PMT2100 Series
Photomultiplier Tubes

User Guide

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Table of Contents

Chapter 1 Warning Symbol Definitions 1

Chapter 2 Safety 2

Chapter 3 Description 3

3.1. Overview 3

Chapter 4 Getting Started 5

4.1. Ordering Codes 5

4.2. Unpacking and Inspection 5

4.3. Setting Up PMT2100 Series PMT 6

4.3.1. Minimum Computer Requirements 6
4.3.2. Preparation 6

Chapter 5 Operation 7

Chapter 6 Software 9

6.1. PMT2100 Software Development Kit (SDK) Installation .. 9

6.2. Keysight IO Libraries Suite 13

6.2.1. Keysight VISA Settings Configuration 16

6.3. NI-VISA Runtime 18.5 18

6.4. Software Startup 24

6.5. Setting the PMT2100 Offset 26

6.6. GUI (Graphical User Interface) 27

6.6.1. Display Area 27
6.6.2. Menu 28

6.7. Updating the Firmware 29

Chapter 7 Maintaining the PMT2100 Series 31

7.1. Storing the PMT2100 Series 31

7.2. Troubleshooting 31

Chapter 8 Electrical Schematic 32

Chapter 9 Performance Plots 33

Chapter 10 Specifications 34

10.1. General Specifications 34

10.2. PMT Specifications 35

10.3. Amplifier Specifications 36

Chapter 11 Mechanical Drawing 37

Chapter 12 Commands 41

Chapter 13 Certifications and Compliance 43

Chapter 14 Warranty 44

Chapter 15 Regulatory 45

Chapter 16 Thorlabs Worldwide Contacts 46

Chapter 1 Warning Symbol Definitions

Below is a list of warning symbols you may encounter in this manual or on your device.

Symbol	Description
	Direct Current
	Alternating Current
	Both Direct and Alternating Current
	Earth Ground Terminal
	Protective Conductor Terminal
	Frame or Chassis Terminal
	Equipotentiality
	On (Supply)
	Off (Supply)
	In Position of a Bi-Stable Push Control
	Out Position of a Bi-Stable Push Control
	Caution: Risk of Electric Shock
	Caution: Hot Surface
	Caution: Risk of Danger
	Warning: Laser Radiation
	Caution: Spinning Blades May Cause Harm

Chapter 2 Safety

All statements regarding safety of operation and technical data in this user guide will only apply when the unit is operated correctly. Please read the following warnings and cautions carefully before operating the device.

WARNING

DO NOT use the device for anything other than its intended use. If the device is used in a manner not specified by Thorlabs, the protection provided by the equipment may be impaired.

CAUTION

DO NOT operate in a wet, damp, or explosive environment.

Chapter 3 Description

Our PMT2100 Series Photomultiplier Tubes (PMTs) have an integrated transimpedence amplifier, designed for the detection of signals from DC to 80 MHz. They have built-in low pass filters (250 kHz, 2.5 MHz and 80 MHz). The USB cable powers and controls the PMT2100 PMTs. A buffered output drives a 50 Ω impedance up to ±1.5 V. The housing includes C-Mount threading (1.00"-32) for convenient mounting of external optics, emission filters, and irises.

The PMT2100 series consist of PMT2100 (C-Mount threading, only available with Thorlabs Imaging Systems), PMT2101 (SM1-threaded aperture with imperial mounting threads), PMT2101/M (SM1-threaded aperture with metric mounting threads), and PMT2102 (C-Mount threading, standalone unit).

3.1. Overview

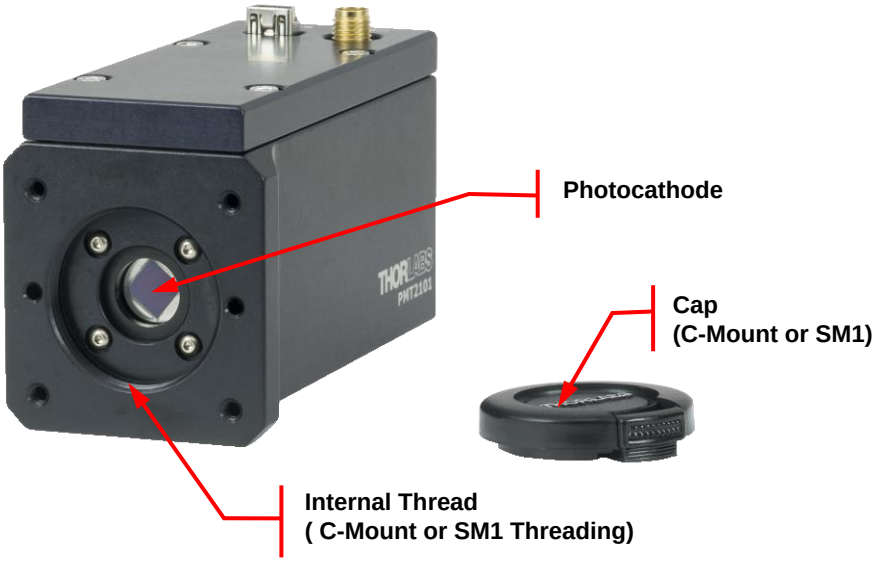


Figure 1 PMT2100 Series PMT Front View

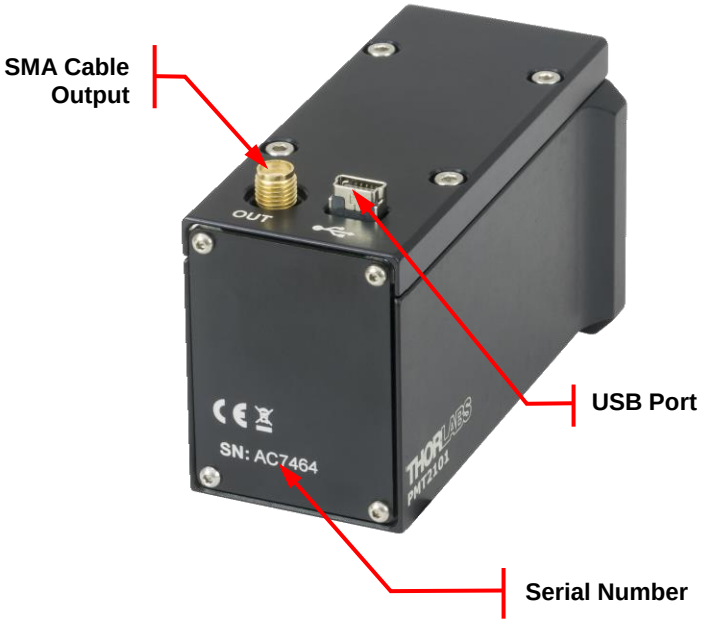


Figure 2 PMT2100 Series PMT Rear View

Chapter 4 Getting Started

This section is provided for those interested in getting the Photomultiplier Tube module up and running quickly.

4.1. Ordering Codes

Ordering Codes	Description
PMT2100	Non-Cooled GaAsP PMTs with Built-in Amplifier, C-Mount (Only Available with Thorlabs Imaging Systems)
PMT2101	Non-Cooled GaAsP PMTs with Built-in Amplifier, SM1-Threaded Aperture with Imperial Mounting Threads
PMT2101/M	Non-Cooled GaAsP PMTs with Built-in Amplifier, SM1-Threaded Aperture with Metric Mounting Threads
PMT2102	Non-Cooled GaAsP PMTs with Built-in Amplifier, C-Mount

4.2. Unpacking and Inspection

Open the package, and carefully remove the PMT2100 series PMT and its accessories. The table lists the standard accessories shipped with the device.

Name	Quantity			
	PMT2100	**PMT2101**	**PMT2101/M**	**PMT2102**
Photomultiplier Tube	1	1	1	1
USB Male A to USB Mini 2.0	1	1	1	1
SMA to SMB Cable 120"	1	1	1	1
C-Mount Cap	1	-	-	1
SM1 Cap	-	1	1	-
PMT2100 Control Software CD	1	1	1	1

Inspect the device and its accessories for any missing parts or damage. If there is any problem, please contact our nearest office (see ***Chapter 16 Thorlabs Worldwide Contacts*** for details).

4.3. Setting Up PMT2100 Series PMT

4.3.1. Minimum Computer Requirements

Computer Requirements	
Operating System	Windows 7 or 10 (64-Bit)
Driver	Keysight IO Libraries Suite (Version 17.2.20818.0)
Other Software	Visual C++ Redistributable Package (2012), Microsoft .NET 4.5.2

4.3.2. Preparation

1. Mount the PMT on your optical table or application. Keep the PMT cap on until you are ready to start the experiment.
2. Connect the USB port to the computer.
3. Connect a 50 Ω SMA to SMB cable from the **OUT** port of the PMT to a data acquisition equipment. If you use your own cable and the cable length is longer than 120", we recommend you to terminate the opposite end of the cable at 50 Ω for maximum performance.

CAUTION

DO NOT expose the photomultiplier tube to strong light sources (especially UV). They can temporarily increase the noise in the output signal. It can additionally trip the PMT and potentially cause permanent damage to the unit.

4. Install the required software/driver on your computer as described in ***Chapter 6: Software.***
5. Start the PMT2100 Control software (refer to ***Section 6.4: Software Startup***) and adjust the PMT offset (refer to ***Section 6.5 Setting the PMT2100 Offset***).
6. Switch on the light source.
7. Use the PMT2100 Control software (refer to ***Chapter 6: Software***) to control the output gain of the PMT.

Note: The warm-up time required before applying control voltage is 30–60 minutes.

Chapter 5 Operation

The light to voltage conversion can be estimated by multiplying the wavelength-dependent responsivity of the photomultiplier tube by the transimpedance gain and input optical power:

Output (V) = Transimpedance Gain (V/A) x Sensitivity (A/W) x Gain x Input Optical Power (W)

The sensitivity can be estimated from Figure 3 and the calibration data. The gain can be estimated from Figure 4.

The PMT performance degrades over time.

