Photodiode Heads and Instruments

The PD-300 series heads offer spectral coverage from 193-1800nm. The power range of the series is from picowatts to 3 Watts.

OPHIR
Laser Measurement Group

PD300 Series Smart Heads

CW power 1pW to 30mW (300mW or 3W with supplied filter)

Recommended Use: Low power CW lasers, out of fiber measurement

- Fiber adapters available for SMA, ST, FC, LC, SC
- Automatic, dynamic cancellation of up to 98% of background light
- Swivel mount - handheld or stand
- From picoWatts to 300mW or 3W (PD300-3W)
- 200-1800nm with different models
- User-selected wavelength correction
- Resolution to 0.1pW
- Choice of units - Watts, dBm
- Screen graphics: Digital power, analog bar graph, zoom, power vs. time, laser tuning, average, offset (see examples below)

Since many low power lasers have powers of about 5 to 30mW, and most photodiode detectors saturate at about 2mW, the PD300 head series has been constructed with a built-in filter that enables the basic head to measure to 300mW without saturation. The PD300 and associated heads have extensive circuitry to reject both outside electromagnetic and electrostatic interference. They are fully CE qualified.

Examples of Screens with Nova Display (page 75)

Digital Power Screen

Wavelength correction
Watts or dBm
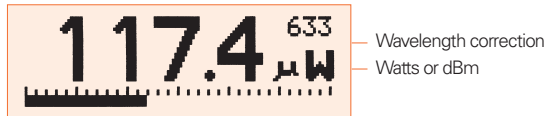
- Auto or manual range
- 120 point bargraph display
- Watts or dBm
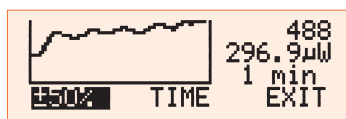- Wavelength correction, user-selected and programmable

Average Screen

Toggle Go / Stop

- Periodic (1/3 sec to 30 sec) or continuous (10 sec to 1 hour) average for fast changing or slowly changing lasers
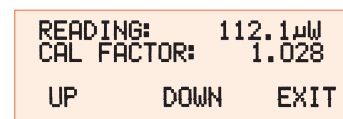
Laser Tuning Screen

Zoom   Time scale

- Autoranging
- Cursor for max power adjustment

Calibration Screen

Calibration factor adjustment

- Using known laser source

Laser Power & Energy

Heads

Displays

Beam Profile Wavelength

Integrated Systems

OEM Products

OPHIR
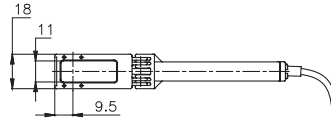Laser Measurement Group

PD300 / PD300-1W / PD300-3W

CW power 1nW-30mW (300mW / 1W or 3W with supplied filter)

Recommended Use: Low power CW lasers (HeNe, diode, etc.), out of fiber measurement
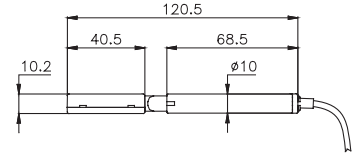Special Features: Automatic background subtraction, F.O. adapters available
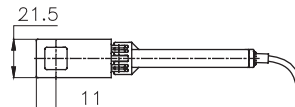
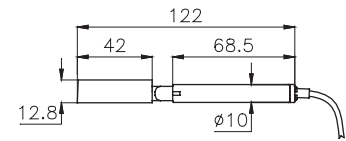PD300 with filter off

