Energy sensors
1.2 Energy Sensors

Introduction

Pyroelectric sensors are for measuring repetitive pulse energies and average powers at pulse rates up to 25000 pulses per second and pulse widths up to 20ms. Note that single shot energy with pulse rates less than one pulse every 5s or so can be measured with thermal sensors described in the power sensor section.

Pyroelectric Sensors

Pyroelectric type sensors are useful for measuring the energy of repetitively pulsed lasers at up to 25,000Hz and are sensitive to low energies. They are less durable than thermal types and therefore should not be used whenever it is not necessary to measure the energy of each pulse and average power measurement is sufficient. Pyroelectric sensors use a pyroelectric crystal that generates an electric charge proportional to the heat absorbed. Since the two surfaces of the crystal are metalized, the total charge generated is collected and therefore the response is not dependent on beam size or position. This charge then charges a capacitor in parallel with the crystal and the voltage difference thus generated is proportional to the pulse energy. After the energy is read by the electronic circuit, the charge on the crystal is discharged to be ready for the next pulse. The response time of the pyroelectric sensor depends on the time it takes for the heat to enter the crystal and heat it up. For metallic type pyro detectors, this time is tens of µs and thus the metallic type can run at a high repetition rate. For the BF and BB type, the response time is hundreds of µs with a correspondingly lower repetition rate.

Ophir pyroelectric detectors have unique and proprietary circuitry that allow them to measure long pulses as well as short pulses and work at a high duty cycle, i.e. where the pulse width is as much as 30% of the total cycle time.

Ophir came out with the compact C line of pyroelectric sensors that replaced previous models. The electronics and mechanics has been completely upgraded and the current sensors are superior in every way: more compact, wider dynamic range, have higher repetition rates and measure longer pulses. Through constant development, Ophir again brings you the best performance in the market.

Note: Older line of Pyroelectric sensors is not supported by the StarBright and StarLite meters.

All Ophir power and energy sensors come with a mounting stand.
Absorption and Damage Graphs for Pyroelectric Sensors

Absorption vs. Wavelength

Damage Threshold vs. Pulse Width
Wavelength Range and Repetition Rate Range for Energy Sensors

Wavelength Range

Repetition Rate Range
1.2.1 Photodiode Energy Sensors

**10pJ to 15µJ**

### Features
- Silicon and Germanium detectors
- Very sensitive - down to 10pJ
- Repetition rates to 20kHz
- Wide spectral range

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Use</strong></td>
<td>Low energies</td>
<td>Infrared</td>
<td>Lowest energies</td>
<td>Infrared, lowest energies</td>
</tr>
<tr>
<td><strong>Aperture mm</strong></td>
<td>Ø10</td>
<td>Ø5</td>
<td>Ø10</td>
<td>Ø5</td>
</tr>
<tr>
<td><strong>Absorber Type</strong></td>
<td>Si photodiode</td>
<td>Ge photodiode</td>
<td>Si photodiode</td>
<td>Ge photodiode</td>
</tr>
<tr>
<td><strong>Spectral Range µm</strong></td>
<td>0.19 - 1.1</td>
<td>0.7 - 1.8</td>
<td>0.2 - 1.1</td>
<td>0.7 - 1.8</td>
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<tr>
<td><strong>Calibration Accuracy</strong></td>
<td>±1.5%</td>
<td>±1.5%</td>
<td>±1.5%</td>
<td>±1.5%</td>
</tr>
<tr>
<td><strong>Energy Scales</strong></td>
<td>20µJ to 20nJ</td>
<td>600nJ to 6nJ</td>
<td>200nJ to 200pJ</td>
<td>20nJ to 200pJ</td>
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<tr>
<td><strong>Lowest Measurable Energy nJ</strong></td>
<td>1 at 900nm</td>
<td>1 at 1550nm</td>
<td>0.01 at 900nm</td>
<td>0.03 at 1550nm</td>
</tr>
<tr>
<td><strong>Max Pulse Width ms</strong></td>
<td>0.005</td>
<td>0.005</td>
<td>0.005</td>
<td>0.005</td>
</tr>
<tr>
<td><strong>Maximum Pulse Rate pps</strong></td>
<td>20kHz</td>
<td>10kHz</td>
<td>20kHz</td>
<td>10kHz</td>
</tr>
<tr>
<td><strong>Additional Error with Frequency %</strong></td>
<td>±1% to 20kHz</td>
<td>±1.5% to 10kHz</td>
<td>±1.5% to 20kHz</td>
<td>±1.5% to 10kHz</td>
</tr>
<tr>
<td><strong>Linearity with Energy for &gt; 10% of full scale %</strong></td>
<td>±2% to 20kHz</td>
<td>±2% to 10kHz</td>
<td>±2% to 20kHz</td>
<td>±2% to 10kHz</td>
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<tr>
<td><strong>Damage Threshold J/cm²</strong></td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td><strong>Maximum Average Power mW</strong></td>
<td>50 at 800nm</td>
<td>6</td>
<td>5</td>
<td>5</td>
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<tr>
<td><strong>Maximum Average Power Density W/cm²</strong></td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
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<tr>
<td><strong>Max Energy vs. Wavelength</strong></td>
<td>Wavelength Max Energy</td>
<td>Wavelength Max Energy</td>
<td>Wavelength Max Energy</td>
<td>Wavelength Max Energy</td>
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<tr>
<td>&lt;300nm</td>
<td>15µJ</td>
<td>150nJ</td>
<td>150nJ</td>
<td>150nJ</td>
</tr>
<tr>
<td>350 - 550nm</td>
<td>8µJ</td>
<td>75nJ</td>
<td>75nJ</td>
<td>75nJ</td>
</tr>
<tr>
<td>&gt;800nm</td>
<td>5µJ</td>
<td>5nJ</td>
<td>5nJ</td>
<td>5nJ</td>
</tr>
<tr>
<td>1480 - 1560nm</td>
<td>170nJ</td>
<td>170nJ</td>
<td>170nJ</td>
<td>170nJ</td>
</tr>
<tr>
<td>Fiber Adapters Available</td>
<td>ST, FC, SMA, SC</td>
<td>ST, FC, SMA, SC</td>
<td>ST, FC, SMA, SC</td>
<td>ST, FC, SMA, SC</td>
</tr>
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<td><strong>Compliance</strong></td>
<td>CE, China RoHS</td>
<td>CE, China RoHS</td>
<td>CE, China RoHS</td>
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<td><strong>Version</strong></td>
<td>7Z02944</td>
<td>7Z02955</td>
<td>7Z02945</td>
<td>7Z02946</td>
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</table>

**Note:** (a) This is basic calibration accuracy. In certain wavelength regions calibration there is additional error as tabulated here.

