



Neonode® Touch Sensor Module **Get Started**

2020-10-09

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2 Getting started with Touch Sensor Module Evaluation

2.1 Getting Started with Sensor Evaluation - Plug and Play with USB

2.1.1 Required Equipment

The following equipment from the evaluation kit is required:

- 1 x Neonode Touch Sensor Module
- 1 x FPC cable with connector
- 1 x Interface board

Additional required equipment:

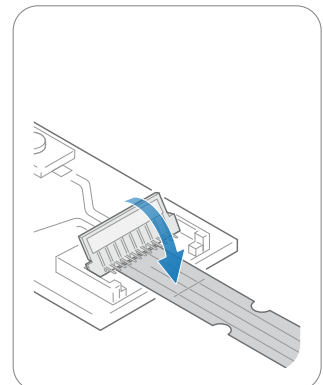
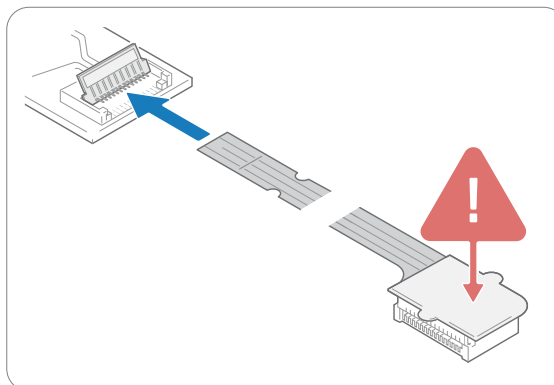
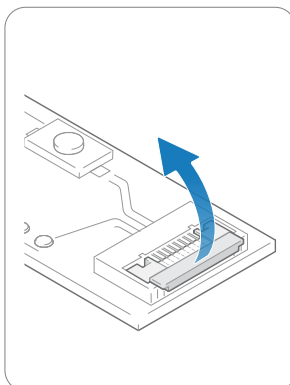
- Computer
 - Operating system: Windows 8.1 or Windows 10.
 - Software requirements: .NET Framework 4.5 or higher is required and can be downloaded from Microsoft's official website. Windows 8 and higher has this installed by default.
- USB cable with a Micro USB type B connector

⚠ Make sure that the USB cable transmits both power and data and not only power.

- (Optional) tape for mounting

2.1.2 Connecting Sensor Module

1. Connect the FPC cable to the interface board:

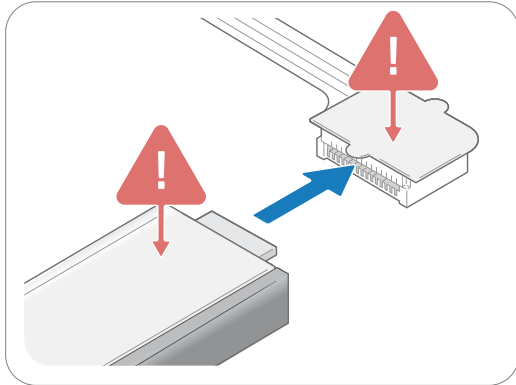


- a. Lift the flip lock on the interface board.
- b. Insert the FPC cable into the end of the connector, with the connector pads facing down, towards interface board. The yellow piece of PCB of the connector on the other side of the cable is facing

upwards. Make sure the direction is straight into the connector and the pads have reached the end of the connector.

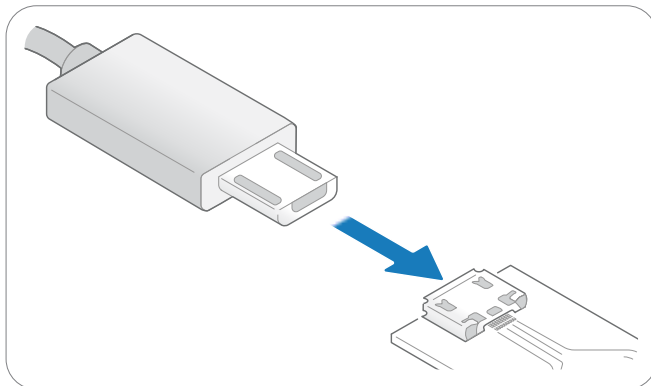
- c. Make sure the connector pads of the FPC cable are facing downwards, towards interface board. The sensor module risks damage if the FPC cable is connected in wrong direction.
- d. Press down the flip lock.

2. Connect the FPC cable to the sensor module:



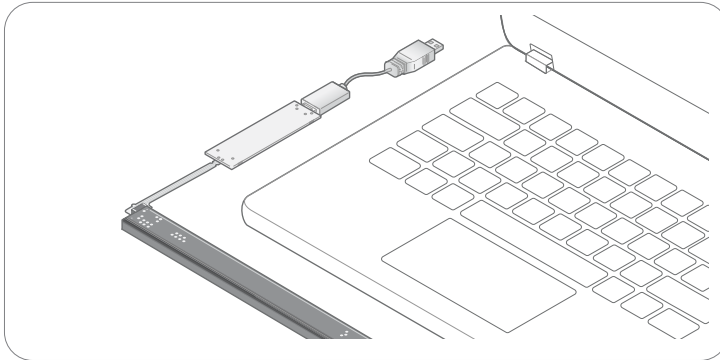
- a. Place the sensor module so that the module's connector pads are facing downwards (steel surface upwards).
- b. Insert the sensor module into the connector on FPC cable (yellow piece of PCB of the FPC connector still facing upwards).
- c. Make sure the direction of the pads is straight into the connector, and the pads have reached the end of the connector.

3. Connect a USB cable with a Micro USB type B connector to the interface board.

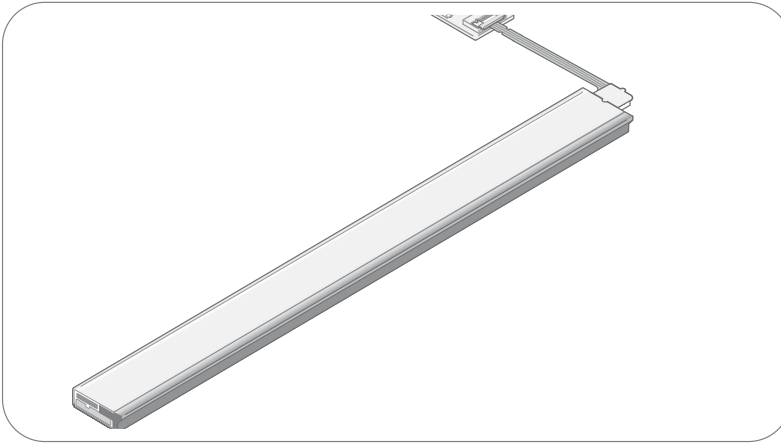


4. Make sure no object is within the touch active area of the sensor module before connecting power to the sensor through USB. The sensor calibrates itself when powered on and an object within the touch active area may interfere with the calibration.

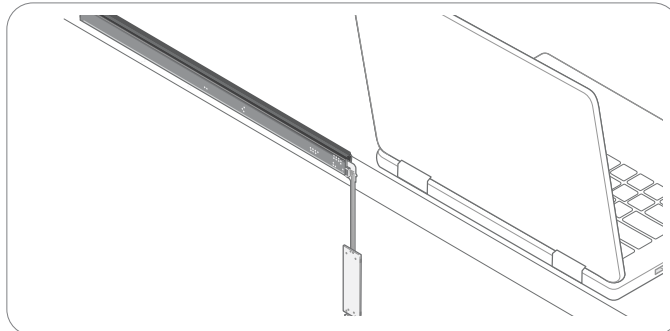
- a. If the sensor module is of the 0° type: place the module on a table with the steel surface facing downwards and with the optical surface facing towards you.



