UP17P-6S-W5	6 W	7 W	1 mW	200 J	190 nm	10 µm	High Threshold	17 mm Ø	70
UP12E-10S-H5	10 W	20 W	1 mW	5 J	190 nm	20 µm	Broadband	12 mm Ø	60
UP19K-15S-H5	15 W	30 W	1 mW	15 J	190 nm	20 µm	Broadband	19 mm Ø	62
UP25T-15S-H12	15 W	15 W	10 Mw	40 J	190 nm	20 µm	Broadband	25 mm Ø	64
UP19K-15S-W5	15 W	30 W	1 mW	200 J	190 nm	10 µm	High Threshold	17 mm Ø	72
UP19K-15S-VR	15 W	20 W	2 mW	40 J	190 nm	2.5 µm	Volume Abs.	18 mm Ø	76
UP12E-20H-H5	20 W	40 W	1 mW	5 J	190 nm	20 µm	Broadband	12 mm Ø	60
UP19K-30H-H5	30 W	60 W	1 mW	15 J	190 nm	20 µm	Broadband	19 mm Ø	62
UP19K-30H-W5	30 W	60 W	1 mW	200 J	190 nm	10 µm	High Threshold	17 mm Ø	72
UP19K-30H-VR	30 W	35 W	2 mW	40 J	190 nm	2.5 µm	Volume Abs.	18 mm Ø	76
UP25N-40S-H9	40 W	80 W	3 mW	40 J	190 nm	20 µm	Broadband	25 mm Ø	64
UP55N-40S-H9	40 W	80 W	5 mW	200 J	190 nm	20 µm	Broadband	55 mm Ø	66
UP50N-40S-W9	40 W	80 W	5 mW	500 J	190 nm	10 µm	High Threshold	50 mm Ø	74
UP19K-50L-H5	50 W	90 W	1 mW	15 J	190 nm	20 µm	Broadband	19 mm Ø	62
UP19K-50L-W5	50 W	85 W	1 mW	200 J	190 nm	10 µm	High Threshold	17 mm Ø	72
UP19K-50F-W5	50 W	85 W	1 mW	200 J	190 nm	10 µm	High Threshold	17 mm Ø	72
UP19K-50W-W5	50 W	85 W	1 mW	200 J	190 nm	10 µm	High Threshold	17 mm Ø	72
UP50N-50H-W9	50 W	85 W	5 mW	500 J	190 nm	10 µm	High Threshold	50 mm Ø	74
UP50N-50F-W9	50 W	85 W	5 mW	500 J	190 nm	10 µm	High Threshold	50 mm Ø	74
UP50M-50W-W9	50 W	85 W	5 mW	500 J	190 nm	10 µm	High Threshold	50 mm Ø	74
UP55N-50S-VR	50 W	50 W	15 mW	500 J	190 nm	2.5 µm	Volume Abs.	55 mm Ø	78
UP12E-70W-H5	70 W	110 W	1 mW	5 J	190 nm	20 µm	Broadband	12 mm Ø	60
UP25N-100H-H9	100 W	200 W	3 mW	40 J	190 nm	20 µm	Broadband	25 mm Ø	64
UP55N-100H-H9	100 W	200 W	5 mW	200 J	190 nm	20 µm	Broadband	55 mm Ø	66
UP55N-100H-VR	100 W	100 W	15 mW	500 J	190 nm	2.5 µm	Volume Abs.	55 mm Ø	78
UP19K-110F-H9	110 W	150 W	3 mW	25 J	190 nm	20 µm	Broadband	19 mm Ø	62
UP19K-150W-H5	150 W	190 W	1 mW	15 J	190 nm	20 µm	Broadband	19 mm Ø	62
UP55N-150F-VR	150 W	150 W	15 mW	500 J	190 nm	2.5 µm	Volume Abs.	55 mm Ø	66
UP19K-200W-H9	200 W	200 W	3 mW	25 J	190 nm	20 µm	Broadband	19 mm Ø	62
UP55M-200W-VR	200 W	200 W	15 mW	500 J	190 nm	2.5 µm	Volume Abs.	55 mm Ø	78
UP25T-250W-H12	250 W	250 W	10 mW	40 J	190 nm	20 µm	Broadband	25 mm Ø	64
UP25N-250F-H12	250 W	300 W	10 mW	40 J	190 nm	20 µm	Broadband	25 mm Ø	64
UP55N-300F-H12	300 W	300 W	15 mW	200 J	190 nm	20 µm	Broadband	55 mm Ø	66
UP25M-350W-H12	350 W	350 W	3 mW	40 J	190 nm	20 µm	Broadband	25 mm Ø	64
UP55M-500W-H12	500 W	500 W	5 mW	200 J	190 nm	20 µm	Broadband	55 mm Ø	66
UP55G-500F-H12	500 W	500 W	15 mW	200 J	190 nm	20 µm	Broadband	55 mm Ø	68

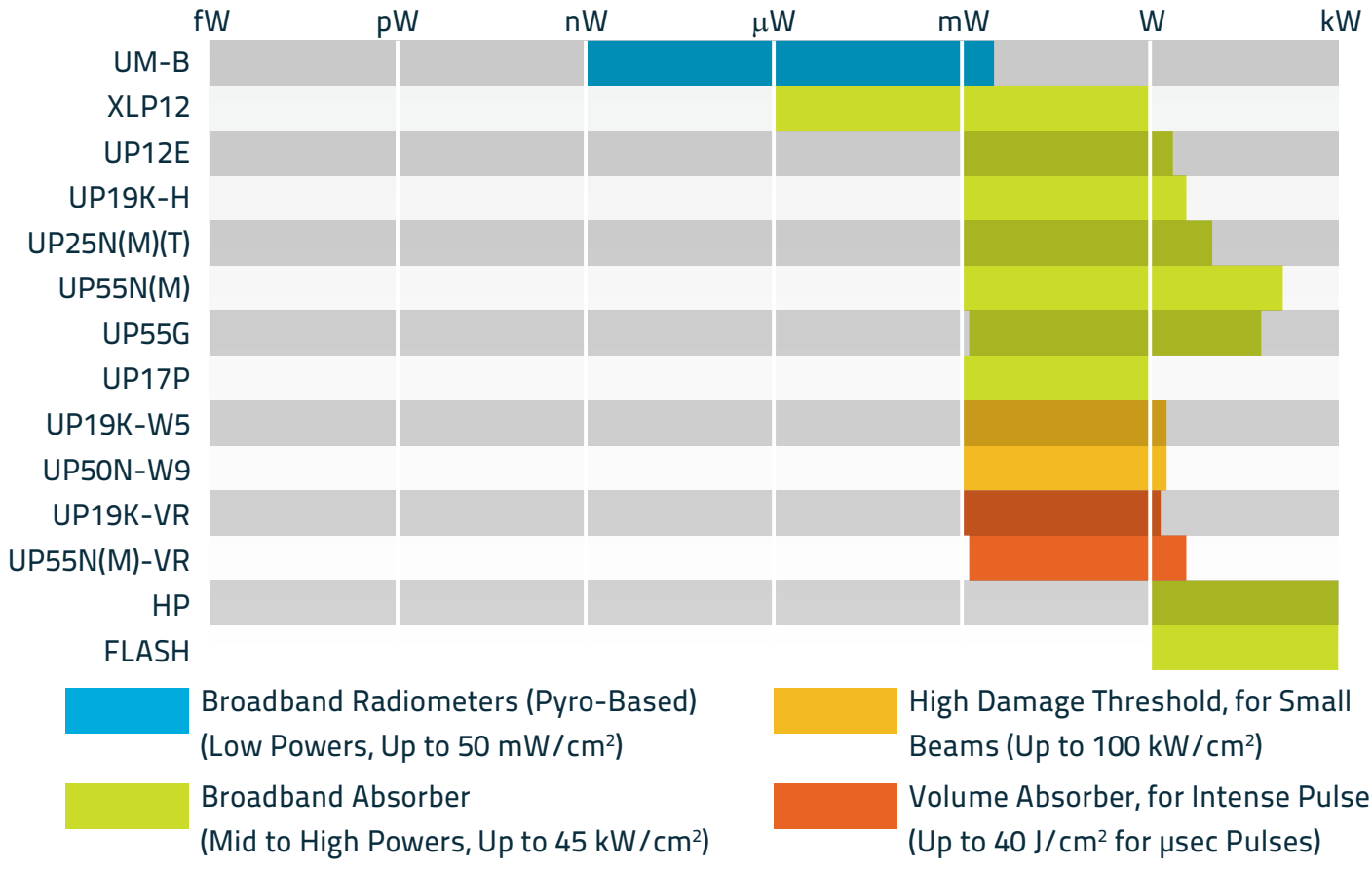
COMPARISON TABLE

MODEL	Pmax ^	Pmax (1 min)	Noise Level	Emax	λmin	λmax	ABSORBER TYPE	APERTURE	SEE PAGE
FLASH-500-55	500 W	N/A	100 mW	N/A	190 nm	20 µm	Broadband	55 mm Ø	82
FLASH-500-10S-IPL	500 W	N/A	100 mW	350 J	190 nm	20 µm	Broadband	10 x 10 mm	84
FLASH-500-20R5-IPL	500 W	N/A	100 mW	350 J	190 nm	20 µm	Broadband	20 x 5 mm	84
FLASH-500-55-W-IPL	500 W	N/A	100 mW	350 J	190 nm	20 µm	Broadband	55 mm Ø	84
FLASH-3K-55	3000 W	N/A	5 W	N/A	190 nm	20 µm	Broadband	55 mm Ø	82
HP100A-3KW-HE	3000 W	4000 W	3 W	N/A	190 nm	20 µm	Broadband	100 mm Ø	80
FLASH-6K-55	6000 W	N/A	20 W	N/A	190 nm	20 µm	Broadband	55 mm Ø	82
FLASH-10K-55	10000 W	N/A	30 W	N/A	190 nm	20 µm	Broadband	55 mm Ø	82
HP60A-10KW-GD	10000 W	10000 W	10 W	N/A	800 nm	12 µm	Broadband	60 mm Ø	80
HP100A-12KW-HD	12000 W	12000 W	10 W	N/A	190 nm	20 µm	Broadband	100 mm Ø	80

POWER RANGES

You can use the graph below to compare the power ranges of our pyroelectric and thermopile power detectors. Ranges go from the noise level to the maximum power reading.

Table 1. Comparison of the power ranges of the pyroelectric and thermopile power detectors



XLP12

12 mm Ø, 1 µW - 3 W – Low Power Thermopile

KEY FEATURES

1 **Low Power Thermopile**
Noise level of a photo detector with the large bandwidth and high power capacity of a thermal device

2 **Minimal Thermal Drift**
Only 6 µW/°C (with the IR filter)

3 **High Sensitivity**
200 mV/W (without the IR filter)

4 **IR Filter (XLP12F Model)**
Removes unwanted IR interference

5 **Isolation Tube**
Eliminates power fluctuations created by air turbulence

5 **Smart Interface**
Containing all the calibration data

AVAILABLE MODELS

XLP12-3S-H2
(3W-Standalone)

XLPF12-3S-H2
(3W-Standalone-IR Filter)

ACCESSORIES

Stand with Steel Post
(Model Number: 200160)

Extension Cables
(4, 15, 20 or 25 m)

IR Filter (Mounted)
(Model Number: 201076)

Fiber Adaptors & Connectors
(FC, SC, ST and SMA)

Pelican Carrying Case

SEE ALSO

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UNO 24
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XLP12
SPECIFICATIONS

*Also traceable to NRC-CNRC

MODELS	XLP12-3S-H2	XLPF12-3S-H2
MAX AVERAGE POWER (CONTINUOUS / 1 MINUTE)	3 W / 3 W	3 W / 3 W
EFFECTIVE APERTURE	12 mm Ø	12 mm Ø
COOLING METHOD	Convection	Convection

MEASUREMENT CAPABILITY		
Spectral Range	0.19 – 20 µm	0.28 – 2.1 µm [a]
Noise Equivalent Power [b]	±0.5 µW	±0.5 µW
Thermal Drift [c]	12 µW/°C	6 µW/°C
Rise Time (nominal) [d]	2.5 sec	2.5 sec
Sensitivity (typ into 100 kΩ load) [e]	200 mV/W	180 mV/W
Calibration Uncertainty [f]	±2.5 %	±2.5 %
Repeatability	±0.5 %	±0.5 %
Energy Mode		
Sensitivity	25 mV/J	22.5 mV/J
Maximum Measurable Energy [g]	5 J	5 J
Noise Equivalent Energy [b]	12 µJ	12 µJ
Minimum Repetition Period	16 sec	16 sec
Maximum Pulse Width	300 ms	300 ms
Accuracy with energy calibration option	±5 %	±5 %

DAMAGE THRESHOLDS		
Maximum Average Power Density [h]	1 kW/cm²	1 kW/cm²
Pulsed Laser Damage Thresholds	Max Energy Density	Peak Power Density
1064 nm, 360 µs, 5 Hz	5 J/cm²	14 kW/cm²
1064 nm, 7 ns, 10 Hz	1 J/cm²	143 MW/cm²
532 nm, 7 ns, 10 Hz	0.6 J/cm²	86 MW/cm²
266 nm, 7 ns, 10 Hz	0.3 J/cm²	43 MW/cm²

PHYSICAL CHARACTERISTICS		
Effective Aperture	12 mm Ø	12 mm Ø
Absorber (High Damage Threshold)	H2	H2
Dimensions	73H x 73W x 20D mm (72D mm with tube)	73H x 73W x 28D mm (80D mm with tube)
Weight (head only)	0.31 kg	0.32 kg

ORDERING INFORMATION		
Full Product Name	XLP12-3S-H2	XLPF12-3S-H2
Product Number (Including stand)	201035	201078

a. This spectral range refers to the calibration traceability. For details, please contact us at: info@gentec-eo.com.
b. Nominal value, actual value depends on electrical noise in the measurement system.
c. With Gentec-EO MAESTRO.
d. With Gentec-EO MAESTRO, UNO, P-LINK, TUNER and S-LINK-2 monitors.
e. Maximum output voltage = sensitivity x maximum power.
f. Including linearity with power.
g. For 360 µs pulses. Higher pulse energy possible when customized for long pulses (ms), less for short pulses (ns).
h. At 1064 nm, 1 W CW.

Specifications are subject to change without notice

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UP12E

12 mm Ø, 1 mW - 110 W

KEY FEATURES

1 Modular Concept
Increase the power capability of your detector:
3 different cooling modules

2 High Performance
Fast Rise Time (0.3 sec)
High Damage Threshold (36 kW/cm²)

3 Compact Design
Only 14 mm thick (10S model)

4 Energy Mode
Measure single shot energy up to 5 J

5 Smart Interface
Containing all the calibration data

AVAILABLE MODELS

UP12E-10S-H5
(10W-Standalone)

UP12E-20H-H5
(20W-Heatsink)

UP12E-70W-H5
(70W-Water-Cooled)

ACCESSORIES

Stand with Steel Post
(Model Number: 200160)

Extension Cables
(4, 15, 20 or 25 m)

Fiber Adaptors and Connectors
(FC, SC or SMA)

Pelican Carrying Case

SEE ALSO

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OEM DETECTORS 116
COMPATIBLE MONITORS
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- TUNER 22
- UNO 24
- S-LINK-2 26
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UP12E
SPECIFICATIONS

CE NIST* Traceable WEEE RoHS COMPLIANT

*Also traceable to NRC-CNRC

MODELS	UP12E-10S-H5	UP12E-20H-H5	UP12E-70W-H5
MAX AVERAGE POWER (CONTINUOUS / 1 MINUTE)	10 W / 20 W	20 W / 40 W	70 W [f] / 110 W [f]
EFFECTIVE APERTURE	12 mm Ø	12 mm Ø	12 mm Ø
COOLING METHOD	Convection	Heatsink	Water-Cooled
MEASUREMENT CAPABILITY			
Spectral Range	0.19 – 20 µm	0.19 – 20 µm	0.19 – 20 µm
Noise Equivalent Power [a]	1 mW	1 mW	1 mW
Rise Time (nominal) [b]	0.3 sec	0.3 sec	0.3 sec
Sensitivity (typ into 100 kΩ load) [c]	0.53 mV/W	0.53 mV/W	0.53 mV/W
Calibration Uncertainty [d]	±2.5 %	±2.5 %	±2.5 %
Repeatability	±0.5 %	±0.5 %	±0.5 %
Energy Mode			
Sensitivity	0.84 mV/J	0.84 mV/J	0.84 mV/J
Maximum Measurable Energy [e]	5 J	5 J	5 J
Noise Equivalent Energy [a]	0.02 J	0.02 J	0.02 J
Minimum Repetition Period	1.5 sec	1.5 sec	1.5 sec
Maximum Pulse Width	50 ms	50 ms	50 ms
Accuracy with energy calibration option	±5 %	±5 %	±5 %
DAMAGE THRESHOLDS			
Maximum Average Power Density [g]	36 kW/cm²	36 kW/cm²	36 kW/cm²
Pulsed Laser Damage Thresholds	Max Energy Density		Peak Power Density
1064 nm, 360 µs, 5 Hz	5 J/cm²		14 kW/cm²
1064 nm, 7 ns, 10 Hz	1 J/cm²		143 MW/cm²
532 nm, 7 ns, 10 Hz	0.6 J/cm²		86 MW/cm²
266 nm, 7 ns, 10 Hz	0.3 J/cm²		43 MW/cm²
PHYSICAL CHARACTERISTICS			
Effective Aperture	12 mm Ø	12 mm Ø	12 mm Ø
Absorber (High Damage Threshold)	H5	H5	H5
Dimensions	38H x 38W x 14D mm	38H x 38W x 45D mm	38H x 38W x 32D mm
Weight (head only)	0.13 kg	0.15 kg	0.19 kg
ORDERING INFORMATION			
Full Product Name	UP12E-10S-H5	UP12E-20H-H5	UP12E-70W-H5
Product Number (Including stand)	200384	200386	200390

a. Nominal value, actual value depends on electrical noise in the measurement system.
b. With Gentec-EO MAESTRO, UNO, P-LINK, TUNER and S-LINK-2 monitors.
c. Maximum output voltage = sensitivity x maximum power.
d. Including linearity with power.
e. For 360 µs pulses. Higher pulse energy possible when customized for long pulses (ms), less for short pulses (ns).
f. Minimum cooling flow 0.5 liters/min, water temperature ≤ 22°C, 1/8 NPT compression fittings for 1/4 inch semi-rigid tube. Contact Gentec-EO for clean deionized water cooling module option.
g. At 1064 nm, 10 W CW.

Specifications are subject to change without notice

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UP19K-H

19 mm Ø, 1 mW - 200 W

KEY FEATURES

1 Modular Concept
Increase the power capability of your detector:
5 different cooling modules

2 High Performance
Fast Rise Time (0.6 sec)
High Damage Threshold (45 kW/cm²)

3 Compact Design
Only 20.6 mm thick (15S model)

4 Energy Mode
Measure single shot energy up to 15 J

5 Smart Interface
Containing all the calibration data

AVAILABLE MODELS

UP19K-15S-H5
(15W-Standalone)

UP19K-30H-H5
(30W-Heatsink)

UP19K-50L-H5
(50W-Large Heatsink)

UP19K-110F-H9
(110W-Fan-Cooled)

UP19K-150W-H5
(150W-Water-Cooled)

UP19K-200W-H9
(200W-Water-Cooled)

ACCESSORIES

Stand with Steel Post
(Model Number: 200160)

Extension Cables
(4, 15, 20 or 25 m)

Isolation Tube
(Model Number: 100966)

Fiber Adaptors and Connectors
(FC, SC or SMA)

12V Power Supply
(Model Number: 200130)

Pelican Carrying Case

SEE ALSO

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COMPATIBLE MONITORS
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- UNO 24
- S-LINK-2 26
- P-LINK 28
- M-LINK 30

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UP19K-H

SPECIFICATIONS

*Also traceable to NRC-CNRC

MODELS	UP19K-15S-H5	UP19K-30H-H5	UP19K-50L-H5	UP19K-110F-H9	UP19K-150W-H5	UP19K-200W-H9
MAX AVERAGE POWER (CONTINUOUS / 1 MINUTE)	15 W / 30 W	30 W/ 60 W	50 W / 90 W	110 W / 150 W	150 W [f] / 190 W [f]	200 W [f] / 200 W [f]
EFFECTIVE APERTURE	19 mm Ø	19 mm Ø	19 mm Ø	19 mm Ø	19 mm Ø	19 mm Ø
COOLING METHOD	Convection	Heatsink	Large Heatsink	Fan-Cooled	Water-Cooled	Water-Cooled
MEASUREMENT CAPABILITY						
Spectral Range	0.19 – 20 µm	0.19 – 20 µm	0.19 – 20 µm	0.19 – 20 µm	0.19 – 20 µm	0.19 – 20 µm
Noise Equivalent Power [a]	1 mW	1 mW	1 mW	3 mW	1 mW	3 mW
Rise Time (nominal) [b]	0.6 sec	0.6 sec	0.6 sec	1.5 sec	0.6 sec	1.5 sec
Sensitivity (typ into 100 kΩ load) [c]	0.65 mV/W	0.65 mV/W	0.65 mV/W	0.23 mV/W	0.65 mV/W	0.23 mV/W
Calibration Uncertainty [d]	±2.5 %	±2.5 %	±2.5 %	±2.5 %	±2.5 %	±2.5 %
Repeatability	±0.5 %	±0.5 %	±0.5 %	±0.5 %	±0.5 %	±0.5 %
Energy Mode						
Sensitivity	0.65 mV/J	0.65 mV/J	0.65 mV/J	0.23 mV/J	0.65 mV/J	0.23 mV/J
Maximum Measurable Energy [e]	15 J	15 J	15 J	25 J	15 J	25 J
Noise Equivalent Energy [a]	0.02 J	0.02 J	0.02 J	0.06 J	0.02 J	0.06 J
Minimum Repetition Period	4 sec	4 sec	4 sec	4 sec	4 sec	4 sec
Maximum Pulse Width	88 ms	88 ms	88 ms	88 ms	88 ms	88 ms
Accuracy with energy calibration option	±5 %	±5 %	±5 %	±5 %	±5 %	±5 %
DAMAGE THRESHOLDS						
Maximum Average Power Density [g]	36 kW/cm²	36 kW/cm²	36 kW/cm²	45 kW/cm²	36 kW/cm²	45 kW/cm²
Pulsed Laser Damage Thresholds		Max Energy Density			Peak Power Density	
1064 nm, 360 µs, 5 Hz		5 J/cm² (H5), 9 J/cm² (H9)			14 kW/cm² (H5), 25 kW/cm² (H9)	
1064 nm, 7 ns, 10 Hz		1 J/cm²			143 MW/cm²	
532 nm, 7 ns, 10 Hz		0.6 J/cm²			86 MW/cm²	
266 nm, 7 ns, 10 Hz		0.3 J/cm²			43 MW/cm²	
PHYSICAL CHARACTERISTICS						
Effective Aperture	19 mm Ø	19 mm Ø	19 mm Ø	19 mm Ø	19 mm Ø	19 mm Ø
Absorber (High Damage Threshold)	H5	H5	H5	H9	H5	H9
Dimensions	50H x 50W x 20.6D mm	50H x 50W x 56.3D mm	76.2H x 76.2W x 74.7D mm	54.2H x 54.2W x 55.6D mm	50H x 50W x 33D mm	50H x 50W x 33D mm
Weight (head only)	0.16 kg	0.21 kg	0.48 kg	0.25 kg	0.24 kg	0.28 kg
ORDERING INFORMATION						
Full Product Name	UP19K-15S-H5	UP19K-30H-H5	UP19K-50L-H5	UP19K-110F-H9	UP19K-150W-H5	UP19K-200W-H9
Product Number (Including stand)	200173	200174	200175	200996	200177	200583

a. Nominal value, actual value depends on electrical noise in the measurement system.
b. With Gentec-EO MAESTRO, UNO, P-LINK, TUNER and S-LINK-2 monitors.
c. Maximum output voltage = sensitivity x maximum power.
d. Including linearity with power.
e. For 360 µs pulses. Higher pulse energy possible when customized for long pulses (ms), less for short pulses (ns).
f. Minimum cooling flow 0.5 liters/min, water temperature ≤ 22°C, 1/8 NPT compression fittings for 1/4 inch semi-rigid tube. Contact Gentec-EO for clean deionized water cooling module option.
g. At 1064 nm, 10 W CW.

Specifications are subject to change without notice

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UP25N-H

25 mm Ø, 3 mW - 350 W

KEY FEATURES

1 Modular Concept
Increase the power capability of your detector: 4 different cooling modules

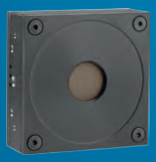
2 High Performance
- Fast Rise Time (1.3 sec)
- High Damage Threshold (45 kW/cm²)

3 Compact Design (T Version)
Only 62.4 x 62.4 mm front and 38.1 mm thick for up to 250 W continuous power

4 Energy Mode
Measure single shot energy up to 40 J

5 Smart Interface
Containing all the calibration data

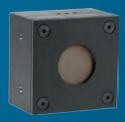
AVAILABLE MODELS


UP25N-40S-H9
(40W-Standalone)

UP25N-100H-H9
(100W-Heatsink)

UP25N-250F-H12
(250W-Fan-Cooled)

UP25M-350W-H12
(350W-Water-Cooled)


UP25T-15S-H12
(15W-Standalone)

UP25T-250W-H12
(250W-Water-Cooled)

ACCESSORIES

Stand with Steel Post
(Model Number: 200234)

Extension Cables
(4, 15, 20 or 25 m)

Fiber Adaptors and Connectors
(FC, SC or SMA)

12V Power Supply
(Model Number: 200130)

Pelican Carrying Case

SEE ALSO

HOW IT WORKS 12
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COMPATIBLE MONITORS
- MAESTRO 18
- TUNER 22
- UNO 24
- S-LINK-2 26
- P-LINK 28
- M-LINK 30

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UP25N-H

SPECIFICATIONS

CE NIST* Traceable WEEE RoHS COMPLIANT

*Also traceable to NRC-CNRC

MODELS	UP25N-40S-H9	UP25N-100H-H9	UP25N-250F-H12	UP25M-350W-H12	UP25T-15S-H12	UP25T-250W-H12
MAX AVERAGE POWER (CONTINUOUS / 1 MINUTE)	40 W / 80 W	100 W / 200 W	250 W / 300 W	350 W [f] / 350 W [f]	15 W / 15 W	250 W [f] / 250 W [f]
EFFECTIVE APERTURE	25 mm Ø	25 mm Ø	25 mm Ø	25 mm Ø	25 mm Ø	25 mm Ø
COOLING METHOD	Convection	Heatsink	Fan-Cooled	Water-Cooled	Convection	Water-Cooled
MEASUREMENT CAPABILITY						
Spectral Range	0.19 – 20 µm	0.19 – 20 µm	0.19 – 20 µm	0.19 – 20 µm	0.19 – 20 µm	0.19 – 20 µm
Noise Equivalent Power [a]	3 mW	3 mW	10 mW	10 mW	10 mW	10 mW
Rise Time (nominal) [b]	1.3 sec	1.3 sec	1.3 sec	1.3 sec	1.3 sec	1.3 sec
Sensitivity (typ into 100 kΩ load) [c]	0.23 mV/W	0.23 mV/W	0.1 mV/W	0.1 mV/W	0.1 mV/W	0.1 mV/W
Calibration Uncertainty [d]	±2.5 %	±2.5 %	±2.5 %	±2.5 %	±2.5 %	±2.5 %
Repeatability	±0.5 %	±0.5 %	±0.5 %	±0.5 %	±0.5 %	±0.5 %
Energy Mode						
Sensitivity	0.14 mV/J	0.14 mV/J	0.05 mV/J	0.05 mV/J	0.05 mV/J	0.05 mV/J
Maximum Measurable Energy [e]	40 J	40 J	40 J	40 J	40 J	40 J
Noise Equivalent Energy [a]	0.2 J	0.2 J	0.2 J	0.2 J	0.2 J	0.2 J
Minimum Repetition Period	4.6 sec	4.6 sec	11.5 sec	11.5 sec	11.5 sec	11.5 sec
Maximum Pulse Width	123 ms	123 ms	1300 ms	1300 ms	1300 ms	1300 ms
Accuracy with energy calibration option	±5 %	±5 %	±5 %	±5 %	±5 %	±5 %
DAMAGE THRESHOLDS						
Maximum Average Power Density						
1064 nm, 10 W, CW	45 kW/cm²	45 kW/cm²	45 kW/cm²	45 kW/cm²	45 kW/cm²	45 kW/cm²
10.6 µm, 10 W, CW	14 kW/cm²	14 kW/cm²	14 kW/cm²	14 kW/cm²	14 kW/cm²	14 kW/cm²
Pulsed Laser Damage Thresholds		Max Energy Density			Peak Power Density	
1064 nm, 360 µs, 5 Hz		9 J/cm²			25 kW/cm²	
1064 nm, 7 ns, 10 Hz		1 J/cm²			143 MW/cm²	
532 nm, 7 ns, 10 Hz		0.6 J/cm²			86 MW/cm²	
266 nm, 7 ns, 10 Hz		0.3 J/cm²			43 MW/cm²	
PHYSICAL CHARACTERISTICS						
Effective Aperture	25 mm Ø	25 mm Ø	25 mm Ø	25 mm Ø	25 mm Ø	25 mm Ø
Absorber (High Damage Threshold)	H9	H9	H12	H12	H12	H12
Dimensions	89H x 89W x 32D mm	89H x 89W x 106D mm	89H x 89W x 116D mm	89H x 89W x 40D mm	62.4H x 62.4W x 38.1D mm	62.4H x 62.4W x 38.1D mm
Weight (head only)	0.68 kg	0.99 kg	1.44 kg	0.87 kg	0.31 kg	0.33 kg
ORDERING INFORMATION						
Full Product Name	UP25N-40S-H9	UP25N-100H-H9	UP25N-250F-H12	UP25M-350W-H12	UP25T-15S-H12	UP25T-250W-H12
Product Number (Including stand)	200198	200202	201154	201894	201961	201875

a. Nominal value, actual value depends on electrical noise in the measurement system.
b. With Gentec-EO MAESTRO, UNO, P-LINK, TUNER and S-LINK-2 monitors.
c. Maximum output voltage = sensitivity x maximum power.
d. Including linearity with power.
e. For 360 µs pulses. Higher pulse energy possible when customized for long pulses (ms), less for short pulses (ns).
f. Minimum cooling flow 1.5 liters/min, water temperature ≤ 22°C, 1/8 NPT compression fittings for 1/4 inch semi-rigid tube. Contact Gentec-EO for clean deionized water cooling module option.

Specifications are subject to change without notice

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UP55N-H

55 mm Ø, 5 mW - 700 W

KEY FEATURES

1 Modular Concept
Increase the power capability of your detector:
5 different cooling modules

2 High Performance
Fast Rise Time (2 sec)
High Damage Threshold (45 kW/cm²)

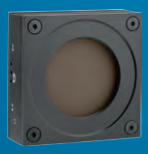
3 Compact Design
Only 32 mm thick (40S model)

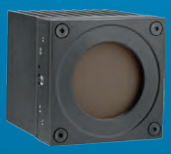
4 Special High Power Absorber
HD absorber available for continuous readings up to 700 W

5 Energy Mode
Measure single shot energy up to 200 J

6 Smart Interface
Containing all the calibration data

AVAILABLE MODELS


UP55N-40S-H9
(40W-Standalone)


UP55N-100H-H9
(100W-Heatsink)

UP55N-300F-H12
(300W-Fan-Cooled)

UP55M-500W-H12
(500W-Water-Cooled)

UP55M-700W-HD
(700W-Water-Cooled)

ACCESSORIES

Stand with Steel Post
(Model Number: 200234)

Extension Cables
(4, 15, 20 or 25 m)

Fiber Adaptors and Connectors
(FC, SC or SMA)

3-Port Fiber Cylinder with
Adaptors and Plug

12V Power Supply
(Model Number: 200130)

Pelican Carrying Case

SEE ALSO

HOW IT WORKS 12
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COMPATIBLE MONITORS
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- S-LINK-2 26
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- M-LINK 30

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UP55N-H

SPECIFICATIONS

CE NIST* Traceable WEEE RoHS COMPLIANT

*Also traceable to NRC-CNRC

NEW NEW

MODELS	UP55N-40S-H9	UP55N-100H-H9	UP55N-300F-H12	UP55M-500W-H12	UP55M-700W-HD
MAX AVERAGE POWER (CONTINUOUS / 1 MINUTE)	40 W / 80 W	100 W / 200 W	300 W / 300 W	500 W [f] / 500 W [f]	700 W [f] / 700 W [f]
EFFECTIVE APERTURE	55 mm Ø	55 mm Ø	55 mm Ø	55 mm Ø	55 mm Ø
COOLING METHOD	Convection	Heatsink	Fan-Cooled	Water-Cooled	Water-Cooled
MEASUREMENT CAPABILITY					
Spectral Range	0.19 – 20 µm	0.19 – 20 µm	0.19 – 20 µm	0.19 – 20 µm	0.19 – 20 µm
Noise Equivalent Power [a]	5 mW	5 mW	15 mW	15 mW	45 mW
Rise Time (nominal) [b]	2 sec	2 sec	2 sec	2 sec	2 sec
Sensitivity (typ into 100 kΩ load) [c]	0.12 mV/W	0.12 mV/W	0.06 mV/W	0.06 mV/W	0.03 mV/W
Calibration Uncertainty [d]	±2.5 %	±2.5 %	±2.5 %	±2.5 %	±2.5 %
Repeatability	±0.5 %	±0.5 %	±0.5 %	±0.5 %	±0.5 %
Energy Mode					
Sensitivity	0.028 mV/J	0.028 mV/J	0.015 mV/J	0.015 mV/J	0.008 mV/J
Maximum Measurable Energy [e]	200 J	200 J	200 J	200 J	200 J
Noise Equivalent Energy [a]	0.25 J	0.25 J	0.25 J	0.25 J	0.25 J
Minimum Repetition Period	11.1 sec	11.1 sec	12 sec	12 sec	12 sec
Maximum Pulse Width	433 ms	433 ms	430 ms	430 ms	430 ms
Accuracy with energy calibration option	±5 %	±5 %	±5 %	±5 %	±5 %
DAMAGE THRESHOLDS					
Maximum Average Power Density					
1064 nm, 10 W, CW	45 kW/cm²	45 kW/cm²	45 kW/cm²	45 kW/cm²	45 kW/cm²
10.6 µm, 10 W, CW	14 kW/cm²	14 kW/cm²	14 kW/cm²	14 kW/cm²	14 kW/cm²
Pulsed Laser Damage Thresholds	Max Energy Density			Peak Power Density	
1064 nm, 360 µs, 5 Hz	9 J/cm²			25 kW/cm²	
1064 nm, 7 ns, 10 Hz	1 J/cm²			143 MW/cm²	
532 nm, 7 ns, 10 Hz	0.6 J/cm²			86 MW/cm²	
266 nm, 7 ns, 10 Hz	0.3 J/cm²			43 MW/cm²	
PHYSICAL CHARACTERISTICS					
Effective Aperture	55 mm Ø	55 mm Ø	55 mm Ø	55 mm Ø	55 mm Ø
Absorber (High Damage Threshold)	H9	H9	H12	H12	HD
Dimensions	89H x 89W x 32D mm	89H x 89W x 106D mm	89H x 89W x 116D mm	89H x 89W x 40D mm	89H x 89W x 40D mm
Weight (head only)	0.62 kg	0.93 kg	1.41 kg	0.81 kg	0.90 kg
ORDERING INFORMATION					
Full Product Name	UP55N-40S-H9	UP55N-100H-H9	UP55N-300F-H12	UP55M-500W-H12	UP55M-700W-HD
Product Number (Including stand)	200218	200222	201160	201883	201916

a. Nominal value, actual value depends on electrical noise in the measurement system.
b. With Gentec-EO MAESTRO, UNO, P-LINK, TUNER and S-LINK-2 monitors.
c. Maximum output voltage = sensitivity x maximum power.
d. Including linearity with power.
e. For 360 µs pulses. Higher pulse energy possible when customized for long pulses (ms), less for short pulses (ns).
f. Minimum cooling flow 1.5 liters/min, water temperature ≤ 22°C, 1/8 NPT compression fittings for 1/4 inch semi-rigid tube. Contact Gentec-EO for clean deionized water cooling module option.

Specifications are subject to change without notice

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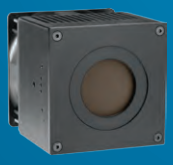
UP55G

55 mm Ø, 15 mW - 600 W, Fan-Cooled

KEY FEATURES

1. **Fan-Cooled**
   High Power without the need for water cooling
2. **Portable**
   Perfect for production environments and service technicians
3. **Special High Power Absorber**
   HD absorber available for continuous readings up to 600 W
4. **Energy Mode**
   Measure single shot energy up to 200 J
5. **Smart Interface**
   Containing all the calibration data

AVAILABLE MODELS



UP55G-500F-H12
(500W-Fan-Cooled)

UP55G-600F-HD
(600W-Fan-Cooled)

ACCESSORIES

Stand with Steel Post
(Model Number: 201102)

Extension Cables
(4, 15, 20 or 25 m)

Fiber Adaptors and Connectors
(FC, SC or SMA)

3-Port Fiber Cylinder with
Adaptors and Plug

12V Power Supply
(Model Number: 200130)

Pelican Carrying Case

SEE ALSO

HOW IT WORKS	12
CALIBRATION	6
TECHNICAL DRAWINGS	88
ABSORPTION CURVES	93
COMPATIBLE MONITORS	
MAESTRO	18
TUNER	22
UNO	24
S-LINK-2	26
P-LINK	28
M-LINK	30
LIST OF ALL ACCESSORIES	174

UP55G
SPECIFICATIONS

*Also traceable to NRC-CNRC

NEW

MODELS	UP55G-500F-H12	UP55G-600F-HD
MAX AVERAGE POWER (CONTINUOUS / 1 MINUTE)	500 W / 500 W	600 W / 600 W
EFFECTIVE APERTURE	55 mm Ø	55 mm Ø
COOLING METHOD	Fan-Cooled	Fan-Cooled

MEASUREMENT CAPABILITY		
Spectral Range	0.19 – 20 µm	0.19 – 20 µm
Noise Equivalent Power [a]	15 mW	45 mW
Rise Time (nominal) [b]	2.8 sec	2.8 sec
Sensitivity (typ into 100 kΩ load) [c]	0.06 mV/W	0.03 mV/W
Calibration Uncertainty [d]	±2.5 %	±2.5 %
Repeatability	±0.5 %	±0.5 %
Energy Mode		
Sensitivity	0.013 mV/J	0.008 mV/J
Maximum Measurable Energy [e]	200 J	200 J
Noise Equivalent Energy [a]	0.25 J	0.25 J
Minimum Repetition Period	14.3 sec	12 sec
Maximum Pulse Width	433 ms	430 ms
Accuracy with energy calibration option	±5 %	±5 %

DAMAGE THRESHOLDS		
Maximum Average Power Density		
1064 nm, 10 W, CW	45 kW/cm²	
1064 nm, 500 W, CW	8 kW/cm²	
Pulsed Laser Damage Thresholds	Max Energy Density	Peak Power Density
1064 nm, 360 µs, 5 Hz	9 J/cm²	25 kW/cm²
1064 nm, 7 ns, 10 Hz	1 J/cm²	143 MW/cm²
532 nm, 7 ns, 10 Hz	0.6 J/cm²	86 MW/cm²
266 nm, 7 ns, 10 Hz	0.3 J/cm²	43 MW/cm²

PHYSICAL CHARACTERISTICS		
Effective Aperture	55 mm Ø	55 mm Ø
Absorber (High Damage Threshold)	H12	HD
Dimensions	120H x 120W x 135D mm	120H x 120W x 135D mm
Weight (head only)	2.75 kg	2.75 kg

ORDERING INFORMATION		
Full Product Name	UP55G-500F-H12	UP55G-600F-HD
Product Number (Including stand)	201100	201879

a. Nominal value, actual value depends on electrical noise in the measurement system.
b. With Gentec-EO MAESTRO, UNO, P-LINK, TUNER and S-LINK-2 monitors.
c. Maximum output voltage = sensitivity x maximum power.
d. Including linearity with power.
e. For 360 µs pulses. Higher pulse energy possible when customized for long pulses (ms), less for short pulses (ns).

