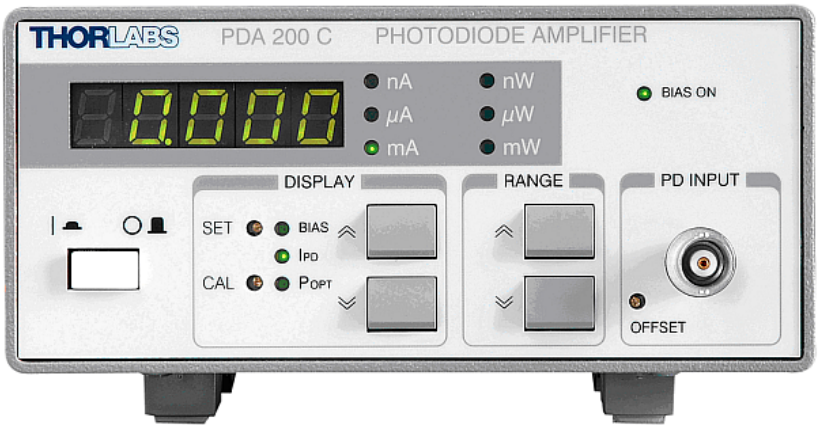
THORLABS

Photodiode Amplifier

PDA200C
Operation Manual



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Contents

Foreword 2

1 General Information 3

1.1 Ordering Codes and Accessories 3

2 Getting Started 4

2.1 Parts List 4

2.2 Preparation 4

3 Operating Instruction 5

3.1 Operating Elements 5

3.2 Operation 7

3.2.1 Connecting a Photodiode 7

3.2.2 Offset Adjustment 7

3.2.3 Calibration of the Power Display 8

3.2.4 Setting a BIAS Voltage 8

3.2.5 Analog Control Output 9

3.2.6 Disabling the Beeper 9

4 Maintenance and Service 10

4.1 Line Voltage Setting 10

4.2 Replacing Mains Fuses 11

4.3 Troubleshooting 12

5 Appendix 13

5.1 Technical Data 13

5.2 Safety 15

5.3 Environmental Conditions 16

5.4 Manufacturer Address 17

5.5 Declaration of Conformity 18

5.6 Warranty 19

5.7 Exclusion of Liability and Copyright 19

5.8 Thorlabs Worldwide Contacts and WEEE Policy 20

We aim to develop and produce the best solution for your application in the field of optical measurement technique. To help us to live up to your expectations and improve our products permanently we need your ideas and suggestions. Therefore, please let us know about possible criticism or ideas. We and our international partners are looking forward to hearing from you.

Thorlabs GmbH

Warning

Sections marked by this symbol explain dangers that might result in personal injury or death. Always read the associated information carefully, before performing the indicated procedure.

Attention

Paragraphs preceded by this symbol explain hazards that could damage the instrument and the connected equipment or may cause loss of data.

Note

This manual also contains "NOTES" and "HINTS" written in this form.

Please read this advice carefully!

1 General Information

The Thorlabs PDA200C is a precise photodiode current amplifier compatible with all kinds of photodiodes. After a calibration the PDA200C can be used as precise optical power meter.

Typical applications of the PDA200C are:

- simple operation of photodiodes (transimpedance amplifier)
- sensitive pico-Ampère meter
- low noise amplification of photodiode current
- simple optical power meter

The PDA200C is easy to operate via the operating elements on the front panel. The operating parameters are shown on an illuminated 5-digit LED display. Either PD-current, optical power or bias voltage can be displayed. The displayed parameter is chosen by up / down toggle switches and indicated by LEDs. The units of the measurement for current and power ranges are indicated by LEDs. The unit for bias voltage is V.

The offset of the input amplifier and of the photodiode can easily be adjusted using a 12-turn potentiometer.

The bias voltage ranging from 0 V to+10 V (for polarity anode grounded) or from 0 V to -10 V (for polarity cathode grounded) can be applied to the photodiode using the sliding switch on the rear panel of the PDA200C. The voltage is set using a 12-turn potentiometer.

The displayed power values can be calibrated for a known power level by a potentiometer.

The Analog Out provides a DC voltage proportional to the photodiode current.

The installed mains filter and the transformer shielding provide a low ripple at the analog control output.

If requested Thorlabs offers calibrated photodiodes as accessories.

Attention

Please find all safety information and warnings concerning this product in the chapter Safety 15 in the Appendix.