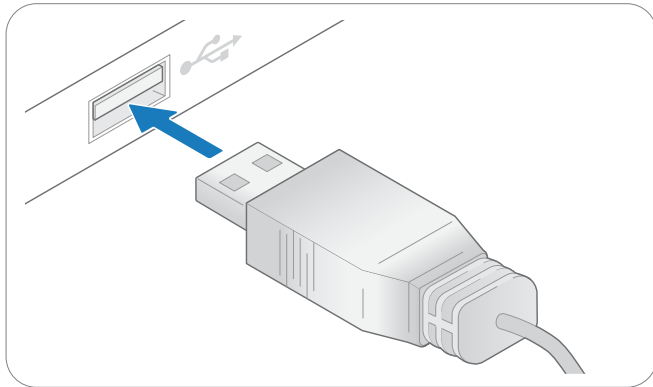
- b. If the sensor module is of the 90° type: place the module on a table with the steel surface facing upwards, so the optical surface is facing upwards as well. Make sure no object is within the touch active area above the sensor module.



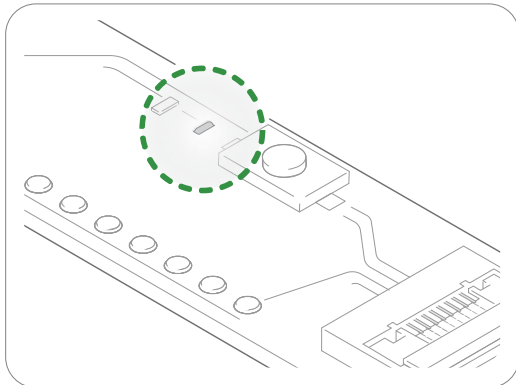
- i. Alternatively, you can mount the sensor module by using tape in order to fasten the steel surface to the edge of a table, with the optical surface facing towards you.



5. Insert the USB cable into a computer.



6. The green LED on the interface board lights up when connected.



7. When the sensor module has enumerated, it will act as a touch screen USB HID device.
8. Put an object in the touch active area, touch HID reports will be sent to your computer.
9. To visualize touches, you can for example use Paint (default Windows application) and draw lines by moving your finger in the touch active area.

2.2 Getting Started with Sensor Evaluation - Workbench and USB

2.2.1 Required Equipment

The following equipment from the evaluation kit is required:

- 1 x Neonode Touch Sensor Module
- 1 x FPC cable with connector
- 1 x Interface board

Additional required equipment:

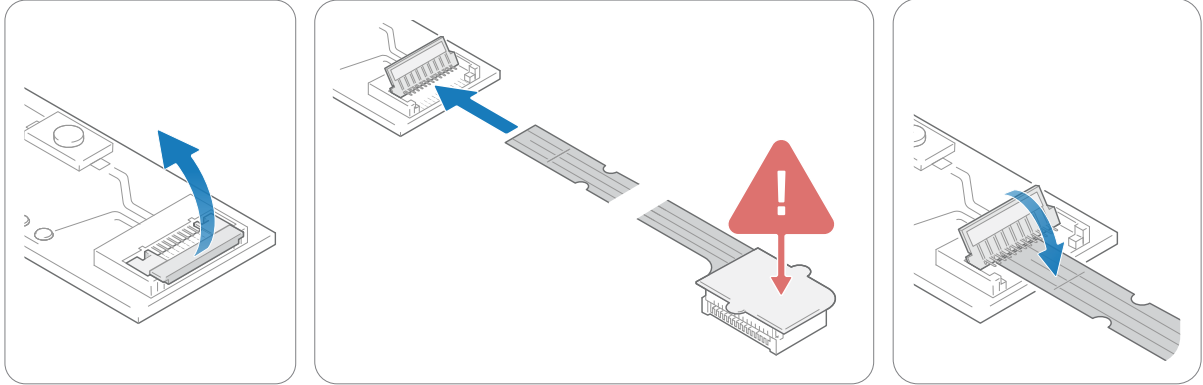
- Computer
 - Operating system: Windows 8.1 or Windows 10.
 - Software requirements: .NET Framework 4.5 or higher is required and can be downloaded from Microsoft's official website. Windows 8 and higher has this installed by default.
- USB cable with a Micro USB type B connector

⚠ Make sure that the USB cable transmits both power and data and not only power.

- (Optional) tape for mounting

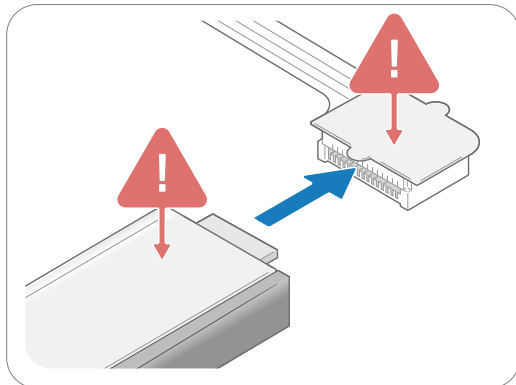
2.2.2 Connecting Sensor Module

1. Connect the FPC cable to the interface board:



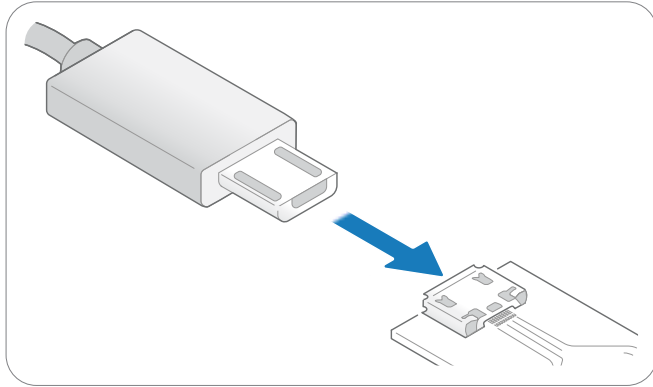
- Lift the flip lock on the interface board.
- Insert the FPC cable into the end of the connector, with the connector pads facing down, towards interface board. The yellow piece of PCB of the connector on the other side of the cable is facing upwards. Make sure the direction is straight into the connector and the pads have reached the end of the connector.
- Make sure the connector pads of the FPC cable are facing downwards, towards interface board. The sensor module risks damage if the FPC cable is connected in wrong direction.
- Press down the flip lock.

2. Connect the FPC cable to the sensor module:

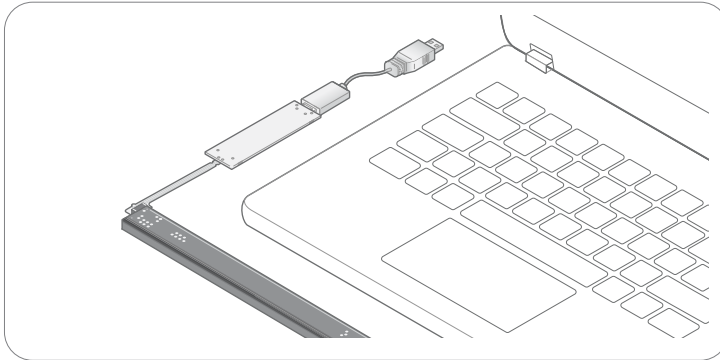


- Place the sensor module so that the module's connector pads are facing downwards (steel surface upwards).
- Insert the sensor module into the connector on FPC cable (yellow piece of PCB of the FPC connector still facing upwards).
- Make sure the direction of the pads is straight into the connector, and the pads have reached the end of the connector.

