Model 8020-38

Addressable Bus Converter

Instruction Manual



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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.

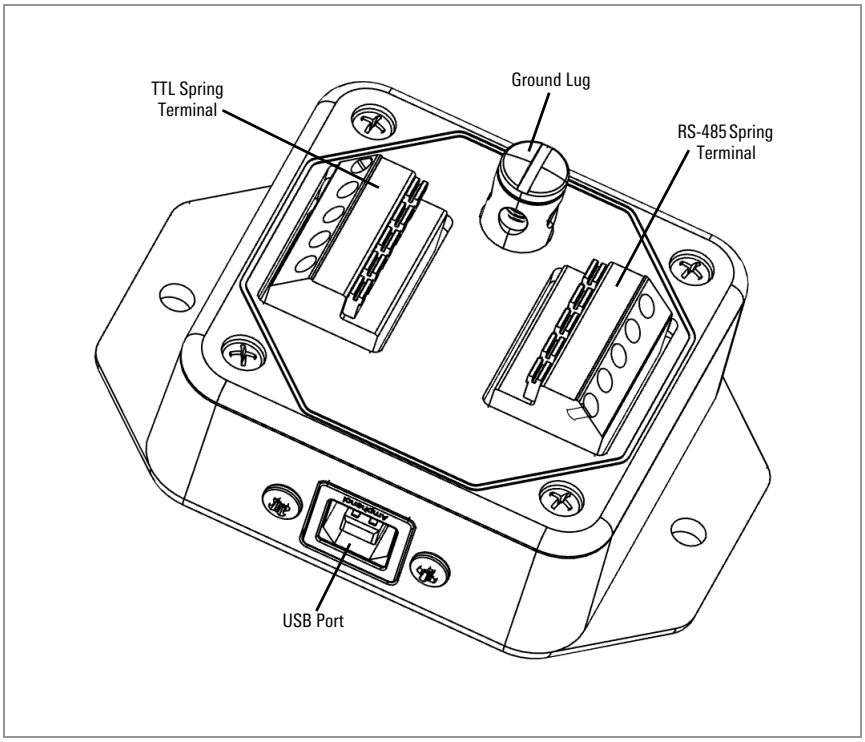


FIGURE 1: *Model 8020-38 Addressable Bus Converter*

2. INSTALLATION

2.1 MAKE WIRE CONNECTIONS

The table below shows the function of each of the conductors of GEOKON RS-485 cables.

Instrument Cable Conductors	Description
Red	String Power
White	Communication RS-485+
Green	Communication RS-485-
Black	Ground
Shield	Analog Ground

TABLE 1: *RS-485 String Wiring*

2.1.1 RS-485 CABLE CONNECTION

Connect each of the RS-485 string conductors to their respective spring terminal connections on the Addressable Bus Converter, as follows:

1. Connect the red wire lead to the connection labeled 12V (OUT) [RED] on the RS-485 spring terminal.
2. Connect the white wire lead to the connection labeled 485+ [WHITE] on the RS-485 spring terminal.
3. Connect the green wire lead to the connection labeled 485- [GREEN] on the RS-485 spring terminal.
4. Connect the bare wire lead to the connection labeled SHIELD on the RS-485 spring terminal.
5. Connect the black wire lead to the connection labeled GND [BLACK] on the RS-485 spring terminal.

See the figure below.