Specifications are subject to change without notice

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UP17P

17 mm Ø, 1 mW - 7 W, Ultra Thin Casing

KEY FEATURES

1 Ultra Thin Casing
Only 10.7 mm thick!

2 Choice Between 2 Absorbers
- H5: 36 kW/cm²
- W5: Unequalled 100 kW/cm²

3 High "Power to Size" Ratio
6 W continuous reading

4 Energy Mode
Measure single shot energy up to 200 J (with the W5 version)

5 Smart Interface
Containing all the calibration data

AVAILABLE MODELS

UP17P-6S-H5
(6W-36 kW/cm²)

UP17P-6S-W5
(6W-100 kW/cm²)

ACCESSORIES

Stand with Steel Post
(Model Number: 200160)

Extension Cables
(4, 15, 20 or 25 m)

Pelican Carrying Case

SEE ALSO

HOW IT WORKS 12
CALIBRATION 6
TECHNICAL DRAWINGS 88
ABSORPTION CURVES 93
COMPATIBLE MONITORS
- MAESTRO 18
- TUNER 22
- UNO 24
- S-LINK-2 26
- P-LINK 28
- M-LINK 30

LIST OF ALL ACCESSORIES 174

UP17P
SPECIFICATIONS

*Also traceable to NRC-CNRC

MODELS	UP17P-6S-H5	UP17P-6S-W5
MAX AVERAGE POWER (CONTINUOUS / 1 MINUTE)	6 W / 7 W	6 W / 7 W
EFFECTIVE APERTURE	17 mm Ø	17 mm Ø
COOLING METHOD	Convection	Convection

MEASUREMENT CAPABILITY		
Spectral Range	0.19 – 20 µm	0.19 – 10 µm
Noise Equivalent Power [a]	1 mW	1 mW
Rise Time (nominal) [b]	0.8 sec	1.4 sec
Sensitivity (typ into 100 kΩ load) [c]	0.6 mV/W	0.6 mV/W
Calibration Uncertainty [d]	±2.5 %	±2.5 %
Repeatability	±0.5 %	±0.5 %
Energy Mode		
Sensitivity	0.7 mV/J	0.2 mV/J
Maximum Measurable Energy [e]	15 J	200 J
Noise Equivalent Energy [a]	0.02 J	0.02 J
Minimum Repetition Period	4 sec	5 sec
Maximum Pulse Width	88 ms	133 ms
Accuracy with energy calibration option	±5 %	±5 %

DAMAGE THRESHOLDS				
Maximum Average Power Density [f]	36 kW/cm²		100 kW/cm²	
Pulsed Laser Damage Thresholds	Max Energy Density	Peak Power Density	Max Energy Density	Peak Power Density
1064 nm, 360 µs, 5 Hz	5 J/cm²	14 kW/cm²	100 J/cm²	667 kW/cm²
1064 nm, 7 ns, 10 Hz	1 J/cm²	143 MW/cm²	1.1 J/cm²	157 MW/cm²
532 nm, 7 ns, 10 Hz	0.6 J/cm²	86 MW/cm²	1.1 J/cm²	157 MW/cm²
266 nm, 7 ns, 10 Hz	0.3 J/cm²	43 MW/cm²	0.7 J/cm²	27 MW/cm²

PHYSICAL CHARACTERISTICS		
Effective Aperture	17 mm Ø	17 mm Ø
Absorber (High Damage Threshold)	H5	W5
Dimensions	46H x 46W x 10.7D mm	46H x 46W x 10.7D mm
Weight (head only)	0.1 kg	0.1 kg

ORDERING INFORMATION		
Full Product Name	UP17P-6S-H5	UP17P-6S-W5
Product Number (Including stand)	201036	201037

a. Nominal value, actual value depends on electrical noise in the measurement system.
b. With Gentec-EO MAESTRO, UNO, P-LINK, TUNER and S-LINK-2 monitors.
c. Maximum output voltage = sensitivity x maximum power.
d. Including linearity with power.
e. For 360 µs pulses. Higher pulse energy possible when customized for long pulses (ms), less for short pulses (ns).
f. At 1064 nm, 10 W CW.

Specifications are subject to change without notice

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UP19K-W5

17 mm Ø, 1 mW - 85 W, 100 kW/cm²

KEY FEATURES

1 Modular Concept
Increase the power capability of your detector: 5 different cooling modules

2 Very High Damage Threshold
100 kW/cm² in average power density

3 Compact Design
Only 21 mm thick (15S model)

4 Energy Mode
Measure single shot energy up to 200 J

5 Smart Interface
Containing all the calibration data

AVAILABLE MODELS

UP19K-15S-W5
(15W-Standalone)

UP19K-30H-W5
(30W-Heatsink)

UP19K-50L-W5
(50W-Large Heatsink)

UP19K-50F-W5
(50W-Fan-Cooled)

UP19K-50W-W5
(50W-Water-Cooled)

ACCESSORIES

Stand with Steel Post
(Model Number: 200160)

Extension Cables
(4, 15, 20 or 25 m)

12V Power Supply
(Model Number: 200130)

Pelican Carrying Case

SEE ALSO

HOW IT WORKS 12
CALIBRATION 6
TECHNICAL DRAWINGS 88
ABSORPTION CURVES 93
OEM DETECTORS 116
COMPATIBLE MONITORS
- MAESTRO 18
- TUNER 22
- UNO 24
- S-LINK-2 26
- P-LINK 28
- M-LINK 30

LIST OF ALL ACCESSORIES 174

UP19K-W5

SPECIFICATIONS

NIST* Traceable

*Also traceable to NRC-CNRC

MODELS	UP19K-15S-W5	UP19K-30H-W5	UP19K-50L-W5	UP19K-50F-W5	UP19K-50W-W5
MAX AVERAGE POWER (CONTINUOUS / 1 MINUTE)	15 W / 30 W	30 W / 60 W	50 W / 85 W	50 W / 85 W	50 W [f] / 85 W [f]
EFFECTIVE APERTURE	17 mm Ø	17 mm Ø	17 mm Ø	17 mm Ø	17 mm Ø
COOLING METHOD	Convection	Heatsink	Large Heatsink	Fan-Cooled	Water-Cooled
MEASUREMENT CAPABILITY					
Spectral Range	0.19 – 10 µm	0.19 – 10 µm	0.19 – 10 µm	0.19 – 10 µm	0.19 – 10 µm
Noise Equivalent Power [a]	1 mW	1 mW	1 mW	1 mW	1 mW
Rise Time (nominal) [b]	1.4 sec	1.4 sec	1.4 sec	1.4 sec	1.4 sec
Sensitivity (typ into 100 kΩ load) [c]	0.65 mV/W	0.65 mV/W	0.65 mV/W	0.65 mV/W	0.65 mV/W
Calibration Uncertainty [d]	±2.5 %	±2.5 %	±2.5 %	±2.5 %	±2.5 %
Repeatability	±0.5 %	±0.5 %	±0.5 %	±0.5 %	±0.5 %
Energy Mode					
Sensitivity	0.33 mV/J	0.33 mV/J	0.33 mV/J	0.33 mV/J	0.33 mV/J
Maximum Measurable Energy [e]	200 J	200 J	200 J	200 J	200 J
Noise Equivalent Energy [a]	0.02 J	0.02 J	0.02 J	0.02 J	0.02 J
Minimum Repetition Period	5 sec	5 sec	5 sec	5 sec	5 sec
Maximum Pulse Width	133 ms	133 ms	133 ms	133 ms	133 ms
Accuracy with energy calibration option	±5 %	±5 %	±5 %	±5 %	±5 %
DAMAGE THRESHOLDS					
Maximum Average Power Density [g]	100 kW/cm²	100 kW/cm²	100 kW/cm²	100 kW/cm²	100 kW/cm²
Pulsed Laser Damage Thresholds	Max Energy Density			Peak Power Density	
1064 nm, 150 µs, 10 Hz	100 J/cm²			667 kW/cm²	
1064 nm, 7 ns, 10 Hz	1.1 J/cm²			157 MW/cm²	
532 nm, 7 ns, 10 Hz	1.1 J/cm²			157 MW/cm²	
248 nm, 26 ns, 10 Hz	0.7 J/cm²			27 MW/cm²	
PHYSICAL CHARACTERISTICS					
Effective Aperture	17 mm Ø	17 mm Ø	17 mm Ø	17 mm Ø	17 mm Ø
Absorber (High Damage Threshold)	W5	W5	W5	W5	W5
Dimensions	50H x 50W x 20.6D mm	50H x 50W x 56.3D mm	76.2H x 76.2W x 74.7D mm	54.2H x 54.2W x 55.6D mm	50H x 50W x 33D mm
Weight (head only)	0.16 kg	0.21 kg	0.48 kg	0.25 kg	0.24 kg
ORDERING INFORMATION					
Full Product Name	UP19K-15S-W5	UP19K-30H-W5	UP19K-50L-W5	UP19K-50F-W5	UP19K-50W-W5
Product Number (Including stand)	200295	200296	200297	200299	200300

a. Nominal value, actual value depends on electrical noise in the measurement system.
b. With Gentec-EO MAESTRO, UNO, P-LINK, TUNER and S-LINK-2 monitors.
c. Maximum output voltage = sensitivity x maximum power.
d. Including linearity with power.
e. For 150 µs pulses. Higher pulse energy possible when customized for long pulses (ms), less for short pulses (ns).
f. Minimum cooling flow 1 liters/min, water temperature ≤ 22°C, 1/8 NPT compression fittings for 1/4 inch semi-rigid tube. Contact Gentec-EO for clean deionized water cooling module option.
g. At 1064 nm, 10 W CW.

Specifications are subject to change without notice

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UP50N-W9

50 mm Ø, 5 mW – 85 W, 100 kW/cm²

KEY FEATURES

1. **Modular Concept**
   Increase the power capability of your detector: 4 different cooling modules
2. **Very High Damage Threshold**
   100 kW/cm² in average power density
3. **Very Large Aperture**
   50 mm Ø effective aperture, perfect for the largest beams
4. **Highest Energy Readings in the Series**
   Measure single shot energy up to 500 J
5. **Smart Interface**
   Containing all the calibration data

AVAILABLE MODELS

UP50N-40S-W9
(40W-Standalone)

UP50N-50H-W9
(50W-Heatsink)

UP50N-50F-W9
(50W-Fan-Cooled)

UP50M-50W-W9
(50W-Water-Cooled)

ACCESSORIES

Stand with Steel Post
(Model Number: 200234)

Extension Cables
(4, 15, 20 or 25 m)

Fiber Adaptors and Connectors
(FC, SC or SMA)

3-Port Fiber Cylinder with
Adaptors and Plug

12V Power Supply
(Model Number: 200130)

Pelican Carrying Case

SEE ALSO

HOW IT WORKS 12
CALIBRATION 6
TECHNICAL DRAWINGS 88
ABSORPTION CURVES 93
OEM DETECTORS 116
COMPATIBLE MONITORS
- MAESTRO 18
- TUNER 22
- UNO 24
- S-LINK-2 26
- P-LINK 28
- M-LINK 30

LIST OF ALL ACCESSORIES 174

UP50N-W9

SPECIFICATIONS

CE NIST* Traceable WEEE RoHS COMPLIANT

*Also traceable to NRC-CNRC

MODELS	UP50N-40S-W9	UP50N-50H-W9	UP50N-50F-W9	UP50M-50W-W9
MAX AVERAGE POWER (CONTINUOUS / 1 MINUTE)	40 W / 80 W	50 W / 85 W	50 W / 85 W	50 W [f] / 85 W [f]
EFFECTIVE APERTURE	50 mm Ø	50 mm Ø	50 mm Ø	50 mm Ø
COOLING METHOD	Convection	Heatsink	Fan-Cooled	Water-Cooled
MEASUREMENT CAPABILITY				
Spectral Range	0.19 – 10 µm	0.19 – 10 µm	0.19 – 10 µm	0.19 – 10 µm
Noise Equivalent Power [a]	5 mW	5 mW	5 mW	5 mW
Rise Time (nominal) [b]	3.5 sec	3.5 sec	3.5 sec	3.5 sec
Sensitivity (typ into 100 kΩ load) [c]	0.12 mV/W	0.12 mV/W	0.12 mV/W	0.12 mV/W
Calibration Uncertainty [d]	±2.5 %	±2.5 %	±2.5 %	±2.5 %
Repeatability	±0.5 %	±0.5 %	±0.5 %	±0.5 %
Energy Mode				
Sensitivity	0.02 mV/J	0.02 mV/J	0.02 mV/J	0.02 mV/J
Maximum Measurable Energy [e]	500 J	500 J	500 J	500 J
Noise Equivalent Energy [a]	0.25 J	0.25 J	0.25 J	0.25 J
Minimum Repetition Period	11.1 sec	11.1 sec	11.1 sec	11.1 sec
Maximum Pulse Width	467 ms	467 ms	467 ms	467 ms
Accuracy with energy calibration option	±5 %	±5 %	±5 %	±5 %
DAMAGE THRESHOLDS				
Maximum Average Power Density [g]	100 kW/cm²	100 kW/cm²	100 kW/cm²	100 kW/cm²
Pulsed Laser Damage Thresholds	Max Energy Density		Peak Power Density	
1064 nm, 150 µs, 5 Hz	100 J/cm²		667 kW/cm²	
1064 nm, 7 ns, 10 Hz	1.1 J/cm²		157 MW/cm²	
532 nm, 7 ns, 10 Hz	1.1 J/cm²		157 MW/cm²	
248 nm, 26 ns, 10 Hz	0.7 J/cm²		27 MW/cm²	
PHYSICAL CHARACTERISTICS				
Effective Aperture	50 mm Ø	50 mm Ø	50 mm Ø	50 mm Ø
Absorber (High Damage Threshold)	W9	W9	W9	W9
Dimensions	89H x 89W x 32D mm	89H x 89W x 106D mm	89H x 89W x 116D mm	89H x 89W x 40D mm
Weight (head only)	0.62 g	0.93 g	1.38 g	0.81 g
ORDERING INFORMATION				
Full Product Name	UP50N-40S-w9	UP50N-50H-W9	UP50N-50F-W9	UP50M-50W-W9
Product Number (Including stand)	200896	200897	200898	201887

a. Nominal value, actual value depends on electrical noise in the measurement system.
b. With Gentec-EO MAESTRO, UNO, P-LINK, TUNER and S-LINK-2 monitors.
c. Maximum output voltage = sensitivity x maximum power.
d. Including linearity with power.
e. For 360 µs pulses. Higher pulse energy possible when customized for long pulses (ms), less for short pulses (ns).
f. Minimum cooling flow 0.5 liters/min, water temperature ≤ 22°C, 1/8 NPT compression fittings for 1/4 inch semi-rigid tube. Contact Gentec-EO for clean deionized water cooling module option.
g. At 1064 nm, 10 W CW.

Specifications are subject to change without notice

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UP19K-VR

18 mm Ø, 2 mW - 35 W, Volume Absorber

KEY FEATURES

1 Modular Concept
Increase the power capability of your detector:
2 different cooling modules

2 High Peak Power Volume Absorber
- Perfect for high density beams
- Average power density of 700 W/cm² prevents degradation caused by repetitive pulses

3 Compact Design
Only 21 mm thick (15S model)

4 Energy Mode
Measure single shot energy up to 40 J

5 Smart Interface
Containing all the calibration data

AVAILABLE MODELS

UP19K-15S-VR
(15W-Standalone)

UP19K-30H-VR
(30W-Heatsink)

ACCESSORIES

Stand with Steel Post
(Model Number: 200160)

Extension Cables
(4, 15, 20 or 25 m)

Pelican Carrying Case

SEE ALSO

HOW IT WORKS 12
CALIBRATION 6
TECHNICAL DRAWINGS 88
COMPATIBLE MONITORS
- MAESTRO 18
- TUNER 22
- UNO 24
- S-LINK-2 26
- P-LINK 28
- M-LINK 30

LIST OF ALL ACCESSORIES 174

UP19K-VR

SPECIFICATIONS

CE NIST* Traceable WEEE/RoHS COMPLIANT

*Also traceable to NRC-CNRC

MODELS	UP19K-15S-VR	UP19K-30H-VR
MAX AVERAGE POWER (CONTINUOUS / 1 MINUTE)	15 W / 20 W	30 W / 35 W
EFFECTIVE APERTURE	18 mm Ø	18 mm Ø
COOLING METHOD	Convection	Heatsink

MEASUREMENT CAPABILITY		
Spectral Range [a]	0.3 – 2.5 µm	0.3 – 2.5 µm
Noise Equivalent Power [b]	2 mW	2 mW
Rise Time (nominal) [c]	2.5 sec	2.5 sec
Sensitivity (typ into 100 kΩ load) [d]	0.34 mV/W	0.34 mV/W
Calibration Uncertainty [e]	±2.5 %	±2.5 %
Repeatability	±0.5 %	±0.5 %
Energy Mode		
Sensitivity	0.1 mV/J	0.1 mV/J
Maximum Measurable Energy [f]	40 J	40 J
Noise Equivalent Energy [b]	0.02 J	0.02 J
Minimum Repetition Period	4.5 sec	4.5 sec
Maximum Pulse Width	90 ms	90 ms
Accuracy with energy calibration option	±5 %	±5 %

DAMAGE THRESHOLDS		
Maximum Average Power Density [g]	700 W/cm²	700 W/cm²
Pulsed Laser Damage Thresholds	Max Energy Density	Peak Power Density
1064 nm, 360 µs, 10 Hz	40 J/cm²	111 kW/cm²
1064 nm, 7 ns, 10 Hz	6 J/cm²	860 MW/cm²
532 nm, 7 ns, 10 Hz	4 J/cm²	570 MW/cm²
266 nm, 7 ns, 10 Hz	1 J/cm²	143 MW/cm²

PHYSICAL CHARACTERISTICS		
Effective Aperture	18 mm Ø	18 mm Ø
Absorber (Volume Absorber)	VR	VR
Dimensions	50H x 50W x 20.6D mm	50H x 50W x 56.3D mm
Weight (head only)	0.16 kg	0.21 kg

ORDERING INFORMATION		
Full Product Name	UP19K-15S-VR	UP19K-30H-VR
Product Number (Including stand)	201149	201150

a. Adjustment multipliers for wavelengths under 300 nm are not traceable.
b. Nominal value, actual value depends on electrical noise in the measurement system.
c. With Gentec-EO MAESTRO, UNO, P-LINK, TUNER and S-LINK-2 monitors.
d. Maximum output voltage = sensitivity x maximum power.
e. Including linearity with power.
f. For 360 µs pulses. Higher pulse energy possible when customized for long pulses (ms), less for short pulses (ns).
g. At 1064 nm, 10 W CW.

Specifications are subject to change without notice

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UP55N-VR

55 mm Ø, 15 mW - 200 W, Volume Absorber

NEW

KEY FEATURES

1 Modular Concept
Increase the power capability of your detector: 4 different cooling modules

2 High Peak Power Volume Absorber
- Perfect for high density beams
- Average power density of 700 W/cm² prevents degradation caused by repetitive pulses

3 Large Aperture
55 mm Ø aperture accomodates the largest beams

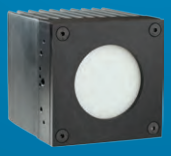
4 High Average Power
Up to 200 W of continuous power with the water-cooled unit

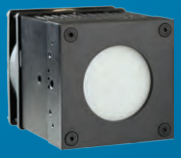
5 Energy Mode
Measure single shot energy up to 200 J

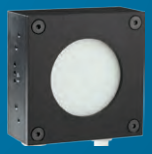
6 Smart Interface
Containing all the calibration data

AVAILABLE MODELS

UP55N-50S-VR
(50W-Standalone)


UP55N-100H-VR
(100W-Heatsink)


UP55N-150F-VR
(150W-Fan-Cooled)


UP55M-200W-VR
(200W-Water-Cooled)

ACCESSORIES

Stand with Steel Post
(Model Number: 200234)

Extension Cables
(4, 15, 20 or 25 m)

Fiber Adaptors and Connectors
(FC, SC or SMA)

3-Port Fiber Cylinder with
Adaptors and Plug

12V Power Supply
(Model Number: 200130)

Pelican Carrying Case

SEE ALSO

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- S-LINK-2 26
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LIST OF ALL ACCESSORIES 174

UP55N-VR

SPECIFICATIONS

CE NIST* Traceable WEEE RoHS COMPLIANT

*Also traceable to NRC-CNRC

MODELS	UP55N-50S-VR	UP55N-100H-VR	UP55N-150F-VR	UP55M-200W-VR
MAX AVERAGE POWER (CONTINUOUS / 1 MINUTE)	50 W / 50 W	100 W / 100 W	150 W / 150 W	200 W [g] / 200 W [g]
EFFECTIVE APERTURE	55 mm Ø	55 mm Ø	55 mm Ø	55 mm Ø
COOLING METHOD	Convection	Heatsink	Fan-Cooled	Water-Cooled
MEASUREMENT CAPABILITY				
Spectral Range [a]	0.3 – 2.5 µm	0.3 – 2.5 µm	0.3 – 2.5 µm	0.3 – 2.5 µm
Noise Equivalent Power [b]	15 mW	15 mW	15 mW	15 mW
Rise Time (nominal) [c]	4 sec	4 sec	4 sec	4 sec
Sensitivity (typ into 100 kΩ load) [d]	0.04 mV/W	0.04 mV/W	0.04 mV/W	0.04 mV/W
Calibration Uncertainty [e]	±2.5 %	±2.5 %	±2.5 %	±2.5 %
Repeatability	±0.5 %	±0.5 %	±0.5 %	±0.5 %
Energy Mode				
Sensitivity	0.028 mV/J	0.028 mV/J	0.015 mV/J	0.015 mV/J
Maximum Measurable Energy [f]	200 J	200 J	200 J	200 J
Noise Equivalent Energy [b]	0.25 J	0.25 J	0.25 J	0.25 J
Minimum Repetition Period	11.1 sec	11.1 sec	12 sec	12 sec
Maximum Pulse Width	433 ms	433 ms	430 ms	430 ms
Accuracy with energy calibration option	±5 %	±5 %	±5 %	±5 %
DAMAGE THRESHOLDS				
Maximum Average Power Density [h]	700 W/cm²	700 W/cm²	700 W/cm²	700 W/cm²
Pulsed Laser Damage Thresholds	Max Energy Density		Peak Power Density	
1064 nm, 360 µs, 5 Hz	40 J/cm²		111 kW/cm²	
1064 nm, 7 ns, 10 Hz	6 J/cm²		860 MW/cm²	
532 nm, 7 ns, 10 Hz	4 J/cm²		570 MW/cm²	
266 nm, 7 ns, 10 Hz	1 J/cm²		143 MW/cm²	
PHYSICAL CHARACTERISTICS				
Effective Aperture	55 mm Ø	55 mm Ø	55 mm Ø	55 mm Ø
Absorber (Volume Absorber)	VR	VR	VR	VR
Dimensions	89H x 89W x 32D mm	89H x 89W x 106D mm	89H x 89W x 116D mm	89H x 89W x 44D mm
Weight (head only)	0.62 kg	0.93 kg	1.41 kg	0.84 kg
ORDERING INFORMATION				
Full Product Name	UP55N-50S-VR	UP55N-100H-VR	UP55N-150F-VR	UP55M-200W-VR
Product Number (Including stand)	201296	201934	201856	201292

a. Adjustment multipliers for wavelengths under 300 nm are not traceable.
b. Nominal value, actual value depends on electrical noise in the measurement system.
c. With Gentec-EO MAESTRO, UNO, P-LINK, TUNER and S-LINK-2 monitors.
d. Maximum output voltage = sensitivity x maximum power.
e. Including linearity with power.
f. For 360 µs pulses. Higher pulse energy possible when customized for long pulses (ms), less for short pulses (ns).
g. Minimum cooling flow 1 liters/min, water temperature ≤ 22°C, 1/8 NPT compression fittings for 1/4 inch semi-rigid tube. Contact Gentec-EO for clean deionized water cooling module option.
h. At 1064 nm, 10 W CW.

Specifications are subject to change without notice

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HP

100 mm Ø, 3 W – 12 000 W

KEY FEATURES

1 High Power Handling
Handles up to 12 kW of continuous power with our standard models. Custom models available for higher powers

2 Thermally Stable
Less sensitive to variations in water cooling temperature

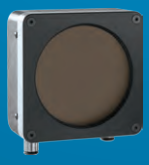
3 Large Aperture
Our standard HP models (3KW and 12KW) have a very large effective aperture of 100 mm Ø to accomodate even the largest laser beams. Larger apertures with various shapes are available upon request.

4 Special Model for Small Beams
10 kW model with reflective cone available. Perfect for small beams (with Avg Power Densities up to 10 kW/cm²)

5 Direct USB Connection to a PC
Each head comes with both a DB-15 connector (for use with a Gentec-EO monitor) and a USB2.0 output for direct connection to a PC

AVAILABLE MODELS (STANDARD)

HP100A-3KW-HE
(3000W-Water-Cooled)



HP100A-12KW-HD
(12000W-Water-Cooled)

HP60A-10KW-GD
(10000W-High Avg Power)

LARGE APERTURES / HIGH POWERS

- Very High Average Powers (Up to 30 kW, more on request)
- NO Limitations on Aperture Size and Shape
- High Damage Thresholds
- Direct USB Output to PC
- CO2, YAG, Fiber Laser, Diode Arrays...

ACCESSORIES

Stand with Steel Post
(Model Number: 201102)

Extension Cables
(4, 15, 20 or 25 m)

5 m USB Cable
(Included)

Pelican Carrying Case

SEE ALSO

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HP

CE NIST* Traceable WEEE/RoHS COMPLIANT

*Also traceable to NRC-CNRC

NEW

MODELS	HP100A-3KW-HE	HP100A-12KW-HD	HP60A-10KW-GD
MAX AVERAGE POWER (CONTINUOUS / 5 MINUTE)	3 000 W / 4 000 W	12 000 W / 12 000 W	10 000 W / 10 000 W High Average Power up to 10 kW/cm²
EFFECTIVE APERTURE	100 mm Ø	100 mm Ø	60 mm Ø with cone reflector
COOLING METHOD	Water-Cooled	Water-Cooled	Water-Cooled

MEASUREMENT CAPABILITY			
Spectral Range	0.19 – 20 µm	0.19 – 20 µm	0.8 – 12 µm
Noise Equivalent Power [a]	3 W	10 W	10 W
Rise Time (nominal)	7 sec	9 sec	11 sec
Sensitivity (typ into 100 kΩ load)	0.5 mV/W	0.15 mV/W	0.2 mV/W
Calibration Uncertainty	±5 % @ 1064 nm	±5 % @ 1064 nm	±5 % @ 1064 nm
Repeatability	±2 %	±2 %	±2 %
Linearity with Power	±2 %	±2 %	±2 %
Linearity vs Beam Diameter	±1 %	±1 %	< 35 mm Ø: ±0.5 % > 35 mm Ø: ±1.5 %

DAMAGE THRESHOLDS			
Maximum Average Power Density [b]			
500 W	10 kW/cm²	16 kW/cm²	
3 kW	3 kW/cm²	9.7 kW/cm²	
5 kW		6.5 kW/cm²	
10 kW		3.5 kW/cm²	< 35 mm Ø: 10 kW/cm² > 35 mm Ø: 3.5 kW/cm²

PHYSICAL CHARACTERISTICS			
Effective Aperture	100 mm Ø	100 mm Ø	60 mm Ø (Optimized for 35 mm Ø)
Absorber (High Damage Threshold)	HE	HD	GD (cone reflector)
Required Cooling Flow	(4 - 6) LPM < ±1 LPM/min [c]	(6 - 10) LPM < ±1 LPM/min [c]	(6 - 10) LPM < ±1 LPM/min [c]
Temperature of Cooling Water	(15 - 25) °C < ±3°C/min [c]	(15 - 25) °C < ±3°C/min [c]	(15 - 25) °C < ±3°C/min [c]
Output Connectors	DB-15 cable & USB port	DB-15 cable & USB port	DB-15 cable & USB port
PCB Electrical Supply	Through USB or Gentec-EO monitors	Through USB or Gentec-EO monitors	Through USB or Gentec-EO monitors
Maximum Output Signal	2 V	2 V	2 V
Dimensions	127H x 127W x 74D mm	127H x 127W x 70D mm	127H x 127W x 90D mm
Weight (head only)	1.8 kg	3.3 kg	5 kg

ORDERING INFORMATION			
Full Product Name	HP100A-3KW-HE	HP100A-12KW-HD	HP60A-10KW-GD
Product Number (Including stand)	201963	201329	201306

a. Nominal value, actual value depends on electrical noise in the measurement system.
b. At 1064 nm, 1.07-1.08 µm and 10.6 µm.
c. > 1 min.

Specifications are subject to change without notice

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FLASH

Handheld Laser Probe, 500 W, 3 kW, 6 kW and 10 kW

KEY FEATURES

1 Wide Power Range
Very low noise level = wide power range with just one device

2 No-Wait Measurements
5 seconds measurements allow for very short cooling time (all models except FLASH-3K-55)

3 Easy Operation
- Backlight with ON/OFF controls
- Thermometer for head temperature
- Red and Green LEDs for device status
- Functions separated on 2 buttons

4 Available with Handle or Cable
- Standard Model: Fixed Handle
- In Option: -C Model with 5 feet soft cable and removable handle

5 Large Aperture
55 mm aperture to accommodate large beams

6 Rugged
- All-metal body
- High Damage Thresholds

AVAILABLE MODELS

FLASH-500-55 (500 W-Handheld)	FLASH-3K-55 (3 kW-Handheld)	FLASH-(6K/10K)-55 (6 & 10 kW-Handheld)	FLASH-500-55-C (500 W-With Cable)	FLASH-3K-55-C (3 kW-With Cable)	FLASH-(6K/10K)-55-C (6 & 10 kW-With Cable)

ACCESSORIES

Stand with Steel Post
(Model Number: 201102)

Pelican Carrying Case

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FLASH

SPECIFICATIONS

NIST* Traceable

*Also traceable to NRC-CNRC

MODELS	FLASH-500-55	FLASH-3K-55	FLASH-6K-55	FLASH-10K-55
MAX AVERAGE POWER (CONTINUOUS)	500 W	3 000 W	6 000 W	10 000 W
EFFECTIVE APERTURE	55 mm Ø	55 mm Ø	55 mm Ø	55 mm Ø
COOLING METHOD	Convection	Convection	Convection	Convection

MEASUREMENT CAPABILITY

Spectral Range	0.19 – 20 µm		0.19 – 20 µm		0.19 – 20 µm		0.19 – 20 µm	
Maximum Measurable Power	500 W		3000 W		6000 W		10000 W	
Available Wavelengths	CO_2, YAG, Custom (250 - 2500 nm) - Up to 3 Calibrations/Unit							
Noise Equivalent Power	0.1 W		5 W		20 W		30 W	
Response Time	5 sec		10 sec		5 sec		5 sec	
Calibration Uncertainty	±3 %		±5 %		±5 %		±5 %	
Number of Readings Before Cooling (Maximum Exposure Time Before Cooling)	100 W	25 (200 sec)	0.5 kW	6 (72 sec)	1 kW	6 (36 sec)	1 kW	10 (60 sec)
	200 W	12 (100 sec)	1 kW	3 (36 sec)	2 kW	3 (18 sec)	2 kW	5 (30 sec)
	300 W	8 (60 sec)	1.5 kW	2 (24 sec)	3 kW	2 (12 sec)	5 kW	2 (12 sec)
	500 W	5 (40 sec)	3 kW	1 (12 sec)	6 kW	1 (6 sec)	10 kW	1 (6 sec)

DAMAGE THRESHOLDS

Maximum Average Power Density				
1064 nm, 100 W, CW	25 kW/cm²	–	–	–
1064 nm, 500 W, CW	5 kW/cm²	7 kW/cm²	–	–
1064 nm, 3000 W, CW	–	5 kW/cm²	8 kW/cm²	–
1064 nm, 6000 W, CW	–	–	7 kW/cm²	7 kW/cm²
1064 nm, 10000 W, CW	–	–	–	5.5 kW/cm²
Maximum Allowable Absorber Temperature	65 °C	65 °C	75 °C	75 °C

GENERAL SPECIFICATIONS

Digital Display	40 x 20 mm
Battery Type	2 x AA batteries, 3.0 V
Battery Life	>5000 measurements
Operating Temperature Range	10 to 40 °C
Storage Temperature Range	10 to 60 °C

PHYSICAL CHARACTERISTICS

Effective Aperture	55 mm Ø	55 mm Ø	55 mm Ø	55 mm Ø
Dimensions (Sensor Head, Monitor and Handle)	335H x 88W x 35D mm	335H x 88W x 45D mm	335H x 88W x 36D mm	335H x 88W x 46D mm
Weight	930 g	1240 g	1520 g	2150 g

ORDERING INFORMATION

	Standard	Cable	Standard	Cable	Standard	Cable	Standard	Cable
Common Product Name	FLASH-500-55		FLASH-3K-55		FLASH-6K-55		FLASH-10K-55	
Add Extension for Cable		-C		-C		-C		-C
Product Number	201244	201959	201245	201973	201851	201975	201868	201977

Specifications are subject to change without notice

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FLASH-IPL

Handheld Laser Probe for IPL Sources, 2 - 350 J per pulse

KEY FEATURES

1 Direct Measurement of the FLUENCE
Measurement in J/cm² with our calibrated 1 cm² apertures

2 Choice Between 3 Apertures Formats
- FLASH-IPL-S: Square Aperture of 10 x 10 mm
- FLASH-IPL-R: Rectangular Aperture of 5 x 20 mm
- FLASH-IPL-55: Round Aperture of 55 mm Ø

3 High Energy Per Pulse
Accurate readings up to 350 J/pulse!

4 Easy Operation
- Backlight with ON/OFF controls
- Thermometer for head temperature
- Red and Green LEDs for device status
- Functions separated on 2 buttons

5 Available with Handle or Cable
- Standard Model: Fixed Handle
- In Option: -C Model with 5 feet soft cable and removable handle

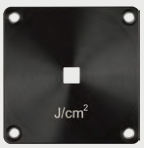
6 Optional Window
For measurements with gel-coupled IPL heads. Protects the absorber, easy to clean

AVAILABLE MODELS

FLASH-500-10S-IPL (10 x 10 mm Aperture)	FLASH-500-20R5-IPL (5 x 20 mm Aperture)	FLASH-500-55-W-IPL (55 mm Ø with Window)	FLASH-500-10S-IPL-C (10 x 10 mm - With Cable)	FLASH-500-20R5-IPL-C (5 x 20 mm - With Cable)	FLASH-500-55-IPL-W-C (55 mm Ø Win. & Cable)

ACCESSORIES

Stand with Steel Post
(Model Number: 201102)



IPL-S Cover
(10 x 10 mm Aperture)

IPL-R Cover
(5 x 20 mm Aperture)

Pelican Carrying Case

SEE ALSO

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FLASH-IPL

SPECIFICATIONS

CE NIST* Traceable WEEE/RoHS COMPLIANT

*Also traceable to NRC-CNRC

MODELS	FLASH-IPL		
MAX PULSE ENERGY (SINGLE SHOT)	350 J		
EFFECTIVE APERTURE	Square: 10 x 10 mm	Rectangular: 5 x 20 mm	Round: 55 mm Ø
APERTURE TYPE	Calibrated (1 cm^2)	Calibrated (1 cm^2)	Full Aperture with Quartz Window

MEASUREMENT CAPABILITY	FLASH-500-10S-IPL	FLASH-500-20R5-IPL	FLASH-500-55-W-IPL
Spectral Range	0.19 – 20 µm		
Available Wavelengths	CO_2, YAG, Custom (250 - 2500 nm) - Up to 3 Calibrations/Unit		
IPL Mode (Energy Mode)			
Energy Range	2 - 350 J		
Noise Equivalent Energy	500 mJ		
Sensitivity	0.013 mV/J		
Response Time	2 sec		
Minimum Repetition Period	15 sec (= time between measurements)		
Maximum Pulse Width	433 ms		
Accuracy in IPL Mode	±5 %		
Power Mode			
Maximum Measurable Power	500 W		
Noise Equivalent Power	0.1 W		
Response Time	5 sec		
Calibration Uncertainty	Typical Value (±3 % uncertainty available with optional power mode calibration)		

DAMAGE THRESHOLDS	
Maximum Average Power Density	45 kW/cm^2 (1064 nm, 10 W, CW)
Pulsed Laser Damage Threshold	175 J/cm^2 (10 ms pulses)
Maximum Allowable Absorber Temperature	65 °C

GENERAL SPECIFICATIONS	
Digital Display	40 x 20 mm
Battery Type	2 x AA batteries, 3.0 V
Battery Life	>5000 measurements
Operating Temperature Range	10 to 40 °C
Storage Temperature Range	10 to 60 °C

PHYSICAL CHARACTERISTICS			
Effective Aperture	Square: 10 x 10 mm	Rectangular: 5 x 20 mm	Round: 55 mm Ø
Dimensions (Sensor Head, Monitor and Handle)		335H x 88W x 35D mm	
Weight		930 g	

ORDERING INFORMATION	Standard	Cable	Standard	Cable	Standard	Cable
Common Product Name	FLASH-500-10S-IPL		FLASH-500-20R5-IPL		FLASH-500-55-W-IPL	
Add Extension for Cable		-C		-C		-C
Product Number	201998	202002	201999	202003	202064	202065

Specifications are subject to change without notice

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UM-B

5 nW - 200 mW, Radiometer for Ultra-Low Power Measurements

KEY FEATURES

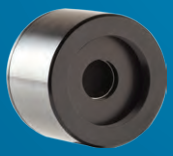
1 Very Low Noise Level
Noise levels of a photo detector, but with the large bandwidth of a pyroelectric:
- Down to 5 nW when using the Analog Power Module (APM)

2 Very High Responsivity
Up to 20 000 V/W when using the Analog Power Module (APM)

3 Very Large Bandwidth
From DUV to FIR thanks to pyroelectric technology

4 Smart Interface
Containing all the calibration data

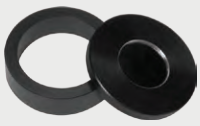
AVAILABLE MODELS



UM9B-BL
(9 mm-Organic Black)

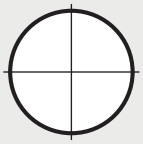
ACCESSORIES

Stand with Delrin Post
(Model Number: 200428)



Removable IR Windows
(Various types available)

Fiber Adaptors & Connectors
(FC, SC, ST and SMA)



IR Alignement Aide
and Crosshairs

APM Analog Power Supply
(Model Number: 201495)

SDC-5000 Digital
Optical Chopper

SEE ALSO

TECHNICAL DRAWINGS 88
COMPATIBLE MONITORS
- MAESTRO 18
- TUNER 22
- UNO 24
- S-LINK-2 26
- P-LINK 28
- M-LINK 30

LIST OF ALL ACCESSORIES 174

UM-B

SPECIFICATIONS

Approved or in the process of being approved*

MODELS	UM9B-BL
MAX AVERAGE POWER	200 mW
EFFECTIVE APERTURE	9 mm Ø
COMPATIBLE MODULE(S)	APM and Power Monitors

