MCMK3 3-Axis USB HID Joystick

User Guide



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Chapter 1 Introduction

The MCMK3 3-Axis USB HID Joystick consists of a hand-operated knob box with an attached USB cable. Each of the three side faces of the knob box include a Rotating Encoder Knob and a Push-button LED switch (with a green LED). A smaller knob on the top face adjusts the velocity output of the bigger rotating knobs.

1.1 Device Overview

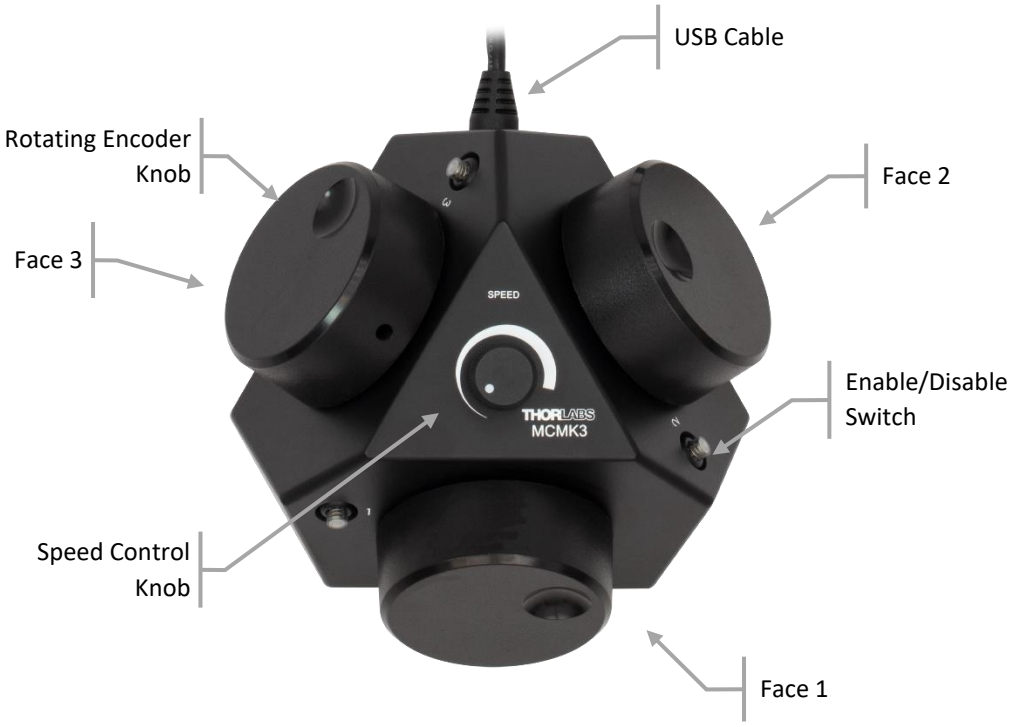


Figure 1 MCMK3 Joystick Elements

1.2 Safety Information

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.



Caution
The 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 ft).



Note
This equipment has been tested and found to comply with the limits for a Class A 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.



Note
This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Chapter 2 Getting Started

2.1 Unpacking and Inspection

Open the package, and carefully remove the MCMK3 Joystick. Inspect the device for any missing parts or damage. If there is any problem, please contact our nearest office (see ***Chapter 10, on Page 25*** for details).



Figure 2 MCMK3 Packaging

2.2 Setting up the MCMK3 Joystick

2.2.1 Minimum Computer Requirements

Operating System	Windows 10 64-bit (or later)
Other Software	Microsoft .NET Framework 4.8 (or later) Microsoft .NET Desktop Runtime 6.0
USB Version	USB 2.0

2.2.2 Setup

1. Plug the MCMK3 USB cable into the computer.
2. You should see the below popup message:

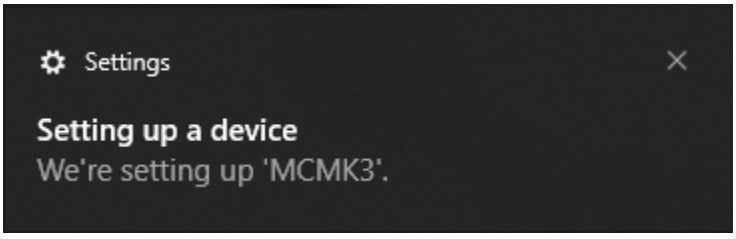


Figure 3 MCMK3 Device Setup Popup

3. A few seconds after this message disappears, the below message will appear:

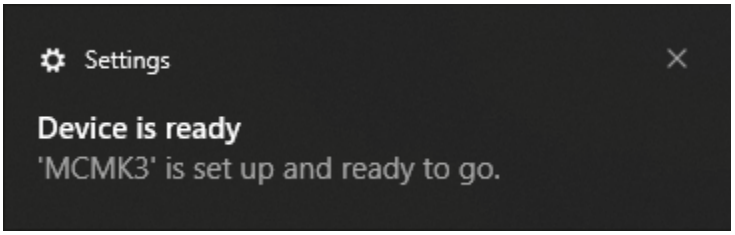


Figure 4 MCMK3 Device Ready Popup

4. The MCMK3 Joystick is now ready for use as a USB HID Device. See ***Chapter 4, on Page 17*** for more information.

Chapter 3 Software

Thorlabs offers two software tools for the MCMK3 Joystick. The first is the Thorlabs Joystick Firmware Update Utility for firmware updates, and the second is the Thorlabs Joystick Test Utility for assessing the USB HID In and Out report functionality of the MCMK3 Joystick. The latest versions of both of these, along with the firmware .hex file, can be found on **www.thorlabs.com**.

3.1 Thorlabs Joystick Firmware Update Utility Installation and Update Procedure

The MCMK3 Joystick comes with the latest firmware version installed. Use the below processes to install the firmware updater, and subsequently, to update the MCMK3 Joystick to the latest firmware version.

3.1.1 Installation

1. Navigate to the below Thorlabs software downloads page URL, where you can search for the MCMK3 in the search tab.

   https://www.thorlabs.com/software

   After doing so, you will find a list of product specific documents available for download for the MCMK3 Joystick.

2. On this page, navigate to the firmware update utility tab, and click on the download button to begin downloading the utility installer, following the instructions that appear. Make sure to note the location the installer is downloaded to.

3. Navigate to the location where the installer was downloaded, then right-click on the ZIP file and extract all of the contents, noting the extraction directory.

4. Navigate to the extracted folder, and find and run the installer software, following the instructions that appear, noting the location the software is installed to.