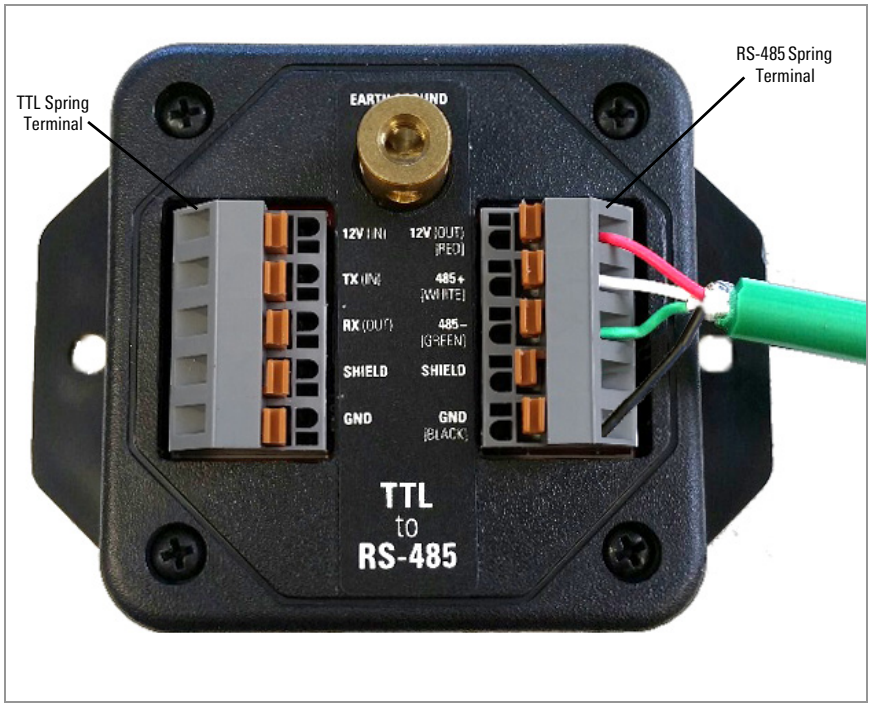


FIGURE 2: *Connecting RS-485 String to Addressable Bus Converter*

2.1.2 TTL CONNECTION

To connect the Converter to a TTL-capable device, do the following:

1. Connect the RX wire of the logger/reader to the connection labeled RX [OUT] on the TTL spring terminal.
2. Connect the TX wire of the logger/reader to the connection labeled TX [IN] on the TTL spring terminal.
3. Connect the external 12 volt supply positive (+) and negative (-) wires to the connections labeled 12V and GND on the TTL spring terminal, respectively.
4. Connect the shield wire to the connection labeled SHIELD on the TTL spring terminal as well.

See the figure below.

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.

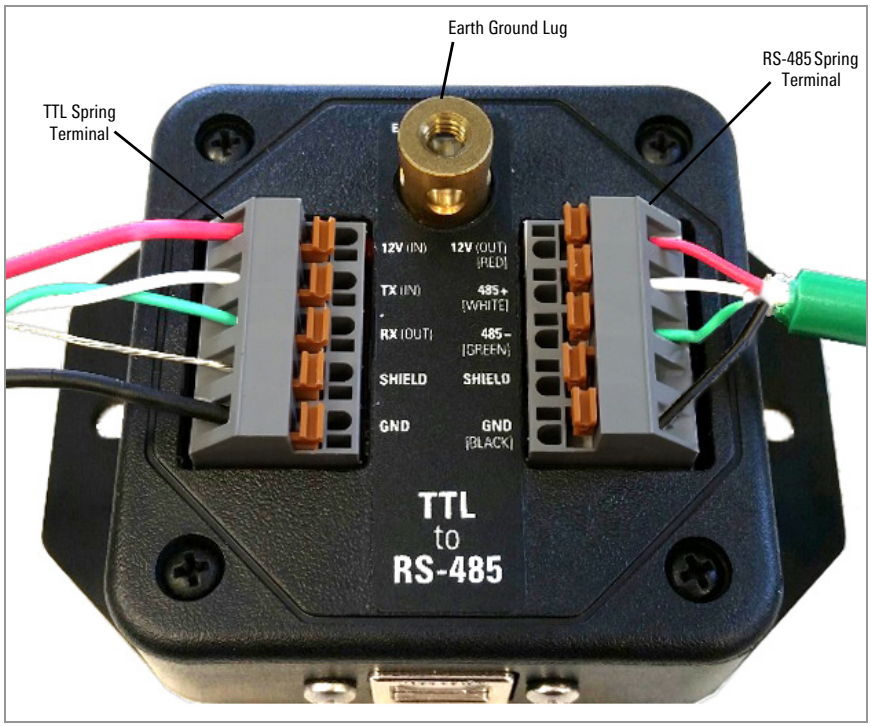


FIGURE 3: *Connecting TTL and External Power to Addressable Bus Converter*

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.

2.1.3 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. See the figure below.