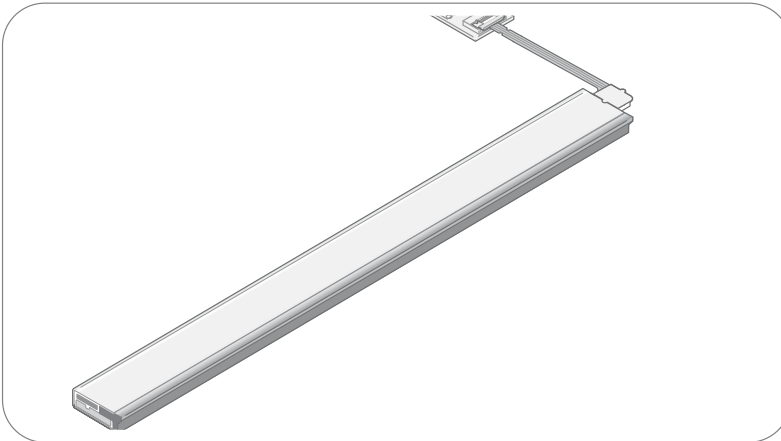
3. Connect a USB cable with a Micro USB type B connector to the interface board.



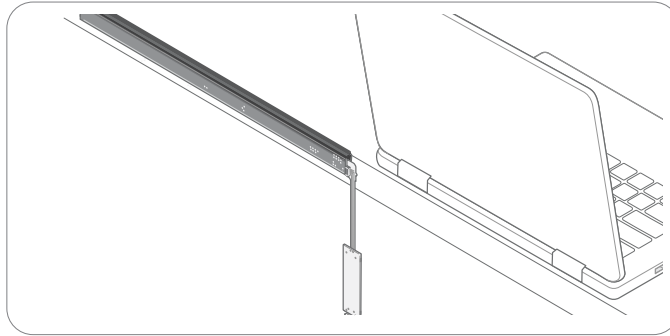
4. Make sure no object is within the touch active area of the sensor module before connecting power to the sensor through USB. The sensor calibrates itself when powered on and an object within the touch active area may interfere with the calibration.
 - a. If the sensor module is of the 0° type: place the module on a table with the steel surface facing downwards and with the optical surface facing towards you.



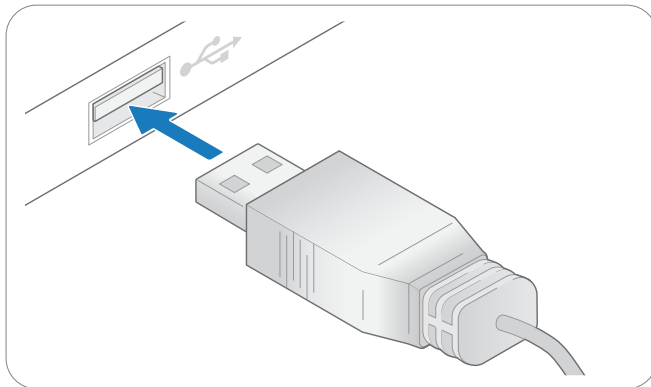
- b. If the sensor module is of the 90° type: place the module on a table with the steel surface facing upwards, so the optical surface is facing upwards as well. Make sure no object is within the touch active area above the sensor module.



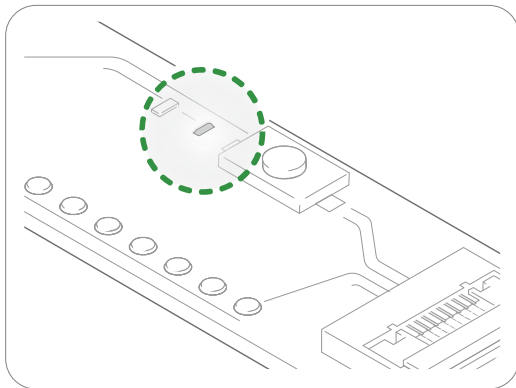
- i. Alternatively, you can mount the sensor module by using tape in order to fasten the steel surface to the edge of a table, with the optical surface facing towards you.



5. Insert the USB cable into a computer.



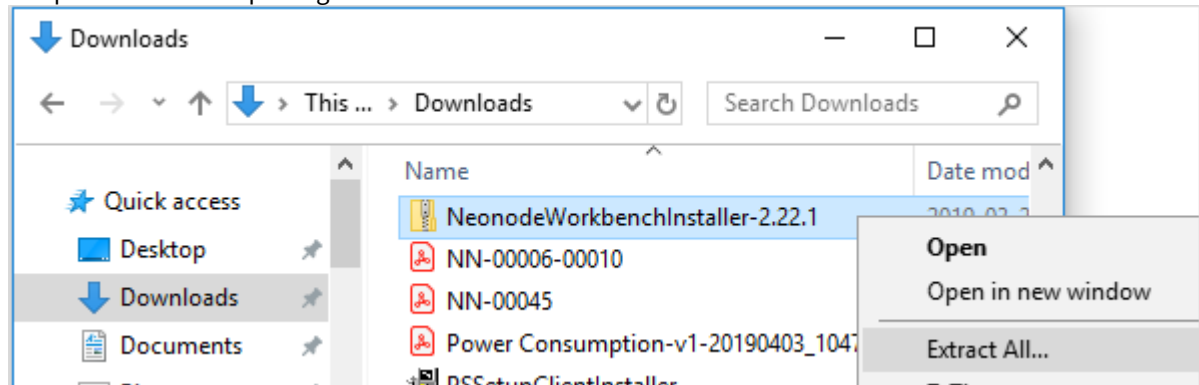
6. The green LED on the interface board lights up when connected.



2.2.3 Install and Open Neonode Workbench

1. Download the latest release of the Workbench installation package from <https://support.neonode.com/docs/pages/viewpage.action?pageId=2490816>.


2. Unzip the installation package.



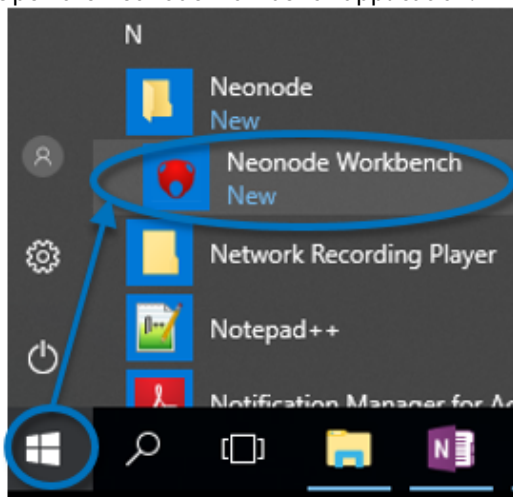
3. Open the installation package folder.
4. Run the Workbench installer (.msi file) and follow the instructions.

Name	Date modified	Type
NeonodeWorkbenchInstaller-2.22.1	2019-04-01 12:40	Windows Installer ...
Workspace	2019-04-01 12:40	Compressed (zipp...