front view

side view

PD300 with filter installed

front view

side view

PD300 / PD300-1W				PD300-3W		
	PD300 / PD300-1W **Filter out**	PD300 **Filter in**	PD300-1W **Filter in**		**Filter out**	**Filter in**
Spectral Response:	350 – 1100nm	400 – 1100nm	400 – 1100nm	Spectral Response:	350 – 1100nm	400 – 1100nm
Power Scales:	30.00mW/3.000mW/ 300.0μW/30.00μW/ 3.000μW/300.0nW/ 30.00nW/dBm	300.00mW / 30.0mW / dBm	1.000W/300.00mW/ 30.0mW/dBm	Power Scales:	100.0mW/30.00mW / 3.000mw /300.0μW / 30.00μW /3.000μW / 300.0nW /dBm	3.000W/300.00mW/ 30.0mW/dBm
Maximum Power vs. Wavelength:				Maximum Power vs. Wavelength		
<488nm	30mW	300mW	1W	<488nm	100mW	3W
633nm	20mW	300mW	1W	633nm	100mW	3W
670nm	13mW	200mW	1W	670nm	100mW	2.5W
790nm	10mW	100mW	0.6W	790nm	100mW	2W
904nm	10mW	150mW	0.7W	904nm	100mW	2W
1064nm	25mW	250mW	1W	1064nm	100mW	3W
Damage Threshold:	10W/cm²	50W/cm²	50W/cm²	Damage Threshold:	10W/cm²	150W/cm²
Max Pulse Energy:	2μJ	20μJ	100μJ	Max Pulse Energy:	20μJ	500μJ
Accuracy: (including errors due to temp. variations)	±10% 360 – 400nm ±3% 400 – 950nm ±5% 950 - 1100n	±5% 400-950nm ±7% 950-1100nm	±5% 400-950nm ±7% 950 - 1100nm	Accuracy: (including errors due to temp. variations)	±10% 360–400nm ±3% 400–950nm ±5% 950 - 100n	±5% 400–950nm ±7% 950 – 1100nm
Aperture:	10mm x 10mm					
Response Time:	0.2s					
Beam Position Dependence:	±2%				±2%	±3% over 70% of area
Noise:	0.02nW at mid spectrum with filter out					
Background Subtraction:	95 – 98% of background is cancelled automatically under normal room conditions, even when changing continuously			N.A.		

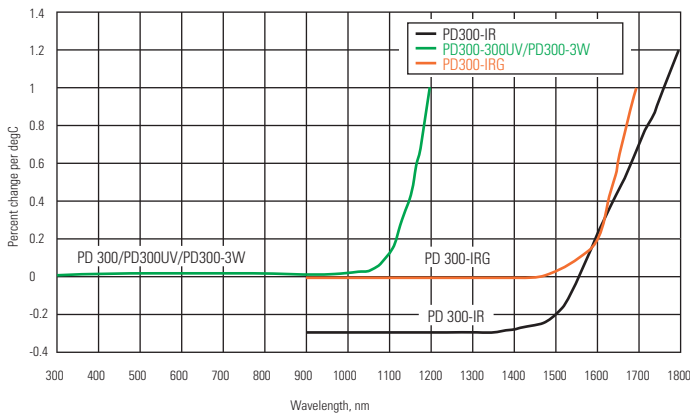| Ordering Information		
Item	**Description**	**Ophir P/N**
PD300	350-1100nm, up to 300mW	1Z02410
PD300-1W	350-1100nm, up to 1W	1Z02411
PD300-3W-V1	350-1100nm, up to 3W and for high power densities	1Z02426
Fiber adapters	See page 52 for fiber adapter ordering information	

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Laser Measurement Group

PD300-IR/PD300-UV

CW power 5nW-300mW (IR), 10pW-300mW (UV)

Recommended Use: Low power CW lasers (HeNe, diode, etc.), out of fiber measurement
Special Features: Infrared, 800-1800nm

Recommended Use: Low power CW lasers (HeNe, diode, etc.), out of fiber measurement
Special Features: Wide spectral range, 200-1100nm, very low noise

PD300-IR			PD300-UV		
	Filter Out	**Filter In**		**Filter Out**	**Filter In**
Spectral Response:	800-1800nm	800-1800nm	Spectral Response:	200-1100nm [a]	220-1100nm
Power Scales:	30.00mW/3.000mW/ 300.0μW/30.00μW/ 3.000μW/300.0nW/dBm	300.0mW/30.0mW/dBm	Power Scales:	3.000mW/300.0μW/ 30.00μW/3.000μW/ 300.0μW/30.00nW/ 3.000nW/dBm	300.00mW/30.0mW/ 3.000mW/300.0μW/dBm
Maximum Power vs. Wavelength			Maximum Power vs. Wavelength		
800nm	12mW	120mW	250-350nm	3mW	300mW
1000-1300nm	30mW	300mW	400nm	3mW	300mW
1400nm	30mW	250mW	600nm	3mW	300mW
1500nm	25mW	80mW	800-950nm	2.5mW	150mW
1600nm	30mW	100mW	1064nm	3mW	30mW
1800nm	30mW	300mW			
Damage Threshold:	10W/cm²	50W/cm²	Damage Threshold:	10W/cm²	150W/cm²
Max Pulse Energy:	2μJ	20μJ	Max Pulse Energy:	0.4μJ	15μJ
Accuracy:	±5% 800 - 900nm	±7% 800-900nm	Accuracy:	±6% 200 - 250nm	±10% 220-300nm
(Including errors due	±4% 900 - 1700nm	±6% 900-1700nm	(Including errors due	±3% 250 - 950nm	±5% 300-950nm
to temp. variations)	±7% 1700 - 1800nm	±9% 900-1700nm	to temp. variations)	±5% 950 - 1100nm	±7% 950-1100nm