1.1 Ordering Codes and Accessories

Ordering code	Short description
PDA200C	Photodiode amplifier / optical power meter

Thorlabs offers a variety of photodiodes for different wavelengths and power ranges, which can be used with the PDA200C.

Please visit our homepage http://www.thorlabs.com for further information.

2 Getting Started

2.1 Parts List

Please inspect the shipping container for damage. Please do not cut through the cardboard. You might need the box for storage or for returns. If the shipping container seems to be damaged, keep it until you have inspected the contents and you have inspected the PDA200C mechanically and electrically.

Verify that you have received the following items within the package:

1. 1 PDA200C
2. 1 grounding cable
3. 1 flat-bladed screwdriver 1.8 x0.5 mm
4. 1 power cord, connector according to ordering country
5. 1 Quick Reference

2.2 Preparation

Prior to operating a PDA200C controller, check if the set line voltage matches with your local power supply and if the appropriate fuses are inserted. See sections Line Voltage Setting 10 and Replacing the Mains Fuses 11.

Connect the unit to the power line using the supplied cable. Turn the unit on by pressing the line switch (F9) 5.

Via the connector jack of the chassis ground (R2) the external optical setup can be connected to ground potential, if required. The required grounding cable is attached.

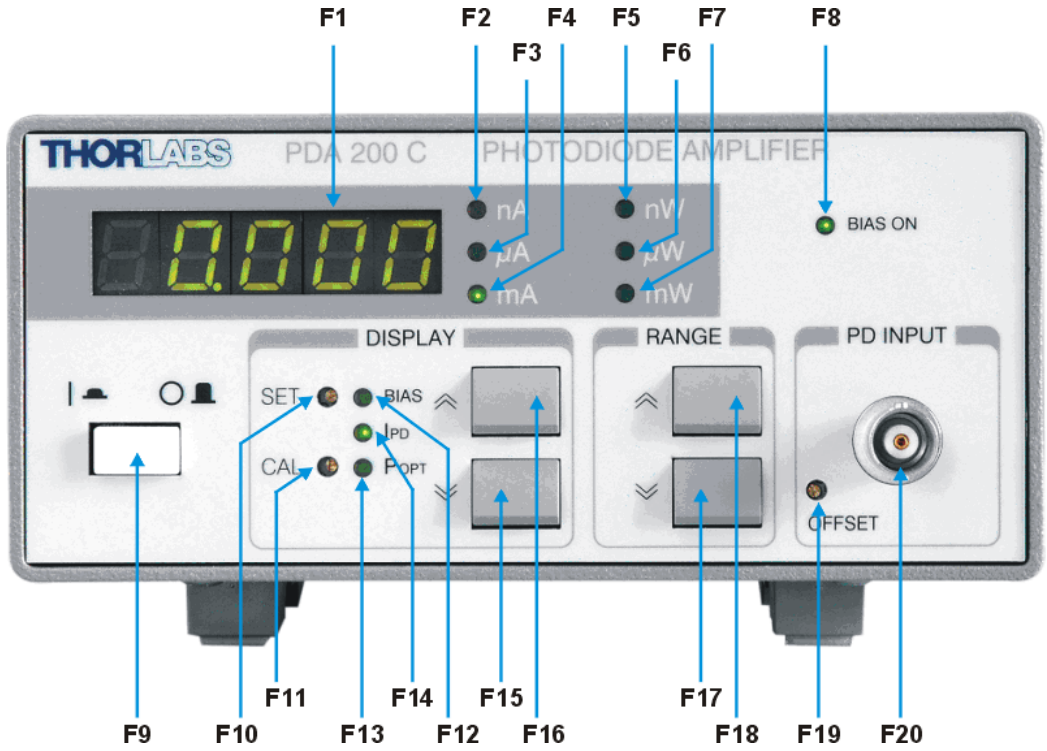
Note

Grounding is strongly recommended in order to avoid hum and noise interference to the photodiode input, particularly when measuring low photodiode current.