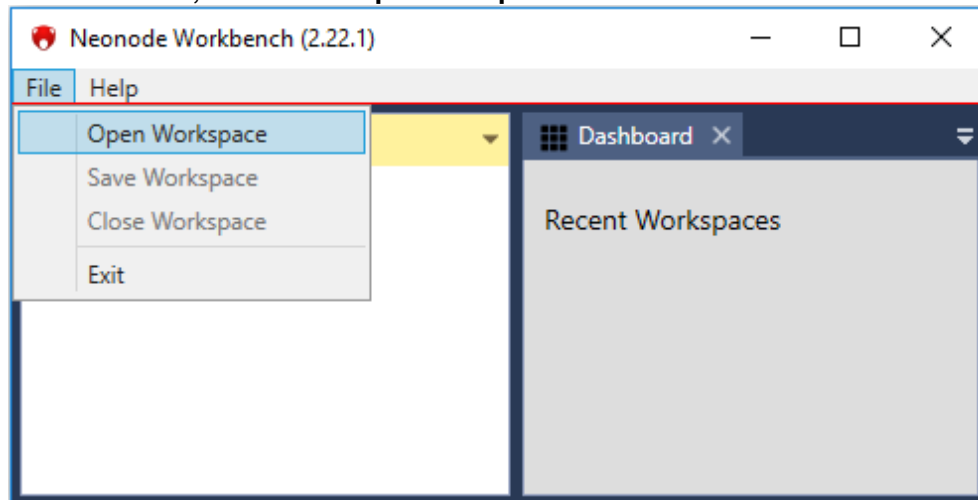
5. Open the installation package folder again.
6. Unzip the Workspace folder to a location where you have write permissions. Write permissions are required to save settings and user data.

 In order for the Workbench application to operate, the files in the Workspace folder must be kept together. Move the entire folder if you want to relocate the workspace file.

7. Open the Neonode Workbench application.



8. From the toolbar, select **File >> Open Workspace**.

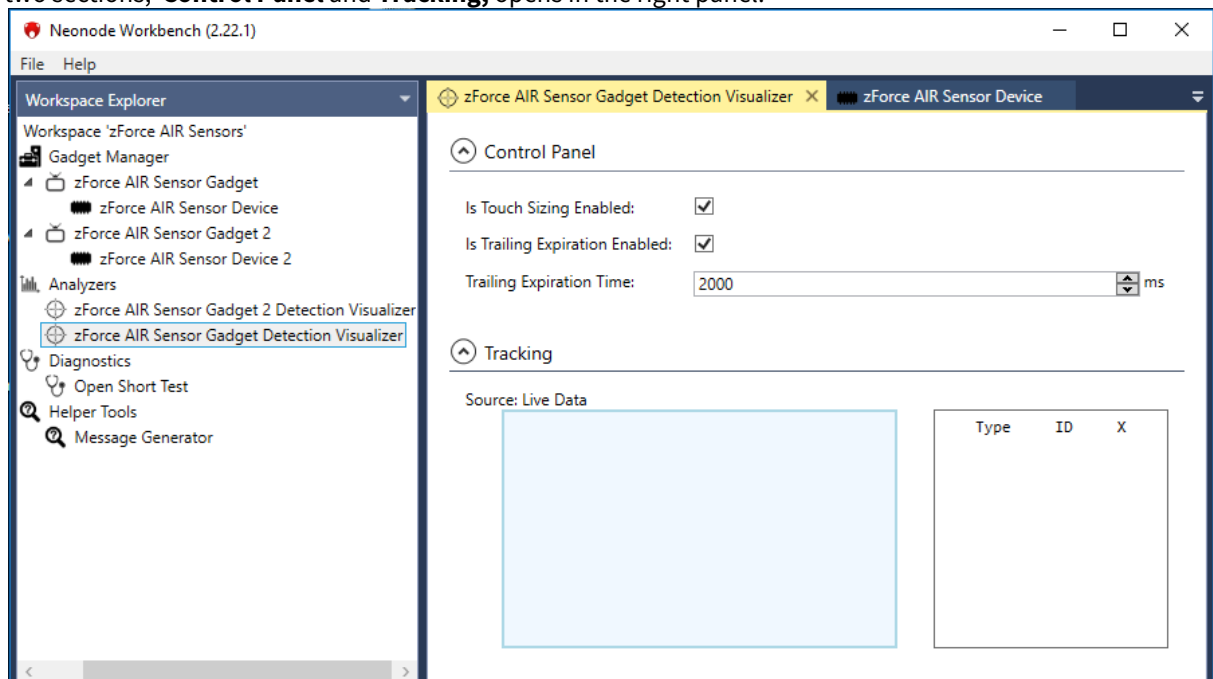



9. Navigate to the Workspace folder and double-click the .nww file inside the folder.

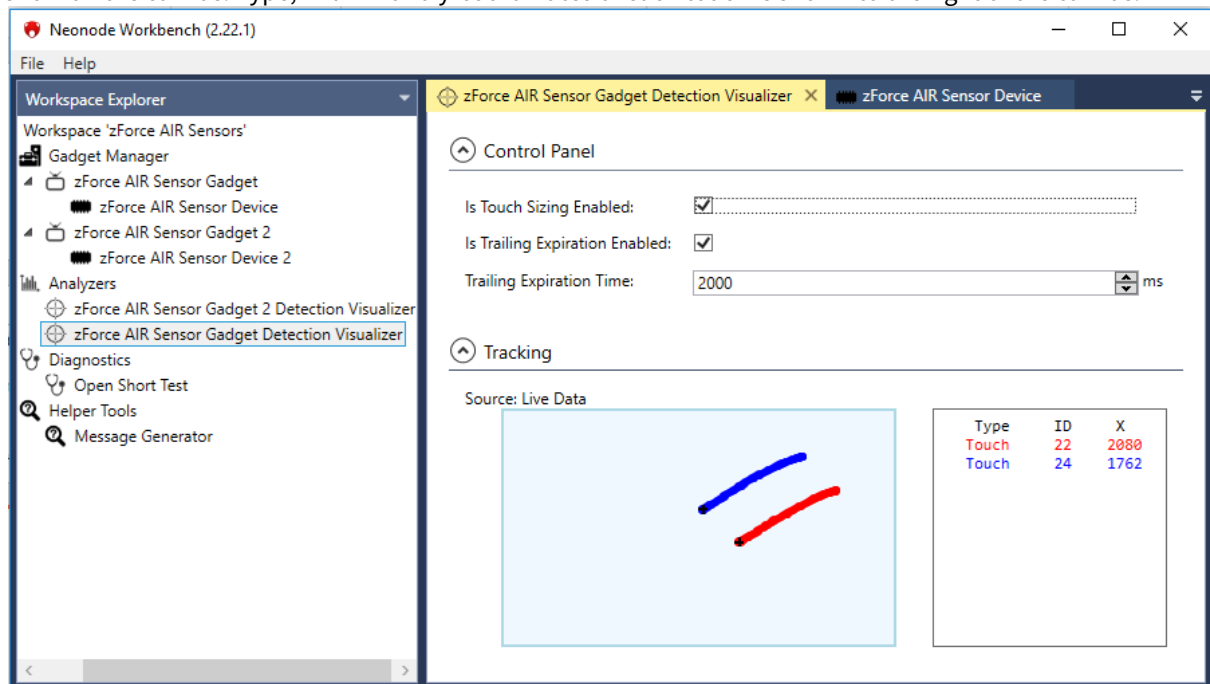
Name	Date modified	Type
Analizers	2019-04-01 12:49	File folder
Diagnostics	2019-04-01 12:49	File folder
Gadget Manager	2019-04-01 12:49	File folder
Helper Tools	2019-04-01 12:49	File folder
zForce AIR Sensors.nww	2019-04-01 13:27	NWW File

2.2.4 Visualizing Touches with Workbench

1. In the left panel of the workspace, double-click **zForce AIR Sensor Gadget Detection Visualizer**. A tab with two sections, **Control Panel** and **Tracking**, opens in the right panel.



