Pyroelectric, Photodiode and RP Heads for Repetitive Energy Measurements

Pyroelectric and Photodiode Heads

RP Heads

Pyroelectric and Photodiode Heads for Repetitive Pulses

Ophir pyroelectric meters use innovative, patented technology which facilitates accurate and repeatable measurements over an extensive range of conditions. Ophir's pyroelectric meters exclusive features are:

Accuracy

- Accuracy completely independent of pulse rate, duration or history.
- Built-in wavelength correction.

Performance

- Pulse rate to 5000Hz (PE10).
- Energy measurement to 10pJ (PD10-pJ).
- High damage threshold.
- Diffuser models for high energy YAG / Holmuim / Erbium lasers.
- Diffuser is removable.
- Metallic and broadband coatings.
- Wide dynamic range.

Versatility

- Measurements of very long and very short pulses (e.g. excimer and holmium) with same head.
- **Nova, Nova II** and **Laserstar** displays with Smart Connector, compatible with all Ophir Thermopile and Photodiode heads.
  Measurement from nW to KW, µJ to 200J with appropriate heads
- **Nova** and **Laserstar** displays show average power, frequency, average energy, exposure, energy bar graph and more.
- **Nova II** and **Laserstar** displays allow on-board storage and transmission of every pulse to >1500Hz.

RP Heads

The use of Ophir RP (Repetitive Pulse) models together with the Laserstar display allows you to measure energy of repetitively pulsed lasers with a high degree of accuracy. The innovative principle of the RP (patented) combines highly accurate measurement of average power using a thermal head, with measurements of relative pulse energy using a photodiode that provides the energy per pulse. This innovation allows RP to measure powers and energies only a thermal head is able to measure with measurement of repetitive pulse energy. You can also measure at repetition rates never before available.

The RP also gives you a wealth of information about your laser. Along with pulse energy it provides data about average power, frequency, minimum and maximum values, missing pulses, time jitter and standard deviation. The display of pulse energies can be either numerical or in graphs. Up to 50,000 points, of data can be stored on-board in nonvolatile memory and can be sent either offline or online to PC.

The RP heads have a separate fast photodiode to measure temporal pulse shape. When the BNC output is connected to a fast scope, the pulse shape is displayed with ns resolution.

The RP also does everything a standard Ophir thermal head can do such as power measurement, single shot energy and laser power tuning.

Pyroelectric and Photodiode Heads for Repetitive Pulses Photodiode Heads

PD10

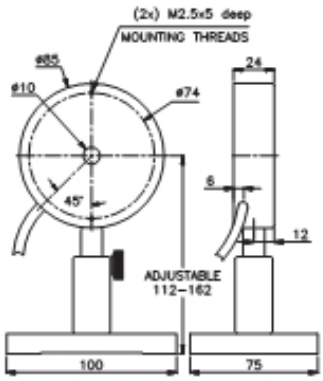
Pulse Energy Measurements 1nJ to 20µJ, up to 10,000Hz

Recommended Use: Measurement of low energies and high repetition rates

Special Features: Energies down to nanojoules and frequencies up to 10KHz

Spectral Response:	Silicon Photodiode, 0.19 - 1.1µm	
Surface reflectivity:	50% approx.	
Aperture:	Ø10mm	
Energy Scales:	20µJ/2µJ/200nJ/20nJ	
Lowest Measurable Energy:	2nJ at 900nm	
Noise on Lowest Range:	0.2nJ	
Maximum Pulse Width:	5µs	
Additional Error with Frequency:	±1% to 10000Hz	
Maximum Average Power:	50mW at 800nm	
Maximum Average Power Density:	50W/cm²	
Maximum Energy vs. Wavelength	Wavelength	Maximum Energy
	<300nm	15µJ
	350 - 550nm	8µJ
	>800nm	5µJ
Damage Threshold:	0.1J/cm²	
Calibration Accuracy:	± 5%	
Additional Error with Wavelength:	Additional Error	Wavelength
	±3%	193nm, 200-250nm
	0	250-950nm
	±2%	950-1100nm
Linearity:	±1% for > 10% of full scale	

