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Control Module Software

For Use With PN: KAI-5051

You MUST cycle power to the control module for a change to become live!

This User Guide Covers:

- A Visual Tour of the Graphical User Interface
- How to Load Firmware to the Kaizen Relay Control Module

Notes to Mention:

- Software support is strictly for Windows 10 and Up
- A Micro USB **Data** Cable is required to connect to and upload firmware to the Kaizen Relay Control Module
    - This can be purchased on the Kaizen Speed website
- The GUI is currently **only a visual aid** and facilitator of programming the control module -- all configuration and programming is done through *written code*. This *written code* can then be uploaded to the control module using the GUI. Written code will be developed by **Kaizen Relay Control Module Development Partners**. For more information, visit the Kaizen Speed website or contact us using the email listed below.
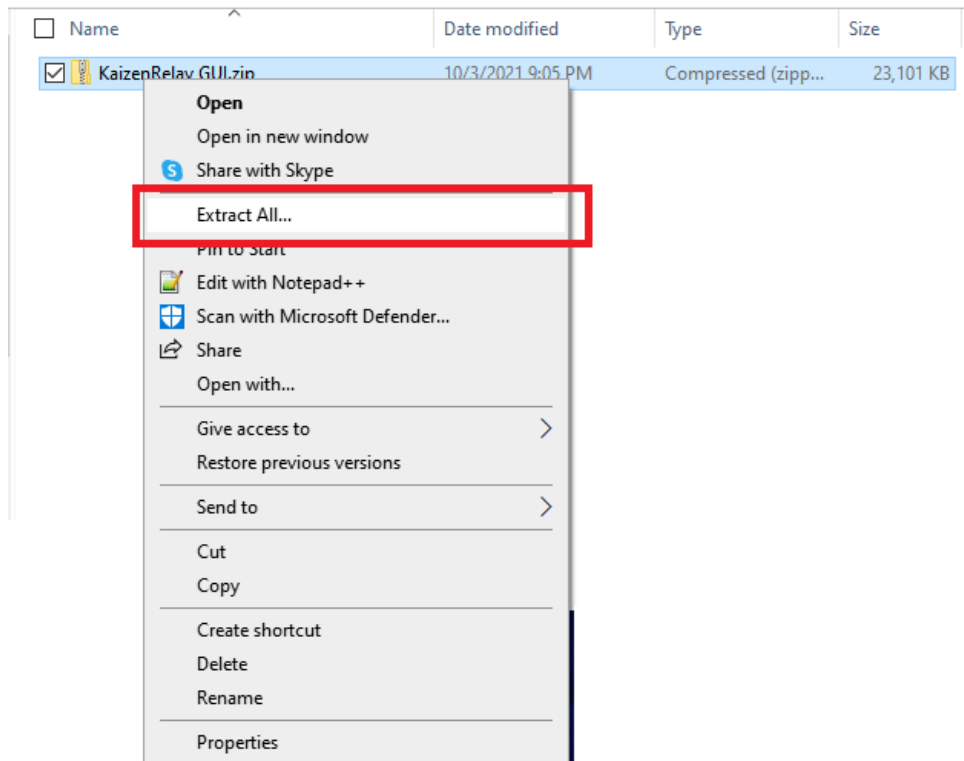
Abbreviations:

- GUI (Graphical User Interface)

Contact Information:

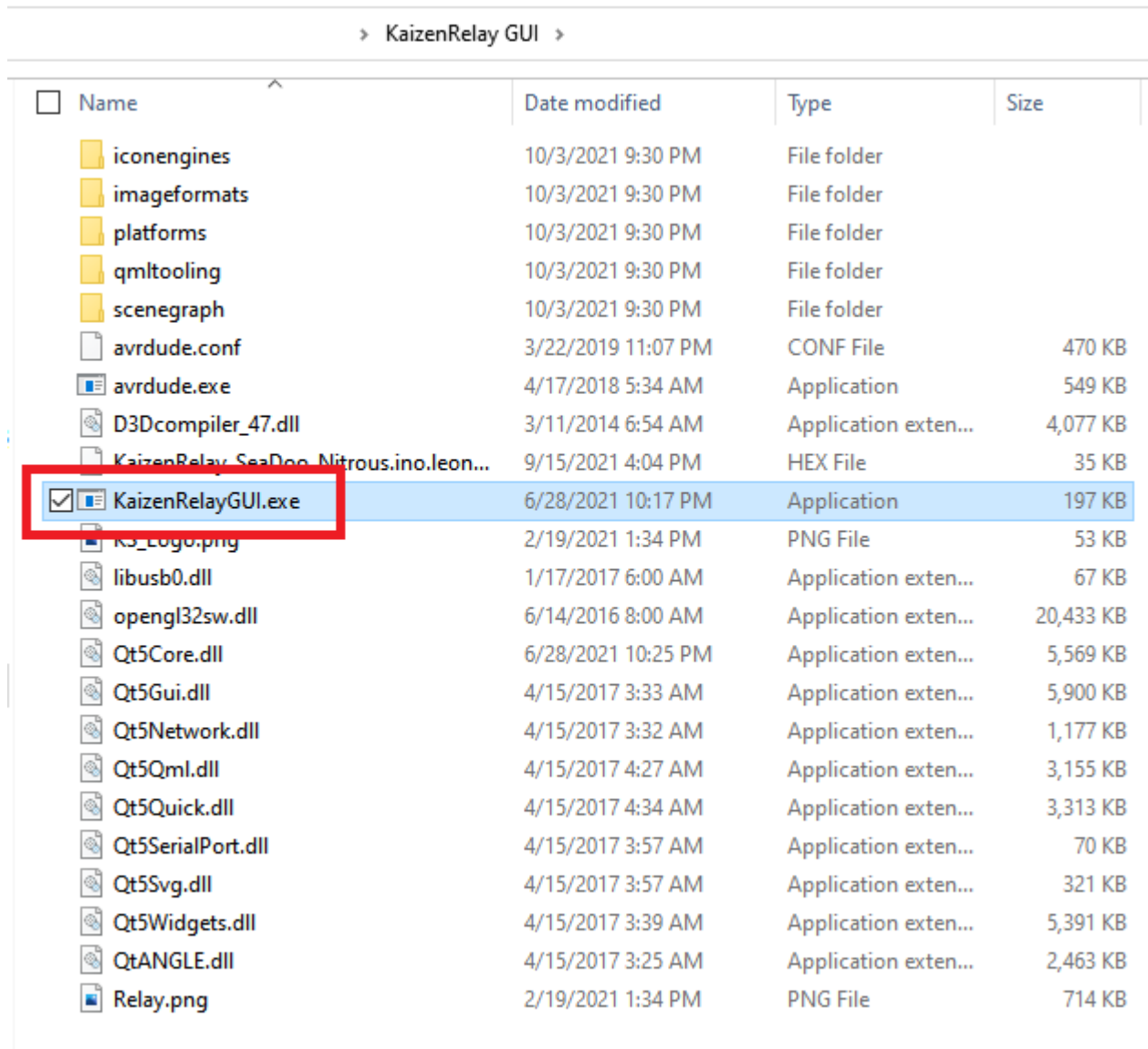- Email - **Programs@KaizenSpeed.com**

Installing the GUI

The software is downloaded from the Kaizen Speed website as a compressed ZIP folder.

