PM100D2, PM100D3
Optical Power and Energy Meter Consoles

Quick Reference



Table of Contents

Chapter 1 Introduction 1
1.1 Intended Use 1
1.2 Explanation of Safety Warnings 1
1.3 Description 1
1.4 Technical Data 2
1.4.1 Specifications 2
1.4.2 Main Features 5
1.4.3 Mechanical Drawings 6
1.5 Pin Diagrams 7
1.5.1 Sensor Connector 7
1.5.2 AUX Connector (PM100D3 Console Only) 8
1.6 Components 9
1.7 Simplified Declaration of Conformity 10
1.8 FCC Designation 10
1.9 General Wireless Compliance Related Information 11
Chapter 2 Safety 12
Chapter 3 Installation 13
3.1 Warranty Information 13
3.2 Packing List 13
3.3 Installation Instructions 13
3.4 Connecting a Power or Energy Sensor 13
3.5 First Measurements 13
Chapter 4 Troubleshooting and Repair 14
Chapter 5 Disposal 14
Chapter 6 Thorlabs Worldwide Contacts 15

Chapter 1 Introduction

1.1 Intended Use

The PM100Dx optical power and energy meter consoles are designed for laboratory and field service use to measure the optical power from coherent and incoherent light sources in combination with compatible and suitable external optical power or energy sensors. The devices may not be used or integrated into equipment that is applied in pharmaceutical, medical, or military applications.

The product may only be used in accordance with the instructions described in this manual. Any other use will invalidate the warranty.

1.2 Explanation of Safety Warnings

⚠WARNING Warning indicates a hazard with a medium level of risk that, if not avoided, could result in death or severe injury.

NOTICE Indicates information considered important, but not hazard-related, such as damage to the product.

CE UKCA The CE marking on the product is the manufacturer's declaration that the product complies with the essential requirements of the relevant European health, safety, and environmental protection legislation.



The wheelie bin symbol on the product, the accessories or packaging indicates that this device must not be treated as unsorted municipal waste but must be collected separately.

1.3 Description

The PM100Dx Optical Power and Energy Meter Consoles are simple to use, fast tools that allow power measurements of optical signals and signal power trends. They also feature convenient data storage and remote connectivity. Each unit has a long-lasting rechargeable battery, which can be recharged via a USB-C connector or wirelessly (Item # PM100D3 only), ensuring the power meter can be operated continuously throughout an extended workday.

The housing features a foldable stand, rubber protective elements, a recessed connection plane, and a 1/4"-20 thread for mounting.

The PM100D3 device also supports thermal power and position sensors, features Bluetooth LE connectivity, and an embedded inductive wireless charging coil.

1.4 Technical Data

1.4.1 Specifications

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

Item #	PM100D2	PM100D3
Display and Operation		
Display Type	3.5" IPS 640 x 480 px (Full Color)	
Display Screens	Numerical with Bar Graph, Line Graph, Statistics, Simulated Analog Needle	Numerical with Bar Graph, Line Graph, Statistics, Simulated Analog Needle, Pass/Fail, Scope
Viewing Area	71.0 mm x 53.3 mm	
Refresh Rate	50 Hz	
Audio	Piezoelectric Speaker	
Sensor Interface		
Compatible Sensors	Thermal and Photodiode Power Sensors, Pyroelectric Energy Sensors	Thermal and Photodiode Power Sensors, Thermal Position & Power Sensors, Pyroelectric Energy Sensors
AD Converter	16-bit	
Sampling Speed	1 kS/s	1 kS/s, 100 kS/s in Burst and Scope Modes
Trigger	Adjustable, 3 - 90% of Each Measurement Range for Pyro and Photodiode in Peak Mode	Adjustable, 3 - 90% of Each Measurement Range for Pyro and Photodiode in Peak Mode, or External Trigger
Connector	DB9F - Left Side	
Temperature Control	NTC Thermistor	
Temperature Range	-10 to 80 °C	
Analog Outputs		
Signal	Amplified Input Signal or 12-bit DAC Corrected Input Signal	Amplified Input Signal, 12-bit DAC Corrected Input Signal, or 14-bit DAC Corrected X-Y Position
Voltage Range	0 to 2.5 V	0 to 2.5 V (Power), -2.0 to 2.0 V (Position)
Accuracy	±3%	
Bandwidth	Up to 100 kHz, Dependent on Sensor and Settings	
Connector	SMA - Left Side	SMA - Left Side, AUX Connector - Rear