Aperture:	Ø5mm	10mm x 10mm
Response Time:	0.2s	0.2s
Beam Position Dependence:	±2%	±2%
Noise:	0.02nW at mid spectrum with filter out	±1pW at mid spectrum with filter out
Background Subtraction:	N.A	N.A

Note: a. Additional Calibration at 193nm available

Temperature Coefficient of Sentivity

PD 300 Angle Dependence
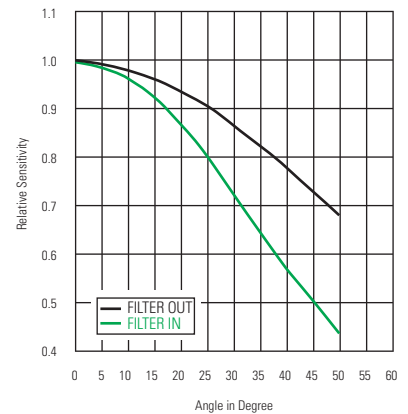
Ordering Information		
Item	**Description**	**Ophir P/N**
PD300-IR	800-1800nm, up to 300mW	1Z02412
PD300-UV	200-1100nm, up to 300mW	1Z02413
PD300-UV-193	200-1100nm with additional calibration at 193 nm	1Z02413A
Fiber adapters	See page 52 for fiber adapter ordering information	

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Laser Power & Energy

Heads

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Integrated Systems

OEM Products

PD300-IRG

CW power 10pW - 150mW

Recommended Use: Fiber optic communications, DWDM from 800 - 1700nm
Special Features: Very low noise - 100 femtoWatts.

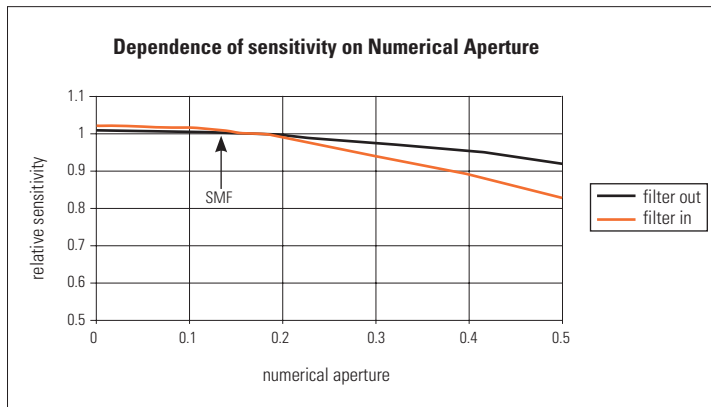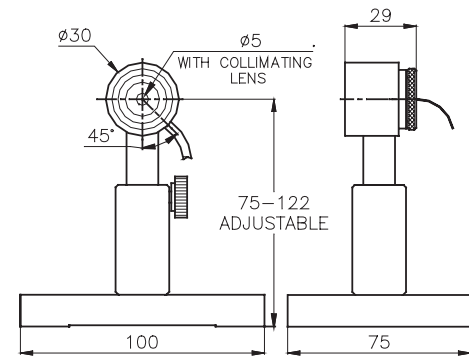Comes with collimating optics for both parallel and fiber input

Wide dynamic range: -90dBm to 25dBm

PD300-IRG

	Filter Out	Filter In
Spectral Response:	800-1700nm	950-1700nm
Power Scales:	800.0μW / 80.00μW/ 8.000μW / 800.0nm/ 80.00nW / 8.000nW/ 800.0pW / dBm	300.0mW / 30.00mW / 3.000mW / dBm
Maximum Power vs. Wavelength		
<1000nm	800μW	100mW
1100nm	800μW	30mW
1200nm	800μW	50mW
>1300nm	800μW	150mW
Damage Threshold:	5W/cm²	50W/cm²
Max Pulse Energy:	1μJ	100μJ
Accuracy at 25°C	±3% 100-1650nm ±5% <1000 >1650nm	±6% 100-1600nm ±8% <1000 >1650nm
Detector Type:	InGaAs	
Noise level:	±300fW at 1550nm and 1s average	
Linearity with power:	±0.5%	
Response time:	0.2s	
Background subtraction:	N.A.	
For parallel beam input		
Maximum aperture:	5mm	
Beam position dependence:	±1% over 80% of aperture	
For fiber input		
Numerical aperture dependence:	See graph	
Fiber adapters available:	FC, FC/APC, LC, SMA	