MEASUREMENT CAPABILITY	With APM	With Monitor
Spectral Range	0.1 - 20 µm	0.1 - 20 µm
Max Measurable Power	200 mW	200 mW
Noise Equivalent Power	5 nW	200 nW
Rise Time (0-100%)	≤ 0.2s	≤ 0.2s
Sensitivity	20 000 V/W	150 V/W
Calibration Uncertainty	±4 %	±4 %
DAMAGE THRESHOLDS		
Maximum Average Power Density (1064 nm)	50 mW/cm^2	50 mW/cm^2
PHYSICAL CHARACTERISTICS		
Effective Aperture	9 mm Ø	
Sensor	Pyroelectric	
Absorber	BL	
Connector	DB-15	
Dimensions	38.1Ø X 26.2D mm	
Weight	91 g	
ORDERING INFORMATION		
Full Product Name	UM9B-BL-BNC	UM9B-BL-USB
Product Number	201522	204527

Specifications are subject to change without notice

* For details, contact your Gentec-EO representative

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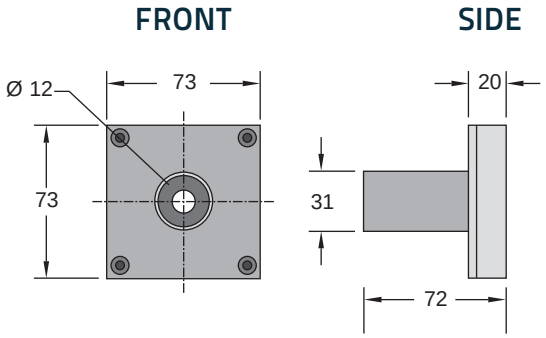
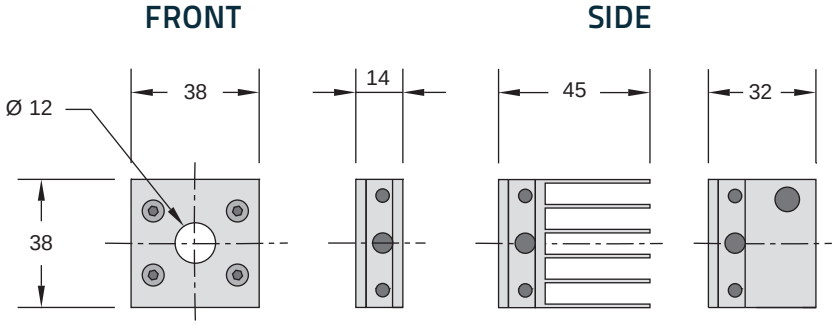
TECHNICAL DRAWINGS

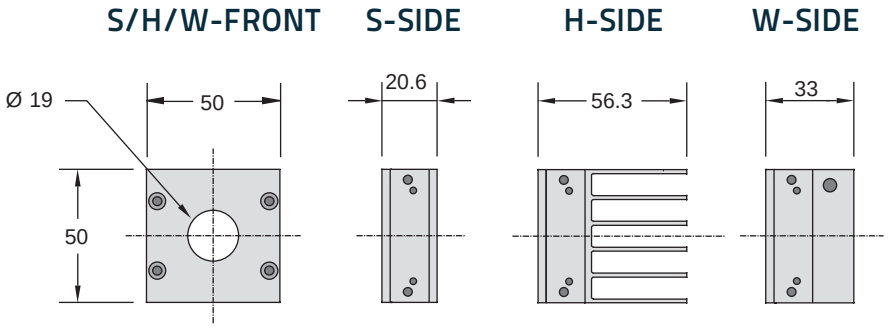
XLP12

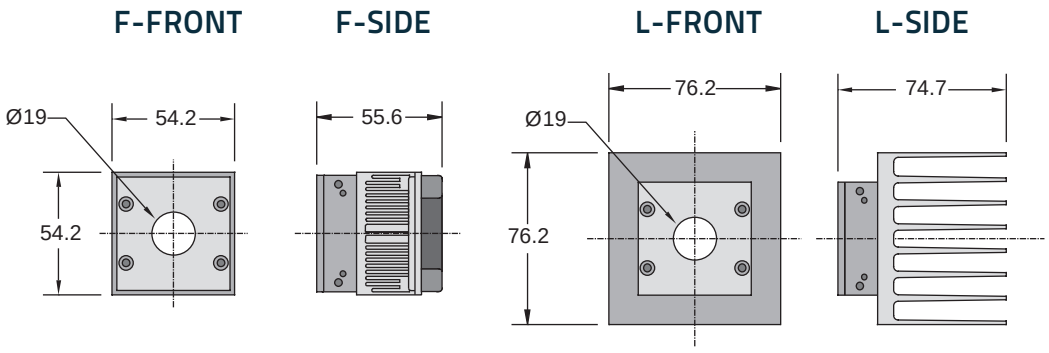


UP12E



UP19K-H

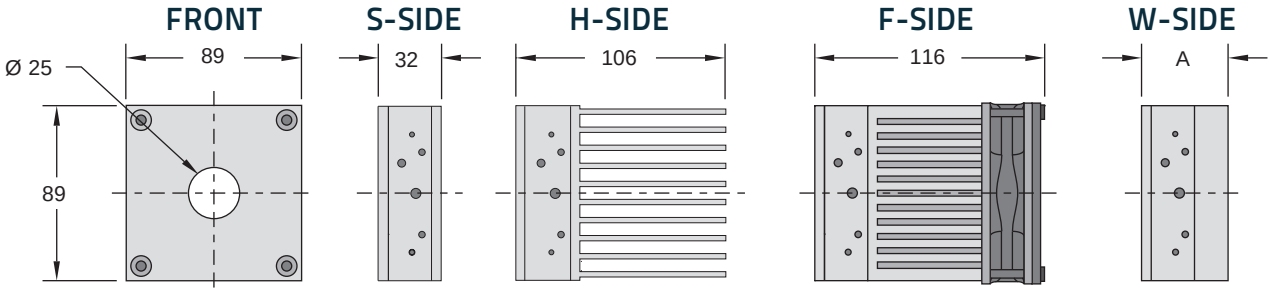




All dimensions in mm

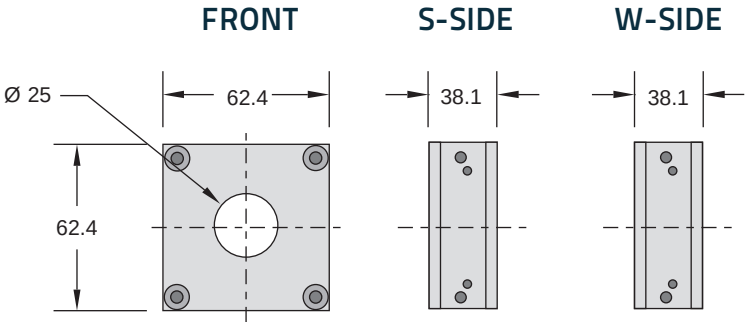
TECHNICAL DRAWINGS

UP25N-H

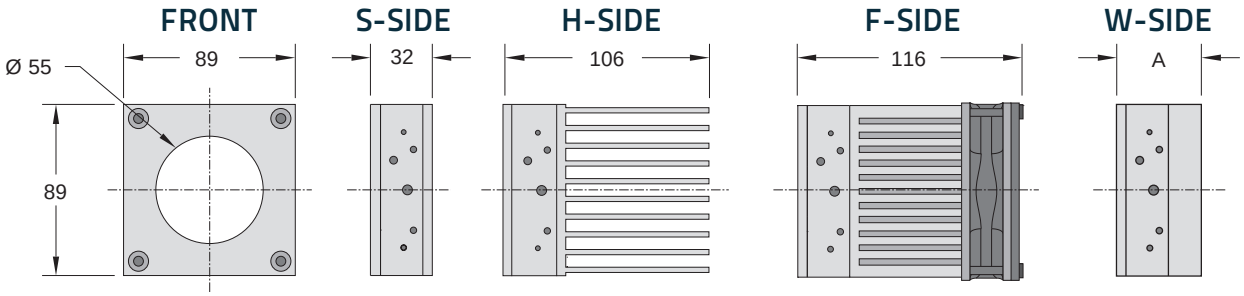


CASING	DIM. A
N	44
M	40

UP25T-H

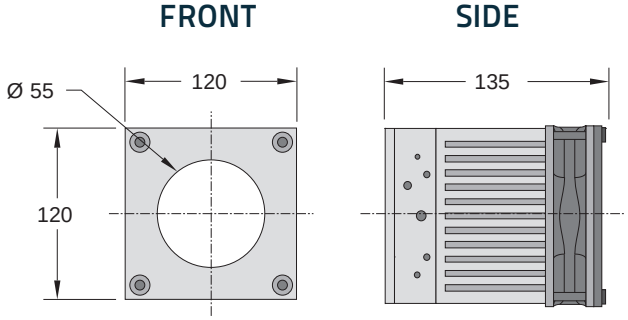


UP55N-H/VR



CASING	DIM. A
N	44
M	40

UP55G



All dimensions in mm

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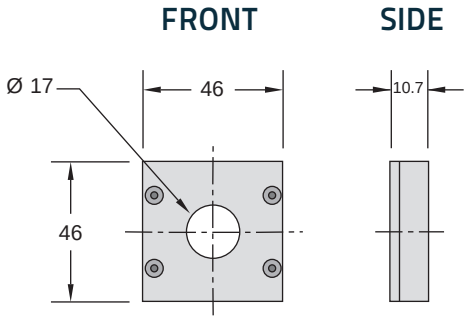
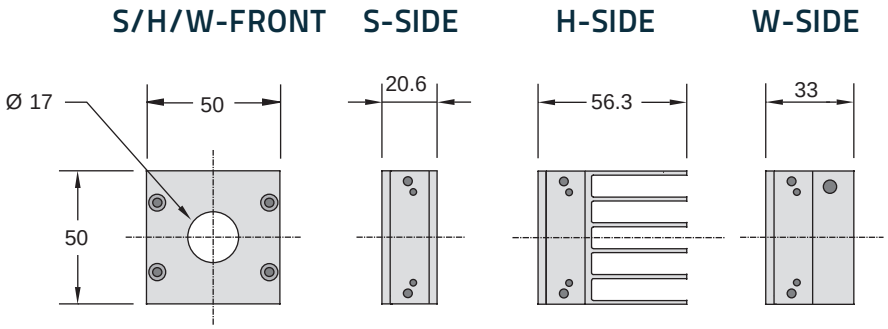
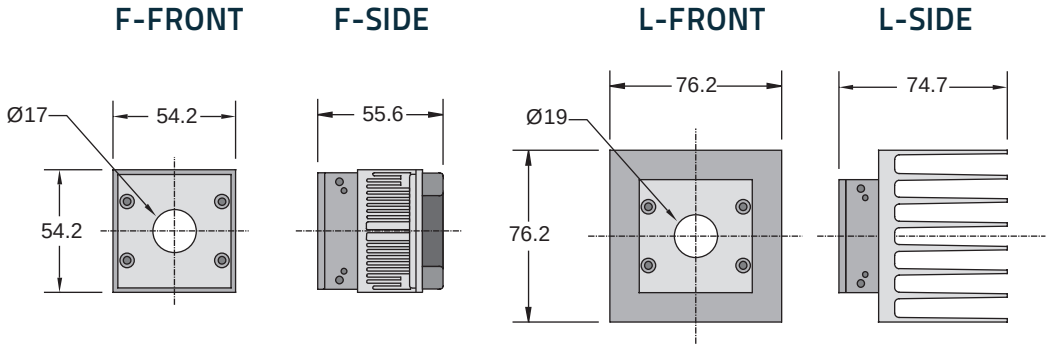
TECHNICAL DRAWINGS

UP17P

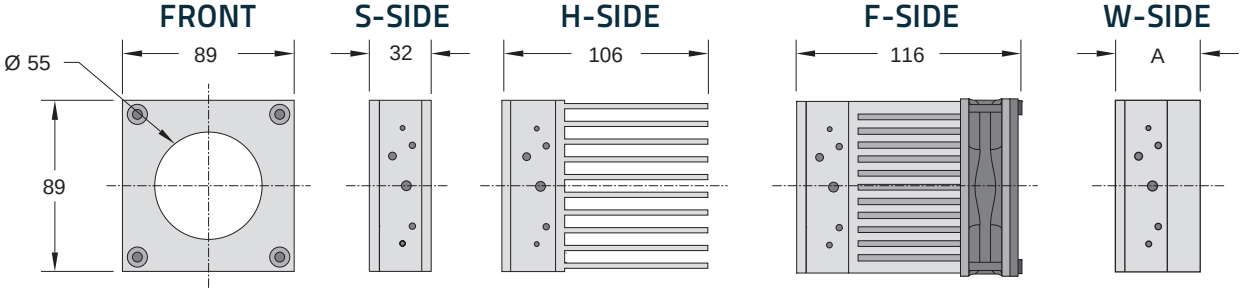


UP19K-W5





UP50N-W9



CASING	DIM. A
N	44
M	40

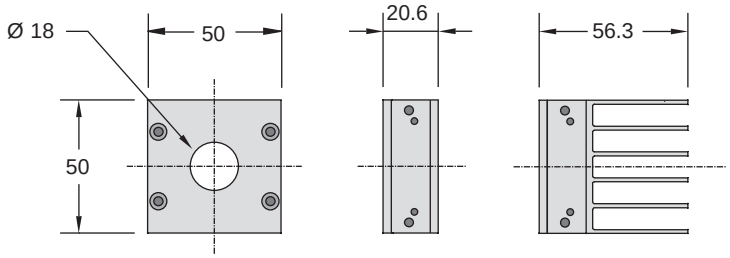
All dimensions in mm

TECHNICAL DRAWINGS

UP19K-VR

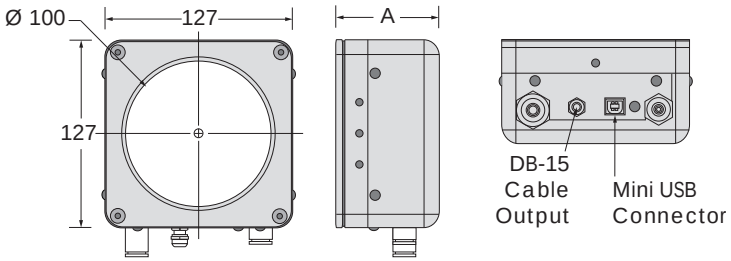
(For UP55N-VR see UP55N-H)

FRONT S-SIDE H-SIDE



HP100A

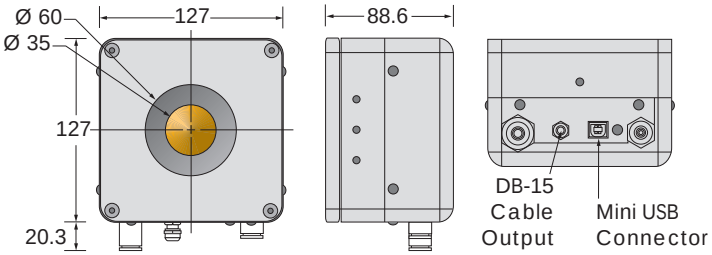
FRONT SIDE BOTTOM



MODEL	DIM. A
3KW	74
12KW	70

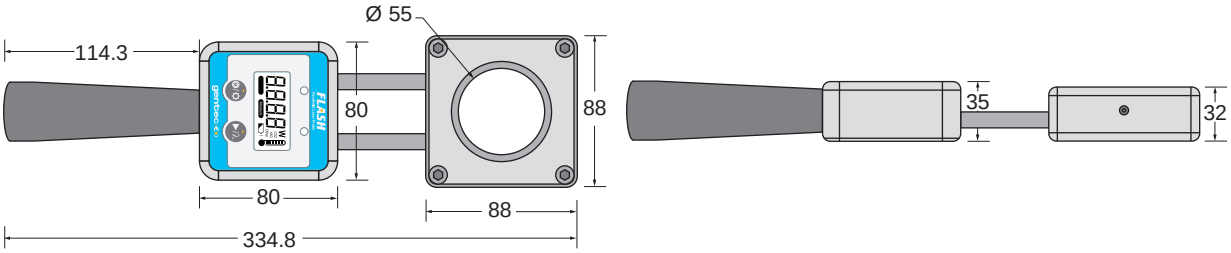
HP60A-10KW-GD

FRONT SIDE SIDE



FLASH-500-55

FRONT SIDE



All dimensions in mm

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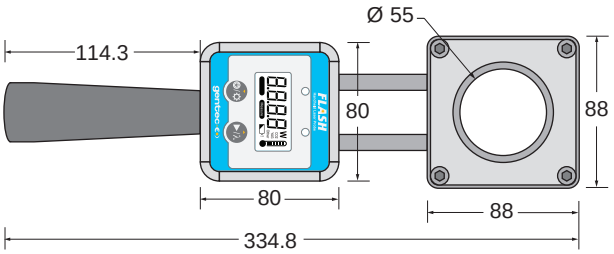
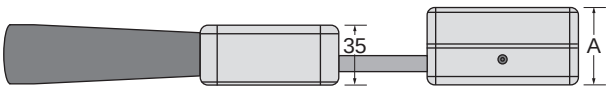
TECHNICAL DRAWINGS

FLASH-3K/6K/10K-55

FRONT



SIDE



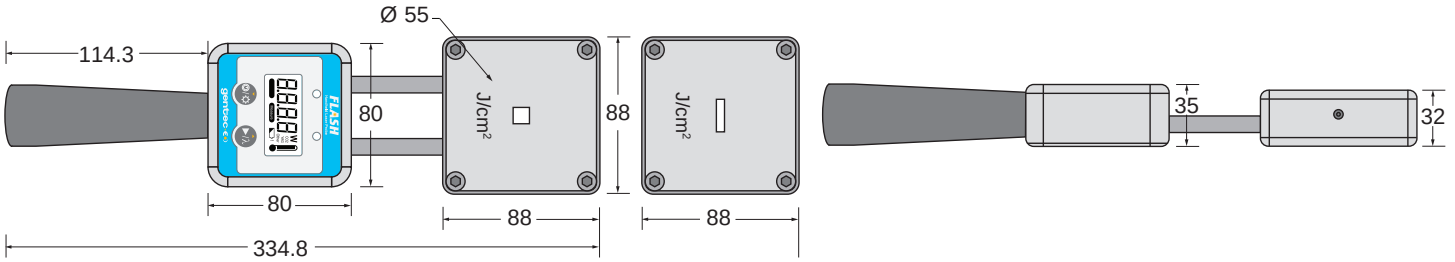
MODEL	DIM. A
3K	45
6K	36
10K	46

FLASH-IPL (10S/20R5)

S-FRONT

R-FRONT

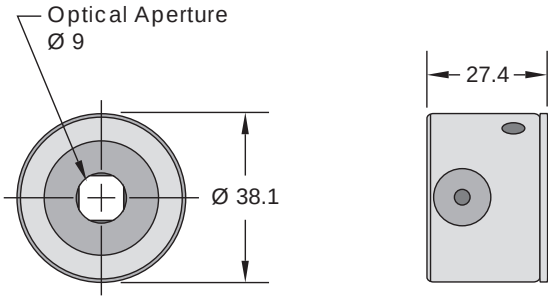
SIDE



UM-B

FRONT

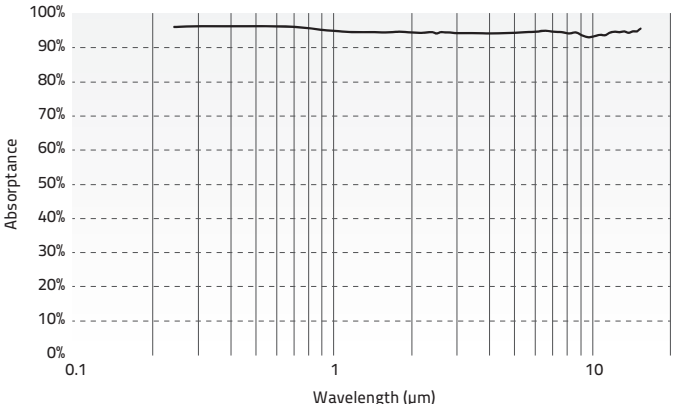
SIDE



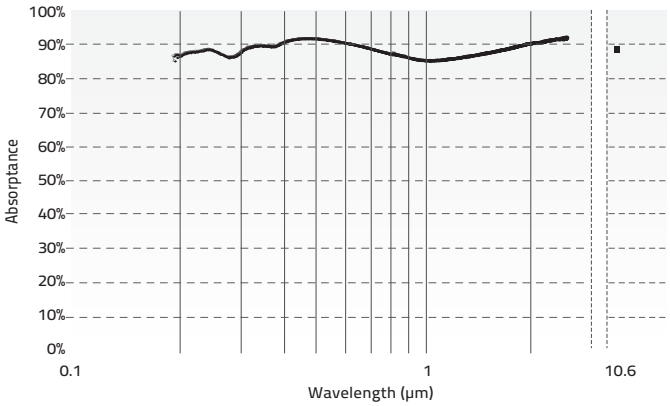
All dimensions in mm

ABSORPTION CURVES

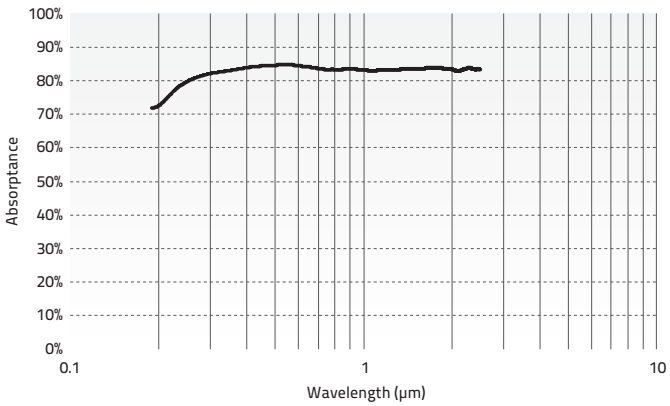
UM-B



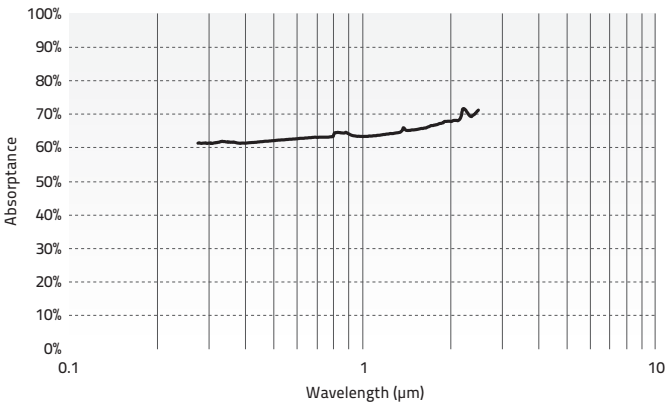
UP-H



UP-W



UP-VR



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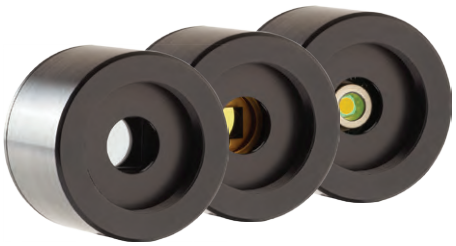
PRESENTATION

OVERVIEW OF THE DIFFERENT MODELS

Our photo detectors are offered for both power or energy measurements. Measure as low as a few femtojoules in energy or a few picowatts in power. Our photo detectors are also offered in standalone formats, where the electronics are integrated in the device, or as standard sensors that you hook up to a meter.

FOR POWER MEASUREMENTS

The section below lists all the photo detectors used for power measurements. The corresponding comparison table and power range chart are given at the next page.



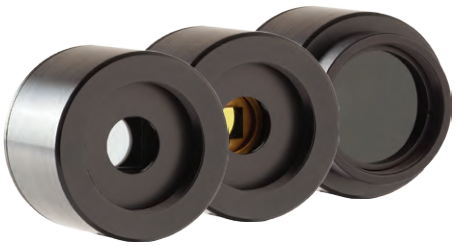
See page 96

PH-B

- 3, 5 and 10 mm Ø Apertures
- Silicon, Germanium or InGaAs Sensors
- Very Low Powers, down to the pW level

pW

NOISE DOWN TO THE pW LEVEL



See page 98

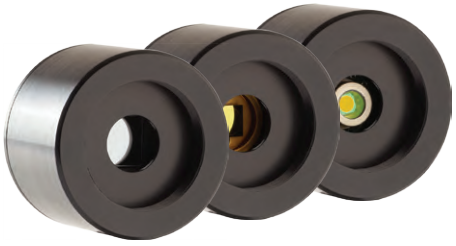
PH

- High Power Photo Detectors for measurements up to 750 mW
- Available from UV to IR
- Silicon, UV-Silicon or Germanium Sensors
- OD1/OD2 Attenuators Available

HIGH POWER Si OR Ge SENSORS

FOR ENERGY MEASUREMENTS

The section below lists all the photo detectors used for energy measurements. The corresponding comparison table and energy range chart are given at page 104.



See page 100

PE-B

- 3, 5 and 10 mm Ø Apertures
- Germanium or InGaAs Sensors
- Lowest Noise Level of ALL Energy Detectors (2 fJ with PE3B-Si)

fJ

2 fJ NOISE LEVEL

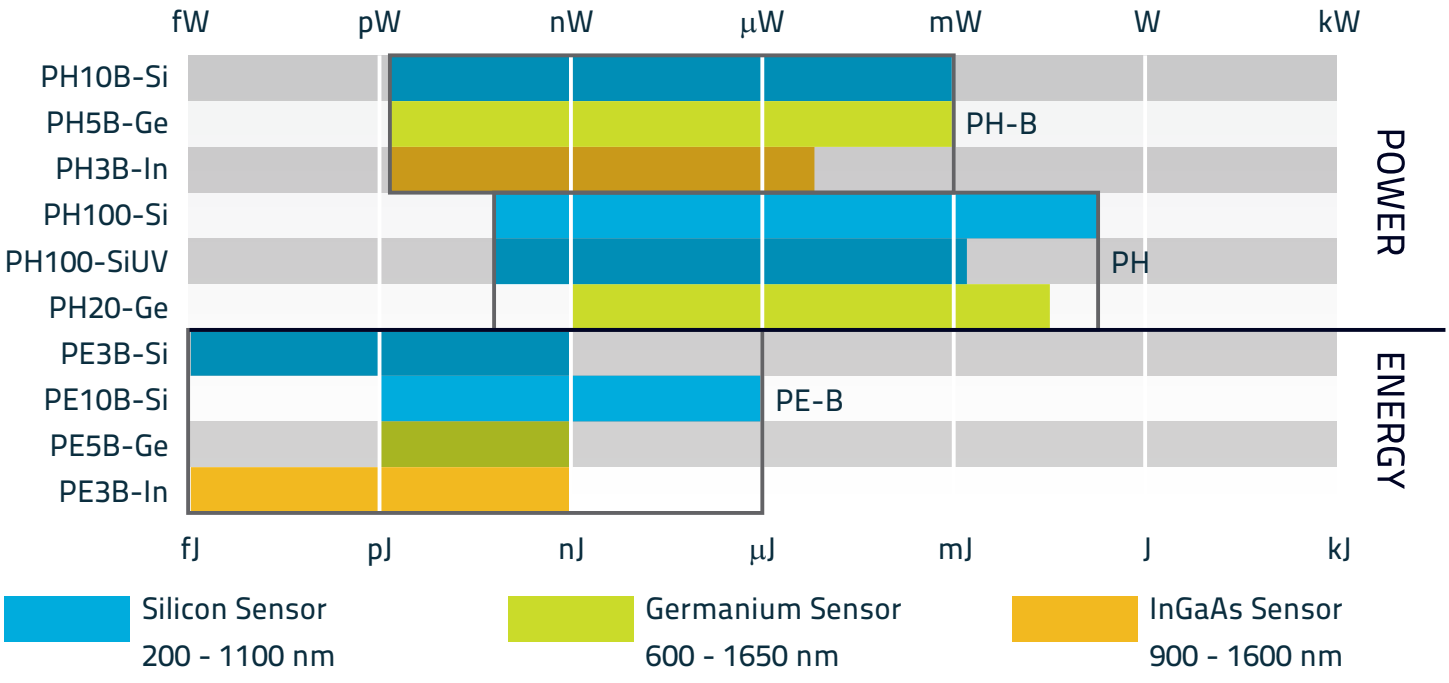
COMPARISON TABLE

FOR POWER MEASUREMENTS

MODEL	Pmax	Pmin	λmin	λmax	SENSOR TYPE	APERTURE	SEE PAGE
PH3B-In	200 µW	10 pW	900 nm	1.6 µm	InGaAs	3 mm Ø	96
PH10B-Si	2 mW	20 pW	190 nm	1.1 µm	Silicon	10 mm Ø	96
PH5B-Ge	2 mW	10 pW	1000 nm	1.7 µm	Germanium	5 mm Ø	96
PH100-SiUV	4 mW	600 pW	210 nm	900 nm	UV-Silicon	10 mm Ø	98
PH100-SiUV-OD1	25 mW	6 nW	400 nm	900 nm	UV-Silicon	10 mm Ø	98
PH100-Si	36 mW	600 pW	300 nm	1.1 µm	Silicon	10 mm Ø	98
PH20-Ge	30 mW	2 nW	800 nm	1.65 µm	Germanium	5 mm Ø	98
PH100-SiUV-OD2	30 mW	60 nW	630 nm	900 nm	UV-Silicon	10 mm Ø	98
PH100-Si-OD1	300 mW	6 nW	400 nm	1.1 µm	Silicon	10 mm Ø	98
PH20-Ge-OD1	300 mW	20 nW	900 nm	1.65 µm	Germanium	5 mm Ø	98
PH20-Ge-OD2	500 mW	200 nW	950 nm	1.65 µm	Germanium	5 mm Ø	98
PH100-Si-OD2	750 mW	60 nW	630 nm	1.1 µm	Silicon	10 mm Ø	98

FOR ENERGY MEASUREMENTS

MODEL	Emax	Emin	λmin	λmax	SENSOR TYPE	APERTURE	SEE PAGE
PE3B-Si	2 nJ	2 fJ	190 nm	1.1 µm	Silicon	3 mm Ø	100
PE3B-In	2 nJ	5 fJ	900 nm	1.6 µm	InGaAs	3 mm Ø	100
PE5B-Si	20 nJ	500 fJ	190 nm	1.1 µm	Silicon	5 mm Ø	100
PE5B-Ge	20 nJ	500 fJ	1000 nm	1.7 µm	Germanium	5 mm Ø	100
PE10B-Si	2 µJ	2 pJ	190 nm	1.1 µm	Silicon	10 mm Ø	100



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PH-B

10 pW - 2 mW, Our Lowest Power Measurements

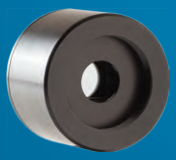
KEY FEATURES

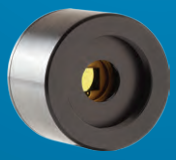
1 Very Sensitive Photo Detector
Measure down to 10 pW level

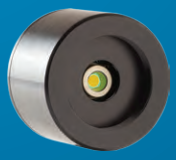
2 3 Sensors Available
- PH10B-Si: 10 mm Ø, Silicon sensor for 0.21 to 1.08 µm
- PH5B-Ge: 5 mm Ø, Germanium sensor for 0.8 to 1.65 µm
- PH3B-In: 3 mm Ø, InGaAs sensor for 0.9 to 1.6 µm

3 Smart Interface
Containing all the calibration data

AVAILABLE MODELS

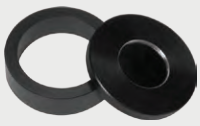

PH10B-Si
(10 mm - Silicon)


PH5B-Ge
(5 mm - Germanium)


PH3B-In
(3 mm - InGaAs)

ACCESSORIES

Stand with Delrin Post
(Model Number: 200428)


Removable IR Windows
(Various types available)

Fiber Adaptors & Connectors
(FC, SC, ST and SMA)

APM Analog Power Supply
(Model Number: 201495)

Pelican Carrying Case

SEE ALSO

TECHNICAL DRAWINGS 102
COMPATIBLE MONITORS
MAESTRO 18
UNO 24
P-LINK 28
M-LINK 30
LIST OF ALL ACCESSORIES 174

PH-B

SPECIFICATIONS

Approved or in the process of being approved*

MODELS	PH10B-Si	PH5B-Ge	PH3B-In
MAX AVERAGE POWER	2 mW	2 mW	200 µW
EFFECTIVE APERTURE	10 mm Ø	5 mm Ø	3 mm Ø

MEASUREMENT CAPABILITY			
Spectral Range	0.21 - 1.08 µm	0.8 - 1.65 µm	0.9 - 1.6 µm
Maximum Measurable Power [a]	2 mW	2 mW	200 µW
Noise equivalent power [b]	20 pW	10 pW	10 pW
Rise Time (0-100%)	≤ 0.2 s	≤ 0.2 s	≤ 0.2 s
Peak Sensitivity	15 kV/W	100 kV/W	96 kV/W
Calibration Uncertainty [c]	±8 % 210 - 219 nm	± 3.5% 800 - 1650 nm	± 4% 900 - 1600 nm
	±6.5 % 220 - 399 nm		
	±2.5 % 400 - 899 nm		
	±3.5 % 900 - 999 nm		
	±5 % 1000 - 1049 nm		
	±7 % 1050 - 1080 nm		
DAMAGE THRESHOLDS			
Max Average Power Density (@ 1.064 µm)	1 mW/cm²	1 mW/cm²	1 mW/cm²
PHYSICAL CHARACTERISTICS			
Effective Aperture	10 mm Ø	5 mm Ø	3 mm Ø
Sensor	Silicon	Germanium	InGaAs
Connector	DB-15	DB-15	DB-15
Dimensions	38.1 Ø x 27.4D mm	38.1 Ø x 27.4D mm	38.1 Ø x 27.4D mm
Weight	91 g	91 g	91 g
ORDERING INFORMATION			
Full Product Name	PH10B-Si	PH5B-Ge	PH3B-In
Product Number	202022	202023	202142

a. Maximum value depends on the monitor.
b. Nominal value, depends on environmental electromagnetic interference.
c. With a Gentec-EO monitor.

Specifications are subject to change without notice

* For details, contact your Gentec-EO representative

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PH

600 pW to 750 mW, Si and Ge Sensors

KEY FEATURES

1 Large Apertures
10 mm Ø for the Silicon sensors

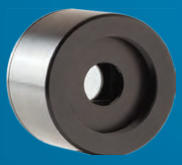
2 3 Versions
- Silicon: 320 - 1100 nm, up to 750 mW
- Silicon-UV: 210 - 1080 nm, up to 30 mW
- Germanium: 800 - 1650 nm, up to 500 mW

3 Choice of Attenuators
- OD1: 10 % Transmission
- OD2: 1 % Transmission

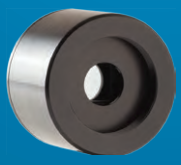
4 Precise Calibration
Wavelength selection in 1 nm steps

5 Smart Interface
Containing all the calibration data

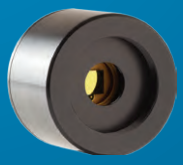
AVAILABLE MODELS



PH100-Si
(10 mm - Silicon)

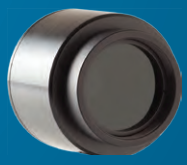


PH100-Si^{UV}
(10 mm - UV-Silicon)



PH20-Ge
(5 mm - Germanium)

OD1 / OD2 ATTENUATORS



PH Series Detector
With OD1/OD2 Attenuator

OD1/OD2 Attenuators sold in option. When bought together, the detector is calibrated with and without the attenuator.

ACCESSORIES

Stand with Delrin Post
(Model Number: 200428)

Fiber Adaptors & Connectors
(FC, SC, ST and SMA)

Pelican Carrying Case

SEE ALSO

CALIBRATION 6
TECHNICAL DRAWINGS 102
COMPATIBLE MONITORS
MAESTRO 18
UNO 24
P-LINK 28
M-LINK 30
LIST OF ALL ACCESSORIES 174

PH
SPECIFICATIONS

CE NIST* Traceable WEEE/RoHS COMPLIANT

*Also traceable to NRC-CNRC

MODELS	PH100-Si	PH-100Si^{UV}	PH20-Ge
MAX AVERAGE POWER (ALONE / WITH OD2)	36 mW / 750 mW	2.8 mW / 30 mW	30 mW / 500 mW
EFFECTIVE APERTURE	10 mm Ø	10 mm Ø	5 mm Ø
MEASUREMENT CAPABILITY			
Spectral Range	320 – 1100 nm	210 – 1080 nm	800 – 1650 nm
With OD1	400 – 1100 nm	400 – 1080 nm	900 – 1650 nm
With OD2	630 – 1100 nm	630 – 1080 nm	950 – 1650 nm
Maximum Measurable Power [a]	36 mW @ 1064 nm	4 mW @ 532 nm	30 mW @ 1064 nm
With OD1	300 mW @ 1064 nm	25 mW @ 532 nm	300 mW @ 1064 nm
With OD2	750 mW @ 1064 nm	30 mW @ 850 nm	500 mW @ 1064 nm
Noise Equivalent Power [b]	10 pW @ 980 nm	10 pW @ 850 nm	60 pW @ 1550 nm
Rise Time (nominal)	0.2 sec	0.2 sec	0.2 sec
Peak Sensitivity	0.58 A/W @ 980 nm	6.5 A/W @ 980 nm	0.98 A/W @ 1550 nm
Calibration Uncertainty	±6.5 % 320 - 399 nm	±8 % 200 - 219 nm	±3.5 % 800 - 1650 nm
	±2.5 % 400 - 899 nm	±6.5 % 220 - 399 nm	–
	±3.5 % 900 - 999 nm	±2.5 % 400 - 899 nm	–
	±5 % 1000 - 1049 nm	±3.5 % 900 - 999 nm	–
	±7 % 1050 - 1100 nm	±5 % 1000 - 1049 nm	–
	–	±7 % 1050 - 1080 nm	–
Accuracy (with OD filters)	±5 % 400 - 1049 nm ±7 % 1050 - 1100 nm	±5 % 400 - 1049 nm ±7 % 1050 - 1080 nm	±5 %
DAMAGE THRESHOLDS			
Maximum Average Power Density	100 W/cm^2	100 W/cm^2	100 W/cm^2
Saturation Level	30 mW/cm^2 @ 1064 nm	65 mW/cm^2 @ 532 nm	320 mW/cm^2 @ 1064 nm
PHYSICAL CHARACTERISTICS			
Effective Aperture	10 mm Ø	10 mm Ø	5 mm Ø
Dimensions	38.1Ø x 27.4D mm	38.1Ø x 27.4D mm	38.1Ø x 27.4D mm
Weight (head only)	130 g	130 g	130 g
ORDERING INFORMATION			
Full Product Name	PH100-Si	PH100-Si^{UV}	PH20-Ge
Product Number	200878	200879	200866
Full Product Name	PH100-Si-OD1	PD100-Si^{UV}-OD1	PH20-Ge-OD1
Product Number	200880	200881	200874
Full Product Name	PH100-Si-OD2	PH100-Si^{UV}-OD2	PH20-Ge-OD2
Product Number	200882	200883	200875

a. Maximum value depends on the monitor.
b. Nominal value. Depends on environmental electromagnetic interference.