Item #	PM100D2	PM100D3
AUX Input / Output		
Function	N/A	4 GPIO, AN OUT for Power (Analog Input Signal and 12-bit DAC) and Position Sensor (14-bit DAC), I2C, UART, and Analog and Digital Supply Voltages
Interfaces and Accessible Memory		
Data Storage	8 GB eMMC (Accessible via USB)	
Interfaces	USB 2.0 Full Speed	USB 2.0 Full Speed / Bluetooth Low Energy / UART
Connector	USB-C - Left Side	USB-C - Left Side, AUX Connector - Rear
Photodiode Sensor Measurement		
Measurement Ranges	21 Current Ranges: 2 nA - 10 mA	
	Ranges Selectable in W or A	
Accuracy	±0.2% of Full Scale (>400 nA - 10 mA)	
	±0.5% of Full Scale (2 nA - 400 nA)	
Digital Resolution	1 pA / Responsivity Value (A/W)	
Bandwidth	DC - 100 kHz, Dependent on Sensor and Settings	
Thermal Sensor Measurement		
Measurement Ranges	9 Voltage Ranges: 2 mV - 1 V	
	Ranges Selectable in W or V	
Accuracy	±0.5% of Full Scale (>4 mV - 1 V) ±1% of Full Scale (2 mV - 4 mV)	
Digital Resolution	1 µV / Responsivity Value (V/W)	
Bandwidth	DC - 10 Hz, Dependent on Sensor and Settings	
Pyroelectric Sensor Measurement		
Measurement Ranges	13 Voltage Ranges: 20 mV - 200 V	
	Ranges Selectable in J or V	
Accuracy	±0.5% of Full Scale (20 mV - 200 V)	
Digital Resolution	10 µV / Responsivity Value (V/J)	
Max Repetition Rate	50 kHz	
Thermal Position and Power Sensor Measurement		
Power Ranges	N/A	9 Voltage Ranges: 2 mV - 1 V
Position Accuracy	N/A	Sensor Dependent
Digital Position Resolution	N/A	1 µm

Item #	PM100D2	PM100D3
Power Management		
Battery	Li-Polymer, 3.7 V, 2300 mAh	
Charger / DC-Input	5 V / 1 A (USB-C)	5 V / 1 A (USB-C or Wireless Charging)
Dimensions and Mounting		
Dimensions (L x W x H)	163.0 mm x 98.4 mm x 35.0 mm (6.42" x 3.87" x 1.38")	
Weight	0.355 kg (0.783 lbs)	
Mounting Options	Fold-Out Stand, 1/4"-20 Thread	
Operating Temperature	0 to 40 °C	
Storage Temperature	-40 to 70 °C	

1.4.2 Main Features

Features	PM100D2	PM100D3
3.5" IPS Color Display	✓	✓
Capacitive Touchscreen	✓	✓
Physical Control Buttons	✓	✓
Rubber Protection, Foldable Stand, and 1/4-20" Post Mounting	✓	✓
Rechargeable Battery	✓	✓
Fast Charging via USB-C Connector	✓	✓
Embedded Wireless Charging Coil	×	✓
Data Storage to Internal Flash Memory	✓	✓
Internal Flash Memory Access via USB	✓	✓
Pass/Fail Analysis	×	✓
Scope Mode	×	✓
Admin / User Levels	×	✓
Physical Menu Button Configuration	×	✓
USB 2.0 Full Speed Interface	✓	✓
Bluetooth Low Energy Connectivity	×	✓
Compatible with OPM Remote Software	✓	✓
Firmware Updates via USB	✓	✓
Photodiode Power Sensors	✓	✓
Thermal Power Sensors	✓	✓
Thermal Power and Position Sensors	×	✓
Pyroelectric Energy Sensors	✓	✓
Smart Analog Output	✓	✓
Auxiliary Functions Connector	×	✓
USB Type C to Type A Cable, 2 m Long	✓	✓
Softshell Storage Bag for Console and Sensors	×	✓