PD10



PD10-pJ

NEW

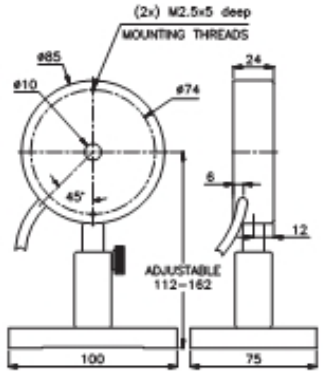
Pulse Energy Measurements 10pJ to 200nJ, up to 10,000Hz

Recommended Use: Measurement of extremely low energies and high repetition rates

Special Features: Energies down to picojoules frequencies up to 10KHz

Spectral Response:	Silicon Photodiode, 0.2 - 1.1µm	
Surface Reflectivity:	30% approx.	
Aperture:	Ø10mm	
Energy Scales:	200nJ/20nJ/2nJ/200pJ	
Lowest Measurable Energy:	10pJ at 900nm	
Noise on Lowest Range:	2pJ	
Maximum Pulse Width:	5µs	
Additional Error with Frequency:	±1% to 10000Hz	
Maximum Average Power:	0.5mW	
Maximum Average Power Density:	5W/cm²	
Maximum Energy vs. Wavelength	Wavelength	Maximum Energy
	<300nm	150nJ
	350-550nm	75nJ
	>800nm	50nJ
Damage Threshold:	0.1J/cm²	
Calibration Accuracy:	± 5%	
Additional Error with Wavelength:	Additional Error	Wavelength
	±2%	200-250nm
	0	250-950nm
	±2%	950-1100nm
Linearity:	±1% for > 10% of full scale	

PD10-pJ



Ordering information		
Item	**Description**	**Ophir P/N**
PD10 V2	Photodiode energy meter for up to 15µJ and 10KHz	1Z02823
PD10-pJ V2	Photodiode energy meter for up to 200nJ and 10KHz	1Z02824

Pyroelectric Heads

PE9 / PE9-F

Pulse Energy Measurements 0.2µJ up to 1mJ, up to 20KHz

Recommended Use: Measurement of low energies

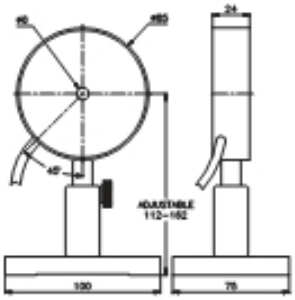
Special Features: PE9: Low energies, rep rate up to 4KHz, broad spectral range
PE9-F: As above with rep rates to 20KHz

Specifications	PE9	PE9-F
Maximum Pulse Width:	15µs	0.5µs
Maximum Pulse Rate:	4KHz	20KHz
Additional Error with Frequency:	±2.5% to 3KHz, ±8% to 4KHz	±2% error to 20kHz
Lowest Measurable Energy:	<0.2µJ	0.3µJ
Applicable Displays:	Operates with all Ophir smart displays	Operates only with Nova II Laserstar and USB Interface
Spectral Response:	Metallic absorber 0.19-12µm	
Surface Reflectivity:	50% approx	
Energy Scales:	1mJ, 200µJ, 20µJ, 2µJ	
Noise on Lowest Range:	30nJ	
Calibration Accuracy:	± 3%	
Additional Error with Wavelength:		
157nm	±10%	
193nm	0	
240-800nm	±4%	
1064nm	0	
1480-1600nm	0	
2-3µm	±8%	
10.6µm	±15%	
Damage Threshold:		
<100ns	0.1J/cm²	
1µs	0.2J/cm²	
Aperture:	Ø 8mm	
Maximum Average Power:	2W	
Maximum Average Power Density:	50W/cm²	
Linearity:	±1% ±10nJ for >10% of full scale [a]	
Cooling:	Convection	

Notes: a. For PE9-F on lowest scale, offset can reach - 100nJ for frequencies below 5KHz

NEW

PE9



Ordering information		
Item	**Description**	**Ophir P/N**
PE9-V2	Pyroelectric energy meter for very low energies 0.2µJ to 1mJ, 4KHz, metallic absorber.	1Z02877
PE9-F	Pyroelectric energy meter for very low energies 0.3µJ to 1mJ, 20KHz, metallic absorber. Operates with Nova II, Laserstar and USB Interface only.	1Z02882

