Model 8020-38

Addressable Bus Converter

Instruction Manual



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Document Revision: B | Release Date: 1/8/26

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1. INTRODUCTION

The GEOKON Model 8020-38 Addressable Bus Converter enables connections between GEOKON addressable sensor strings and a variety of systems, including personal computers, programmable logic controllers, readouts, and data loggers.

The Addressable Bus Converter acts as a bridge between USB- or TTL-capable readers and the GEOKON RS-485-enabled sensor strings. The device supports bidirectional signal conversion between USB and RS-485 or between TTL and RS-485.

The Converter draws its power from the 5 volt USB bus when connected to a computer via the USB port. It then generates its own 12 volt supply for the RS- 485 bus, which is used to power the sensor string. The Converter requires an external 12 volt, 500 milliamp DC power supply when connected via a TTL port. In the case that the Converter is connected to both USB and TTL simultaneously, the USB host is selected by default.

The Converter can communicate with the host over USB version 1.0 and higher, over 5-volt TTL, and/or over inverted 5-volt TTL. If the host requires TTL inversion the 'INV TTL' switch on the underside of the PCB must be set to the ON position. See Section 2.3 for more information.

Communication with GEOKON addressable sensor strings uses the MODBUS RTU protocol over a half-duplex RS-485 connection. The Converter is designed for GEOKON addressable string systems and features resettable baud rates, ranging between 9600 bits per second and 115.2 kilobits per second.

The Converter is contained inside a rugged ABS plastic case and incorporates a variety of safety features. These include high current surge protection, transient voltage suppression, electro-static discharge protection, and a heavy-duty earth ground lug.

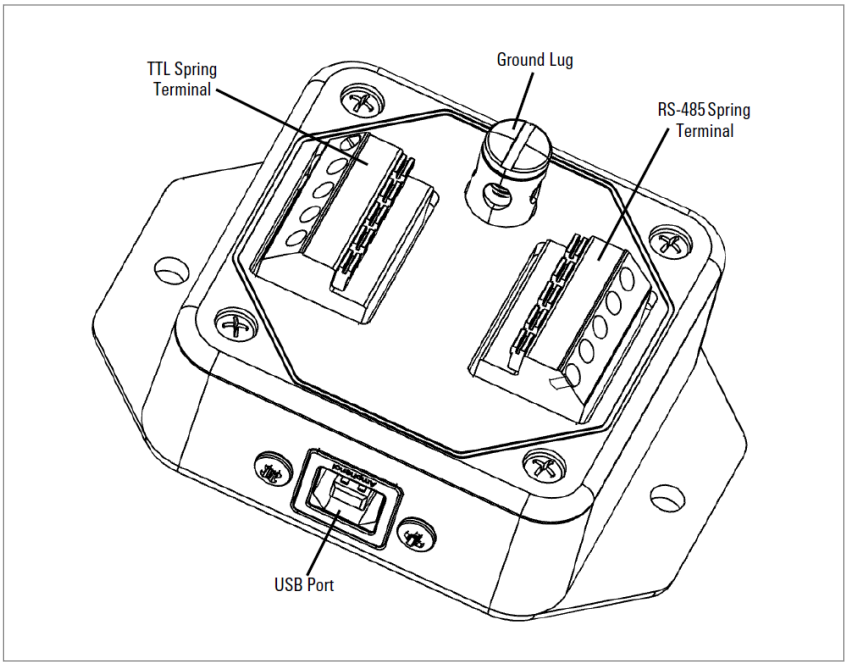


FIGURE 1: *Model 8020-38 Addressable Bus Converter*

2. INSTALLATION

2.1 RS-485 CABLE CONNECTION

Connect each of the RS-485 string conductors to their respective spring terminal connections on the Addressable Bus Converter.

Instrument Cable Conductors	Model 8020-38 Spring Terminal	Description
Red	12V (OUT) [RED]	String Power
White	485+ [WHITE]	Communication RS-485+
Green	485- [GREEN]	Communication RS-485-
Black	GND [BLACK]	Ground
Shield	SHIELD	Analog Ground

TABLE 1: *RS-485 String Wiring*

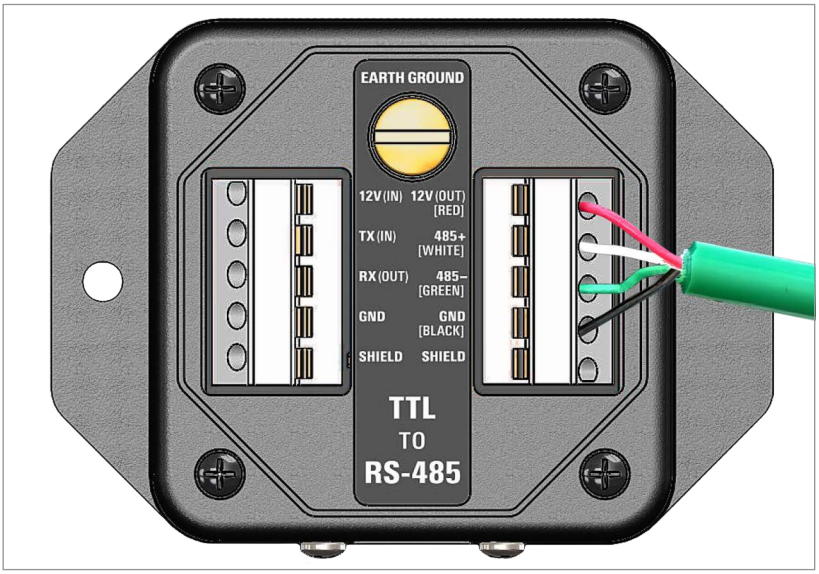


FIGURE 2: *Connecting RS-485 String to Addressable Bus Converter*

2.2 WIRING TO DATA COLLECTION DEVICE

2.2.1 TTL CONNECTION

To connect the Converter to a TTL-capable device (data logger / reader), wire to the respective spring terminal connections on the Addressable Bus Converter.

Note: The TTL signal ground reference MUST be connected to the Addressable Bus Converter ground, as well as to the ground of the external power supply.