1.4.3 Mechanical Drawings

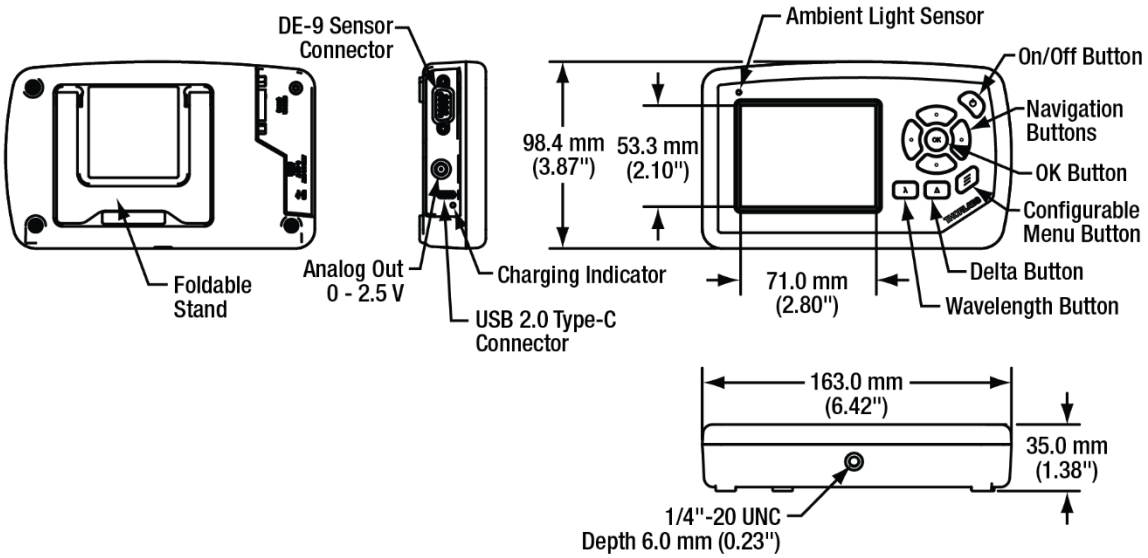


Figure 1 PM100D2 Mechanical Drawing

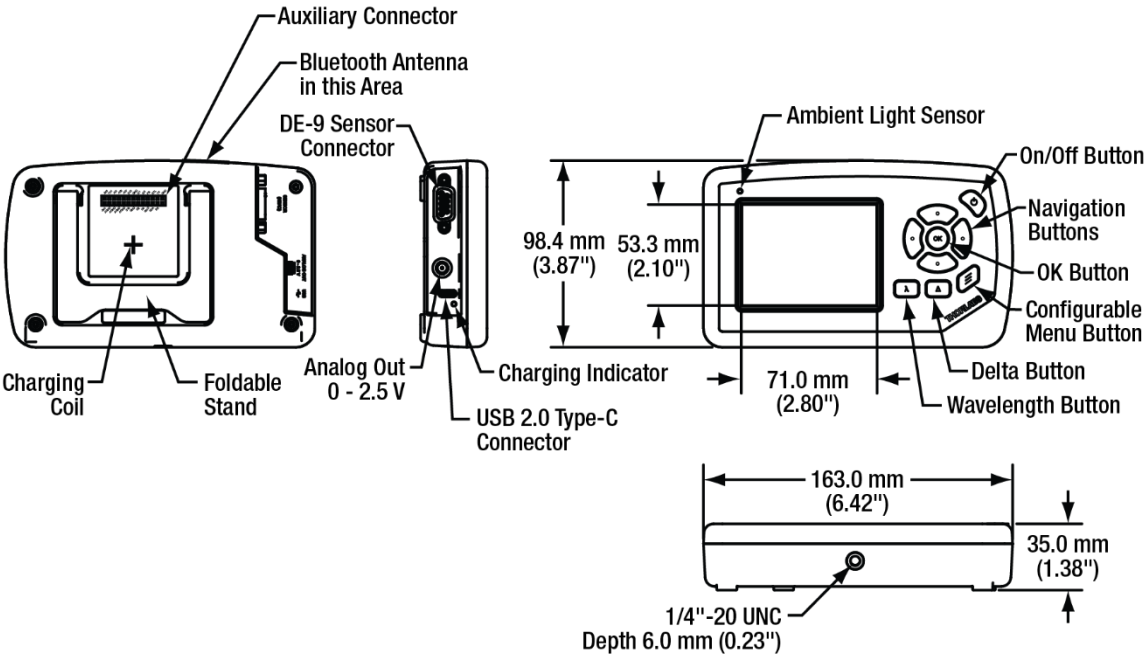


Figure 2 PM100D3 Mechanical Drawing

1.5 Pin Diagrams

1.5.1 Sensor Connector

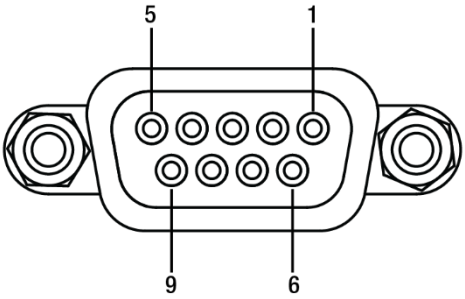


Figure 3 Pin Assignment of the Sensor Connector Jack (Female)

Pin Diagram	
Pin	**Connection**
1	+5 V. Provides a supply voltage with a 50 mA maximum drive current, protected by a self-resetting fuse.
2	EEPROM Digital I/O: Keep this pin not connected for custom sensors to avoid malfunction.
3	Photodiode Ground (Anode), Thermal and Pyro Sensor Ground, Analog Ground
4	Photodiode Cathode, Quadrant 3 for Position Sensors (PM100D3 Console Only)
5	Pyroelectric Sensor +, Quadrant 4 for Position Sensors (PM100D3 Console Only)
6	Digital Ground
7	PRESENT: NTC, 1 kΩ to 15 kΩ Resistor to Pin 3 (Analog Ground) to enable a custom sensor.
8	Thermal Sensor +, Quadrant 1 for Position Sensors (PM100D3 Console Only)
9	Quadrant 2 for Position Sensors (PM100D3 Console Only)