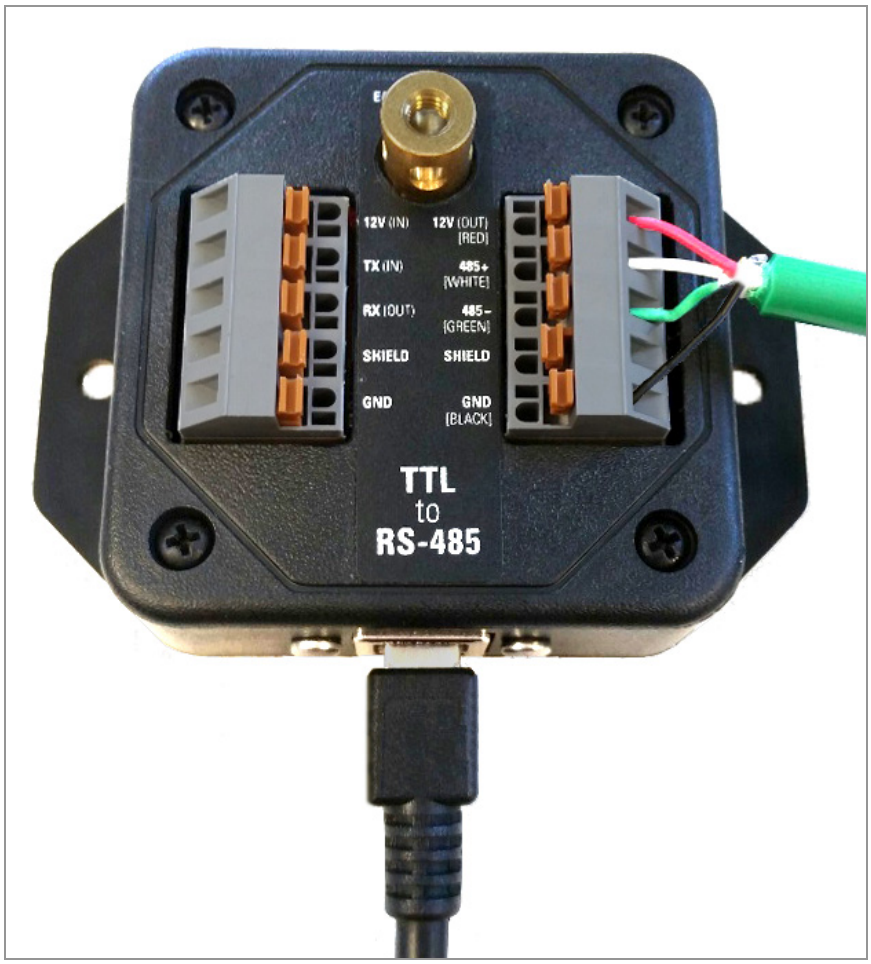


FIGURE 4: *Connecting USB Cable to Addressable Bus Converter*

2.2 SETTING 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.

2.2.1 USING USB 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.
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.

2.2.2 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.

2.3 CONFIGURING TTL INVERSION

Some dataloggers 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. Do the following:

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.

   Warning: 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.

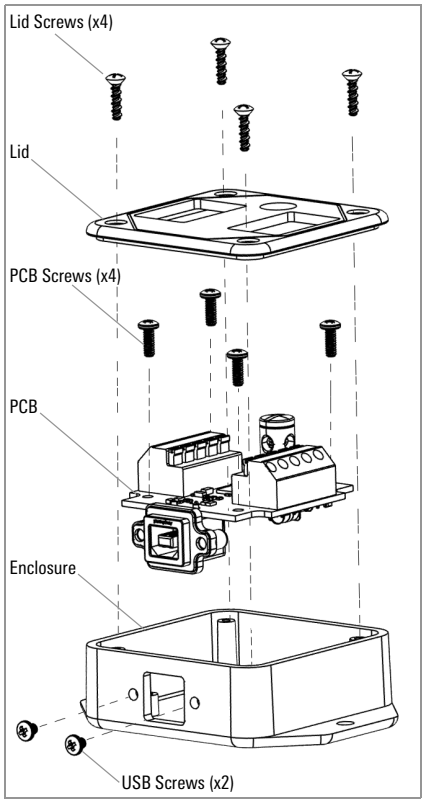


FIGURE 5: *Disassembling the 8020-38 Converter*

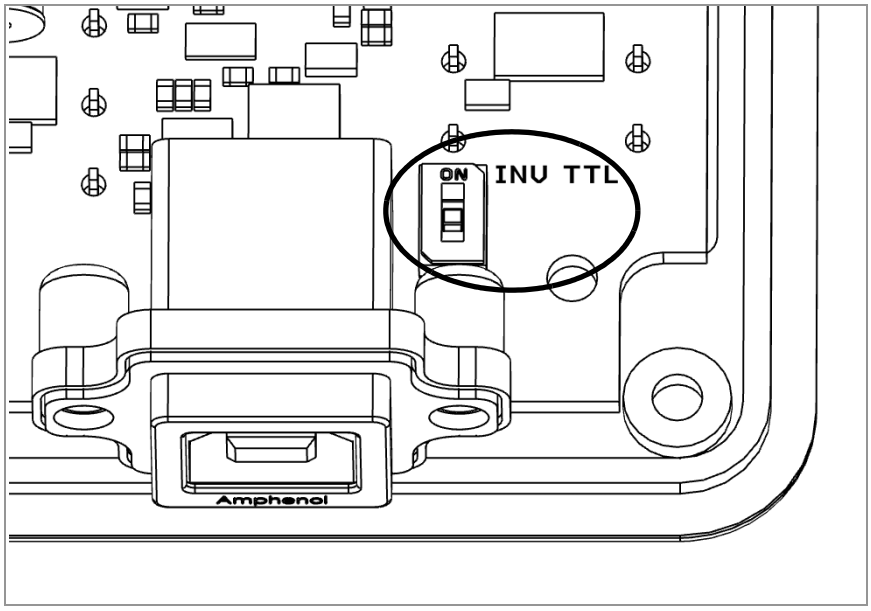


FIGURE 6: *TTL Inversion ON/OFF switch*

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. USING THE ADDRESSABLE BUS CONVERTER