Note: See temperature variation graph on page 23
Note: 1. Graph assumes equal intensity into all angles up to maximum N.A.
2. Calibration is done with SMF, N.A. 0.13

PD300-IRG
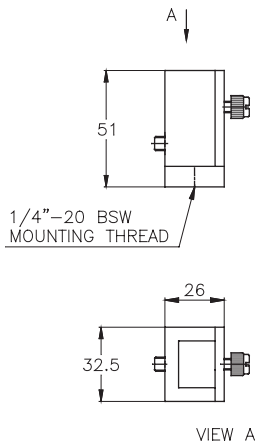with fiber input

PD300-IRG
with no fiber input

Dependence of sensitivity on Numerical Aperture

relative sensitivity vs numerical aperture

SMF

filter out
filter in

Note: 1. Graph assumes equal intensity into all angles up to maximum N.A.
2. Calibration is done with SMF, N.A. 0.13

ø30
ø5
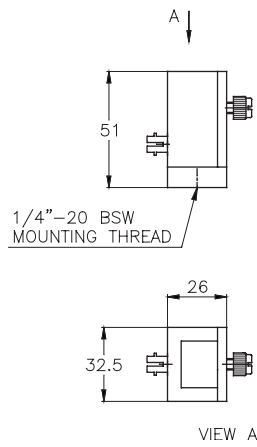WITH COLLIMATING LENS
29
45°
75−122 ADJUSTABLE
100
75

Ordering Information		
Item	Description	Ophir P/N
PD300-IRG-V1	800-1700nm, up to 300mW with IRG detector, built in collimating optics and removable filter	1Z02402
Fiber adapters	See page 52 for fiber adapter ordering information	

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Accessories for Standard PD300 Smart Heads

Fiberoptic and CDRH Adapters for PD3300 Heads

PD300-FO-SMA

PD300-FO-ST

PD300-FO-FC

PD300-FO-SC

Laser Power & Energy

Heads

Displays

Beam Profile Wavelength

Integrated Systems

OEM Products
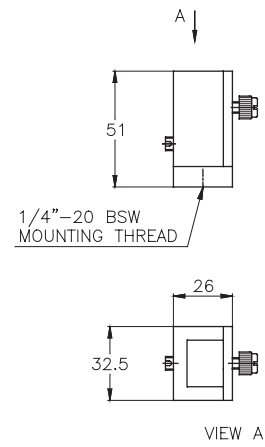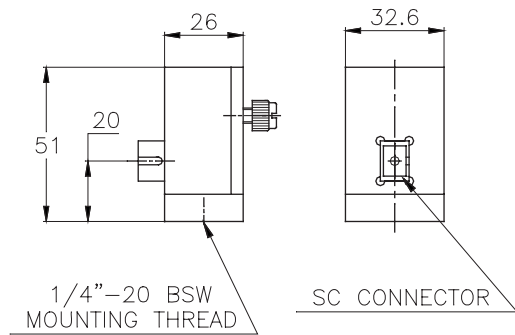
Ordering Information		
Item	**Description**	**Ophir P/N**
PD300-CDRH	Ø7mm aperture adapter for CDRH measurements	1Z02418
Fiber Adapters	See page 52 for fiber adapter ordering information	

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Radiometer and Photometer Heads

In addition to photodiode heads for individual wavelengths, Ophir also supplies heads for measuring the output of broadband light sources. The PD300-BB head has spectrally flat response from 400 to 1000nm and therefore can give the true total power of any broadband light source in that spectral region. The PD300-CIE head has a spectral response similar to that of the human eye and can therefore make measurements in eye response units of Lux. The PD300-CIE is designed with a small detector with the source overfilling the detector. It measures the light intensity per unit area in units of Lux or Foot Candles.
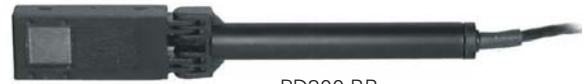
PD300-BB   Radiometer Head

CW power 50pW - 6mW

Recommended Use: Power measurement of broodbard light sources
Special Features: Flat spectral response from 400 to 1000nm