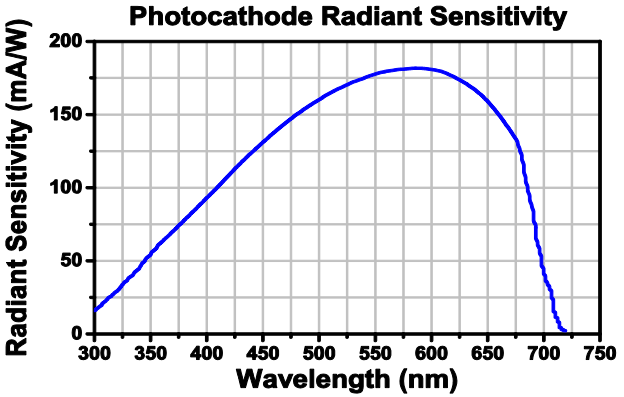


Figure 3 Typical Spectral Photocathode Radiant Sensitivity

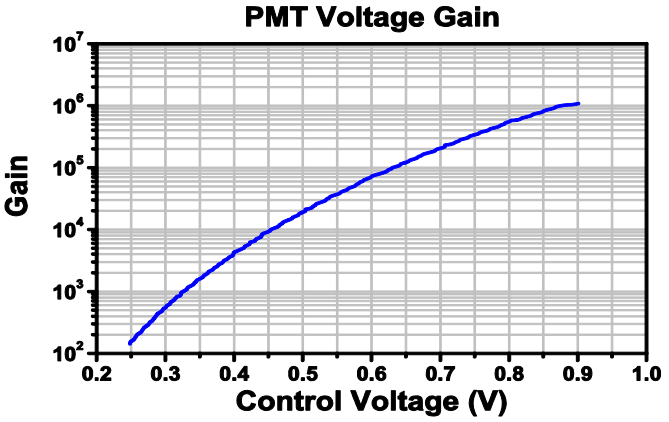


Figure 4 Typical Voltage Gain Curve

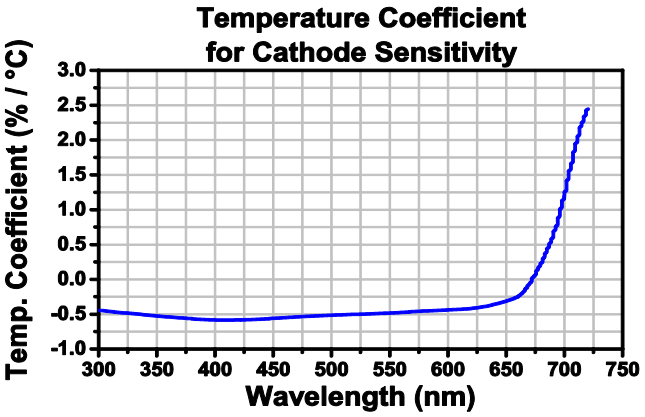


Figure 5 Temperature Coefficient

The maximum output of a PMT2100 Series PMT is ±1.5 V for 50 Ω loads. To avoid saturation, the output signal should not exceed the maximum output voltage. If necessary, use external neutral density filters (e.g., Item # NDC-50C-4M-A) to reduce the input light level.

CAUTION

DO NOT allow high light levels (enough to cause a trip) to enter the PMT while it is on. High light levels can permanently damage the photocathode.The maximum current signal should not exceed the value of 50 µA average.

There is an internal counter that records the number of trips. To query this counter, refer to ***Chapter 12: Commands*** for the commands.

Chapter 6 Software

The gain, output offset and bandwith can all be control with the PMT2100 software.

6.1. PMT2100 Software Development Kit (SDK) Installation

1. Insert the PMT2100 Software CD into the computer, and open *70-0037 – PMT2100 SDK* folder.
2. Double click the **Installer** (.exe) application to open the *PMT2100 Setup* window.
3. Click *Next* to continue.

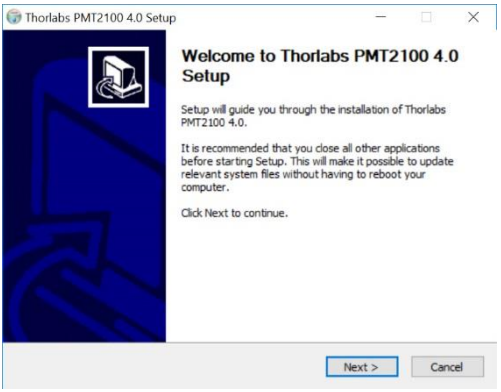


Figure 6 Setup Window

4. In the *Choose Components* window, select SDK if you want the software development kit files installed, then click *Next*.

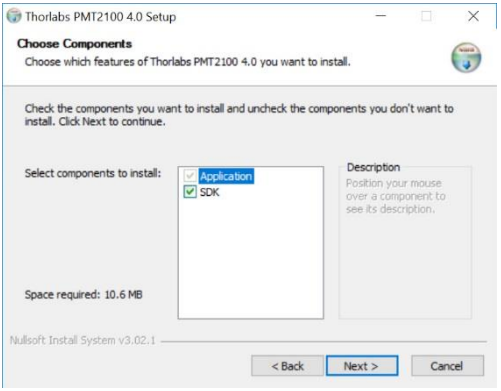


Figure 7 Choose Components Window

5. In the *Choose Install Location* window, select the destination folder you like the files installed, then click *Install*.

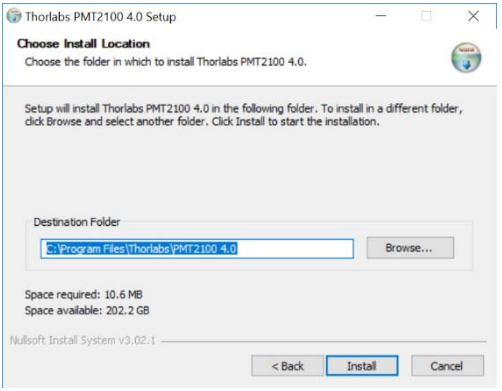


Figure 8 Choose Install Location Window

6. The PMT2100 setup will begin installation.

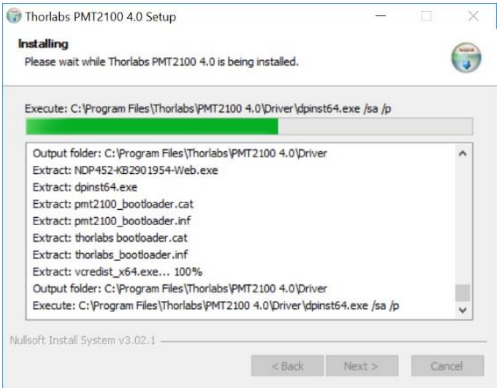


Figure 9 Installing Window

7. During installation, the *Device Driver Intallation Wizard* will appear. Click *Next* to begin installing the software drivers that some computer devices need in order to work.

Figure 10 Device Driver Installation Wizard Window

8. Once drivers are installed, click *Finish* to complete drivers installation.

Figure 11 Completing the Device Driver Installation Wizard Window

9. The installer will automatically search your computer for *Microsoft Visual C++ Redistributable (x64) – 11.0.61030*. It will download and install it if it's not found on your computer.

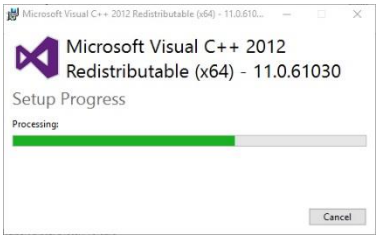


Figure 12 Microsoft Visual C++ 2012 Redistributable Window

10. Once done installing the necessary software, select *Reboot now* and click *Finish* in the *Completing Thorlabs PMT2100 Setup* window to close the *Setup* window and restart your computer.

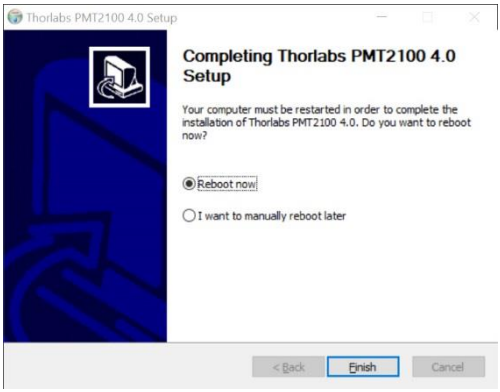


Figure 13 Completing the Thorlabs PMT2100 Setup Window

11. PMT2100 setup is now complete and a new Windows shortcut is added to your desktop.

Figure 14 PMT2100 4.0 Shortcut Icon

6.2. Keysight IO Libraries Suite

Note: Install Version 17.2.20818.0 provided in the PMT2100 Control Software CD. DO NOT update the Keysight IO Libraries Suite to the latest version available on www.keysight.com.

1. Insert the PMT2100 Software CD into the computer, and open *Keysight IO Libraries* folder.
2. Double click the **IOLibSuite_17_2_20818_0** application to open the *User Account Control* window. Click *Yes* on the *User Account Control* window. *The InstallShield Wizard* window appears. Click *Next*.