3 Operating Instruction

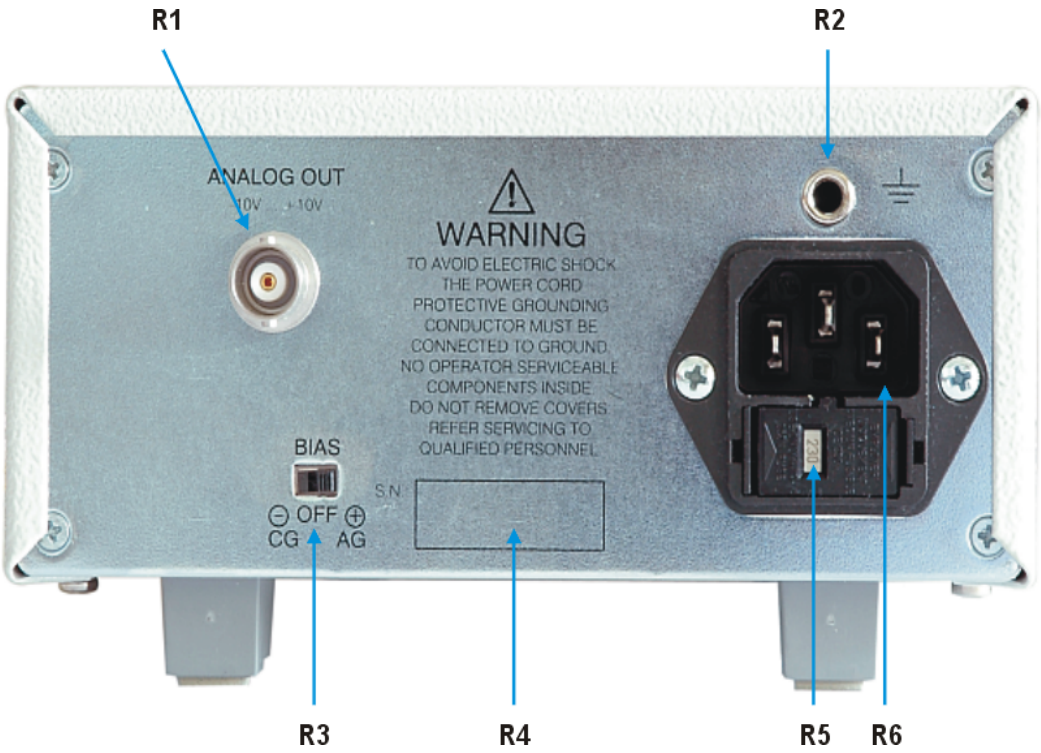
3.1 Operating Elements

Operating elements at front panel



F1	-	5-digit LED display
F2	LED "nA"	Current display in nA
F3	LED "µA"	Current display in µA
F4	LED "mA"	Current display in mA
F5	LED "nW"	Power display in nW
F6	LED "µW"	Power display in µW
F7	LED "mW"	Power display in mW
F8	LED "BIAS ON"	Bias voltage switched on
F9	-	Line switch (ON / OFF)
F10	SET	Potentiometer for setting the bias voltage
F11	CAL	Potentiometer for calibrating the power display "P_{OPT}"
F12	LED "BIAS"	Display shows the bias voltage in volts
F13	LED "P_{OPT}"	Display shows the optical power
F14	LED "I_{PD}"	Display shows the photodiode current
F15	Key "DOWN"	Select the parameter to be displayed
F16	Key "UP"	Select the parameter to be displayed
F17	Key Range "Down"	Select the measurement range (increasing the sensitivity)
F18	Key Range "Up"	Select the measurement range (decreasing the sensitivity)
F19	OFFSET	Potentiometer for PD input offset adjustment
F20	PD INPUT	Photodiode input

Operating elements at rear panel



R1 Monitor control output "ANALOG OUT", 0 … ±10V
R2 4 mm banana jack for grounding
R3 Selector switch for the photodiode bias voltage: CG (-) / OFF / AG (+)
R4 Serial number of the unit
R5 Indicator / switch for line voltage (included in fuse holder)
R6 Mains connector and fuse holder

3.2 Operation

Attention

Prior to switch on the PDA200C please check if the line voltage setting (see the indicated voltage in the fuse holder's window R5 6) corresponds to your mains voltage! If the selected voltage does not match, please set it correctly as described in section "Line Voltage Setting 10".

Push the line switch (F9) to turn the unit on.

After switching on the unit, the LED display (F1) and one of the LEDs, indicating the selected measurement value (F12 ... F14), lights up. If no display is shown, please check the line voltage setting and the mains fuses.

Using up and down keys (F15) and (F16) the desired parameter can be selected.

The PDA200C is immediately ready to use after turning on. The rated accuracy is reached, however, after a warming-up time of approx. 10 minutes.