Specifications are subject to change without notice

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PE-B

2 fJ - 2 µJ, Our Lowest Energy Measurements

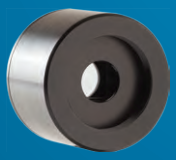
KEY FEATURES

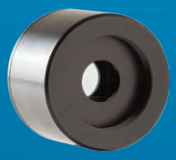
1 Very Low Noise Level
Take measurements down to 2 fJ with the M-LINK and the MAESTRO

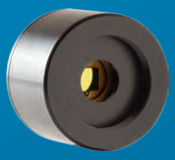
2 3 Sensors Available
- PE-B-Si family: 3 and 10 mm Ø Silicon sensors for 0.21 to 1.08 µm
- PE5B-Ge: 5 mm Ø, Germanium sensor for 0.8 to 1.65 µm
- PE3B-In: 3 mm Ø, InGaAs sensor for 0.9 to 1.6 µm

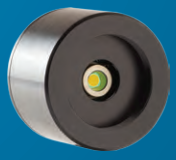
3 Smart Interface
Containing all the calibration data

AVAILABLE MODELS


PE3B-Si
(3 mm - Silicon)

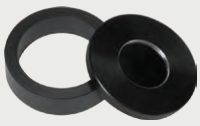

PE10B-Si
(10 mm - Silicon)


PE5B-Ge
(5 mm - Germanium)

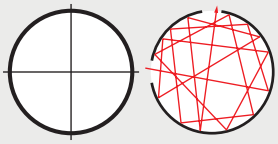

PE3B-In
(3 mm - InGaAs)

ACCESSORIES

Stand with Delrin Post
(Model Number: 200428)


Removable IR Windows
(Various types available)

Fiber Adaptors & Connectors
(FC, SC, ST and SMA)


IR Alignement Aide, Cross-hairs and Integrating Sphere

APM Analog Power Supply
(Model Number: 201495)

Pelican Carrying Case

SEE ALSO

TECHNICAL DRAWINGS 102
COMPATIBLE MONITORS
MAESTRO 18
M-LINK 30
LIST OF ALL ACCESSORIES 174

PE-B

SPECIFICATIONS

Approved or in the process of being approved*

MODELS	PE3B-Si	PE10B-Si	PE5B-Ge	PE3B-In
MAX MEASURABLE ENERGY	2 nJ	2 µJ	20 nJ	2 nJ
EFFECTIVE APERTURE	3 mm Ø	10 mm Ø	5 mm Ø	3 mm Ø

MEASUREMENT CAPABILITY	With Monitor	With APM	With Monitor	With APM	With Monitor	With APM	With Monitor
Spectral Range	0.21 - 1.08 µm	0.21 - 1.08 µm		0.8 - 1.65 µm		0.9 - 1.6 µm	
Max Measurable Energy [a]	2 nJ	2 µJ		20 nJ		2 nJ	
Noise Equivalent Energy [b]	2 fJ	20 pJ	2 pJ	1 pJ	0.5 pJ	100 fJ	5 fJ
Rise Time (0-100%)	15 µs	15 µs		15 µs		15 µs	
Max Repetition Rate	1000 Hz	2000 Hz	1000 Hz	2000 Hz	1000 Hz	2000 Hz	1000 Hz
Max Pulse Width	10 µs	10 µs		10 µs		10 µs	
Sensitivity	N/A	20 MV/J		1 GV/J		10 GV/J	
Calibration Uncertainty [c]	± 5%	±8 % 210 - 219 nm ±6.5 % 220 - 399 nm ±2.5 % 400 - 899 nm ±3.5 % 900 - 999 nm ±5 % 1000 - 1049 nm ±7 % 1050 - 1080 nm		± 5%		± 5%	

DAMAGE THRESHOLDS				
Max Energy Density	5 µJ/cm²	5 µJ/cm²	5 µJ/cm²	5 µJ/cm²
Max Average Power Density (@ 1064nm)	1 mW/cm²	1 mW/cm²	1 mW/cm²	1 mW/cm²

PHYSICAL CHARACTERISTICS				
Effective Aperture	3 mm Ø	10 mm Ø	5 mm Ø	3 mm Ø
Sensor	Silicon	Silicon	Germanium	InGaAs
Connector	DB-15	DB-15	DB-15	DB-15
Dimensions	38.1Ø x 27.4D mm	38.1Ø x 27.4D mm	38.1Ø x 27.4D mm	38.1Ø x 27.4D mm
Weight	91 g	91 g	91 g	91 g

ORDERING INFORMATION				
Full Product Name	PE3B-Si	PE10B-Si	PE5B-Ge	PE3B-In
Product Number	202021	202019	202020	202143

a. Maximum value depends on the monitor.
b. Nominal value. Depends on environmental electromagnetic interference.
c. With Gentec-EO monitor.

Specifications are subject to change without notice

* For details, contact your Gentec-EO representative

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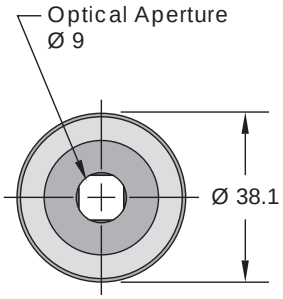
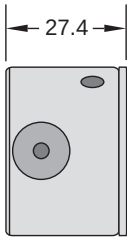
TECHNICAL DRAWINGS

PH10B-Si
PH100-Si/Si^{UV}
PE10B-Si

FRONT

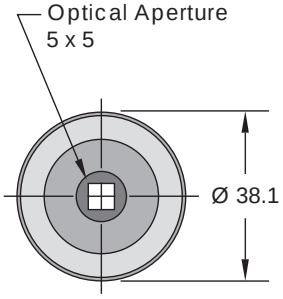


SIDE

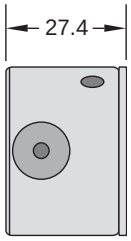


PH5B-Ge
PH20-Ge
PE5B-Ge

FRONT

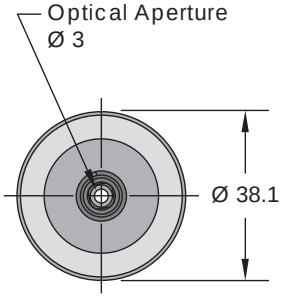


SIDE

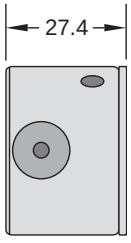


PH3B-In
PE3B-In

FRONT



SIDE

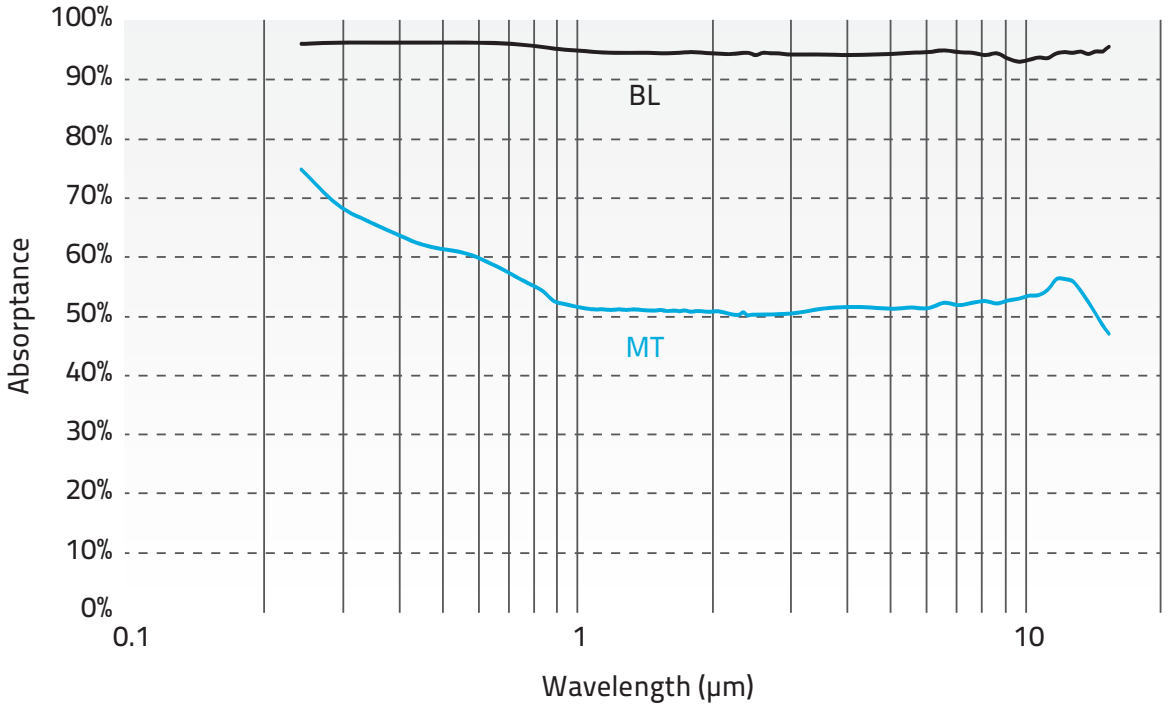


All dimensions in mm

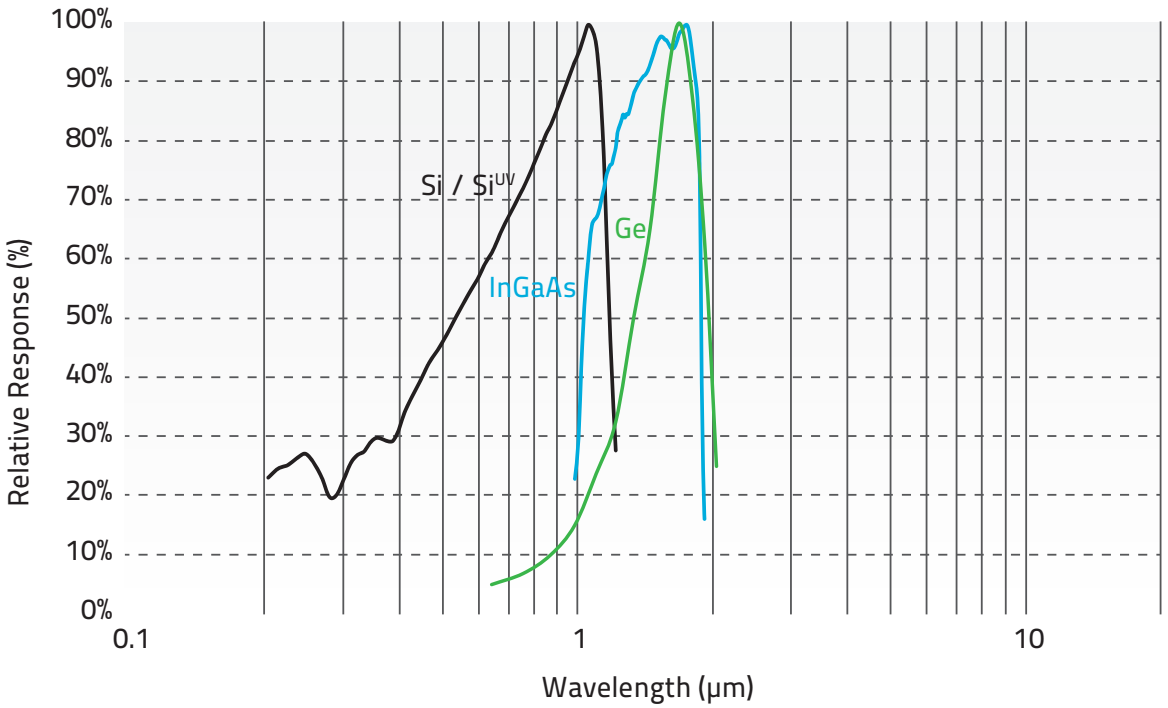
ABSORPTION CURVES

PH-B / PE-B

ABSORPTANCE



RELATIVE RESPONSE



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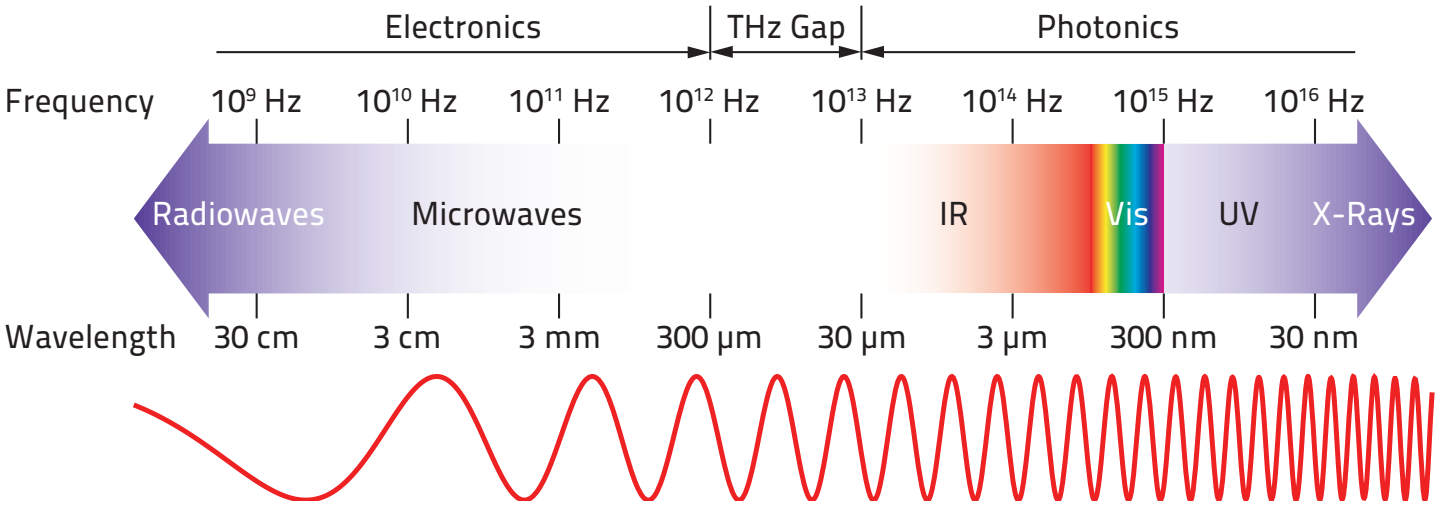
PRESENTATION

WHAT IS TERAHERTZ RADIATION?

The THz portion of the electromagnetic spectrum fills the gap between the far infrared and the microwaves. More precisely, it is nestled between the high-frequency edge of the microwave band, 300 gigahertz (3×10^{11} Hz), and the long-wavelength edge of far-infrared light, 3000 GHz (3×10^{12} Hz or 3 THz). In wavelengths, this range corresponds to 0.1 mm (or 100 µm) infrared to 1.0 mm microwave. The THz band is set in the region where electromagnetic physics can best be described by its wave-like characteristics (microwave) and its particle-like characteristics (infrared). [a]

[a] Source: Wikipedia

Figure 1. The electromagnetic spectrum showing the THz gap from 100 µm to 1000 µm or 3 THz to 0.3 THz



WHAT IS IT USED FOR?

THz radiation is interesting because of the way it interacts with matter:

- It can penetrate things like wood, plastics, clothing, and other materials.
- It is also absorbed by water, or a material that contains water, like human skin.
- It is non-ionizing and therefore not harmful to humans like X-rays can be.

One of the first uses is the "full body scan" used at airports. It also has uses in medical applications for early detection of cancer cells.

HOW IS IT MEASURED?

THz sources come in many varieties, including those with CW or Pulsed outputs. They range in power from nW to mW and in energy from nJ to mJ. Like most electromagnetic sources, they must be characterized for performance and/or control.

Older THz detection methods include:

- Golay Cells
- Micro-bolometers
- Pyroelectric detector and electrical devices like photo-acoustic and Schottky diode detectors

WHY ARE GENTEC-EO PRODUCTS BETTER?

- **Golay Cells** used to be the detector of choice, but they are costly and often very large.
- **Pyroelectric Detectors** (like the ones used in our THZ Detectors) used to have lower performances, but recent advances placed them on the same technical level as Golay Cells, and even higher. Pyroelectric Detectors in THz measuring show several benefits to the user:
  - Broadband thermal response from 0.1 to 3000 µm
  - Can be used at room temperature with high sensitivity (measure nW of power and nJ of energy)
  - Wider power range (from nW to mW)
  - Lower cost

PRESENTATION

OVERVIEW OF THE DIFFERENT MODELS

We have a unique line of sensors and meters for the terahertz region. You can choose either a standalone device with on-board electronics or go with our T-Rad meter and a separate sensor. We also have small terahertz detectors that come as discrete pyroelectric units for integration.

See page 106

THZ-I-BNC

- THz Detectors with Integrated Analog (BNC) Module (no need for a monitor)
- Wide Dynamic Range from nW to mW
- BNC output:
  - Battery or AC Powered (for use with an oscilloscope)
  - Very Low Noise Level (0.4 nW for THZ2I-BL-BNC)

INTEGRATED BNC MODULE

See page 108

THZ-B SENSORS WITH T-RAD-USB OR APM MODULES

- Large Choice of Apertures:
  1.5 mm, 5 mm and 9 mm Ø
- High Voltage responsivity:
  Up to 500 kV/W with the THZ9B-MT-BNC
- High Average Powers:
  Up to 200 mW with the 5 and 9 mm probes
- Choice between Digital or Analog Modules:
  Digital (T-Rad-USB), Analog (APM). See below.

T-RAD-USB

The T-Rad-USB Lock-In Amplifier Module is a small shielded box that houses a microprocessor, 12-bit ADC and USB connector. It is powered by the USB connection and also includes an analog output and trigger input BNC to sync it to the chopper frequency. It comes with our incredibly powerful Software and LabView Drivers.

APM

The APM provides battery or AC power to our THZ-B sensors. It includes a power On/Off switch and a BNC output connector. To get accurate and fast readings, just plug the THZ-B probe into the APM, and the APM BNC output into your oscilloscope.

See page 112

QS-THZ

- Hybrid Pyroelectric Detectors
- Small TO5/TO8 Packages
- Available in 5 Sizes: 1.5, 2, 3, 5 and 9 mm Ø Apertures
- Wide Dynamic Range from nW to mW
- QS-I-TEST Test Box Available

DISCRETE PYROELECTRIC DETECTORS
SMALL TO5/TO8 PACKAGES

THZ-I-BNC

THz Detector, Integrated Analog Module

KEY FEATURES

1. **Measure Sources from 0.1 to 30 THz**
   Broadband, room temperature operation, easier to use and less expensive than a Golay cell
2. **Wide Dynamic Range from nW to mW**
   With state of the art pyroelectric sensors, measure down to 50 nW with 1 nW resolution
3. **Integrated Analog Module**
   Plug the device directly to your oscilloscope
4. **Battery or AC Powered**
   Includes 9V Battery and AC Power Eliminator
5. **Calibrated Devices**
   All THz detectors are calibrated in the 0.25 to 15 µm (20 THz) region

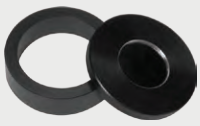
AVAILABLE MODELS

THZ2I-BL-BNC
(2 mm-Organic Black)

THZ5I-MT-BNC
(5 mm-Metallic)

ACCESSORIES

Stand with Delrin Post
(Model Number: 200428)



Removable IR Windows
(Various types available)

SDC-5000 Digital
Optical Chopper

Pelican Carrying Case

SEE ALSO

TECHNICAL DRAWINGS 114
LIST OF ALL ACCESSORIES 174

THZ-I-BNC

SPECIFICATIONS

Approved or in the process of being approved*

MODELS	THZ2I-BL-BNC	THZ5I-MT-BNC
MAX AVERAGE POWER	200 mW	200 mW
EFFECTIVE APERTURE	2 mm Ø	5 mm Ø
INTEGRATED MODULE	Analog (BNC)	Analog (BNC)

MEASUREMENT CAPABILITY		
Spectral Range		
Frequency	0.1 - 30 THz	0.1 - 30 THz
Wavelength	3000 - 10 µm	3000 - 10 µm
Max Measurable Power	200 mW	200 mW
Noise Equivalent Power	0.4 nW [4.0 x 10^{-10} W/(Hz)^{½}]	1.0 nW [1.0 x 10^{-9} W/(Hz)^{½}]
Rise Time (0-100%)	≤ 0.2s	≤ 0.2s
Sensitivity (Typical)	140 kV/W	70 kV/W
Calibration Uncertainty	± 4%	± 4%
DAMAGE THRESHOLDS		
Maximum Average Power Density (1064 nm)	50 mW/cm^2	50 mW/cm^2
PHYSICAL CHARACTERISTICS		
Effective Aperture	2 mm Ø	5 mm Ø
Sensor	Pyroelectric	Pyroelectric
Absorber	BL	MT
Analog Output	0-10 V	0-10 V
Dimensions	81.3Ø X 99.3D mm	81.3Ø X 99.3D mm
Weight	500 g	500 g
ORDERING INFORMATION		
Full Product Name	THZ2I-BL-BNC	THZ5I-MT-BNC
Product Number	201701	201702

Specifications are subject to change without notice

* For details, contact your Gentec-EO representative

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THZ-B

THz Detectors for T-Rad-USB Module

KEY FEATURES

1 Measure Sources from 0.1 to 30 THz
Broadband, room temperature operation, easier to use and less expensive than a Golay cell

2 Wide Dynamic Range from nW to mW
With state of the art pyroelectric sensors, measure down to 50 nW with 1 nW resolution

3 Use with T-Rad THz Digital or Analog Power Modules
Each head can be connected to an oscilloscope using the analog power module (APM) or directly to a PC with the digital power module (T-Rad-USB)

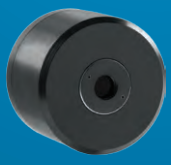
4 Large Area Sensors Available
5 mm and 9 mm diameter pyroelectric sensors make optical alignment easier

5 Calibrated Devices
All THz detectors are calibrated in the 0.25 to 15 µm (20 THz) region

6 User-Friendly Software with Many Features (When used with T-Rad-USB)
- Strip Chart, Hiatogram and Full Statistics
- Controls and Power display always visible
- Tuning Needle display includes min/max indicators
- Data Logging for long term testing

AVAILABLE MODELS

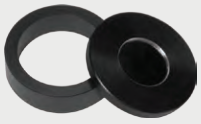
THZ1.5B-MT
(1.5mm-Metallic)


THZ5B-MT
(5mm-Metallic)

THZ9B-MT
(9mm-Metallic)

ACCESSORIES

Stand with Delrin Post
(Model Number: 200428)


Removable IR Windows
(Various types available)

SDC-5000 Digital
Optical Chopper

APM Analog Power Supply
(Model Number: 201495)

Pelican Carrying Case

SEE ALSO

TECHNICAL DRAWINGS 114
COMPATIBLE MODULES
T-RAD-USB
APM
LIST OF ALL ACCESSORIES 174

WATCH THE DEMONSTRATION VIDEO AVAILABLE ON OUR WEBSITE AT www.gentec-eo.com

THZ-B
SPECIFICATIONS

Approved or in the process of being approved*

MODELS	THZ1.5B-MT	THZ5B-MT	THZ9B-MT
MAX AVERAGE POWER	20 mW	200 mW	200 mW
EFFECTIVE APERTURE	1.5 mm Ø	5 mm Ø	9 mm Ø
COMPATIBLE MODULE(S)	APM and T-Rad-USB	APM and T-Rad-USB	APM and T-Rad-USB

MEASUREMENT CAPABILITY	With APM	With T-Rad-USB	With APM	With T-Rad-USB	With APM	With T-Rad-USB
Spectral Range						
Frequency	0.1 - 30 THz		0.1 - 30 THz		0.1 - 30 THz	
Wavelength	3000 - 10 µm		3000 - 10 µm		3000 - 10 µm	
Max Measurable Power	1.4 µW	20 mW	14 µW	200 mW	500 µW	200 mW
Noise Equivalent Power (NEP)	2.0×10^{-10} W/(Hz)^{½}	2 nW	1.0×10^{-9} W/(Hz)^{½}	5 nW	3.0×10^{-9} W/(Hz)^{½}	10 nW
Rise Time (0-95%)	≤ 0.2s		≤ 0.2s		≤ 0.2s	
Sensitivity (Typical)	700 kV/W	N/A	70 kV/W	N/A	20 kV/W	N/A
DAMAGE THRESHOLDS						
Max Average Power Density (@ 1064 nm)	10 mW/cm^2		10 mW/cm^2		10 mW/cm^2	
PHYSICAL CHARACTERISTICS						
Effective Aperture	1.5 mm Ø		5 mm Ø		9 mm Ø	
Sensor	Pyroelectric		Pyroelectric		Pyroelectric	
Absorber	MT		MT		MT	
Dimensions	66.0Ø x 46.5D mm		66.0Ø x 46.5D mm		66.0Ø x 46.5D mm	
Weight	227 g		227 g		227 g	
ORDERING INFORMATION						
Full Product Name	THZ1.5B-MT-BNC	THZ1.5B-MT-USB	THZ5B-MT-BNC	THZ5B-MT-USB	THZ9B-MT-BNC	THZ9B-MT-USB
Product Number	201757	201747	201746	201750	201755	201751

Specifications are subject to change without notice

* For details, contact your Gentec-EO representative

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THZ-B

T-RAD-USB

The T-RAD-USB is a microprocessor-based digital radiometer that includes a 12-bit ADC and unique DSP Lock-In Software. It is powered by a USB connection, which also acts as a Virtual COM port. When a THZ-B Terahertz Pyroelectric detector is plugged into the T-Rad-USB module, the module reads the content of the head's EEPROM, which identifies the detector and provides calibration and wavelength correction data. The LabView Software supplied with the device makes it very easy to set up the radiometer, measure a THz or broadband source and record data. The software is compatible with Windows XP, VISTA and 7.

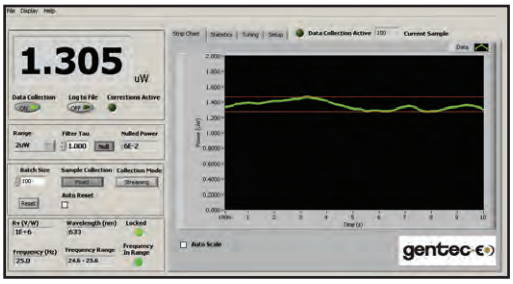
T-Rad-USB (Front View)

T-Rad-USB (Rear View)

SPECIFICATIONS & FEATURES

	T-Rad-USB
Compatible Detector Heads	THZ-B
Full Scale Ranges	200 nW - 20 mW *
Power On Light	Green
Detector Input	Lemo Connector
Analog Output	BNC Connector - 0 to 3.6 V
Computer Connection	USB (Virtual COM Port)
Trigger Input (TTL)	BNC Connector

* Actual ranges vary based on the THZ-B detector selected



INSTRUMENT CONTROL AND STRIP CHART

Instrument controls and the radiant power measurement are always visible, making it easy to change the radiometer settings, no matter which display tab is selected. Instrument controls include: Range, Filter Tau, Batch Size, Data Collection Mode, Reset Options, and a Null button for background cancellation. In addition, there are more set up and operation status indicators including: detector Rv, Wavelength, Frequency (actual), Locked and Frequency in Range lights. The Strip Chart displays the Radiant Power measurement in Watts, either continuously or by the batch. Select full scale, auto scale or use our manual scaling option.

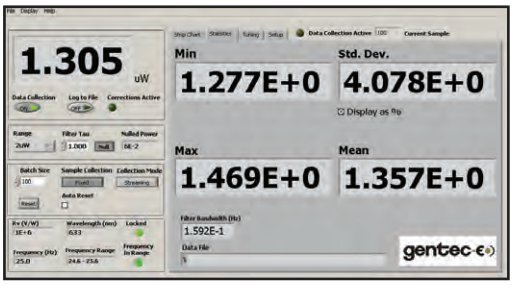
INSTRUMENT CONTROL AND TUNING NEEDLE

The "TUNE" tab selects the very useful "Tuning Needle" display. This is a simulated analog meter whose speed is determined by the "filter tau" setting. It is expected to be used during the set-up of a radiometer with a source. The "tau" value is usually set to a small value when aligning the probe to the source (i.e. when peaking the reading). There a button control to select "full scale", "min-max" or "reset". In the "min-max" mode, the indicators are "blue" for the minimum power and "red" for the maximum power.

THZ-B

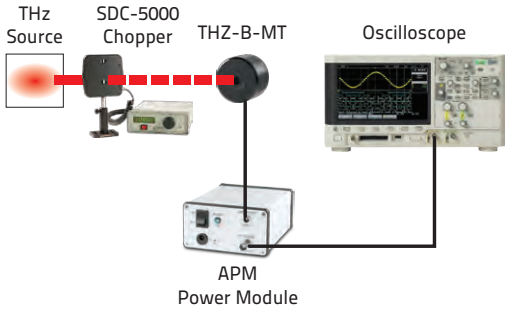
INSTRUMENT CONTROL AND STATISTICS

In the "Statistics" tab there are 4 large windows that contain the statistics for the selected batch, including: Minimum, Maximum, Standard Deviation and Mean, expressed in Engineering Notation. Standard Deviation can be displayed in Watts or as a % that is user-selectable. There is also a window that shows the bandwidth of the Digital Band Pass Filter based on the user selected "Filter Tau" (0.100 to 100 seconds). A lower time constant is helpful when setting up, and a longer one when making measurements, especially on the lower ranges of the instrument.



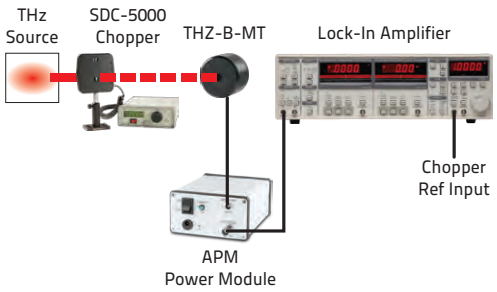
THZ-B-BNC DETECTOR AND OSCILLOSCOPE

Here is a basic analog set up that would be useful if the optical power of the source was about 5 µW or greater. The output of the THZ5B-MT-BNC detector would be approximately 600 mV @ 5 Hz chopping frequency, giving plenty of signal for an oscilloscope. Simply read the voltage output and divide by the Rv factor (V/W) of the detector to measure the intensity of the source in Watts. Also consider applying a wavelength correction factor under certain circumstances.



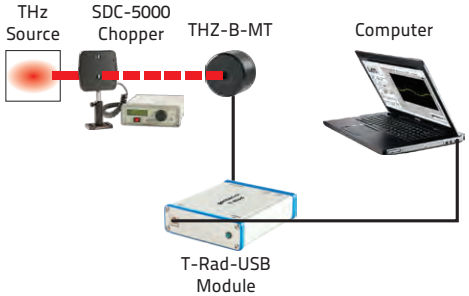
THZ-B-BNC DETECTOR AND LOCK-IN AMPLIFIER

This is another analog set-up option that we recommended it if you have to measure very low power levels (i.e. less than 5 µW) where the signal may be buried in the broadband noise. The voltage output of the analog THZ-B detector, powered by our APM, is routed to the Lock-In Amplifier input, and the Sync Output of our SDC-5000 Chopper is connected to the reference input. The Lock-In Amplifier will lock on the chopping frequency and you can dial in a long integrating time and measure a very low RMS voltage. The voltage divided by our Voltage Responsivity (V/W) equals the power of the source.



THZ-B-USB DETECTOR AND T-RAD-USB

Although analog solutions are available, for simplicity, convenience and sensitivity, we recommend you choose our THZ-B-USB detectors and the T-Rad-USB Digital Radiometer. Our unique DSP Lock-In Amplifier software provides a function much like the Analog Lock-In, but is so much easier to use. It also addresses thermal drift of the sensor and allows you to display the power measurement and complete statistics directly in digital and graphic formats. Set the range, null the background, set the filter tau (bandwidth) and make the measurement. It's that easy!



QS-THZ

Hybrid THz Detectors

KEY FEATURES

1. **Measure Sources from 0.1 to 30 THz**
   Broadband, room temperature operation, easier to use and less expensive than a Golay cell
2. **Wide Dynamic Range from nW to mW**
   With state of the art pyroelectric sensors, measure down to 50 nW with 1 nW resolution
3. **Easy to Integrate Format**
   TO5 and TO8 packages make the QS-THZ detectors small and easy to integrate in an existing system
4. **Several Detector Sizes**
   Sensors with apertures of 2 x 2 mm and 5 and 9 mm Ø available
5. **Calibrated Devices**
   All THz detectors are calibrated in the 0.25 to 15 µm (20 THz) region
6. **Test Box Available**
   Can be used with our QS-I-TEST test box which provides mounting and power supply

AVAILABLE MODELS

- QS2-THZ-BL 2 x 2 mm, Discrete Pyroelectric Sensor with Organic Black Coating in TO5 Packaging
- QS5-THZ-MT 5 mm Ø, Discrete Pyroelectric Sensor with Metallic Coating in TO5 Packaging
- QS9-THZ-BL 9 mm Ø, Discrete Pyroelectric Sensor with Organic Black Coating in TO8 Packaging

ACCESSORIES

QS-I-Test
Evaluation Test Box

Permanent IR Windows
(Various types available)

SDC-5000 Digital
Optical Chopper

Pelican Carrying Case

SEE ALSO

TECHNICAL DRAWINGS 114
LIST OF ALL ACCESSORIES 174

QS-THZ
SPECIFICATIONS

Approved or in the process of being approved*

MODELS	QS2-THZ-BL	QS5-THZ-MT	QS9-THZ-BL
VOLTAGE RESPONSIVITY	140 kV/W	70 kV/W	30 kV/W
EFFECTIVE APERTURE	2 x 2 mm	5 mm Ø	9 mm Ø
PACKAGE	TO5	TO5	TO8
MEASUREMENT CAPABILITY			
Spectral Range			
Frequency	0.1 - 30 THz	0.1 - 30 THz	0.1 - 30 THz
Wavelength	3000 - 10 µm	3000 - 10 µm	3000 - 10 µm
Max Power Density	50 mW/cm²	50 mW/cm²	50 mW/cm²
Noise Equivalent Power	4.0×10^{-10} W/(Hz)½	1.0×10^{-9} W/(Hz)½	3.0×10^{-9} W/(Hz)½
Detectivity [a]	5.10^{8} cm(Hz)½ /W	4.10^{8} cm(Hz)½ /W	$2.7.10^{8}$ cm(Hz)½ /W
Voltage Responsivity [a]	140 kV/W	70 kV/W	30 kV/W
PHYSICAL CHARACTERISTICS			
Effective Aperture	2 x 2 mm	5 mm Ø	9 mm Ø
Package	TO5	TO5	TO8
Sensor	Pyroelectric	Pyroelectric	Pyroelectric
Absorber	BL	MT	BL
Dimensions	3.6Ø x 7.5D mm	3.6Ø x 7.5D mm	3.6Ø x 7.5D mm
Weight	45 g	45 g	45 g
ORDERING INFORMATION			
Full Product Name	QS2-THZ-BL	QS5-THZ-MT	QS9-THZ-BL
Product Number	201691	201692	201690

a: 630 nm, 5 Hz

Specifications are subject to change without notice

QS-I-TEST EVALUATION TEST BOX

	QS-I-TEST
Batteries	+9V/-9V
R_f Resistors	10^5 - 10^{10} Ω
C_f Compensating	YES
Package	101.6H x 127W x 58.4D
Optical Mount	¼-20 Threaded
Front Bezel	SM1 (1.035-40)

* For details, contact your Gentec-EO representative

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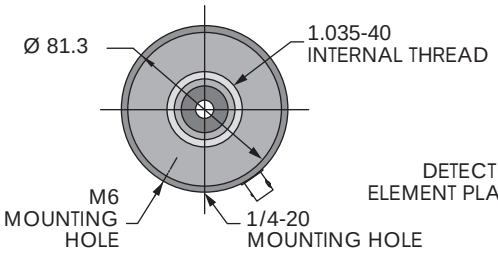
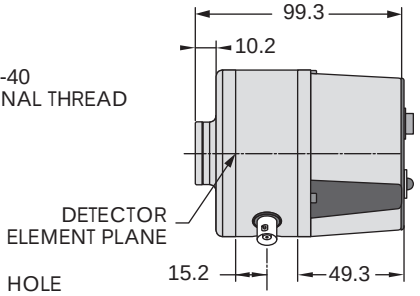
TECHNICAL DRAWINGS

THZ-I-BNC

FRONT

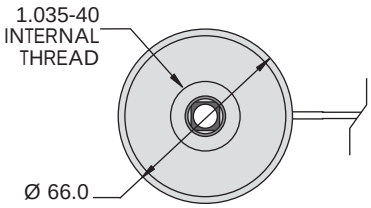


SIDE

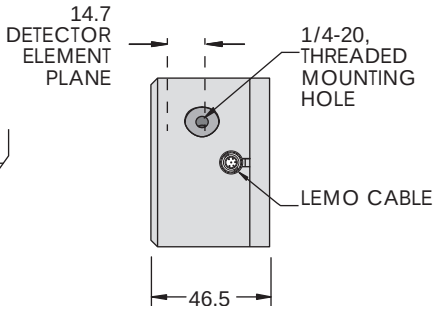


THZ-B

FRONT

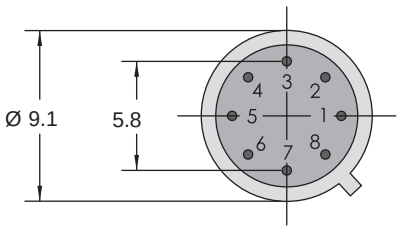


SIDE

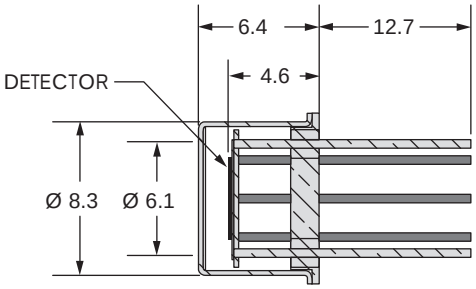


QS-THZ (TO5-BASED)

FRONT

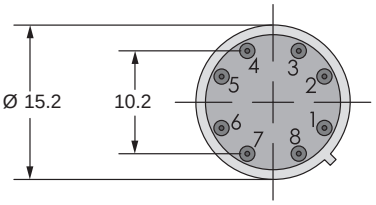


SIDE

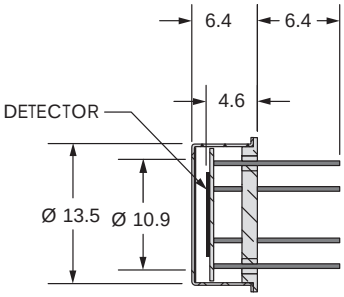


QS-THZ (TO8-BASED)

FRONT



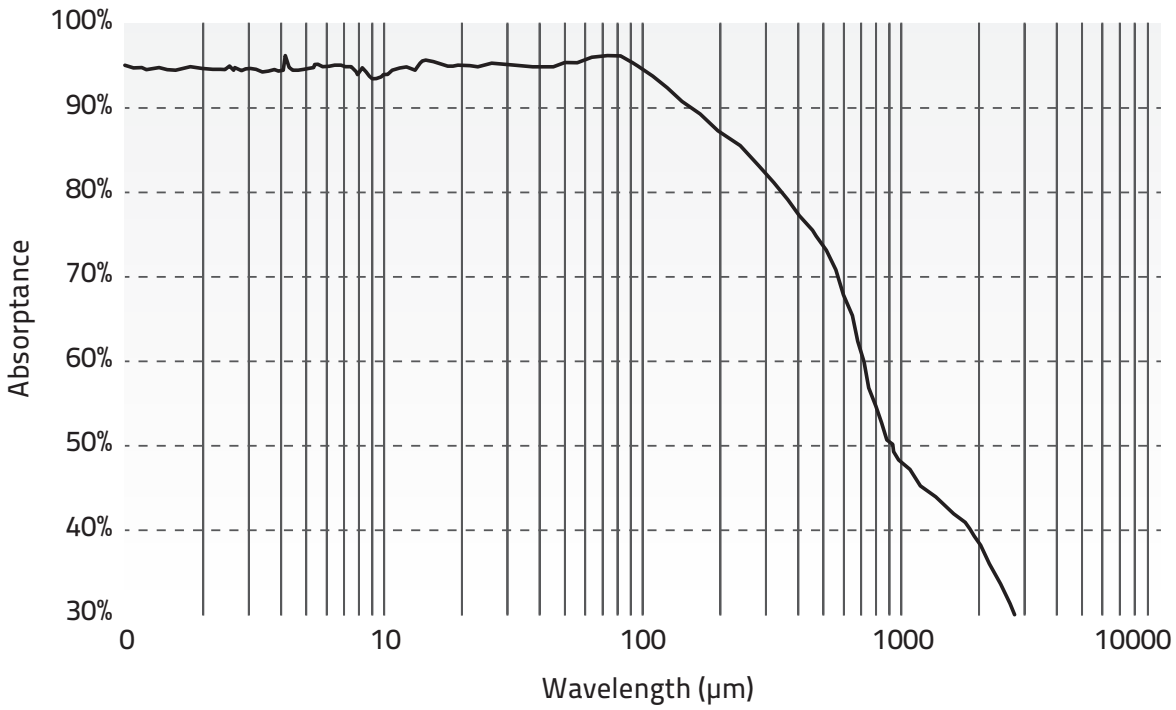
SIDE



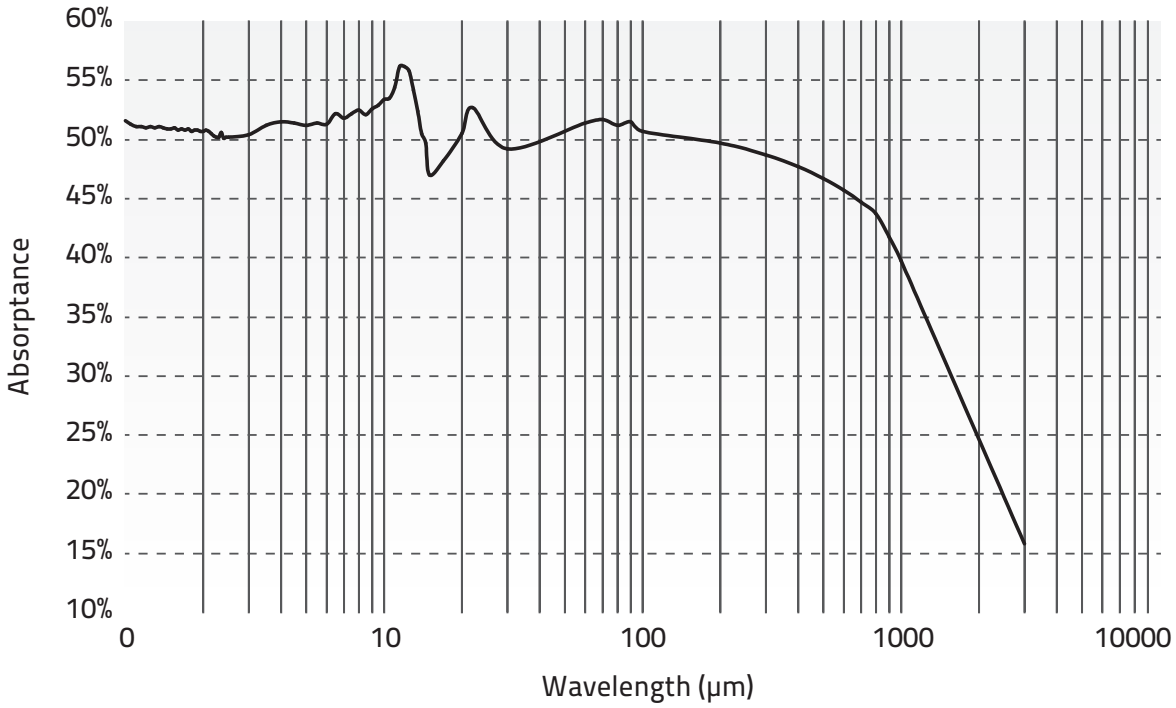
All dimensions in mm

ABSORPTION CURVES

THZ-BL



THZ-MT



All dimensions in mm

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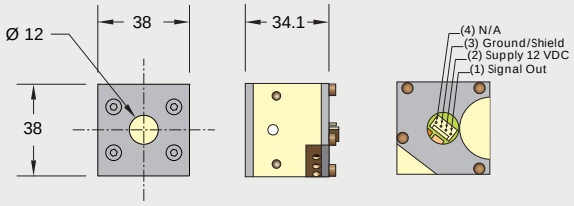
PRESENTATION

PRODUCT CHARACTERISTICS

Gentec-EO offers OEM customers the highest flexibility so that you make no compromise. Whether you want a different housing, a specific sensitivity or another output connector, we have a solution for you. We will customize existing models or design a whole new detector to meet your needs.