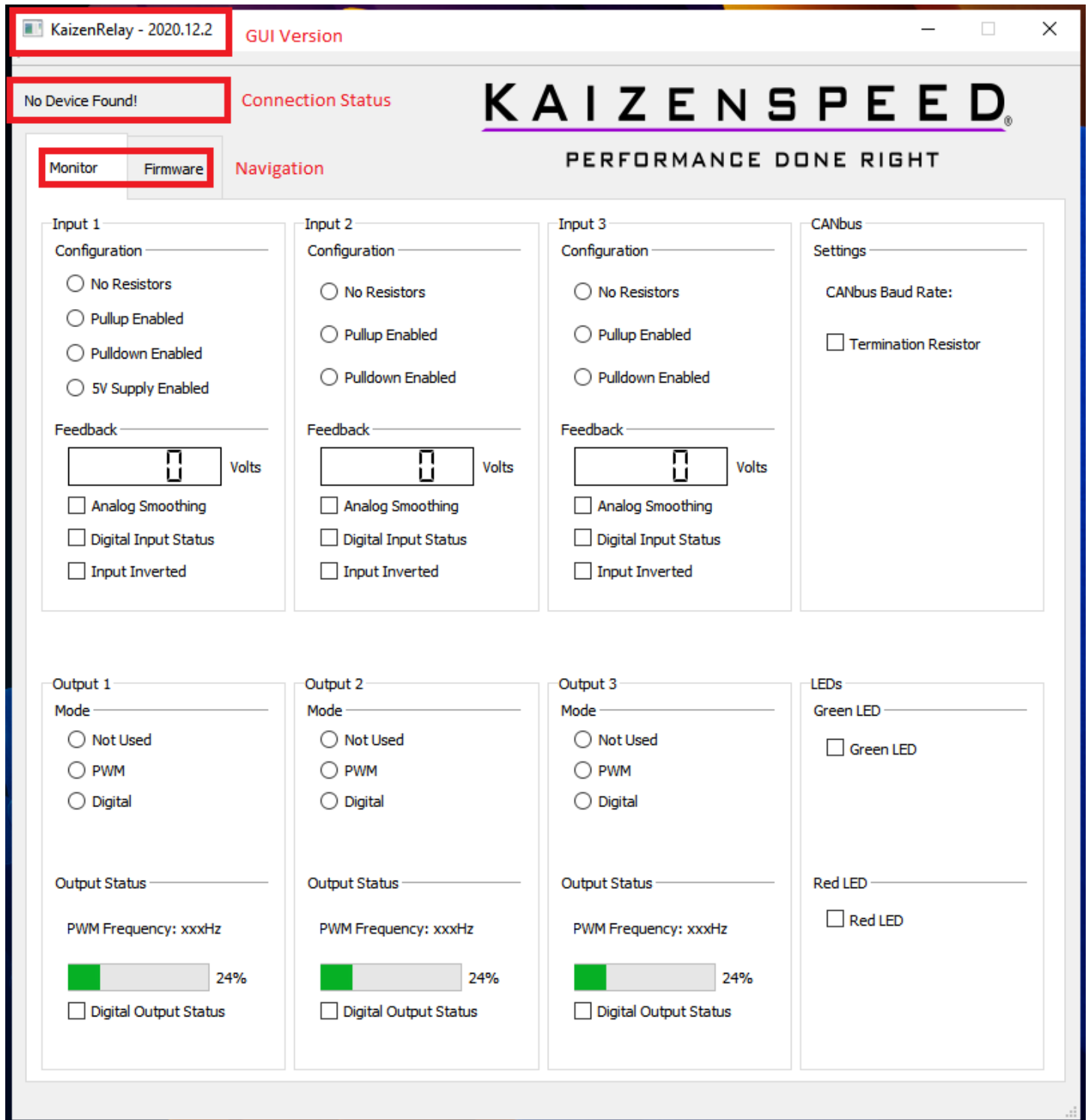Navigate to the downloaded item, right click on it, and choose "Extract All…"

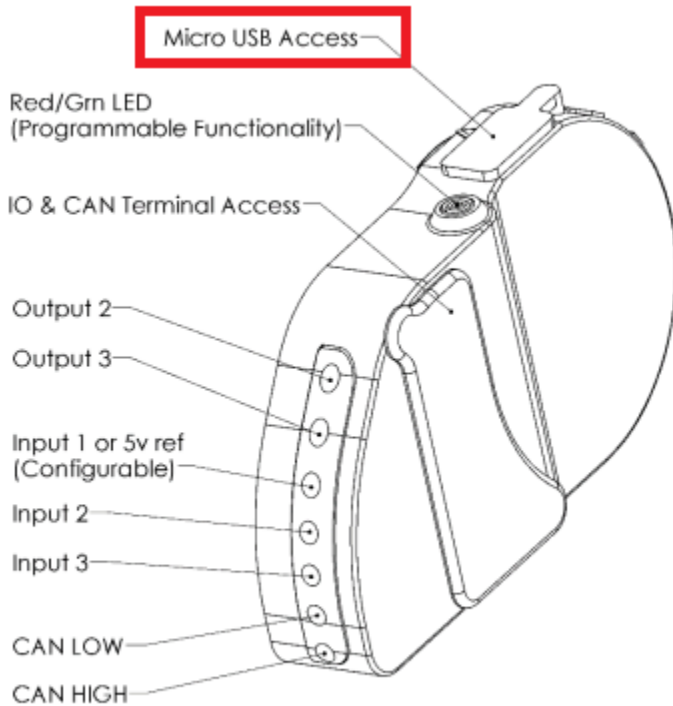Navigate into the extracted folder and double click "Kaizen Relay GUI.exe"