2. If either section in the right panel is collapsed, click  to expand it.
3. In the right panel
 - a. Enable or disable **Touch Sizing**. With Touch Sizing enabled, the size of a detected object is indicated by the size of the tracking cursor.
 - b. Enable or disable **Trailing Expiration**. With Trailing Expiration enabled, the trail of a detected object is shown, indicating its movement.
4. Move one or more fingers or other objects in the active area of the sensor module. The registered touches show on the canvas. Type, ID and x- and y-coordinates of each touch is shown to the right of the canvas.



In Workbench, you can also

- Access sensor information such as firmware version.
- Configure the sensor module to explore different configurations.
- Perform a test to identify any damaged laser or photo diodes.
- Generate sensor messages in hexadecimal format without understanding the structure of the communication protocol message.

For further information, please refer to [Workbench documentation](https://support.neonode.com/docs/display/Workbench/Getting+Started+with+Neonode+Workbench) ¹

2.3 Getting Started with Sensor Evaluation - I2C and Arduino

2.3.1 Table of Contents

- [Required Equipment](#) (see page 15)
- [Connecting Sensor Module using Interface Board](#) (see page 15)
- [Connecting Sensor Module using Neonode Prototyping Board](#) (see page 18)

¹ <https://support.neonode.com/docs/display/Workbench/Getting+Started+with+Neonode+Workbench>.

- [Arduino Library](#) (see page 20)

2.3.2 Required Equipment

2.3.3 Required Equipment using Interface Board

The following equipment from the evaluation kit is required:

- 1 x Neonode Touch Sensor Module
- 1 x FPC cable with connector
- 1 x Interface Board

Additional required equipment:

- An Arduino-compatible board. The I2C library described here supports most Arduino-compatible boards.
- An Arduino development environment, for example Arduino IDE.
- USB cable with a Micro USB type B connector

❗ Make sure that the USB cable transmits both power and data and not only power.

- (Optional) tape for mounting

Required Equipment using Neonode Prototyping Board

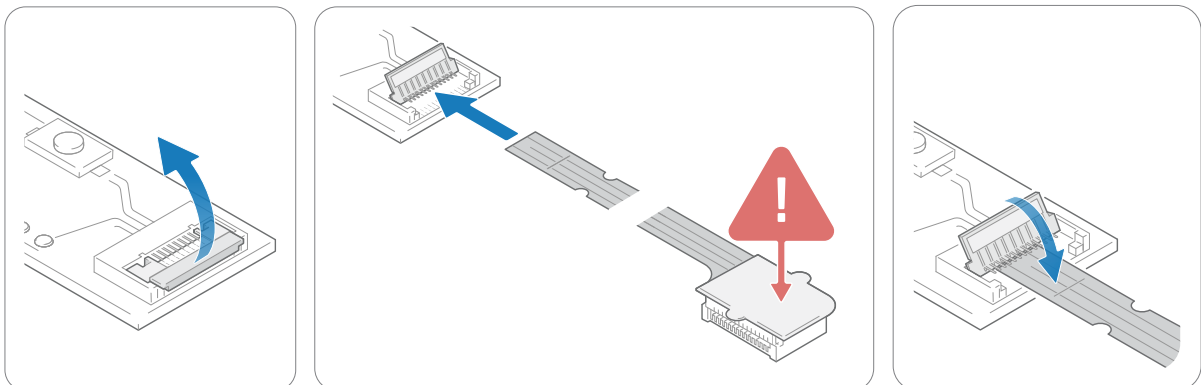
- 1 x Neonode Touch Sensor Module
- 1 x Neonode Prototyping Board
- An Arduino development environment, for example the Arduino IDE.
- USB cable with a Micro USB type B connector

❗ Make sure that the USB cable transmits both power and data and not only power.

- (Optional) tape for mounting

2.3.4 Connecting Sensor Module using Interface Board

1. Connect the FPC cable to the interface board:

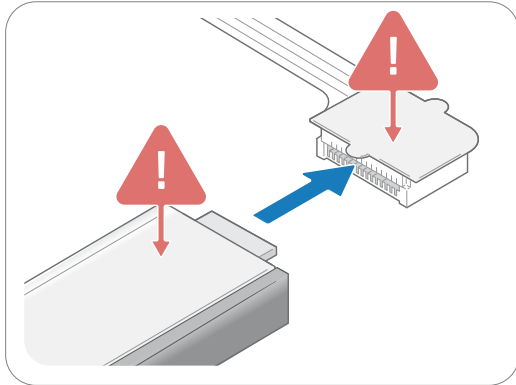


- a. Lift the flip lock on the interface board.
- b. Insert the FPC cable into the end of the connector, with the connector pads facing down, towards interface board. The yellow piece of PCB of the connector on the other side of the cable is facing

upwards. Make sure the direction is straight into the connector and the pads have reached the end of the connector.

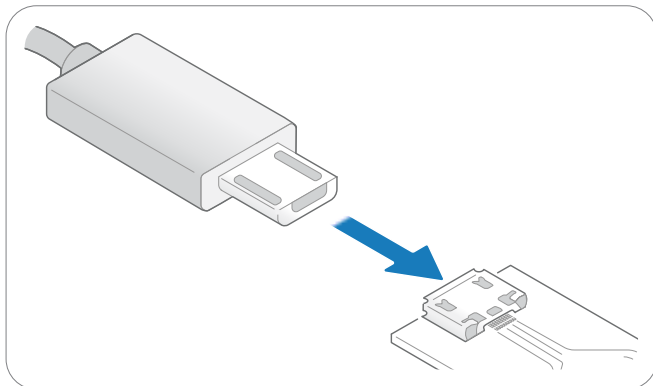
- c. Make sure the connector pads of the FPC cable are facing downwards, towards interface board. The sensor module risks damage if the FPC cable is connected in wrong direction.
- d. Press down the flip lock.

2. Connect the FPC cable to the sensor module:



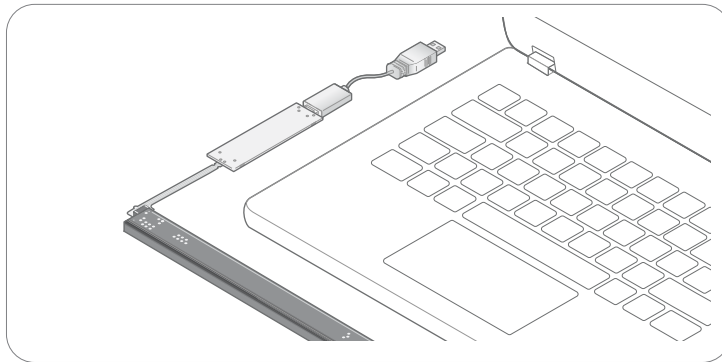
- a. Place the sensor module so that the module's connector pads are facing downwards (steel surface upwards).
- b. Insert the sensor module into the connector on FPC cable (yellow piece of PCB of the FPC connector still facing upwards).
- c. Make sure the direction of the pads is straight into the connector, and the pads have reached the end of the connector.

3. Connect a USB cable with a Micro USB type B connector to the interface board.

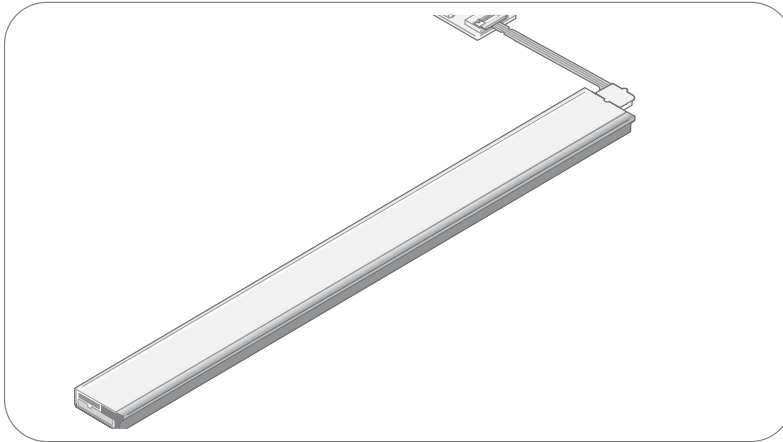


4. Make sure no object is within the touch active area of the sensor module before connecting power through USB. The sensor module calibrates itself when powered on and an object within the touch active area may interfere with the calibration.