**Note:** (b) With the “user threshold” setting set to minimum. For other settings, the spec is for >10% of full scale or greater than twice the “user threshold”, whichever is greater. The user threshold is not available with LaserStar, Nova/Orion, Pulsar USB and Quasar. For these meters, the threshold is set to minimum and the linearity spec is >10% of full scale. The PD-C series will only operate with Nova or Orion meters with an additional adapter Ophir P/N 7Z08272 (see page 103). The adapter can introduce up to 1% additional measurement error. The user threshold feature allows adjustment of the internal threshold up to 25% of full scale if desired to avoid false triggering in noisy environments.

**For further information, see the FAQs on our Website.**

**Note:** (c) Additional Error with Frequency of ±1% only for energies up to 2µJ. For higher energies ±1% up to 10kHz, -4% at 20kHz.

**Note:** (d) Additional Error with Frequency of ±1% only for energies up to 20nJ. For higher energies ±2% up to 10kHz, -5% at 20kHz.
0.1µJ to 1mJ

**Features**
- Ø8mm aperture
- Repetition rates up to 20,000Hz
- High sensitivity sensors
- Pulse widths up to 20µs

<table>
<thead>
<tr>
<th>Model</th>
<th>PE9-C</th>
<th>PE9-ES-C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Use</strong></td>
<td>Very Sensitive</td>
<td>Most Sensitive</td>
</tr>
<tr>
<td>Aperture mm</td>
<td>Ø8</td>
<td>Ø8</td>
</tr>
<tr>
<td>Absorber Type</td>
<td>metallic</td>
<td>metallic</td>
</tr>
<tr>
<td>Spectral Range µm</td>
<td>0.15 - 12</td>
<td>0.15 - 12</td>
</tr>
<tr>
<td>Surface Reflectivity % approx.</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Calibration Accuracy +/- (%)</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Max Pulse Width Setting (µs)</td>
<td>1µs</td>
<td>2µs</td>
</tr>
<tr>
<td>Energy Scales</td>
<td>1µJ to 2µJ</td>
<td>1µJ to 2µJ</td>
</tr>
<tr>
<td>Lowest Measurable Energy µJ</td>
<td>0.5</td>
<td>&lt;0.2</td>
</tr>
<tr>
<td>Max Pulse Rate pps</td>
<td>25kHz</td>
<td>15kHz</td>
</tr>
<tr>
<td>Noise on Lowest Range µJ</td>
<td>0.04</td>
<td>0.05</td>
</tr>
<tr>
<td>Additional Error with Frequency %</td>
<td>±1% to 15kHz</td>
<td>±1% to 15kHz</td>
</tr>
</tbody>
</table>