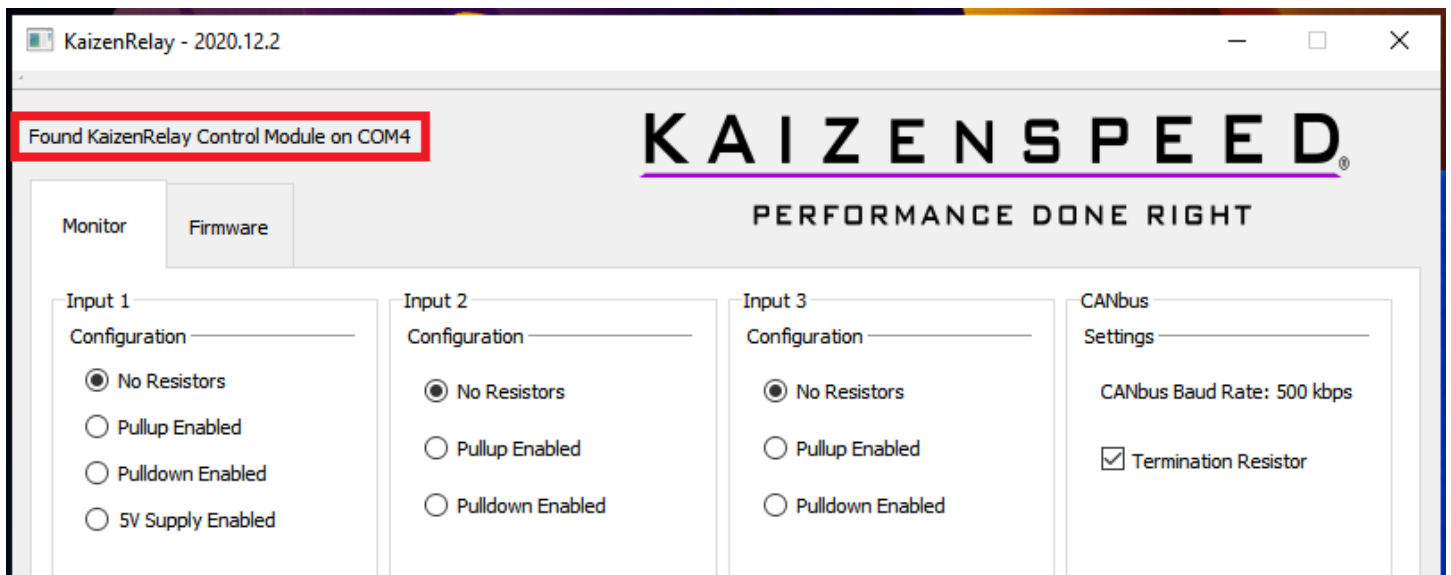| Name	Date modified	Type	Size
iconengines	10/3/2021 9:30 PM	File folder	
imageformats	10/3/2021 9:30 PM	File folder	
platforms	10/3/2021 9:30 PM	File folder	
qmltooling	10/3/2021 9:30 PM	File folder	
scenegraph	10/3/2021 9:30 PM	File folder	
avrdude.conf	3/22/2019 11:07 PM	CONF File	470 KB
avrdude.exe	4/17/2018 5:34 AM	Application	549 KB
D3Dcompiler_47.dll	3/11/2014 6:54 AM	Application exten...	4,077 KB
KaizenRelay_SeaDoo_Nitrous.ino.leon...	9/15/2021 4:04 PM	HEX File	35 KB
KaizenRelayGUI.exe	6/28/2021 10:17 PM	Application	197 KB
K3_Logo.png	2/19/2021 1:34 PM	PNG File	53 KB
libusb0.dll	1/17/2017 6:00 AM	Application exten...	67 KB
opengl32sw.dll	6/14/2016 8:00 AM	Application exten...	20,433 KB
Qt5Core.dll	6/28/2021 10:25 PM	Application exten...	5,569 KB
Qt5Gui.dll	4/15/2017 3:33 AM	Application exten...	5,900 KB
Qt5Network.dll	4/15/2017 3:32 AM	Application exten...	1,177 KB
Qt5Qml.dll	4/15/2017 4:27 AM	Application exten...	3,155 KB
Qt5Quick.dll	4/15/2017 4:34 AM	Application exten...	3,313 KB
Qt5SerialPort.dll	4/15/2017 3:57 AM	Application exten...	70 KB
Qt5Svg.dll	4/15/2017 3:57 AM	Application exten...	321 KB
Qt5Widgets.dll	4/15/2017 3:39 AM	Application exten...	5,391 KB
QtANGLE.dll	4/15/2017 3:25 AM	Application exten...	2,463 KB
Relay.png	2/19/2021 1:34 PM	PNG File	714 KB

KaizenRelay GUI

Once opened, you should see the below image:

Connecting to the Control Module

Red/Grn LED
(Programmable Functionality)

Micro USB Access

IO & CAN Terminal Access

Output 2
Output 3

Input 1 or 5v ref
(Configurable)
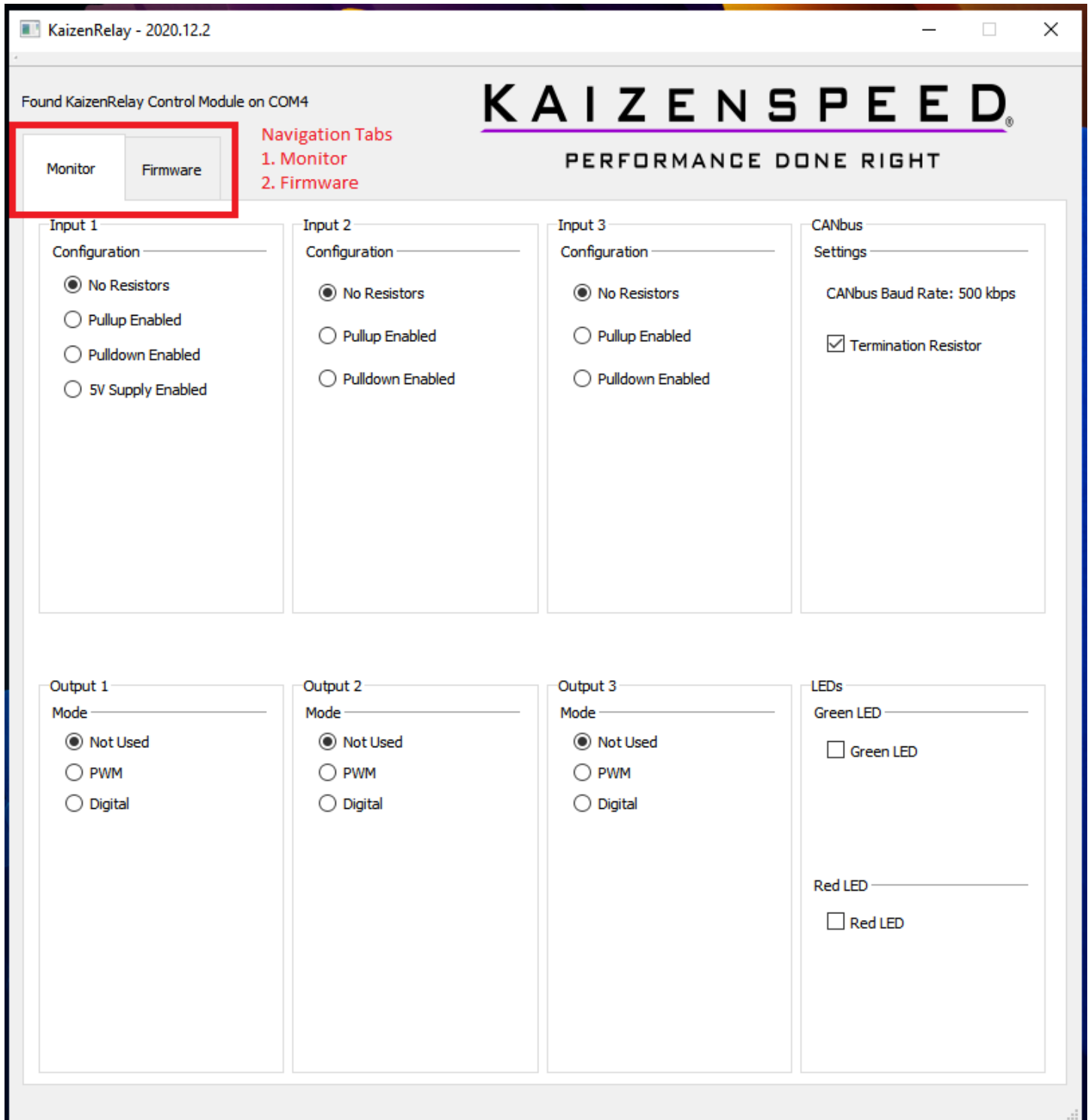
Input 2

Input 3

CAN LOW

CAN HIGH

Connect to the Kaizen Relay Control Module using a Micro USB Cable. You will see the Connection Status change to reflect the newly found Kaizen Relay Control Module.