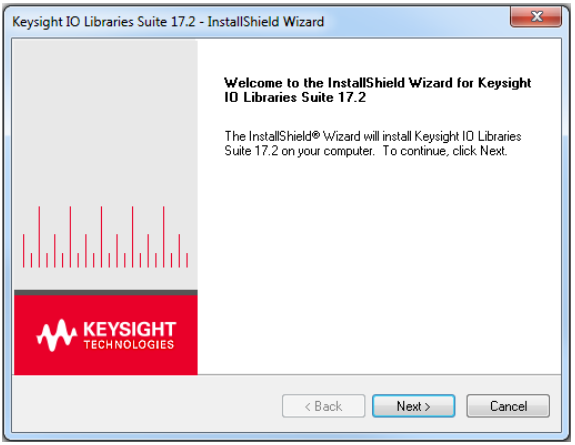


Figure 15 InstallShield Wizard Window

3. On the *InstallShield Wizard* window, select *Agree* and click *Next*.

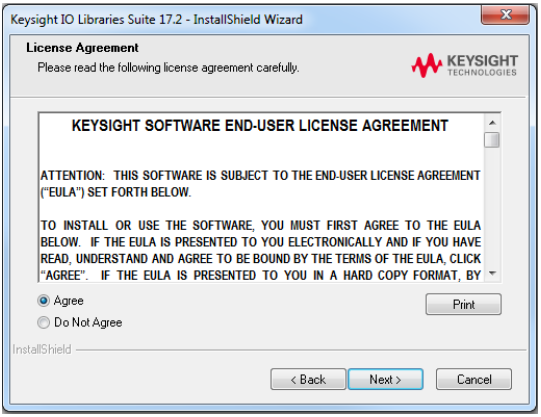


Figure 16 InstallShield Wizard - License Agreement

Note: If installation fails due to error *0x800F081F* (a .NET Framework 3.5 incompatability), abort Keysight installation and proceed to ***Section 6.3: NI-VISA Runtime 18.5***; otherwise, continue.

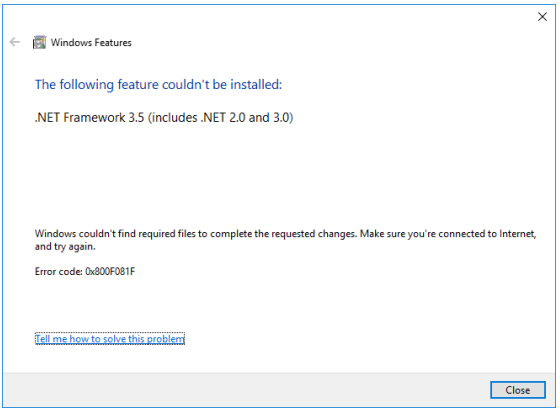


Figure 17 Windows Error Code: 0x800F081F

4. Select *Typical* for the setup type, and click *Next.*

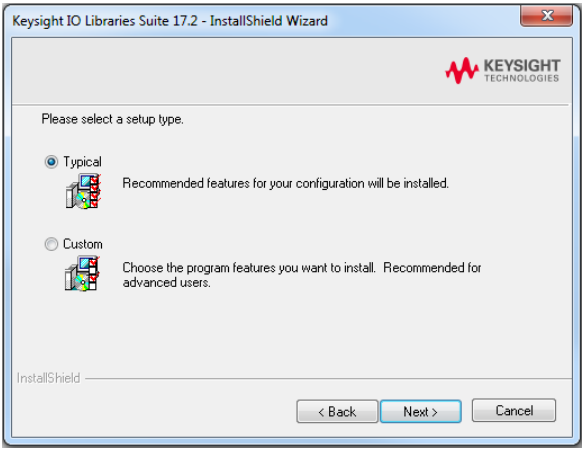


Figure 18 InstallShield Wizard - Setup

5. Click *Install* to copy the files.

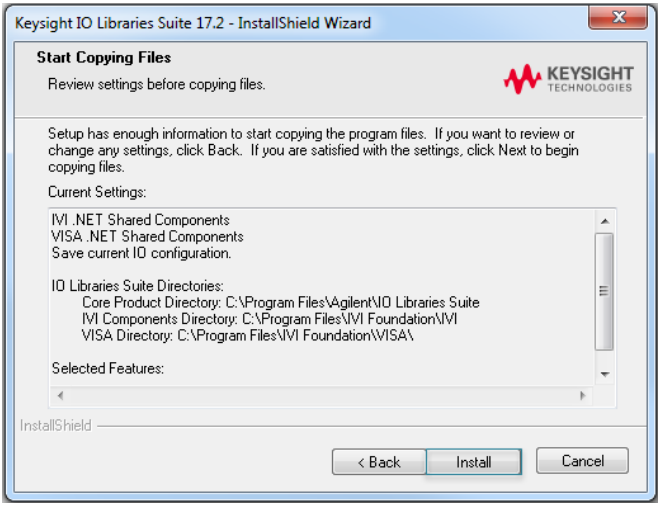


Figure 19 Installshield Wizard – Copying Files

6. Click *Finish* to exit the *InstallShield Wizard* window.

The Keysight IO Libraries Suite setup is complete.

6.2.1. Keysight VISA Settings Configuration

Follow the below procedure, if you have installed NI (National Instruments) Software on your computer. If you do not configure the Keysight VISA Settings, the PMT may not respond.

Note: If you do not have NI software installed on your computer, DO NOT configure the Keysight VISA Settings.

Use a USB cable to connect the PMT to the computer.

7. Right click on the *Keysight IO Libraries Suite* icon, and click *Connection Expert*.

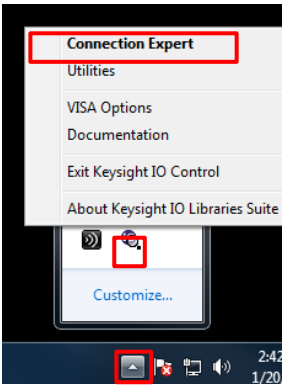


Figure 20 Keysight IO Libraries Suite

8. In the *Keysight Connection Expert* window, click *Settings>VISA Conflict Manager>General VISA Settings*. Select the parameters as shown in Figure 21 and click *Accept*.

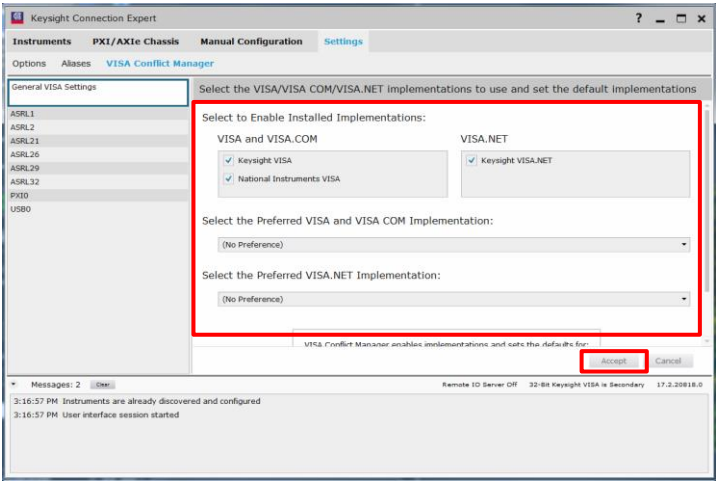


Figure 21 Keysight Connection Expert Window

9. In the *Keysight Connection Expert* window, click *Settings>VISA Conflict Manager>USB0*. Set the parameters as shown in the figure below and click *Accept*.

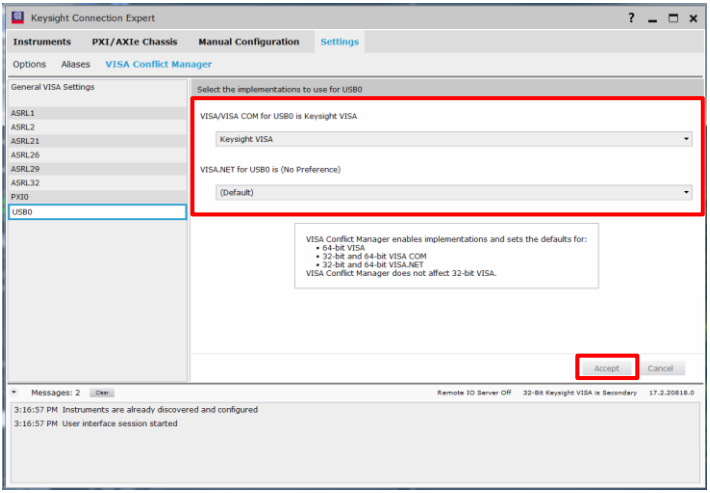


Figure 22 VISA Conflict Manager Tab

10. Close the *Keysight Connection Expert* window.

6.3. NI-VISA Runtime 18.5

Note: It is NOT necessary to install NI-VISA Runtime 18.50 provided in the PMT2100 Software CD, unless Keysight IO Library failed to install. If Keysight installed successfully, continue to next section. DO NOT update the NI-VISA Software.

1. Insert the PMT2100 Software CD into the computer, and open *70-0099 – NIVISA_Runtime* folder.
2. Double click the *NIVISA1850runtime* application to open the *NI-VISA Runtime 18.5 self-extracting archive* window, then click *OK*.