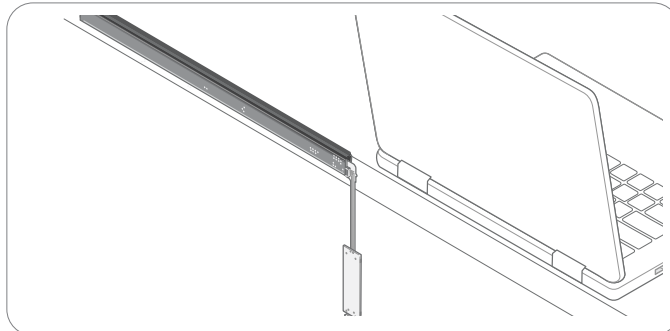
- a. If the sensor module is of the 0° type: place the module on a table with the steel surface facing downwards and with the optical surface facing towards you.



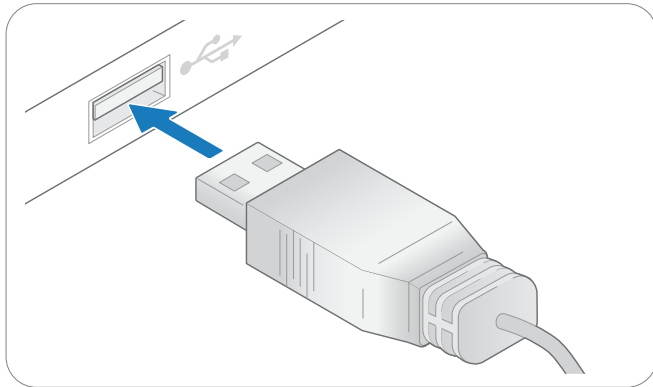
- b. If the sensor module is of the 90° type: place the module on a table with the steel surface facing upwards, so the optical surface is facing upwards as well. Make sure no object is within the touch active area above the sensor module.



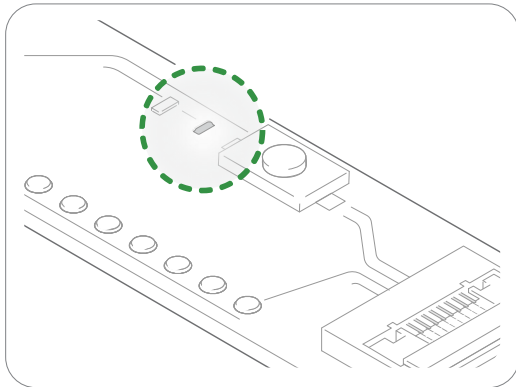
- i. Alternatively, you can mount the sensor module by using tape in order to fasten the steel surface to the edge of a table, with the optical surface facing towards you.



5. Insert the USB cable into a computer.



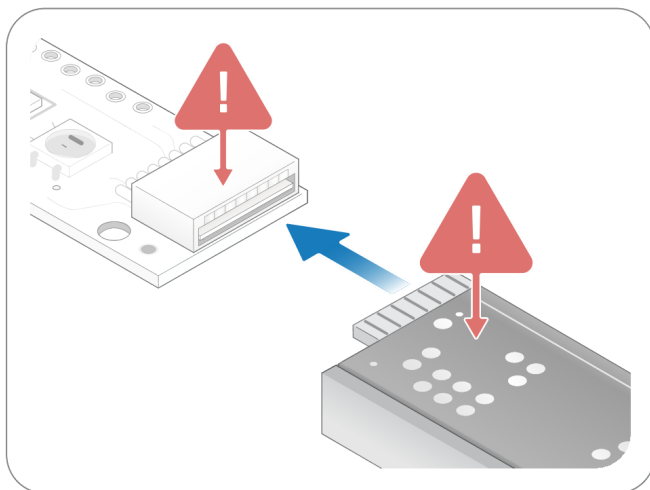
6. The green LED on the interface board lights up when connected.



2.3.5 Connecting Sensor Module using Neonode Prototyping Board

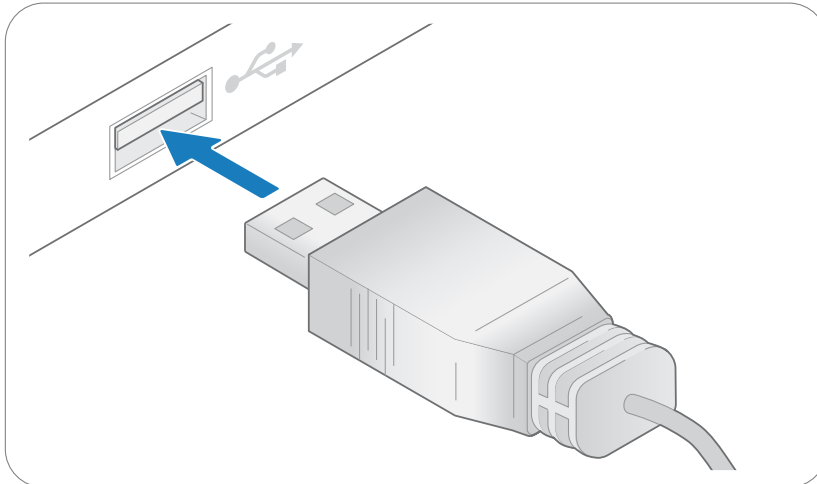
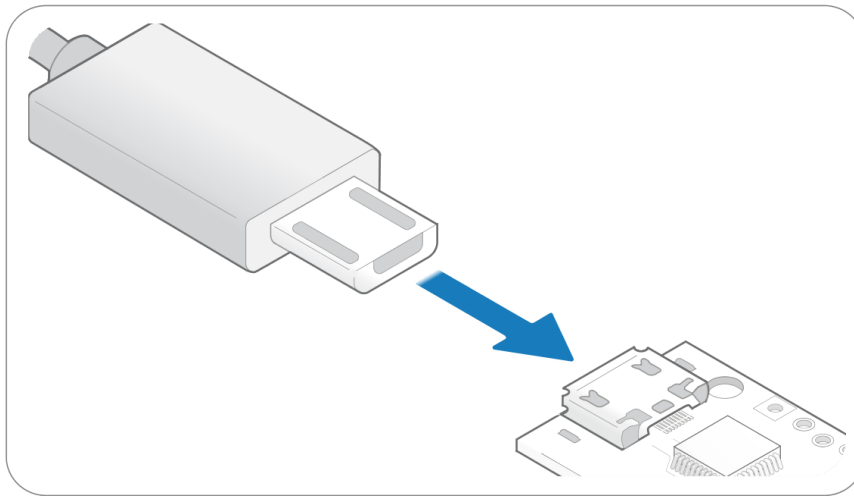
Evaluate Touch Sensor Module using Prototyping Board

1. Connect the sensor Module to the Prototyping Board



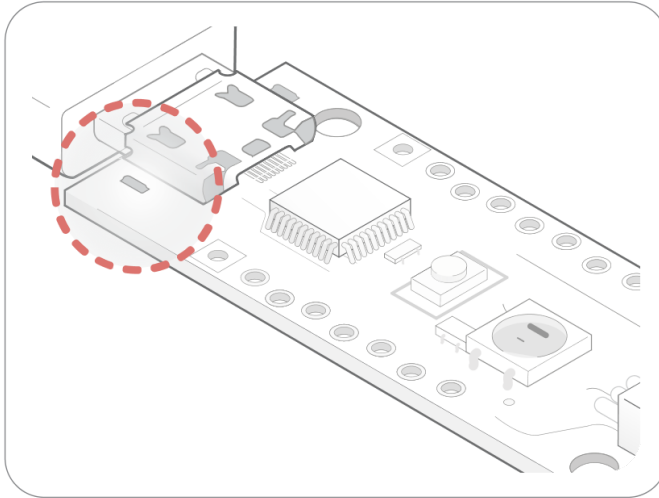
- a. Place the sensor module so that the module's connector pads are facing upwards (black surface upwards).