KaizenRelay - 2020.12.2

Found KaizenRelay Control Module on COM4

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Monitor   Firmware

Input 1

Configuration

- ◉ No Resistors
- ○ Pullup Enabled
- ○ Pulldown Enabled
- ○ 5V Supply Enabled

Input 2

Configuration

- ◉ No Resistors
- ○ Pullup Enabled
- ○ Pulldown Enabled

Input 3

Configuration

- ◉ No Resistors
- ○ Pullup Enabled
- ○ Pulldown Enabled

CANbus

Settings

CANbus Baud Rate: 500 kbps

☑ Termination Resistor

Navigating the GUI

The GUI has two Tabs: Monitor and Firmware

Monitor Tab

Monitor Tab allows you to visualize what is happening inside the control module, primarily:

Displays how Inputs 1, 2, and 3 are configured: the choices are

- No Pullup or Pulldown Resistors
- Pullup Resistor to 5V
- Pulldown Resistor to Ground
- Input 1 Only - Can also be enabled as a 5V Sensor Supply for powering sensors to be read by any of the other inputs.
    - For example, a normal 3-pin pressure sensor requires a 5V Supply, a reference ground, and outputs the signal. The control module can supply the 5V from Input 1, Read the Sensor on Input 2, and toggle an output based on the voltage read in. When 5V is supplied by the control module, make sure to ground the sensor at the same place the Kaizen Relay(s) and Control Module are grounded.
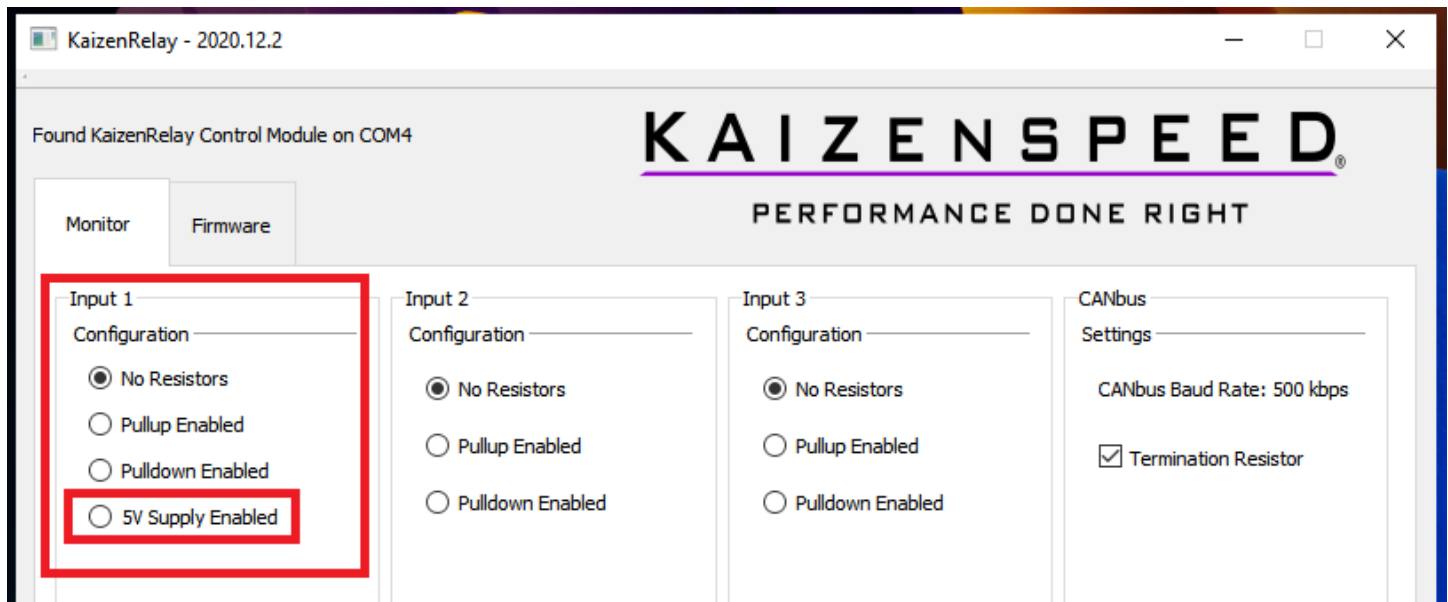
Displays how Outputs 1, 2, and 3 are configured: the choices are

- Not Used / Off
- PWM
- Digital

All three outputs are identical and ONLY SWITCH GROUND. There is a weak pullup resistor on each output to ensure the output is OFF when not in use.