NEW

PD300-BB

PD300-BB	
Spectral Response:	400 - 1000nm (see graph)
Power Scales:	8.000mW / 800. 0μW / 80.00μW / 8.000μW/ 800.0nW / 80.00nW /8.000nW / dBm
Maximum Power vs. Wavelength, all wavelengths	6mW
Damage Threshold	10W/cm²
Max Pulse Energy:	1μJ
Accuracy	Worst case deviation from flat spectrum ±10% (see graph)
Aperture:	10x10mm
Response Time	0.2s
Beam Position Dependence	±2%
Noise Level	±2pW
Background Subtraction:	N. A.
Dimensions	See drawings on page 22

Typical sensitivity curve of PD300-BB
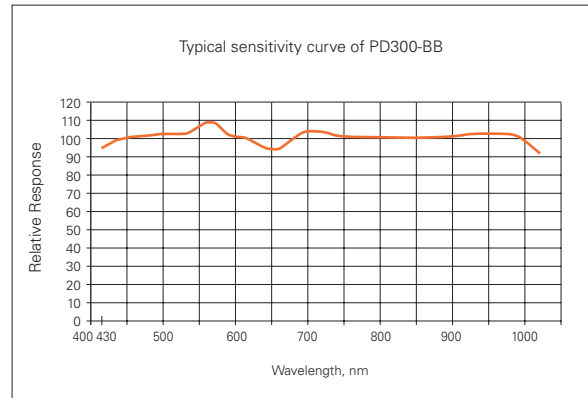
PD300-CIE   Photometer Head

Photopic Measurements 20m Lux-200K Lux

Recommended Use: Measurement of illumination sources
Special Features: Measurements in units of Lux or Foot Candles

PD300-CIE

PD300-CIE	
Spectral Response:	400 – 700nm (see graph)
Measurement Scales (for Lux units):	200.0K Lux / 20.00K Lux / 2.000K Lux / 200.0 Lux / 20.00 Lux / 2.000 Lux
Measurement Units	Lux (Lumen/m²) or Foot Candles (Lumen/ft²)
Damage Threshold	10W/cm²
Max Pulse Energy:	1μJ
Accuracy	(see graph)
Active Area:	2.4x2.8mm
Response Time	0.2s
Noise Level	±1m Lux
Background Subtraction:	N. A.
Dimensions	See drawings on page 22

PD300-CIE spectral response vs. CIE curve
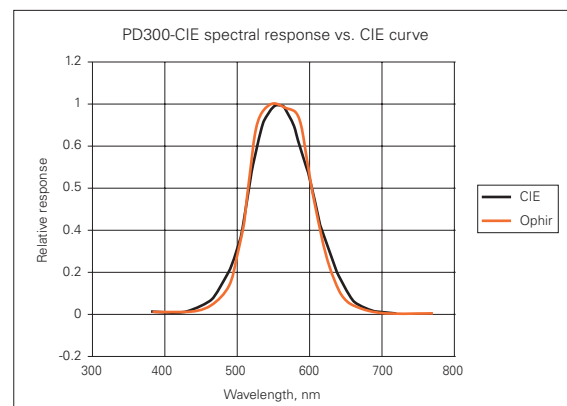
Ordering Information		
Item	Description	Ophir P/N
PD300-BB	Radiometric head with flat spectral response from 400 to 1000nm	1Z02405
PD300-CIE	Photometric head with CIE eye response. Measurement in Lux or FC	1Z02406

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PD300-TP Thin Profile Power Meter

CW power 50pW - 1W

Recommended Use: Low power CW lasers in tight locations
Special Features: Very thin profile - 4mm only

PD300-TP

	Filter Out	Filter In
Spectral response:	350 - 1100nm	400 - 1100nm
Power Scales:	3.000mW / 300.0μW / 30.00μW / 3.000μW / 300.0nW / 30.00nW / 3.000nW / dBm	1W / 300.0mW / 30.00mW / 3.000mW / dBm
Maximum Power vs. Wavelength		
350 - 400nm	3mW	
400 - 500nm	3mW	1W
600nm	2.5mW	1W
700nm	2mW	500mW
800 - 950nm	1.5mW	300mW
1064nm	3mW	500mW
Damage Threshold	10W/cm²	50W/cm²
Additional Error with Power Density	N.A.	5W/cm² - 2%, 15W/cm² - 4%
Max Pulse Energy:	1μJ	100μJ
Accuracy:	±7% 350 - 400nm	±10% 350 - 400nm
(Including errors due to	±3% 400 - 950nm	±5% 400 - 950nm
temp. variations)	±5% 950 -1100nm	±7% 950 -1100nm
Aperture:	10 x 10mm	
Response Time:	0.2s	
Beam Position Dependence:	±2%	
Noise:	±2pW at mid spectrum with filter out	
Background Subtraction:	N.A.	