5. Locate and double-click on the application to run the Thorlabs Joystick Firmware Update Utility.

   If preferred, to access the application from another location, left-click on the file once, and then right-click and select “Create shortcut”. Follow the instructions that appear, to place the shortcut file in the desired location.

3.1.2 Setup

1. Plug the MCMK3 Joystick into an open USB port on your computer.
2. Navigate to and double click on the Thorlabs Joystick Firmware Update Utility icon.
3. The below window should appear stating the Device Name (MCMK3), and the Serial Number (found on the baseplate of the MCMK3 Joystick). If the MCMK3 Joystick does not appear here, please click the refresh button, or try to plug it into a different USB port on your computer.

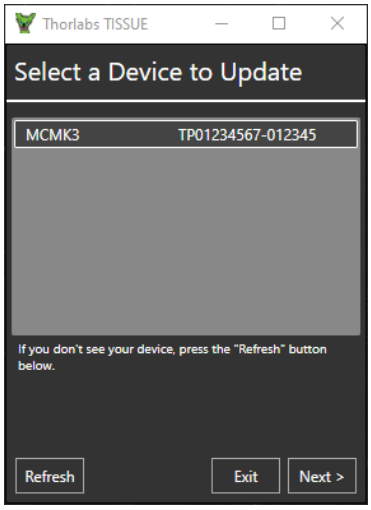


Figure 5 "Select a Device" Firmware Update Utility Window

4. Highlight the MCMK3 Joystick plugged into your computer by clicking once on the row containing the Serial Number, and then click the Next button.
5. The below window should appear. From here, you can choose to update the firmware on the MCMK3 Joystick to the latest version available, or verify the firmware version that is currently installed. These two actions are explained in the next section.

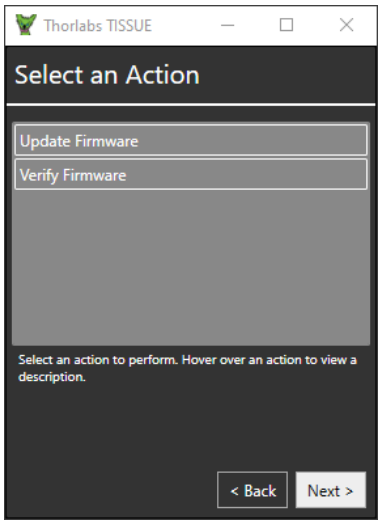


Figure 6 "Select an Action" Firmware Update Utility Windowb

3.1.3 Actions

From the “Select an Action” Window you have the option to either update the firmware, or verify the firmware installed on the MCMK3 Joystick. Both of these actions are explained in more detail below. First however, it is important to download the most up to date firmware version for the MCMK3 Joystick from the website.

1. Download Firmware

   a. Navigate to the below Thorlabs software downloads page URL, where you can search for the MCMK3 in the search tab. After doing so you will find a list of product specific documents available for download for the MCMK3 Joystick.

      https://www.thorlabs.com/software

   b. On this page, navigate to the firmware tab, and click on the download button to begin downloading the firmware, following the instructions that appear. Make sure to note the location the firmware is downloaded to.

2. Update Firmware

   a. Select the Update Firmware option on the “Select an Action” Window and click the Next Button.

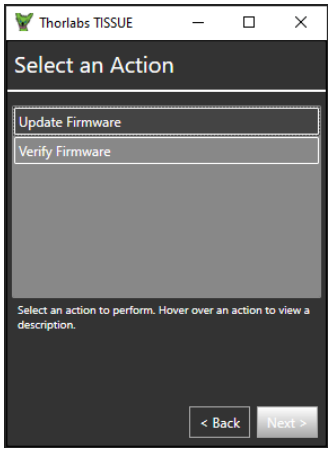


Figure 7 Update Firmware Selected

   b. Click the Browse button and navigate to the location the firmware was saved to, and select the firmware file, then click the Next button.

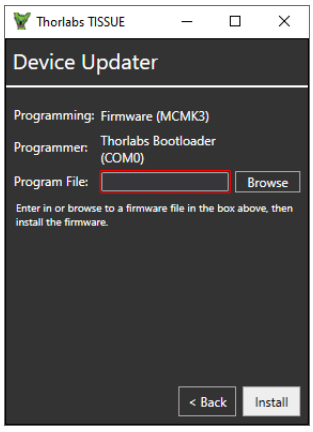


Figure 8 Browse to and select Firmware to update to

c. Click on the Install button, and wait for the progress bar to finish. A message will pop up saying that the Update has been completed. Please power cycle the MCMK3 Joystick before use, by unplugging and plugging in the USB cable.

3. Verify Firmware

a. Select the Verify Firmware option on the “Select an Action” Window and click the Next Button.

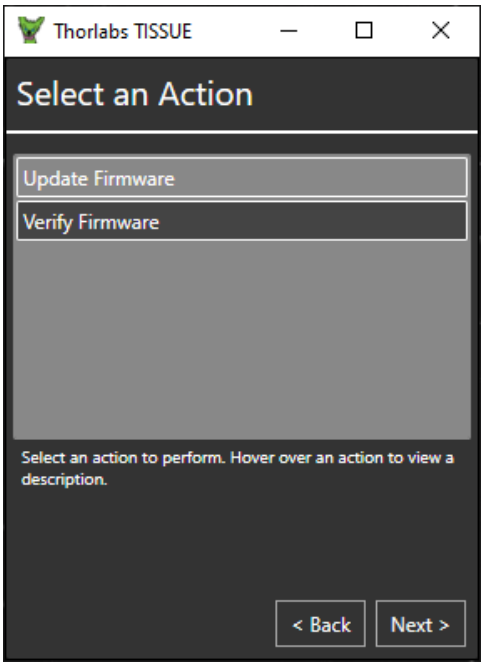


Figure 9 Verify Firmware Selected

b. Click the Browse button and navigate to the location the firmware was saved to, and select the firmware file, then click the Next button.