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

Power	
Power Supply Input	USB: 5 Volts DC 500 mA; TTL: 12 Volts DC 500 mA
Power Supply Output	12 Volts DC 200 mA (max)
Sleep Current	500 uA Max (During USB Suspend)
Operating Current	15 mA (max)
Operating Temperature	-40°C 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	Polycase LP-11FMBT enclosure 3.500"x2.545"x1.007", Black, Flush/Textured Cover, PCB Mounting Bosses

TABLE 2: *Device Specifications*

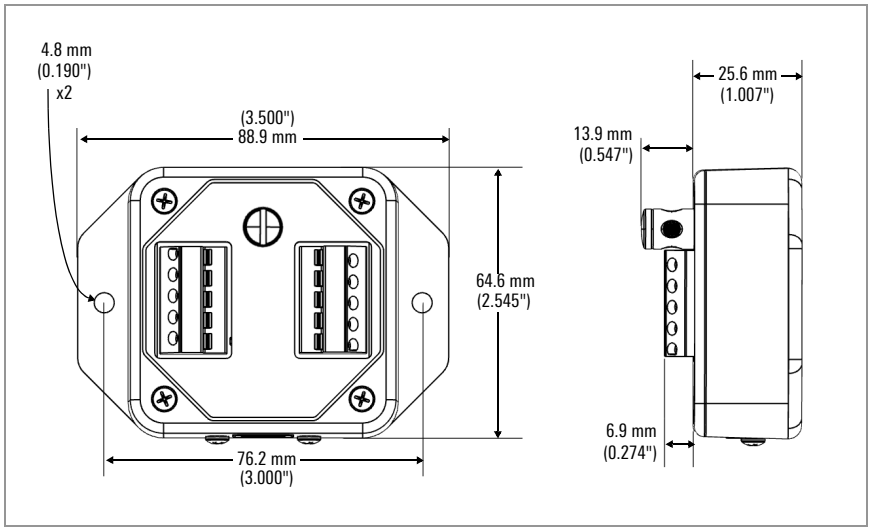


FIGURE 7: *Device Dimensions*

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 the GEOKON website 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'.