1.5.2 AUX Connector (PM100D3 Console Only)

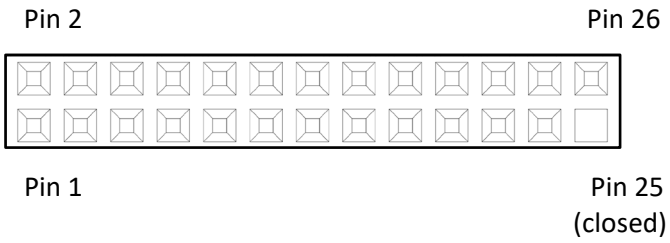


Figure 4 Pin Assignment of the AUX Connector

Pin Diagram	
Pin	**Connection**
1	-2V4: -2.4 V Negative Periphery Analog Voltage Supply, 50 mA Maximum
2	2V8: +2.8 V Positive Periphery Analog Voltage Supply, 50 mA Maximum
3, 5, 7, 9	AGND: Analog Ground
4	TH1: Configurable NTC Input
6	AO1: Analog Output, Parallel to AO SMA Connector, 0 - 2.5 V
8	AOX: DAC-Controlled Analog Outputs for X Position, ±2.0 V
10	AOY: DAC-Controlled Analog Outputs for Y Position, ±2.0 V
11	5V0: 5.0 V Digital Periphery Voltage Supply, 100 mA Maximum
12	3V3: 3.3 V Digital Periphery Voltage Supply, 100 mA Maximum, DIO, and Buses
13, 14, 19, 26	GND: Digital Ground
15, 16, 17, 18	IO1 - IO4: GPIO, or Trigger-Configurable Digital Ports, 3.3 V Logic, 5 V Tolerant
21, 22	SDA, SCL: User Accessible I2C Interface, 3.3 V Logic
23, 24	RX, TX: UART Remote Interface, 3.3 V Logic
25	Closed Pin for Polarity Protection with Extension Cable