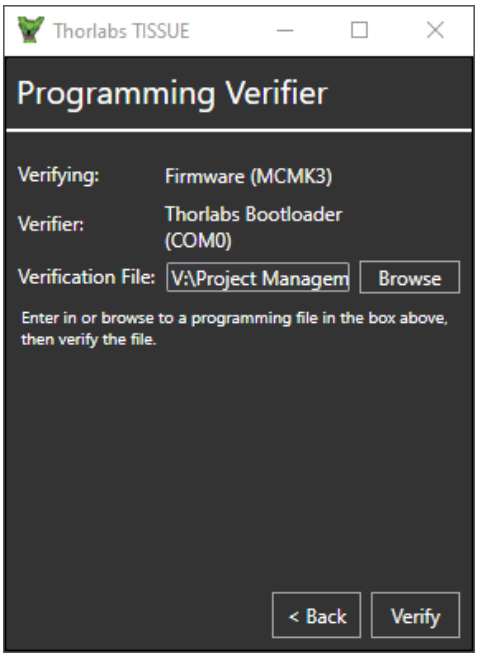


Figure 10 Browse to and select Firmware to Verify against

c. Click on the Verify button, and follow the on screen instructions. You will need to power cycle the MCMK3, then click OK on the pop-up window, and then click the Next button.

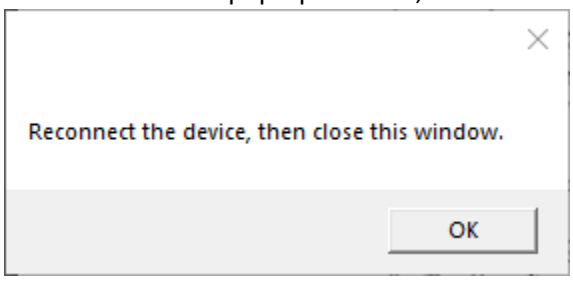


Figure 11 Power Cycle pop-up window

d. Wait for the progress bar to finish, and then click Next. A message will pop up indicating if the verification has been successful.

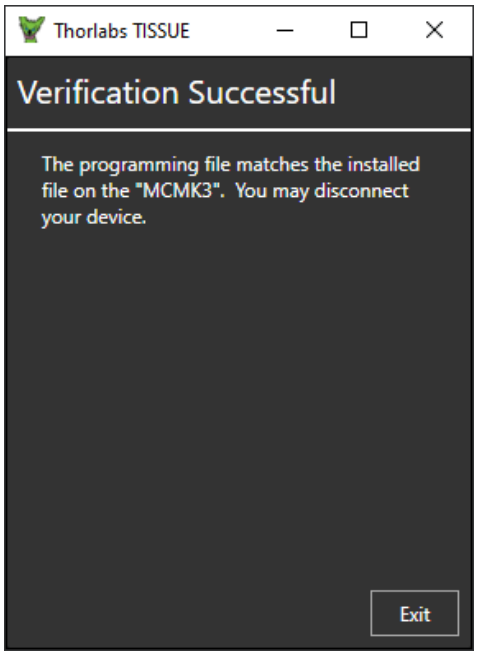


Figure 12 Successful Firmware Verification

In the case that the verification has not been successful, please ensure that the correct, and most up to date firmware file for the MCMK3 Joystick has been downloaded, as described in **Section 3.1.3, Step 1**, above. Please also ensure that this file has been correctly selected in Step 3(c) above.

If the firmware file is correct and up to date, and you are still encountering issues when attempting to verify the firmware on the MCMK3 Joystick, please contact our nearest office (see ***Chapter 10, on Page 25*** for details) for assistance from an applications engineer.

3.2 Thorlabs Joystick Test Utility Installation Procedure

The Thorlabs Joystick Test Utility can be used to verify the HID In and Out reporting of the MCMK3 Joystick through a visual interface.

3.2.1 Installation

1. Navigate to the below Thorlabs software downloads page URL, where you can search for the MCMK3 in the search tab.

   https://www.thorlabs.com/software

   After doing so, you will find a list of product specific documents available for download for the MCMK3 Joystick.

2. On this page, navigate to the Test utility tab, and click on the download button to begin downloading the utility installer, following the instructions that appear. Make sure to note the location the installer is downloaded to.

3. Navigate to the location where the installer was downloaded, then right-click on the ZIP file and extract all of the contents, noting the extraction directory.

4. Navigate to the extracted folder, and find and run the installer software, following the instructions that appear, noting the location the software is installed to.

5. Locate and double-click on the application to run the Thorlabs Joystick Test Utility.

   If preferred, to access the application from another location, left-click on the file once, and then right-click and select “Create shortcut”. Follow the instructions that appear, to place the shortcut file in the desired location.

3.2.2 Setup

1. Plug the MCMK3 Joystick into an open USB 2.0 (or higher) port on your computer.

2. Double-click on the Thorlabs Joystick Test Utility.

3. The Test Utility home screen should appear. The MCMK3 Joystick should be recognized automatically, and the utility should display the Serial Number found on the bottom of the MCMK3 Joystick.

   The Test Utility is now ready for use with the MCMK3 Joystick.

3.2.3 User Interface

The below diagram depicts and labels some of the basic software features on the Thorlabs Joystick Test Utility that will be referenced in case the need for troubleshooting arises.

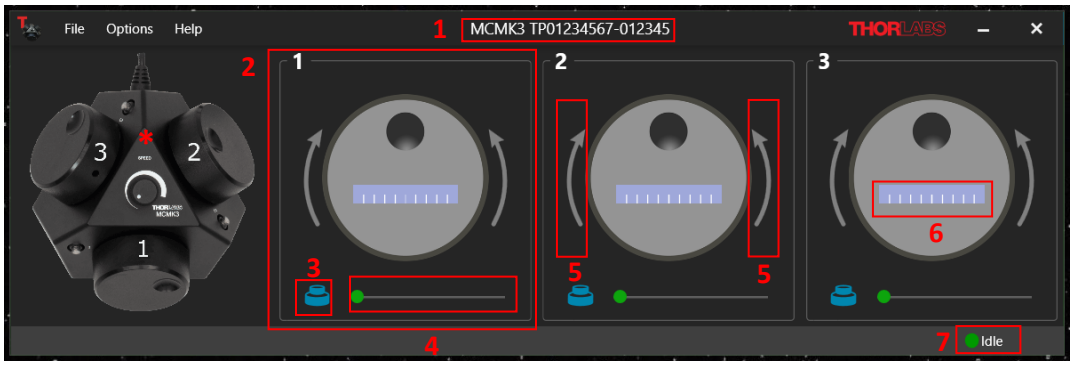


Figure 13 Test Utility User Interface

1. **Serial Number Display Area**: Joystick Serial Number will display here
2. **Face Control Box**: Everything displayed within this box pertains to the Face on the Joystick with the same number. For example, the Face 1 Control Box will display and control encoder inputs and Push-button inputs and outputs only from Face 1.
3. **Push-button Depression Indicator**: This Push-button symbol will turn red when the Push-button on the Joystick is pressed.
4. **Push-button LED Slider**: This 0% to 100% slider controls the brightness of the Push-button LED.
5. **Clockwise and Counterclockwise Rotation Direction Arrows**: These arrows turn blue to match the direction the Encoder Knob is rotated in
6. **Encoder Knob Rotation Velocity Gauge**: This gauge, where each tick from left to right represents 10% of maximum velocity, will fill up as the Encoder Knob is rotated at a faster rate.