COMPACTNESS

As an OEM, we know space is often a constraint. This is why we offer very compact detectors to ease the integration inside machines. We have built our expertise on detector compactness on our exclusive modular design. Users can mix and match existing detectors and cooling modules from a large set of combinations, thus obtaining the smallest detector possible.



PERFORMANCE

If you select an Ultra Disk (UD Series), you can use our external PCB for signal anticipation, amplification and filtering. We can also integrate a PCB inside complete detectors. See the UP SERIES WITH PCB (Page 122) for details.

Anticipation	Amplification	Filtering
0-95% of the signal in as quickly as 0.3 sec with the small UD12-70-H5 and in 0.6 sec with the UD19-200-H5 using our external PCB.	Adjust your disk sensitivity to get the perfect voltage for your acquisition system. Disks can be adjusted from 0.6 to 2 V/W.	Eliminate the high frequency noise coming from the environment with the integrated low-pass filter of our PCB.

CONNECTIVITY

Gentec-EO offers you several types of output connectors, from the more standard DB-15, BNC and Molex to any exotic type you may need.

DB-15	BNC	Molex
This connector contains an EEPROM with custom calibration data for both Power and Energy Detectors.	The BNC output gives you fast, easy installation and the best EMI noise shielding. Perfect for the sensitive Energy Detectors.	With the Molex connector and pigtail, you join the power and signal wires of the pigtail to your system. Easy to unplug for service.

PRESENTATION

OVERVIEW OF THE DIFFERENT MODELS

Almost anything you see in our product line can be turned into an OEM unit! We also offer standard OEM products, at different levels of integration: from the simple thermopile disk to a complete head with internal PCB for signal anticipation and amplification.

See page 118

UD SERIES

- Thermal Sensor Disks
- Designed for Integration
- Many Sizes and Absorber Choices:
  - 12, 19, 25, and 55 mm Ø Apertures
  - Broadband or High Damage Threshold Coatings

THERMAL SENSOR DISKS

See page 120

UP SERIES

- Complete Thermal Heads with Cooling Modules
- Several Sizes, Coolings and Absorber Choices:
  - 12, 19, 25, 50 and 55 mm Ø Apertures
  - Broadband or High Damage Threshold Coatings
  - Convection, Fan or Water-Cooled
- BNC, Molex or DB-15 Connectors

THERMAL SENSOR HEADS

See page 122

UP SERIES WITH PCB

- Complete Thermal Heads with Cooling Modules
- Internal PCB for Amplification, Anticipation and Filtering
- Several Sizes, Coolings and Absorber Choices:
  - 12, 19, 25, 50 and 55 mm Ø Apertures
  - Broadband or High Damage Threshold Coatings
  - Convection, Fan or Water-Cooled
- BNC, Molex or DB-15 Connectors

THERMAL SENSOR HEADS WITH PCB

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UD SERIES

Thermal Sensor Disks, 12 - 55 mm Ø, 1 mW - 400 W

KEY FEATURES

1 Designed for Integration
With a broad bandwidth and high power densities

2 Very Thin Profiles
Starting at only 2 mm deep

3 Various Aperture Sizes
Choose your aperture from 12 mm to 55 mm

4 2 Levels of Integration
- Disk alone
- Disk + PCB

AVAILABLE MODELS

UD12-70-H5
(12 mm-70 W)

UD19-150-H5
(19 mm-150 W)

UD19-200-H9
(19 mm-200 W)

UD25-300-H9
(25 mm-300 W)

UD55-400-H9
(55 mm-400 W)

UD19-50-W5
(19 mm-100 kW/cm²)

HOW TO USE SENSOR DISKS

The Ultra Disks were designed for integration into laser systems. They are the solution if you are engineering the cooling and signal processing into your system already. The chart below and on the next page show the various Possibilities that Gentec-EO offers to OEM users. The choice of a level of integration depends on your needs in terms of calibration, output signal level, cooling avaibility, etc.

1

Disk Alone
- Thermal Sensor Disk

2

+

Disk + PCB
- Thermal Sensor Disk
- Amplification - Anticipation - Filtering

SEE ALSO

LIST OF ALL ACCESSORIES 174

UD SERIES

SPECIFICATIONS

MODELS	UD12-70-H5	UD19-150-H5	UD19-200-H9	UD25-300-H9	UD55-400-H9	UD19-50-W5
MAX AVERAGE POWER (CONTINUOUS / 1 MINUTE)	70 W / 110 W	150 W / 190 W	200 W / 200 W	300 W / 300 W	400 W / 400 W	50 W / 85 W
EFFECTIVE APERTURE	12 mm Ø	19 mm Ø	19 mm Ø	25 mm Ø	55 mm Ø	17 mm Ø
MEASUREMENT CAPABILITY						
Spectral Range	0.19 – 20 µm	0.19 – 20 µm	0.19 – 20 µm	0.19 – 20 µm	0.19 – 20 µm	0.19 – 10 µm
Noise Equivalent Power	1 mW	1 mW	3 mW	3 mW	5 mW	1 mW
Rise Time (nominal) [a, b]	1.6 sec	2.8 sec	4.5 sec	5 sec	11 sec	5 sec
Sensitivity (typ into 100 kΩ load) [b]	0.53 mV/W	0.65 mV/W	0.23 mV/W	0.23 mV/W	0.12 mV/W	0.65 mV/W
Energy Mode						
Sensitivity	0.84 mV/J	0.65 mV/J	0.23 mV/J	0.14 mV/J	0.03 mV/J	0.33 mV/J
Maximum Measurable Energy [c]	5 J	15 J	25 J	40 J	200 J	200 J
Noise Equivalent Energy [a]	20 mJ	20 mJ	60 mJ	0.2 J	0.25 J	23 mJ
DAMAGE THRESHOLDS						
Maximum Average Power Density	36 kW/cm²	36 kW/cm²	45 kW/cm²	45 kW/cm²	45 kW/cm²	100 kW/cm²
Pulsed Laser Damage Thresholds						
1064 nm, 360 µs, 5 Hz	5 J/cm²	5 J/cm²	9 J/cm²	9 J/cm²	9 J/cm²	100 J/cm²
1064 nm, 7 ns, 10 Hz	1 J/cm²	1 J/cm²	1 J/cm²	1 J/cm²	1 J/cm²	1.1 J/cm²
532 nm, 7 ns, 10 Hz	0.6 J/cm²	0.6 J/cm²	0.6 J/cm²	0.6 J/cm²	0.6 J/cm²	1.1 J/cm²
266 nm, 7 ns, 10 Hz	0.3 J/cm²	0.3 J/cm²	0.3 J/cm²	0.3 J/cm²	0.3 J/cm²	0.7 J/cm²
PHYSICAL CHARACTERISTICS						
Absorber	H5	H5	H9	H9	H9	W5
Dimensions	36Ø x 2D mm	44Ø x 3D mm	44Ø x 3D mm	54Ø x 3D mm	85Ø x 4D mm	44Ø x 3D mm
Weight (head only)	4 g	7 g	7 g	13 g	39 g	7 g
ORDERING INFORMATION						
Full Product Name	UD12-70-H5	UD19-150-H5	UD19-200-H9	UD25-300-H9	UD55-400-H9	UD19-50-W5
Product Number (Including stand)	200382	200262	200576	200263	200264	200761

* Other Sizes Available Upon Request

a. These characteristics depend on the thermal management and electronics provided by the user. Packaging, cooling and electronics similar to our Ultra Series (UP) detectors will provide similar performances. See UP Series specifications sheets for more details. Actual performance depends on the tradeoffs in a user's design. It may be possible to enhance some performance parameters at the expense of others.

b. Without anticipation algorithm or circuitry.
c. For 360 µs pulses. Higher pulse energy possible when customized for long pulses (ms), less for short pulses (ns).

Specifications are subject to change without notice

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UP SERIES

Thermal Sensor Heads, 12 - 55 mm Ø, 1 mW - 400 W

KEY FEATURES

1 Fully Integrable Thermopile Sensor Heads
OEM Sensors designed to integrate easily into existing systems

2 Modular Concept
Increase the power capability of your detector : 5 different cooling modules

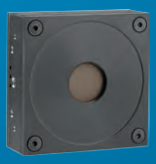
3 Very High Damage Thresholds
Up to 100 kW/cm² in average power density

4 Choice of connectors
DB-15, BNC, Molex

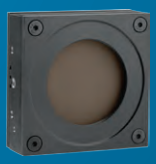
AVAILABLE MODELS

UP12E
(12 mm Ø-Up to 110 W)

UP19K-H
(19 mm Ø-Up to 200 W)



UP25N(M)
(25 mm Ø-Up to 350 W)



UP55N(M)
(55 mm Ø-Up to 500 W)

UP19K-W5
(18 mm Ø-100 kW/cm²)

UP50N(M)-W9
(50 mm Ø-100 kW/cm²)

LEVELS OF INTEGRATION

1

Head Only
- Thermal Sensor Head (with natural response)
- Connector

2

Head with PCB & Connector
- Thermal Sensor Head
- Amplification - Anticipation - Filtering
- Connector

3

Head & Display
- Thermal Sensor Head
- Connector
- Display

SEE ALSO

HOW IT WORKS	12
CALIBRATION	6
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ABSORPTION CURVES	93
COMPATIBLE MONITORS	
MAESTRO	18
UNO	24
S-LINK-2	26
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M-LINK	30
LIST OF ALL ACCESSORIES	174

UP SERIES

SPECIFICATIONS

CE NIST* Traceable WEEE RoHS COMPLIANT

*Also traceable to NRC-CNRC

MODELS	UP12E	UP19K-H	UP25N-H	UP55N-H	UP19K-W5	UP50N-W9
MAX AVERAGE POWER (CONTINUOUS / 1 MINUTE)	70 W / 110 W	200 W / 200 W	350 W / 350 W	500 W / 500 W	50 W / 85 W	50 W / 85 W
EFFECTIVE APERTURE	12 mm Ø	19 mm Ø	25 mm Ø	55 mm Ø	17 mm Ø	50 mm Ø
MEASUREMENT CAPABILITY						
Spectral Range	0.19 – 20 µm	0.19 – 20 µm	0.19 – 20 µm	0.19 – 20 µm	0.19 – 10 µm	0.19 – 10 µm
Available Cooling Modules (Max. Power)						
Standalone (S)	10 W	15 W	40 W	40 W	15 W	40 W
Heatsink (H)	20 W	30 W	100 W	100 W	30 W	50 W
Large Heatsink (L)	–	50 W	–	–	50 W	–
Fan (F)	–	110 W	250 W	300 W	50 W	50 W
Water (W)	70 W	150 W	350 W	500 W	50 W	50 W
Water (W)	–	200 W	–	700 W	–	–
Noise Equivalent Power	1 mW	1-3 mW	3-10 mW	5-15 mW	1 mW	5 mW
Rise Time (nominal)	1.6 sec	2.8-4.5 sec	5-7.9 sec	11-18 sec	5 sec	16 sec
Sensitivity (typ into 10 MΩ load)	0.53 mV/W	0.23-0.65 mV/W	0.1-0.23 mV/W	0.06-0.12 mV/W	0.65 mV/W	0.12 mV/W
Maximum Average Power Density [b]	36 kW/cm²	36-45 kW/cm²	45 kW/cm²	45 kW/cm²	100 kW/cm²	100 kW/cm²
PHYSICAL CHARACTERISTICS						
Effective Aperture	12 mm Ø	19 mm Ø	25 mm Ø	55 mm Ø	17 mm Ø	50 mm Ø
Absorber	H5	H5/H9	H9/H12	H9/H12/HD	W5	W9
Dimensions [c]	38H x 38W x 14D mm	50H x 50W x 20.6D mm	89H x 89W x 32D mm	89H x 89W x 32D mm	50H x 50W x 20.6D mm	89H x 89W x 32D mm
Weight [c]	130 g	160 g	680 g	620 g	160 g	620 g
ORDERING INFORMATION						
Full Product Name (Standalone)	UP12E-10S-H5-DO	UP19K-15S-H5-DO	UP25N-40S-H9-DO	UP55N-40S-H9-DO	UP19K-15S-W5-DO	UP50N-40S-W9-DO
Product Number	200383	200142	200195	200215	200282	200803
Full Product Name (Heatsink)	UP12E-20H-H5-DO	UP19K-30H-H5-DO	UP25N-100H-H9-DO	UP55N-100H-H9-DO	UP19K-30H-W5-DO	UP50N-50H-W9-DO
Product Number	200385	200143	200199	200219	200284	200897
Full Product Name (Large Heatsink)	–	UP19K-50L-H5-DO	–	–	UP19K-50L-W5-DO	–
Product Number	–	200164	–	–	200331	–
Full Product Name (Fan)	–	UP19K-110F-H9-DO	UP25N-250F-H12-DO	UP55N-300F-H12-DO	UP19K-50F-W5-DO	UP50N-50F-W9-DO
Product Number	–	200994	201151	201157	200334	200894
Full Product Name (Water)	UP12E-70W-H5-DO	UP19K-150W-H5-DO	UP25M-350W-H12-DO	UP55M-500W-H12-DO	UP19K-50W-W5-DO	UP50M-50W-W9-DO
Product Number	200389	200194	201893	201882	200300	201887
Full Product Name (Water)	–	UP19K-200W-H9-DO	–	UP55M-700W-HD-DO	–	–
Product Number	–	200582	–	201908	–	–

* Other Sizes Available Upon Request

a. For model with the most efficient cooling module available.
b. At 1064 nm, 10 W CW.
c. For standalone version. Ask gentec-EO for dimensions of other versions.

Specifications are subject to change without notice

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UP SERIES + PCB

Thermal Sensor Heads with Internal PCB, 12 - 55 mm Ø, 1 mW - 400 W

KEY FEATURES

1 Fully Integrable Thermopile Sensor Heads
OEM Sensors designed to integrate easily into existing systems

2 With Internal PCB
Integrated amplification, anticipation and filtering

3 Modular Concept
Increase the power capability of your detector : 5 different cooling modules

4 Very High Damage Thresholds
Up to 100 kW/cm² in average power density

5 Largest Choice of connectors
DB-15, BNC, Molex or custom

AVAILABLE MODELS

- UP12E — 12 mm Ø, 10 W, With Rear Molex Output
- UP19K-H — 19 mm Ø, 15-30-50-110-150 W, Standard Broadband Coating (H5 or H9)
- UP25N — 25 mm Ø, 40-100-250-300 W, Standard Broadband Coating (H9 or H12)
- UP55N — 55 mm Ø, 40-100-300-400 W, Standard Broadband Coating (H9 or H12)
- UP19K-W5 — 17 mm Ø, 15-30-50 W, High Damage Threshold 100 kW/cm² Coating (W5)
- UP50N-W9 — 50 mm Ø, 40-50 W, High Damage Threshold 100 kW/cm² Coating (W9)

LEVELS OF INTEGRATION

1

Head Only
- Thermal Sensor Head (with natural response)
- Connector

2

Head with PCB & Connector
- Thermal Sensor Head
- Amplification - Anticipation - Filtering
- Connector

3

Head & Display
- Thermal Sensor Head
- Connector
- Display

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UP SERIES + PCB

SPECIFICATIONS

CE NIST* Traceable WEEE RoHS COMPLIANT

*Also traceable to NRC-CNRC

MODELS	UP12E	UP19K-H	UP25N	UP55N	UP19K-W5	UP50N-W9
MAX AVERAGE POWER (CONTINUOUS / 1 MINUTE)	70 W / 110 W	200 W / 200 W	350 W / 350 W	700 W / 700 W	50 W / 85 W	50 W / 85 W
EFFECTIVE APERTURE	12 mm Ø	19 mm Ø	25 mm Ø	55 mm Ø	17 mm Ø	50 mm Ø
MEASUREMENT CAPABILITY						
Spectral Range	0.19 – 20 µm	0.19 – 20 µm	0.19 – 20 µm	0.19 – 20 µm	0.19 – 10 µm	0.19 – 10 µm
Available Cooling Modules (Max. Power)						
Standalone (S)	10 W	15 W	40 W	40 W	15 W	40 W
Heatsink (H)	–	30 W	100 W	100 W	30 W	50 W
Large Heatsink (L)	–	50 W	–	–	50 W	–
Fan (F)	–	110 W	250 W	300 W	50 W	–
Water (W)	–	150 W	350 W	500 W	50 W	85 W
Water (W)	–	200 W	–	700 W	–	–
Noise Equivalent Power	0.2 mW	0.2 mW	1-10 mW	2-15 mW	0.2 mW	3 mW
Rise Time (anticipated)	0.3 sec	0.5 sec	1.3 sec	2 sec	1.4 sec	3.5 sec
Sensitivity (typ into 10 MΩ load)	400 mV/W	30-400 mV/W	24-150 mV/W	15-150 mV/W	400 mV/W	120-150 mV/W
Maximum Average Power Density [b]	36 kW/cm²	36-45 kW/cm²	45 kW/cm²	45 kW/cm²	100 kW/cm²	100 kW/cm²
PHYSICAL CHARACTERISTICS						
Effective Aperture	12 mm Ø	19 mm Ø	25 mm Ø	55 mm Ø	17 mm Ø	50 mm Ø
Absorber	H5	H5/H9	H9/H12	H9/H12/HD	W5	W9
Dimensions [b]	38H x 38W x 28.6D mm	50H x 50W x 25.6D mm	89H x 89W x 32D mm	89H x 89W x 32D mm	50H x 50W x 25.6D mm	89H x 89W x 32D mm
Weight [b]	200 g	200 g	680 g	620 g	200 g	620 g
ORDERING INFORMATION [c]						
Full Product Name (Standalone)	UP12E-10S-H5-MT-B	UP19K-15S-H5-MT	UP25N-40S-H9-MT	UP55N-40S-H9-MT	UP19K-15S-W5-MT	UP50N-40S-W9-MT
Product Number	200919	200150	200197	200217	200290	200904
Full Product Name (Heatsink)	–	UP19K-30H-H5-MT	UP25N-100H-H9-MT	UP55N-100H-H9-MT	UP19K-30H-W5-MT	UP50N-50H-W9-MT
Product Number	–	200151	200201	200221	Call	200905
Full Product Name (Large Heatsink)	–	UP19K-50L-H5-MT	–	–	UP19K-50L-W5-MT	–
Product Number	–	200166	–	–	Call	–
Full Product Name (Fan)	–	UP19K-110F-H9-MT	UP25N-250F-H12-MT	UP55N-300F-H12-MT	UP19K-50F-W5-MT	–
Product Number	–	200640	201153	201159	Call	–
Full Product Name (Water)	–	UP19K-150W-H5-MT	UP25M-350W-H12-MT	UP55M-500W-H12-MT	UP19K-50W-W5-MT	UP50M-50W-W9-MT
Product Number	–	200152	201899	201918	Call	201919
Full Product Name (Water)	–	UP19K-200W-H9-MT	–	UP55M-700W-HD-MT	–	–
Product Number	–	200585	–	202144	–	–

* Other Sizes Available Upon Request

a. For model with the most efficient cooling module available.
b. For standalone version. Ask gentec-EO for dimensions of other versions.
c. For Molex connector version (-MT). Contact Gentec-EO for other types.

Specifications are subject to change without notice

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PRESENTATION

Photo courtesy of Lawrence Livermore National Laboratory

A Gentec-EO calorimeter is the only reliable solution available for the largest and highest energy laser beams. Through cooperation with several leading research facilities around the world, Gentec-EO has become the expert in manufacturing, calibrating and servicing calorimeters for use in high energy inertial confinement fusion calorimetric measurement.

PRESENTATION

STATE-OF-THE-ART

We work with a wide range of materials from surface coatings to the amost robust volume absorbers to provide the best solution for your specific application.

- Outstanding signal to noise ratios,
- high sensitivity,
- vacuum compatibility,
- attention to detail and workmanship,

gained over 35 years of experience in thermal-based energy measurement make Gentec-EO the ideal choice for all your high energy measurement needs.

ACCURATE

Using NIST traceable sources and proven calibration techniques, your Gentec-EO calorimeter is always the most accurate large aperture measurement device on the market.

With calibration uncertainties of ±3%, and repeatabilities better than ±2% for very large beams, Gentec-EO offers the very best solution for extreme energy measurement and for balancing in multi laser systems.

CUSTOMIZED

We have designed calorimeters for 16 kJ beams. We have built them for beams as large as 420 x 427 mm in aperture size, to withstand pulse energy densities of more than 15 J/cm^2.

We have also provided highly sensitive, large-aperture size calorimeters for beam energies as low as 50 mJ for the most delicate applications.

Our calorimeters span the band from 190 nm to 25 microns. Moreover, we are happy to push these limits even further. We work with a wide range of materials from surface coatings to the most robust volume absorbers to provide the best solution for your specific application.

APPLICATIONS

LASER FUSION EXPERIMENTS

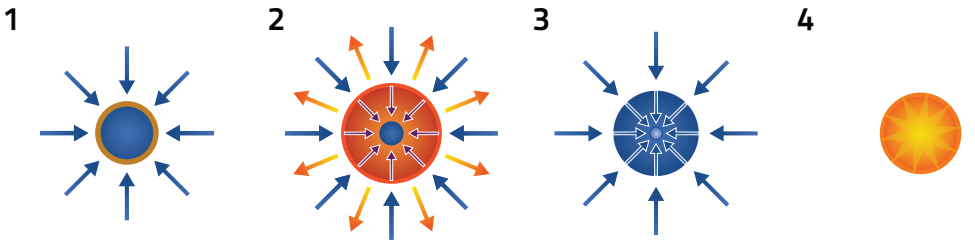
Inertial confinement fusion (ICF) is a process where nuclear fusion reactions are initiated by heating and compressing a fuel target, typically in the form of a pellet that most often contains a mixture of deuterium and tritium. To compress and heat the fuel, energy is delivered to the outer layer of the target using high-energy beams of laser light.* ICF is said to reproduce the energy generation process taking place in the core of the sun.

Several laser fusion projects are underway around the world right now, their main goal is to produce a clean, reliable and nearly unlimited source of energy. All these laser fusion experiments use very high energy lasers of sereval kJ per pulse for which a Gentec-EO calorimeter is the ONLY reliable measuring device available on the market. Over the years, we have been presented with increasingly large and energetic laser pulses to be measured and we have kept pace with the world's most demanding lasers.

*. Source : Wikipedia.

LASER FUSION MECHANISM

Schematic of the stages of inertial confinement fusion using lasers. The blue arrows represent radiation; orange is blowoff; purple is inwardly transported thermal energy.



1. Laser beams or laser-produced X-rays rapidly heat the surface of the fusion target, forming a surrounding plasma envelope.

2. Fuel is compressed by the rocket-like blowoff of the hot surface material.

3. During the final part of the capsule implosion, thefuel core reaches 20 times the density of lead and ignites at 100,000,000 ° C.

4. Thermonuclear burn spreads rapidly through the compressed fuel, yielding many times the input energy.

Typical pulse values for these lasers are in the range:

Aperture Sizes:
Up to 420 x 420 mm

Energy Range:
Up to 16 kJ

Pulse Widths:
Nanoseconds

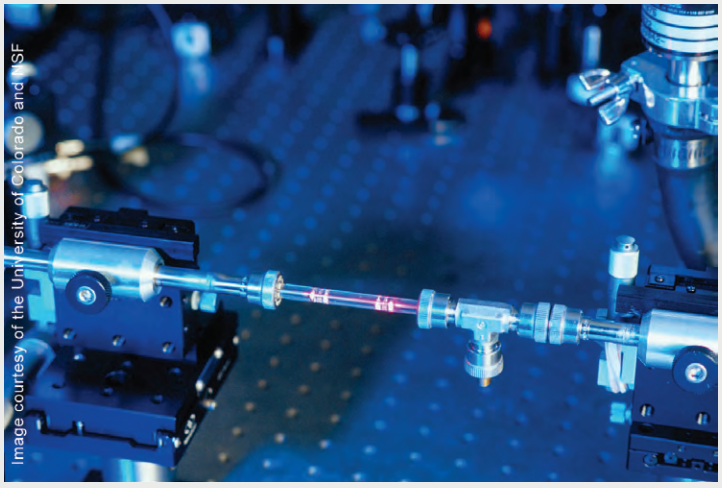
Wavelengths:
From UV to NIR

FEMTOSECOND LASERS

Femtosecond lasers are developping at a very fast pace. Some lasers now feature peak powers in the Petawatts (10^{15} W). Furthermore, the beam sizes can be fairly small, whichresults in peak power densities too high for a standard detector. Typically, pulse values for these lasers are in the range:

Beam Sizes: Up to 160 mm Ø
Energy range: 1 J to 100 J
Pulse Widths: Femto & picosecond
Wavelengths: UV to NIR

For these, a Gentec-EO calorimeter is the only reliable solution. Furthermore, it can sometimesbe used in power meter mode.



TECHNICAL ASPECTS

EXAMPLES OF CUSTOM CALORIMETERS

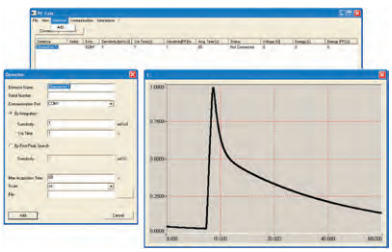
Main Specifications	Spectral Range	Minimum Energy	Maximum Energy
RECTANGULAR APERTURES			
420 x 427 mm	1053 nm	500 J	16 kJ
420 x 427 mm	0.4 - 1.1 µm	200 J	5000 J
100 x 100 mm	351 nm	1 J	50 J
100 x 100 mm	0.4 - 1.1 µm	2 J	100 J
60 x 60 mm	0.19 - 20 µm	50 mJ	1.5 J
ROUND APERTURES			
310 mm Ø	351 nm	20 J	500 J
310 mm Ø	0.35 - 1.1 µm	200 J	1500 J
150 mm Ø	0.3 - 1.1 µm	1 J	500 J
50 mm Ø	0.19 - 10 µm	15 mJ	200 J
19 mm Ø	0.19 - 25 µm	1 mJ	2.3 J
17 mm Ø	0.19 - 10 µm	1 mJ	23 J

MONITORING

Monitor

Dual Channel (up to 4 on request)
Power & EnergyPC-Based (USB or Ethernet)

Acquisition Software



Can handle several calorimeters Saves Data to the PC Graphic Display

Remote System Diagnostic

Validation of the Calibration
Verification of the Signal Response

S-LINK-2

The S-LINK-2 is a 2-channel PCBased power and energy monitor. It is perfect if the device is meant to be integrated into your system and used remotely. The S-LINK-2 gives you the choice between USB or Ethernet connection and it comes with a complete acquisition software. It can be customized with up to 4 channels upon request.
See page 26.

PC-CALO

The PC-Calo is a user-friendly PC interface that reads and controls several channels simultaneously via a USB or Ethernet connection. It reads the voltage outputs of the S-LINK, saves the data in a spreadsheet, displays the data graphically and analyzes the measured energy. The parameters are entered seperately and the data can be treated individually or simultaneously.

RSD

Do the on-site monitoring of your calorimeter using our special diagnostic tool. The verification is done remotely so you can control it from another location. The diagnostic includes the verification of the calorimeter's calibration and of the signal response and data acquisition.

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PRESENTATION

OVERVIEW OF THE DIFFERENT PRODUCTS

Gentec Electro-Optics specializes in the measurement of laser radiation, in all its forms. This is why we have developped very specialized products over the years, that were first aimed at customized applications, but that became standardized products as the demand grew stronger.

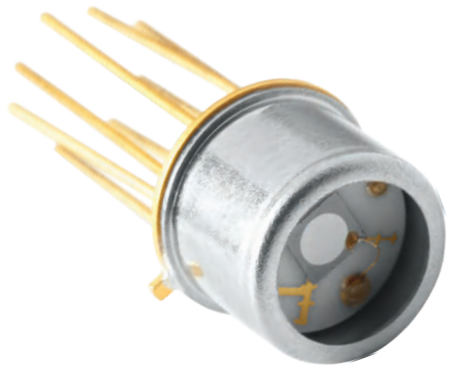
See page 130

MACH Series

ULTRAFAST JOULEMETERS

- High Speed Digital Joulemeters: Measures EVERY PULSE at up to 200 kHz
- Capture and Store up to 4 Million Pulses at the Maximum Repetition Rate
- Track Missing Pulses and Pulses below Threshold
- Wide Energy Range: Measure from pJ to mJ
- Spectral Range from 0.35 to 2.5 µm
- Sensors include Si, InGaAs and Pyroelectric
- Easy USB 2.0 Connection
- Includes Powerful LabView Software with Diagnostic Features

THE FASTEST ENERGY METERS ON THE MARKET:
MEASURE EVERY PULSE AT UP TO 200 KHZ



See pages 136 to 144

QS Series

DISCRETE PYROS

- TO5/TO8 Discrete or Hybrid Pyroelectric Detectors
- Available in 5 Sizes: 1, 2, 3, 5 and 9 mm Ø Apertures
- 5 Families of products to choose from
- Test Box Available for Hybrid Detectors

DISCRETE OR HYBRID PYROS
SMALL TO5/TO8 PACKAGES

See page 146

TRAP

OPTICAL TRAP DETECTORS

- Optical TRAP Detectors in 2 formats:
  - Integrated USB Module
  - Standard Head with Separate Preamplifier
- High Quantum efficiency (QE) >>99%
- Spatial Uniformity Better than 0.02%
- Low Calibration Uncertainty <0.5% from 400 to 980 nm
- For Low Divergence or Collimated Beams
- Heads Optimized for both CW or Pulsed Lasers
- Use these TRAP Detectors As Golden Calibration Standards

TO BE USED AS GOLDEN
CALIBRATION STANDARDS

PRESENTATION

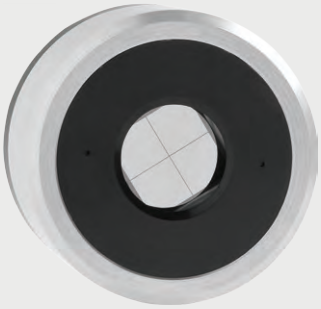
See page 148

QUAD

POSITION SENSING DETECTORS

- Position Sensing QUADrant Pyroelectric Detectors
- Available for both Power (QUAD-P) and Energy (QUAD-E) Measurements
- Measure, Track and Align your Beam in Real Time
- For Wavelengths from UV to IR and even THz
- Large Apertures up to 20 x 20 mm

POSITION SENSING QUADRANT DETECTORS

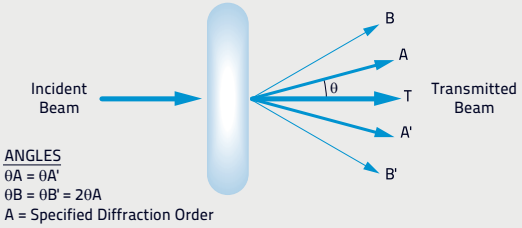


See page 152

HBS

DIFFRACTIVE OPTICS

- HBS - Holographic Beam Samplers, used for Sampling and Attenuation
- Perfect for ON-LINE Monitoring
- Keep the spatial profile intact
- Environment Insensitive
- Very High Damage Threshold



MACH SERIES

130 & 200 kHz Energy Meters

KEY FEATURES

1 Up to 200 kHz Pulse-to-Pulse
- 130kHz with Mach 5 Module and M5 Detectors
- 200 kHz with Mach 6 Module and M6 Detectors

2 Capture and Store up to 4 million Pulses
Store 40 seconds of data at 100 kHz

3 Track Missing Pulses and Pulses Below Threshold
Know how many pulses were missed or that didn't make the energy threshold with this unique pulse feature

4 Several Heads to Choose From
Silicon, InGaAs and Pyroelectric heads for a broad wavelength and energy range

5 Analog Module Available
Use our fast M5/M6 Detectors with the APM and an oscilloscope for fast analog energy measurements

6 Full-Speed USB 2.0 Connection
Ensures high data rate transfer and fast operation

7 User-Friendly Software with Many Diagnostic Features
- Live Mode, Strip Chart, Histogram and Statistics displays
- FFT display of pulse energy data for temporal diagnostics
- Life Test Mode to automate laser testing

AVAILABLE MODELS

- M5/M6-6-Si 6 mm Ø, Silicon Sensor (0.35-1.1 µm)
- M5/M6-6-Si-L 6 mm Ø, Silicon Sensor (0.35-1.1 µm), Low Noise Level
- M5/M6-6-In 6 mm Ø, InGaAs Sensor (1.0-1.6 µm)
- M5/M6-6-In-L 6 mm Ø, InGaAs Sensor (1.0-1.6 µm), Low Noise Level
- M5/M6-6-PY 6 mm Ø, Pyroelectric Sensor with Metallic Coating (0.35-2.5 µm)
- M5/M6-12.5-PY 12.5 mm Ø, Pyroelectric Sensor with Metallic Coating (0.35-2.5 µm)

All M5/M6 heads need to be used with the Mach 5/Mach 6 Energy Meters (respectively)

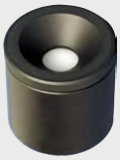
ACCESSORIES

Stand with Delrin Post
(Model Number: 200428)

Additional 9V Power Supply
(Model Number: 200960)

USB Cable
(Model Number: 100776)

APM Analog Power Supply
(Model Number: 201495)



MT-UV-QED
Relative Measurements in UV

Pelican Carrying Case

SEE ALSO

TECHNICAL DRAWINGS 50
COMPATIBLE MODULES
MACH 5/ MACH 6

APM

LIST OF ALL ACCESSORIES 174

APPLICATION NOTES:

PULSE-TO PULSE MEASUREMENTS AT 130 KHZ
121D-201923

MEASUREMENT LIMITS USING JOULEMETERS
121D-201932

WATCH THE DEMONSTRATION VIDEO AVAILABLE ON OUR WEBSITE AT www.gentec-eo.com

MACH SERIES

SPECIFICATIONS

Approved or in the process of being approved*

MODELS (MACH 5/6)	M5-6-Si/ M6-6-Si	M5-6-Si-L/ M6-6-Si-L	M5-6-In/ M6-6-In	M5-6-In-L/ M6-6-In-L	M5-6-PY/ M6-6-PY	M5-12.5-PY/ M6-12.5-PY
MAX ENERGY	200 µJ	2 µJ	200 µJ	2 µJ	20 mJ	200 mJ
MAX AVERAGE POWER	5 W	5 W	5 W	5 W	5 W	25 W
MAX REP RATE (MACH 5/6)	130 000 Hz/ 200 000 Hz	130 000 Hz/ 200 000 Hz	130 000 Hz/ 200 000 Hz	130 000 Hz/ 200 000 Hz	130 000 Hz/ 200 000 Hz	130 000 Hz/ 200 000 Hz
EFFECTIVE APERTURE	6 mm Ø	6 mm Ø	6 mm Ø	6 mm Ø	6 mm Ø	12.5 mm Ø
MEASUREMENT CAPABILITY	With Mach 5/6	With Mach 5/6	With Mach 5/6	With Mach 5/6	With Mach 5/6	With Mach 5/6
Spectral Range	0.35 - 1.1 µm	0.35 - 1.1 µm	1.0 - 1.6 µm	1.0 - 1.6 µm	0.35 - 2.5 µm	0.35 - 2.5 µm
Max Measurable Energy [a]	200 µJ	2 µJ	200 µJ	2 µJ	20 mJ	200 mJ
Noise Equivalent Energy	2 nJ	20 pJ	2 nJ	20 pJ	0.2 µJ	2 µJ
Rise Time (0-100%)	150 ns	150 ns	150 ns	150 ns	150 ns	150 ns
Max Repetition Rate	130 000 Hz/ 200 000 Hz	130 000 Hz/ 200 000 Hz	130 000 Hz/ 200 000 Hz	130 000 Hz/ 200 000 Hz	130 000 Hz/ 200 000 Hz	130 000 Hz/ 200 000 Hz
Max Pulse Width	100 nsec	100 nsec	100 nsec	100 nsec	100 nsec	100 nsec
Calibration Uncertainty	± 4%	± 4%	± 4%	± 4%	± 4%	± 4%
Repeatability	± 1%	± 1%	± 1%	± 1%	± 1%	± 1%
DAMAGE THRESHOLDS						
Max Avg Power (60 seconds)	5 W	5 W	5 W	5 W	5 W	25 W
Max Probe Energy (@ 1064 nm)	200 µJ	2 µJ	200 µJ	2 µJ	20 mJ	200 mJ
PHYSICAL CHARACTERISTICS						
Effective Aperture	6 mm Ø	6 mm Ø	6 mm Ø	6 mm Ø	6 mm Ø	12.5 mm Ø
Sensor	Silicon	Silicon	InGaAs	InGaAs	Pyroelectric	Pyroelectric
Absorber	WA	WA	WA	WA	WA	WA
Dimensions	38.1 Ø x 58.4D mm	38.1 Ø x 58.4D mm	38.1 Ø x 58.4D mm	38.1 Ø x 58.4D mm	38.1 Ø x 58.4D mm	76H x 111W x 76D
Weight (Head only)	150 g	150 g	150 g	150 g	150 g	N/A
ORDERING INFORMATION						
Full Product Name (Mach 5)	M5-6-Si	M5-6-Si-L	M5-6-In	M5-6-In-L	M5-6-PY	M5-12.5-PY
Product Number	201551	201553	201545	201546	201547	201549
Full Product Name (Mach 6)	M6-6-Si	M6-6-Si-L	M6-6-In	M6-6-In-L	M6-6-PY	M6-12.5-PY
Product Number	202115	202116	202117	202118	202119	202120
Modules			Mach 5: 201557 / Mach 6: 202090			

Specifications are subject to change without notice

a. Maximum pulse energy reading will vary with wavelength and probe voltage responsivity (Rv). For more details, please read Application Note 121D-201932 and contact us at info@gentec-eo.com

* For details, contact your Gentec-EO representative

MACH SERIES

MACH 5 / MACH 6 JOULEMETERS

Measure every pulse at up to 130 kHz with MACH 5 and 200 kHz with MACH 6. Measure with 12-bit digital accuracy and capture up to 4 million pulses in real time. Our MACH 5 and MACH 6 Joulemeters are the only instruments in the world that perform at this speed, and with this precision. They are designed to support our full complement of fast energy probes that include Silicon, InGaAs and Pyroelectric Detectors. Measure from pJ to mJ and from 0.35 to 2.5 µm. Using the M5-Si detector and the MT-UV-QED accessory, you can make relative measurements at 266 nm.