3.2.1 Connecting a Photodiode

Photodiodes with both polarities, i.e. cathode or anode grounded, can be used with the PDA200C. If a photodiode with anode connected to ground is used, the display (F1) shows a negative sign.

Attention

If the polarity of the photodiode is not known, first set the bias switch (R3) to zero to avoid damage to the diode!

- Select photo current display "IPD" using up / down keys F15) and F16).
- Select the 10 mA current (range keys F17 and F18).
- Connect the photodiode to the input jack "PD INPUT" (F20).
- Select an appropriate current range to show the actual photodiode current with the best resolution on the LED display.

3.2.2 Offset Adjustment

The Offset Adjustment allows to compensate the input offset of the current amplifier or - if required - to zero the dark current of the connected photodiode. Offset and/or dark current adjustment is recommended to proceed after the PDA200C has warmed up.

Offset compensation:

- Do not connect a photodiode to the input jack "PD INPUT" (F20).
- Select display I_{PD} (F15/ F16).
- Select the 10 µA current range (F17/ F18).
- Using the screwdriver coming with the PDA200C, turn the potentiometer "OFFSET" (F19) in order to achieve a zero I_{PD} current in the display.

It is not necessary to repeat the offset correction after the current measurement range was changed.

Zeroing the PD's dark current

Connect the photodiode to the input jack "PD INPUT" (F20) and make sure the PD is darkened completely. It might be useful to ground the photodiode's housing using the supplied grounding cable, connected to the GND jack R2 6 on the rear panel

- Select display IPD (F15/ F16).
- Select the required PD current range (F17/ F18).
- Using the screwdriver, turn the potentiometer "OFFSET" (F19) in order to achieve a zero IPD current in the display.Aftewr th

Note

After changing the IPD current range, the dark current compensation must be carried out again!

3.2.3 Calibration of the Power Display

The PDA200C can be calibrated in order to display the optical power incident to the connected photodiode. The responsivity of the of the photodiode must not exceed the range 0.05 to 2 A/W. If the connected PD has a responsivity exceeding this eange, please contact Thorlabs for a solution.

- Connect the photodiode and turn the PDA200C on.
- Expose the photodiode to a well known optical power. Make sure that no additional optical power enters the photodiode.
- Select display IPD (F15 / F16).
- Select an appropriate current range (F17 / F18) to show the actual photodiode current with the best possible resolution.
- Select display POPT (F15 / F16).
- Use the screwdriver to adjust the potentiometer "CAL" (F11) in order to get the value of the optical power POPT displayed equal to the known power level.

This calibration is valid for all current ranges of the PDA200C.

3.2.4 Setting a BIAS Voltage

The PDA200C provides the possibility to apply a reverse voltage of up to ±10 V (bias) to the photodiode (photo-conductive mode).

- Set the bias switch (R3 6) to “OFF”
- Connect the photodiode and turn on the PDA200C
- Expose the photodiode to light.
- Select the current range (F17 / F18).

If the displayed value is positive (polarity cathode grounded), set the bias switch (R3) to " - CG". The applied bias voltage is negative.

If the displayed value is negative (polarity anode grounded), set the bias switch (R3) to " + AG". The applied bias voltage is positive.

- Select Display “Bias” (F15 / F16).
- The bias voltage is displayed in volts.
- Use the screwdriver to set the potentiometer "SET" (F10) to the desired value for the bias voltage.

Attention

If the polarity of the bias does not match to the photodiode polarity, the bias voltage may damage the photodiode.

If the bias voltage exceeds the reverse voltage rating of the photodiode, the bias voltage may damage the photodiode

3.2.5 Analog Control Output

The analog output "ANALOG OUT" (R1 6) at the rear panel delivers a DC voltage proportional to the display reading of photodiode current I_{PD}.

The output voltage is

0 …+10 V for a display reading of 0 … 10000 (photodiode cathode grounded) or
0 … -10 V for a display reading of 0 … -10000 (photodiode anode grounded).

The maximum bandwidth of the monitor output "ANALOG OUT" (R1) depends on the current range (see Technical Data 13).

The shield of the BNC "ANALOG OUT" (R1) is grounded, thus an oscilloscope or PC based AD-Converter or other recording device can be connected directly.

Take care to avoid ground loops.

Devices connected to these outputs should have an input resistance 10 kΩ.