**Damage Threshold J/cm²**
- <100ns: 0.1
- 1µs: 0.2
- 300µs: 3

**Surface Reflectivity % approx.**
- approx. 50

**Calibration Accuracy +/- (%)**
- 3

**Max Pulse Width Setting (µs)**
- 1µs
- 2µs
- 20µs

**Energy Scales**
- 1µJ to 2µJ
- 1µJ to 2µJ
- 1µJ to 20µJ

**Lowest Measurable Energy µJ**
- 0.5
- <0.2

**Max Pulse Rate pps**
- 25kHz
- 15kHz

**Noise on Lowest Range µJ**
- 0.04
- 0.05

**Additional Error with Frequency %**
- ±1% to 15kHz
- ±1% to 15kHz

**Damage Threshold J/cm²**
- <100ns: 0.1
- 1µs: 0.2
- 300µs: 3

**Surface Reflectivity % approx.**
- approx. 50

**Calibration Accuracy +/- (%)**
- 3

**Max Pulse Width Setting (µs)**
- 1µs
- 2µs
- 20µs

**Energy Scales**
- 1µJ to 2µJ
- 1µJ to 2µJ
- 1µJ to 20µJ

**Lowest Measurable Energy µJ**
- 0.5
- <0.2

**Max Pulse Rate pps**
- 25kHz
- 15kHz

**Noise on Lowest Range µJ**
- 0.04
- 0.05

**Additional Error with Frequency %**
- ±1% to 15kHz
- ±1% to 15kHz

**Damage Threshold J/cm²**
- <100ns: 0.1
- 1µs: 0.2
- 300µs: 3

**Surface Reflectivity % approx.**
- approx. 50

**Calibration Accuracy +/- (%)**
- 3

**Max Pulse Width Setting (µs)**
- 1µs
- 2µs
- 20µs

**Energy Scales**
- 1µJ to 2µJ
- 1µJ to 2µJ
- 1µJ to 20µJ

**Lowest Measurable Energy µJ**
- 0.5
- <0.2

**Max Pulse Rate pps**
- 25kHz
- 15kHz

**Noise on Lowest Range µJ**
- 0.04
- 0.05

**Additional Error with Frequency %**
- ±1% to 15kHz
- ±1% to 15kHz

**Damage Threshold J/cm²**
- <100ns: 0.1
- 1µs: 0.2
- 300µs: 3

**Surface Reflectivity % approx.**
- approx. 50

**Calibration Accuracy +/- (%)**
- 3

**Max Pulse Width Setting (µs)**
- 1µs
- 2µs
- 20µs

**Energy Scales**
- 1µJ to 2µJ
- 1µJ to 2µJ
- 1µJ to 20µJ

**Lowest Measurable Energy µJ**
- 0.5
- <0.2

**Max Pulse Rate pps**
- 25kHz
- 15kHz

**Noise on Lowest Range µJ**
- 0.04
- 0.05

**Additional Error with Frequency %**
- ±1% to 15kHz
- ±1% to 15kHz

**Damage Threshold J/cm²**
- <100ns: 0.1
- 1µs: 0.2
- 300µs: 3

**Surface Reflectivity % approx.**
- approx. 50

**Calibration Accuracy +/- (%)**
- 3

**Max Pulse Width Setting (µs)**
- 1µs
- 2µs
- 20µs

**Energy Scales**
- 1µJ to 2µJ
- 1µJ to 2µJ
- 1µJ to 20µJ

**Lowest Measurable Energy µJ**
- 0.5
- <0.2

**Max Pulse Rate pps**
- 25kHz
- 15kHz

**Noise on Lowest Range µJ**
- 0.04
- 0.05

**Additional Error with Frequency %**
- ±1% to 15kHz
- ±1% to 15kHz

**Damage Threshold J/cm²**
- <100ns: 0.1
- 1µs: 0.2
- 300µs: 3

**Surface Reflectivity % approx.**
- approx. 50

**Calibration Accuracy +/- (%)**
- 3

**Max Pulse Width Setting (µs)**
- 1µs
- 2µs
- 20µs

**Energy Scales**
- 1µJ to 2µJ
- 1µJ to 2µJ
- 1µJ to 20µJ

**Lowest Measurable Energy µJ**
- 0.5
- <0.2

**Max Pulse Rate pps**
- 25kHz
- 15kHz

**Noise on Lowest Range µJ**
- 0.04
- 0.05

**Additional Error with Frequency %**
- ±1% to 15kHz
- ±1% to 15kHz

**Damage Threshold J/cm²**
- <100ns: 0.1
- 1µs: 0.2
- 300µs: 3

**Surface Reflectivity % approx.**
- approx. 50

**Calibration Accuracy +/- (%)**
- 3

**Max Pulse Width Setting (µs)**
- 1µs
- 2µs
- 20µs

**Energy Scales**
- 1µJ to 2µJ
- 1µJ to 2µJ
- 1µJ to 20µJ

**Lowest Measurable Energy µJ**
- 0.5
- <0.2

**Max Pulse Rate pps**
- 25kHz
- 15kHz

**Noise on Lowest Range µJ**
- 0.04
- 0.05

**Additional Error with Frequency %**
- ±1% to 15kHz
- ±1% to 15kHz

**Damage Threshold J/cm²**
- <100ns: 0.1
- 1µs: 0.2
- 300µs: 3

**Surface Reflectivity % approx.**
- approx. 50

**Calibration Accuracy +/- (%)**
- 3

**Max Pulse Width Setting (µs)**
- 1µs
- 2µs
- 20µs

**Energy Scales**
- 1µJ to 2µJ
- 1µJ to 2µJ
- 1µJ to 20µJ

**Lowest Measurable Energy µJ**
- 0.5
- <0.2

**Max Pulse Rate pps**
- 25kHz
- 15kHz

**Noise on Lowest Range µJ**
- 0.04
- 0.05

**Additional Error with Frequency %**
- ±1% to 15kHz
- ±1% to 15kHz

**Damage Threshold J/cm²**
- <100ns: 0.1
- 1µs: 0.2
- 300µs: 3

**Surface Reflectivity % approx.**
- approx. 50

**Calibration Accuracy +/- (%)**
- 3

**Max Pulse Width Setting (µs)**
- 1µs
- 2µs
- 20µs

**Energy Scales**
- 1µJ to 2µJ
- 1µJ to 2µJ
- 1µJ to 20µJ

**Lowest Measurable Energy µJ**
- 0.5
- <0.2

**Max Pulse Rate pps**
- 25kHz
- 15kHz

**Noise on Lowest Range µJ**
- 0.04
- 0.05

**Additional Error with Frequency %**
- ±1% to 15kHz
- ±1% to 15kHz

**Damage Threshold J/cm²**
- <100ns: 0.1
- 1µs: 0.2
- 300µs: 3

**Surface Reflectivity % approx.**
- approx. 50

**Calibration Accuracy +/- (%)**
- 3

**Max Pulse Width Setting (µs)**
- 1µs
- 2µs
- 20µs

**Energy Scales**
- 1µJ to 2µJ
- 1µJ to 2µJ
- 1µJ to 20µJ

**Lowest Measurable Energy µJ**
- 0.5
- <0.2

**Max Pulse Rate pps**
- 25kHz
- 15kHz

**Noise on Lowest Range µJ**
- 0.04
- 0.05
1.2.2 Pyroelectric Energy Sensors

1µJ to 10mJ

Features
- Ø12mm apertures
- Repetition rates up to 25,000Hz
- High sensitivity sensors
- Pulse widths up to 5ms

<table>
<thead>
<tr>
<th>Model</th>
<th>PE10-C</th>
<th>PE10BF-C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use</td>
<td>Sensitive</td>
<td>High damage threshold</td>
</tr>
<tr>
<td>Aperture mm</td>
<td>Ø12</td>
<td>Ø12</td>
</tr>
<tr>
<td>Absorber Type</td>
<td>metallic</td>
<td>BF</td>
</tr>
<tr>
<td>Spectral Range µm (a)</td>
<td>0.15 - 12</td>
<td>0.15 - 3, 10.6 (d)</td>
</tr>
<tr>
<td>Surface Reflectivity % approx.</td>
<td>50</td>
<td>20</td>
</tr>
<tr>
<td>Calibration Accuracy +/-% (w)</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Max Pulse Width Setting (z)</td>
<td>1µs to 2µl, 30µs to 20µl</td>
<td>1µs to 2µl, 10µm to 20µl</td>
</tr>
<tr>
<td>Energy Scales</td>
<td>100µJ to 2µJ, 10µm to 20µl</td>
<td>10µm to 2µJ, 10µm to 20µl</td>
</tr>
<tr>
<td>Lowest Measurable Energy µJ (c)</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Max Pulse Width µs</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Maximum Pulse Rate pps</td>
<td>25kHz, 5kHz</td>
<td>250Hz, 50Hz</td>
</tr>
<tr>
<td>Noise on Lowest Range µJ</td>
<td>0.1, 0.15</td>
<td>1, 5</td>
</tr>
<tr>
<td>Additional Error with Frequency %</td>
<td>±2% to 15kHz, ±3% to 25kHz</td>
<td>±1% to 5kHz</td>
</tr>
<tr>
<td>Damage Threshold J/cm²</td>
<td>&lt;100ns</td>
<td>0.1</td>
</tr>
<tr>
<td>1µs</td>
<td>0.2</td>
<td>0.8 (b)</td>
</tr>
<tr>
<td>300µs</td>
<td>3</td>
<td>1 (b)</td>
</tr>
<tr>
<td>Linearity with Energy (g)</td>
<td>±1.5%</td>
<td>±2%</td>
</tr>
<tr>
<td>Maximum Average Power W</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Maximum Average Power Density W/cm²</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Fiber Adapters Available (see page 102)</td>
<td>ST, FC, SMA, SC</td>
<td>ST, FC, SMA, SC</td>
</tr>
<tr>
<td>Weight kg</td>
<td>0.25</td>
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<td>Compliance</td>
<td>CE, China RoHS</td>
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<tr>
<td>Version</td>
<td>7Z02932</td>
<td>7Z02938</td>
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</tbody>
</table>