MACH 5 / 6 (Front View)

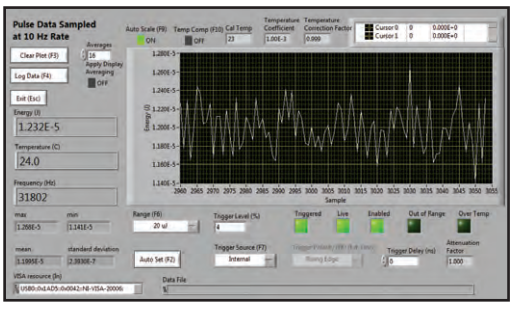
MACH 5 / 6 (Rear View)

SPECIFICATIONS & FEATURES

	MACH 5	MACH 6
Compatible Detector Heads	M5	M6
Maximum Repetition Rate	130,000 Hz	200,000 Hz
Analog Output	0-3 V	0-3 V
External Trigger (TTL)	Optically Coupled	Optically Coupled
Internal Trigger	2-20 %	2-20 %
Trigger Delay (User-Selectable)	38-3825 ns	38-3825 ns
Energy Resolution	1/2000	1/2000
Computer Input Connector	USB2.0	USB2.0

INSTRUMENT CONTROL SCREEN

Our powerful LabView Application Software includes many unique control and diagnostic features. The Instrument Control Screen, shown on the left, is used to set up the operation of the MACH 5/6, including range, trigger, wavelength, and more. In addition, it is used to set a pulse batch size and to ARM the instrument, which starts the data collection. It also gives you access to features like "Autoset", "Call Live Mode", "Run Life Test", "Save Instrument Setup" and the like. These features can be accessed by clicking directly on the feature or pushing the associated function key.



LIVE MODE DISPLAY

The Live mode can be accessed from the Instrument Control Screen, or by simply pressing the "F4" function key on your PC. This mode of operation is intended to act like your typical slower Digital Joulemeter, as it samples the laser pulses at a 10 Hz rate. It provides you with an energy strip chart, live energy reading, statistics and repetition rate. It is a very useful mode when setting up the Mach 5/6 with your laser. You can select "Auto Set", where the instrument runs through the ranges and trigger levels until it finds the correct range, or set them manually. When setup is complete, you will exit this screen and return to the "Control" screen where you will select a Batch Size, Arm the instrument and start taking pulse energy data.

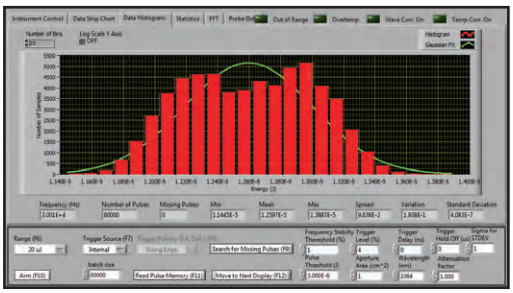
MACH SERIES

STRIP CHART

The Strip Chart Display provides a quick graphical look at the pulse data batch just collected. The data can be displayed in full scale or in auto scale mode. You can also zoom-in on a portion of the data, like shown in the screen on the right. An ND0.3 filter has been dropped through the beam and you can see the effects on the pulse data collected. You can fit trend and min/max lines to the data. Just below the chart, you will find a complete set of statistics for the batch. At the top of this screen you will see tabs that will take you to the Histogram, Statistics, and FFT (Fast Fourier Transform) displays.

HISTOGRAM

Interested in viewing the statistical distribution of the pulse energy data set? The Histogram screen does this for you and fits a "best Gaussian curve" to the data. It displays complete statistical calculations along the bottom of the graph, along with pulse frequency. Just below the statistics, you will find instrument controls, like range and trigger. You are also given the ability to adjust trigger delay and hold off as needed.

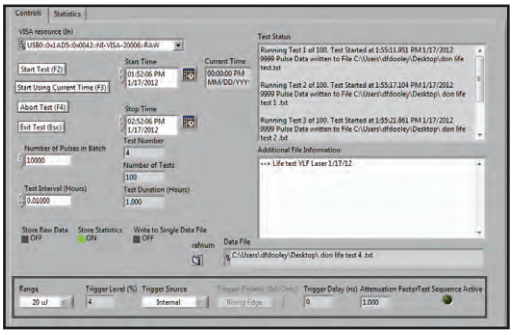


STATISTICS

The Statistics Display offers a very complete set of useful energy readings and calculated statistics. These include: minimum, maximum, average (mean), standard deviation, spread and variation. Some other very handy features include: windows displaying, Average Frequency, Pulse Jitter, Pulses Below Trigger and Pulses Below Threshold (a level set by you). In the screen on the right, you can see that there were 12 pulses below an energy threshold of 3 µW, and 147 missing pulses (or pulses below trigger).

LIFE TEST MODE

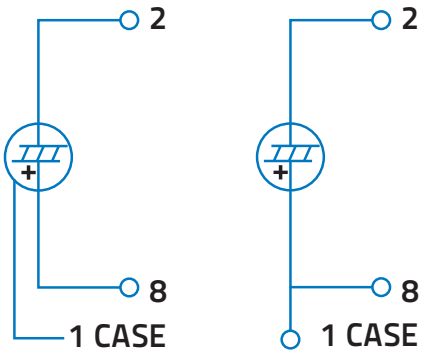
Would you like to run a life test on your high repetition rate pulsed laser? How about a periodic test vs. an environmental change like temperature? We have included a great feature to accomplish this. In the Life Test screen, we give you the ability to select the statistics you want, a start time and date, a stop time and date, the number of pulses and a test interval. You simply identify a file, a place to put the data, and then click on start and walk away! When you come back, you have a data set that tracked the performance of your laser over time, temperature, shock, vibration or anything you chose.



DISCRETE PYROS

PYROELECTRIC THERMAL DETECTORS

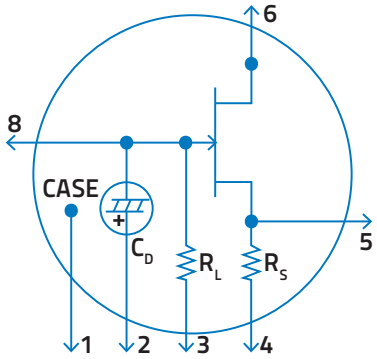
Our pyroelectric detectors are a class of room temperature thermal detectors that produce a current output that is directly proportional to the rate of change of temperature when exposed to a source of radiation. They are best described by an AC current source, capacitor and resistor. Their current output is governed by the equation ***I = p(T)·A·dT/dt***, where I is current, ***p(T)*** is the Pyro Coefficient, ***A*** is the area as defined by the front electrode, and ***dT/dt*** is the rate of temperature change of the pyro crystal. The advantages of a pyroelectric detector over other IR detectors are: room temperature operation, broad spectral response, high sensitivity (D*) and fast response (sub-nsec into 50 Ω).



QS-L (left) and QS-H (right) Pin-Outs

QS-L AND QS-H DISCRETE PYROS

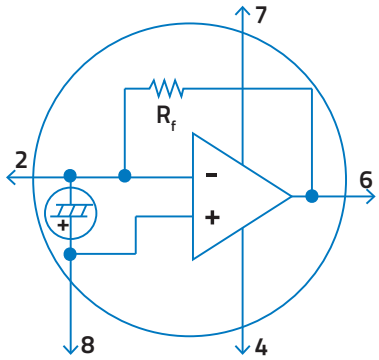
Our passive Discrete Pyroelectric Detectors range from 1 to 9 mm in diameter and are provided in two configurations: high sensitivity or high average power. They present a pyroelectric detector element covered with our metallic coating (MT) and are packaged in a miniature TO-5 or TO-8 can. The diagram shown left identifies the Pin-out for both types of detectors. Available as an option is our organic black coating (BL), which increases the optical absorption and helps flatten the spectral response. We also offer a number of permanent IR Windows that can be added to the TO can. These discrete pyro detectors are ideal for pulsed laser applications.



QS-VL Pin-Out

QS-VL VOLTAGE MODE HYBRID PYROS

Pyroelectric Detectors are high impedance (>10^{13} Ω) devices that require use in an impedance converting circuit when trying to achieve the highest sensitivity (high D*). Our QS-VL Series detectors include our pyroelectric element mated to an ultra-low noise FET in a source follower circuit. These are in turn packaged in a miniature TO-5 or TO-8 can. The equivalent circuit and Pin-out for this series are shown at the left. They are also available is sizes ranging from 1 to 9 mm diameter. These models are ideal for analytical instrumentation applications like Broadband IR Radiometers, Optical Pyrometer, and/or FTIR Spectrometers.



QS-IF and QS-IL Pin-Out

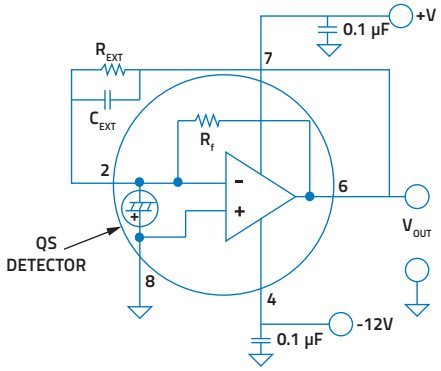
QS-IF AND QS-IL CURRENT MODE HYBRID PYROS

These detectors offer high gain (>105 V/W) and/or high bandwidth (>10 MHz). In this configuration, the pyroelectric detector element is combined to a low noise operational amplifier. The QS-IL models are designed for high performance at low to medium frequencies, while the QS-IF models offer good performance at medium to high frequencies. These detectors are very easy to use. Simply supply the +/- 10 to 15 V to power the operational amplifier and add an external resistor, if required, to adjust the bandwidth and you are ready to measure pulsed, modulated or chopped sources, from nJ to m J and nW to W. These detectors also make great candidates for any variety of broadband analytical instruments or laser measurement products.

DISCRETE PYROS

VOLTAGE OUTPUT VS. FREQUENCY

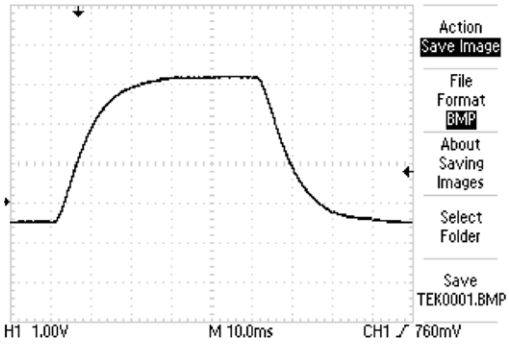
Our QS-VL and QS-IL Hybrid Detectors are designed to maximize voltage output at low frequencies and therefore include load and feedback resistors in the 100 GΩ to 300 GΩ range. They are also designed into 8-pin TO packages that allow the addition of an "external resistor" to lower the output and increase the bandwidth. The circuit diagram at the right shows a typical hook up for our QS5-IL detector (with our MT coating), using external resistors and capacitors. Our QS-IF series, on the other hand, are designed for high bandwidth applications and therefore include a smaller feedback resistor of 100 MΩ. For expert help on designing a detector circuit please contact us info@gentec-eo.com.



QS-IF and QS-IL Circuitry

OPERATION IN POWER MEASUREMENT MODE

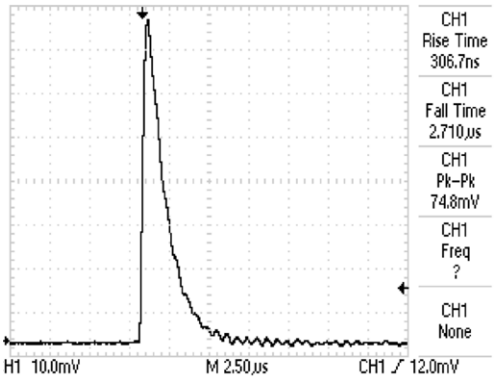
When using our QS-IL Hybrid Detector to measure the Power (in Watts) of your CW or High Rep Rate source (Quasi-CW), you will need to employ an optical chopper. The diagram at the right shows the typical voltage output of a QS5-IL when used with our QS-I-TEST evaluation test box. Note that the voltage output is an approximate "square wave" whose rise and fall times are governed by the RC time constant of the circuit. The optical power is directly proportional to the peak voltage minus the baseline voltage. We calibrate these devices when operating in this mode.



Typical QS-IL Voltage Output in Power Measurement Mode

OPERATION IN ENERGY MEASUREMENT MODE

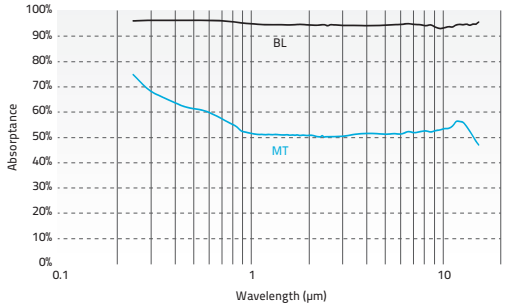
Our Pyroelectric Detectors are an ideal choice when measuring the performance of your pulsed laser in the range of nJ to mJ, across the full spectrum! The scope trace at the right represents the typical output from a QS9-IL, when used with our QS-I-TEST set up as an integrating Joulemeter. Note the fast rise to a peak and then slower decay governed by the RC time constant selected for the integrating circuit. In this configuration you can measure absolute pulse energy, rep rate, and pulse-to-pulse stability. The maximum pulse width of your source is determined by the RC time constant you select and there is no limit as to how short the pulse can be!



Typical QS-IL Voltage Output in Energy Measurement Mode

BROAD SPECTRAL RESPONSE

Unlike photoconductive and photovoltaic detectors, our Pyroelectric Thermal Detectors are not limited to a small part of the electromagnetic spectrum. They are truly broad spectrum detectors, sensitive from 0.1 µm to 3000 µm (EUV, FAR IR, and THz). Any and all radiation absorbed by our coatings or pyro crystal will result in a measurable signal. The two plots at the right show the relative spectral response of detectors with MT and BL coatings. Note that the well documented, NIST traceable calibrated portion of these curves runs from 0.25 µm to 15 µm. There are currently no traceable optical standards for measurements > 15 µm.



Absorption Curves of QS Pyroelectric Detectors

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QS-L

Discrete Pyro Detectors, Low Noise Level

KEY FEATURES

1 Broad Spectral Response
From 0.1 to 100 µm

2 Optimum Current Output
To maximize the detector's thermal time constant

3 Easy to Integrate Format
TO5 and TO8 packages make the QS detectors small and easy to integrate in an existing system

4 Large Area Sensors
5 mm and 9 mm diameter pyroelectric sensors make optical alignment easier

5 Several IR Windows in Option

- Quartz: 0.2 – 3.5 µm
- Barium Fluoride: 0.2 – 17.5 µm
- Sapphire: 0.1 – 7.0 µm
- Silicon: 1.2 – 9.0 µm and 22 – 100 µm
- AR Germanium: 1.8 – 23 µm (10.6 µm peak)

AVAILABLE MODELS

- QS1-L 1 mm Ø, TO5 Packaging
- QS2-L 2 mm Ø, TO5 Packaging
- QS3-L 3 mm Ø, TO5 Packaging
- QS5-L 5 mm Ø, TO5 Packaging
- QS9-L 9 mm Ø, TO8 Packaging

ACCESSORIES

Permanent IR Windows
(Various types available)

Pelican Carrying Case

SEE ALSO

TECHNICAL DRAWINGS 114
LIST OF ALL ACCESSORIES 174

APPLICATION NOTES
QS DETECTORS PIN-OUTS & DESCRIPTIONS
121D-201931

QS-L
SPECIFICATIONS

Approved or in the process of being approved*

MODELS	QS1-L	QS2-L	QS3-L	QS5-L	QS9-L
CURRENT RESPONSIVITY	1 µA/W	0.5 µA/W	0.5 µA/W	0.25 µA/W	0.25 µA/W
EFFECTIVE APERTURE	1 mm Ø	2 mm Ø	3 mm Ø	5 mm Ø	9 mm Ø
PACKAGE	TO5	TO5	TO5	TO5	TO8

MEASUREMENT CAPABILITY					
Spectral Range	0.1 - 1000 µm	0.1 - 1000 µm	0.1 - 1000 µm	0.1 - 1000 µm	0.1 - 1000 µm
Max Average Power	50 mW	50 mW	50 mW	50 mW	50 mW
Capacitance (at 1000 Hz)	15 pF	22 pF	60 pF	90 pF	250 pF
Current Responsivity (at 630 nm)	1 µA/W	0.5 µA/W	0.5 µA/W	0.25 µA/W	0.25 µA/W
Thermal Frequency (3 dB)	3.5 Hz	1.6 Hz	0.8 Hz	0.5 Hz	0.25 Hz
Temperature Coefficient	0.2%/°C	0.2%/°C	0.2%/°C	0.2%/°C	0.2%/°C
PHYSICAL CHARACTERISTICS					
Effective Aperture	1 mm Ø	2 mm Ø	3 mm Ø	5 mm Ø	9 mm Ø
Package	TO5	TO5	TO5	TO5	TO8
Sensor	Pyroelectric	Pyroelectric	Pyroelectric	Pyroelectric	Pyroelectric
Absorber	MT	MT	MT	MT	MT
Dimensions	8.3Ø x 6.4D mm	8.3Ø x 6.4D mm	8.3Ø x 6.4D mm	8.3Ø x 6.4D mm	13.6Ø x 6.4D mm
Weight	1.0 g	1.0 g	1.0 g	1.0 g	1.5 g
ORDERING INFORMATION					
Full Product Name	QS1-L	QS2-L	QS3-L	QS5-L	QS9-L
Product Number	201657	201659	201662	201664	201666

Specifications are subject to change without notice

* For details, contact your Gentec-EO representative

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QS-H

Discrete Pyro Detectors, High Average Power

KEY FEATURES

1 Broad Spectral Response
From 0.1 to 100 µm

2 Handles Higher Average Powers
Thanks to a maximized heat dissipation design

3 Easy to Integrate Format
TO5 and TO8 packages make the QS detectors small and easy to integrate in an existing system

4 Large Area Sensors
5 mm and 9 mm diameter pyroelectric sensors make optical alignment easier

5 Several IR Windows in Option

- Quartz: 0.2 – 3.5 µm
- Barium Fluoride: 0.2 – 17.5 µm
- Sapphire: 0.1 – 7.0 µm
- Silicon: 1.2 – 9.0 µm and 22 – 100 µm
- AR Germanium: 1.8 – 23 µm (10.6 µm peak)

AVAILABLE MODELS

- QS1-H 1 mm Ø, TO5 Packaging
- QS2-H 2 mm Ø, TO5 Packaging
- QS3-H 3 mm Ø, TO5 Packaging
- QS5-H 5 mm Ø, TO5 Packaging
- QS9-H 9 mm Ø, TO8 Packaging

ACCESSORIES

Permanent IR Windows
(Various types available)

Pelican Carrying Case

SEE ALSO

TECHNICAL DRAWINGS 114
LIST OF ALL ACCESSORIES 174

APPLICATION NOTES
QS DETECTORS PIN-OUTS & DESCRIPTIONS
121D-201931

QS-H
SPECIFICATIONS

Approved or in the process of being approved*

MODELS	QS1-H	QS2-H	QS3-H	QS5-H	QS9-H
MAX AVERAGE POWER	500 mW	500 mW	500 mW	500 mW	500 mW
EFFECTIVE APERTURE	1 mm Ø	2 mm Ø	3 mm Ø	5 mm Ø	9 mm Ø
PACKAGE	TO5	TO5	TO5	TO5	TO8

MEASUREMENT CAPABILITY					
Spectral Range	0.1 - 1000 µm	0.1 - 1000 µm	0.1 - 1000 µm	0.1 - 1000 µm	0.1 - 1000 µm
Max Average Power	500 mW	500 mW	500 mW	500 mW	500 mW
Capacitance (at 1000 Hz)	3 pF	12 pF	30 pF	90 pF	250 pF
Current Responsivity (at 630 nm)	0.25 µA/W	0.25 µA/W	0.25 µA/W	0.25 µA/W	0.25 µA/W
Thermal Frequency (3 dB)	5 Hz	5 Hz	5 Hz	5 Hz	5 Hz
Temperature Coefficient	0.2%/°C	0.2%/°C	0.2%/°C	0.2%/°C	0.2%/°C
PHYSICAL CHARACTERISTICS					
Effective Aperture	1 mm Ø	2 mm Ø	3 mm Ø	5 mm Ø	9 mm Ø
Package	TO5	TO5	TO5	TO5	TO8
Sensor	Pyroelectric	Pyroelectric	Pyroelectric	Pyroelectric	Pyroelectric
Absorber	MT	MT	MT	MT	MT
Dimensions	8.3Ø x 6.4D mm	8.3Ø x 6.4D mm	8.3Ø x 6.4D mm	8.3Ø x 6.4D mm	13.6Ø x 6.4D mm
Weight	1.0 g	1.0 g	1.0 g	1.0 g	1.5 g
ORDERING INFORMATION					
Full Product Name	QS1-H	QS2-H	QS3-H	QS5-H	QS9-H
Product Number	201658	201661	201663	201665	201667

Specifications are subject to change without notice

* For details, contact your Gentec-EO representative

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QS-VL

Hybrid Pyro Detectors, Voltage Mode, Low Noise Level

KEY FEATURES

1 Low Noise Level in Voltage Mode
Ultra low noise Field-Effect Transistor (FET) and GΩ resistor for unparalleled performance from 1 Hz to 1 KHz

2 High Voltage Response
Up to 900 V/W

3 Easy to Integrate Format
TO5 and TO8 packages make the QS detectors small and easy to integrate in an existing system

4 Large Area Sensors
5 mm and 9 mm diameter pyroelectric sensors make optical alignment easier

5 Several IR Windows in Option

- Quartz: 0.2 – 3.5 µm
- Barium Fluoride: 0.2 – 17.5 µm
- Sapphire: 0.1 – 7.0 µm
- Silicon: 1.2 – 9.0 µm and 22 – 100 µm
- AR Germanium: 1.8 – 23 µm (10.6 µm peak)

AVAILABLE MODELS

- QS1-VL 1 mm Ø, TO5 Packaging
- QS2-VL 2 mm Ø, TO5 Packaging
- QS3-VL 3 mm Ø, TO5 Packaging
- QS5-VL 5 mm Ø, TO5 Packaging
- QS9-VL 9 mm Ø, TO8 Packaging

ACCESSORIES

QS-V-TEST
(Test Box in Voltage Mode)

Permanent IR Windows
(Various types available)

Pelican Carrying Case

SEE ALSO

TECHNICAL DRAWINGS 114
LIST OF ALL ACCESSORIES 174

APPLICATION NOTES
HOW THEY WORK: QS-I-TEST & QS-V-TEST
121D-201927

QS DETECTORS PIN-OUTS & DESCRIPTIONS
121D-201931

QS-VL
SPECIFICATIONS

Approved or in the process of being approved*

MODELS	QS1-VL	QS2-VL	QS3-VL	QS5-VL	QS9-VL
VOLTAGE RESPONSIVITY	900 V/W	200 V/W	90 V/W	25 V/W	15 V/W
CURRENT RESPONSIVITY	1 µA/W	0.5 µA/W	0.5 µA/W	0.25 µA/W	0.25 µA/W
EFFECTIVE APERTURE	1 mm Ø	2 mm Ø	3 mm Ø	5 mm Ø	9 mm Ø
PACKAGE	TO5	TO5	TO5	TO5	TO8
MEASUREMENT CAPABILITY					
Spectral Range	0.1 - 1000 µm	0.1 - 1000 µm	0.1 - 1000 µm	0.1 - 1000 µm	0.1 - 1000 µm
Max Average Power	50 mW	50 mW	50 mW	50 mW	50 mW
Noise Equivalent Power [a]	$3x10^{-10}$ W/(Hz)^{½}	$6x10^{-10}$ W/(Hz)^{½}	$1x10^{-9}$ W/(Hz)^{½}	$2x10^{-9}$ W/(Hz)^{½}	$5x10^{-9}$ W/(Hz)^{½}
Detectivity [a]	$2.9x10^{8}$ cm(Hz)^{½} /W	$3.0x10^{8}$ cm(Hz)^{½} /W	$2.7x10^{8}$ cm(Hz)^{½} /W	$2.2x10^{8}$ cm(Hz)^{½} /W	$1.6x10^{8}$ cm(Hz)^{½} /W
Capacitance (at 1000 Hz)	15 pF	22 pF	60 pF	90 pF	250 pF
Current Responsivity (at 630 nm)	1 µA/W	0.5 µA/W	0.5 µA/W	0.25 µA/W	0.25 µA/W
Voltage Responsivity [b]	900 V/W	200 V/W	90 V/W	25 V/W	15 V/W
Thermal Frequency (3 dB)	3.5 Hz	1.6 Hz	0.8 Hz	0.5 Hz	2.5 Hz
Load Resistor	300 GΩ	300 GΩ	100 GΩ	100 GΩ	100 GΩ
Supply Voltage	+9 to +15 V	+9 to +15 V	+9 to +15 V	+9 to +15 V	+9 to +15 V
PHYSICAL CHARACTERISTICS					
Effective Aperture	1 mm Ø	2 mm Ø	3 mm Ø	5 mm Ø	9 mm Ø
Package	TO5	TO5	TO5	TO5	TO8
Sensor	Pyroelectric	Pyroelectric	Pyroelectric	Pyroelectric	Pyroelectric
Absorber	MT	MT	MT	MT	MT
Dimensions	8.3Ø x 6.4D mm	8.3Ø x 6.4D mm	8.3Ø x 6.4D mm	8.3Ø x 6.4D mm	13.6Ø x 6.4D mm
Weight	1.0 g	1.0 g	1.0 g	1.0 g	1.5 g
ORDERING INFORMATION					
Full Product Name	QS1-VL	QS2-VL	QS3-VL	QS5-VL	QS9-VL
Product Number	201673	201674	201676	201677	201678

a: 630 nm, 15 Hz, 1 Hz Bandwidth
b: 630 nm, 15 Hz

Specifications are subject to change without notice

QS-V-TEST EVALUATION TEST BOX

	QS-V-TEST
Batteries	+9V
R_L Resistors	10^{5} - 10^{10} Ω
C_f Compensating	NO
Package	101.6H x 127W x 58.4D
Optical Mount	¼-20 Threaded
Front Bezel	SM1 (1.035-40)

* For details, contact your Gentec-EO representative

QS-IF

Hybrid Pyro Detectors, Current Mode, Fast Response

KEY FEATURES

1 High Frequency Response
From 1 KHz to 20 MHz

2 Fast Response in Current Mode
The QS-IF take full advantage of the pyroelectric detectors' fast response times

3 Easy to Integrate Format
TO5 and TO8 packages make the QS detectors small and easy to integrate in an existing system

4 Large Area Sensors
5 mm and 9 mm diameter pyroelectric sensors make optical alignment easier

5 Several IR Windows in Option

- Quartz: 0.2 – 3.5 µm
- Barium Fluoride: 0.2 – 17.5 µm
- Sapphire: 0.1 – 7.0 µm
- Silicon: 1.2 – 9.0 µm and 22 – 100 µm
- AR Germanium: 1.8 – 23 µm (10.6 µm peak)

AVAILABLE MODELS

- QS1-IF 1 mm Ø, TO5 Packaging
- QS2-IF 2 mm Ø, TO5 Packaging
- QS3-IF 3 mm Ø, TO5 Packaging
- QS5-IF 5 mm Ø, TO5 Packaging
- QS9-IF 9 mm Ø, TO8 Packaging

ACCESSORIES

QS-I-TEST
(Test Box in Current Mode)

Permanent IR Windows
(Various types available)

Pelican Carrying Case

SEE ALSO

TECHNICAL DRAWINGS 114
LIST OF ALL ACCESSORIES 174

APPLICATION NOTES:
COMPENSATING CURRENT MODE AMPLIFICATION USING QS-I-TEST 121D-201925

THERMAL SATURATION IN HYBRID PYROELECTRIC DETECTORS 121D-201926

HOW THEY WORK: QS-I-TEST & QS-V-TEST 121D-201927

QS DETECTORS PIN-OUTS & DESCRIPTIONS 121D-201931

QS-IF
SPECIFICATIONS

Approved or in the process of being approved*

MODELS	QS1-IF	QS2-IF	QS3-IF	QS5-IF	QS9-IF
VOLTAGE RESPONSIVITY	100 V/W	50 V/W	50 V/W	25 V/W	25 V/W
CURRENT RESPONSIVITY	1 µA/W	0.5 µA/W	0.5 µA/W	0.25 µA/W	0.25 µA/W
EFFECTIVE APERTURE	1 mm Ø	2 mm Ø	3 mm Ø	5 mm Ø	9 mm Ø
PACKAGE	TO5	TO5	TO5	TO5	TO8

MEASUREMENT CAPABILITY					
Spectral Range	0.1 - 1000 µm	0.1 - 1000 µm	0.1 - 1000 µm	0.1 - 1000 µm	0.1 - 1000 µm
Max Average Power	50 mW	50 mW	50 mW	50 mW	50 mW
Noise Equivalent Power [a]	$5x10^{-8}$ W/(Hz)^{½}	$8x10^{-8}$ W/(Hz)^{½}	$8x10^{-8}$ W/(Hz)^{½}	$1.6x10^{-7}$ W/(Hz)^{½}	$1.6x10^{-7}$ W/(Hz)^{½}
Detectivity [a]	$1.8x10^{6}$ cm(Hz)^{½} /W	$2.2x10^{6}$ cm(Hz)^{½} /W	$3.3x10^{6}$ cm(Hz)^{½} /W	$2.8x10^{6}$ cm(Hz)^{½} /W	$5.0x10^{6}$ cm(Hz)^{½} /W
Capacitance (at 1000 Hz)	15 pF	22 pF	60 pF	90 pF	250 pF
Current Responsivity (at 630 nm)	1 µA/W	0.5 µA/W	0.5 µA/W	0.25 µA/W	0.25 µA/W
Voltage Responsivity [b]	100 V/W	50 V/W	50 V/W	25 V/W	25 V/W
Thermal Frequency (3 dB)	3.5 Hz	1.6 Hz	0.8 Hz	0.5 Hz	0.25 Hz
Feedback Resistor	100 MΩ	100 MΩ	100 MΩ	100 MΩ	100 MΩ
Supply Voltage	± 12 V	± 12 V	± 12 V	± 12 V	± 12 V
PHYSICAL CHARACTERISTICS					
Effective Aperture	1 mm Ø	2 mm Ø	3 mm Ø	5 mm Ø	9 mm Ø
Package	TO5	TO5	TO5	TO5	TO8
Sensor	Pyroelectric	Pyroelectric	Pyroelectric	Pyroelectric	Pyroelectric
Absorber	MT	MT	MT	MT	MT
Dimensions	8.3Ø x 6.4D mm	8.3Ø x 6.4D mm	8.3Ø x 6.4D mm	8.3Ø x 6.4D mm	13.6Ø x 6.4D mm
Weight	1.0 g	1.0 g	1.0 g	1.0 g	1.5 g
ORDERING INFORMATION					
Full Product Name	QS1-IF	QS2-IF	QS3-IF	QS5-IF	QS9-IF
Product Number	201679	201680	201681	201682	201683

a: 630 nm, 15 Hz, 1 Hz Bandwidth
b: 630 nm, 15 Hz

Specifications are subject to change without notice

QS-I-TEST EVALUATION TEST BOX

	QS-I-TEST
Batteries	+9V/-9V
R_f Resistors	10^{5} - 10^{10} Ω
C_f Compensating	YES
Package	101.6H x 127W x 58.4D
Optical Mount	¼-20 Threaded
Front Bezel	SM1 (1.035-40)

* For details, contact your Gentec-EO representative

QS-IL

Hybrid Pyro Detectors, Current Mode, Low Noise Level

KEY FEATURES

1 High Voltage Response in Current Mode
This family of pyro detectors offers a 10^{11} Ω chip resistor that results in an incredible 50 000 V/W voltage response

2 Low Noise Level
The high voltage response allows to detect signals down in the nW range!

3 Easy to Integrate Format
TO5 and TO8 packages make the QS detectors small and easy to integrate in an existing system

4 Large Area Sensors
5 mm and 9 mm diameter pyroelectric sensors make optical alignment easier

5 Several IR Windows in Option

- Quartz: 0.2 – 3.5 µm
- Barium Fluoride: 0.2 – 17.5 µm
- Sapphire: 0.1 – 7.0 µm
- Silicon: 1.2 – 9.0 µm and 22 – 100 µm
- AR Germanium: 1.8 – 23 µm (10.6 µm peak)

AVAILABLE MODELS

- QS1-IL 1 mm Ø, TO5 Packaging
- QS2-IL 2 mm Ø, TO5 Packaging
- QS3-IL 3 mm Ø, TO5 Packaging
- QS5-IL 5 mm Ø, TO5 Packaging
- QS9-IL 9 mm Ø, TO8 Packaging

ACCESSORIES

QS-I-TEST
(Test Box in Current Mode)

Permanent IR Windows
(Various types available)

Pelican Carrying Case

SEE ALSO

TECHNICAL DRAWINGS 114
LIST OF ALL ACCESSORIES 174

APPLICATION NOTES
COMPENSATING CURRENT MODE AMPLIFICATION USING QS-I-TEST 121D-201925

THERMAL SATURATION IN HYBRID PYROELECTRIC DETECTORS 121D-201926

HOW THEY WORK: QS-I-TEST & QS-V-TEST 121D-201927

HIGHEST PERFORMANCE WITH QS DETECTORS 121D-201928

QS DETECTORS PIN-OUTS & DESCRIPTIONS 121D-201931

QS-IL
SPECIFICATIONS

Approved or in the process of being approved*

MODELS	QS1-IL	QS2-IL	QS3-IL	QS5-IL	QS9-IL
VOLTAGE RESPONSIVITY	50 kV/W	25 kV/W	25 kV/W	13 kV/W	13 kV/W
CURRENT RESPONSIVITY	1 µA/W	0.5 µA/W	0.5 µA/W	0.25 µA/W	0.25 µA/W
EFFECTIVE APERTURE	1 mm Ø	2 mm Ø	3 mm Ø	5 mm Ø	9 mm Ø
PACKAGE	TO5	TO5	TO5	TO5	TO8
MEASUREMENT CAPABILITY					
Spectral Range	0.1 - 1000 µm	0.1 - 1000 µm	0.1 - 1000 µm	0.1 - 1000 µm	0.1 - 1000 µm
Max Average Power	50 mW	50 mW	50 mW	50 mW	50 mW
Noise Equivalent Power [a]	$8x10^{-10}$ W/(Hz)^{½}	$2x10^{-9}$ W/(Hz)^{½}	$2x10^{-9}$ W/(Hz)^{½}	$6x10^{-9}$ W/(Hz)^{½}	$6x10^{-9}$ W/(Hz)^{½}
Detectivity [a]	$1.1x10^{8}$ cm(Hz)^{½} /W	$9.0x10^{7}$ cm(Hz)^{½} /W	$1.3x10^{8}$ cm(Hz)^{½} /W	$7.0x10^{7}$ cm(Hz)^{½} /W	$1.3x10^{8}$ cm(Hz)^{½} /W
Capacitance (at 1000 Hz)	15 pF	22 pF	60 pF	90 pF	250 pF
Current Responsivity (at 630 nm)	1 µA/W	0.5 µA/W	0.5 µA/W	0.25 µA/W	0.25 µA/W
Voltage Responsivity [b]	50 kV/W	25 kV/W	25 kV/W	13 kV/W	13 kV/W
Thermal Frequency (3 dB)	3.5 Hz	1.6 Hz	0.8 Hz	0.5 Hz	0.25 Hz
Feedback Resistor	100 GΩ	100 GΩ	100 GΩ	100 GΩ	100 GΩ
Supply Voltage	± 5 to ± 12 V	± 5 to ± 12 V	± 5 to ± 12 V	± 5 to ± 12 V	± 5 to ± 12 V
PHYSICAL CHARACTERISTICS					
Effective Aperture	1 mm Ø	2 mm Ø	3 mm Ø	5 mm Ø	9 mm Ø
Package	TO5	TO5	TO5	TO5	TO8
Sensor	Pyroelectric	Pyroelectric	Pyroelectric	Pyroelectric	Pyroelectric
Absorber	MT	MT	MT	MT	MT
Dimensions	8.3Ø x 6.4D mm	8.3Ø x 6.4D mm	8.3Ø x 6.4D mm	8.3Ø x 6.4D mm	13.6Ø x 6.4D mm
Weight	1.0 g	1.0 g	1.0 g	1.0 g	1.5 g
ORDERING INFORMATION					
Full Product Name	QS1-IL	QS2-IL	QS3-IL	QS5-IL	QS9-IL
Product Number	201684	201685	201686	201687	201688

a: 630 nm, 15 Hz, 1 Hz Bandwidth
b: 630 nm, 15 Hz

Specifications are subject to change without notice

QS-I-TEST EVALUATION TEST BOX

	QS-I-TEST
Batteries	+9V/-9V
R_f Resistors	10^{5} - 10^{10} Ω
C_f Compensating	YES
Package	101.6H x 127W x 58.4D
Optical Mount	¼-20 Threaded
Front Bezel	SM1 (1.035-40)