   ***:** The maximum achievable velocity is determined by the position of the speed knob.
7. **Idle Indicator**: This indicator is green and the text "Idle" is displayed when there is no signal output from the joystick. When a signal is received, the indicator turns yellow and the text "Busy" is displayed.

NOTE: For any issues encountered during Setup, or when using the MCMK3 Joystick,

please refer to ***Chapter 5, on Page 19*** for troubleshooting help.

3.2.4 Troubleshooting Guide

This guide can be used to determine if any issues experienced while using the MCMK3 Joystick are originating from within the joystick, whether related to hardware or software, or if the issues are originating from the device the joystick is plugged into.

1. **Encoder and Speed Knob Testing**

   a. **Rotation Direction Test**

      i. Rotate the Encoder Knob on Face 1 clockwise at a constant rate. Check to see that the **arrow** pointed in the clockwise direction **is highlighted blue**, and that the **rotation velocity gauge is filling up**, in the **Face 1 Control Box**, as shown below.

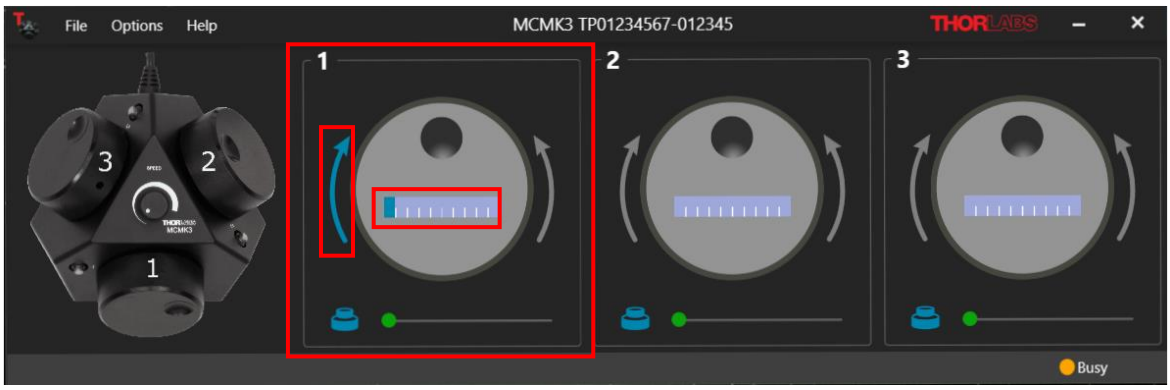


Figure 14 Clockwise Rotation on Test Utility

      ii. Rotate the Encoder Knob on Face 1 counterclockwise at a constant rate. Check to see that the **arrow** pointed in the counterclockwise direction **is highlighted blue**, and that the **rotation velocity gauge is filling up**, in the **Face 1 Control Box**, as shown below.

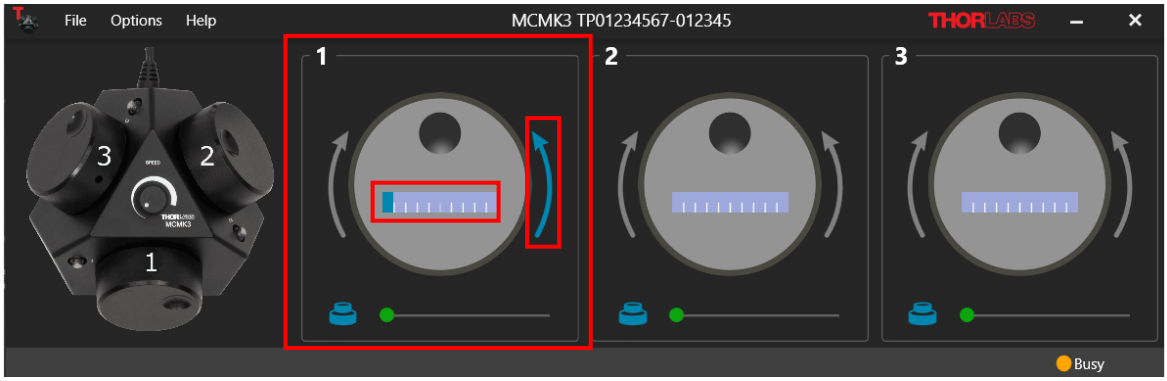


Figure 15 Counterclockwise rotation on Test Utility

      iii. Repeat steps i-ii for **each Knob**, checking to see that the Knob on **Face 2** displays information in the **Face 2 Control Box**, and that the Knob on **Face 3** displays information in the **Face 3 Control Box**.

      Note that **the amount the rotation velocity gauge is filled up does not matter in this test**, only that it does fill up. This concludes the Rotation Direction Test. If the MCMK3 Joystick is not functioning as explained above, please contact our nearest office (see ***Chapter 10, on Page 25*** for details).

b. **Rotation Velocity Test**

i. Rotate the Encoder Knob on Face 1 clockwise or counterclockwise **slowly**, paying attention to the **amount the rotation velocity gauge is filling up**, in the Face 1 Control Box, as shown below.

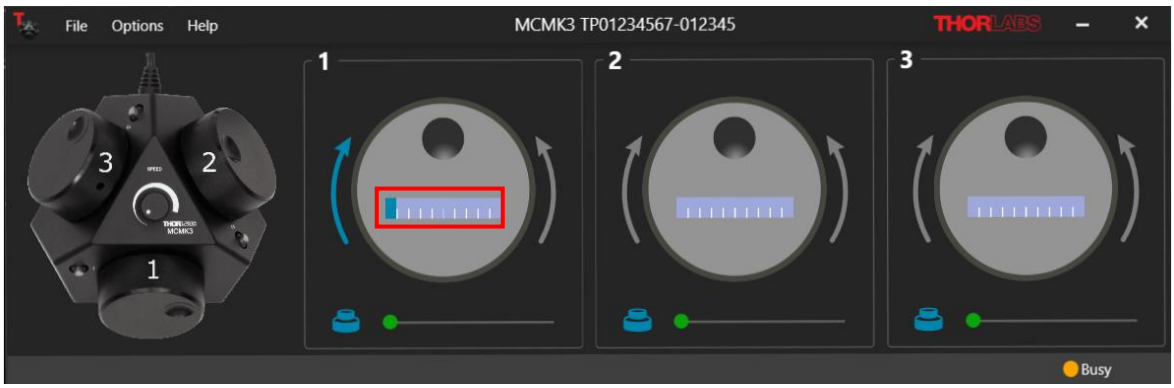


Figure 16 Low Rotation Velocity on Test Utility

ii. Next, rotate the Encoder Knob on Face 1 clockwise or counterclockwise **quickly**, paying attention to the **amount the rotation velocity gauge is filling up**, in the Face 1 Control Box, as shown below.