3.2.6 Disabling the Beeper

If audible signals are unwanted, the beeper can be disabled in this way:

- Press and hold the key “UP” (F16).
- Press the key “Down” (F15). Now the beeper state is displayed:
  - “Sd.On” - Sound ON
  - “Sd.OFF” - Sound OFF

To change the beeper state, hold the key “UP” pressed and toggle the beeper state by pressing "DOWN" key.

4 Maintenance and Service

Protect the PDA200C from adverse weather conditions. The PDA200C is not water resistant.

Attention

To avoid damage to the instrument, do not expose it to spray, liquids or solvents!

The unit does not need a regular maintenance by the user. It does not contain any modules and/or components that could be repaired by the user himself. If a malfunction occurs, please contact Thorlabs for return instructions.

Do not remove covers!

If necessary the unit and the display can be cleaned with a cloth dampened with water. You can use a mild 75% Isopropyl Alcohol solution for more efficient cleaning.

It is recommended to have the unit calibrated by Thorlabs every two years.

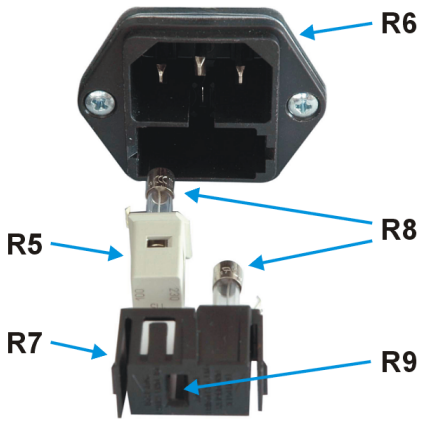
4.1 Line Voltage Setting

The Photodiode Amplifier PDA200C operates at fixed line voltages of

100 V +15% / -10% (90 V … 115 V)
115 V +15% / -10% (104 V … 132 V)
230 V +15% / -10% (207 V … 264 V)

line frequency 50 … 60 Hz.

The line voltage setting can be changed from the rear without opening the unit.



1. Turn off the controller and disconnect the mains cable.

2. The fuse holder (R7) is located below the 3-pole power connector of the mains jack (R6). Release the fuse holder by pressing its plastic retainers with the aid of a small screwdriver. The retainers are located on the right and left side of the holder and must be pressed towards the center.

3. Unplug the white line voltage switch/indicator (R5, containing the left fuse) from the fuse holder (R7), rotate it until the appropriate voltage marking (100V, 115V, or 230V) is on target for the cutout (R9) of the fuse holder, and plug it back into the fuse holder. Press in the fuse holder until locked on both sides. The appropriate line voltage marking must be visible in the cutout (R9) of the fuse holder (R7).

Attention

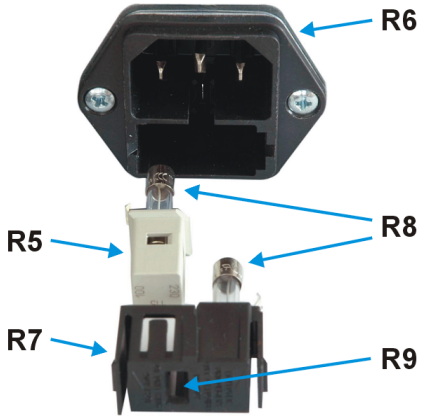
If you have changed to or from 230 V, also change the mains fuses to the correct value given in section Replacing Mains Fuses 11.

4.2 Replacing Mains Fuses

The two power input fuses are externally accessible. If they have opened due to line distortions, incorrect line voltage or other causes, they can be replaced from the rear without opening the unit.

Attention

To avoid risk of fire only the appropriate fuses for the corresponding line voltage must be used.



1. Turn off the PDA200C and disconnect the mains cable.
2. The fuse holder (R7) is located below the 3-pole power connector of the mains jack (R6). Release the fuse holder by pressing its plastic retainers using a small screwdriver. The retainers are located on the right and left side of the holder and must be pressed towards the center.
3. Replace the defective fuses (R8) and press in the fuse holder until locked on both sides. Take care to maintain the correct rotation of the white line voltage indicator / switch (R5) which contains the left fuse and is plugged into the fuse holder. The appropriate line voltage marking must be visible in the cutout (R9) of the fuse holder.

Fuse types

100 V	500 mA, time-lag, 250V	T0.5A 250V
115 V	500 mA, time-lag, 250V	T0.5A 250V
230 V	250 mA, time-lag, 250V	T0.25A 250V

All fuses must meet IEC specification 60127-2/III, time characteristic: time-lag (T), 250V AC, size 5 x 20 mm.