* For details, contact your Gentec-EO representative

TRAP

Optical Trap Detectors

KEY FEATURES

1. **Don't Lose Your Photons Anymore**
   Highest Efficiency Detectors in the Photonics World, Quantum efficiency (QE) >>99 %
2. **Have your own Golden Calibration Standard**
   The high QE makes it an excellent, standalone, calibration transfer standard
3. **Incredible Spatial Uniformity**
   The spatial uniformity is better than 0.02 %
4. **Low Calibration Uncertainty <0.5 %**
   From 480 to 970 nm
5. **For Low Divergence or Collimated Beams**
   Devices optimized for both types of lasers
6. **Measure power from pW to mW**
   When used with the TRAP-PREAMP amplifier that provides a direct digital readout

AVAILABLE MODELS

TRAP7-Si-C
(For Collimated Beams)

TRAP7-Si-D
(For Divergent Beams)

ACCESSORIES

Stand with Delrin Post
(Model Number: 200428)

TRAP-PREAMP

TRAP-PREAMP
Low Noise, High Gain Amplifier

Pelican Carrying Case

SEE ALSO

TECHNICAL DRAWINGS	102
LIST OF ALL ACCESSORIES	174

TRAP
SPECIFICATIONS

Approved or in the process of being approved*

MODELS	TRAP7-Si-C-BNC	TRAP7-Si-D-BNC
MAX AVERAGE POWER	2 mW	2 mW
EFFECTIVE APERTURE	7 mm Ø	7 mm Ø
COMPATIBLE MODULE(S)	TRAP-PREAMP	TRAP-PREAMP
MEASUREMENT CAPABILITY		
Spectral Range (Calibrated)	0.2 - 0.98 µm	0.2 - 0.98 µm
Max Measurable Power	2 mW	2 mW
Noise Equivalent Power	100 pW	100 pW
Sensitivity	0.505 A/W	0.505 A/W
Theoretical Uncertainty		
0.22 - 0.4 µm	< 4.5%	< 4.5%
0.401 - 0.98 µm	< 2%	< 2%
Quantum Efficiency (400nm to 950nm)	> 99%	> 99%
Spatial Uniformity	< 0.02%	< 0.02%
DAMAGE THRESHOLDS		
Max Average Power Density	1 mW/cm²	1 mW/cm²
PHYSICAL CHARACTERISTICS		
Effective Aperture	7 mm Ø	7 mm Ø
Sensor	Silicon	Silicon
Source Type	Collimated	Divergent
Field of view	< ± 10°	< ± 14°
Dimensions	69.1Ø X 30.0D mm	66.8H X 67.3W X 27.4D mm
Weight	227 g	227 g
ORDERING INFORMATION		
Full Product Name	TRAP7-Si-C-BNC	TRAP7-Si-D-BNC
Product Number	201738	201740

Specifications are subject to change without notice

* For details, contact your Gentec-EO representative

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QUAD

Position Sensing Power & Energy Detectors

QUAD-4Track Module

KEY FEATURES

1. **Measure, Track and Align**
   With µm resolution in real time!
2. **4-Channel Detectors**
   Unique pyrolectric QUADrant detector technology handles high peak power without saturation
3. **For CW, Pulsed and High Rep Rate Lasers**
   - QUAD-E: Energy per pulse from µJ to mJ
   - QUAD-P: Powers from µW to mW
4. **From UV to FIR and THz**
   Broadband detectors cover the full spectrum, from UV to Sub-Millimeter wavelengths
5. **Large Area Sensors**
   9 mm and 20 mm square detectors
6. **Fast USB 2.0 Connection**
   Ensures full speed tracking
7. **Includes Application Software**
   Complete LabView Application Software included, with many features

AVAILABLE MODELS

QUAD-9-MT-E	QUAD-20-MT-E	QUAD-9-MT-P	QUAD-20-MT-P
(9 x 9 mm-For Energy)	(20 x 20 mm-For Energy)	(9 x 9 mm-For Power)	(20 x 20 mm-For Power)

ACCESSORIES

Stand with Delrin Post
(Model Number: 200428)

Additional 9V Power Supply
(Model Number: 200960)

USB Cable
(Model Number: 100776)

SDC-5000 Digital
Optical Chopper (for -P)

Pelican Carrying Case

SEE ALSO

TECHNICAL DRAWINGS 160
LIST OF ALL ACCESSORIES 174

APPLICATION NOTES

LASER POSITION SENSING DETECTORS AND MONITOR

121D-201930

WATCH THE DEMONSTRATION VIDEO AVAILABLE ON OUR WEBSITE AT www.gentec-eo.com

QUAD
SPECIFICATIONS

Approved or in the process of being approved*

MODELS	QUAD-9-MT-E / QUAD-9-MT-P	QUAD-20-MT-E / QUAD-20-MT-P
MAX ENERGY / AVG POWER	20 mJ / 200 mW	20 mJ / 200 mW
MAX POSITION RESOLUTION	1 µm / 10 µm	1 µm / 10 µm
EFFECTIVE APERTURE	9 x 9 mm	20 x 20 mm

MEASUREMENT CAPABILITY		
Spectral Range	0.1 - 3000 µm	0.1 - 3000 µm
For -E (Energy sensors)		
Max Measurable Energy	20 mJ/Channel	20 mJ/Channel
Noise Equivalent Energy	0.5 µJ	1.0 µJ
Rise Time (0-100%)	150 µs	150 µs
Max Repetition Rate	1000 Hz	1000 Hz
Max Pulse Width	2.5 µsec	2.5 µsec
Sensitivity	1000 V/J	1000 V/J
For -P (Power sensors)		
Max Measurable Power	200 mW	200 mW
Noise Equivalent Power	1 µW	2 µW
Rise Time (0-100%)	< 0.02 s	< 0.02 s
Max Chopping Frequency	50 Hz	50 Hz
Sensitivity	2000 V/W	2000 V/W
Calibration Uncertainty	± 4%	± 4%
Minimum Position Resolution With QUAD-4Track Monitor	-E: 1 µm -P: 10 µm	-E: 1 µm -P: 10 µm

DAMAGE THRESHOLDS		
Max Average Power Density (@ 1.064 µm)	100 mW/cm²	100 mW/cm²
Max Energy Density (@ 1.064 µm 10 ns)	50 mJ/cm²	50 mJ/cm²

PHYSICAL CHARACTERISTICS		
Effective Aperture	9 x 9 mm	20 x 20 mm
Sensor	Pyroelectric	Pyroelectric
Absorber	MT	MT
Dimensions	63.5Ø X 40.6D mm	63.5Ø X 40.6D mm
Weight	181 g	181 g

ORDERING INFORMATION				
Full Product Name (Detectors)	QUAD-9-MT-E	QUAD-9-MT-P	QUAD-20-MT-E	QUAD-20-MT-P
Product Number	201774	201776	201775	201777
Full Product Name (Module)	QUAD-4Track			
Product Number	201517			

Specifications are subject to change without notice

* For details, contact your Gentec-EO representative

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QUAD

QUAD-4TRACK

The QUAD-4Track is a Laser Position Sensing system designed to support our unique Pyroelectric Quadrant Detectors, QUAD-P and QUAD-E. It is a 4-channel microprocessor-based system that measures the voltage output of each QUAD element and does the math necessary to provide a measurement of the X and Y displacement of a laser beam or image. It is fast and can be used to track, align and/or measure movement in real time, with a resolution of just a few microns!

QUAD-4Track (Front View)

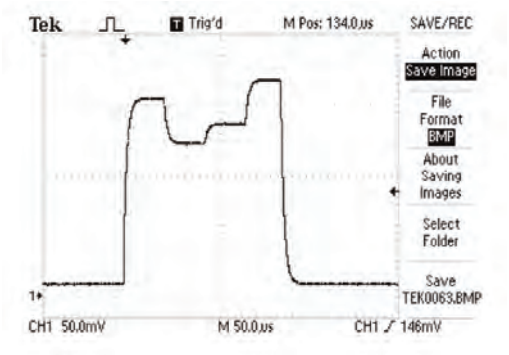
QUAD-4Track (Rear View)

SPECIFICATIONS & FEATURES

Number of Channels	4
Full Scale Ranges (4 Decades) (E / P)	
Joulemeter Mode (with QUAD-E)	20 µJ to 20 mJ
Radiometer Mode (with QUAD-P)	200 µW to 200 mW
USB Connection to Computer	YES (USB 2.0 Full Speed)
Power Supply	9VDC
Power On Light	YES
Detector Input	DB-25 Connector
Detector Analog Output	BNC Connector (0-2 V)
Trigger Input (TTL)	BNC Connector with LED Indicator

QUAD DETECTORS

Our large area Pyroelectric Quadrant Detectors provide unique advantages over other position sensing detectors like Silicon quads or lateral effect photodiodes. They are fast, handle high peak power of pulsed lasers without saturation and respond to lasers across the spectrum, from UV to Far IR and even THz. The QUAD-E is intended for use with pulsed sources at up to 1000 Hz, while the QUAD-P is designed for CW and High Repetition Rate (Quasi CW) sources. Both types of detectors can also be used as standalone units, in an analog mode, for incorporation into your own system application. We can provide a Lemo pigtail cable for this purpose.



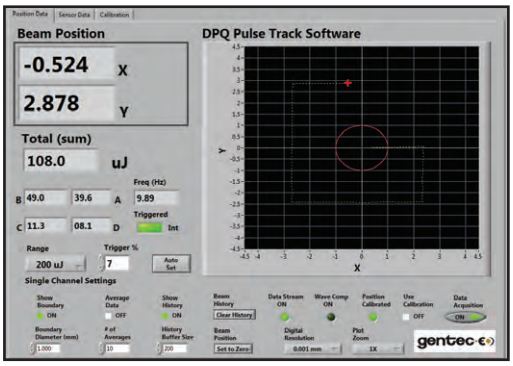
ANALOG OUTPUT

The analog output of the QUAD-4Track provides voltage that is directly proportional to the pulse energy or laser power irradiating each QUAD element. When the four voltage outputs are equal, the beam is centered on the QUAD detector. This provides a very useful tool when setting up our QUAD probes with your source for optical alignment.

QUAD

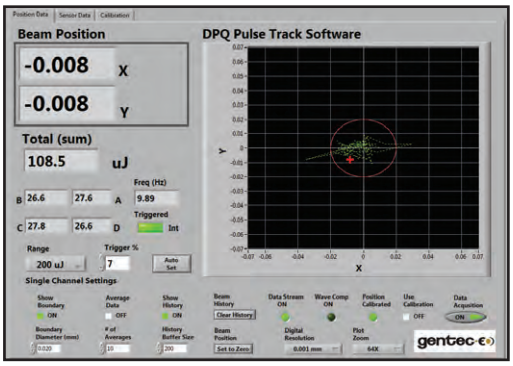
MEASUREMENT SCREEN

QUAD-4Track includes powerful, stand alone, LabView Software which is used to control the instrument, process the data, and display X and Y position. It also displays the energy or power of your source and repetition rate. The large graphic in this screen shows the position of the centroid of the beam and tracks its movement in real time. The software includes many handy features like: set boundary, zoom (2X to 128X), set resolution, data logging, and many more. The green line represents the tracking history.



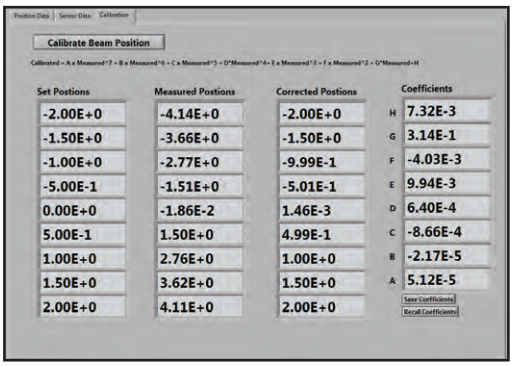
TRACKING THE BEAM OVER TIME

In the measurement screen shown on the right, we are are tracking the beam stability of a pulsed Nd:YLF laser at 10 Hz. Thje resoltuion was set at 0.001 nm, the boundary is at 20 µm (red circle), and the zoom feature is at 64X. The total energy is 108.5 µJ, the final position of the laser is at -8 µm in X and -8 µm in Y. The green tracking line shows the movement of the laser about the zero position over a few hundred pulses.



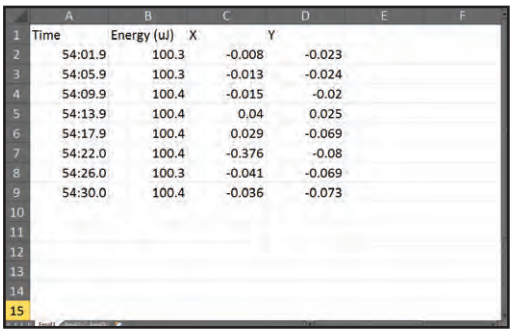
POSITION CALIBRATION SCREEN

We've developed a unique position calibration routine which allows you to calibrate our QUAD-4Track system when working with a uniformly round laser beam. It requires the use of a micrometer-driven linear stage (1-axis only). As you can see from the calibration screen on the right, the procedure involves zeroing the instrument, moving the QUAD probe to nine discrete positions (+2.000 to – 2.000 mm) and then capturing the QUAD readings. It then determines correction coefficients (last column) and applies them to the raw data to arrive at "corrected positions". The QUAD probe is now calibrated!



DATA LOGGING

Another very handy feature is "data logging". This allows you to set up the QUAD-4Track to follow the displacement, energy and/or power of your laser over several minutes, hours or even days. Need to measure the "beam steering" of your laser as it warms up? This is how you do it! Need to measure the beam displacement vs laser repetition rate or energy level? Data logging will help you measure it!



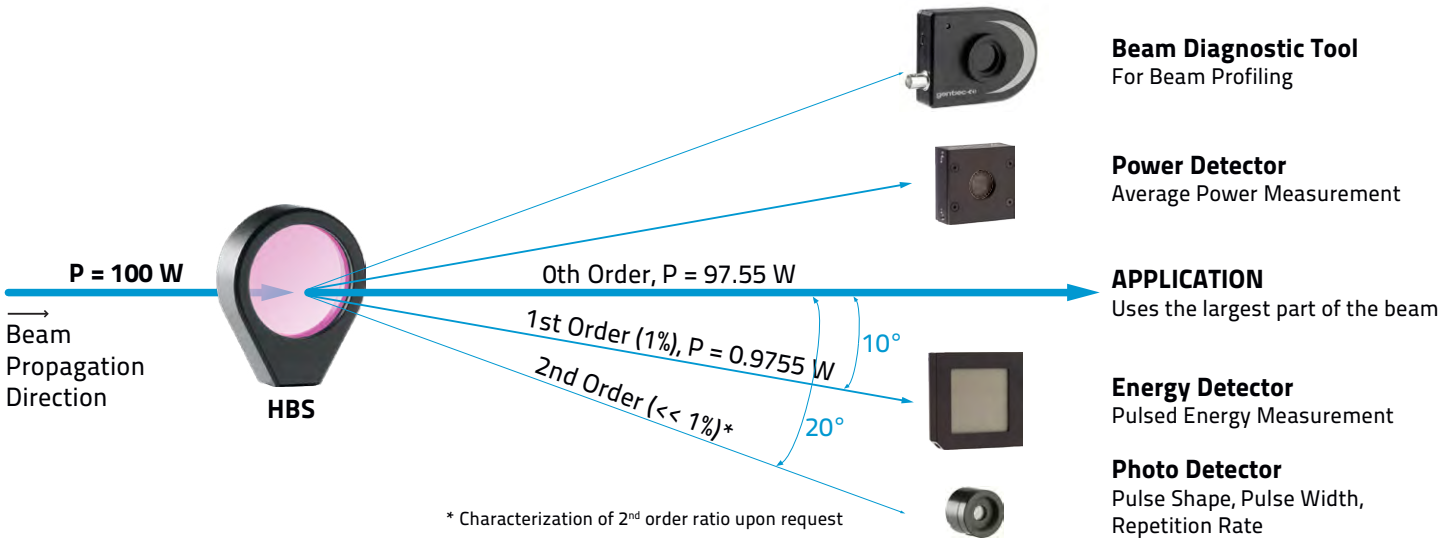
Time	Energy (uJ)	X	Y
54:01.9	100.3	-0.008	-0.023
54:05.9	100.3	-0.013	-0.024
54:09.9	100.4	-0.015	-0.02
54:13.9	100.4	0.04	0.025
54:17.9	100.4	0.029	-0.069
54:22.0	100.4	-0.376	-0.08
54:26.0	100.3	-0.041	-0.069
54:30.0	100.4	-0.036	-0.073

DIFFRACTIVE OPTICS

OVERVIEW

What if you need to measure the performance of the beam in real-time while your application is online? You cannot insert or remove optical components or interrupt the beam either. How do you do that? One way is to divert a small fraction of the beam that is an exact replica of the main beam. Sampling is also a solution if the beam is too "hot" for your diagnostic instruments to handle. In either case, almost all of the main beam is available to do its job.

Figure 1. Example HBS Application
Pulsed ND:YAG, 1064 nm, 1J @ 100 Hz (100 W)



SAMPLING

One approach is to use something like a moveable mirror to sample in time. The beam is interrupted and diverted for small slices of time. A big disadvantage though is that the time sampler provides average values so it is not well suited for real-time operation, especially with pulsed lasers. The other way is to continuously divert a tiny fraction of the beam to another angle while the main beam passes through, along its original line. However it is done, the sample needs to be a low power replica of the main beam.

REAL-TIME BEAM SAMPLING

The components or methods suitable for real-time beam sampling are summarized in Table 1. The particular requirements of an application will narrow down the list of acceptable methods. All of these methods provide a decent replica of the main beam in the sampled beam and all can withstand reasonably high power. If it is important that the polarization of the sample be the same as the beam, then the Mirror and the Frustrated Total Internal Reflection are not good choices due to mixing of the horizontal and vertical polarizations. Low sampling fraction is very good. This means that most of the beam passes on to the application with a tiny percentage being diverted. The Mirror and Hole Matrix remove much more energy from the beam than the other components which is a problem for many applications.

DIFFRACTIVE OPTICS

ISSUES IN BEAM SAMPLING

Table 1. Comparison of Real-Time Sampling Methods

Table 1. Comparison of Real-Time Sampling Methods

	Spatial Profile Available	Polarization Insensitive	Low Sampling Fraction	Sustain High Power	V bration Insensitive	Environment Insensitive	Cartesian Main Beam	Small Unusable Losses	Commercial Product Available
Reflective Samplers									
Wedge: Low-Reflective dielectric coatings on both faces (Rmin)	✓	✓	✓	✓				✓	✓
Mirror: Leakage from high reflectivity mirror (Rmax)	✓			✓	✓		✓	✓	✓
Refractive Samplers									
Cascaded Wedges	✓	✓	✓	✓		✓			
Frustrated Total Internal Reflection (FTIR): Adjustable gap between two prisms	✓		✓	✓			✓	✓	
Transmission Samplers									
Hole matrix: Periodic array of holes machined in highly reflective mirror or transparent substrate	✓	✓		✓	✓		✓	✓	
Holographic: Relief hologram etched on transparent substrate	✓	✓	✓	✓	✓	✓	✓	✓	✓

ENVIRONMENTAL ISSUES

If the relative position of the beam on the sampler is critical, vibration will have a disruptive effect. The methods employing refraction to some degree (eg. prisms and wedges) are highly sensitive to vibration. This includes vibration in the beam as well as the sampler. You will prefer other choices in rough environments or for laser beams that do not have great pointing stability. Changing temperature and humidity can be a problem for all but the Holographic sampler and Cascaded Wedges. This is an important consideration for industrial environments.

APPLICATION ISSUES

Cartesian main beam: if it is important that the main beam continue either parallel or perpendicular to the incident beam, you would have to rule out the Cascaded Wedges or the Wedge. The need for that depends on the design of the optical train. The other problem for the Cascaded Wedges is its unusable losses. Compared to the other methods, a significant fraction of the energy that is diverted from the main beam is not useful for sampling and must be dissipated. That can be substantial in high power applications. From the table you can see that the holographic sampler is suited to the widest range of applications.

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HBS

355 nm, 532 nm and 1064 nm, 1 % and 0.05 %

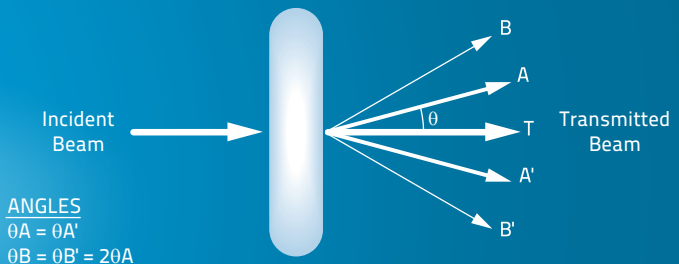
KEY FEATURES

1 On-Line Monitoring
Do real-time sampling of your laser and measure your profile while working

2 Spatial Profile Preserved
The HBS will not create artefacts in your measurements or in your main beam

3 Environment Insensitive
The ONLY sampling component that is insensitive to ALL environmental variations, including polarization

4 Very High Damage Threshold
Can be as high as fused silica itself



ANGLES
θA = θA'
θB = θB' = 2θA
A = Specified Diffraction Order

AVAILABLE MODELS

HBS-355-100-1C-10 (355 nm-1%-Coated)	HBS-532-100-1C-10 (532 nm-1%-Coated)	HBS-532-100-1U-10 (532 nm-1%-Uncoated)	HBS-1064-100-1C-10 (1064 nm-1%-Coated)	HBS-1064-100-1U-10 (1064 nm-1%-Uncoated)	HBS-1064-2000-1C-10 (1064 nm-0.05%-Coated)

ACCESSORIES

Stand with Steel Post
(Model Number: 200160)

1 inch Mount
(Model Number: 101543)

Pelican Carrying Case

SEE ALSO

LIST OF ALL ACCESSORIES 174

HBS

SPECIFICATIONS

MODELS	STANDARD HBS	CUSTOM CAPABILITIES
1ST ORDER RATIO	0.05 % or 1 %	0.05 % to 10 %
WAVELENGTHS	355, 532 & 1064 nm	250 to 2100 nm
DIAMETER	1 inch	Up to 2 inches

MEASUREMENT CAPABILITY		
Wavelengths	355, 532 & 1064 nm	250 to 2100 nm
Substrate		
Shape	Slight wedge 1/2°	With or without edge
Contour	Flat	Flat
Thickness	1/8"	Up to 1/4"
Diameter	1"	Up to 2.5"
Coatings	V-AR (both sides or uncoated)	V-AR (both sides or uncoated)
Type of Grating	Sinusoidal	Sinusoidal or Binary
Typical Calibration Accuracy (1st order)	±3 %	±2 %
1st Order Ratio	Depends on Wavelength	Depends on Wavelength
355 nm	1 %	0.2 to 5 %
532 nm	1 %	0.05 to 10 %
1064 nm	1 % and 0.05 %	0.05 to 10 %
1st Order Angle	Depends on Wavelength	Depends on Wavelength
355 nm	10°	Up to 13°
532 nm	10°	Up to 20°
1064 nm	10°	Up to 20°
Total Insertion Loss (V-AR)	0.3 % per side (typical)	0.2 % to 2 % per side
Total Insertion Loss (Uncoated)	4 % per surface	4 % per surface

DAMAGE THRESHOLDS		
Maximum Energy Density (1064 nm, uncoated)	Up to 86 J/cm²	Up to 86 J/cm²
Maximum Power Density (1064 nm, V-AR)	Up to 2 MW/cm²	Up to 2 MW/cm²

STANDARD HBS MODELS	Wavelenght	1st Order Ratio	Coating	Max En. Dens.	Max Power Dens.	Product Number
HBS-355-100-1C-10	355 nm	1 %	V-AR 355	5 J/cm²	0.5 MW/cm²	23799
HBS-532-100-1C-10	532 nm	1 %	V-AR 532	10 J/cm²	1 MW/cm²	20731
HBS-532-100-1U-10	532 nm	1 %	None	58 J/cm²	N/A	21262
HBS-1064-100-1C-10	1064 nm	1 %	V-AR 1064	20 J/cm²	2 MW/cm²	20733
HBS-1064-100-1U-10	1064 nm	1 %	None	86 J/cm²	N/A	21263
HBS-1064-2000-1C-10	1064 nm	0.05 %	V-AR 1064	20 J/cm²	2 MW/cm²	23977

Specifications are subject to change without notice

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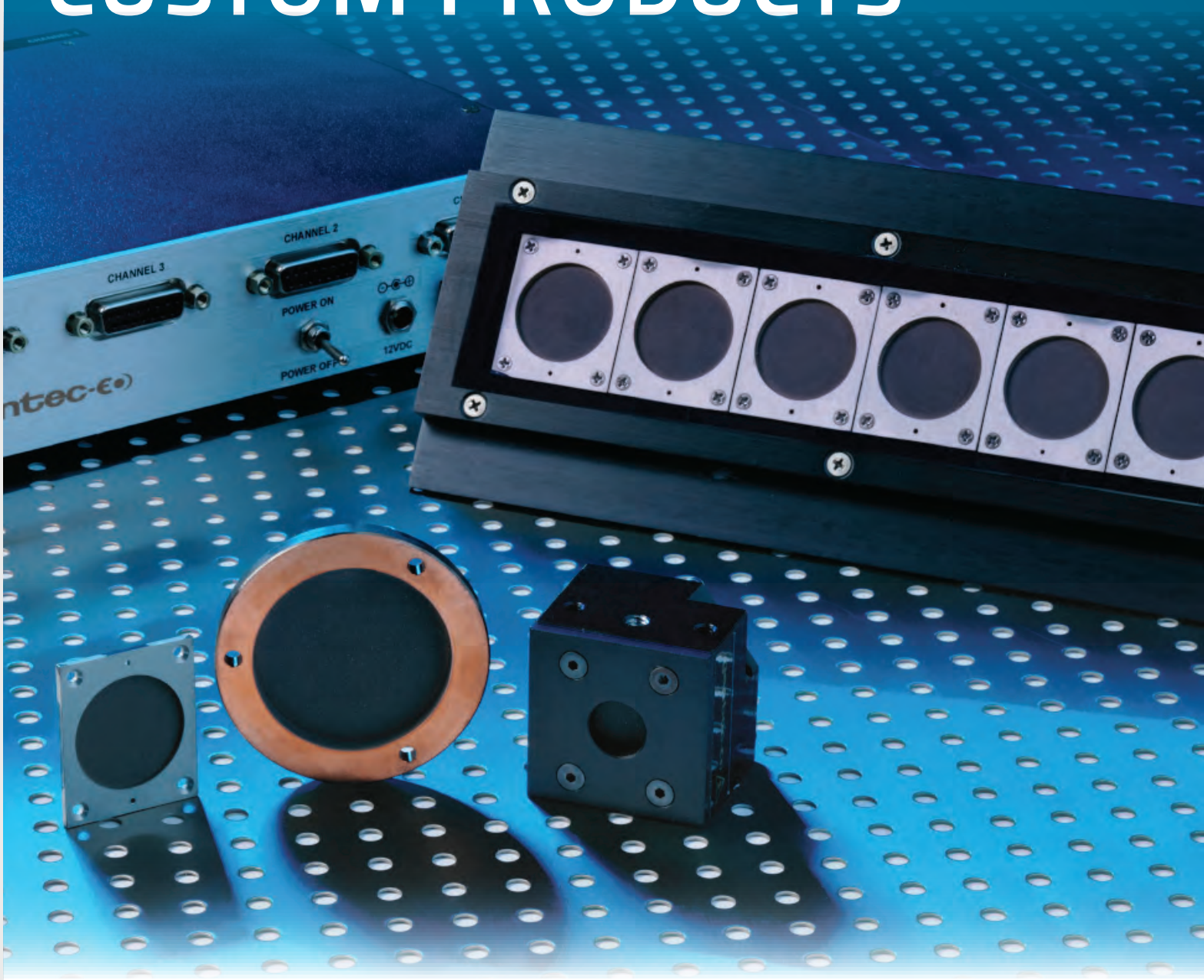
CUSTOM PRODUCTS



After 40 years of experience in the Laser Beam Measurement business, we have developped many customized solutions, sometimes for very unusual applications! This section is only a small portion of the projects we have accomplished for our customers, so do not hesitate to contact us with any special need you may have. We are always striving to find the perfect solution for your application!

CUSTOM PRODUCTS

LARGE SIZE HIGH POWER DETECTORS

Our unique power detector technology offers FULL FLEXIBILITY on both POWER and SIZE:

- Very High Average Powers (Up to 30 kW, more on request)
- NO Limitations on Aperture Size and Shape
- High Damage Thresholds
- Direct USB Output to PC
- CO2, YAG, Fiber Laser, Diode Arrays, etc.

MULTI-KW CAPABILITIES
LARGEST APERTURES ON THE MARKET

6-ELEMENT DETECTOR BAR

Custom detector integration that monitors multiple lasers in a system. This detector bar included six independent power sensors, covered by protection windows with anti-reflective coating, presence sensors, on-board signal conditioning and acquisition to instantly measure power and communicate with the system through industrial serial protocol.

- 6 elements on one board
- Instantaneous power measurement of all 6 elements
- Detector elements protected by windows with AR coating

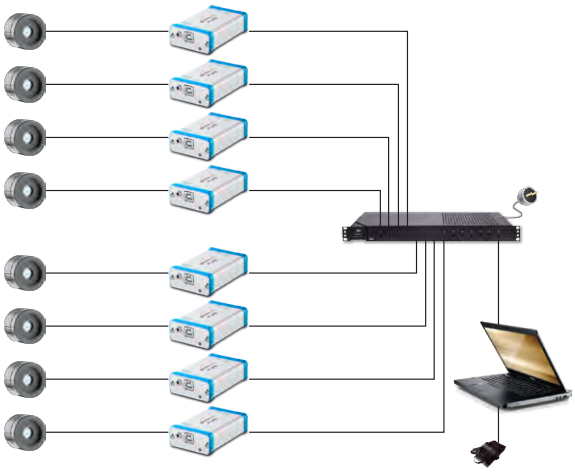
TEMPERATURE-CONTROLLED POWER METERS

- **Temperature Controlled Power Sensors and Controller**: Each head is composed of a low noise detector, thermistor, TE cooler and heat sink to compensate for any temperature change
- **The Ultimate Choice in Measurement Stability**: Temperature control down to 0.05°C from 20 to 30°C gives a temperature coefficient <0.01 %, thus a voltage output stable to 0.01 %

2 Sizes Available for the TP Sensors:

- TP5-BL: 5 mm Ø pyroelectric sensor with organic black coating
- TP9-BL: 9 mm Ø pyroelectric sensor with organic black coating

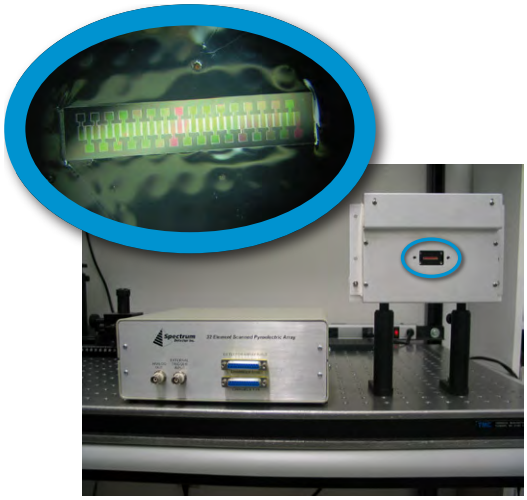
CUSTOM PRODUCTS



OCTOLINK

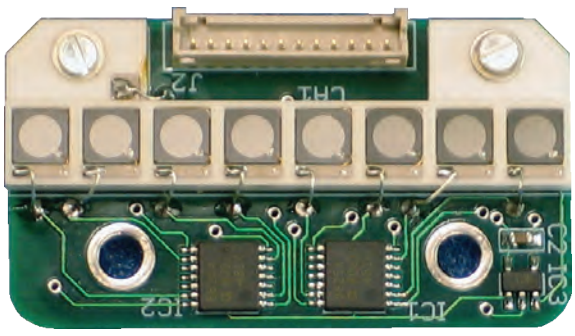
OCTOLINK is our new multichannel software that was specifically designed for the simultaneous measurement of a large set of power detectors. As its name indicates, OCTOLINK allows the measurement of up to 8 devices simultaneously, all on a combined control screen. Furthermore, this tool offers full flexibility on the functionalities, allowing to control, compare and collect data of multiple detectors in a simple but effective manner. The channels can be user-set, allowing a transparent integration in the existing systems. Pass-fail feature and complete data logging make OCTOLINK an ideal and inexpensive solution for long term power monitoring.

MEASURE 8 DETECTORS SIMULTANEOUSLY
USER-SETTABLE INTERFACE



32-CHANNEL THZ PYROELECTRIC ARRAY

The SDX-1105 is a 32-element Pyroelectric Array combined to a 32-channel multiplexing electronics that was designed for a THz Spectrometer Application. The system was designed to be able to measure a few nanojoules of energy from a pulsed THz source in the 0.1 to 20 THz region. As the Pyroelectric detectors are based on a thermal effect, the same device can be used with pulsed lasers from the DUV to FIR. The detector elements of the array are 1 mm tall by 0.5 mm wide and spaced on 0.5 mm centers.



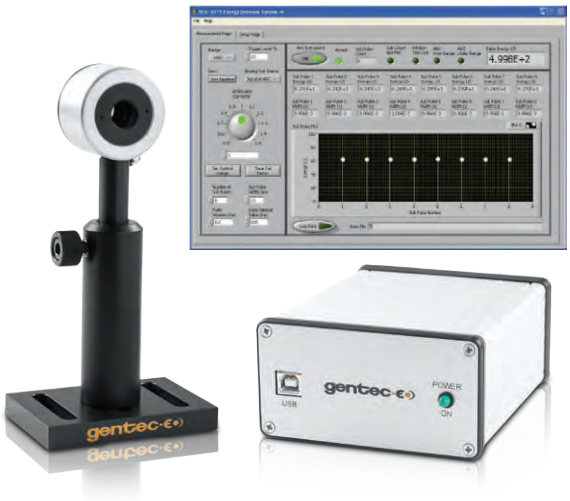
8-CHANNEL ARRAY FOR THZ TOMOGRAPHY

The 8 element Pyroelectric Array and electronics were designed for a Fiber Laser-based, multi-beam, THz Tomography project which was a joint venture between the Universities of Manchester, Southampton and Leeds in the UK.

The goal was to produce a high performance, low noise level, discrete array, capable of measuring 10 nW per channel in the 0.5 to 2 THz range.

8-CHANNEL PYROELECTRIC ARRAY
0.5 TO 2 THz RANGE
10 nW PER CHANNEL

CUSTOM PRODUCTS

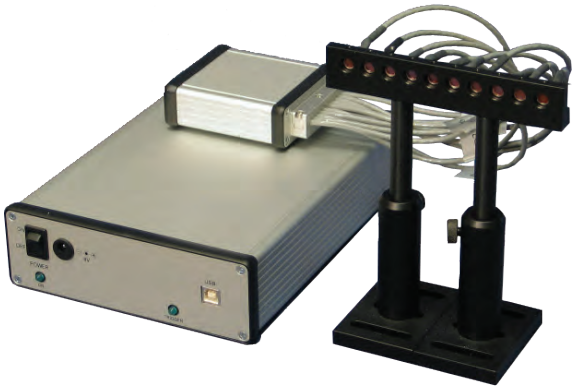


PULSE BURST ENERGY METER

This pulse burts energy meter was developed for Candela Corporation for a new 2-Color Medical Laser System that required measuring the power in multiple pulses and displaying total and sub-pulse energy and pulse width of a laser running in a burst mode.

It was designed to measure a single pulse or up to eight pulses in a burst. The spectral range was 0.5 µm to 3.0 µm.

MEASURES INDIVIDUAL PULSE ENERGIES IN A PULSE BURST



10-CHANNEL ENERGY METER

This Energy Meter was designed for use with Mid-IR and Far-IR lasers and could be used in pairs to create a 20-Channel Digital Joulemeter. The energy sensors were based on fast Pyroelectric Detectors outfitted with KRS5 windows. The microprocessor instrument featured a full speed USB2.0 output, LabView application software and USB Drivers. It also included a multiplexed analog output for use with an oscilloscope that allowed viewing of the relative energy of each channel.

COMBINES 10 ENERGY MEASUREMENTS IN ONE APPLICATION

"HOLLOW" DETECTOR

This special calorimeter demonstrates the extent of Gentec-EO's customization capabilities. This product fulfills the requirements for the newest lasers for high energetic beam experimentation.