PE10-C / PE10BF-C

Note: (a) Calibrated curve is checked and adjusted at the following wavelengths (µm):
- 190 - 800nm add ±4%, 2-3µm add ±8%, 10.6µm add ±15%.
- <240nm not calibrated

Note: (b) For wavelengths below 600nm, derate damage threshold to 60% of given values. Below 300nm, derate to 40% of given values.

Note: (c) For >7% of full scale, with the “user threshold” setting set to minimum. For other settings, the spec is for >7% of full scale or greater than twice the “user threshold”, whichever is greater.

The user threshold is not available with LaserStar, Nova/Orion, Pulsar, USBI and Quasar. For these meters, the threshold is set to minimum and the linearity spec is >10% of full scale. The PE-C series will only operate with Nova or Orion meters with an additional adapter Ophir P/N 7Z08272 (see page 103). The adapter can introduce up to 1% additional measurement error.

The user threshold feature allows adjustment of the internal threshold up to 25% of full scale if desired to avoid false triggering in noisy environments.

For further information, see the FAQs on our Website.

Note: (d) The absorption at 675nm is approximately the same as at 10.6µm. Therefore, to measure a CO₂ laser, set to the 675nm setting. The additional error for measuring 10.6µm is ±5%.

Note: (e) With the LaserStar, Pulsar, USBI, Quasar and Nova/Orion with adapter, for the PE-10-C model the 1µs pulse width setting is displayed as “10µs”.
1.2.2 Pyroelectric Energy Sensors

8µJ to 10J

Features
- Ø24mm apertures
- Metallic coating for high rep rates
- BF coating for highest damage threshold
- Rep rates up to 10kHz
- Measure lasers with pulse widths up to 20ms

Model PE25-C PE25BF-C

<table>
<thead>
<tr>
<th>Use</th>
<th>High rep rate</th>
<th>High damage threshold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aperture mm</td>
<td>Ø24</td>
<td>Ø24</td>
</tr>
<tr>
<td>Absorber Type</td>
<td>metallic</td>
<td>BF</td>
</tr>
<tr>
<td>Spectral Range µm (a)</td>
<td>0.15 - 3</td>
<td>0.15 - 3, 10.6 (e)</td>
</tr>
<tr>
<td>Surface Reflectivity % approx.</td>
<td>50</td>
<td>20</td>
</tr>
<tr>
<td>Calibration Accuracy +/-% (a)</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Max Pulse Width Setting (a)</td>
<td>10kHz</td>
<td>10kHz</td>
</tr>
<tr>
<td>Energy Scales</td>
<td>8µJ to 10J</td>
<td>8µJ to 10J</td>
</tr>
<tr>
<td>Lowest Measurable Energy µJ</td>
<td>10J to 100µJ</td>
<td>10J to 100µJ</td>
</tr>
<tr>
<td>Max Pulse Width ms</td>
<td>50ns</td>
<td>50ns</td>
</tr>
<tr>
<td>Maximum Pulse Rate pps</td>
<td>1kHz</td>
<td>1kHz</td>
</tr>
<tr>
<td>Noise on Lowest Range µJ</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Additional Error with Frequency %</td>
<td>±1%</td>
<td>±1%</td>
</tr>
<tr>
<td>Linearity with Energy for &gt;7% of full scale (c)</td>
<td>±1%</td>
<td>±1%</td>
</tr>
<tr>
<td>Damage Threshold J/cm² (b)</td>
<td>&lt;240nm</td>
<td>&lt;240nm</td>
</tr>
<tr>
<td>≤1000ns</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>1µs</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>300µs</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>2ms</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Maximum Average Power W</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>Maximum Average Power Density W/cm²</td>
<td>350W/cm²</td>
<td>350W/cm²</td>
</tr>
<tr>
<td>Uniformity over surface</td>
<td>±2% over central 50% of aperture</td>
<td>±2% over central 50% of aperture</td>
</tr>
<tr>
<td>Fiber Adapters Available (see page 102)</td>
<td>ST, FC, SMA, SC</td>
<td>ST, FC, SMA, SC</td>
</tr>
<tr>
<td>Weight kg</td>
<td>0.25</td>
<td>0.25</td>
</tr>
<tr>
<td>Compliance</td>
<td>CE, China RoHS</td>
<td>CE, China RoHS</td>
</tr>
<tr>
<td>Part Number</td>
<td>7202937</td>
<td>7202935</td>
</tr>
</tbody>
</table>

Note: (a) Calibration curve is verified and adjusted at specified wavelengths. At other wavelengths, there may be an additional error up to the value given.

Note: (b) With the “user threshold” setting set to minimum. For other settings, the spec is for >7% of full scale or greater than twice the “user threshold”, whichever is greater.

The user threshold is not available with LaserStar, Nova/Orion, Pulsar, USBi, Quasar and LaserStar. For these meters, the threshold is set to minimum and the linearity spec is >10% of full scale. The PE-C series will only operate with Nova or Orion meters with an additional adapter Ophir P/N 7Z08272 (see page 101). The adapter can introduce up to 1% additional measurement error.

For further information, see the FAQs on our Website.

Note: (d) With the LaserStar, Pulsar, USBi, Quasar and Nova/Orion with adapter, only 2 out of 5 pulse widths settings are available; for the PE25-C model the 2µs (displayed as “10µs”) and 1ms settings, and for the PE25BF-C model the 1ms and 10ms settings.