- b. Insert the sensor module to the Prototyping Board's sensor port.
2. The sensor module is now connected to the board, which expose all connections between the sensor module and the board. For details, refer to [Electrical Integration](#)². Do not connect power until the following steps have been performed.
3. Make sure no object is within the touch active area of the sensor module before connecting power through USB. The sensor module calibrates itself when powered on and an object within the touch active area may interfere with the calibration.
 - a. If the sensor module is of the 0° type: place the module on a table with the steel surface facing downwards and with the optical surface facing towards you.
 - b. If the sensor module is of the 90° type: place the module on a table with the steel surface facing upwards, so the optical surface is facing upwards as well. Make sure no object is within the touch active area above the sensor module.
 - i. Alternatively, you can mount the sensor module by using tape in order to fasten the steel surface to the edge of a table, with the optical surface facing towards you.
4. Connect power to the sensor module through the USB.



² <https://support.neonode.com/docs/display/AIRTSUsersGuide/Electrical+Integration>

- a. A red light next to the micro USB port should turn on to indicate power transfer.



5. The Prototyping Board is now ready to be flashed.
6. For further information, please refer to [Get Started With Neonode Prototyping Board](#)³.

2.3.6 Arduino Library

Please refer to our [Arduino Library](#)⁴.

2.4 Getting Started with Sensor Evaluation - SDK and USB

2.4.1 Required Equipment

The following equipment from the evaluation kit is required:

- 1 x Neonode Touch Sensor Module
- 1 x FPC cable with connector
- 1 x Interface board

Additional required equipment:

- [SDK System Requirements](#)⁵
- USB cable with a Micro USB type B connector

⚠ Make sure that the USB cable transmits both power and data and not only power.

- (Optional) tape for mounting.

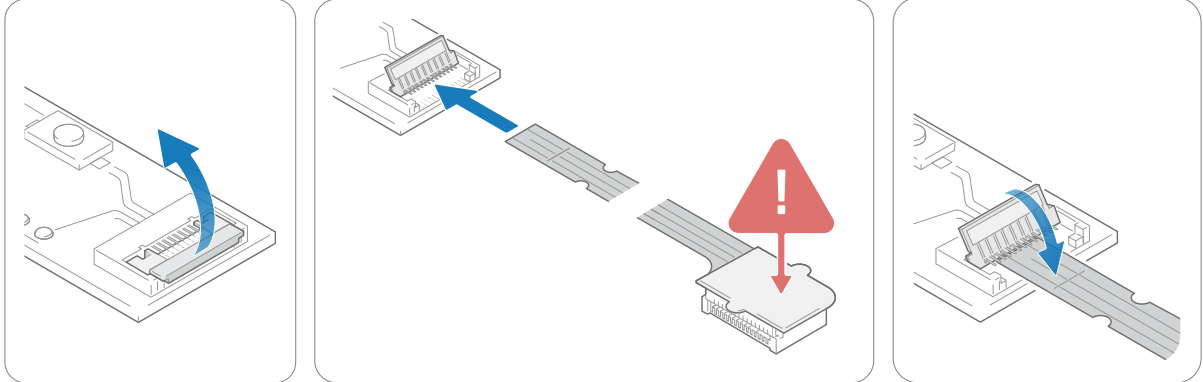
³ <https://support.neonode.com/docs/display/NPB/Get+Started+with+Neonode+Prototyping+Board>

⁴ <https://github.com/neonode-inc/zforce-arduino>

⁵ <https://support.neonode.com/docs/display/SDKDOC/SDK+System+Requirements>

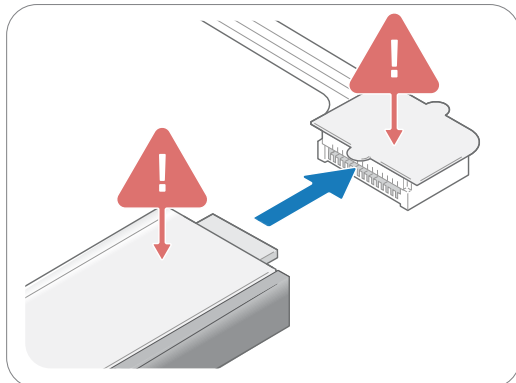
2.4.2 Connecting Sensor

1. Connect the FPC cable to the interface board:



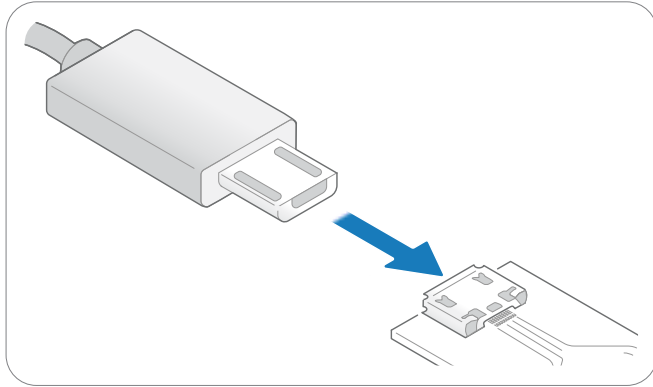
- Lift the flip lock on the interface board.
- Insert the FPC cable into the end of the connector, with the connector pads facing down, towards interface board. The yellow piece of PCB of the connector on the other side of the cable is facing upwards. Make sure the direction is straight into the connector and the pads have reached the end of the connector.
- Make sure the connector pads of the FPC cable are facing downwards, towards interface board. The sensor module risks damage if the FPC cable is connected in wrong direction.
- Press down the flip lock.

Connect the FPC cable to the sensor module:



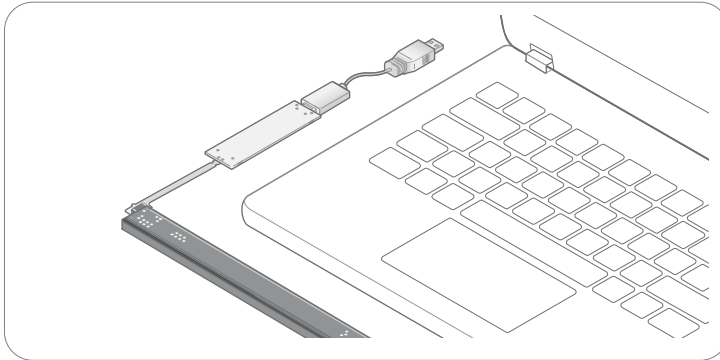
- Place the sensor module so that the module's connector pads are facing downwards (steel surface upwards).
- Insert the sensor module into the connector on FPC cable (yellow piece of PCB of the FPC connector still facing upwards).
- Make sure the direction of the pads is straight into the connector, and the pads have reached the end of the connector.