4.3 Troubleshooting

- Unit does not work at all (no display at the front):
  - PDA200C connected properly to the mains?
    - ➔ Check the mains cable and the line voltage setting (please refer to section Line Voltage Setting 10).
  - PDA200C turned on?
    - ➔ Turn on your PDA200C with the key mains-switch.
  - Check the fuses at the rear panel (see Replacing Mains Fuses 11).
    - ➔ If blown replace the fuses by the correct type (select the appropriate fuse type)

- The measured photo current or optical power seem to be not correct
  - Are all offset errors eliminated?
    - ➔ See "Offset Adjustment 7" for compensation
  - Is the photodiode calibrated?
    - ➔ See "Calibration of the Power Display 8".
  - Was the dark current of the photodiode compensated and subsequently the measurement range changed?
    - ➔ Repeat the dark current calibration 8 for the actual measurement range you are using.

- Measurement results are unstable
  - Check system setup for possible ground loops which may introduce line interferences (50/60 Hz) into your setup.
  - Check if grounding of the PD housing (using the supplied grounding cable) improves noise and / or hum.

- The unit switches on, but display shows error message (e.g., “Err06”)
  - This indicates a malfunction of the PDA200C.
    - ➔ In such case, the controller needs to be returned to Thorlabs for maintenance. Please contact Thorlabs with the information of the error code number and the serial number of your PDA200C in order to receive the RMA (Return Material Authorization) instructions accordingly.

If you don’t find the error source by means of the trouble shooting list please contact Thorlabs for advise and/or return instructions.

5 Appendix

5.1 Technical Data

Specifications	
Full Scale Current Measurement Ranges	100 nA to 10 mA (in Decade Steps)
Maximum Resolution	10 pA
Display Range	0 to 10000 (CG), 0 to -10000 (AG)
Polarity of the Photodiode	Cathode Grounded (CG) or Anode Grounded (AG)
Bias Voltage	0 to -10 V (CG), 0 to +10 V (AG)
Photodiode Sensitivity (for Calibrated Power Display)	0.05 to 2 A/W
Max. Photodiode Capacitance for Frequency Compensated Operation	10 nF
Temperature Coefficient	<50 ppm/°C
Input Impedance	~0 Ω (Virtual Ground)
Photo Current Monitor Output	
Output Voltage Range (Analog Output)	0 to +10 V (CG), 0 to -10 V (AG)
Conversion coefficient	10^3 to 10^8 V/A (depends on PD range, see table below)
Accuracy of Conversion coefficient	±5%
Noise (rms f.s.of current measurement range)	≤0.02%
Load Resistance	>10 kΩ
Common	
Display	LED, 5 Digits
Connectors (PD Input, Analog Output)	BNC
Chassis Ground Connector	4 mm Banana Jack
Line Voltage	100 V 115 V (+15% -10%) 230 V
Line Frequency	50 to 60 Hz
Mains Supply Overvoltage	Category II (Cat II)
Maximum Power Consumption	10 VA
Warm-up Time for Rated Accuracy	10 min
General	
Operating Temperature Range [1])	0 - 40 °C
Storage Temperature Range	-40 to 70 °C
Relative Humidity	Max. 80% up to 31 °C, decreasing to 50% at 40 °C
Pollution Degree (Indoor Use only)	2
Operation Altitude	<2000 m
Dimensions (WxHxD), w/o operating elem.	146 x 66 x 290 mm³
Dimensions (WxHxD), with operating elem.	146 x 77 x 320 mm³
Weight	<3 kg

[1]) non-condensing

All technical data are valid at 23 ± 5°C and 45 ± 15% rel. humidity (non condensing)

Current range	Resolution	Accuracy	Analog Output	
			Bandwidth [2])	Conversion Coeff.
10 mA	1 µA	± 0.05 % f.s.	500 kHz	1 x 10^3 V/A ±5%
1 mA	100 nA	± 0.05 % f.s.	250 kHz	1 x 10^4 V/A ±5%
100 µA	10 nA	± 0.05 % f.s.	70 kHz	1 x 10^5 V/A ±5%
10 µA	1 nA	± 0.05 % f.s.	20 kHz	1 x 10^6 V/A ±5%
1 µA	100 pA	± 0.05 % f.s.	5 kHz	1 x 10^7 V/A ±5%
100 nA	10 pA	± 0.1 % f.s.	1 kHz	1 x 10^8 V/A ±5%

[2]) Small signal 3dB bandwidth of the control output

5.2 Safety

Attention

The safety of any system incorporating the equipment is the responsibility of the assembler of the system.