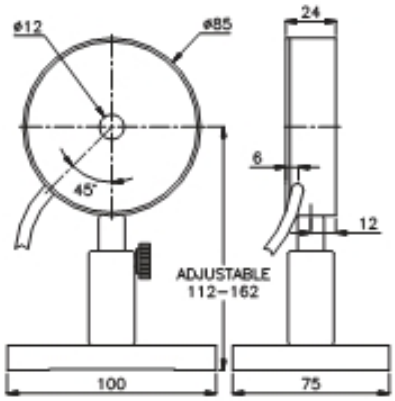
PE10 / PE10BB

Pulse Energy Measurements 2µJ - 10mJ, up to 4000Hz

Recommended Use: High and low repetition rate pulse measurement of low energy lasers
Special Features: Very low energies

Specifications	PE10	PE10BB
Spectral Response:	Metallic absorber 0.15 - 12µm	Black absorber 0.15 - 20µm
Surface Reflectivity:	50% approx.	5% approx.
Maximum Pulse Width:	20µs	500µs
Maximum Pulse Rate:	4000Hz	150Hz
Energy Scales:	10mJ / 2mJ / 200µJ / 20µJ	10mJ / 1mJ / 100µJ
Lowest Measurable Energy:	2µJ	10µJ
Noise on Lowest Range:	0.3µJ	2.5µJ
Additional Error with Frequency:	±1.5% to 3KHz,±3% to 4KHz	±1.5% to 150Hz
Calibration Accuracy:	± 3%	± 3%
Additional Error with Wavelength:		
157nm	±10%	
193nm	0	±2%
240-800nm	±4%	±2%
1064nm	0	0
2-3µm	±8%	±2%
10.6µm	±15%	±5%
Damage Threshold:		
<100ns	0.1J/cm²	0.3J/cm²
1µs	0.2J/cm²	0.3J/cm²
300µs	3J/cm²	1J/cm²
Aperture:	Ø12mm	
Maximum Average Power:	2W	
Maximum Average Power Density:	50W/cm²	
Linearity:	± 2% for >10% of full scale	
Cooling:	Convection	

PE10



Ordering information		
Item	**Description**	**Ophir P/N**
PE10-V2	Pyroelecric energy meter for low energies 2µJ to 10mJ. Spectral range 0.19 - 12µm	1Z02862
PE10-BB-V2	PE10 with broadband spectrally flat absorber	1Z02871

PE25/PE25BB/PE25BBH

Pulse Energy Measurements 15µJ - 10J, up to 5000Hz

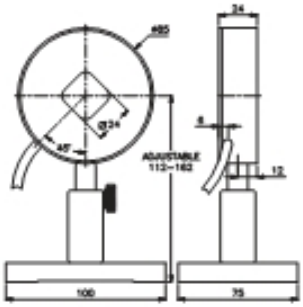
Recommended Use: General use for medium aperture pulsed lasers to 10ms and 5000Hz

Special Features: PE25: High repetition rate, high sensitivity
PE25BB: Spectrally flat, high damage threshold
PE25BBH: Spectrally flat, low reflection, high repetition rate

Specifications	PE25		PE25BB		PE25BBH	
Spectral Response:	Metallic absorber		Black absorber		High speed black absorber	
	0.15 - 3µm		0.15 - 20µm		0.15 - 1.7µm, 10.6µm	
Surface Reflectivity:	50% approx.		5% approx.		5% approx.	
Max Pulse Width Setting:	Short	Long	Short	Long	Short	Long
Maximum Pulse Width:	30µs	1ms	3ms	10ms	50µs	1ms [b]
Maximum Pulse Rate:	5000Hz	250Hz	40Hz	12Hz	1400Hz	200Hz
Energy Scales:	10J to 200µJ	10J to 2mJ	10J to 2mJ	10J to 20mJ	10J to 200µJ	10J to 2mJ
Lowest Measurable Energy:	15µJ	70µJ	100µJ	1mJ	20µJ	100µJ
Noise on Lowest Range:	0.8µJ	2µJ	20µJ	100µJ	1µJ	4µJ
Additional Error with Frequency:	±2% to 5KHz	±1%	±1%	±2%	±2%	±1%
Calibration Accuracy:	± 3%		± 3%		± 3%	
Additional Error with Wavelength:						
157nm	±5%		N.A.		±5%	
193nm	±2%		±2%		±2%	
248nm	0		±2%		0	
355nm	0		±2%		±1%	
300-800nm	±2%		±2%		±2%	
1064µm	0		0		0	
1.5-2µm	±2%		±2%		±2%	
2.94µm	0		±2%		N.A.	
10.6µm	N.A.		±5%		±5%	
Damage Threshold:						
<100ns	0.1J/cm²		0.3J/cm²		0.2J/cm²	
1µs	0.2J/cm²		0.3J/cm²		0.3J/cm²	
300µs	2J/cm²		1J/cm²		2J/cm²	
2ms	6J/cm²		2J/cm²		6J/cm²	
Linearity:	± 2% for >10% of full scale [a]		±2% for >10% of full scale		±2% for >10% of full scale	
Aperture:	24 x 24mm					
Maximum Average Power:	10W					
Maximum Average Power Density:	10W/cm²					
Cooling:	Convection					