The PWM Frequency can be changed via code, and the control module natively supports 10Hz, 50Hz, 100HZ, and 1000Hz (Beta) on each pin. Once one frequency is chosen, all three outputs must use this frequency.
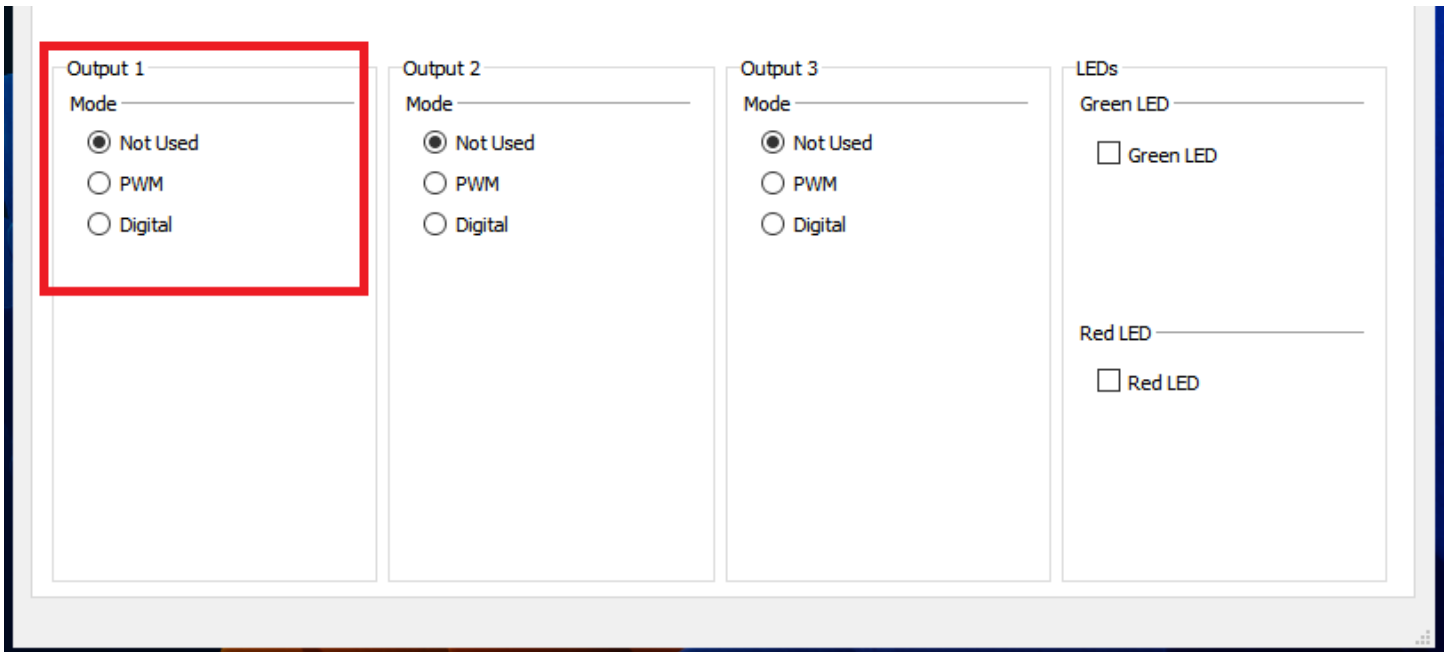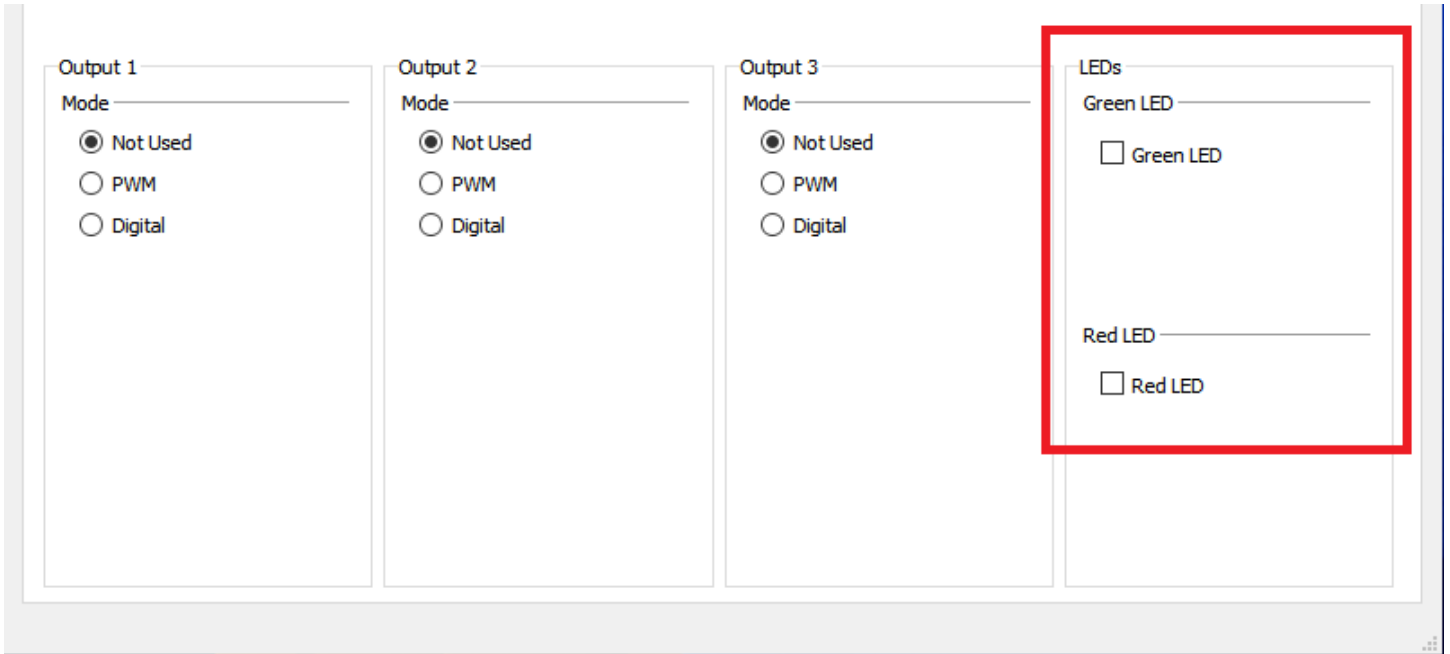
Displays the current CANbus Baud Rate and whether the internal CANbus Termination Resistor is Enabled or Disabled
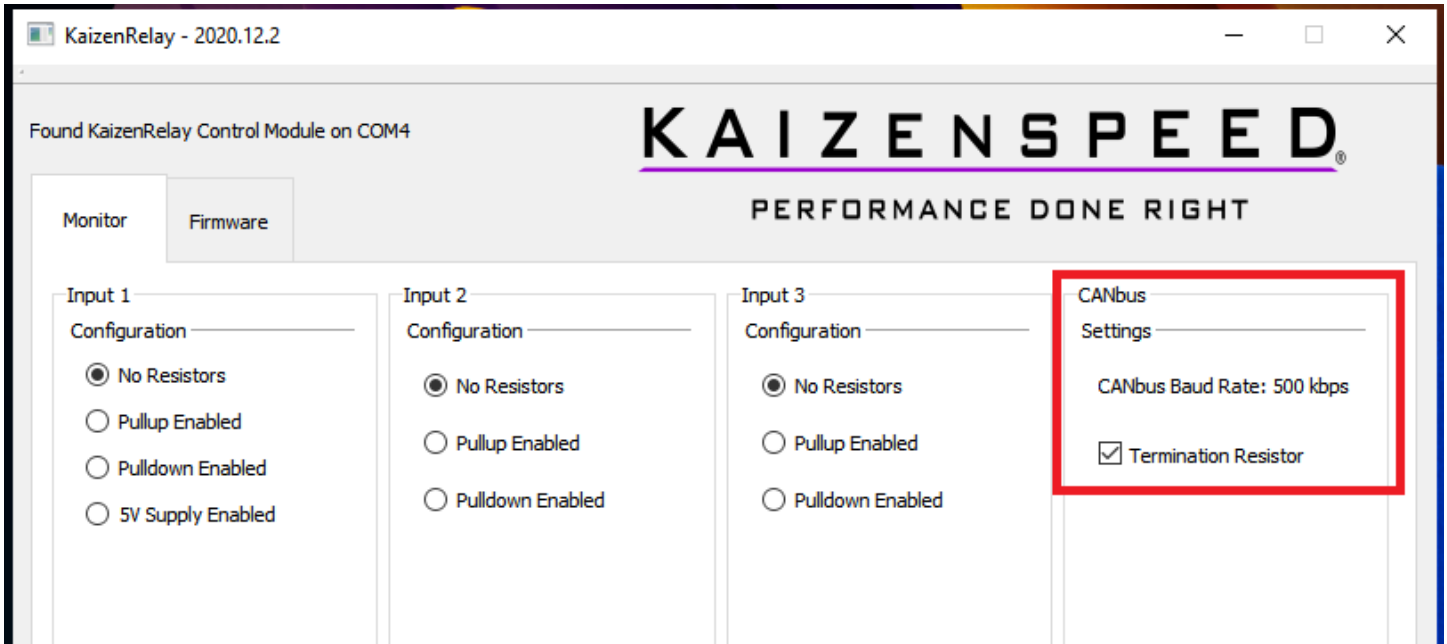
Displays the current status of the Green and Red onboard LEDs, which are also completely programmable

Output 1
Mode
- ◉ Not Used
- ○ PWM
- ○ Digital

Output 2
Mode
- ◉ Not Used
- ○ PWM
- ○ Digital

Output 3
Mode
- ◉ Not Used
- ○ PWM
- ○ Digital

LEDs
Green LED
- ☐ Green LED

Red LED
- ☐ Red LED

<u>Firmware Tab</u>

The Firmware Tab is responsible for uploading new Firmware to the Control Module. Application developers will provide a ".HEX" file containing the necessary code to program the control module. Follow the steps below:

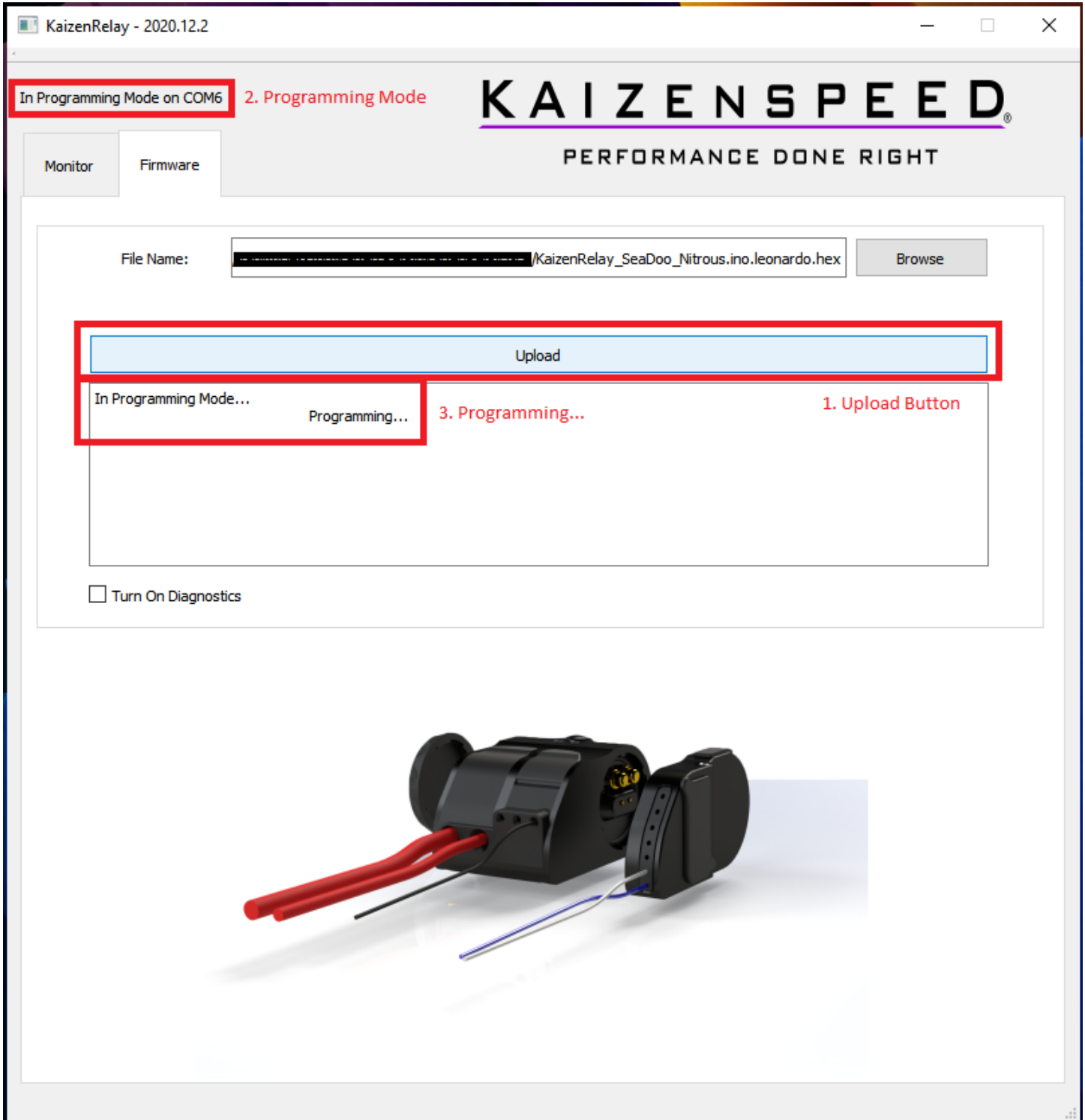1. Ensure you are connected to the Control Module, and click "Browse"
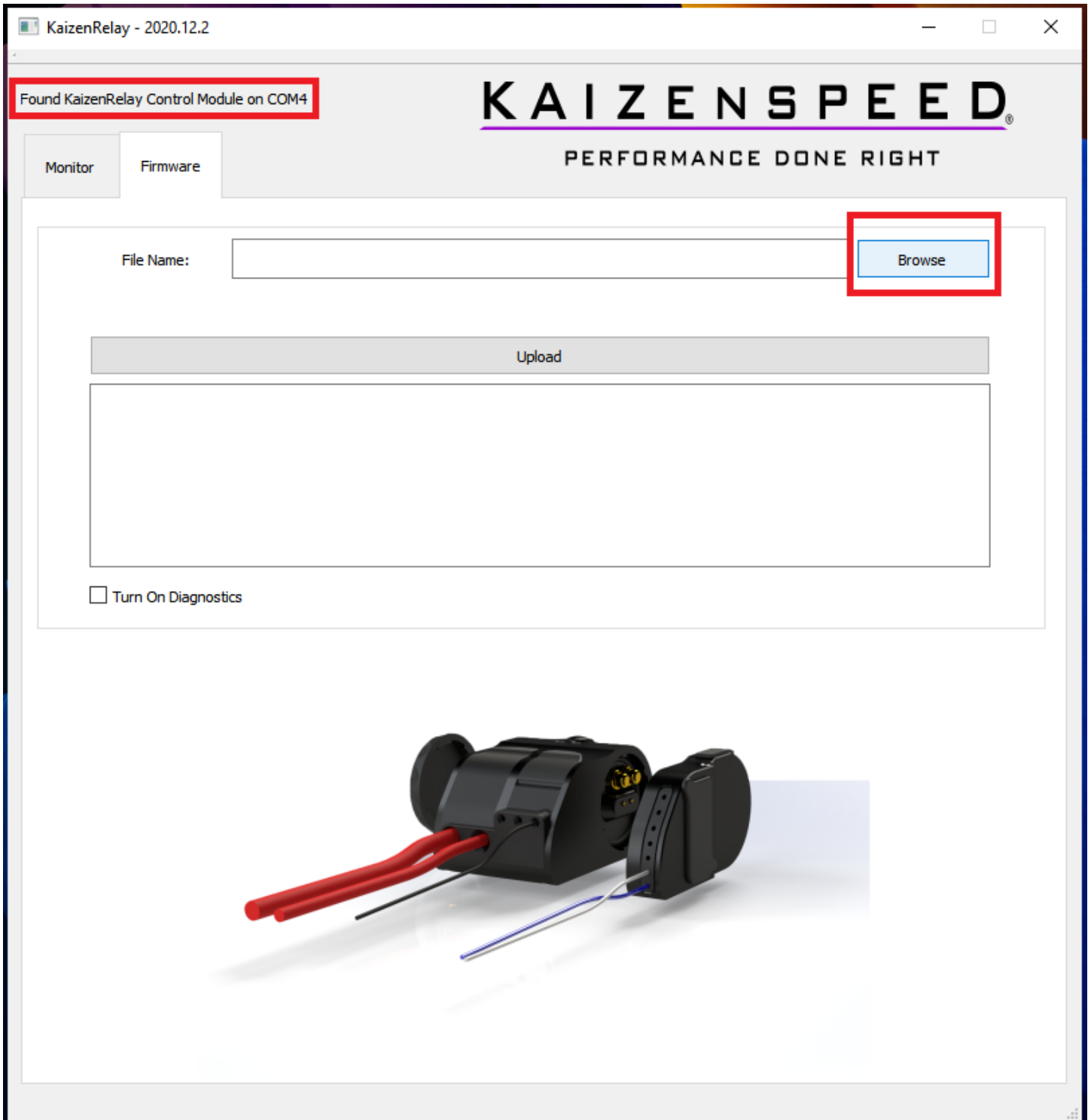
2. Find the .HEX Firmware File, and Click "Open"
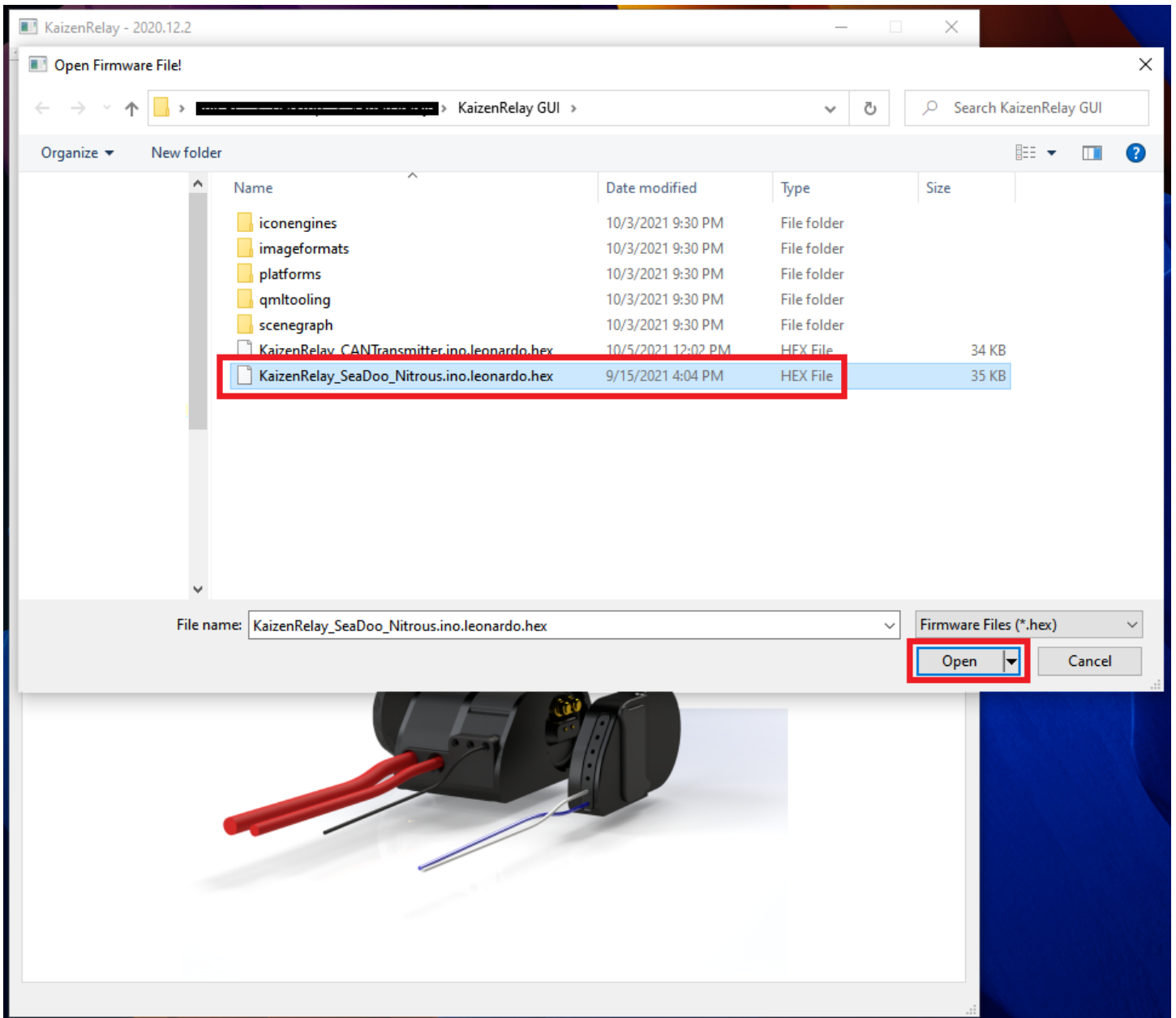
3. Click the Upload Button to begin the programming process - Shown as "1." Below