Wiring of TTL-Capable Device / External Power	Model 8020-38 Spring Terminal
External 12 volt supply positive (+)	12V (IN)
TX	TX (IN)
RX	RX (OUT)
External 12 volt supply negative (-)	GND
Shield	SHIELD

TABLE 2: *TTL / External Power Wiring*

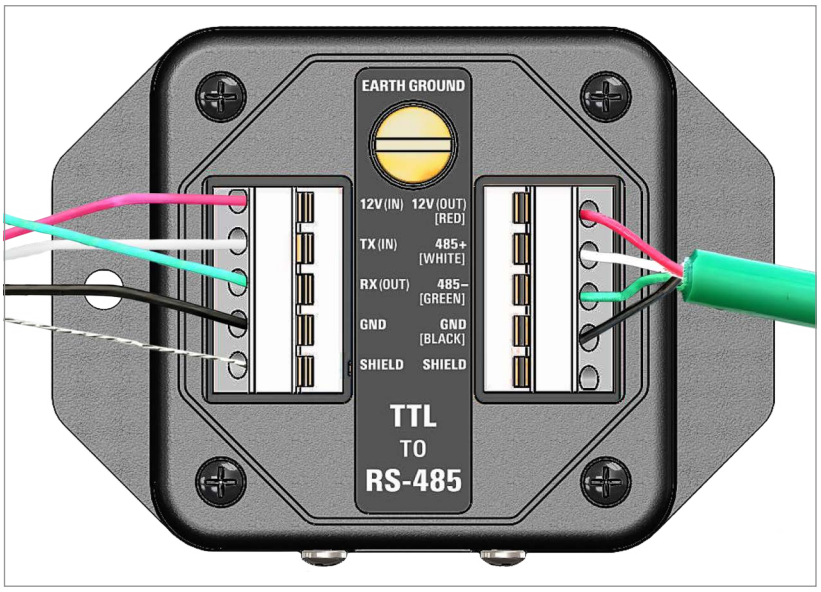


FIGURE 3: *Connecting TTL and External Power to Addressable Bus Converter*

Secure the ground strap to the earth ground lug using the brass screw included with the assembly. Attach the other end of the strap to a reliable earth ground point outside of the enclosure.

2.2.2 USB CONNECTION

To connect the Converter via USB, plug one end of a USB Type A to Type B cable into the USB port on a PC, then plug the other end of the cable into the Converter's USB port.

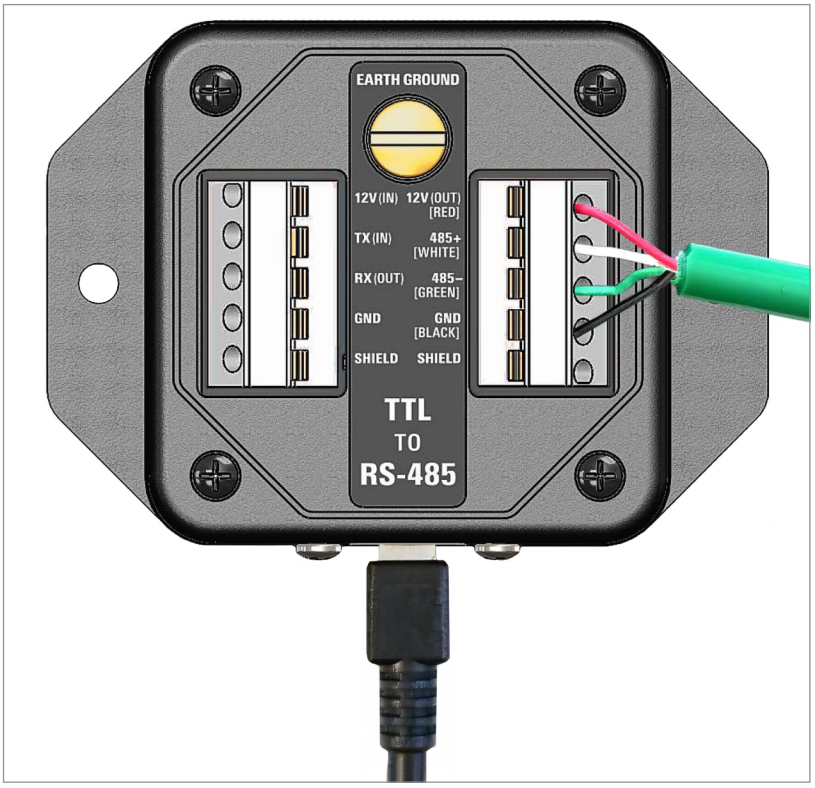


FIGURE 4: *Connecting USB Cable to Addressable Bus Converter*

2.3 SETTING THE BIT RATE

The Addressable Bus Converter has a default bit rate of 115,200 bits per second. However, the Converter supports changing the bit rate, depending on the sensors connected to the RS-485 bus. The TTL, USB, and RS-485 bit rates are all updated automatically when a connection is opened to a USB host.

Note: The bit rate MUST be set using a USB connection. A bit rate change cannot be done over a TTL connection.

2.3.1 USB CONNECTIONS - USING ADDRESSABLE STRING READER (ASR) SOFTWARE

The Addressable String Reader (ASR) is a free application that runs on a PC and is available for download at geokon.com/Software.

After downloading and installing the ASR, launch the application. The following screen will appear:

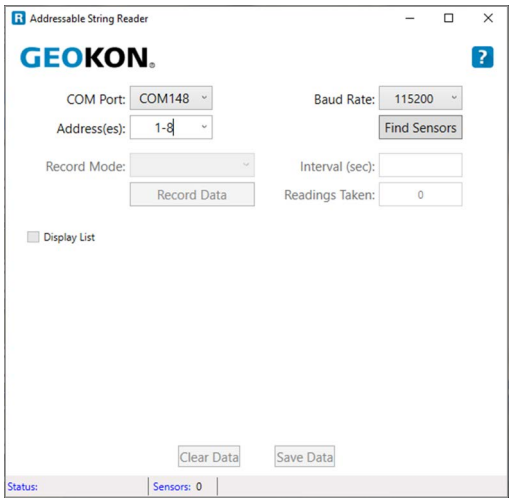


FIGURE 5: *ASR Opening Screen*

1. Enter an address range where the lowest address will typically be 1 and the upper range will be the total number of sensors/units in the string.