Notes: a. ±3% for long pulses
b: 3% lower reading at pulse width >500µs

PE25/PE25BB/
PE25BBH



Ordering Information		
Item	**Description**	**Ophir P/N**
PE25-V2	24x24mm aparture pyroelectric energy meter with metallic absorber	1Z02861
PE25BB-V2	24x24mm aperture pyroelectric energy meter with broadband absorber	1Z02865
PE25BBH-V2	24x24mm aperture pyroelectric energy meter with high rep rate spectrally flat black absorber	1Z02873

PE50/PE50BB/PE50BBH

Pulse Energy Measurements 25µJ to 10J, up to 4000Hz

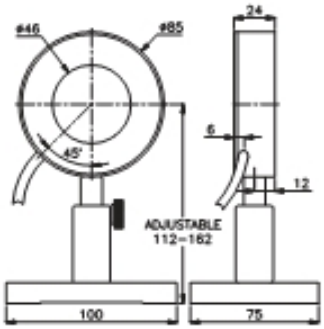
Recommended Use: General for large aperture pulsed lasers to 10ms and 4000Hz

Special Features: PE 50: High repetition rate, high sensitivity
PE 50BB: Spectrally flat, high damage threshold very long pulses PE 50BBH: Spectrally flat, 10W reflection, high repetition rate

Specifications	PE50		PE50BB		PE50BBH	
Spectral Response:	Metallic absorber 0.15 - 3µm		Black absorber 0.15 - 20µm		High speed black absorber 0.15 - 1.7µm, 10.6µm	
Surface Reflectivity:	50% approx.		5% approx.		5% approx.	
Max Pulse Width Setting:	Short	Long	Short	Long	Short	Long
Maximum Pulse Width:	30µs	1ms	3ms	10ms	50µs	1ms [a]
Maximum Pulse Rate:	4000Hz	250Hz	40Hz	10Hz	1000Hz	150Hz
Energy Scales:	10J to 200µJ	10J to 2mJ	10J to 2mJ	10J to 20mJ	10J to 200µJ	10J to 2mJ
Lowest Measurable Energy:	25µJ	80µJ	100µJ	1mJ	20µJ	100µJ
Noise on Lowest Range:	2µJ	8µJ	15µJ	40µJ	2µJ	10µJ
Additional Error with Frequency:	±2%	±1%	±1%	±1%	±1.5%	±1%
Calibration Accuracy:	± 3%		± 3%		± 3%	
Additional Error with Wavelength:						
157nm	±5%		N.A.		±5%	
193nm	±2%		±2%		±2%	
248nm	0		±2%		0	
355nm	0		±2%		±1%	
300-800nm	±2%		±2%		±2%	
1064nm	0		0		0	
1.5-2µm	±2%		±2%		±2%	
2.94µm	0		±2%		N.A.	
10.6µm	N.A.		±5%		±5%	
Damage Threshold:						
<100ns	0.1J/cm²		0.3J/cm²		0.2J/cm²	
1µs	0.2J/cm²		0.3J/cm²		0.3J/cm²	
300µs	2J/cm²		1J/cm²		2J/cm²	
2ms	6J/cm²		2J/cm²		6J/cm²	
Linearity:	± 2% for >10% of full scale		±2% for >10% of full scale		±2% for >10% of full scale	
Maximum Average Power:	20W		15W		15W	
Aperture:	ø46mm					
Maximum Average Power Density:	10W/cm²					
Cooling:	Convection					