Accuracy:
(Including errors due to
temp. variations)

NEW

PD300-TP
handheld use

PD300-TP
Mounted on stand
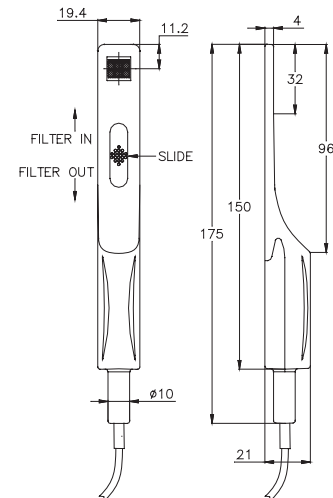
Ordering Information		
Item	**Description**	**Ophir P/N**
PD300-TP	350 - 1100nm, up to 1W, thin profile 4mm thick	1Z02424

Laser Power & Energy

Heads

Displays

Beam Profile Wavelength

Integrated Systems

OEM Products

OPHIR
Laser Measurement Group

PD200 Head and Display

CW power 20nW - 200mW

- 400 to 1100nm spectal range
- 6 decades of range
- Swivel mount head for handheld or stand use
- Compact, portable display unit with backlight for use in low light environment
- Rechargeable (more than 18 hours of operation between chargings)
- Calibration is in head connector for interchangeablility
- Analog output
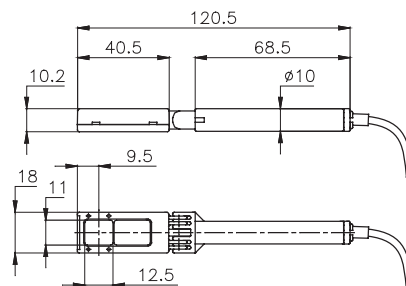
The PD200 laser power meter offers a cost-effective solution for measuring one or two laser wavelengths at powers up to 200mW. Users can set the PD200 to give a calibrated reading at any two wavelengths in the range 400 - 1100nm. (After setting once, the wavelengths cannot be changed). The wavelength sensitivity curve also allows users to extrapolate to other nearby wavelengths. The wavelength calibration is contained in the head connector, allowing interchangeability between different heads and displays. The PD200 has advanced circuitry with excellent sensitivity, signal to noise ratio, accuracy and response time. It also has special circuitry to reject electromagnetic interference.

The PD200 can be operated either by battery or from an AC source with the charger plugged in at all times. Its backlight allows illumination of the display in low light condition and is operated by a switch on the rear panel.

Specifications

Spectral range:	400 - 1100nm
Calibration wavelengths:	One time choice of any two wavelengths in the range 400 - 1100nm
Power ranges:	6 ranges from 200.0mW to 2.000µW
Power noise level:	<1nW
Accuracy at calibrated wavelengths:	±5% 400 - 950nm, ±7% 950 - 1100nm
Linearity:	±1%
Response time:	0.2s
Damage threshold:	50W/cm²
Maximum pulse energy:	50µJ
Aperture:	10x10mm
Head (swivel mount head for handheld or stand use):	(LxWxD) 122 x 17 x 9mm
Display unit:	(LxWxD) 203 x 95 x 38mm
Electromagnetic compatibility:	CE approved
Cable length:	1.5 meters
Backlight:	EL type. Operates only with charge plugged in.
Battery:	2 x RR 1.8A-h NiMH
Charger:	DC: 11 to 22V, 3W. Operation between charges 18hrs. Battery charge time 10 - 14 hr.
Analog output:	1Volt full scale

This curve shows the approximate spectral sensitivity of the PD200 with wavelength and can be used to calculate the approximate power reading of lasers that are different from the calibrated wavelengths

PD200 Spectral Response
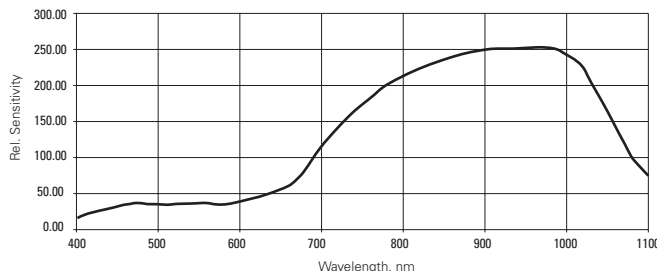
Ordering information