3. Connect a USB cable with a Micro USB type B connector to the interface board.

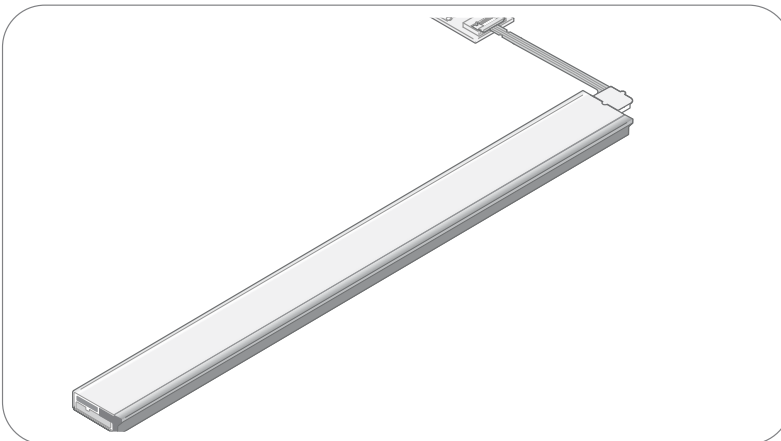


Make sure no object is within the touch active area of the sensor module before connecting power to the sensor through USB. The sensor calibrates itself when powered on and an object within the touch active area may interfere with the calibration.

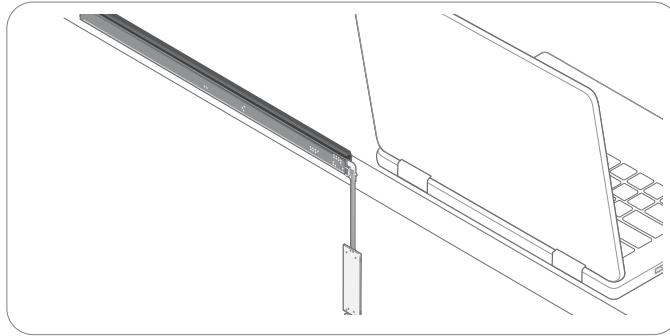
- a. If the sensor module is of the 0° type: place the module on a table with the steel surface facing downwards and with the optical surface facing towards you.



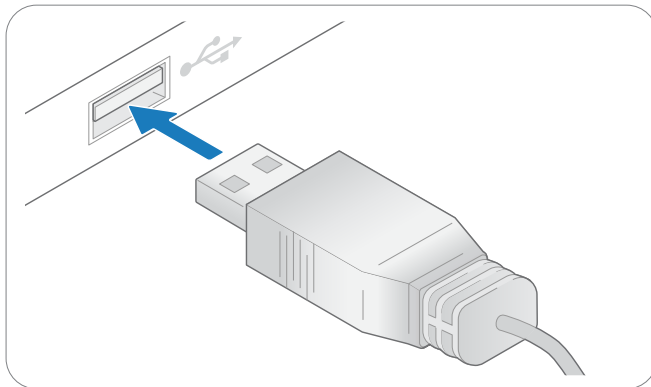
If the sensor module is of the 90° type: place the module on a table with the steel surface facing upwards, so the optical surface is facing upwards as well. Make sure no object is within the touch active area above the sensor module.



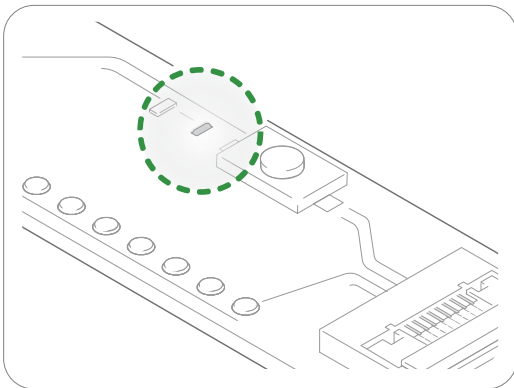
- i. Alternatively, you can mount the sensor module by using tape in order to fasten the steel surface to the edge of a table, with the optical surface facing towards you.



5. Insert the USB cable into a computer.



6. The green LED on the interface board lights up when connected.



2.4.3 Download SDK

1. Follow the SDK guide for your OS.
 - a. [SDK Guide for Windows](#)⁶
 - b. [SDK Guide for Linux](#)⁷

For Further information, please refer to [SDK Documentation](#)⁸.

⁶ <https://support.neonode.com/docs/display/SDKDOC/Getting+started+with+SDK+for+Windows>

⁷ <https://support.neonode.com/docs/display/SDKDOC/Getting+started+with+SDK+for+Linux>

⁸ <https://support.neonode.com/docs/display/SDKDOC>

3 Getting Started with Software Integration

The Neonode Touch Sensor Module can be integrated into any host system that supports either the I2C or the USB HID transport protocol. The zForce communication protocol is based on I2C- or USB HID-transport of messages that are serialized according to the zForce ASN.1 Serialization Protocol. ASN.1 is a standardized way to describe data regardless of language implementation, hardware system and operating system (ISO/IEC 8824).

3.1 Use the zForce SDK

3.1.1 Communicating without Deserializing ASN.1-encoded Messages

The zForce SDK is compatible with USB and Windows or Linux and allows you to communicate with the sensor module without considering serialization or deserialization of ASN.1 encoded messages. It can also be used to create an application for communication with the sensor module. The SDK contains an example program to get you going. An explanation of the program in pseudocode is available [here](#)⁹.

Download zForce SDK from [Downloads](#)¹⁰ and please refer to the separate [zForce SDK documentation](#)¹¹.

3.2 Use the Touch Sensor Module Interface Library for Arduino

3.2.1 Communicating with I2C and Arduino

The Touch Sensor Module interface library is compatible with I2C and Arduino. It is a primitive function library and can be used to handle the communication with the sensor module. The library contains an example program to get you going.

For more information, refer to [zForce Arduino Library](#)¹².

3.3 Communicating Using a System and a Programming Language of Your Choice

Learn more about the [zForce Communication Protocol](#)¹³ and write your own application to read and write data via one of the following transport modes:

- USB Raw HID Mode
- I2C Transport

Make sure to prepare the sensor module for communication, refer to [Initializing Sensors](#)¹⁴.

Neonode provides the following help to get you started:

- A Message Generator, as part of the Neonode Workbench. This tool can be used to generate serialized messages according to the zForce ASN.1 Protocol. Refer to separate [Neonode Workbench documentation](#)¹⁵ for further information.

9 <https://support.neonode.com/docs/display/SDKDOC/Example+Program+Pseudocode>

10 <https://support.neonode.com/docs/display/Downloads/zForce+SDK+Downloads>

11 <https://support.neonode.com/docs/pages/viewpage.action?pageId=21135404>

12 <https://support.neonode.com/docs/display/AIRTSUsersGuide/Touch+Sensor+Module+Interface+Library+for+Arduino>

13 <https://support.neonode.com/docs/display/AIRTSUsersGuide/zForce+Communication+Protocol>

14 <https://support.neonode.com/docs/display/AIRTSUsersGuide/Preparing+the+Sensor+for+Communication>

15 <https://support.neonode.com/docs/display/Workbench/Getting+Started+with+Neonode+Workbench>

- Examples of different implementations. Refer to [Implementation Examples](#)¹⁶.
- Support. For any questions, please refer to [Neonode Help Center](#)¹⁷.

¹⁶ <https://support.neonode.com/docs/display/AIRTSUsersGuide/Implementation+Examples>

¹⁷ <https://helpcenter.neonode.com/hc/en-us/requests/new>