Notes: a. 3% lower reading at pulse width >500µs. PE50BBH-L version available with pulse widths up to 10ms

PE50/PE50BB/PE50BBH



PE50 Vacuum Flange

PE50 with vacuum flange for DUV measurement at 157nm

Ordering information		
Item	**Description**	**Ophir P/N**
PE50-V2	46mm aperture pyroelectric energy meter with metallic absorber	1Z02860
PE50BB-V2	46mm aperture pyroelectric energy meter with broadband absorber	1Z02864
PE50BBH-V2	46mm aperture pyroelectric energy meter with high rep rate spectrally flat black absorber	1Z02874
PE50BBH-L-V2	46mm aperture pyroelectric energy meter with spectrally flat black absorber for pulse widths up to 10ms	1Z02881
PE50-157-V2	KF40 Vacuum flange to replace PE50 front flange. Fits PE50 to vacuum system for measuring vacuum UV 157nm radiation	1Z11018

PE25BB-DIF/PE25-DIF

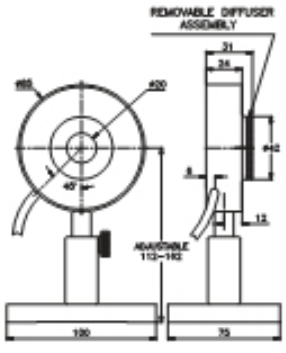
Pulse Energy Measurements 50µJ to 20J, up to 2500Hz

Recommended Use: PE25BB-DIF: High evergy YAG lasers, general
PE25-DIF: High rep rate high energy lasers

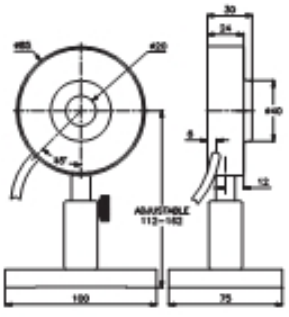
Special Features: Diffuser for high damage threshold

Specifications	PE25BB-DIF				PE25-DIF	
	Diffuser out		Diffuser in		Diffuser in only	
Aperture:	24x24mm		Ø20mm		Ø20mm	
Spectral Response:	0.15 - 20µm		0.4 - 2.5µm		0.4 - 2.5µm	
Surface Reflectivity:	5% approx.		15% approx.		15% approx.	
Calibration Accuracy:	± 3%		± 3%		± 3%	
Additional Error with Wavelength:						
193nm	±2%		N.A.		N.A.	
248nm	±2%		N.A.		N.A.	
400-800nm	±2%		See note a		See note a	
1064nm	0		0		0	
1.5-2.5µm	-4% (See note c)		See note b		See note b	
2.1µm	-4% (See note c)		0		N.A.	
10.6µm	±5% (See note c)		N.A.		N.A.	
Damage Threshold:						
<100ns	0.3J/cm²		1.5J/cm²		1.5J/cm²	
1µs	0.3J/cm²		2J/cm²		3J/cm²	
300µs	1J/cm²		10J/cm²		30J/cm²	
Linearity:	±2% for>10% of full scale		±2% for >10% of full scale		±2% for >10% of full scale	
Maximum Average Power:	10W		30W		30W	
Max Ave Power Density:	10W/cm²		300W/cm²		300W/cm²	
Max Pulse Width Setting:	Short	Long	Short	Long	Short	Long
Maximum Pulse Width:	3ms	12ms	3ms	12ms	50µs	1ms
Maximum Pulse Rate:	40Hz	10Hz	40Hz	10Hz	2500Hz	250Hz
Energy Scales:	10J to 2mJ	10J to 20mJ	20J to 4mJ	20J to 40mJ	20J to 4mJ	20J to 4mJ
Lowest Measurable Energy:	50µJ	500µJ	200µJ	1mJ	150µJ	200µJ
Noise on Lowest Range:	5µJ	20µJ	10µJ	50µJ	10µJ	10µJ
Additional Error with Frequency:	±1%	±2%	±1.5%	±1.5%	±1.5%	±1%
Cooling	Convection					

Notes:
a. Calibrated for 532nm
b. With diffuser installed, head is not calibrated at these wavelengths but provision is made for user calibration
c. When set to 106 setting