   Example: If two sensors/units are connected to the PC (via the 8020-38) the range should be entered as "1-2".

2. Ensure that the COM port is correctly set and then select **Find Sensors**.

In this example the 8020-38 is connected to the PC via COM3, the ASR has found 2 sensor channels and the first address (channel) 1 data is currently being displayed.

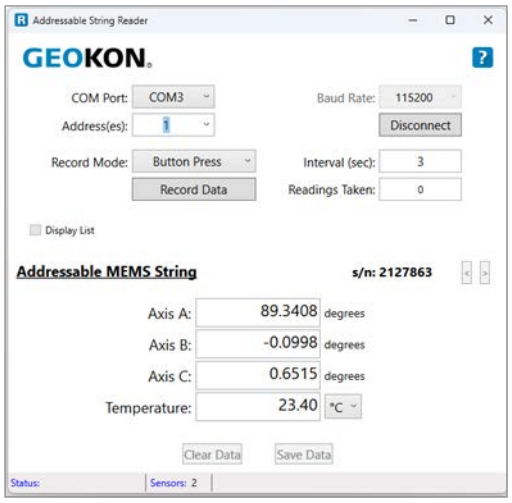


FIGURE 6: *Address (Channel) 1 Output Display*

3. From the **Address(es)** drop-down list, selecting **ALL** enables the left and right arrow buttons on the right-hand side of the display and allows the user to easily scroll between channels.

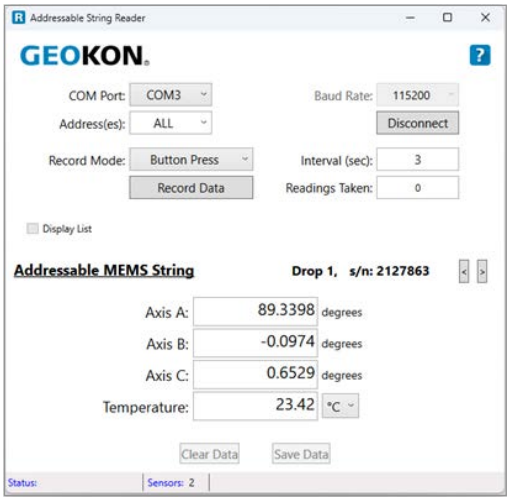


FIGURE 7: *Address Selection, Drop Selection Buttons "<" and ">" Enabled*

4. Readings can be recorded one of two ways:
   - **Record manually:** Confirm **Button Press** is selected from the **Record Mode** drop-down list. Select **Record Data**.
   - **Record continuously:** Set a time interval in the **Interval (sec)** field. Select **Continuous** from the **Record Mode** drop-down list.
5. After one or more readings have been recorded, the **Display List** check box is enabled, allowing a list of readings to be displayed.

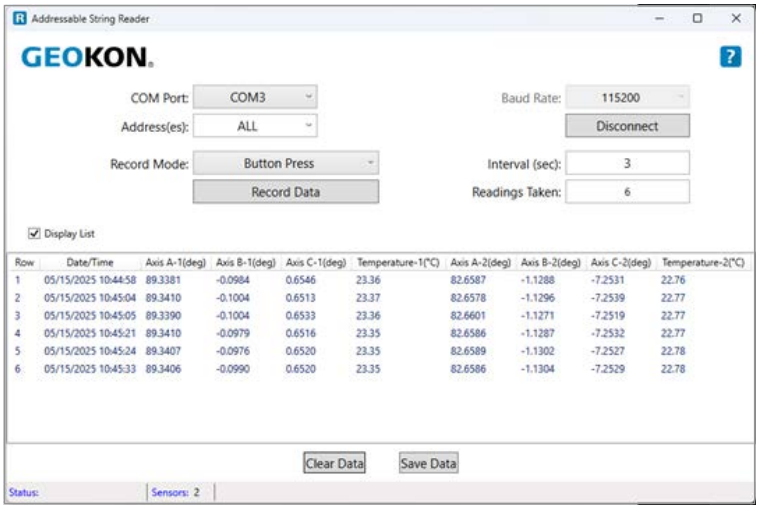


FIGURE 8: *Display List Checkbox Enabled, Readings List Enabled*

Readings can be saved to a .CSV file at any time by selecting **Save Data**. Help is available by selecting **?**.

2.3.2 USB CONNECTIONS - USING OTHER HOST SOFTWARE

To change the bit rate, do the following:

1. Connect the USB cable to the USB port on the Converter.
2. Start the host software on the PC, such as the Addressable String Reader (ASR) Software (see instruction below).
3. Set the desired bit rate in the settings of the host program.

4. Open the connection.

The software will write the new bit rate to the Converter's non-volatile memory. The new bit rate will serve as the default bit rate after the next power-up.

2.3.3 TTL CONNECTIONS - USING TERMINAL EMULATION

There might be times when no dedicated USB host software is available. An example of this is when the system will be used in a TTL to RS-485 application. For such times a terminal emulator program such as Docklight™ or Hyperterminal™ can be substituted for the USB host software. Do the following:

1. Connect the Converter to a PC using a USB cable.
2. Open the terminal emulator program.
3. Select the COM port and bit rate settings.
4. Open the connection.