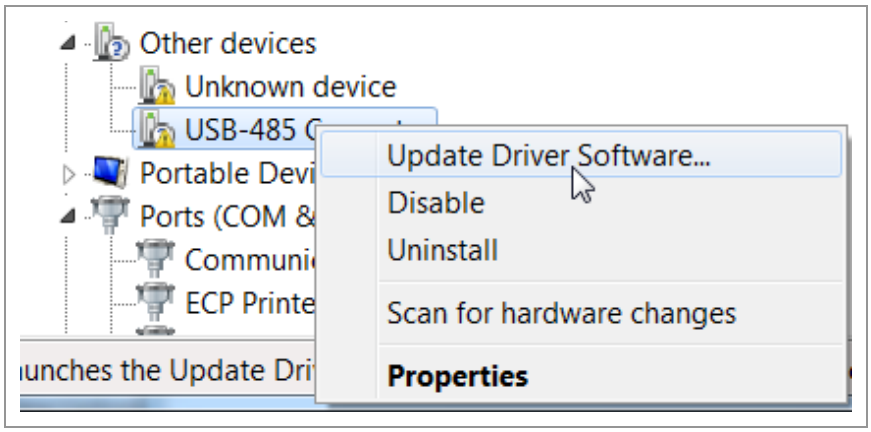


FIGURE 8: *Select "Update Driver Software"*

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

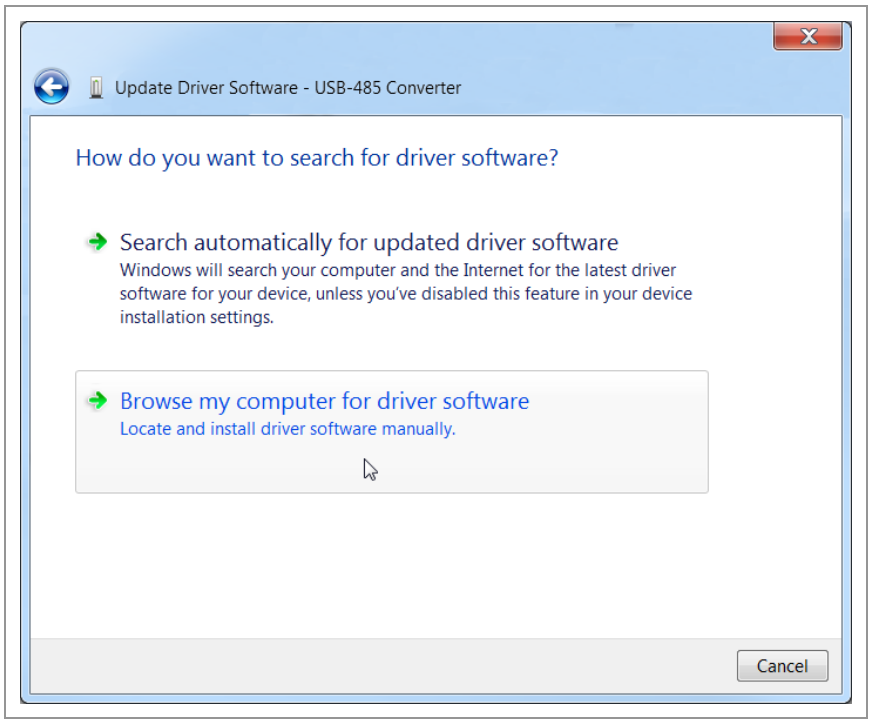


FIGURE 9: *Select "Browse my computer for driver software"*

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

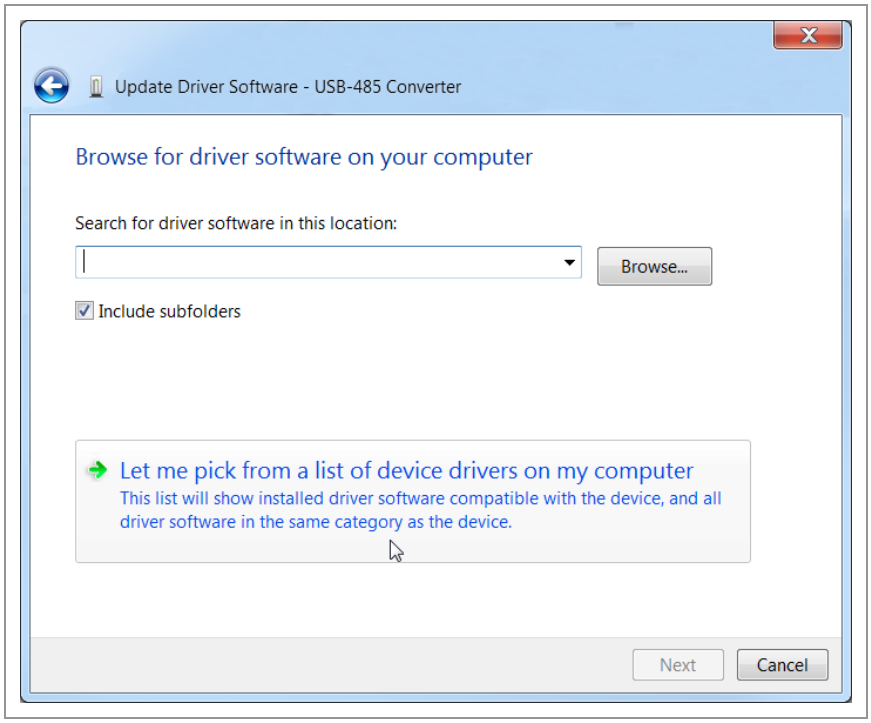


FIGURE 10: *Select "Let me pick from a list of device drivers on my computer"*