PE25BB-DIF



PE25-DIF

Ordering information		
Item	**Description**	**Ophir P/N**
PE25BB-DIF	24x24mm/20mm aperture pyroelectric energy meter with broadband absorber and removable diffuser	1Z02879
PE25-DIF	20mm aperture pyroelectric energy meter with fixed diffuser for high rep rates.	1Z02880

PE50BB-DIF/PE50DIF-ER

Pulse Energy Measurements 60µJ to 40J, up to 400Hz

Recommended Use: PE50BB-DIF: High energy YAG lasers, general
PE50DIF-ER: High rep rate high energy lasers, Erbium lasers

Special Features: Removable diffuser for high damage threshold

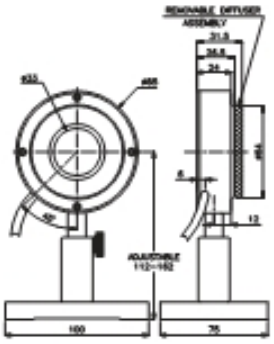
Specifications	PE50BB-DIF				PE50DIF-ER			
	Diffuser out		Diffuser in		Diffuser out		Diffuser in	
Aperture:	Ø46mm		Ø33mm		Ø46mm		Ø33mm	
Spectral Response:	0.19 - 20µm		0.4 - 2.5µm		0.19 - 3µm		0.4 - 3µm	
Surface Reflectivity:	5%		15%		50%		15%	
Calibration Accuracy:	± 3%		± 3%		± 3%		± 3%	
Additional Error with Wavelength:								
193nm	±2%		N.A.		N.A.		N.A.	
248nm	±2%		N.A.		0		N.A.	
400-800nm	±2%		See note a		±2%		See note b	
1064nm	0		0		0		0	
1.5-2.5µm	±2%		See note b		N.A.		See note b	
2.1µm, 2.94µm	±2%		N.A.		N.A.		0	
10.6µm	±5%		N.A.		N.A.		N.A.	
Damage Threshold:								
<100ns	0.3J/cm²		3J/cm²		0.1J/cm²		1.5J/cm²	
1µs	0.3J/cm²		3J/cm²		0.2J/cm²		3J/cm²	
300µs	1J/cm²		10J/cm²		4J/cm²		40J/cm²	
Linearity:	±2% for>10% of full scale		±2% for >10% of full scale		±2% for >10% of full scale		±2% for >10% of full scale	
Maximum Average Power:	15W		40W		20W		40W	
Max Ave Power Density:	10W/cm²		500W/cm²		10W/cm²		500W/cm²	
Max Pulse Width Setting:	Short	Long	Short	Long	Short	Long	Short	Long
Maximum Pulse Width:	3ms	10ms	3ms	10ms	200µs	1ms	200µs	1ms
Maximum Pulse Rate:	40Hz	10Hz	40Hz	10Hz	400Hz	200Hz	400Hz	200Hz
Energy Scales:	10J to 2mJ	10J to 20mJ	40J to 8mJ	40J to 80mJ	10J to 2mJ	10J to 2mJ	30J to 6mJ	30J to 6mJ
Lowest Measurable Energy:	100µJ	1mJ	500µJ	5mJ	60µJ	100µJ	300µJ	0.5mJ
Noise on Lowest Range:	15µJ	40µJ	80µJ	200µJ	5µJ	10µJ	30µJ	50µJ
Additional Error with Frequency:	±1%	±1%	±1%	±1%	±1%	±1%	±1%	±1%
Cooling	Convection							

Notes: a: Calibrated for 532nm
b: With diffuser installed, head is not calibrated at these wavelengths but provision is made for user calibration

PE50BB-DIF/PE50DIF-ER

DIFFUSER in

DIFFUSER out



Ordering information		
Item	**Description**	**Ophir P/N**
PE50BB-DIF-V2	33/46mm aperture pyroelectric energy meter with broadband absorber and removable diffuser	1Z02866
PE50DIF-ER-V2	33/46mm aperture pyroelectric energy meter with metallic absorber and removable diffuser	1Z02867

PE50-DIF-U

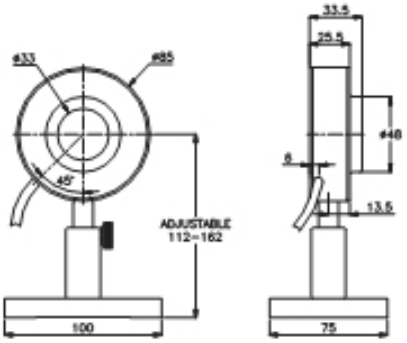
Pulse Energy Measurements 40µJ to 10J, up to 3000Hz