2.4 CONFIGURING TTL INVERSION

Some data loggers communicate over the TTL connection using inverted logic. When connecting a GEOKON addressable sensor string to a logger with inverted TTL signals, be sure to configure the Converter to handle this form of communication. Follow the steps below and refer to Figure 9:

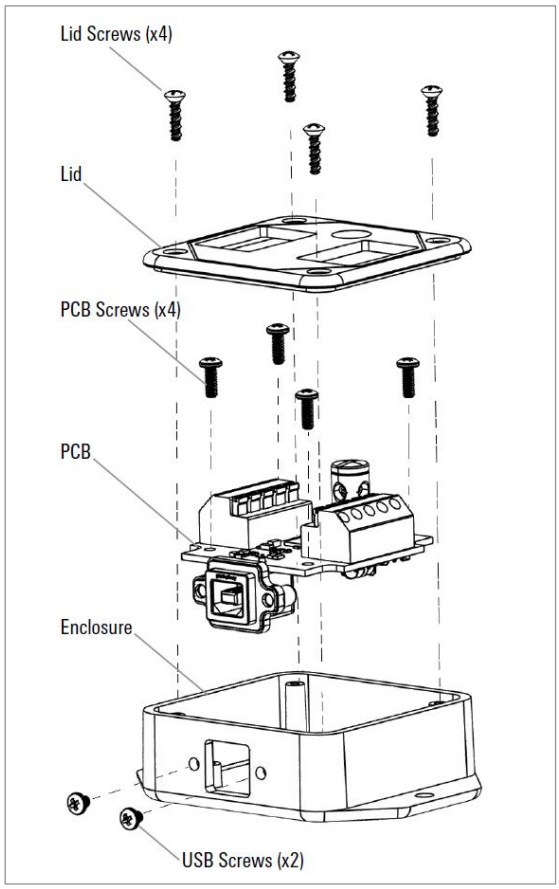


FIGURE 9: *Disassembling the Model 8020-38 Converter*

1. Remove the two USB connector screws.
2. Remove the four enclosure lid screws and remove the lid.
3. Remove the four PCB mounting screws.

Important! Use ESD protection for the remaining steps to avoid causing damage to the PCB.

4. Remove the PCB from the enclosure.
5. Flip the PCB upside down and move the 'INV TTL' switch to the ON position.

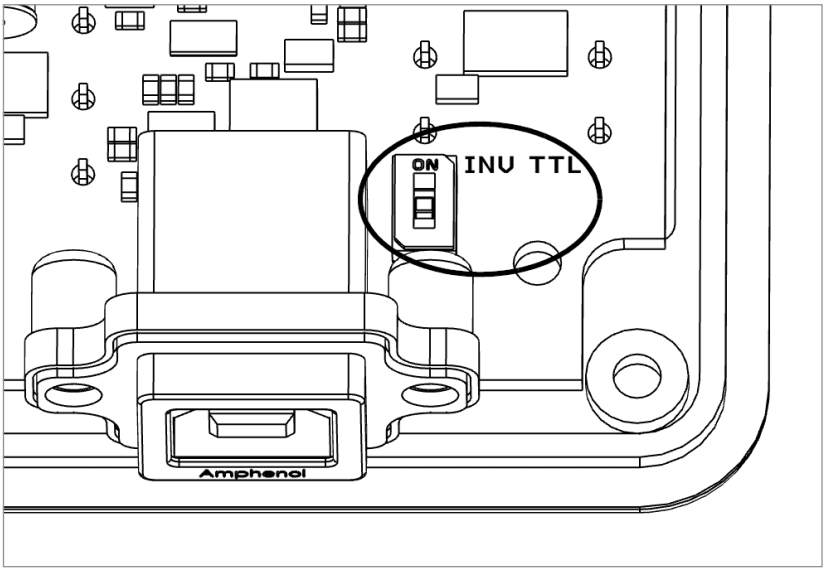


FIGURE 10: *TTL Inversion ON/OFF Switch*

6. Re-assemble the Converter by following the previous steps in reverse.

For your convenience this setting can be applied by GEOKON prior to shipping out the Converter.

3. OPERATION

The 8020-38 Addressable Bus Converter automatically detects the connection type. The USB connection always takes precedence over the TTL connection, so the USB port must be vacant when the converter is intended for a TTL connection.

3.1 USB MODE

The Addressable Bus Converter will display as a virtual COM port in the Device Manager when it is plugged into a computer's USB port.

Windows 10 immediately recognizes CDC (Communication Device Class) USB devices, so no driver installation is necessary for PCs with this operating system.

However, Windows versions 7, 8, and 8.1 require custom drivers to communicate with the Addressable Bus Converter. See Appendix B for instructions on how to install the required USB drivers for the Converter.

Once the Addressable Bus Converter is connected to the RS-485 bus and the PC via the USB cable, it is powered up and ready to operate.

Note: When the USB cable is plugged in, the Converter automatically electronically disconnects the external power supply provided on the TTL spring terminal (if connected). The Converter and the addressable sensor string are powered from the USB supply.

3.2 TTL MODE

TTL mode is engaged as long as a USB cable is not connected to the Addressable Bus Converter and the device is supplied power from the 12V connection on the TTL spring terminal. At this point the Converter is powered up and ready to operate, assuming the bit rate of the Addressable Sensor String is 115,200 bits per second, or was updated to the proper value over a USB connection.

APPENDIX A. SPECIFICATIONS

A.1 MODEL 8020-38 ADDRESSABLE BUS CONVERTER SPECIFICATIONS

Power	
Power Supply Input	USB: 5 Volts DC 500 mA TTL: 12 Volts DC 500 mA
Power Supply Output	12 Volts DC 150 mA (max)
Sleep Current	500 µA Max (During USB Suspend)
Operating Current	15 mA (max)
Operating Temperature	-40 to +80 °C
Communication	
Interface	RS-485 (half-duplex, two-wire differential) USB 1.0 to USB 3.1 5V TTL (single-ended) 5V TTL (single-ended, inverted)
Baud Rate	115200 (default), 57600, 38400, 19200, 14400, 9600 bps
Mechanical	
Housing	Black Polycase LP-11FMBT enclosure 88.9 x 64.6 x 39.5 mm (3.500 x2.545 x1.554"), Flush/Textured Cover, PCB Mounting Bosses