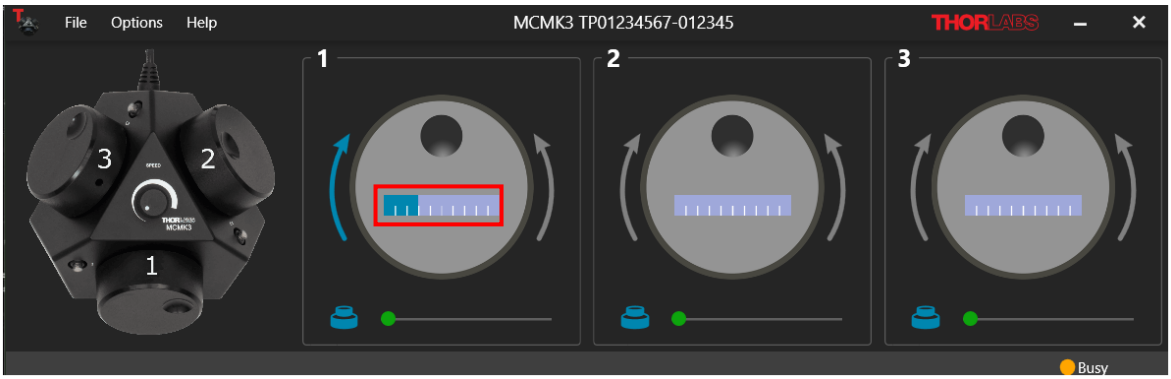


Figure 17 High Rotation Velocity on Test Utility

iii. Check to see that the **amount the rotation velocity gauge is filling up increases** as you rotate the knob more **quickly**, and **decreases** as you rotate the knob **slowly**.

Repeat i-ii for Knobs 2 and 3**.** This concludes the Rotation Velocity Test. If the MCMK3 Joystick is not functioning as explained above, please contact our nearest office (see ***Chapter 10, on Page 25*** for details).

c. **Speed Knob Test**

i. Rotate the Velocity (Speed) Knob on top of the MCMK3 Joystick counterclockwise until it stops (rotate to minimum).

ii. Rotate the Encoder Knob on Face 1 in either direction **at a constant rate**. Take note of the **amount the rotation velocity gauge is filling up** in the Face 1 Control Box.

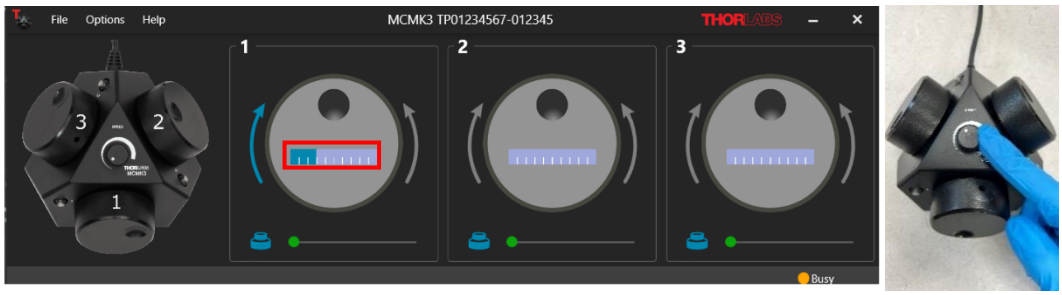


Figure 18 Low Speed Knob Setting

iii. Gradually rotate the Speed Knob clockwise and then gradually counterclockwise (increasing and decreasing speed), while still **rotating the Encoder Knob on Face 1 in either direction at a constant rate**. **Increasing** the speed should **increase the amount the rotation velocity gauge is filling up** in the Face 1 Control Box, while **decreasing** the speed will **decrease the amount the velocity gauge is filled up**.



Figure 19 High Speed Knob Setting

iv. Repeat i-iii for Knobs 2 and 3. This concludes the Speed Knob Test. If the MCMK3 Joystick is not functioning as explained above, please contact our nearest office (see ***Chapter 10, on Page 25*** for details).

2. **Push-button LED Testing**

a. **Button Test**

i. Press the Push-button on Face 1 multiple times, and check that the Push-button depression indicator in the Face 1 Control Box **changes colors** in response.

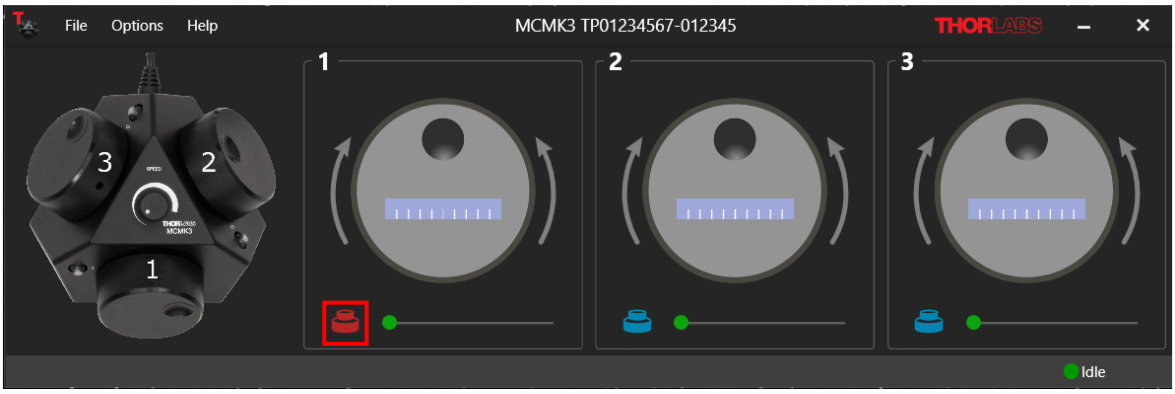


Figure 20 Push-button depression indicator

ii. Repeat the above step for the Push-buttons on Face 2 and Face 3, checking to see that the Push-button depression indicator **changes colors** in the Face 2 and Face 3 control boxes.