Recommended Use: High energy excimer lasers in the UV

Special Features: High damage threshold and high repetition rate
Millions of pulses with no change in calibration

Spectral Response:	0.19 - 0.4µm
Surface reflectivity:	15% approx.
Maximum Pulse Width:	30µs
Maximum Pulse Rate:	3000Hz
Energy Scales:	10J / 2J / 200mJ / 20mJ / 2mJ / 200µJ
Lowest Measurable Energy:	30µJ
Noise on Lowest Range:	1.5µJ
Additional Error with Frequency:	± 1%
Calibration Accuracy:	± 3%
Additional Error with Wavelength:	
193nm	0
248nm	0
308nm	±3%
351nm	±2%
Damage Threshold for <100ns pulses:	>300mJ/cm²
Linearity:	± 2% for >10% of full scale
Maximum Average Power:	20W
Aperture:	Ø33mm
Maximum Average Power Density:	25W/cm²
Uniformity over the Surface:	±2%
Change in Calibration with Dose:	1% change with 150,000J/cm²
Cooling:	Convection

PE50-DIF-U



PE50HD

Pulse Energy Measurements 1mJ to 10J, up to 100Hz

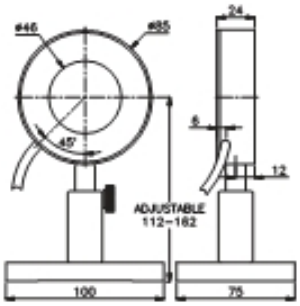
Recommended Use: High energy excimer lasers at 193nm

Special Features: High damage threshold for 193nm radiation

Spectral Response:	HD type for 157nm 12µm, calibrated at 193nm
Surface Reflectivity:	~10% in the UV
Maximum Pulse Width:	1ms [a]
Maximum Pulse Rate:	100Hz
Energy scales:	10J/1J/100mJ/10mJ
Lowest Measurable Energy:	0.5mJ
Noise on Lowest Range:	20µJ
Additional Error with Frequency	±1%
Calibration Accuracy:	± 3% at 193nm
Damage Threshold:	1J/cm² [b]
Linearity:	±2% for >10% of full scale
Maximum Average Power:	15W
Aperture:	Ø 46mm
Maximum Average Power Density:	10W/cm²
Uniformity over Surface	± 3% over 80% of area
Cooling:	Convection

Note: a. Linearity with pulse width: ±1% 0 - 400µs, ±4% at 1ms
Note: b. At energy densities above 0.5J/cm² reading may be lower with no permanent damage.

PE50HD



Ordering information		
Item	**Description**	**Ophir P/N**
PE50-DIF-U	33mm aperture pyroelectric head with high damage threshold and high repetition rate for UV lasers	1Z02875
PE50HD	46mm aperture pyroelectirc head with very high damage threshold absorber for 193nm	1Z02863

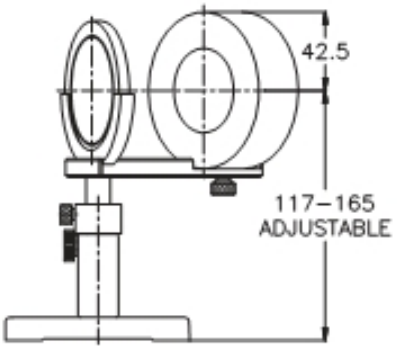
Beam Splitter for Pyro and Thermal Heads

Single and Multiple Pulse Measurements Increased Damage Threshold to 10X More

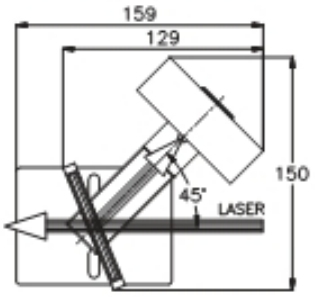
Recommended Use: High energy pulsed lasers (e.g. Excimer, YAG, Alexandrite and Ruby).
Special Features: Allows measurement of very high energy density lasers. For PE25, PE50, 30 and 30(150) series heads.