Item	Description	Ophir P/N
PD200-V2	PD200 smart head	1Z02425
PD200 display	PD200 display unit	1Z01804
Stand	Swivel stand for PD200	1Z09004

OPHIR
Laser Measurement Group

BC20 Power Meter for Scanned Beams

Recommended Use: Bar code scanners, laser printers, etc
Special Features: Measure scanned beams "on the fly"

- Scanned or static beams
- ±3% accuracy
- For Nova, Orion, Nova II or Laserstar displays
- Dynamic background suppression
- Scanned beams up to 30,000 inch/sec
- Analog output
- Rechargeable
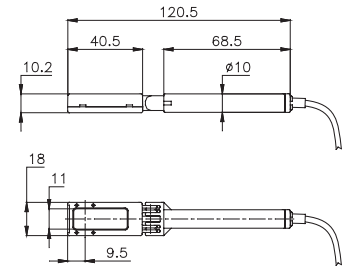
The BC20 scanned beam laser power meter has become the industry standard for measuring scanned laser beams as well as hard-to-reach static beams. The BC20 uses a silicon detector and innovative circuitry to measure scanned as well as static beams of up to 20 milliwatts with a noise level of microwatts. This instrument has patented dynamic background subtraction that eliminates over 95% of background light and allows measurement in normal room light. The calibration of each measurement head is in the head plug so that heads and displays can be interchanged without losing calibration. It also allows user recalibration if desired. The BC20 has advanced circuitry with excellent sensitivity, signal to noise ratio, accuracy, and response time; its special circuitry rejects electromagnetic interference. The measuring wand swivels 180º providing access to beams hidden in complicated assemblies. The Nova smart head display is compatible not only with the BC20, but with all of the 50+ Ophir photodiode, pyroelectric and thermal power/energy heads.

Specifications

Wavelengths:	633, 650, 675nm (others available)
Power ranges:	2.000mW / 20.00mW
Hold function:	"Hold" pressed-holds highest reading for 5s before updating "Hold" not pressed - updates display 3 times per second
Calibration accuracy:	±3% + 3 least significant digits
Detector saturation level:	20mW/mm^2
Maximum power density:	50W/cm^2
Deviation from static reading at maximum scan velocity:	-3% at 30,000 inch/s
Background subtraction:	Background is automatically subtracted from both scanned and static beams. Under normal room light conditions, background reading is <0.005mW
Beam position dependence:	<±2%
Detector dimensions:	10mm x 10mm
Analog output:	2.5mm stereo jack on Nova or Orion display. Sensitivity 1 Volt full scale
Electromagnetic compatibility:	CE approved
Battery and charger:	Nova or Orion display has 2x RR (sub-C) 1.8Ah NiCd rechargeable battery with 18 hours operation between charges. Low battery indication. Charger included. Battery charge time: 10-14 hrs.
Dimensions LxWxD	battery Head: 122 x 18 x 10mm
	Display 203 x 95 x 38mm

Graph of the approximate relative spectral response of the BC20 for purpose of interpolation, if the instrument is to be used at a wavelength other than the ones that are factory calibrated.
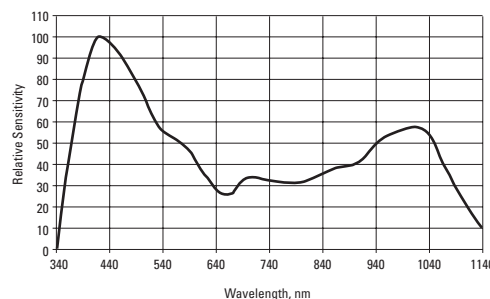
Ordering Information

Item	Description	Ophir P/N
BC20-SH	BC20 smart head detector calibrated for 633, 650 and 670nm	1Z02422A
Stand	Swivel stand for BC20 head	1Z09004

OPHIR
Laser Measurement Group

Laser Power & Energy

Heads

Displays

Beam Profile Wavelength

Integrated Systems

OEM Products

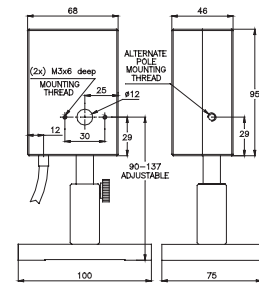# Integrating Sphere Smart Heads For Divergent Beams