9. Click 'Next'.

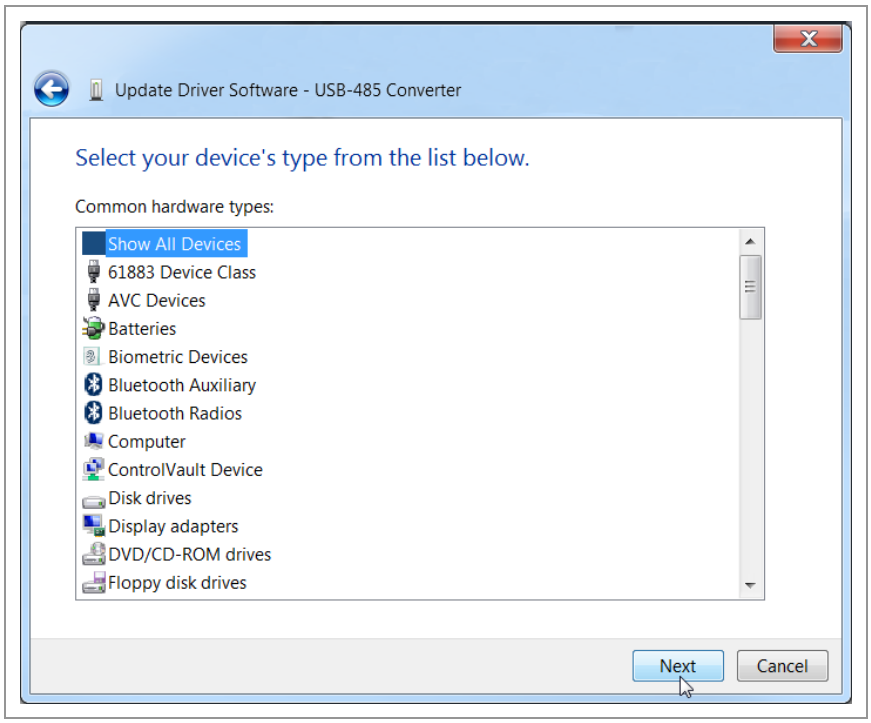


FIGURE 11: *Click 'Next' to Select All Device Types*

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

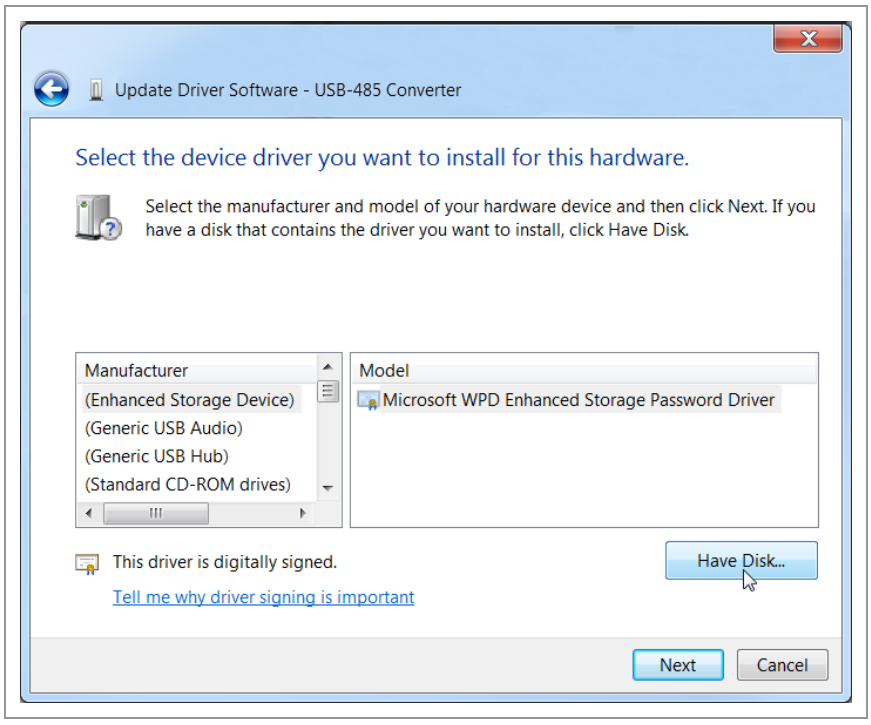


FIGURE 12: *Click 'Have Disk'*

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

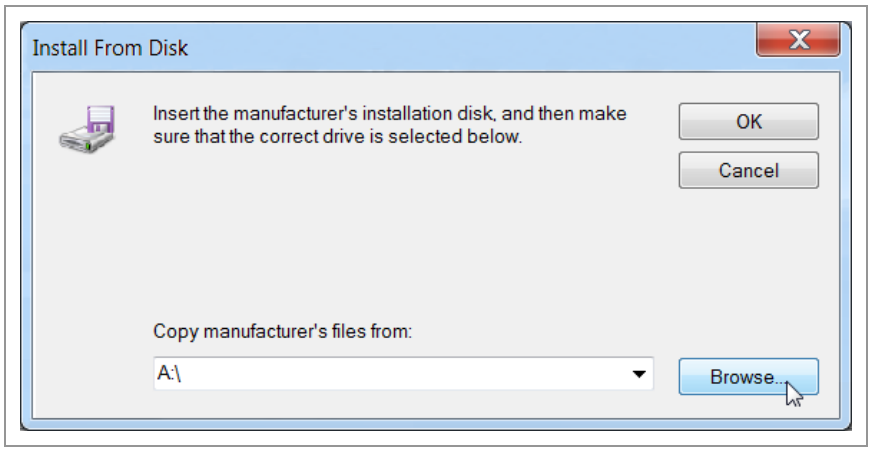


FIGURE 13: *Browse to the Provided .INF File*

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