TABLE 3: *Model 8020-38 Addressable Bus Converter Specifications*

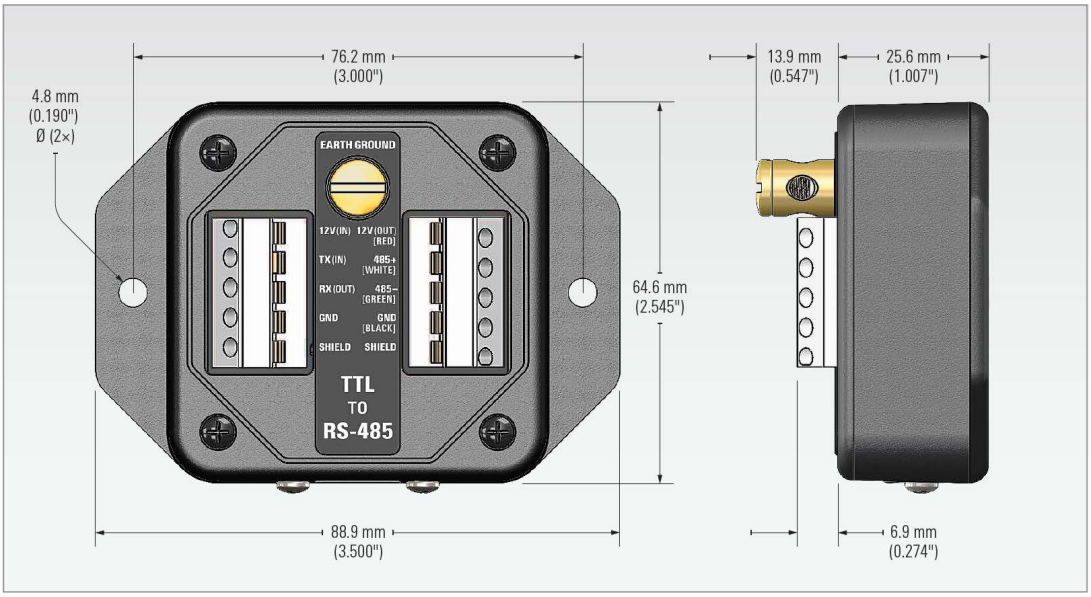


FIGURE 11: *Device Dimensions*

APPENDIX B. INSTALLING USB DRIVERS

B.1 WINDOWS 10

The GEOKON Model 8020-38 Addressable Bus Converter uses the USB drivers that are native to Windows 10, so no driver installation is needed. Simply connect the USB cable from the Converter to the PC.

B.2 WINDOWS 7, 8, AND 8.1

The Addressable Bus Converter requires custom USB drivers for use with Legacy Windows systems. To install these drivers, do the following:

1. Download the driver package from geokon.com/Software and unzip the package onto your PC.
2. Plug one end of the USB cable into the PC's USB port.
3. Plug the other end of the USB cable into the Addressable Bus Converter's USB port.
4. Open the Windows Device Manager, located in the Windows Control Panel.
5. Expand the **Other devices** listing.
6. Right-click **USB-485 Converter** and select **Update Driver Software**.