1.6 Components

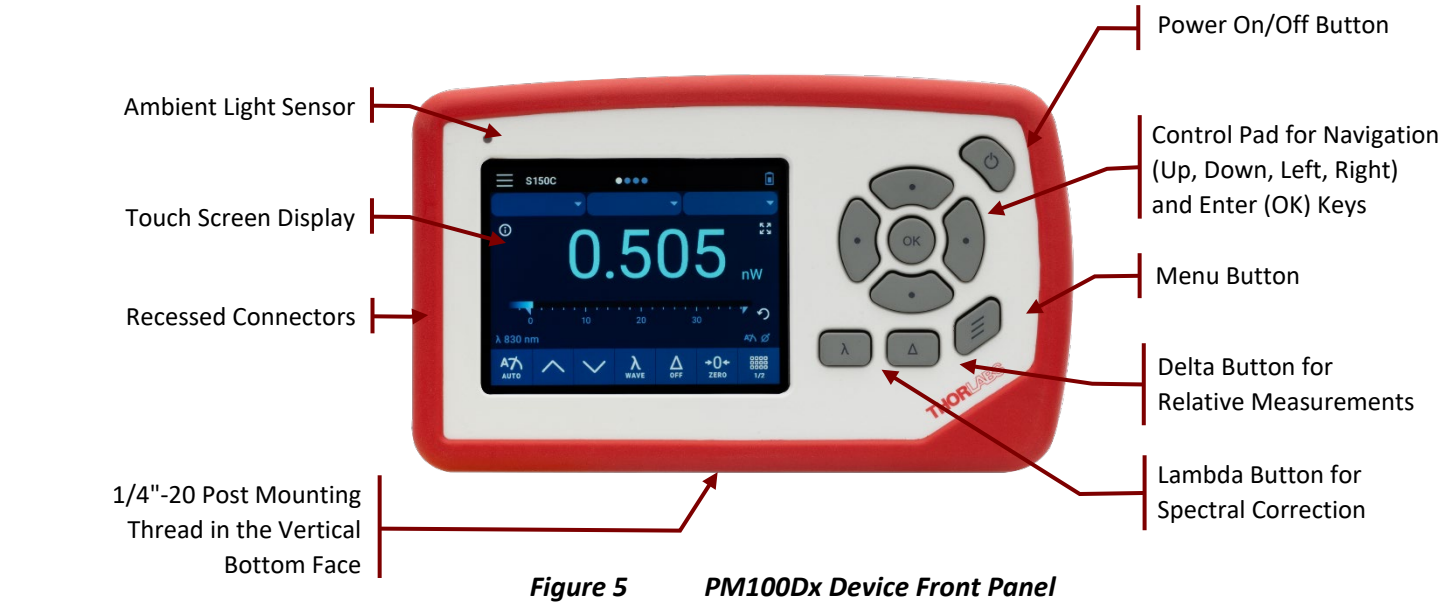


Figure 5 PM100Dx Device Front Panel

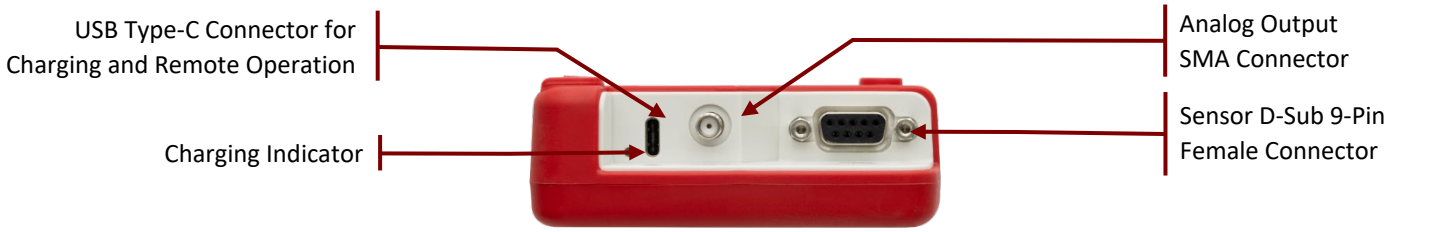


Figure 6 Recessed PM100Dx Device Connector Plane

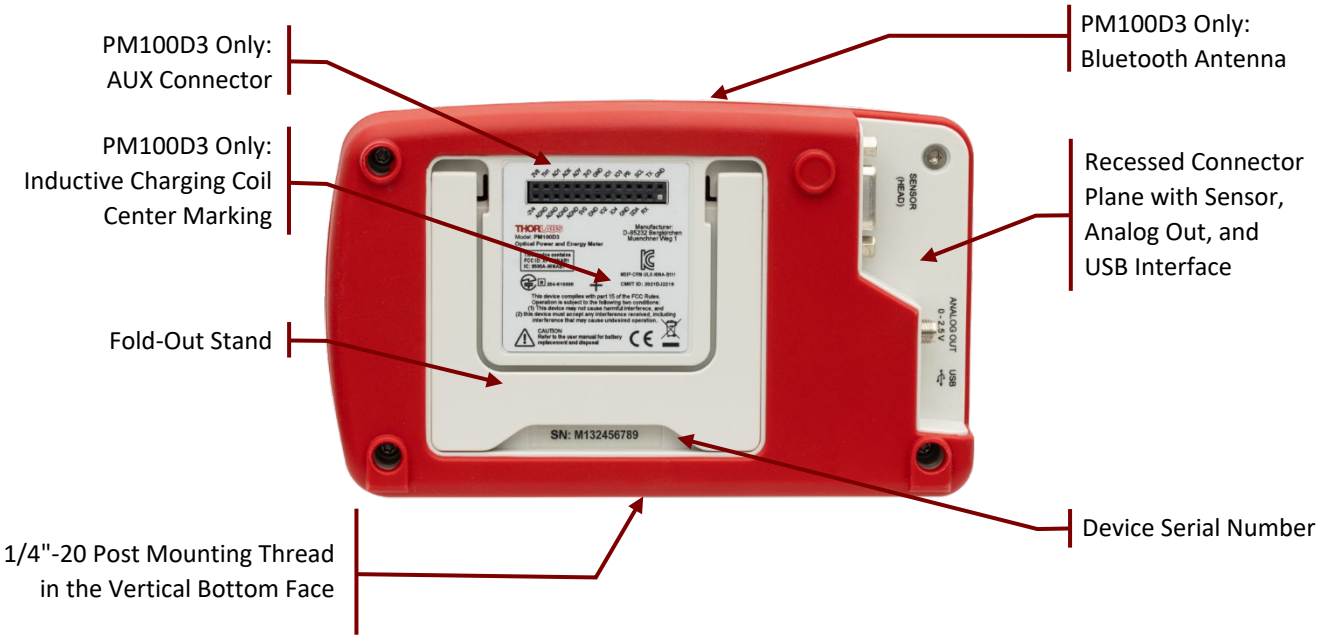


Figure 7 PM100Dx Device Back View (Picture Shows PM100D3 Device)

1.7 Simplified Declaration of Conformity

Hereby, Thorlabs declares that the radio equipment type u-blox NINA-B112 is in compliance with Directive 2014/53/EU. The full text of the EU declaration of conformity is available at the following internet address: **https://www.thorlabs.com/newgrouppage9.cfm?objectgroup_id=3341**

1.8 FCC Designation

Class B FCC Designation:
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

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. 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/TV 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 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. The correction of interference caused by such unauthorized modification, substitution or attachment will be the responsibility of the user.

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

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

1.9 General Wireless Compliance Related Information

The PM100D3 device has an internal radio module with an integrated antenna to which the following information applies:

This product does not contain any wireless user serviceable components. Any unauthorized product changes or modifications will invalidate the warranty and all applicable regulatory certifications and approvals.

The module used is NINA-B112 from u-blox.

The device is designed to work in the Bluetooth® 2.4 GHz band.

The radio module can be deactivated by the user.

Hereby, Thorlabs declares that the radio equipment type NINA-B112 is in compliance with Directive 2014/53/EU. The full text of the EU declaration of conformity is available at the following internet address: **https://www.u-blox.com/en**

US / Canada Registration Number and Labeling on the Device:

This device contains
FCC ID: XPYNINAB1
IC: 8595A-NINAB1

China Registration Number:

本设备包含型号核准代码(分别)为: CMIIT ID: 2021DJ2218的无线电发射模块。

Japanese Giteki Mark and Registration Number:

R 204-610006

Brazil Registration Number:

ANATEL
03882-16-05903

Korean KC Mark and Registration Number:

MSIP-CRM-ULX-NINA-B111

"Este equipamento opera em caráter secundário, isto é, não tem direito a proteção contra interferência prejudicial, mesmo de estações do mesmo tipo, e não pode causar interferência a sistemas operando em caráter primário."

Chapter 2 Safety

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.

Changes to this device cannot be made nor may components not supplied by Thorlabs be used without written consent from Thorlabs.