This concludes the Button Test. If the MCMK3 Joystick is not functioning as explained above, please contact our nearest office (see ***Chapter 10, on Page 25*** for details).

b. **LED Test**

i. In the software, find the Push-button LED brightness slider in the Face 1 Control Box, shown in a red box on the image below. Move this slider to around 50%, and then to 100%, while checking to see that the **LED brightness follows the slider percentage**.

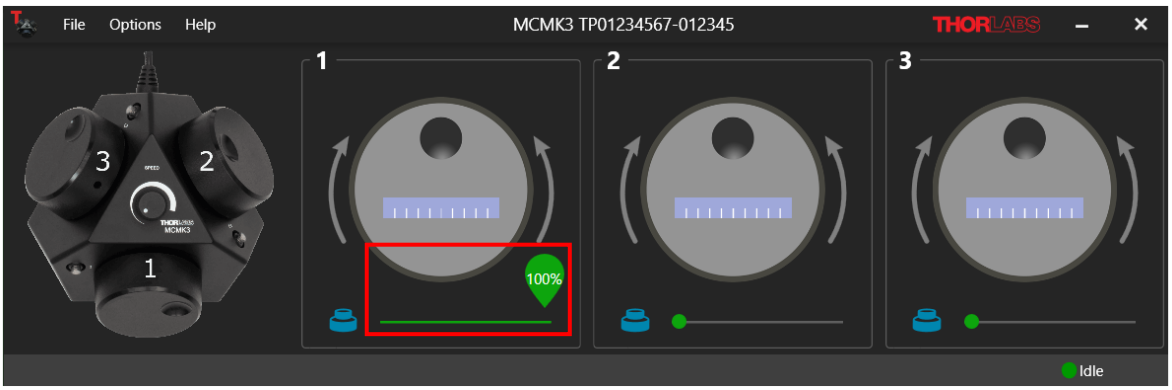


Figure 21 Push-button LED brightness slider

ii. Repeat the above step to test the Push-button LEDs on Face 2 and Face 3, using the Push-button LED brightness slider in the Face 2 and Face 3 control boxes respectively.

This concludes the Push-button LED Test. If the MCMK3 Joystick is not functioning as explained above, please contact our nearest office (see ***Chapter 10, on Page 25*** for details).

Chapter 4 USB HID In and Out Reports

The MCMK3 joystick is a USB HID Class Device, and as such can be configured and used with a variety of different joysticks that can utilize the USB HID Class. More resources regarding the Device Class Definition for USB HID can be found at usb.org/hid. The hardware controls, and the IN and OUT Report Structure used specifically for the MCMK3 joystick are explained in more detail below.

4.1 Hardware Controls Overview

The table below describes all hardware controls on the MCMK3 joystick.

Hardware Control	Description	HID Report Summary
Position Knob (One per Face)	Encoder Knob	16 bit IN report each, 10 bits dedicated to speed
Push-button LED (One per Face)	Push-button switch with green LED indicator	1 bit IN report, and 1 bit OUT report for each button
Speed Knob (Top of Device)	Potentiometer where adjustment affects the maximum output possible from position knob input	N/A (Internal modulation of position knobs)

4.2 VID and PID

For those interested in configuring the MCMK3 Joystick for their own applications, the VID and PID used to identify the joystick are listed in the table below. These can also be found by finding the device in the Device Manager (under HID devices), and then right-clicking and going to Properties → Events → Information.

VID	PID
0x1313	0x2005

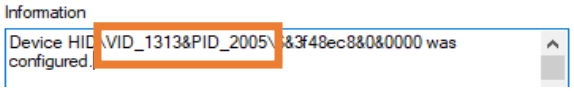


Figure 22 Device Manager Information

4.3 USB HID IN Report

The table below details the IN report by byte, where Knob 0, Knob 1, and Knob 2 refer to the Rotating Knobs, and B0, B1, and B2 refer to the Push-button switches:

Byte 7	Byte 6								Byte 5	Byte 4	Byte 3	Byte 2	Byte 1	Byte 0
NA	NA	NA	NA	NA	NA	B2	B1	B0	Knob 2		Knob 1		Knob 0	
0	0	0	0	0	0	0/1	0/1	0/1	0 to 1023		0 to 1023		0 to 1023	

- The Rotating Knobs will produce a value equal to 511 in the IN report when there is no input detected.
- The Rotating Knobs will produce a value in the IN report from 510 to 0 for a counterclockwise rotation, and from 512 to 1023 for a clockwise rotation.
    - The deadband can be increased to decrease the sensitivity of the knobs
- The actual value produced in the IN report is dependent on the velocity at which the knob is being rotated, and the position of the Speed Control Knob.
- The Push-button will produce a value of either 0 or 1 in the IN report dependent on whether the button is pressed or released.

4.4 USB HID OUT Report

The table below details the OUT report by byte, where LED 0, LED 1, and LED 2 refer to the LEDs on the Push-buttons:

Byte 3	Byte 2	Byte 1	Byte 0
Internal Use	LED 2	LED 1	LED 0
N/A	0 to 255	0 to 255	0 to 255

- The OUT report, with a byte dedicated to each Push-button LED contains a value from 0 to 255, with the LED off when receiving a value of 0 and the LED at maximum brightness when receiving a value of 255.

Chapter 5 Maintenance

Protect the MCMK3 Series from adverse weather conditions; it is not water resistant. The unit does not need regular maintenance. If you suspect a problem with the MCMK3 Series, please follow the troubleshooting procedure outlined below in **Section 5.2**. If, after doing so, you are still experiencing problems, please contact our nearest office (see ***Chapter 10, on Page 25*** for details) for assistance from an applications engineer.

5.1 Cleaning

Use a damp lint-free cloth to clean the unit.