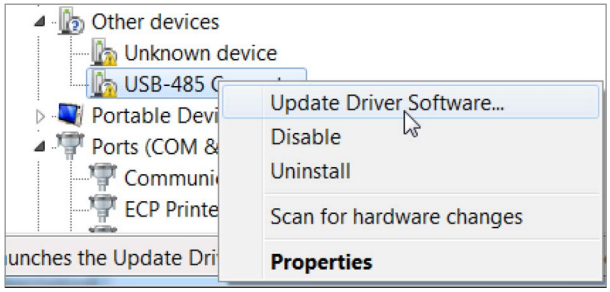


FIGURE 12: *Update Driver Software*

7. In the window that displays, select **Browse my computer for driver software**.

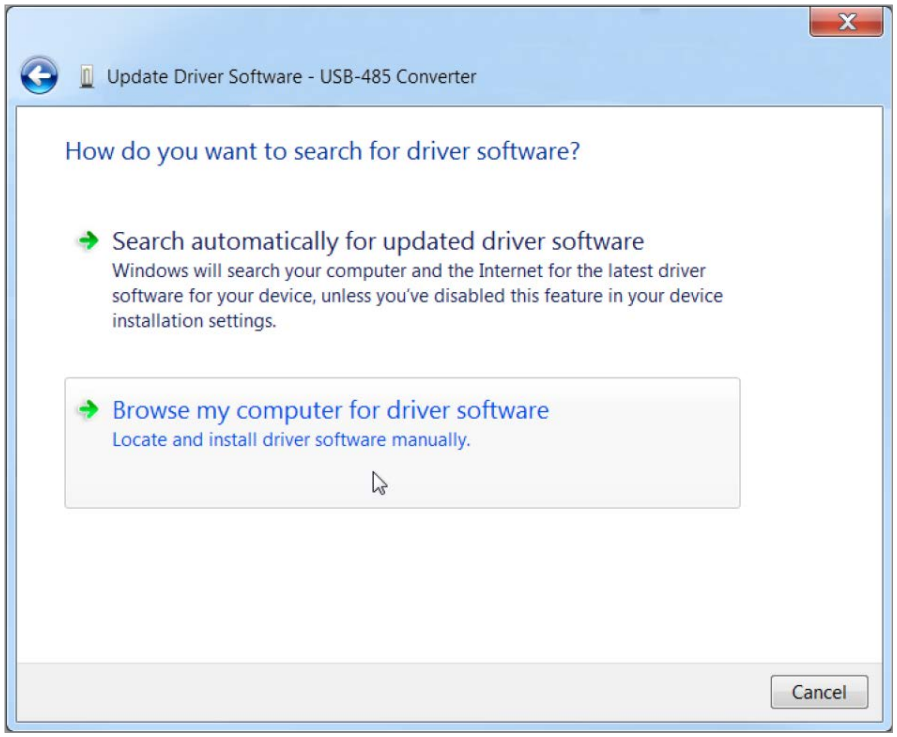


FIGURE 13: *Browse for Driver Software*

8. In the next window, select **Let me pick from a list of device drivers on my computer**.

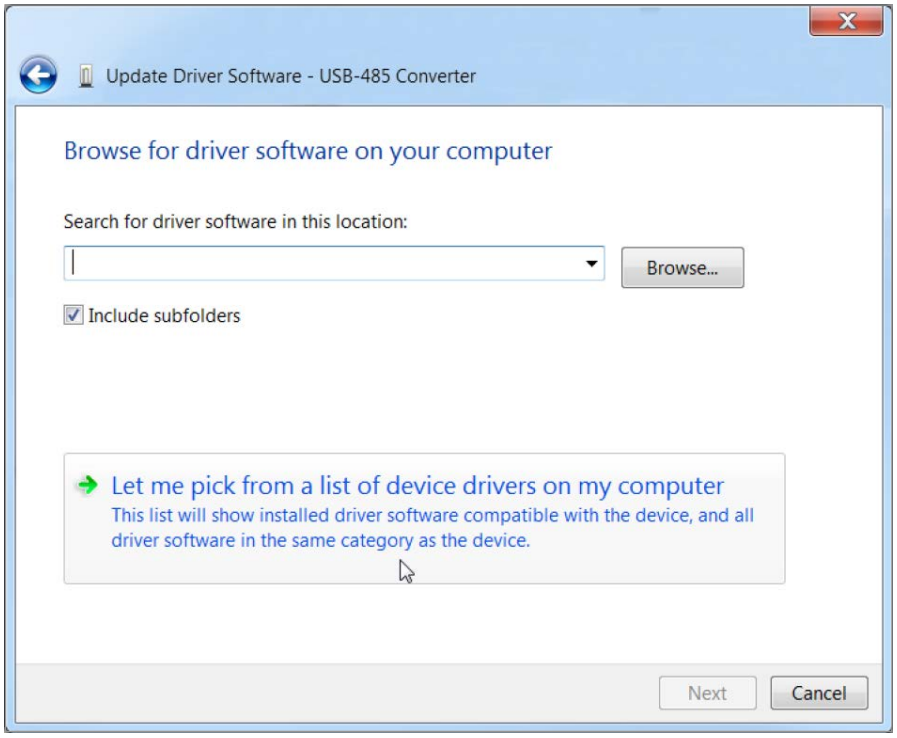


FIGURE 14: Select Device Drivers List

9. Select **Next**.

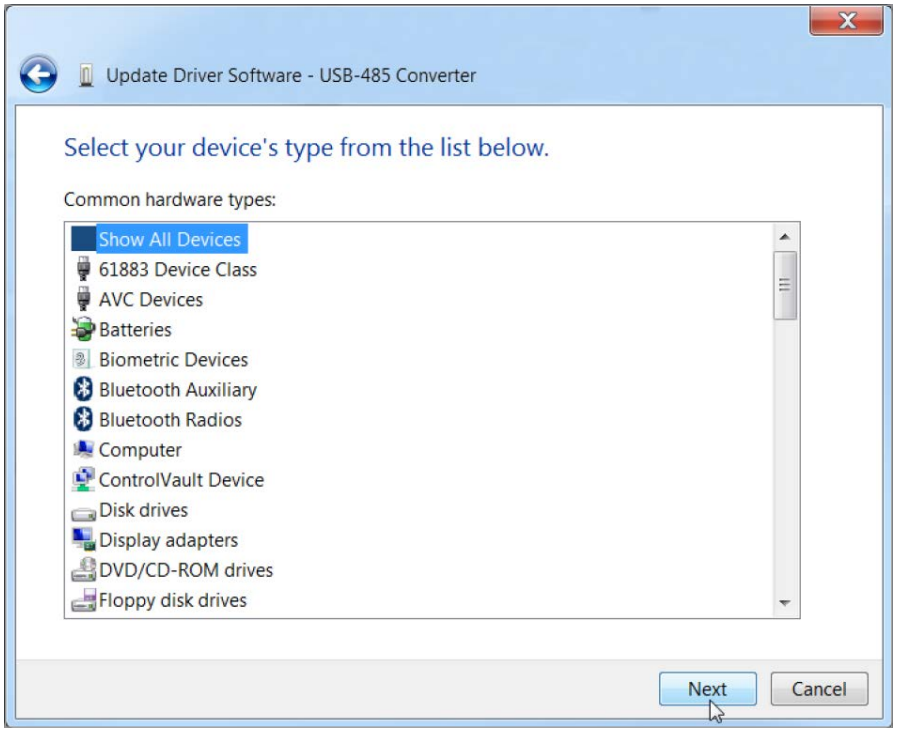


FIGURE 15: *Select Next*

10. In the following window, select **Have Disk**.

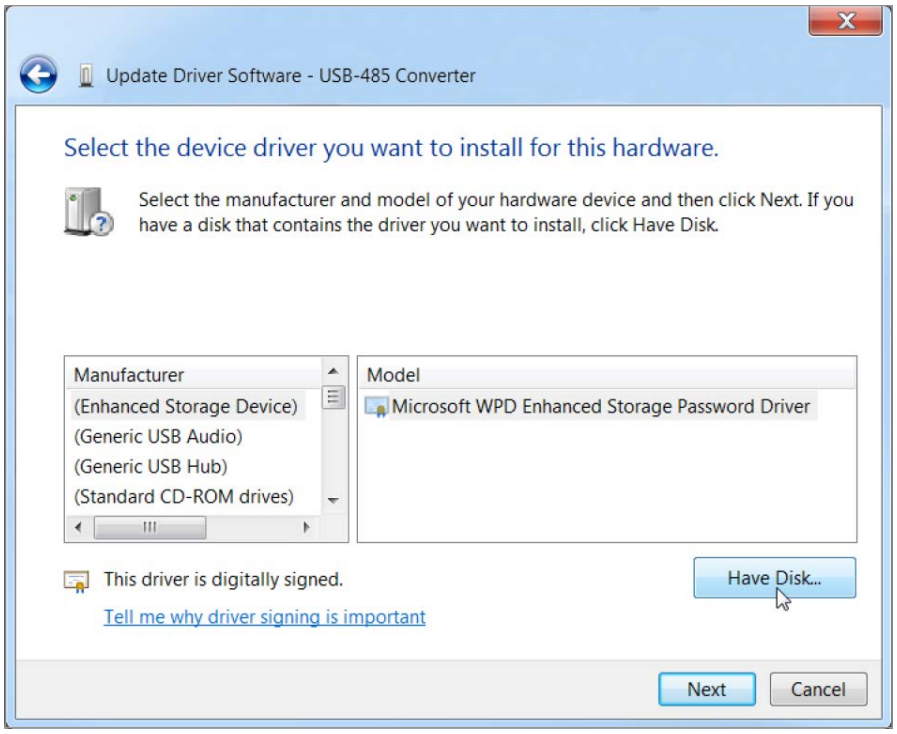


FIGURE 16: *Select Have Disk*

11. In the new **Install From Disk** window that displays, select **Browse** and direct it to the .INF file provided in the driver package.