⚠WARNING

Explosion Warning
The PM100Dx devices must not be operated in explosion endangered environments!

NOTICE

Do not open the instrument. Apart from the battery replacement described in the device manual, downloadable at https://www.thorlabs.com/manuals.cfm, there are no user-serviceable parts inside!

Chapter 3 Installation

3.1 Warranty Information

The precision PM100Dx devices are only serviceable if returned and properly packed into the complete original packaging including the complete shipment plus the cardboard insert that holds the enclosed devices. If necessary, ask for replacement packaging. Refer servicing to qualified personnel.

3.2 Packing List

- PM100D2 or PM100D3 Optical Power and Energy Meter Console
- USB Cable, Type-A to Type-C, 2 m Long
- Certificate of Calibration
- Quick Reference
- PM100D3 Console Only:
    - AUX Connector Extension Cable, 300 mm Long
    - Softshell Storage Bag for Console and Sensors

3.3 Installation Instructions

The PM100Dx optical power and energy meters are ready to operate out of the box. However, due to regulatory requirements, the unit will be shipped with a battery charge level of less than 25%, so it is advisable to fully charge the battery prior to first use. Connect the PM100Dx device to a compatible wall plug USB charging adapter or a PC with a USB power port using the supplied USB cable, and then allow the power meter to fully charge (usually within 2 hours).

If the PM100Dx power meter will be operated remotely, install the **Optical Parameter Monitor** software from the Thorlabs website. It comes with all of the required instrument drivers, examples, and an application to set all of the settings and to visualize or record the measurement results. It includes useful tools like a firmware update wizard, user calibration, and a laser calculator.

3.4 Connecting a Power or Energy Sensor

The PM100D2 console is compatible with any currently offered photodiode, thermal, or pyroelectric C-series power or energy sensor. The PM100D3 console, in addition, supports Thorlabs power and position sensors.

The sensor connector location is in a recess below the upper left corner of the device. Turn the device over and gently push the "C-Series" connector, with the Thorlabs logo facing out, into the D-Sub socket until it clicks into place. Sensors can be hot-swapped.

The meter will automatically detect the connected sensor and configure the best possible default setting after powering on.

3.5 First Measurements

Some hints to perform accurate laser power measurements:

- Press the power on/off button to turn on the PM100Dx power meter console.
- Navigate to the main measurement screen – this is the out-of-the-box default screen.
- Set the wavelength of your laser light source.
- Turn the unit to auto-ranging or select an appropriate measurement range.
- Perform a zeroing with the detector covered and any lasers switched off.
- Uncover the sensor, turn on the laser, and view the displayed measurement result.

Chapter 4 Troubleshooting and Repair

Below are a few checks to help with troubleshooting problems that may arise. Please contact your local Thorlabs Technical Support office with any questions.

Failure	Troubleshooting
Unit Does Not Turn On	Ensure that the battery is sufficiently charged; otherwise, connect the device to an external power supply. The device may not have shut down properly, in this case press the power On/Off button for >3 seconds, and try to start the device again by short-pressing the standby button.
Display Shows "No Sensor Connected"	Check that a "C-series" power or energy sensor is connected properly. When the error occurs after a sensor "hot-plug", try restarting the instrument.
Display Shows "Sensor Not Supported"	This message will appear when trying to connect a thermal power and position sensor to the PM100D2 console.
Battery Does Not Charge	Check for the charging LED; it must blink green during charge. In case the LED is red, check the power supply or check for abnormal heating of the device.
Unit Automatically Switches Off	Check the battery status. The unit turns off to protect the battery below 6% SOC. Also, check the automatic switch-off feature in the device settings.
Measurement Value Does Not Update	Check if the unit is in peak mode or top mode. The measurement will only update on valid trigger conditions. Otherwise, restart the instrument.
Unit is Frozen and Does Not React to Any Interaction	Press the power button until the device powers down. Restart the device.
Wireless Charging Function Does Not Work	Check that the orientation of the charging transmitter is correct. Check that the transmitter has power and is turned on. The PM100D3 console charging LED should flash to indicate charging or be solid when fully charged.

Chapter 5 Disposal



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. It is the user's responsibility to delete all personal data stored on the device prior to disposal.

Chapter 6 Thorlabs Worldwide Contacts

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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