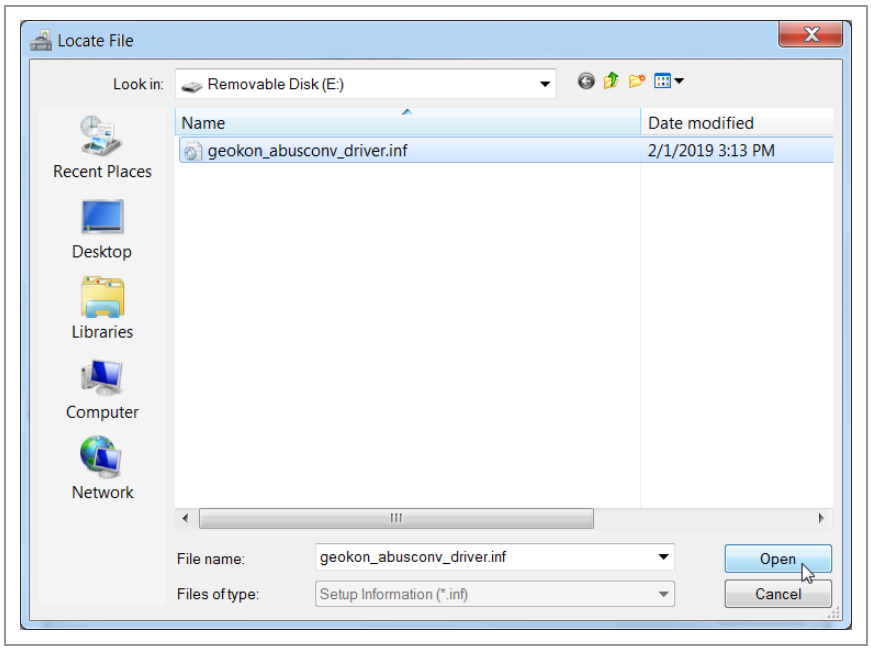


FIGURE 14: *Open the .INF File*

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

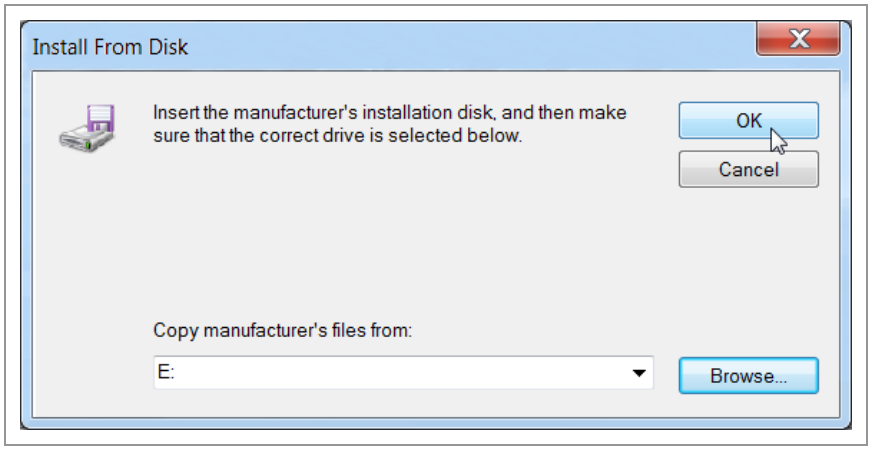


FIGURE 15: *Click 'OK' to Confirm Directory*

14. Click 'Next'.

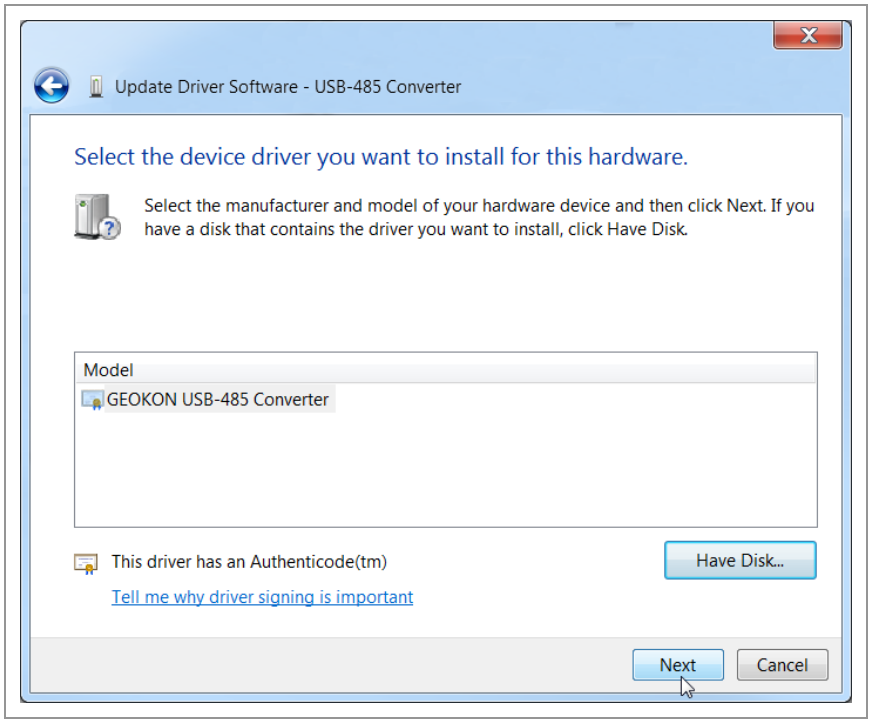


FIGURE 16: *Click 'Next' to Select Driver*

15. If an 'Update Driver Warning' appears, click 'Yes'.

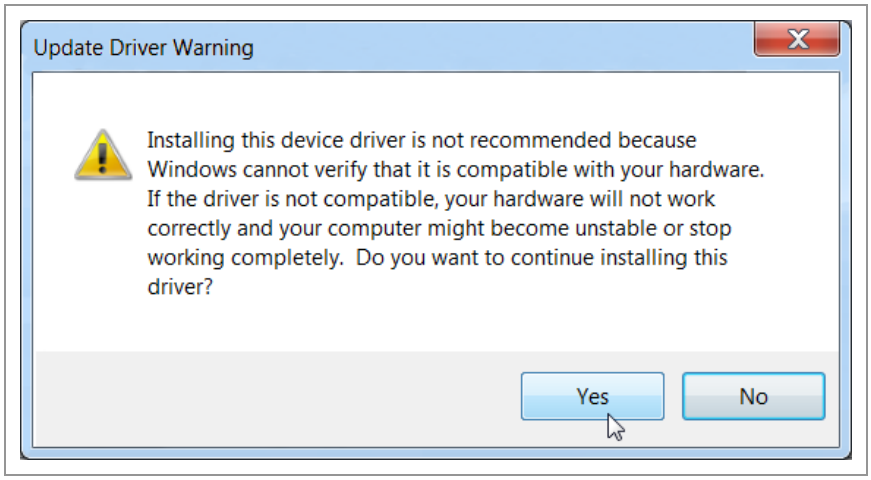