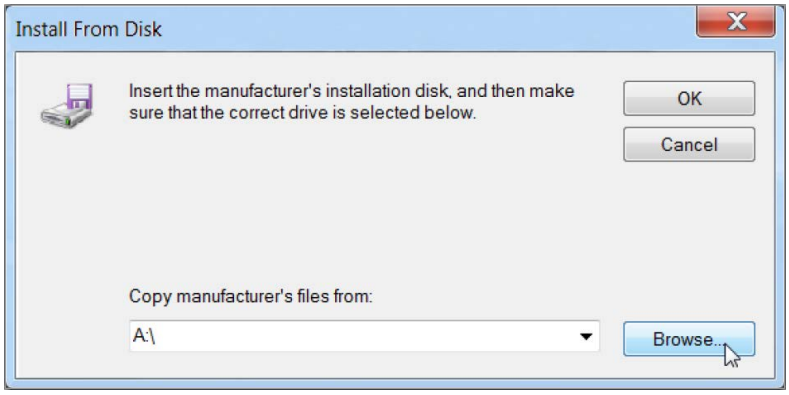


FIGURE 17: *Browse to the Provided .INF File*

12. Select the .INF file and click **Open**.

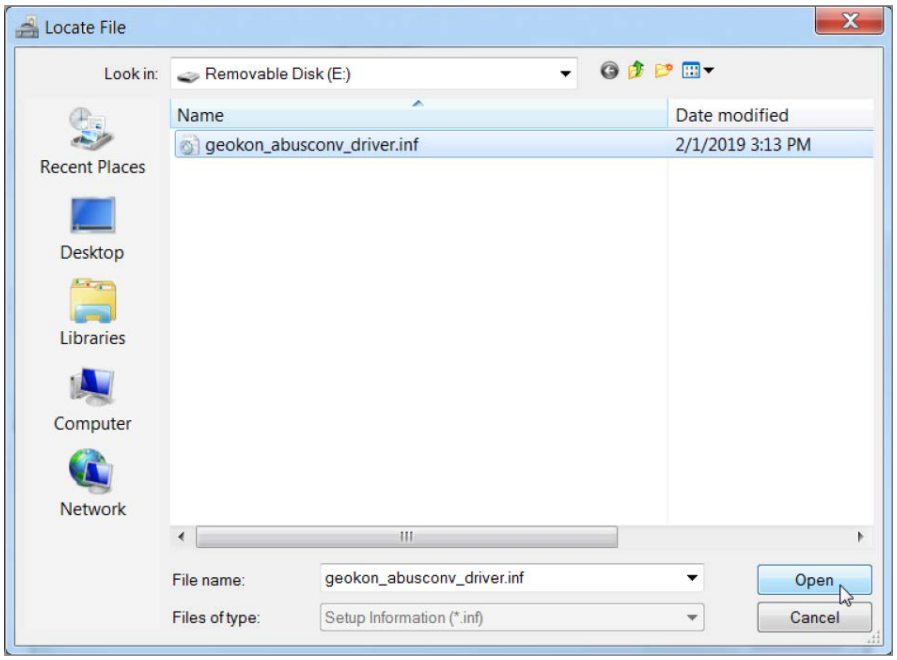


FIGURE 18: *Open the .INF File*

13. Back in the **Install From Disk** window, select **OK**.

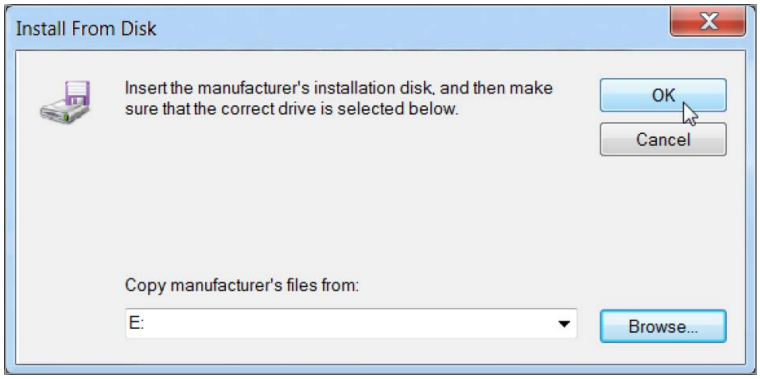


FIGURE 19: *Confirm Directory*

14. Select **Next**.

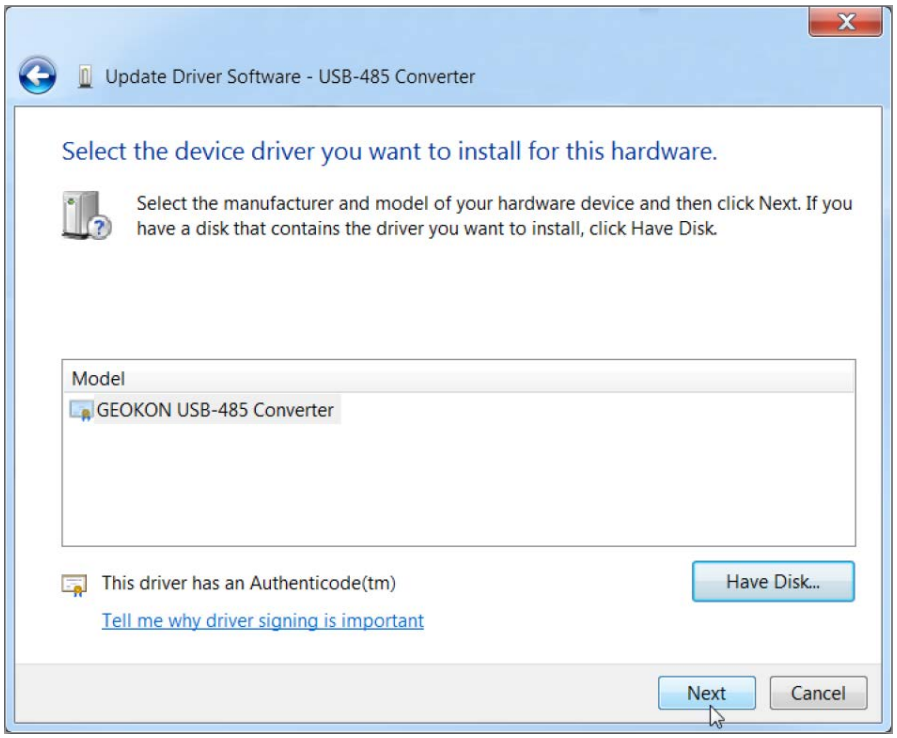


FIGURE 20: *Select Next*

15. If an **Update Driver Warning** appears, select **Yes**.

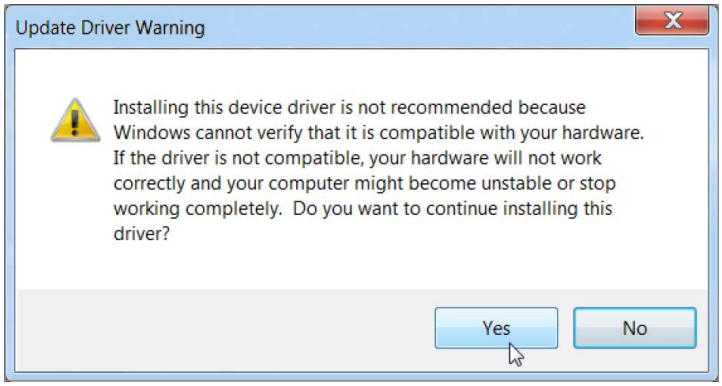