5.2 Troubleshooting

The MCMK3 Joystick troubleshooting procedure involves using the Thorlabs Joystick Test Utility to ensure that all parts of the device are functioning by verifying the USB HID In and Out reports being sent and received by the joystick. Use the table below, in **Section 5.2.1**, to help determine which part(s) of the Troubleshooting Guide, in **Section 3.2.4**, you should follow to diagnose the MCMK3 Joystick . The Troubleshooting Guide is a step by step walk through of how to use the Thorlabs Joystick Test Utility to diagnose the MCMK3 Joystick . The installation procedure, setup, user interface, and troubleshooting guide are explained in ***Chapter 3, Section 3.2, on Page 11*.**

5.2.1 Problem/ Solution Table

The table below lists out some of the problems you might experience when setting up or using your MCMK3 joystick. For problems not discussed below, please reach out to our nearest office.

Problem	Solution
MCMK3 joystick not recognized by utility	• Power cycle the joystick • Plug the joystick into a different USB Port • Follow **Section 3.1.3, Step 1 and 3**, to see if the joystick has the most up to date Firmware version ○ If the joystick doesn't have the most up to date firmware, follow **Section 3.1.3, Step 2** to update the firmware.

Encoder Knob movement not registered, or Encoder Knob rotation output is erratic	• Follow **1(a) and 1(b) in Section 3.2.4** to see if the joystick passes the Troubleshooting Guide Rotation Direction and Velocity Test
	  ○ If the joystick fails the test, reach out to Tech Support
	  ○ If the joystick passes the test, double check in **Chapter 4, Section 4.3** to ensure your interpretation of the HID In report is correct.

Encoder Knob rotation direction is incorrect	• Follow **1(a) in Section 3.2.4** to see if the joystick passes the Troubleshooting Guide Rotation Direction Test
	  ○ If the joystick fails the test, reach out to Tech Support
	  ○ If the joystick passes the test, double check in **Chapter 4, Section 4.3** to ensure your interpretation of the HID In report is correct.

Encoder Knob movement not mapped correctly	• Follow **1(a) and 1(b) in Section 3.2.4** to see if the joystick passes the Troubleshooting Guide Rotation Direction and Velocity Test (specifically paying attention to **step iii** in each test)

	○ If the joystick fails the test, and the movement is not mapped correctly in the Thorlabs Joystick Test Utility, reach out to Tech Support ○ If the joystick passes the test, double check in **Chapter 4, Section 4.3** to ensure your interpretation of the HID In report is correct.
Speed Knob not adjusting maximum Encoder Knob velocity	• Follow **1(c) in Section 3.2.4** to see if the joystick passes the Troubleshooting Guide Speed Knob Test ○ If the joystick fails the test, reach out to Tech Support ○ If the joystick passes the test, double check in **Chapter 4, Section 4.3** to ensure your interpretation of the HID In report is correct.
Push-button press is not registered	• Follow **2(a) in Section 3.2.4** to see if the joystick passes the Troubleshooting Guide Button Test ○ If the joystick fails the test, reach out to Tech Support ○ If the joystick passes the test, double check in **Chapter 4, Section 4.3** to ensure your interpretation of the HID In report is correct.
Push-button LED not responding as intended	• Follow **2(b) in Section 3.2.4** to see if the joystick passes the Troubleshooting Guide LED Test ○ If the joystick fails the test, reach out to Tech Support ○ If the joystick passes the test, double check in **Chapter 4, Section 4.4** to ensure your interpretation of the HID Out report is correct.
Push-button not mapped correctly	• Follow **2(a) and 2(b) in Section 3.2.4** to see if the joystick passes the Troubleshooting Guide Button and LED Test (specifically paying attention to **step ii** in each test) ○ If the joystick fails the test, reach out to Tech Support ○ If the joystick passes the test, double check in **Chapter 4, Section 4.3** to ensure your interpretation of the HID In report is correct.

Chapter 6 Specifications

Specification	Value
Input Power Requirements	
Voltage	5 VDC (USB)
Current	50 mA (average), 100 mA (max)
HID Specifications	
HID In - Reporting Joystick Features	3 Rotating Encoder Knobs for 3 unique axis controls, and 3 Push-buttons with embedded green LEDs
Rotating Encoder Knob Bit Resolution	10 bits
Rotating Encoder Knob Encoder Resolution	0.35°
General Specifications	
Computer Connection	USB 2.0
Housing Dimensions	5.04” x 5.92“ x 3.17” (128.1 mm x 150.3 mm x 80.4 mm)