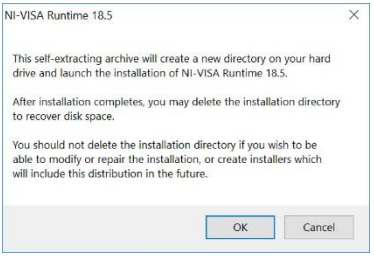


Figure 23 NI-VISA Runtime 18.5 Self Extracting Archive Window

3. In the *WinZip Self-Extractor – NIVISA1850runtime* window, click *Unzip* to extract all files from the installer.

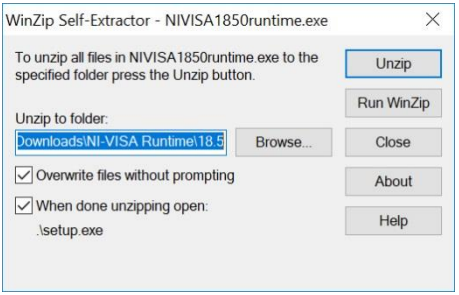


Figure 24 WinZip Self-Extractor – NIVISA1850runtime Window

4. Click *OK* once all files have been extracted.

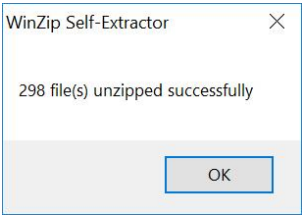


Figure 25 WinZip Self-Extractor Window

5. The *NI-VISA 18.5 Runtime* setup window appears. Click *Next*.

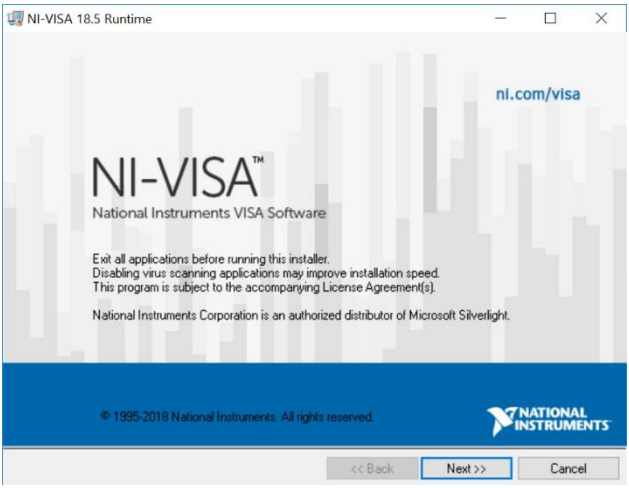


Figure 26 NI-VISA 18.5 Runtime Setup Window

6. In the *Destination Directory* window, select the destination folder you like the files installed, then click *Next*.

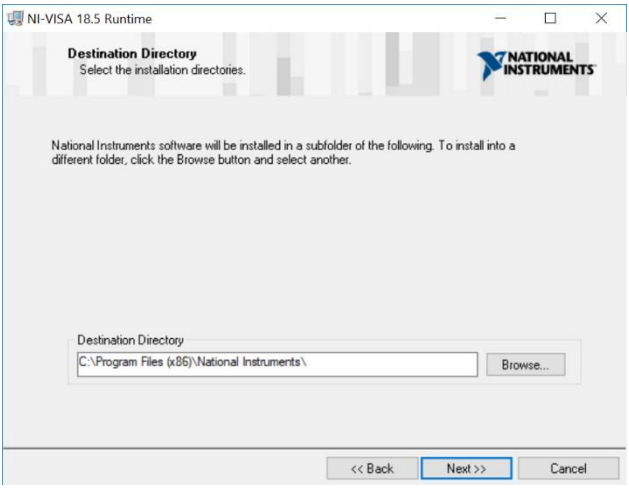


Figure 27 Destination Directory Window

7. In the *Features* window, make sure R*untime Support>COM Support* and *.NET 4.0-4.5.1 Runtime Support (IVI)* are selected, then click *Next*.

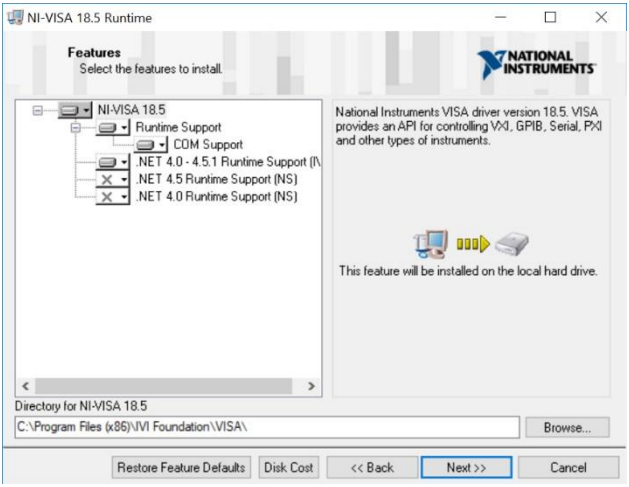


Figure 28 Features Window

8. In the *Product Notifications* window, uncheck "*Search for important messages and updates…"* then click *Next*.

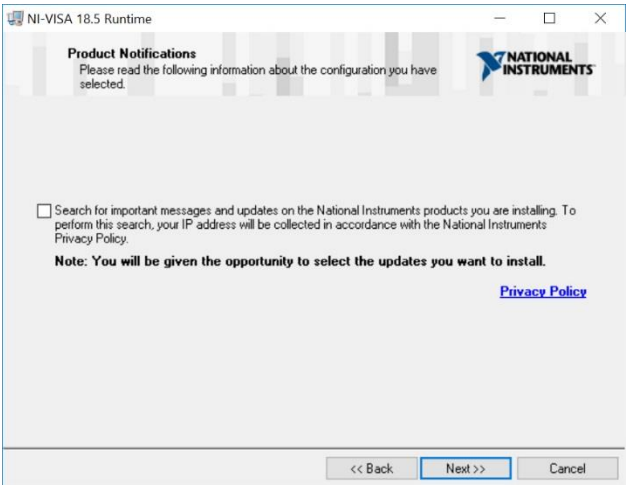


Figure 29 Product Notifications Window

9. In the *License Agreement* window, select *I accept the above 2 License Agreement(s)*, then click *Next*.

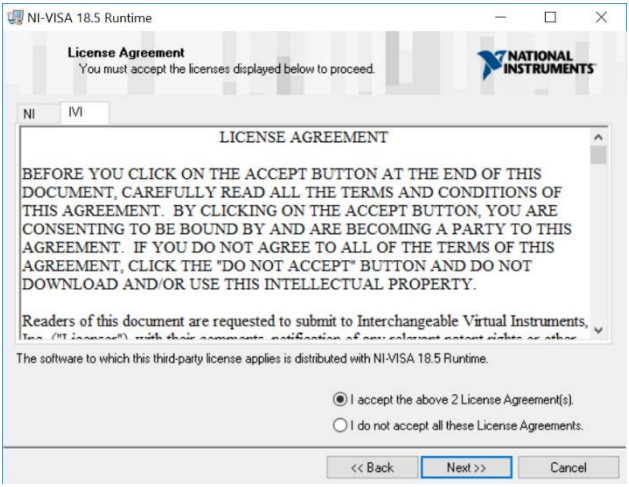


Figure 30 License Agreement Window

10. In the *Driver Software Installation* window, select *Always trust software from National Instruments Corporation*, then click *Next*.

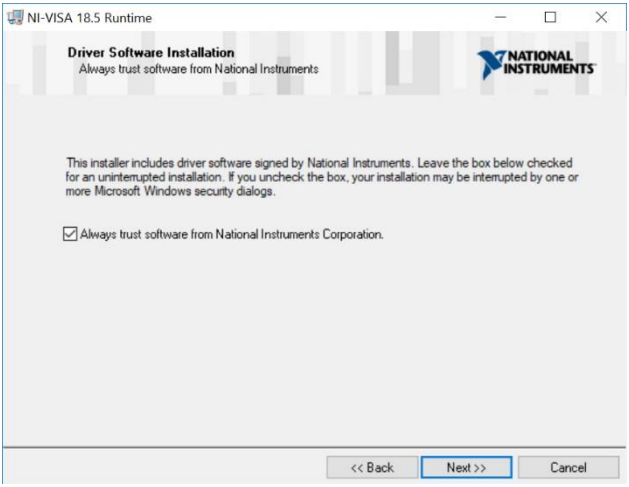


Figure 31 Driver Software Installation Window

11. In the *Disable Windows Fast Startup* window, select *Disable Windows fast startup to prevent problems with installing or removing hardware*,then click *Next*.

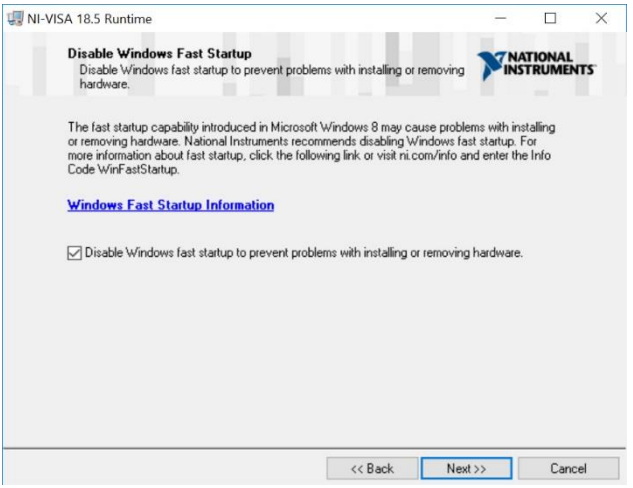


Figure 32 Disable Windows Fast Startup Window

12. In the *Start Installation* window, click *Next* to begin installation.

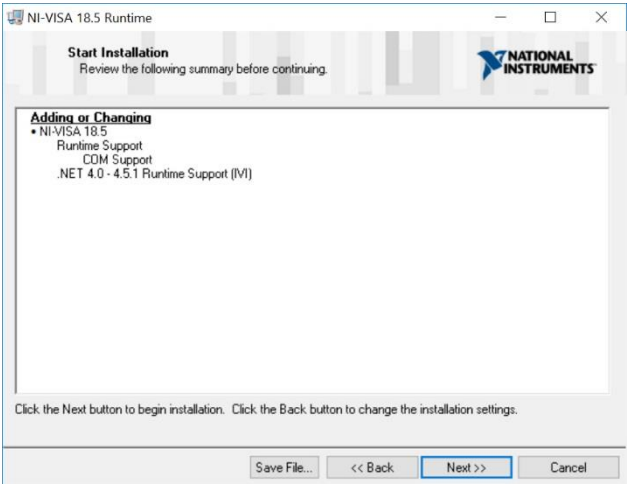


Figure 33 Start Installation Window

13. Click *Finish* in the *Installation Complete* window.

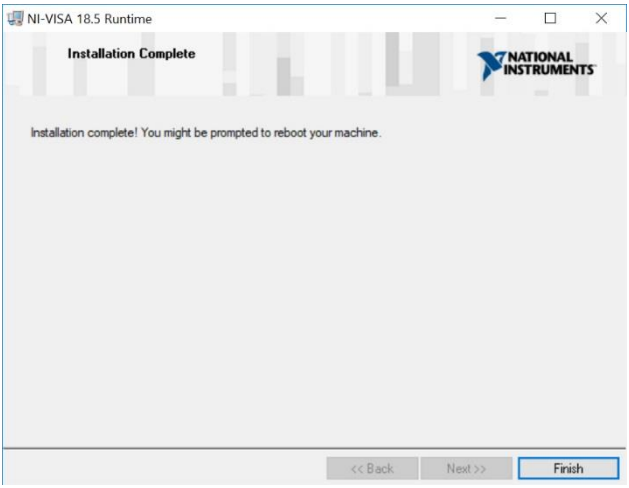


Figure 34 Installation Complete Window

14. You must restart your computer to complete this operation, click *Restart*.

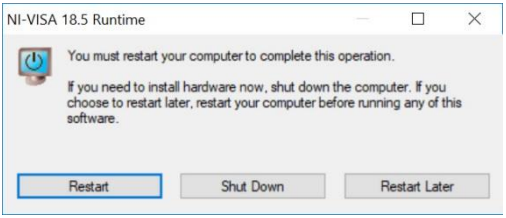


Figure 35 NI-VISA 18.5 Runtime Restart Prompt Window

6.4. Software Startup

The PMT2100 Control Software can control both PMT1000 and PMT2100 Series. The software can control up to six PMTs.