   Once the Upload button is clicked, the Control Module will go into Programming Mode - Shown as "2." Below

   The Control Module will begin programming - Shown as "3." Below

4. If successfully completed, a window will appear, confirming the new programming - Shown as "1." Below

    Also, if the new program is set to send out data over the USB connection, it will begin to do so - Shown as "2." Below
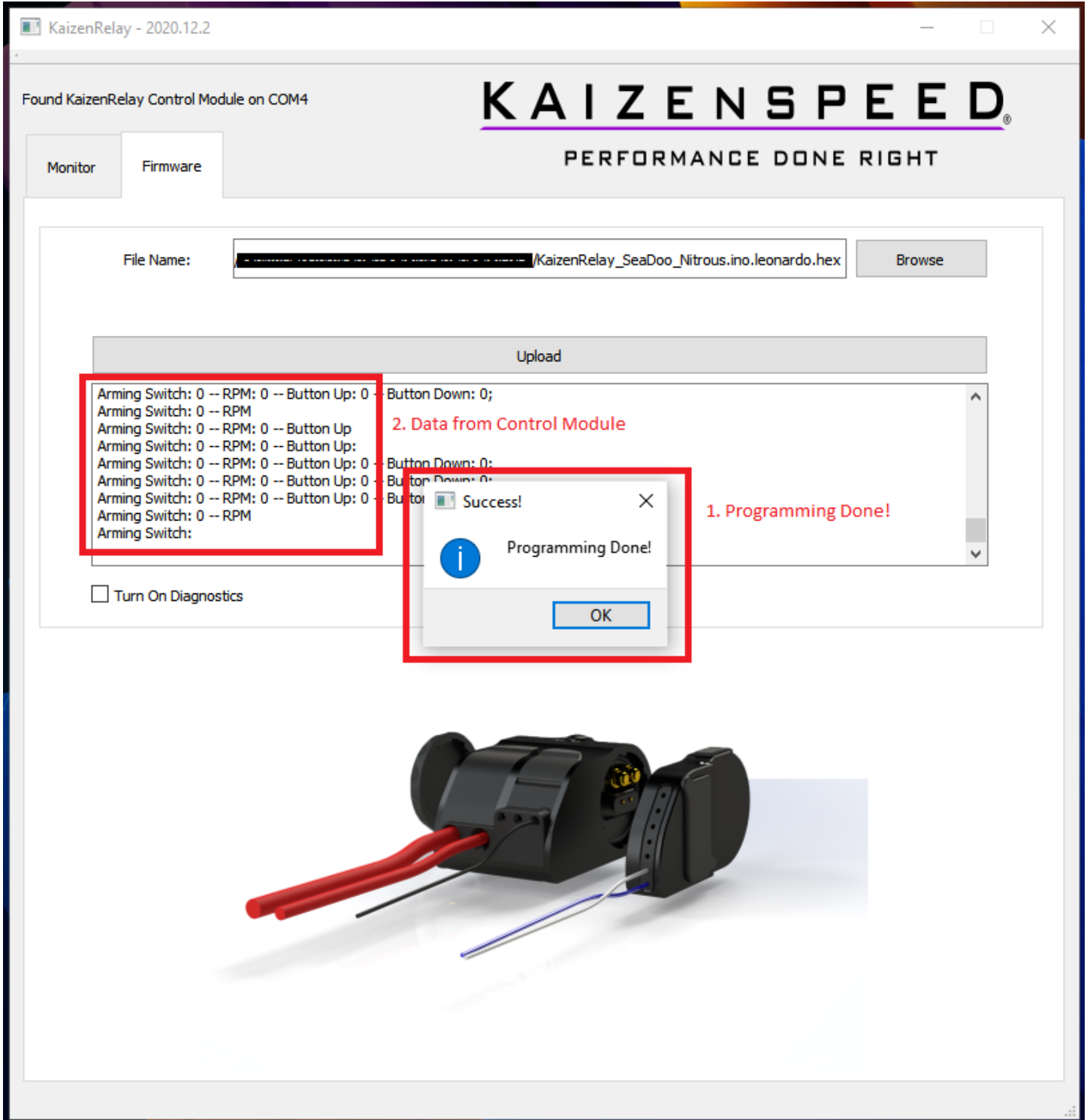
5. If programming is not successful, an error message will appear instead. Check that the Kaizen Relay and Control Module are powered, and that the USB cable being used is a Data Cable, and not just a Power/ Charging Cable as is common with many USB Micro Cables (some cables don't have all the pins populated!) We recommend purchasing a USB Cable from the Kaizen Speed website to ensure a proper connection.