Chapter 7 Mechanical Drawings

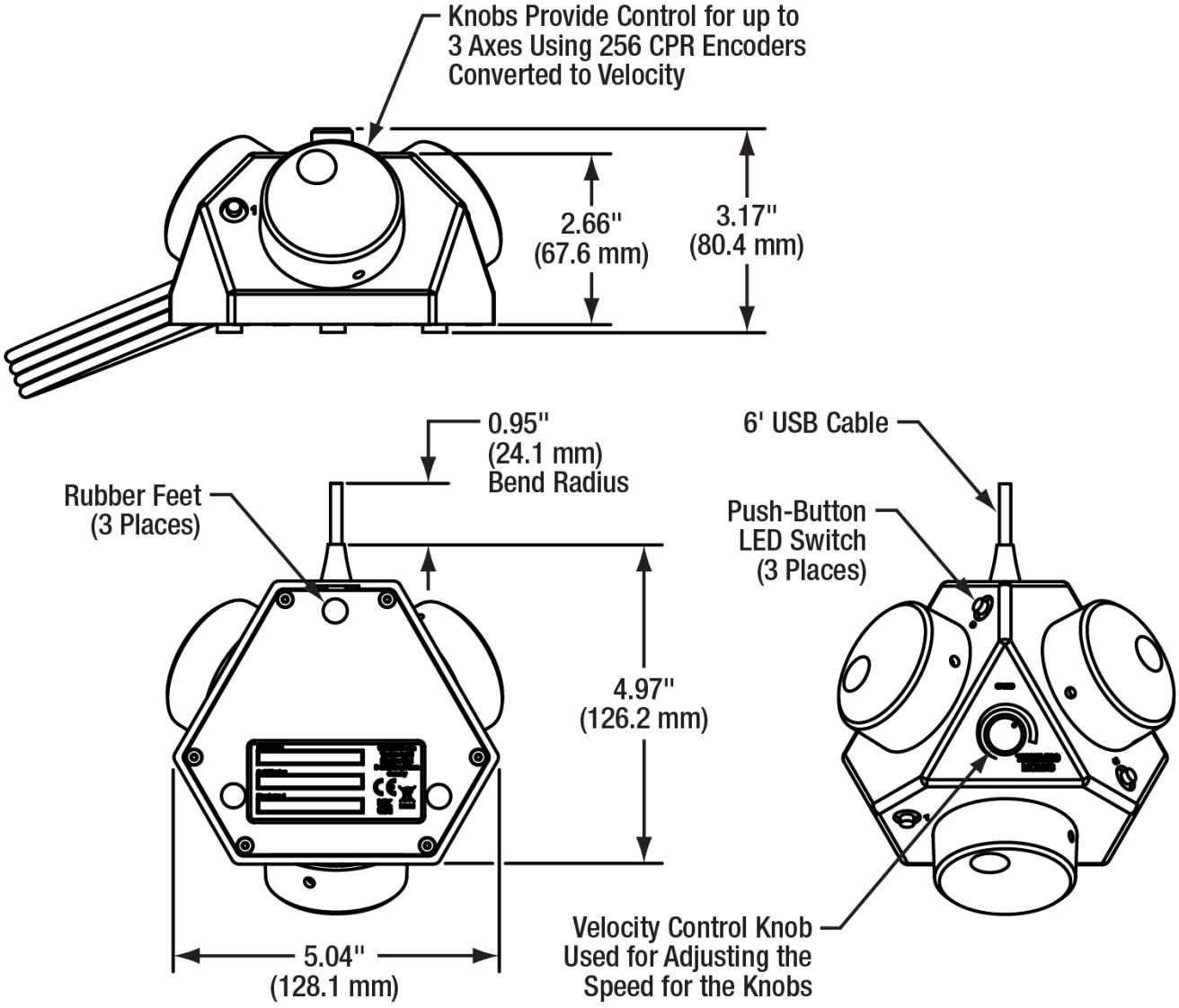
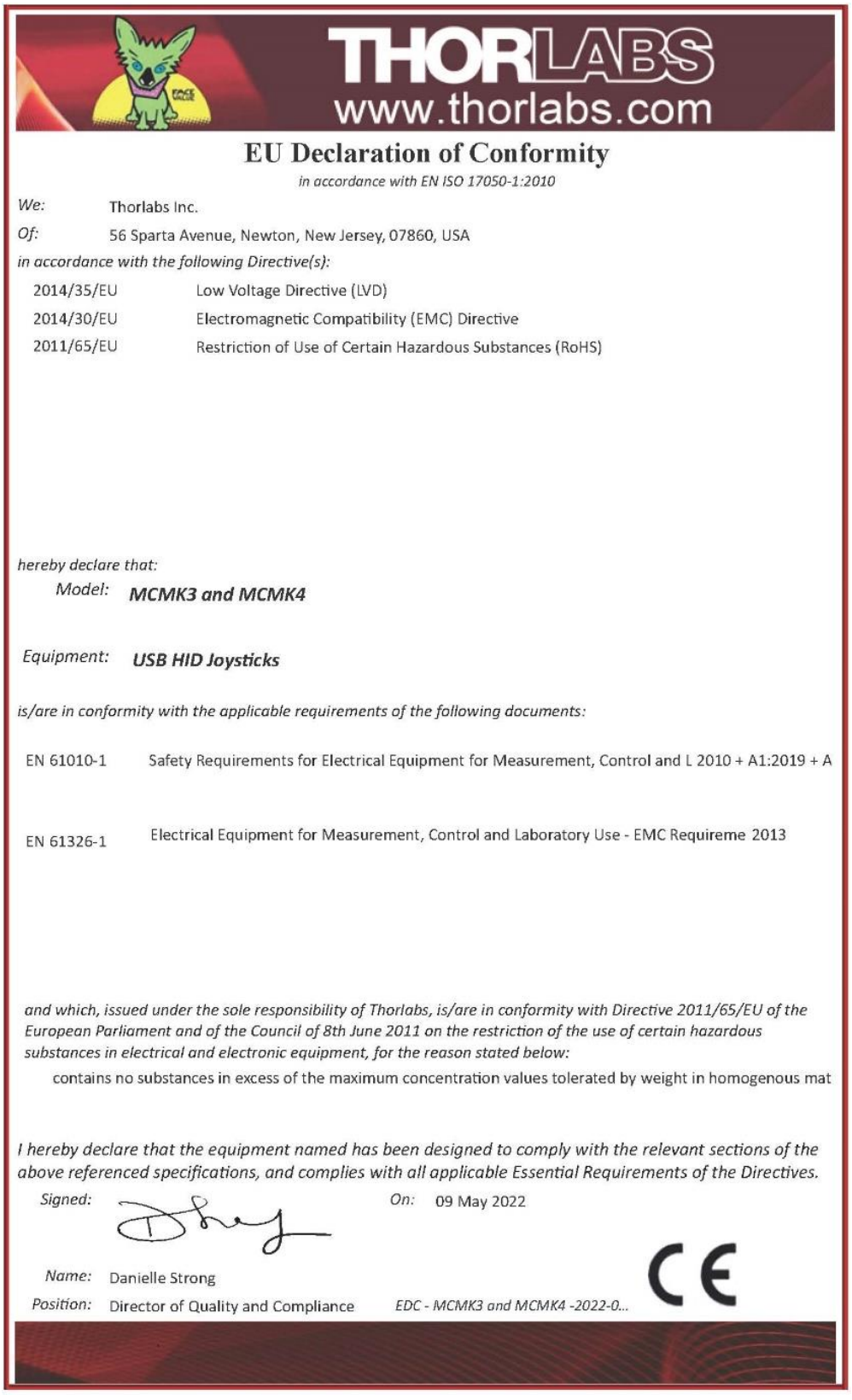


Figure 23 MCMK3 Joystick Mechanical Drawings

Chapter 8 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: ***MCMK3 and MCMK4***

Equipment: ***USB HID Joysticks***

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

EN 61010-1	Safety Requirements for Electrical Equipment for Measurement, Control and L 2010 + A1:2019 + A
EN 61326-1	Electrical Equipment for Measurement, Control and Laboratory Use - EMC Requireme 2013

and which, issued under the sole responsibility of Thorlabs, is/are 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:

contains no substances in excess of the maximum concentration values tolerated by weight in homogenous mat

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:* 09 May 2022

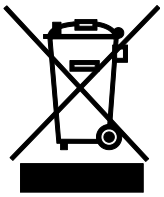
Name: Danielle Strong

Position: Director of Quality and Compliance

EDC - MCMK3 and MCMK4 -2022-0...

CE

Chapter 9 Warranty and RMA Information



Annex I

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 private data stored on the device prior to disposal.

9.1 Return of Devices

This precision device is 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.

Chapter 10 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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