1. Double click the *PMT2100_Control.exe* file from the *Application* folder. The *Connection Settings* window appears.

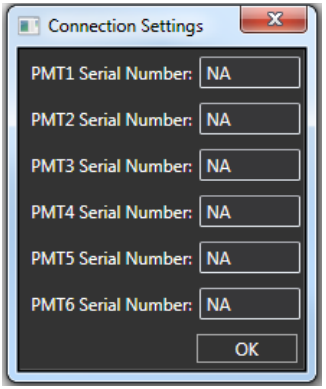


Figure 36 Connection Settings Window

2. In the *Connection Settings* window, enter the SN (serial number) of the PMTs (six to eight digit alphanumeric printed on the back of the PMT) in use. Click *OK*. The *PMT2100 Control* window appears. If you do not know the serial number, type *NA* in the textbox for the respective PMT. The system updates the PMT's serial number in the *PMT2100 Control* window.

   Note: The software is case-sensitive. Use only uppercase alphabetical characters.

   Note: For a six digit alphanumeric SN, prefix the digit with 00.

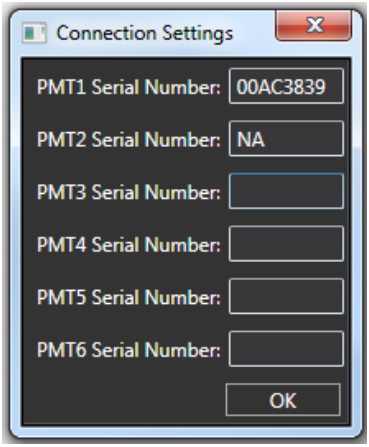


Figure 37 Connection Settings Window with Serial Number

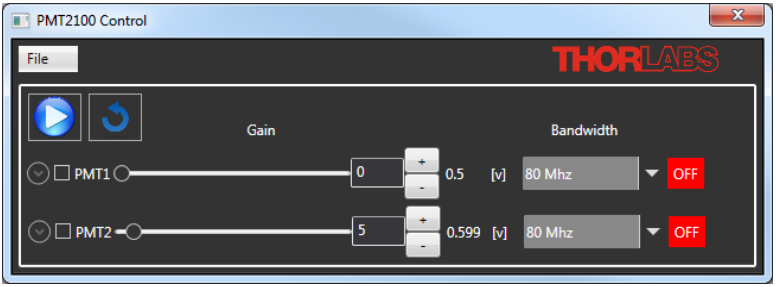


Figure 38 PMT2100 Control Window

3. Click the button next to each PMT to expand the respective PMT panel.

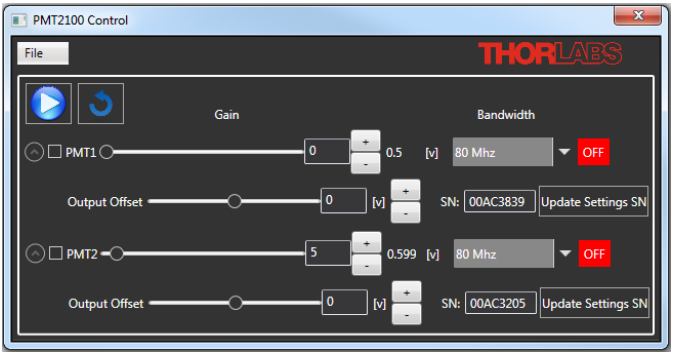


Figure 39 PMT2100 Control Window

Note: If the serial number is unavailable, select the respective PMT on the *PMT2100 Control* window, and click the *Update Settings SN* button to update the PMT's serial number in the *PMTSettings* file.

6.5. Setting the PMT2100 Offset

You must set the offset for each of the PMT2100 PMT devices.

Note: For a Galvo-Resonant system, once the initial offset adjustment is set, you do not have to adjust the offset for every use. For a Galvo-Galvo system, you may need to adjust the offset depending on the Dwell Time setting.

1. Switch off the room lights.

   Note: An unpowered PMT exposed to bright light can have a high dark count that may take several minutes to hours to dissipate.

2. Open the *PMT2100 Control* window.

3. Use the table below to configure all the PMT2100s.

Scanner	PMT Input Range	Bandwidth	Gain
Galvo-Resonant	1 V	80 MHz	0
Galvo-Galvo	1 V	Large Dwell Time (Slow Scan): 250 kHz Small Dwell Time (Fast Scan): 2.5 MHz	0

4. Capture an image on your image scanning equipment.

5. Adjust the gain on *PMT2100 Control* window until the average of all the pixels in the image is 50 - 100.

6.6. GUI (Graphical User Interface)

The GUI consists of the display area and the menu.

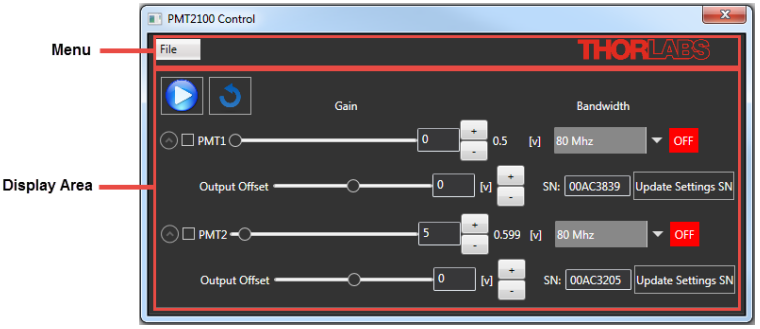


Figure 40 PMT2100 Graphic User Interface

6.6.1. Display Area

You can control the PMT activities from the main display area. It displays all the PMTs (maximum six) that are connected to the system.

- **Activate Button** : activates the enabled PMTs. Click the button, and the ON icon appears next to the enabled PMT's bandwidth.
- **Refresh Button** : refreshes the PMT connections. If the connection is lost and you need to reconnect, click the button to restore the PMT connection. For safety purposes, the existing PMT connections are turned off.
- **Gain:** controls the PMT gain using the slider. The actual voltage gain appears on the right side of the +/- button. If a PMT is on, and if you reduce the gain to zero, the PMT turns off. The OFF icon appears next to the selected PMT's bandwidth. Increase the gain to turn on the PMT.
- **Output offset:** sets the offset for the ouput. Use the slider or the +/- button to change the ouput offset.
- **Bandwidth:** changes the bandwidth to the desired frequency (80 MHz, 2.5 MHz, 250 kHz) from the drop-down menu.
- **Stop Button** : deactivates the enabled PMT. The button appears after activating the button.

Note: You can change or preset the gain, output offset, and bandwidth for a PMT. But, you must select the respective PMT to update it with the new values. To select a PMT, check the box next to the respective PMT.

Note: If the PMT trips, TRIP appears next to the Bandwidth. Click the Reset button to reset the trip.

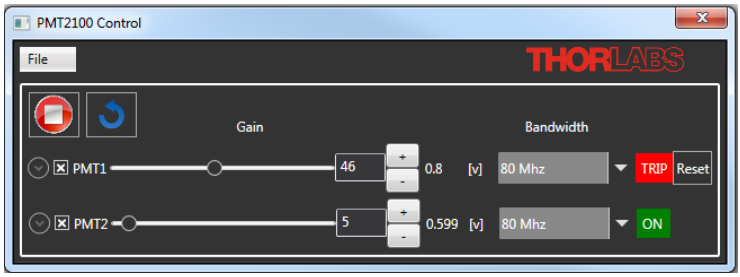


Figure 41 PMT Trip

CAUTION

Excessive trips can damage the PMT.

6.6.2. Menu

The menu consists of the *File* menu. Use the *File* menu to update the firmware or to exit from the *PMT2100 Control* window.

- Click *File>Update Firmware* to open the file path for the .hex file (provided by Thorlabs). Select the .hex file, and click *Open* to update the firmware. (Refer to ***Section 6.7: Updating the Firmware*** if you are updating the firmware for the first time.)

  Note: DO NOT update the firmware until you receive a newer version of firmware from Thorlabs.

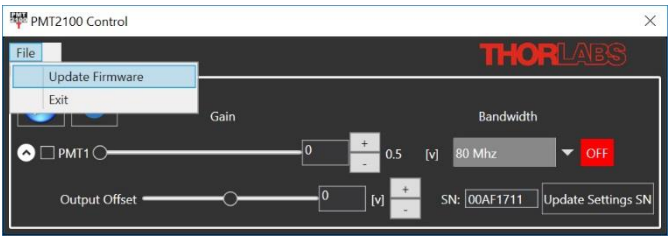


Figure 42 Firmware Update

- Click *File>Exit* to close the *PMT2100 Control* window.

6.7. Updating the Firmware

Make sure to update your firmware immediately if you receive a newer version of firmware from Thorlabs.

Note: If updating is necessary, it is best to update one at a time. Unplug all PMT's except for one, then repeat this section for each PMT.

1. Save the latest firmware (.hex file) on your computer.
2. Open the *PMT2100 Control* window, and click *File>Update Firmware*. Make sure to have only one PMT plugged into your computer via USB.