- High energy at low repetition rate for continuous measurement
- Femtosecond pulse
- Very large diameter with different shapes & sizes available
- Offers the flexibility to measure both power or energy
- Center hole option for let through an electron beam

SHORT PULSES, HIGH ENERGIES VARIOUS SHAPES & SIZES

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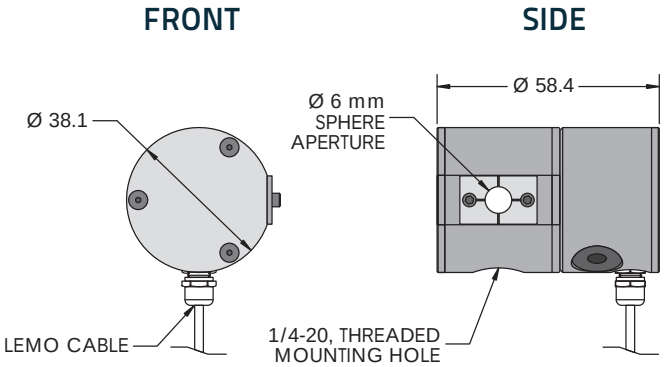
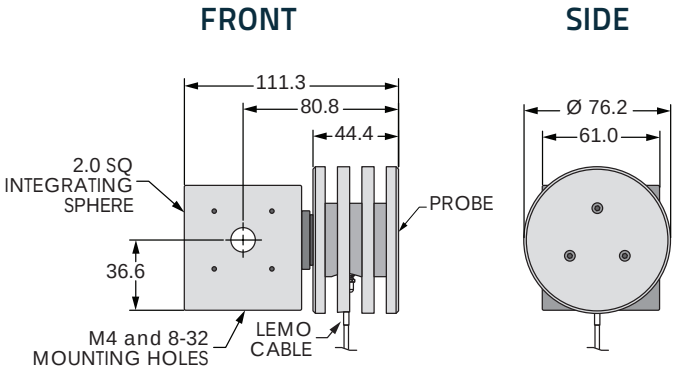
TECHNICAL DRAWINGS

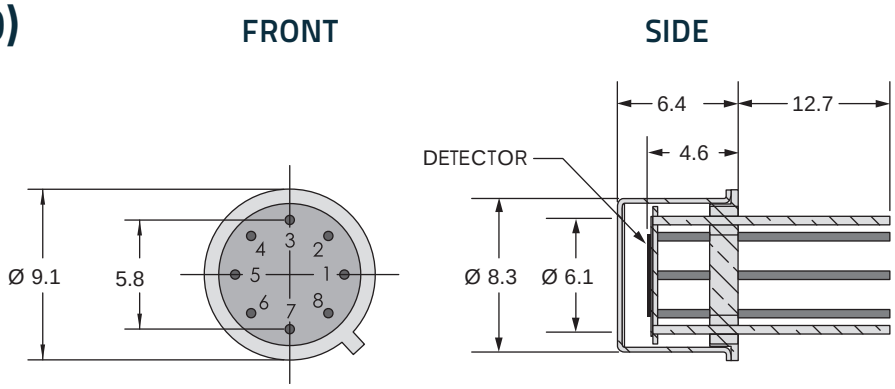
M5/M6 (6 mm Ø)



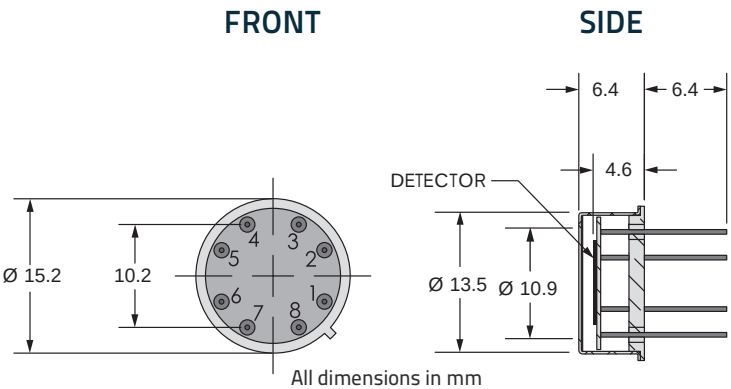
M5/M6 (12.5 mm Ø)



QS (TO5-BASED)



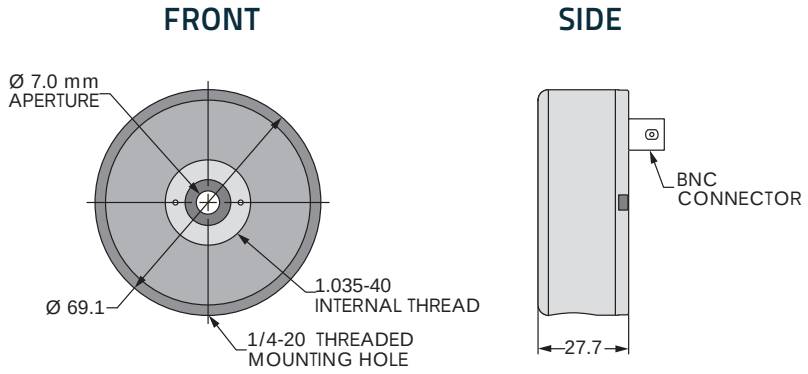
QS (TO8-BASED)



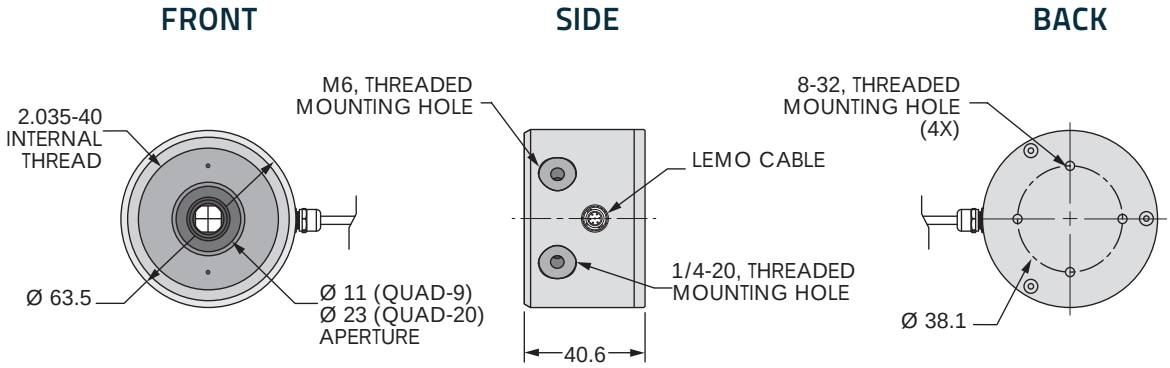
All dimensions in mm

ABSORPTION CURVES

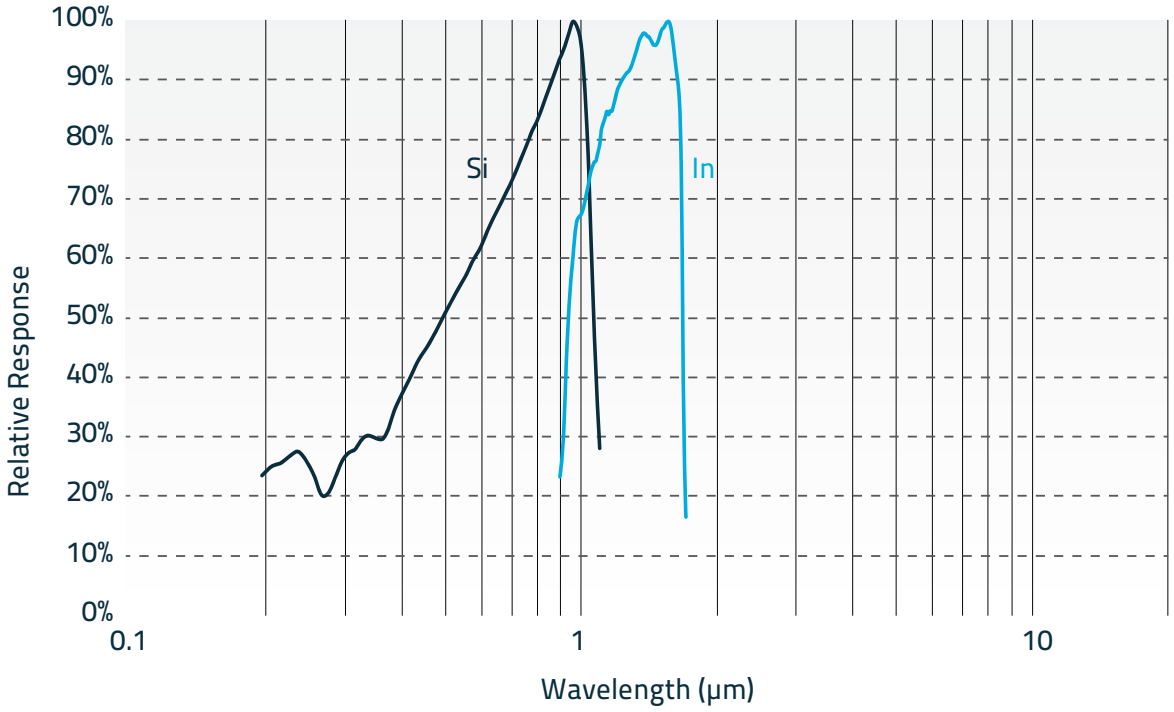
TRAP



QUAD



M5/M6-Si & M5/M6-In



All dimensions in mm

PRESENTATION

OVERVIEW OF THE DIFFERENT MODELS

Gentec-EO has a large choice of beam diagnostic tools. from CCD cameras to scanning systems and even position sensing detectors, we have all you need to characterize your beam.

See page 164

BEAMAGE

- ½ in & ⅔ in CCD Cameras
- 1.4 MPixels
- UV to IR Wavelengths
- Sensor Size up to 8.8 x 6.6 mm
- USB Powered and Controlled

½ in and ⅔ in CCD CAMERAS

See page 166

BEAMAGE FOCUS

- ½ in & ⅔ in CCD Cameras with Fiber Tapers
- For Large Beams up to 20 x 15 mm
- 1.4 MPixels
- UV to IR Wavelengths
- USB Powered and Controlled

½ in and ⅔ in CCD CAMERAS WITH FIBER TAPERS FOR LARGE BEAMS

See page 168

BEAM'R2

- Scanning Slit Beam Profiler
- XY Slit Planes
- Si, InGaAs and Extended InGaAs Sensors
- Sensor Size up to 6 x 5 mm

XY SCANNING SLITS

See page 168

BEAMMAP2

- Scanning Slit Beam Profiler
- XYZθϕ Slit Planes
- Real Time M2, Divergence and Collimation
- Si, InGaAs and Extended InGaAs Sensors
- Sensor Size up to 6 x 5 mm

XYZϕθ SCANNING SLITS
REAL TIME M2, DIVERGENCE AND COLLIMATION

COMPARISON TABLE

See page 170

BEAMSCOPE-P8

- Scanning Probe Beam Profiler
- Pinholes, Single Slits or XY Slits Available
- Real Time Measurement of : XY Profile, Angular Divergence, Ellipticity, Centroid Position, Gaussian Fit and more
- 2D or 3D Plots
- For Large Beams up to 40 x 23 mm (with M2 Stage)

SCANNING PROBE PROFILERS

COMPARISON TABLE

MODEL	PROFILE	M2	SCAN	KNIFE EDGE	CCD	PULSED LASERS	RESOLUTION	MAX IMAGE SIZE	SEE PAGE
Beamage	X-Y	Option			✓	< 20 kHz	1 µm	8.8 x 6.6 mm	164
Beamage Focus	X-Y				✓	< 20 kHz	1.6 µm	20 x 15 mm	166
Beam'R2	X-Y		✓			> 100 kHz	0.5 µm	6 x 5 mm	168
BeamMap2	X-Y-Z-θ-ϕ	Real Time	✓	✓		> 100 kHz	0.5 µm	6 x 5 mm	168
BeamScope-P8	X-Y	Option	✓			> 10 kHz	0.1 µm	40 x 23 mm	170

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BEAMAGE

½ in and ⅔ in CCD Cameras

KEY FEATURES

1 Plug and Play
Direct USB2.0 connection

2 For CW or Pulsed Lasers
Suitable for both CW and pulsed lasers, with single pulse capture up to 20 kHz

3 User-Friendly Software
- Background capture and subtraction
- XY profiles and centroids
- Gaussian and top hat fits
- Beam wander tool

4 Auto Trigger
Automatically synchronizes to pulsed lasers

5 M2 Capabilities
With optional M2 stage and lenses

AVAILABLE MODELS

Beamage-CCD12
(½ in CCD Camera)

Beamage-CCD23
(⅔ in CCD Camera)

AVAILABLE SENSORS

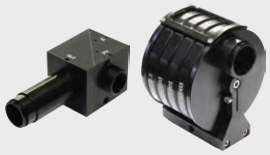
4 Sensor choices for each size:

• Standard Si	350 - 1150 nm
• -1310	1290 - 1350 nm
• -IR	1480 - 1680 nm
• With UG11 Filter	260 - 380 nm

ACCESSORIES

Stand with Delrin Post
(Model Number: 200428)

M2 Stage (M2DU)



CUB, CUB-UV & EAM-2
Beam Splitters and Attenuators

Stackable ND Filters
(0.5, 1.0, 2.0, 3.0 & 4.0)

UV Converters &
IR Adaptors

Pelican Carrying Case

SEE ALSO

ACCESSORIES FOR BEAM DIAGNOSTICS	172
LIST OF ALL ACCESSORIES	174

BEAMAGE

SPECIFICATIONS

MODELS	BEAMAGE-CCD12	BEAMAGE-CCD23
SENSOR TECHNOLOGY	CCD	CCD
EFFECTIVE APERTURE	6.3 x 4.8 mm	8.8 x 6.6 mm
MEASUREMENT CAPABILITY		
Pixel Count	1.4 MPixels	1.4 MPixels
H x V	1360 x 1024	1360 x 1024
Pixel Dimension	4.65 x 4.65 µm	6.45 x 6.45 µm
Minimum Measurable Beam	~47 µm	~65 µm
Shutter Type	Synchronous	Synchronous
Maximum Full Frame Rate	~10 Hz	~10 Hz
Single Pulse Capture	20 kHz	20 kHz
Signal to RMS Noise	1000:1	1000:1
Electronic Shutter Dynamic Range	43 dB	43 dB
ADC	14 bit	14 bit
WAVELENGTH RANGES		
Standard	350 - 1150 nm	350 - 1150 nm
-1310 (residual silicon response) [a]	1290 - 1350 nm	1290 - 1350 nm
-IR (with Phosphor coating) [b]	1480 - 1680 nm	1480 - 1680 nm
With UG11 Filter (for UV) [c]	260 - 380 nm	260 - 380 nm
DAMAGE THRESHOLDS [d]		
Maximum Average Power [e]	1 W	1 W
Saturation Level (1064 nm)		
Continuous Laser	10 W/cm²	10 W/cm²
Pulsed Laser	300 µJ/cm²	300 µJ/cm²
PHYSICAL CHARACTERISTICS		
Sensor Size	6.3 x 4.8 mm	8.8 x 6.6 mm
Dimensions (not including filter)	61H x 81.1W x 22.9D mm	61H x 81.1W x 22.9D mm
Weight (head only)	230 g	230 g
ORDERING INFORMATION		
Full Product Name	BEAMAGE-CCD12	BEAMAGE-CCD23
Product Number (Stand not included)	201027	201028

a. With 1290 nm long-pass filter instead of ND4.
b. A standard Si chip camera can also be fitted with a cam-IR adaptor for NIR detection.
c. A standard Si chip camera can also be fitted with a UV converter for profiles down to 190 nm.
d. With ND4 filter.

Specifications are subject to change without notice

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BEAMAGE FOCUS

½ in and ⅔ in CCD Cameras with Fiber Tapers for Large Beams

KEY FEATURES

1 Large Area Fiber Tapers
2 sizes for large beams:
- Focus I: 11 x 14 mm
- Focus II: 20 x 15 mm

2 Plug and Play
Direct USB2.0 connection

3 For CW or Pulsed Lasers
Suitable for both CW and pulsed lasers, with single pulse capture up to 20 kHz

4 User-Friendly Software
- Background capture and subtraction
- XY profiles and centroids
- Gaussian and top hat fits
- Beam wander tool

5 Auto Trigger
Automatically synchronizes to pulsed lasers

AVAILABLE MODELS

Beamage-Focus I-CCD12
(14.4 x 10.8 mm Taper)

Beamage-Focus II-CCD23
(20 x 15 mm Taper)

AVAILABLE SENSORS

3 Sensor choices for each size:

• Standard Si	350 - 1150 nm
• -1310	1290 - 1350 nm
• -IR	1480 - 1680 nm

ACCESSORIES

Stand with Delrin Post
(Model Number: 200428)

Stackable ND Filters (Focus I)
(0.5, 1.0, 2.0, 3.0 & 4.0)

Stackable NDL Filters (Focus II)
(0.5, 1.0, 2.0, 3.0 & 4.0)

CUB, CUB-UV & EAM-2
Beam Splitters and Attenuators

Pelican Carrying Case

SEE ALSO

ACCESSORIES FOR BEAM DIAGNOSTICS 172
LIST OF ALL ACCESSORIES 174

BEAMAGE FOCUS

SPECIFICATIONS

MODELS	BEAMAGE FOCUS I	BEAMAGE FOCUS II
SENSOR TECHNOLOGY	CCD	CCD
EFFECTIVE APERTURE	14.4 x 10.8 mm	20 x 15 mm
MEASUREMENT CAPABILITY		
Pixel Count	1.4 MPixels	1.4 MPixels
H x V	1360 x 1024	1360 x 1024
Pixel Dimension	10.5 x 10.5 µm	14.5 x 14.5 µm
Minimum Measurable Beam	~105 µm	~145 µm
Pixel Multiplying Factor (PMF)	2.25	2.27
Shutter Type	Synchronous	Synchronous
Maximum Full Frame Rate	~10 Hz	~10 Hz
Single Pulse Capture	20 kHz	20 kHz
Signal to RMS Noise	1000:1	1000:1
Electronic Shutter Dynamic Range	43 dB	43 dB
ADC	14 bit	14 bit
WAVELENGTH RANGES		
Standard	350 - 1150 nm	350 - 1150 nm
-1310 (residual silicon response) [a]	1290 - 1350 nm	1290 - 1350 nm
With UG11 Filter (for UV) [b]	260 - 380 nm	260 - 380 nm
DAMAGE THRESHOLDS [c]		
Maximum Average Power	1 W	1 W
Saturation Level (1064 nm)		
Continuous Laser	10 W/cm²	10 W/cm²
Pulsed Laser	300 µJ/cm²	300 µJ/cm²
PHYSICAL CHARACTERISTICS		
Effective Aperture	14.4 x 10.8 mm	20 x 15 mm
Sensor Size	6.3 x 4.8 mm (CCD12)	8.8 x 6.6 mm (CCD23)
Dimensions	61H x 81.1W x 48.6D mm	61H x 81.1W x 57.3D mm
Weight (head only)	310 g	310 g
ORDERING INFORMATION		
Full Product Name	BEAMAGE FOCUS I	BEAMAGE FOCUS II
Product Number (Stand not included)	201112	201074

a. With 1290 nm long-pass filter instead of ND4.
a. A standard Si chip camera can also be fitted with a UV converter for profiles down to 190 nm.
b. With ND4 filter.

Specifications are subject to change without notice

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BEAMR2-BEAMMAP2

Scanning Slits Beam Profilers

KEY FEATURES

1 Plug and Play
Direct USB2.0 connection

2 Beam'R2
Each single plane XY beam profiling head contains a 2.5 µm slit pair for high dynamic range slit mode & a 25 µm slit pair for 0.1 µm resolution Knife-Edge mode

3 BeamMap2
Adds multiple Z-plane scanning to allow the measurement of:
- Real-time XYZ profiles, Focus position
- Real-time M2, Divergence, Collimation

4 True2D Slits
0.4 µm thick metallic multilayer films on a sapphire substrate avoid the tunnel effect of air slits

AVAILABLE MODELS

Beam'R2
(XY Planes)

BeamMap2
(XYZΘΦ Planes)

AVAILABLE SENSORS

3 Sensor choices for each model:

• Standard Si	190 - 1050 nm
• InGaAs	675 - 1750 nm
• Extended InGaAs	0.8 - 2.5 µm

ACCESSORIES

Stand with Delrin Post
(Model Number: 200428)

CUB, CUB-UV & EAM-2
Beam Splitters and Attenuators

Pelican Carrying Case

SEE ALSO

ACCESSORIES FOR BEAM DIAGNOSTICS 172
LIST OF ALL ACCESSORIES 174

BEAMR2-BEAMMAP2

SPECIFICATIONS

MODELS	BEAM'R2	BEAMMAP2
SLIT-SCAN PLANES	XY	XYZθΦ
MEASUREMENT CAPABILITY		
Dimensions of Capture Region		
Si	5 mm	5mm
InGaAs	3 mm	3mm
Extended InGaAs	1.5 mm	1.5 mm
Laser Types	CW or Pulsed (> 100 kHz)	CW or Pulsed (> 100 kHz)
Waist Diameters ($2\omega_0$)	0.5 - 1500 µm	0.5 - 1500 µm
Waist Diameter Resolution	0.2 % of beam diameter	0.2 % of beam diameter
Best Resolution	0.1 µm	0.1 µm
Precisions		
Beam Divergence	N/A	± 1 mrad over a ± 100 mrad range
Beam Pointing	N/A	± 1 mrad over a ± 100 mrad range
Beam M^2	N/A	± < 5 %, M^2 =1.0 to > 20
Waist Centroid Position	± 2 µm rms	± 2 µm rms
Auto Gain Range	40 dB (10 000:1)	40 dB (10 000:1)
Update Rate	5 Hz	5 Hz
WAVELENGTH RANGES		
Si	190 - 1050 nm	190 - 1050 nm
InGaAs	675 - 1750 nm	675 - 1750 nm
Extended InGaAs	0.8 - 2.5 µm	0.8 - 2.5 µm
DAMAGE THRESHOLDS		
Maximum Average Power	1 W	1 W
Maximum Irradiance		
> 500 nm	0.5 mW/µm²	0.5 mW/µm²
< 500 nm	0.25 mW/µm²	0.25 mW/µm²
PHYSICAL CHARACTERISTICS		
Scanned Areas		
Si	6 x 5 mm	6 x 5 mm
InGaAs	4 x 5 mm	4 x 5 mm
InAs	2.5 x 5 mm	2.5 x 5 mm
Dimensions	61.0H x 67.3W x 68.2D mm	61.0H x 67.3W x 68.2D mm
Weight (head only)	450 g	450 g
ORDERING INFORMATION		
Full Product Names		
Si	BR2-Si	BMS2-4XY250*-Si
InGaAs	BR2-IGA	BMS2-4XY250*-IGA
Extended InGaAs	BR2-IGA-X.X	BMS2-4XY250*-IGA-X.X

* Default unit has 250 µm plane spacing. 50, 100, 500, 750 & 5000 µm plane spacings available

Specifications are subject to change without notice

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BEAMSCOPE-P8

Scanning Probe Beam Profiler

KEY FEATURES

1 Plug and Play
Direct USB2.0 connection

2 Real-Time Measurements
- X-Y profile
- Angular divergence
- Ellipticity, Centroid and Gaussian fit
- Relative power

3 Wide Range of Beam Diameters
- Can profile beams as small as 3 mm in diameter to 40 x 23 mm (with the 2D-stage

4 Wide Wavelength Range
From 190 nm to 4 µm

5 High Resolution
Down to 0.5 mm (or 0.5 %)

AVAILABLE MODELS

BS-PA
(Pinhole Aperture)

BS-SS
(Single Slits)

BS-XY
(XY Slits)

AVAILABLE SENSORS

3 Sensor choices for each model:

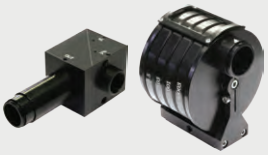
• Standard Si	190 - 1150 nm
• Ge	800 - 1800 nm
• InAs	1.5 - 3.5 µm

ACCESSORIES

Stand with Delrin Post
(Model Number: 200428)

M2-Stage

M2 Stage (M2DU)



CUB, CUB-UV & EAM-2
Beam Splitters and Attenuators

Pelican Carrying Case

SEE ALSO

ACCESSORIES FOR BEAM DIAGNOSTICS	172
LIST OF ALL ACCESSORIES	174

BEAMSCOPE-P8

SPECIFICATIONS

MODELS	BEAMSCOPE-P8
APERTURE TYPES	Pinholes, Single Slit, X-Y Slits

MEASUREMENT CAPABILITY	
Measured Profile Parameters	Gaussian beam diameter, Gaussian fit, Second moment beam diameter, Knife-edge beam diameter, Centroid position (relative & absolute) Beam wander display
Displayed Profiles	X only, Y only, X & Y 2-D plot, 3-D plot
Laser Types	CW or Pulsed (> 10 kHz)
Waist Diameters	2 µm - 15 mm
Measurement Resolution	<0.1 µm, or 0.1 % of beam diameter
Optical Dynamic Range	42.5 dB optical (23 000:1)
Update Rate	>1 Hz typical, 2 Hz maximum
WAVELENGTH RANGES	
Si	190 - 1150 nm
Ge	800 - 1800 nm
InAs	1.5 - 3.5 µm
DAMAGE THRESHOLDS	
Maximum Average Power	1 W
Maximum Irradiance	
> 500 nm	0.5 mW/µm²
< 500 nm	0.25 mW/µm²
PHYSICAL CHARACTERISTICS	
Scanned Areas	
Pinholes (PA Series)	Line Scan – Pinhole diameter x 23 mm
Single Slits (SS Series)	Rectangle – Si: 7 x 23 mm, Ge: 5 x 23 mm, InAs: 3 x 23 mm
X-Y Slits (XY Series)	Trapezoid – Si: 5 x 15/5 mm, Ge: 3 x 15/5, InAs: 2 x 15/5 mm
2D-Stage (M2DU)	Rectangle – 40 x 23 mm
Dimensions	51H x 115W x 62D mm
Weight (head only)	540 g

ORDERING INFORMATION

Full Product Name	PA	SS	XY
Si	BS8-PAxx	BS8-SSyy	BS8-XYyy
Ge	BS8G-PAxx	BS8G-SSyy	BS8G-XYyy
InAs	BS8IA-PAxx	BS8IA-SSyy	BS8IA-XYyy

xx: For pinhole apertures, replace xx by 5, 10, 25, 50 or 100 (mm)
yy: For single and dual slits, replace yy by 2.5, 5, 10, 25, 50 or 100 (mm)

Specifications are subject to change without notice

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ACCESSORIES FOR BD

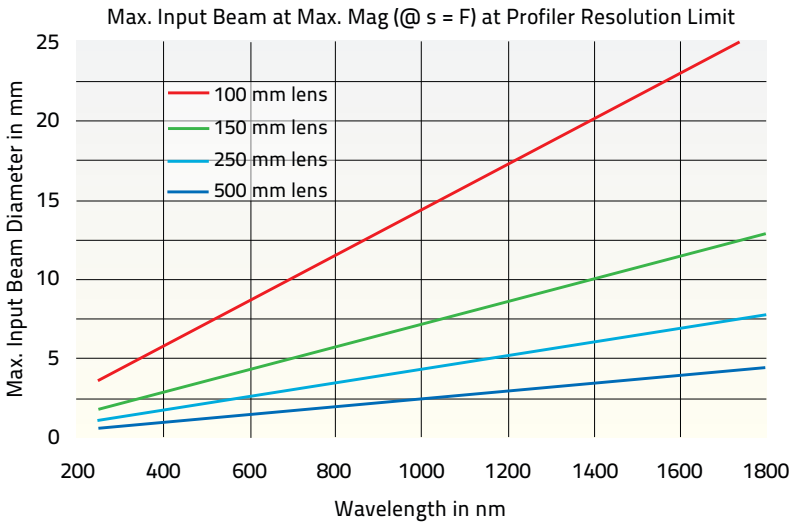
M2DU - M2 STAGE FOR BEAMAGE

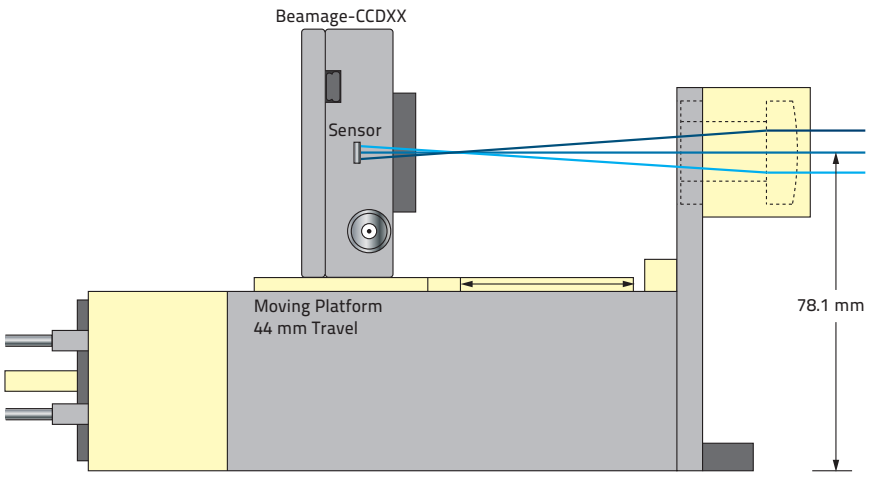
DESCRIPTION

The USB 2.0 interfaced M2DU accessory converts any Beamage-CCDXX series beam profiling camera into a compact ISO 11146 compliant M2 measurement system. The M2DU system comprises a lens fixed to the front of a moving stage on which the Beamage camera moves up to 44 mm. An 85 mm focal length, 400 to 900 nm, achromat refocuses an input beam to a waist within the stage travel range. (Alternative lens focal lengths and coatings will be recommended/supplied for some applications.) Sampling in accordance with the ISO 11146 standard measures the hyperbolic region about the waist. A least squares hyperbolic fit to the second moment diameter data allows calculation of the M2 value and related parameters.

SPECIFICATIONS

Beam Diameters:	See Graph
Wavelengths:	
UV:	250 - 450 nm
VIS:	400 - 800 nm
NIR:	630 - 1050 nm
TEL:	1000 - 1800 nm
M2 Repeatability:	±2 %
Focal Lengths:	
100 nm	(25 mm Ø)
150 nm	(25 mm Ø)
250 nm	(25 mm Ø)
500 nm	(50 mm Ø)





OPERATION

Operation includes an Auto scan range mode which simplifies scanning a range in accordance with the ISO standard, and is described fully in the Application Note which accompanies the stage. An initial 20-point scan with an Average of 2 images at each positioned is performed over the total range of the stage. The software then establishes the optimal scan range for M2 measurement in accordance with the Standard. Averaging is set to 5 images per position and 60 equispaced positions in z about the beamwaist. A typical full scan takes 5 minutes, but coarser scans may be performed faster.

ACCESSORIES FOR BD

EAM2 - VARIABLE ATTENUATOR

DESCRIPTION

EAM-2 is a simple-to-use variable attenuator. It consists of a bank of four filter wheels, each with three different filters ranging from 100% transmission down to 0.003 %. This filter bank offers almost continuous attenuation from 0 to more than 93 dB (Optical Density > 9).

The EAM-2 has three M6 mounting holes and can also connect directly to the C-mount port of a camera. EAM-2 uses Schott NG absorbing filter glass (NG). The filters are laser grade polished to 10-5 scratch-dig and /10 finish. All filters are mounted at a 4° angle to suppress back-reflection interference fringes

SPECIFICATIONS

Maximum Attenuation:	93 dB (OD9)
Minimum Attenuation:	0dB
Maximum Power Density:	1 W/cm²
Maximum Energy Density:	100 mJ/cm²
Wavelength Range:	350 - 2200 nm
Clear Aperture:	18 mm Ø
Angle:	4°
Mounting:	3 x M6, C-Mount

		Wheel #							
		1		2		3		4	
		dB	%	dB	%	dB	%	dB	%
Filter #	1	0	100	0	100	0	100	0	100
	2	0.5	90	5	30	20	1	35	0.03
	3	1	80	10	10	25	0.3	40	0.01
	4	3	50	15	3	30	0.1	45	0.0003

CUB & CUB-UV - BEAM SPLITTER CUBES

DESCRIPTION

The CUB beam splitter cube takes a fixed ratio beam sample. It uses the front surface reflection from an uncoated laser mirror to achieve a reflection of 3% to 10% of the main laser beam for further analysis.

The surface is polished to 10-5 scratch-dig and 1/10 wave finish, wedged at 10 arcmin to avoid interference fringes and can take power densities up to 2 MW/cm². Like the EAM attenuator it has C-Mount ports and can be connected to the EAM and your camera with the ETCM connecting tubes. It can post mount from an M6 threaded post.

SPECIFICATIONS

Attenuation:	3% to 10% (Polarization dependent)
Spectral Range:	
CUB:	350 - 2200 nm
CUB-UV:	190 - 2200 nm
Clear Aperture:	19 mm
Damage Threshold:	50 J/cm²

Part #	Description
CUB	Beam Splitter
CUB-UV	UV Beam Splitter
ETCM-2	Tube Set with 2 Tubes (2 x 50 mm tubes + 4 adaptor rings)
ETCM-3	Tube Set with 3 Tubes (3 x 50 mm tubes + 4 adaptor rings)

POWER SUPPLIES & BATTERIES

MODEL	DESCRIPTION	PART NUMBER
FAN-12V-US	Power Supply, 12V (US), for fan-Cooled detectors	200130B
FAN-12V-EU	Power Supply, 12V (Europe), for fan-Cooled detectors	200130C
FAN-12V-UK	Power Supply, 12V (UK), for fan-Cooled detectors	200130G
MON-9V-US	Power Supply, 9V (US). For monitors and modules.	200960B
MON-9V-EU	Power Supply, 9V (Europe). For monitors and modules.	200960C
MON-9V-UK	Power Supply, 9V (UK). For monitors and modules.	200960G
MON-BAT	Battery Pack for: MAESTRO, SOLO 2.	201013
PE-BAT	Battery Pack for: SOLO PE.	200083
UPG-12V-US	Power Supply, 12V-6.66A, for UP55G (US)	201103B
UPG-12V-EU	Power Supply, 12V-6.66A, for UP55G (Europe)	201103C
UPG-12V-UK	Power Supply, 12V-6.66A, for UP55G (UK)	201103G

ADAPTORS & CABLES

MODEL	DESCRIPTION	PART NUMBER
DB-15-ADAPTOR	DB-15 to DB-15 Replacement Adaptor	Call
DB15-BNC	DB15 to BNC Adaptor for XLE4, QE12, QE25, QE50, QE65, QE95.	200036
EXT-4	Extension Cable (4 m)	Call
EXT-15	Extension Cable (15 m)	Call
EXT-20	Extension Cable (20 m)	Call
EXT-25	Extension Cable (25 m)	Call
PLK-RS232	RS-232 Cable for P-LINK (RS-232)	200593
MON-RS232	RS-232 Cable for : SOLO 2 and SOLO X (RS-232)	200925
MON-USB	USB Cable for : P-LINK, S-LINK-2, M-LINK, Mach 5, T-Rad-USB and QUAD-4Track	100776
MAE-USB	USB Cable for : MAESTRO (also used for Beamage, SOLO PE, SOLO X)	100182
MAE-RS232	RS-232 Cable for MAESTRO	201860
MAE-ANALOG	Analog Ouput Cable for MAESTRO	201958
MAE-TRIG	External Trigger Cable for MAESTRO	201956

FIBER OPTIC ACCESSORIES

MODEL	DESCRIPTION	PART NUMBER
FOA-19	Fiber Optic Adaptor (19 mm threaded) for UP19K-H Series.	200180
FOA-25	Fiber Optic Adaptor (25 mm threaded) for UP25 Series.	200261
FOA-50	Fiber Optic Adaptor (50 mm threaded) for UP50-55 Series.	200183
FOA-COVER12	Fiber Optic Adaptor Cover for UP12E. 12 mm fiber adaptor cover for UP12E series.	100690
FOA-COVER50	Fiber Optic Adaptor Cover for UP55. Reduces aperture from 55 to 50 mm.	101135
FOA-CYL50	Fiber Optic Adaptor: 50 mm Conical Cylinder for UP50 series.	200052
FOA-FULL-FC	Fiber Optic Adaptor FC with full cover. For: XLP12, -B heads (except THZ) PH and STEP.	100905
FOA-FULL-SMA	Fiber Optic Adaptor SMA with full cover. For: XLP12, -B heads (except THZ) PH and STEP.	100906
FOA-FULL-ST	Fiber Optic Adaptor ST with full cover. For: XLP12, -B heads (except THZ) PH and STEP.	100907
FOC-FC	Fiber Optic Connector FC. For UP Series.	200867
FOC-PLUG	Fiber Optic Connector, PLUG to close port of fiber cylinder. For UP50-55 Series.	100281
FOC-SC	Fiber Optic Connector SC. For UP Series.	200182
FOC-SMA	Fiber Optic Connector SMA. For UP Series.	200868

POUCHES & CASES

MODEL	DESCRIPTION	PART NUMBER
MON-POUCH	Padded protection pouch with velcro flap. For TUNER, UNO, P-LINK, M-LINK, and S-LINK-2	200128
MON-WALL	Wall Support for : SOLO 2, TUNER, UNO.	201241
PEL-1400	Pelican Carrying Case (Model 1400). 12 x 10 x 6 in.	Call
PEL-1450	Pelican Carrying Case (Model 1450). 15 x 11 x 6 in.	Call
PEL-1500	Pelican Carrying Case (Model 1500). 17 x 12 x 7 in.	Call
PEL-1550	Pelican Carrying Case (Model 1550). 19 x 15 x 8 in.	Call

STANDS & HOLDERS

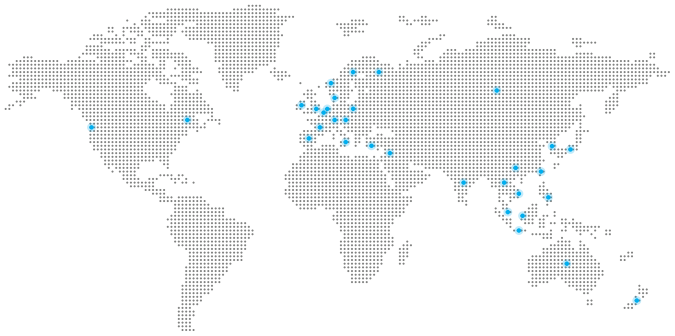
MODEL	DESCRIPTION	PART NUMBER
HBS-MOUNT	1in Mount for HBS.	101543
STAND-D-233	Stand with 2 x 3in Base, 3in Cylinder, Delrin Post, ¼-20 & 8-32 for : QE-B, QE12, QE25, QE50, QE65-S, QE95-S, Mach 5, UM-B, STEP, PH-B, PH, PE-B, TRAP, THZ-I-BNC, THZ-B, Beamage, Beamage Focus, BeamMap2-BeamR2, Beamscope-P8, QUAD.	200428
STAND-D-443	Stand with 4 x 4in Base, 3in Cylinder, Delrin Post, ¼-20 & 8-32 for : QE65-H, QE95-H	201284
STAND-S-233	Stand, 2 x 3in Base, 3in Cylinder, Steel Post, 8-32 & ¼-20 for : XLP12, UP12E, UP17P, UP19K-H, UP19K-W5, HBS Mount.	200160
STAND-S-443	Stand, 4 x 4in Base, 3in Cylinder, Steel Post, 8-32 & ¼-20 for : UP25N, UP50N, UP55N, UP60N.	200234
STAND-S-443-C	Stand, 4 x 4in Base, 3in Cylinder, 3in Steel Post, 8-32 & ¼-20, with slip-on post collar for : UP55G, UP60G, FLASH, FLASH-IPL and HP.	201102

WINDOWS & FILTERS

MODEL	DESCRIPTION	PART NUMBER
IR-FILTER	IR-FILTER for XLP12.	201076
MT-UV-QED	Special Attenuator for M5 ultrafast pyroelectric probes. Allows relative measurements in UV.	Call
QED-12	QE12 Attenuator.	201200
QED-25	QE25 Attenuator.	201199
QED-50	QE50 Attenuator.	201198
QED-65	QE65 Attenuator.	201282
QED-95	QE95 Attenuator.	201323
Various Windows	Interchangeable or Permanent Windows (Barium, Quartz, Germanium, Sapphire, Silicon, Zinc)	Call

MISCELLANEOUS

MODEL	DESCRIPTION	PART NUMBER
APM	Analog Power Module, to interface -B heads with oscilloscopes or lock-in amplifiers.	201495
BL	Organic Black (BL) Coating for QS pyroelectric detectors (not for QS-THZ).	Call
DIGS-1	Integrating Sphere, 1 in Ø, SM1 Thread. For PE-B heads.	201503
EXT-PCB	External PCB for UD Disks.	200651
QS-I-TEST	Evaluation Test Box for QS Detectors (in current mode).	201693
QS-V-TEST	Evaluation Test Box for QS detectors (in voltage mode).	201694
SDC-5000	SDC-5000 Digital Optical Chopper.	102855
SM1A7	Alignment Crosshair. For -I and -B heads (except THZ) and STEP.	201652
SM1A8	IR Alignment Aide. For -I and -B heads (except THZ) and STEP.	201653
UP19K-TUBE	Isolation Tube for UP19K	100966



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NOTES

RETURNS & WARRANTY

CALIBRATION AND REPAIR SERVICE

All Gentec-EO products receive an NIST traceable calibration and are shipped with a Calibration Certificate to prove it. The certificate tells you the sensitivity of your power or energy head, the ambient calibration conditions, and a list of all the NIST traceable standards and instruments used in the calibration.

The actual need for recalibration depends on use and environmental conditions. Under typical operating conditions and laser exposures annual recalibration is the industry standard recommended by calibration experts such as NIST. Our highly professional service department is happy to recalibrate or repair your instrument any time you need it. In every case, you will get the same accurate calibration and detailed certificate as when your instrument was new. In addition, we do an incoming calibration test to let you know how the device was performing before service. We will help you meet any ISO and quality requirements. Here is how to send an RMA request:

BY PHONE

Mr. Nicolas Litalien
1-418-651-8003 ext. 302

BY E-MAIL

Mr. Nicolas Litalien
service@gentec-eo.com

USING OUR ONLINE RMA FORM

Go to http://www.gentec-eo.com/support/technical-support-and-rma-request
Fill out the online form and click "SUBMIT REQUEST"

In all cases, please prepare the following information before contacting us:

- Model Name(s)
- Serial Number(s)
- If a repair is needed, please provide a description of the problem

WARRANTY

Annual recalibration is an industry standard that is recommended to ensure the most accurate measurements all the time. Now you can turn that into a Lifetime Warranty for Gentec-EO joulemeters or wattmeters. As long as the purchaser has returned the product once a year, every year, since purchase, they will get routine repairs for no additional charge. Your cost is just the modest calibration fee for your product. The only condition is that it must not have been subject to unauthorized service or damaged by misuse, including laser exposure outside of our published specifications. You always have parts, labor and recalibration service for no charge if service is necessary the first year after purchasing any of our products. Why stop there when you can protect your investment for the life of the product? Take advantage of our Lifetime Warranty.

GENTEC-EO
WORLDWIDE

LEADER IN
LASER BEAM
MEASUREMENT
SINCE 1972

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