If further issues arise, there is a "Turn On Diagnostics" check box that can be enabled (Shown as "1." Below) to give further information. Please enable this check box, and RE-UPLOAD, then copy and paste the resulting text (Shown as "2." Below) into an email to Programs@KaizenSpeed.com.
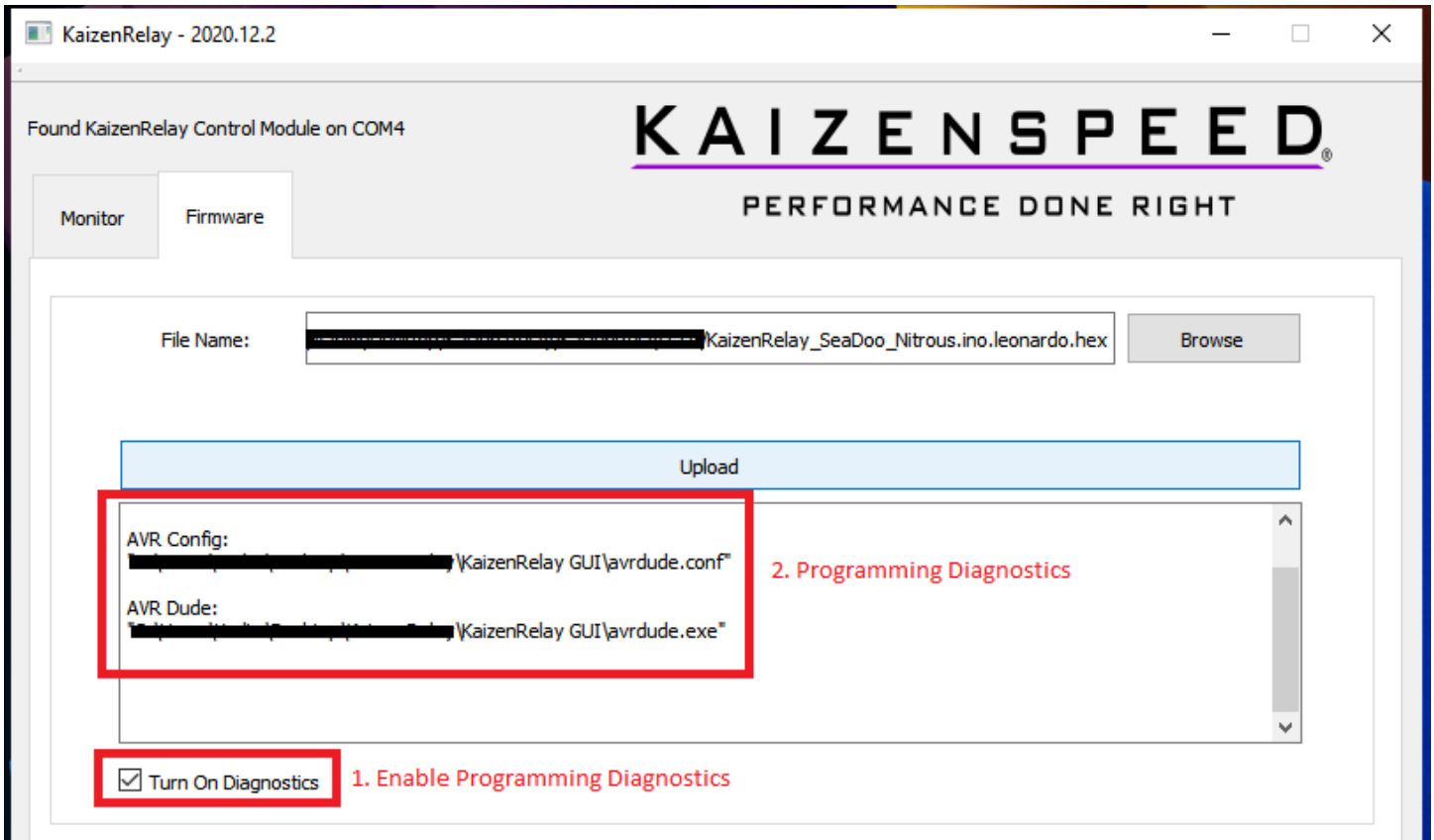
Control Module Feedback

Once programmed, the control module will give feedback to the user over the USB connection.

If an Input is configured for an Analog Input, the current voltage will be displayed. Analog smoothing is a built-in software feature implemented that allows rapidly changing signals to be filtered. Analog smoothing is a unitless range of 1-100 that is enabled in the software. More smoothing makes the input less susceptible to electrical noise, but slows down the response of the voltage readings - Shown as "1." Below

If an Input is configured for a Digital Input, the current digital status will be displayed via a "Digital Input Status" check box. An Input configured for digital signals, will read "TRUE" or "Logic 1" for any voltage above 2V. If the voltage on the Input pin is below 2V, the output will read "FALSE" or " Logic 0". In the software, we added a feature to flip this outcome, if desired. If a "TRUE" or "Logic 1" is required when the signal is below 2V, enable the "Input Invert" function in the programming, and the result will show on the GUI - Shown as "2." Below

If an Output is configured for PWM functionality, the currently selected Frequency will be displayed, and the current Duty Cycle of the output will be displayed below that. Remember, the outputs are "Low Side Outputs" which output a ground. If you would like the Output the function as a "High Side Output" outputting 12V, instead, please adjust the output in the programming → High Side Duty Cycle = (100 - Low Side Duty Cycle) - Shown as "3." Below

If an Output is configured for Digital functionality, the Output Status will be displayed below, as well. These outputs are meant to drive the Kaizen Relay Inputs, and CAN NOT drive a load directly. As such, they are "Low Side Outputs" and should be fed into the Negative Trigger Pin on the Kaizen Relay - Shown as "4." Below

Any and all questions should be directed to Programs@KaizenSpeed.com

We will continue to update this User Guide as questions and solutions arise.