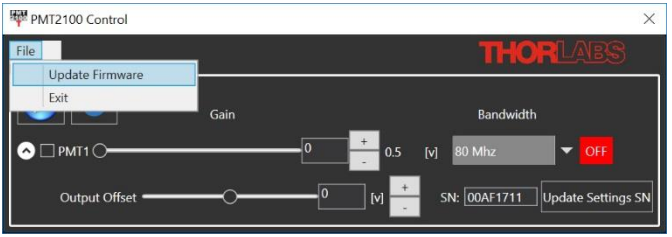


Figure 43 Updating the Firmware

3. A Firmware Update window appears; click *Yes* to continue.

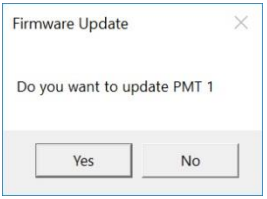


Figure 44 Firmware Update

4. Browse the .hex file on your computer then click *Open*. The *Thorlabs Update Com Port Selection* window appears. Select the COM port your PMT appears in the Device Manager, then click *OK*.

   Note: Navigate to the Device Manager, and look for *Thorlabs Bootloader* under *Ports (COM & LPT).*

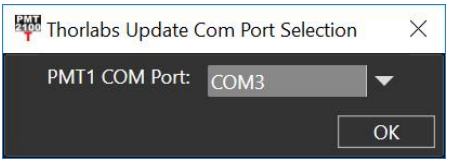


Figure 45 Thorlabs Update Com Port Selection Window

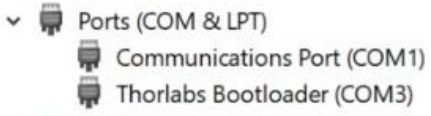


Figure 46 Device Manager Window

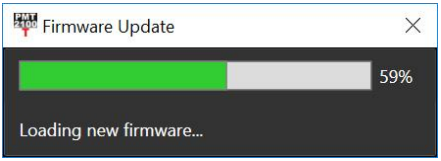


Figure 47 Loading New Firmware

5. When finished, click the X to close the Firmware Update window.

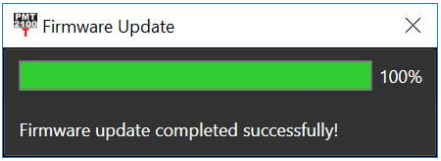


Figure 48 Firmware Update Completed Successfully

6. Your PMT will now show as *USB Test and Measurement Devices (IVI)* under *Device Manager>USB Test and Measurement Devices.*

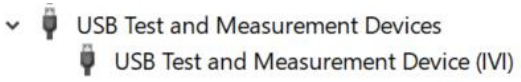


Figure 49 Device Manager Window

The firmware update is complete.

Chapter 7 Maintaining the PMT2100 Series

To clean the PMT2100 series PMTs:

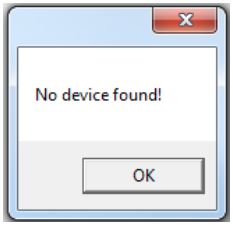
- Use a soft, damp cloth to clean the housing.
- Use only optical grade wipes to clean the window of the tube.

There are no serviceable parts in the PMT2100 series' optical head. If you suspect a problem with the PMT2100 series, please contact our nearest office for assistance from an application engineer (see ***Chapter 16 Thorlabs Worldwide Contacts*** for details).

7.1. Storing the PMT2100 Series

When not in use, store the PMT2100 series in an environment without light leakage or stray light.

7.2. Troubleshooting

Problem	Solution
	• Check the PMT connection. • Check the serial number entered in the *Connection Settings* window. For a six digit alphanumeric SN, prefix the digit with 00. • Unplug and replug the USB cable. • Call Thorlabs Technical Support for assistance (see ***Chapter 16 Thorlabs Worldwide Contacts*** for details).
PMT Not Communicating with the Computer	• If your computer has NI software installed, then make sure to configure Keysight VISA Settings (see ***Section 6.2.1: Keysight VISA Settings Configuration*** for details).

Chapter 8 Electrical Schematic

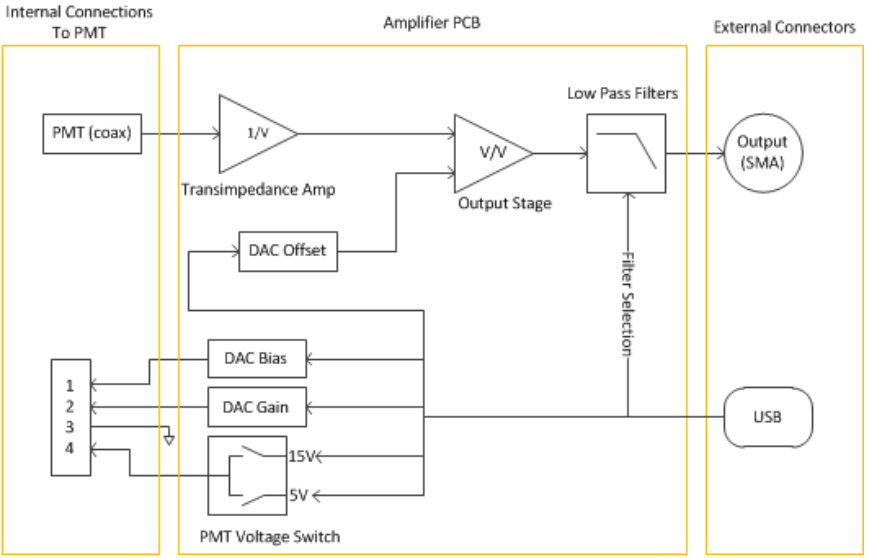


Figure 50 Electrical schematic of the PMT2100

Chapter 9 Performance Plots

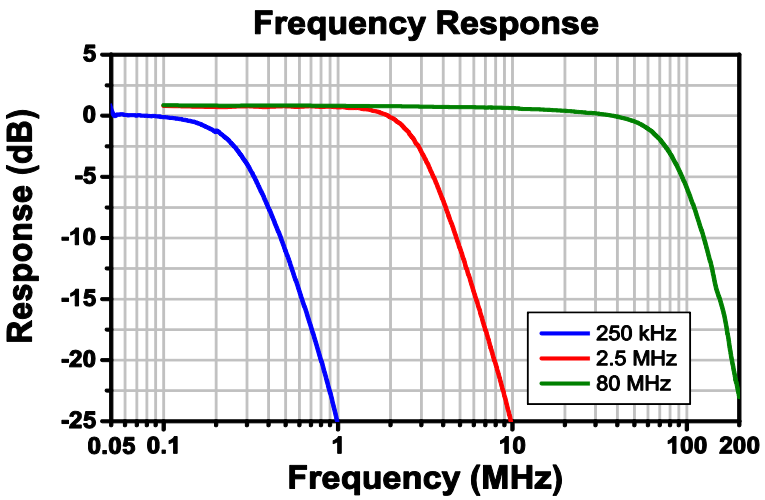


Figure 51 Amplifier Frequency Response

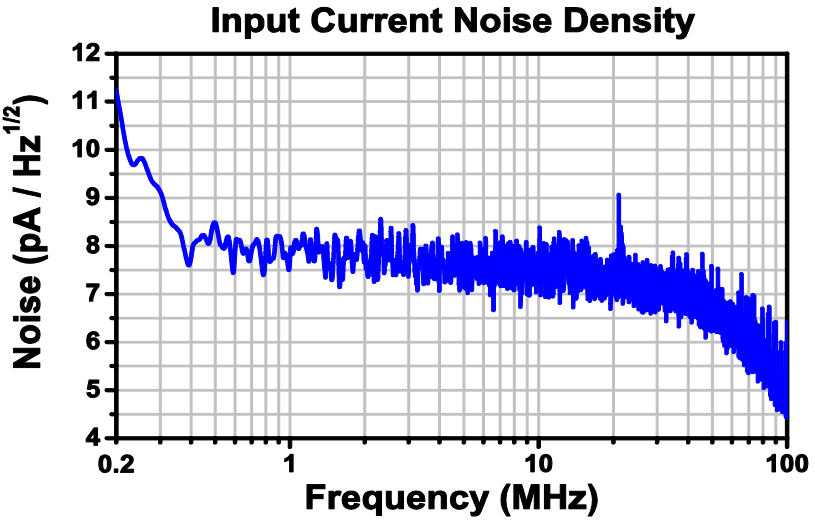


Figure 52 Input Current Noise Density

Chapter 10 Specifications

10.1. General Specifications

Specification		Value
Module Dimensions	**PMT2100**	3.32" x 1.35" x 1.93" (84.4 mm x 34.3 mm x 49 mm)
	PMT2101	3.43" x 1.6" x 2.10" (87.2 mm x 40.6 mm x 53.5 mm)
	PMT2101/M	3.43" x 1.6" x 2.10" (87.2 mm x 40.6 mm x 53.5 mm)
	PMT2102	3.32" x 1.35" x 1.95" (84.4 mm x 34.3 mm x 49.6 mm)
Operating Temperature		5 to 35 °C
Storage Temperature		-20 °C to +50 °C
Main Unit Input Voltage		5 V DC
Output Voltage		± 1.5 V
Control Voltage Connector		USB
Weight	**PMT2100**	300 g (0.66 lbs)
	PMT2101	
	PMT2101/M	
	PMT2102	

10.2. PMT Specifications

Specification		Value
PMT Type		Hamamatsu GaAsP H10770PA-40
Cooling		Non-Cooled
Photocathode Geometry		Head On
Window		Borosilicate, Flat Window
Spectral Response		300 - 720 nm
PMT Gain (Max)		>1.0 x 10^6
Supply Adjustable Range (Relative Sensitivity, Gain Control)		1:50
Ripple Noise		0.6 mV
Settling Time of Sensitivity Control[1]		0.2 s
Photocathode Active Area		Ø5 mm
Peak Wavelength		580 nm
Cathode Radiant Sensitivity	**At 420 nm**	108 mA/W (Typical)
	At 550 nm	176 mA/W (Typical)
Dark Count[2,3]	**Typical**	6000 s^{-1}
	Maximum	18000 s^{-1}
Warm-Up Time Before Control Voltage[4]		30 to 60 minutes
Induced Ripple in Signal[5]		0.6 mV_{pp} (Max)
Anode Pulse Rise Time[6]		1.00 ns
Anode Current (Max)[7]		500 µA
Protection Circuit		50 µA
Control Voltage Range		+0.50 to +1.0 V
Recommended Control Voltage Range Vcontrol		+0.50 to +0.80 V Input Impedance: 100 kΩ

[1] Stabilized time in the control voltage adjustment from +1.0 V to +0.5 V.
[2] After 30 min Storage in Darkness
[3] Control Voltage: Plateau ; Temperature Control at 25 °C
[4] The dark count rate specification is valid when the PMT has been turned on in the dark, no control voltage has been applied during the specified warm-up time, and no signal has been incident during the specified warm-up time.
[5] Measured across 1 M Ω / 22 pF Load
[6] Control Voltage: +0.8 V; Temperature Control at 25 °C
[7] Exceeding the maximum anode current will irreparably damage the PMT. The PMT must be shielded from ambient light and the control voltage must be carefully chosen so that unexpected signal spikes do not cause the anode current to be exceeded.