All statements regarding safety of operation and technical data in this instruction manual will only apply when the unit is operated correctly as it was designed for.

The PDA200C must not be operated in explosion endangered environments!

Do not obstruct the air ventilation slots in the housing! Do not remove covers! Do not open the cabinet. There are no parts serviceable by the operator inside!

This precision device is only serviceable if returned and properly packed into the complete original packaging including the cardboard insert that holds the enclosed devices. If necessary, ask for replacement packaging. Refer servicing to qualified personnel!

Only with written consent from Thorlabs may changes to single components be made or components not supplied by Thorlabs be used.

Attention

Prior to applying power to the PDA200C, make sure that the protective conductor of the 3 conductor mains power cord is correctly connected to the protective earth ground contact of the socket outlet! Improper grounding can cause electric shock resulting in damage to your health or even death!

Ensure that the line voltage setting of the fuse holder at the rear panel agrees with your local supply and that the corresponding fuses are inserted. If not, please change the line voltage setting (see section Line voltage setting 10) and the mains fuses (see section Replacing the mains fuses 11).

To avoid risk of fire, only the appropriate fuses for the corresponding line voltage must be used.

All modules must only be operated with duly shielded connection cables.

Attention

The following statement applies to the products covered in this manual, unless otherwise specified herein. The statement for other products will appear in the respective accompanying documentation.

Note This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules and meets all requirements of the Canadian Interference-Causing Equipment Standard ICES-003 for digital apparatus. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/T.V. technician for help.

Users that change or modify the product described in this manual in a way not expressly approved by Thorlabs (party responsible for compliance) could void the user's authority to operate the equipment.

Thorlabs GmbH is not responsible for any radio television interference caused by modifications of this equipment or the substitution or attachment of connecting cables and equipment other than those specified by Thorlabs GmbH. The correction of interference caused by such unauthorized modification, substitution or attachment will be the responsibility of the user.

The use of shielded I/O cables is required when connecting this equipment to any and all optional peripheral or host devices. Failure to do so may violate FCC and ICES rules.

Attention

Mobile telephones, cellular phones or other radio transmitters must not be used within the range of three meters of this unit since the electromagnetic field intensity may then exceed the maximum allowed disturbance values according to IEC61326-1.

This product has been tested and found complying with the limits according to IEC 61326-1 for using connection cables shorter than or equal to 3 meters (9.8 feet).

Attention

Vous pouvez trouver les traductions françaises des paragraphes ayant trait à la sécurité d'utilisation de ce produit sur le lien suivant:

https://www.thorlabs.com/_sd.cfm?fileName=15987-D03.pdf&partNumber=PDA200C

En outre, vous pouvez soit scanner le QR code, soit vous référer à la section "Documents" sur la page web du produit.

5.3 Environmental Conditions

Mains Supply Overvoltage	Category II (Cat II)
Relative Humidity	Max. 80% up to 31 °C; decreasing to 50% at 40 °C
Pollution Degree (Indoor use only)	2
Operation Altitude	<2000 m
Operating Temperature Range (non condensing)	0°C to 40°C

5.4 Manufacturer Address

Manufacturer Address Europe
Thorlabs GmbH
Münchner Weg 1
D-85232 Bergkirchen
Germany
Tel: +49-8131-5956-0
Fax: +49-8131-5956-99
www.thorlabs.de
Email: europe@thorlabs.com

EU-Importer Address
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Fax: +49-8131-5956-99
www.thorlabs.de
Email: europe@thorlabs.com

5.5 Declaration of Conformity

EU Declaration of Conformity

in accordance with EN ISO 17050-1:2010

We: Thorlabs GmbH

Of: Münchner Weg 1, 85232 Bergkirchen, Deutschland

in accordance with the following Directive(s):

2014/35/EU	Low Voltage Directive (LVD)
2014/30/EU	Electromagnetic Compatibility (EMC) Directive
2011/65/EU	Restriction of Use of Certain Hazardous Substances (RoHS)

hereby declare that:

Model: ***PDA200C***

Equipment: ***Benchtop Photodiode Amplifier***

is in conformity with the applicable requirements of the following documents:

EN 61010-1	Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use.	2010
EN 61326-1	Electrical Equipment for Measurement, Control and Laboratory Use - EMC Requirements	2013

and which, issued under the sole responsibility of Thorlabs, is in conformity with Directive 2011/65/EU of the European Parliament and of the Council of 8th June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment, for the reason stated below:

does not contain substances in excess of the maximum concentration values tolerated by weight in homogenous materials as listed in Annex II of the Directive

I hereby declare that the equipment named has been designed to comply with the relevant sections of the above referenced specifications, and complies with all applicable Essential Requirements of the Directives.