Note: (e) If the sensor is set to the 1064nm wavelength, then when measuring 10µm pulses, the reading will be approximately 1.19X the correct reading. If you use the attenuation function and set the attenuation to read 0.84, then you will have the correct reading at 1064nm. The additional error at 1064nm is +/-5%.

For drawings please see page 99
# 1.2.2 Pyroelectric Energy Sensors

## 10µJ to 10J

### Features
- Ø46mm apertures
- Metallic coating for high rep rates
- BF coating for highest damage threshold
- Rep rates up to 10kHz
- Measure lasers with pulse widths up to 20ms

### Model PE50-C
- **Use**
  - Aperture mm: Ø46
  - Absorber Type: metallic
  - Spectral Range µm (a): 0.15 - 3
  - Surface Reflectivity % approx.: 50
  - Calibration Accuracy +/- % (a): 3
  - Max Pulse Width Setting (a): 2µs
  - Energy Scales: 10J to 200µJ
  - Lowest Measurable Energy µJ (c): 10
  - Additional Error with Frequency %: ±1.5%
  - Damage Threshold J/cm² (b): <100ns 0.1
  - Maximum Average Power W: 15
  - Uniformity over surface: ±2% over central 50% of aperture
  - Fiber Adapters Available: ST, FC, SMA, SC
  - Compliance: CE, China RoHS

### Model PE50BF-C
- **Use**
  - Aperture mm: Ø46
  - Absorber Type: BF
  - Spectral Range µm (a): 0.15 - 3, 10.6 (e)
  - Surface Reflectivity % approx.: 20
  - Calibration Accuracy +/- % (a): 3
  - Max Pulse Width Setting (a): 3µs
  - Energy Scales: 10J to 200µJ
  - Lowest Measurable Energy µJ (c): 10
  - Additional Error with Frequency %: ±1.5%
  - Damage Threshold J/cm² (b): <100ns 0.8
  - Maximum Average Power W: 25
  - Uniformity over surface: ±2% over central 50% of aperture
  - Fiber Adapters Available: ST, FC, SMA, SC
  - Compliance: CE, China RoHS

### Energy Sensor with optional heat sink

### Table

<table>
<thead>
<tr>
<th>Model</th>
<th>PE50-C</th>
<th>PE50BF-C</th>
<th>Energy Sensor with optional heat sink</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aperture mm</td>
<td>046</td>
<td>046</td>
<td></td>
</tr>
<tr>
<td>Absorber Type</td>
<td>metallic</td>
<td>BF</td>
<td></td>
</tr>
<tr>
<td>Spectral Range µm</td>
<td>0.15 - 3</td>
<td>0.15 - 3, 10.6</td>
<td></td>
</tr>
<tr>
<td>Surface Reflectivity %</td>
<td>50</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Calibration Accuracy +/- %</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Max Pulse Width Setting (a)</td>
<td>2µs</td>
<td>3µs</td>
<td></td>
</tr>
<tr>
<td>Energy Scales</td>
<td>10J to 200µJ</td>
<td>10J to 200µJ</td>
<td>10J to 200µJ</td>
</tr>
<tr>
<td>Lowest Measurable Energy µJ (c)</td>
<td>10</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Additional Error with Frequency %</td>
<td>±1.5% to 2kHz</td>
<td>±1.5% to 2kHz</td>
<td>±1.5% to 2kHz</td>
</tr>
<tr>
<td>Damage Threshold J/cm² (b)</td>
<td>0.1</td>
<td>0.8</td>
<td></td>
</tr>
<tr>
<td>Maximum Average Power W</td>
<td>15</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Uniformity over surface</td>
<td>±2% over central 50% of aperture</td>
<td>±2% over central 50% of aperture</td>
<td></td>
</tr>
<tr>
<td>Fiber Adapters Available</td>
<td>ST, FC, SMA, SC</td>
<td>ST, FC, SMA, SC</td>
<td></td>
</tr>
<tr>
<td>Compliance</td>
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<tr>
<td>Part Number</td>
<td>7202936</td>
<td>7202934</td>
<td></td>
</tr>
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</table>
# 1.2.3 High Energy Pyroelectric Sensors

## 20µJ to 10J

### Features
- Sensors with diffuser for high energies and high energy densities
- Metallic coating for high rep rates
- BF coating for highest damage threshold
- Wide spectral range. Measure YAG and harmonics and many more.
- Rep rates up to 10kHz
- Measure lasers with pulse widths up to 20ms