10.3. Amplifier Specifications

Specification	Conditions	Min	Typical	Max
Noise				
Input Current Noise[8]	@ 1 MHz, C_{in} = 4 pF	-	6.5 pA/√Hz	-
Total Input Noise[8]	DC to 80 MHz	-	5.8 pA/√Hz Avg	-
Transfer Characteristics				
Total Transimpedance[9]	Combined Stages, DC	10500 V/A	11000 V/A	12000 V/A
Amplifier Bandwidth (at 6 dB)[10]	Software Configurable	-	DC to 80 MHz DC to 2.5 MHz DC to 250 kHz	-
Transresistance	Input Stage Z-Amp, DC	-	3.48 kΩ	-
Input				
Linear Input Range	0 V Output Bias	-	-	±50 µA
Maximum Input[11]	-	-	-	±500 µA
DC Input Impedance	-	-	33 Ω	-
Input Reference	-	-	0 V	-
Output				
DC Bias	50 Ω Load	-1.5 VDC	0 VDC	1.5 VDC
Output Range	50 Ω Load	-1.5 V	-	+1.5 V
Impedance	DC to 80 MHz	-	50 Ω	-
Return Loss	DC to 80 MHz	15 dB	-	-
Slew Rate	-	-	625 V/µs	-
DC Performance				
DC Offset Voltage Drift	Average, @ Output	-	±103 µV/°C	-
Power Supply				
Input Voltage	-	4.5 V	5 V	5.5 V
Input Current	-	-	350 mA	500 mA

[8] Bandwidth and equivalent input current noise are typical values, which depend on the source capacitance. To achieve best possible bandwidth and noise performance, reduce the source capacitance by using short cables at the input of the amplifier.
[9] Positive Gain; current flowing into the amplifier input is considered positive, and produces a resulting positive output voltage.
[10] The bandwidth decreases as the output signal magnitude increases.
[11] Operation above this specification is likely to permanently damage the amplifier.