3A-IS

CW & Average Power Measurements 1µW-3W

Recommended Use: Divergent beams, diode lasers
Special Features: Measures total power of divergent beams

Absorber:	Photodiode 420-1100nm
Aperture:	Ø12mm
Digital Power Scales:	3W to 3µW and dBm
Maximum Average Power Density:	200W/cm² on integrating sphere surface
Power Noise Level:	20nW
Power Accuracy:	±5% 420-1000nm,±10% 1000-1100nm
Maximum Pulse Energy:	5mJ
Response Time with Display (0 - 95%):	0.2s
Linearity with Power:	±1%
Maximum Beam Divergence:	±40 degrees
Sensitivity to Beam Size and Angle:	±2%
Cooling:	Convection
Fiber Adapters Available:	SC, LC,ST, FC,SMA
Fiber Output Port:	One fiber output port available with output= 2E-4 of input power/ mm² of fiber area.

3A-IS
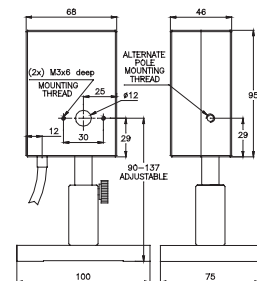
3A-IS-IRG

CW & Average Power Measurements 1µW-3W

NEW

Recommended Use: Divergent beams for 800-1700nm
Special Features: Measures divergent beams for DWDM

Absorber:	InGaAs detector 800-1700nm
Aperture:	Ø12mm
Digital Power Scales:	3W to 3µW
Maximum Average Power Density:	200W/cm² on integrating sphere surface
Power Noise Level:	20nW
Power Accuracy:	±5%
Maximum Pulse Energy:	5mJ
Response Time with Display (0 - 95%):	0.2s
Linearity with Power:	±1%
Maximum Beam Divergence:	±40 degrees
Sensitivity to Beam Size and Angle:	±2%
Cooling:	Convection
Fiber Adapters Available:	SC,LC,ST,FC,SMA
Fiber Output Port:	One fiber output port available with output= 2E-4 of input power/ mm² of fiber area.

3A-IS-IRG

Ordering Information		
Item	**Description**	**Ophir P/N**
3A-IS-V1	Integrating Sphere power meter for 420-1100nm	1Z02404
3A-IS-IRG	Integrating Sphere power meter for 800-1700nm	1Z02403
Fiber Adapters	See page 52 for ordering information	

OPHIR
Laser Measurement Group

F100A-IS

CW & Single Pulse Measurements 50mW-100W 30mJ-100J
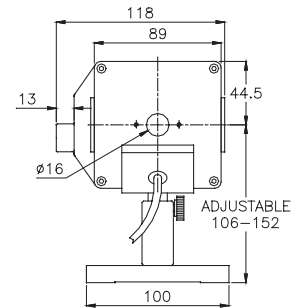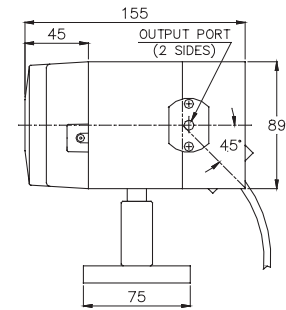
Recommended Use: Divergent beams, diode lasers
Special Features: Measures total power of divergent beams and has additional
                                output fiber ports.

Absorber:	Lambertian white coating with thermal detector
Spectral Range:	350-1300nm
Aperture:	Ø16mm
Maximum Beam Divergence:	±45 degrees
Sensitivity to Beam Size and Angle:	±2%
Fiber ports:	2 sides fiber ports with adapters for SMA, FC, ST
	Input also accepts Ophir fiber adapters
Digital Power Scales:	100W / 20W / 2W
Maximum Average Power Density:	200W/cm² on integrating sphere surface
Power Noise Level:	5mW
Power Accuracy:	±5% at wavlengths 532nm, 800nm and 1064nm
Response Time with Display (0-95%):	1s
Linearity with Power:	±1%
Energy Scales:	100J / 30J / 3J
Energy Threshold:	30mJ
Cooling:	Fan cooled

F100A-IS

Laser Power & Energy

Heads

Displays

Beam Profile Wavelength

Integrated Systems

OEM Products

Ordering Information

Item	Description	Ophir P/N
F100A-IS	100 Watt integrating sphere power/energy meter	1Z02510
Fiber adapters	See page 52 for ordering information	

OPHIR Laser Measurement Group