<table>
<thead>
<tr>
<th>Model</th>
<th>PE50-DIF-C</th>
<th>PE25BF-DIF-C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use</td>
<td>High rep rate. Complete calibration curve</td>
<td>Complete calibration curve. High damage threshold</td>
</tr>
<tr>
<td><strong>Aperture mm</strong></td>
<td>Ø35</td>
<td>Ø20</td>
</tr>
<tr>
<td><strong>Absorber Type</strong></td>
<td>Metallic with diffuser</td>
<td>BF with diffuser</td>
</tr>
<tr>
<td><strong>Spectral Range µm</strong></td>
<td>0.19 - 2.2, 2.94</td>
<td>0.24 - 2.2</td>
</tr>
<tr>
<td><strong>Surface Reflectivity % approx.</strong></td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td><strong>Calibration Accuracy +/- %</strong></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td><strong>Max Pulse Width Setting µs</strong></td>
<td>2µs, 30µs, 500µs, 1ms, 5ms</td>
<td>1ms, 2ms, 5ms, 10ms, 20ms</td>
</tr>
<tr>
<td><strong>Energy Scales</strong></td>
<td>10J to 200µJ, 10J to 200µJ, 10J to 200µJ, 10J to 200µJ, 10J to 200µJ, 10J to 200µJ, 10J to 200µJ, 10J to 200µJ, 10J to 200µJ, 10J to 200µJ</td>
<td>10J to 200µJ, 10J to 200µJ, 10J to 200µJ, 10J to 200µJ, 10J to 200µJ, 10J to 200µJ, 10J to 200µJ, 10J to 200µJ, 10J to 200µJ, 10J to 200µJ</td>
</tr>
<tr>
<td><strong>Lowest Measurable Energy µJ</strong></td>
<td>20, 20, 100, 120, 200, 100, 150, 200, 200, 300</td>
<td>1, 2, 5, 10, 20, 250Hz, 100Hz, 50Hz, 40Hz, 20Hz</td>
</tr>
<tr>
<td><strong>Max Pulse Width ms</strong></td>
<td>0.002, 0.03, 0.5, 1, 5</td>
<td>1, 2, 5, 10, 20</td>
</tr>
<tr>
<td><strong>Maximum Pulse Rate pps</strong></td>
<td>10kHz</td>
<td>250Hz, 100Hz, 50Hz, 40Hz, 20Hz</td>
</tr>
<tr>
<td><strong>Noise on Lowest Range µJ</strong></td>
<td>±2% to 2kHz, ±4% to 5kHz</td>
<td>±1% to 1kHz, ±1% to 1kHz, ±1% to 1kHz, ±1% to 2kHz</td>
</tr>
<tr>
<td><strong>Additional Error with Frequency %</strong></td>
<td>±2% to 2kHz, ±4% to 5kHz</td>
<td>±2% to 2kHz, ±4% to 5kHz</td>
</tr>
<tr>
<td><strong>Linearity with Energy for &gt;7% of full scale %</strong></td>
<td>±1.5%</td>
<td>±2%</td>
</tr>
<tr>
<td><strong>Damage Threshold J/cm²</strong></td>
<td>±2%</td>
<td></td>
</tr>
<tr>
<td><strong>&lt;100ns</strong></td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td><strong>1µs</strong></td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td><strong>300µs</strong></td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td><strong>2ms</strong></td>
<td>40</td>
<td>60</td>
</tr>
<tr>
<td><strong>Maximum Average Power W</strong></td>
<td>25, 40 with optional heat sink</td>
<td>20, 30 with optional heat sink</td>
</tr>
<tr>
<td><strong>Maximum Average Power Density W/cm²</strong></td>
<td>100</td>
<td>120</td>
</tr>
<tr>
<td><strong>Uniformity over surface %</strong></td>
<td>±2.5% over central 20mm</td>
<td>±2.5% over central 10mm</td>
</tr>
<tr>
<td><strong>Weight kg</strong></td>
<td>0.25</td>
<td>0.25</td>
</tr>
<tr>
<td><strong>Compliance</strong></td>
<td>CE, China RoHS</td>
<td>CE, China RoHS</td>
</tr>
</tbody>
</table>

### Part Number
- **PE50-DIF-C**: 7Z02939
- **PE25BF-DIF-C**: 7Z02941

### Notes:
- (a) Calibration curve is verified and adjusted at specified wavelengths. At other wavelengths, there may be an additional error up to the value given.
- (b) For wavelengths >=2.1µm, derate to 40% of above values. For beam size <=4mm, derate to 50% of above values.
- (c) With the “user threshold” setting set to minimum. For other settings, the spec is for >7% of full scale or greater than twice the “user threshold”, whichever is greater.
- (d) With the LaserStar, Pulsar, USBI, Quasar and Nova/Orion with adapter, only 2 out of 5 pulse widths settings are available; for the PE50-DIF-C model the 2µs (displayed as “30µs”) and 1ms settings, and for the PE25BF-DIF-C model the 1ms and 10ms settings.

* For drawings please see page 99.
1.2.3 High Energy Pyroelectric Sensors

100µJ to 40J

**Features**
- Sensors with diffuser for high energies and high energy densities
- BF coating for highest damage threshold
- BB coating for spectral flatness
- Wide spectral range. Measure YAG and harmonics and many more.
- Rep rates up to 250Hz
- Measure lasers with pulse widths up to 20ms
- PE50BF-DIFH-C sensor - highest damage threshold

### Model Use

<table>
<thead>
<tr>
<th>Model</th>
<th>PE50BF-DIF-C</th>
<th>PE50BF-DIFH-C</th>
<th>PE50BB-DIF-C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aperture mm</td>
<td>Ø35</td>
<td>Ø46</td>
<td>Ø33</td>
</tr>
<tr>
<td>Absorber Type</td>
<td>BF with diffuser</td>
<td>BF with diffuser</td>
<td>BB with diffuser</td>
</tr>
<tr>
<td>Energy Scales</td>
<td>10J to 2mJ</td>
<td>10J to 2mJ</td>
<td>40J to 8mJ</td>
</tr>
<tr>
<td>Lowest Measurable Energy mJ</td>
<td>0.2</td>
<td>0.4</td>
<td>0.1</td>
</tr>
<tr>
<td>Maximum Pulse Ratepps</td>
<td>250Hz</td>
<td>100Hz</td>
<td>40Hz</td>
</tr>
<tr>
<td>Additional Error with Frequency %</td>
<td>±1%</td>
<td>±1%</td>
<td>±1%</td>
</tr>
<tr>
<td>Damage Threshold J/cm²</td>
<td>PE50BF-DIF-C</td>
<td>PE50BF-DIFH-C</td>
<td>Diffuser out</td>
</tr>
<tr>
<td>Maximum Average Power W</td>
<td>25, 40 with optional heat sink</td>
<td>10, 15 with optional heat sink</td>
<td>Diffuser in</td>
</tr>
<tr>
<td>Uniformity over surface</td>
<td>±2.5% over central 20mm</td>
<td>±2% over 70% of diameter</td>
<td>±2.5% over central 20mm</td>
</tr>
<tr>
<td>Linearity with Energy for &gt;7% of full scale (c)</td>
<td>±1%</td>
<td>±1%</td>
<td>±1%</td>
</tr>
<tr>
<td>Compliance</td>
<td>CE, China RoHS</td>
<td>CE, China RoHS</td>
<td>CE, China RoHS</td>
</tr>
<tr>
<td>Version</td>
<td>7Z02940</td>
<td>7Z02943</td>
<td>7Z02947</td>
</tr>
</tbody>
</table>

Notes:
- (a) Calibration accuracy at various wavelengths as specified here.
- At other wavelengths, there may be an additional error up to the value given.
- (b) For wavelengths >2.1μm, derate to 10% of above values.
- For wavelengths below 600nm, derate to 60% of given values (for DIFH 50% of given values).
- For wavelengths below 240nm, derate to 1J/cm².
- Calibrated at 1064nm, 355nm, 532nm, 1064nm and 2100nm.
- Specified wavelengths: 193nm, 248-266nm, 355nm, 532nm, 1064nm and 2100nm.
- For beam size <=5mm. For 10mm beam, derate DIF to 80% and DIFH to 70% of above.