Chapter 11 Mechanical Drawing

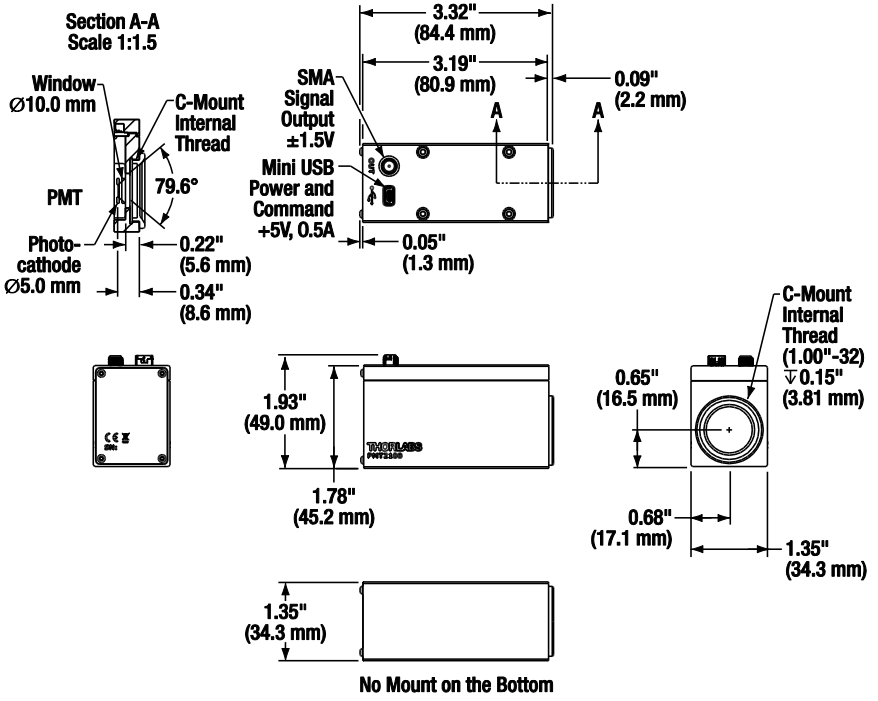


Figure 53 Mechanical Drawing of the PMT2100 Series PMT Housing

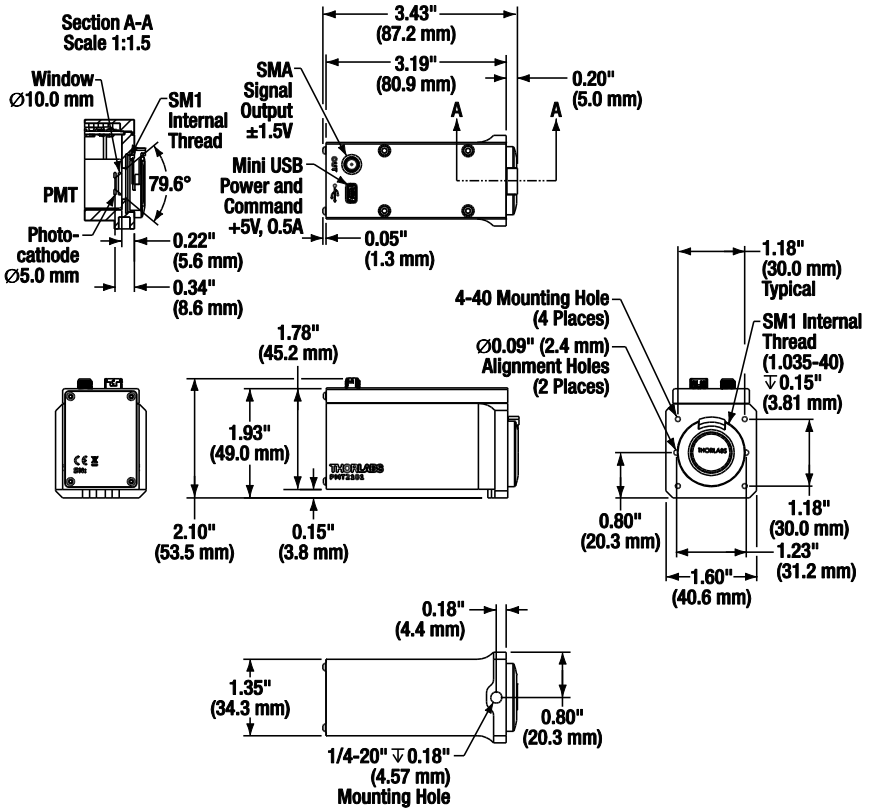


Figure 54 Mechanical Drawing of the PMT2101 Series PMT Housing

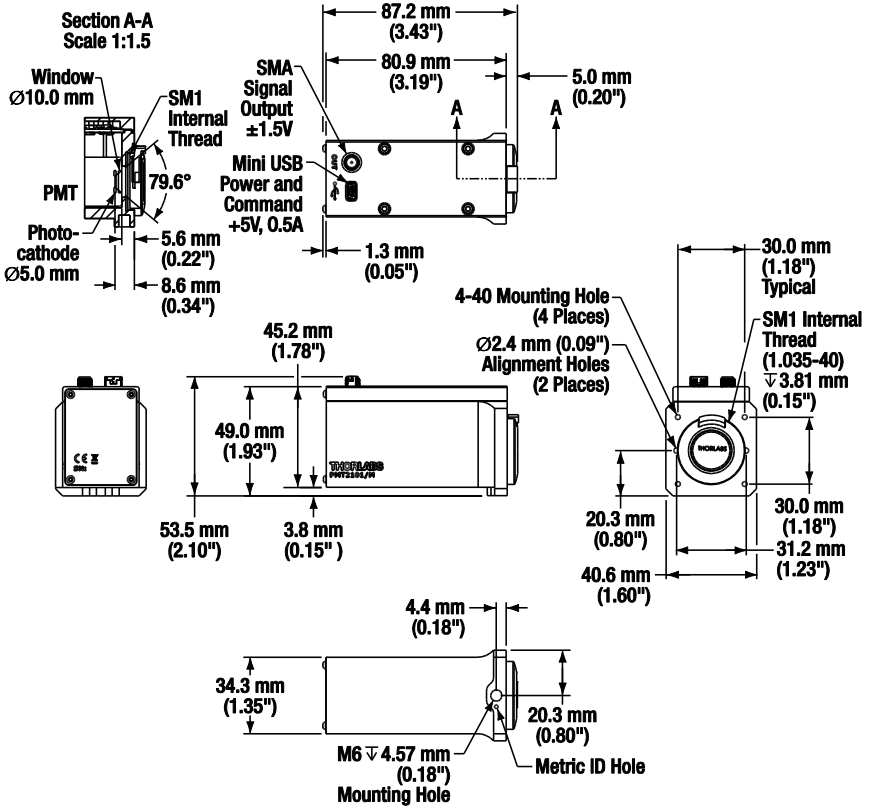


Figure 55 Mechanical Drawing of the PMT2101/M Series PMT Housing

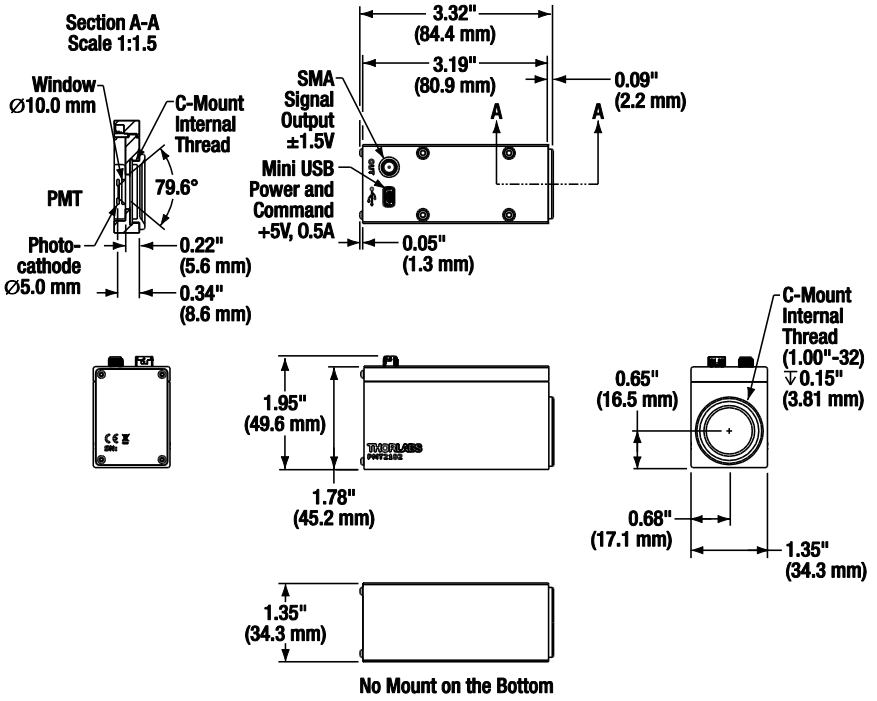


Figure 56 Mechanical Drawing of the PMT2102 Series PMT Housing

Chapter 12 Commands

The USB commands are based on the SCPI command set. If you are new to SCPI, refer to www.keysight.com for details. You must use Keysight driver to communicate with the device. All SCPI instruments implement common commands declared mandatory by IEEE 488.2. The commands implemented are as follows:

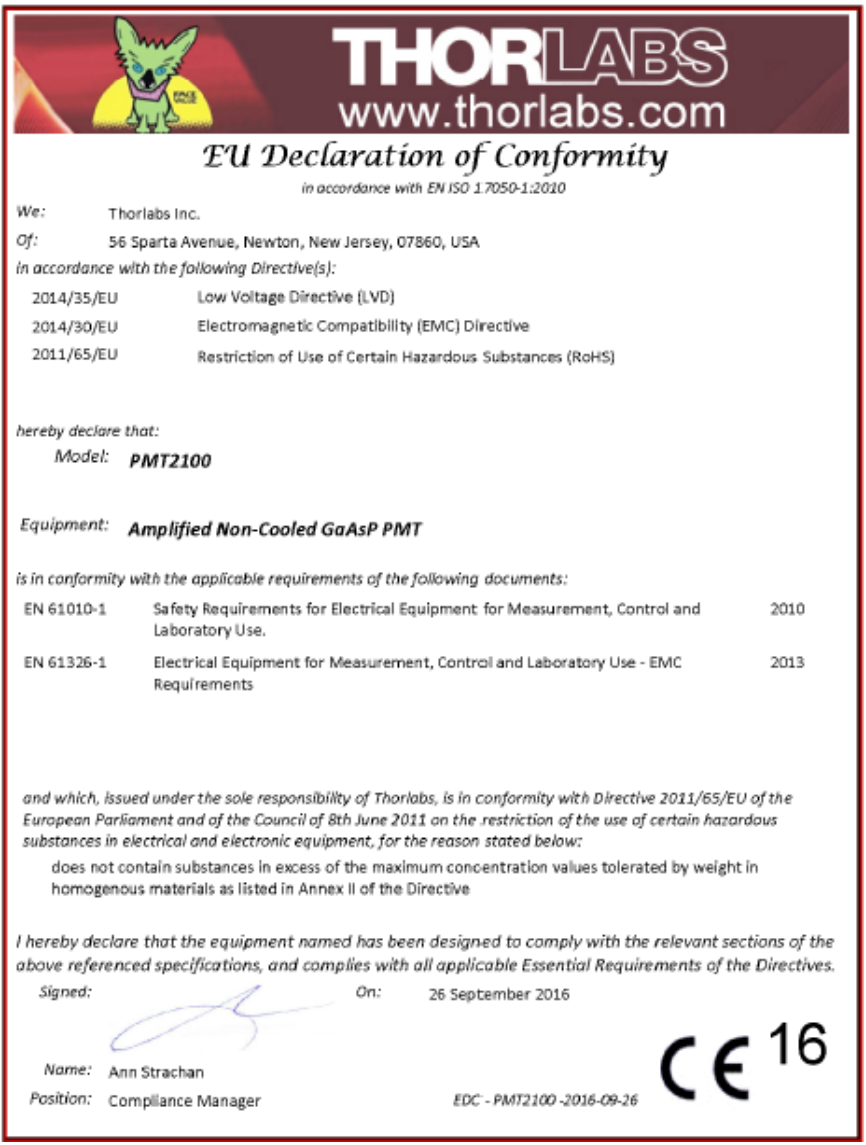
Mnemonic	Name	488.2 Section
***IDN?**	Identification Query	10.14
***STB?**	Read Status Byte Query	10.36

The specific commands that are implemented in the PMT2100 series are as follows:

Command	Description
INSTrument	
:NSELect <numeric>	Selects Source Channel by Number
:NSELect?	Gets the Selected/Last Channel Number
[:SELect] <identifier>	SELect - Selects Source Channel by Name <GAIN; BIAS; OFFSET; TRIP>
[:SELect]?	Gets the Selected/Last Channel Name

Command	Description
SENSe	
:DETector[:FUNCtion] <function>	Sets the Type of PMT Connected to the System <H10721-20>
:FILTer[:LPASs]:FREQuency <numeric>	Sets the Low Pass Frequency after the Second Amp Stage <80MHz; 2.5MHz; 250kHz>
:FUNCtion[:ON] <sensor>	ON - Turns the PMT Power On
:FUNCtion[:OFF] <sensor>	OFF - Turns the PMT Power Off
:FUNCtion:STATe? <sensor>	STATe - Returns Boolean of Current State of the PMT
:CURRent[:DC]:PROTection:CLEar	CLEar – Clears Current Trip Condition
:CURRent[:DC]:PROTection:TRIPped?	TRIPped – Checks if the PMT has Tripped
:CURRent[:DC]:PROTection:TRIPped:COUNTs?	COUNTs – Counts the Number of Times the PMT has Tripped
SOURce	
:VOLTage[:LEVel][:IMMediate][:AMPLitude] <numeric>	Sets the Output on the Selected Channel, Units of V or V/W
:VOLTage[:LEVel][:IMMediate][:AMPlitude]?	Queries the Voltage on the Selected Channel, Units of V or V/W

Chapter 13 Certifications and Compliance



THORLABS
www.thorlabs.com

EU Declaration of Conformity

in accordance with EN ISO 17050-1:2010

We: Thorlabs Inc.

Of: 56 Sparta Avenue, Newton, New Jersey, 07860, USA

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: ***PMT2100***

Equipment: ***Amplified Non-Cooled GaAsP PMT***

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:* 26 September 2016

Name: Ann Strachan

Position: Compliance Manager

EDC - PMT2100 -2016-09-26

CE 16

Chapter 14 Warranty

Thorlabs warrants that all products sold will be free from defects in material and workmanship, and will conform to the published specifications under normal use, when correctly installed and maintained.

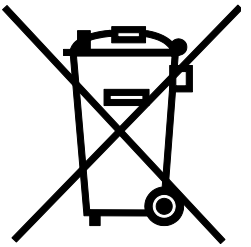
Thorlabs provides the warranty for a period of one year.

Chapter 15 Regulatory

As required by the WEEE (Waste Electrical and Electronic Equipment Directive) of the European Community and the corresponding national laws, Thorlabs offers all end users in the EC the possibility to return “end of life” units without incurring disposal charges.

This offer is valid for Thorlabs electrical and electronic equipment:

- Sold after August 13, 2005
- Marked correspondingly with the crossed out “wheelie bin” logo (see right)
- Sold to a company or institute within the EC
- Currently owned by a company or institute within the EC
- Still complete, not disassembled and not contaminated



Wheelie Bin Logo

As the WEEE directive applies to self contained operational electrical and electronic products, this end of life take back service does not refer to other Thorlabs products, such as:

- Pure OEM products, that means assemblies to be built into a unit by the user (e.g. OEM laser driver cards)
- Components
- Mechanics and optics
- Left over parts of units disassembled by the user (PCB’s, housings etc.).

If you wish to return a Thorlabs unit for waste recovery, please contact Thorlabs or your nearest dealer for further information.

Waste Treatment is Your Own Responsibility

If you do not return an “end of life” unit to Thorlabs, you must hand it to a company specialized in waste recovery. Do not dispose of the unit in a litter bin or at a public waste disposal site.

Ecological Background

It is well known that WEEE pollutes the environment by releasing toxic products during decomposition. The aim of the European RoHS directive is to reduce the content of toxic substances in electronic products in the future.

The intent of the WEEE directive is to enforce the recycling of WEEE. A controlled recycling of end of life products will thereby avoid negative impacts on the environment.

Chapter 16 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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