FIGURE 21: *Confirm Installation*

16. In the **Windows Security** window that appears, select **Install**.

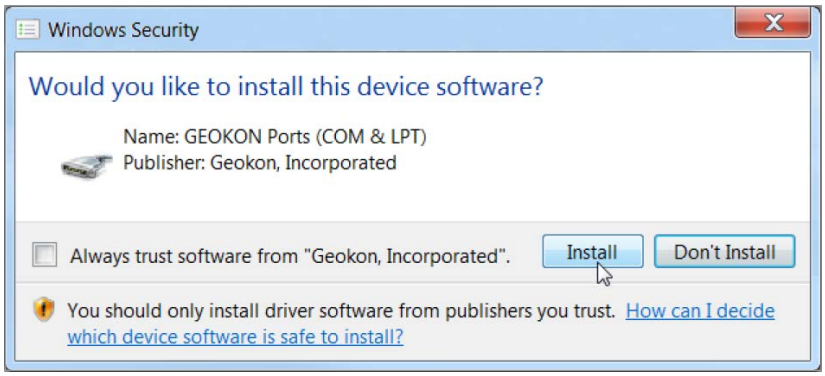


FIGURE 22: *Install*

17. Finally, select **Close**. Confirm in the Windows Device Manager that the Addressable Bus Converter appears under **Ports (COM & LPT)** as a **GEOKON USB-485 Converter**.

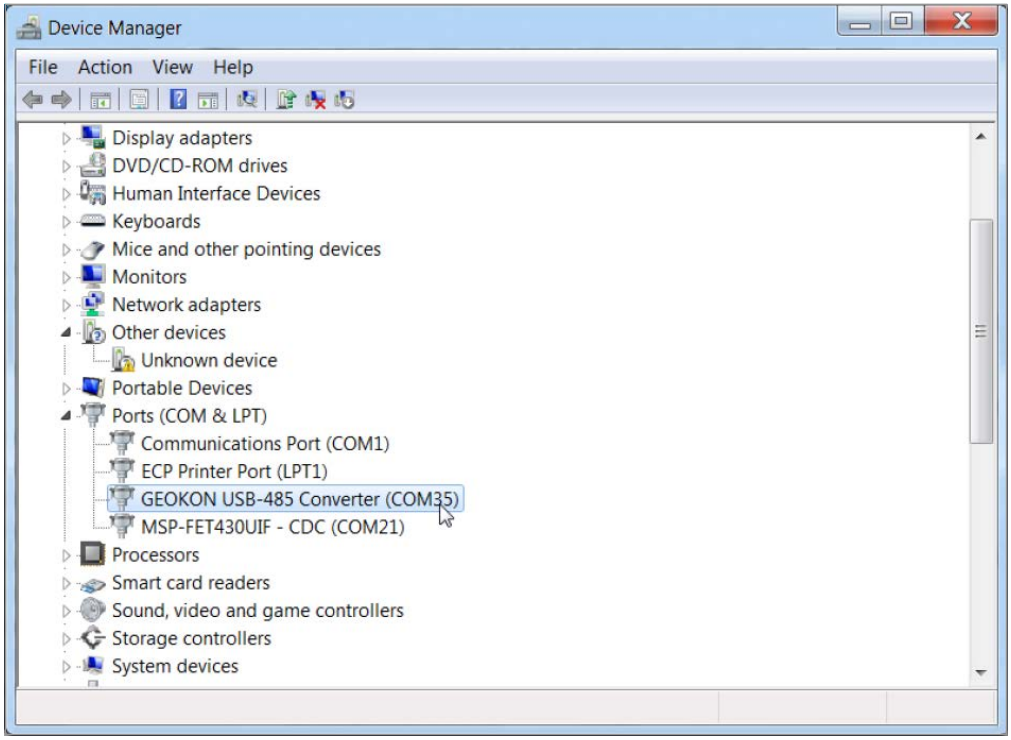


FIGURE 23: *Confirm Location of Addressable Bus Converter in Device Manager*

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