**Notes:**
- (a) With the "user threshold" setting set to minimum. For other settings, the spec is for >7% of full scale or greater than twice the "user threshold" whichever is greater.
- The user threshold is not available with LaserStar, Nova/Oriion, Pulsar, USBi and Quasar for these meters, the threshold is set to minimum and the linearity spec is >10% of full scale.
- Calibration accuracy at 2100nm, ±5%.
- For further information, see the FAQs on our Website.

*For drawings please see page 99*
### 1.2.3 High Energy Pyroelectric Sensors

**10µJ to 40J**

**Features**
- Removable diffusers
- PE50-DIF-ER-C mainly for NIR lasers
- PE100BF-DIF-C for very large beams
- Rep rates up to 10kHz
- Measure lasers with pulse widths up to 20ms

<table>
<thead>
<tr>
<th>Model</th>
<th>PE50-DIF-ER-C</th>
<th>PE100BF-DIF-C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use</td>
<td>Mainly for 1064nm, 2.1µm and 2.94µm</td>
<td>Very large aperture</td>
</tr>
<tr>
<td>Diffuser</td>
<td>Diffuser out</td>
<td>Diffuser in</td>
</tr>
<tr>
<td>Aperture mm</td>
<td>Ø46</td>
<td>Ø33</td>
</tr>
<tr>
<td>Absorber Type</td>
<td>Metallic</td>
<td>BF with diffuser</td>
</tr>
<tr>
<td>Spectral Range µm (a)</td>
<td>0.19 - 3</td>
<td>0.15 - 3</td>
</tr>
<tr>
<td>Surface Reflectivity % approx.</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Calibration Accuracy +/-% (a)</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Max Pulse Width Setting (µs)</td>
<td>2µs, 3µs, 5µs, 10µs</td>
<td>10µs, 20µs, 50µs, 100µs</td>
</tr>
<tr>
<td>Energy Scales</td>
<td>10J to 200µJ</td>
<td>10J to 2mJ</td>
</tr>
<tr>
<td>Lowest Measurable Energy mJ (b)</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>Max Pulse Width ms</td>
<td>0.002</td>
<td>0.002</td>
</tr>
<tr>
<td>Maximum Pulse Rate pps</td>
<td>10kHz, 5kHz, 800Hz</td>
<td>25kHz, 5kHz, 800Hz</td>
</tr>
<tr>
<td>Noise on Lowest Range µJ</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Additional Error with Frequency %</td>
<td>±2% to ±3%</td>
<td>±2% to ±3%</td>
</tr>
<tr>
<td>Linearity with Energy for &gt; 10% of full scale (b)</td>
<td>±1.5%</td>
<td>±1%</td>
</tr>
<tr>
<td>Damage Threshold J/cm²</td>
<td>&lt;100ns: 0.1, 1µs: 3, 300µs: 2, 2ms: 6</td>
<td>15, 25 with optional heat sink: 40, 60 with optional heat sink: 25</td>
</tr>
<tr>
<td>Maximum Average Power W</td>
<td>20</td>
<td>15, 25 with optional heat sink: 40, 60 with optional heat sink: 25</td>
</tr>
<tr>
<td>Weight kg</td>
<td>0.3</td>
<td>1.2</td>
</tr>
<tr>
<td>Compliance</td>
<td>CE, China RoHS</td>
<td>CE, China RoHS</td>
</tr>
<tr>
<td>Version</td>
<td>7Z02948</td>
<td>7Z02942</td>
</tr>
</tbody>
</table>

**Notes:**
- (a) Calibrated at 532nm and 1064nm only for PE50-DIF-ER-C, at 1064nm, 2100nm and 2940nm only for PE100BF-DIF-C.
- (b) With the "user threshold" setting set to minimum. For other settings, the spec is for >10% of full scale or greater than twice the "user threshold", whichever is greater.

**PE50-DIF-ER-C**

- Removable diffusers
- Diffuser assembly adjustable
- Compatible with Centauri, StarBright, StarLite, Nova II, Vega, Juno, Juno+ and EA-1
- Calibrated at 532nm and 1064nm only

**PE100BF-DIF-C**

- Removable diffuser assembly
- Diffuser out adjustable
- Calibrated at 532nm, 1064nm and 1550nm only
1.2.3 High Energy Pyroelectric Sensors

1mJ to 40J

Features
- Fan or conduction cooled for high average power capability
- BF coating with diffuser for highest damage threshold
- Wide spectral range. Measure YAG and harmonics and many more
- Rep rates up to 250Hz
- Measure lasers with pulse widths up to 20ms