The beam splitter attachment for use with pyroelectric and some thermal heads allows reflection between 5% and 10% of the energy into the head while transmitting the rest. This enables measurement of very high energies and energy densities not measurable before. Provision is made for the PE25, PE50, 30 or 30(150) series heads to be mounted on the beam splitter assembly as shown in illustration. The beam splitter assembly swivels between the measurement position "A" and a position directly in the beam "B" where the beam splitter is removed. The user can check the exact calibration of the beam splitter by measuring the full beam in position "B" at a low energy which will not damage the head and then in position "A" and taking the ratio between "A" and "B".

Beam Splitter:	UV grade fused silica. Spectral range 0.19-3µm	
Aperture:	Ø60mm	
Maximum Energy Density on window J/cm²for single or repetitive pulses:	pulse width 10ns >300µs	damage threshold 5J/cm² >200J/cm²
Fraction split off by beam splitter at 45°:	4% to 9% depending on wavelength	

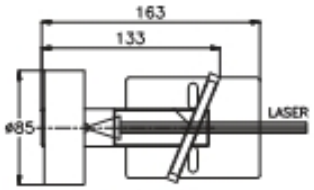


BEAM SPLITTER installed



Position "A"
beam splitter installed.
Fraction of beam
reflected into head.

BEAM SPLITTER removed



Position "B"
beam splitter removed.
Direct beam on head.

Ordering Information		
Item	**Description**	**Ophir P/N**
Beam Splitter	Beam Splitter for PE and thermal heads	1Z17001
Replacement window for Beam Splitter		1F01075

Fiberoptic Adapters and Accessories for Pyroelectric Heads

Pyroelectric Scope Adapter

Plug-in module allows Ophir pyroelectric smart heads to have an oscilloscope output in addition to the smart display. With this adapter, you can display on an oscilloscope every pulse up to the maximum operating frequency of the head. Unlike with “dumb” pyroelectric heads, the pulses are after signal conditioning and the height of the square topped pulses displayed is proportional to pulse energy.

Pyroelectric Test Slides

Package of 3 slides coated with the same absorber (metallic or broadband) as the pyroelectric head. Used to verify that the maximum energy density of the laser beam does not exceed damage limits. One test slide is supplied as standard with each head.

SCOPE ADAPTER

FIBER ADAPTER

TEST SLIDES

Ordering information		
Item	**Description**	**Ophir P/N**
Scope Adapter for Pro Head	Plugs in between the PE head and display. Provides BNC output to scope to see every pulse up to the maximum frequency of the head.	1Z11012
PE Metallic Test Plate - set of 3	Damage threshold test plate for metallic coating PE heads	1E06031A
PE BB Test Plate - set of 3 PE	Damage threshold test plate for BB coating PE heads	1E06031C
BBH Test Plate - set of 3 Ferrite	Damage threshold test plate for BBH coating PE heads	1E06031B
choke	Ferrite choke to install on head cable near head to reduce electromagnetic interference in situations of high EMI	1H4014

Fiber Adapters

Mounting fiber optics to your pyroelectric heads requires an adapter bracket then the fiber optic adapter for the type of fiber used. The information below also shows the distance from the fiber tip to the absorber or diffuser surface.

Ordering Information for Fiber Adapter Mounting Bracket (Each bracket can be used for all adapters below)			
PE head type-	**Head P/N**	**Bracket P/N**	**Distance from fiber to detector surface**
PD10-V2	1Z02823	1Z08236	10mm
PD10-pJ-V2	1Z02824	1Z08236	10mm
PE9	1Z02877	1Z08231	10mm
PE10-V2	1Z02862	1Z08236	10mm
PE25-V2	1Z02861	1Z08231	10mm
PE25BB-V2	1Z02865	1Z08231	10mm
PE50-V2	1Z02860	1Z08232	15mm
PE50BB-V2	1Z02864	1Z08232	15mm
PE50BB-DIF-V2	1Z02866	1Z08232	15mm
PE50DIF-ER-V2	1Z02867	1Z08232	15mm

Ordering Information for Fiber Adapters					
Head	**SC Fiber Adapter**	**LC Fiber Adapter**	**ST Fiber Adapter**	**FC Fiber Adapter**	**SMA Fiber Adapter**
All PE heads	1Z08227	1Z08228	1Z08226	1Z08229	1G01236