FIGURE 17: *Confirm Installation*

16. In the 'Windows Security' window that appears, click 'Install'.

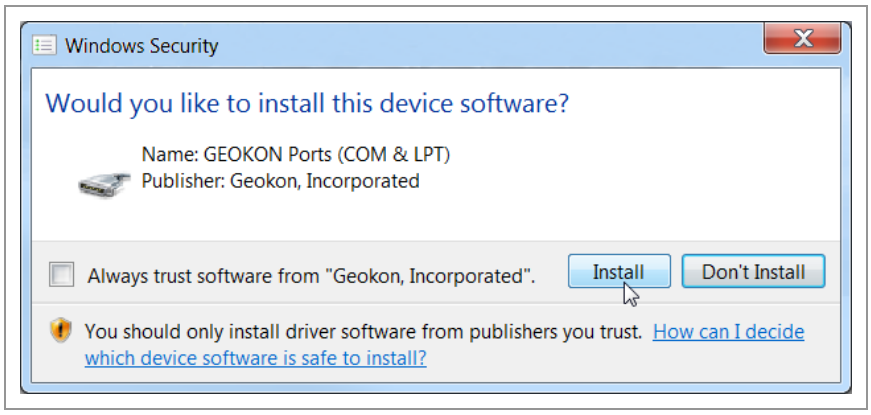


FIGURE 18: *Click 'Install' to Install Drivers*

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

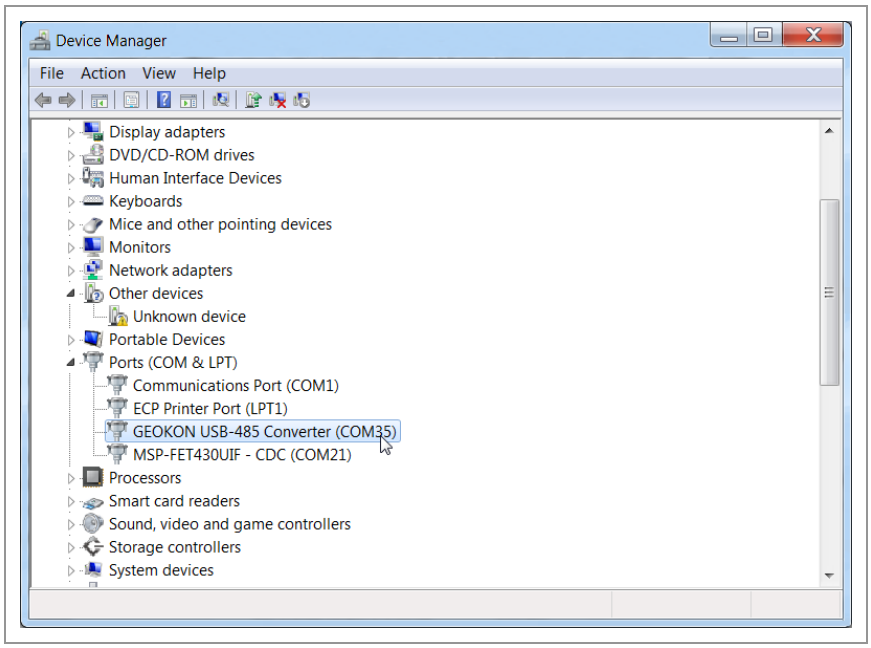


FIGURE 19: *Verify Addressable Bus Converter Appears in Device Manager*

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