Model

<table>
<thead>
<tr>
<th>Use</th>
<th>FPE80BF-DIF-C</th>
<th>PE80BF-DIF-C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diffuser</td>
<td>High average power pulsed lasers</td>
<td>Large aperture pulsed lasers</td>
</tr>
<tr>
<td>Aperture mm</td>
<td>Ø53</td>
<td>Ø67</td>
</tr>
<tr>
<td>Absorber Type</td>
<td>BF with diffuser</td>
<td>BF with diffuser</td>
</tr>
<tr>
<td>Spectral Range μm (a)</td>
<td>0.19 – 2.2, 2.94</td>
<td>0.19 – 2.2, 2.94</td>
</tr>
<tr>
<td>Surface Reflectivity %</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Calibration Accuracy (+/- %)</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Max Pulse Width Setting (a)</td>
<td>Energy Scales</td>
<td>Energy Scales</td>
</tr>
<tr>
<td>1ms</td>
<td>40 to 40mJ</td>
<td>40 to 40mJ</td>
</tr>
<tr>
<td>2ms</td>
<td>40 to 40mJ</td>
<td>40 to 40mJ</td>
</tr>
<tr>
<td>5ms</td>
<td>40 to 40mJ</td>
<td>40 to 40mJ</td>
</tr>
<tr>
<td>10ms</td>
<td>40 to 40mJ</td>
<td>40 to 40mJ</td>
</tr>
<tr>
<td>20ms</td>
<td>40 to 40mJ</td>
<td>40 to 40mJ</td>
</tr>
<tr>
<td>Lowest Measurable Energy mJ (k,l)</td>
<td>1, 1, 2, 2, 2</td>
<td>4, 4, 4</td>
</tr>
<tr>
<td>Max Pulse Width ms</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Maximum Pulse Rate pps</td>
<td>250Hz, 100Hz, 50Hz, 40Hz, 20Hz</td>
<td>250Hz, 100Hz, 50Hz, 40Hz, 20Hz</td>
</tr>
<tr>
<td>Noise on Lowest Range μL</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>Maximum Average Power W</td>
<td>120</td>
<td>200</td>
</tr>
<tr>
<td>Maximum Average Power Density at Maximum Power W/cm²</td>
<td>400</td>
<td>400</td>
</tr>
<tr>
<td>Uniformity over surface</td>
<td>±2% over central 40mm</td>
<td>±2% over central 60mm</td>
</tr>
<tr>
<td>Cooling</td>
<td>fan (see page 103 for details)</td>
<td>conduction</td>
</tr>
<tr>
<td>Weight kg</td>
<td>1.2</td>
<td>0.5</td>
</tr>
<tr>
<td>Compliance</td>
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<td>CE, China RoHS</td>
</tr>
<tr>
<td>Version</td>
<td>7Z02950</td>
<td>7Z02954</td>
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</table>

Notes:
(a) Calibration accuracy at various wavelengths as specified here. At other wavelengths, there may be an additional error up to the value given.
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(c) Maximum average power at other wavelengths not specified above ±2% <250nm not calibrated.
(d) For wavelengths >2.1μm, derate to 10% of above values. For wavelengths below 600nm, derate to 60% of given values. For wavelengths below 240nm, derate to 1J/cm². For beam size <=16mm. For 32mm beam, derate to 50% of above values.
(e) With the “user threshold” setting set to minimum. For other settings, the spec is for >10% of full scale or greater than twice the “user threshold”, whichever is greater. The user threshold is not available with LaserStar, Nova/Oriion, Pulsar, USBI and Quasar. For these meters, the threshold is set to minimum and the linearity spec is >10% of full scale. The PE-E series will only operate with Nova or Orion meters with an additional adapter Ophir P/N 7Z08272 (see page 103). The adapter can introduce up to 1% additional measurement error. The user threshold feature allows adjustment of the internal threshold up to 25% of full scale if desired to avoid false triggering in noisy environments.
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1.2.4 Energy Sensors Accessories

1.2.4.1 Accessories for Pyroelectric Sensors

Fiberoptic Adapter for Pyroelectric Sensors

Oscilloscope Adapter for Pyroelectric Sensors

Heat Sink for PE-C Series Sensors

Beam Splitter Specifications

<table>
<thead>
<tr>
<th>Material</th>
<th>UV grade fused silica</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spectral range</td>
<td>0.19 - 2.2µm</td>
</tr>
<tr>
<td>Aperture</td>
<td>Ø60mm</td>
</tr>
<tr>
<td>Damage threshold for pulses</td>
<td>&lt;10ns PW 3J/cm²  &gt;300µs PW 200J/cm²</td>
</tr>
<tr>
<td>Fraction split off</td>
<td>See graph</td>
</tr>
</tbody>
</table>

Accessory Description Part number

Heat Sink Heat sink that screws onto rear of PE25 and PE50 series sensors and allows working at over 50% higher average powers. 7Z08267

Scope Adapter Plugs in between the PE sensor and power meter. Provides BNC output to scope to see every pulse up to the maximum frequency of the sensor. 7Z11012

Fiber Adapters To mount fibers to sensors you need an adapter bracket and fiber adapter. All fiber adapters are compatible with the adapter bracket selected.

Fiber Adapter Brackets Mounting brackets to allow mounting fiber adapters to pyroelectric sensors.

<table>
<thead>
<tr>
<th>PE Sensor Family Type</th>
<th>Bracket P/N</th>
<th>Distance from fiber to detector</th>
</tr>
</thead>
<tbody>
<tr>
<td>PD10-C / PD10-IR-C / PD10-pJ-C</td>
<td>7Z08275</td>
<td>10mm</td>
</tr>
<tr>
<td>PE50-C / PE50BF-C</td>
<td>7Z08270</td>
<td>15mm</td>
</tr>
<tr>
<td>PE9-C / PE9-ES-C / PE10-C / PE10BF-C / PE25-C / PE25BF-C</td>
<td>7Z08269</td>
<td>10mm</td>
</tr>
</tbody>
</table>

Fiber Adapters Fiber adapters for mounting to above brackets

For all PE sensors above Beam Splitter Assembly to measure pulsed laser sources too energetic for direct measurement. The reading with the Beam Splitter can be calibrated by setting the laser to a lower energy that will not damage the sensor and then taking a measurement with the beam splitter and without and taking the ratio.
### 1.2.4.1 Accessories for Pyroelectric Sensors - Continued

<table>
<thead>
<tr>
<th>Accessory</th>
<th>Description</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Damage Threshold Test Plates</strong></td>
<td>Test plates with same absorber coating as the sensor. For testing that laser beam is not above damage threshold</td>
<td>Metallic type</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7E06031A</td>
</tr>
<tr>
<td><strong>Nova PE-C Adapter</strong></td>
<td>The adapter plugs between the Nova D15 socket and the smart plug of the PE-C sensor to allow the Nova to operate with PE-C series sensors. See PE-C spec sheet for details.</td>
<td>7Z08272</td>
</tr>
<tr>
<td><strong>PE-C to PE Size Adapter</strong></td>
<td>The newer PE-C series sensors have a Ø62mm diameter. The older PE series sensors have a Ø85mm diameter. This adapter allows using the PE-C type sensors in jigs and setups that were originally designed for PE sensors.</td>
<td>7Z08273</td>
</tr>
<tr>
<td><strong>Negative Polarity Power Supply/Charger</strong></td>
<td>For FPE80BF-DIF-C sensor (1 unit supplied with the sensor)</td>
<td>7E05029</td>
</tr>
</tbody>
</table>