Signed: *On:* 15 November 2019

Name: Bruno Gross

Position: General Manager

EDC - PDA200C -2019-11-15

CE

This product was tested for and complies with the following standards:

- CAN/CSA-C22.2 No. 61010-1-04
- ANSI/UL 61010-1-2004

5.6 Warranty

Thorlabs warrants material and production of the PDA200C for a period of 24 months starting with the date of shipment. During this warranty period Thorlabs will see to defaults by repair or by exchange if these are entitled to warranty.

For warranty repairs or service the unit must be sent back to Thorlabs. The customer will carry the shipping costs to Thorlabs, in case of warranty repairs Thorlabs will carry the shipping costs back to the customer.

If no warranty repair is applicable the customer also has to carry the costs for back shipment.

In case of shipment from outside EU duties, taxes etc. which should arise have to be carried by the customer.

Thorlabs warrants the hard- and/or software determined by Thorlabs for this unit to operate fault-free provided that they are handled according to our requirements. However, Thorlabs does not warrant a fault free and uninterrupted operation of the unit, of the software or firmware for special applications nor this instruction manual to be error free. Thorlabs is not liable for consequential damages.

Restriction of Warranty

The warranty mentioned before does not cover errors and defects being the result of improper treatment, software or interface not supplied by us, modification, misuse or operation outside the defined ambient stated by us or unauthorized maintenance.

Further claims will not be consented to and will not be acknowledged. Thorlabs does explicitly not warrant the usability or the economical use for certain cases of application.

Thorlabs reserves the right to change this instruction manual or the technical data of the described unit at any time.

5.7 Exclusion of Liability and Copyright

Thorlabs has taken every possible care in preparing this document. We however assume no liability for the content, completeness or quality of the information contained therein. The content of this document is regularly updated and adapted to reflect the current status of the hardware and/or software. We furthermore do not guarantee that this product will function without errors, even if the stated specifications are adhered to.

Under no circumstances can we guarantee that a particular objective can be achieved with the purchase of this product.

Insofar as permitted under statutory regulations, we assume no liability for direct damage, indirect damage or damages suffered by third parties resulting from the purchase of this product. In no event shall any liability exceed the purchase price of the product.

Please note that the content of this document is neither part of any previous or existing agreement, promise, representation or legal relationship, nor an alteration or amendment thereof. All obligations of *Thorlabs* result from the respective contract of sale, which also includes the complete and exclusively applicable warranty regulations. These contractual warranty regulations are neither extended nor limited by the information contained in this document. Should you require further information on this product, or encounter specific problems that are not discussed in sufficient detail in the document, please contact your local *Thorlabs* dealer or system installer.

5.8 Thorlabs Worldwide Contacts and WEEE Policy

For technical support or sales inquiries, please visit us at www.thorlabs.com/contact for our most up-to-date contact information.

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Thorlabs, Inc.
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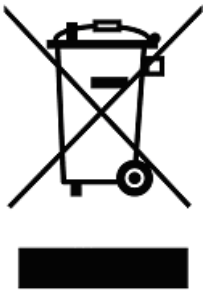
chinasales@thorlabs.com

Thorlabs 'End of Life' Policy (WEEE)

Thorlabs verifies our compliance with the WEEE (Waste Electrical and Electronic Equipment) directive of the European Community and the corresponding national laws. Accordingly, all end users in the EC may return “end of life” Annex I category electrical and electronic equipment sold after August 13, 2005 to Thorlabs, without incurring disposal charges. Eligible units are marked with the crossed out “wheelie bin” logo (see right), were sold to and are currently owned by a company or institute within the EC, and are not dissembled or contaminated. Contact Thorlabs for more information. Waste treatment is your own responsibility. “End of life” units must be returned to Thorlabs or handed to a company specializing in waste recovery. Do not dispose of the unit in a litter bin or at a public waste disposal site.



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