SENTINEL

Guide for Sentinel Systems

RS485

&

Defender Keypads

GLOSSORY

Introduction to Defender Keypads

Sentinel Systems has worked hard to create a great keypad that works along with the Sentinel programs to ensure security and peace of mind at all facilities that use our products. The Defender series of keypads is the newest line of keypad Sentinel Systems that has been released with features designed to meet the needs of our customers. All the keypads in this line come with smart technology that stores information on the keypad, so they will remain functional if they have connection to a power source. The Defender Lite is a smaller keypad than the Defender giving facilities an option to have a keypad at the facility that a traditional keypad may not fit in. The Defender Pro comes with a built-in speaker and the option of a camera making it the perfect keypad for an entrance gate.

The entire Defender line runs off the RS485 (making them a direct replacement for the Davinci and 3200i keypads) and still uses the 18g 4 wire that has always been used for Sentinel Systems hardware making upgrades as easy as possible for all customers. The Defender and Defender Pro use the same goose neck stand as the prior keypads as well. The Defender Lite is designed to be mounted inside a wall or on the side of a building.

Introduction to the RS485

The RS485 is the CIM (Communication Interface Module) used with Sentinel Systems software to control hardware that is paired with the systems. The RS485 bridges the gap between the computer and the keypads so that tenant information can be transmitted to the keypads at the facility. The RS485 is the CIM that is used with the Da Vinci, 3200i and the entire Defender line of keypads.

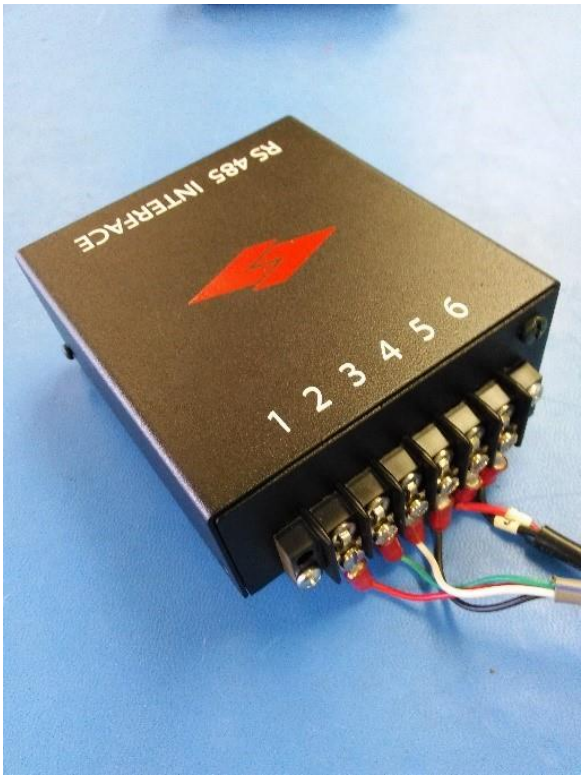


Figure 1 RS485 Interface

RS485 Installation

Installing the RS485 is a relatively easy process, with the only tool needed being a small Philips head screwdriver. The RS485 has two sides in which connections need to be made for the module to work. One side will have a single port that uses a USB A connector and on the other side there are six wire connections, two that provide power to the box and four that go out to the keypad system.

On the RS485 where the six connections are, Ports 5 and 6 are always going to be the power into the RS485; with 5 being the positive line in and 6 being the ground. The voltage being supplied to the CIM box will always be 12 Volts DC, too high and components can burn out; too low and the CIM will not have sufficient power to function. It is very important to make sure the voltage is correct going into the CIM as it provides the power to the keypads, and they also need 12 Volts DC to function.

The wiring on Ports 1-4 goes out to the keypad, providing power and communications to the system. The wire required for the system is 18-gauge 4 conductor shield wire (18/4), it works optimally for the system to hold communication. With this it is suggested to use the color combination of Red, Black, White and Green. The keypad boards are labeled for this color combination, so a deviation from the color combination can create confusion during troubleshooting.

Red: Power

White: Communications

Green: Communications

Black: Ground

Silver: Shield

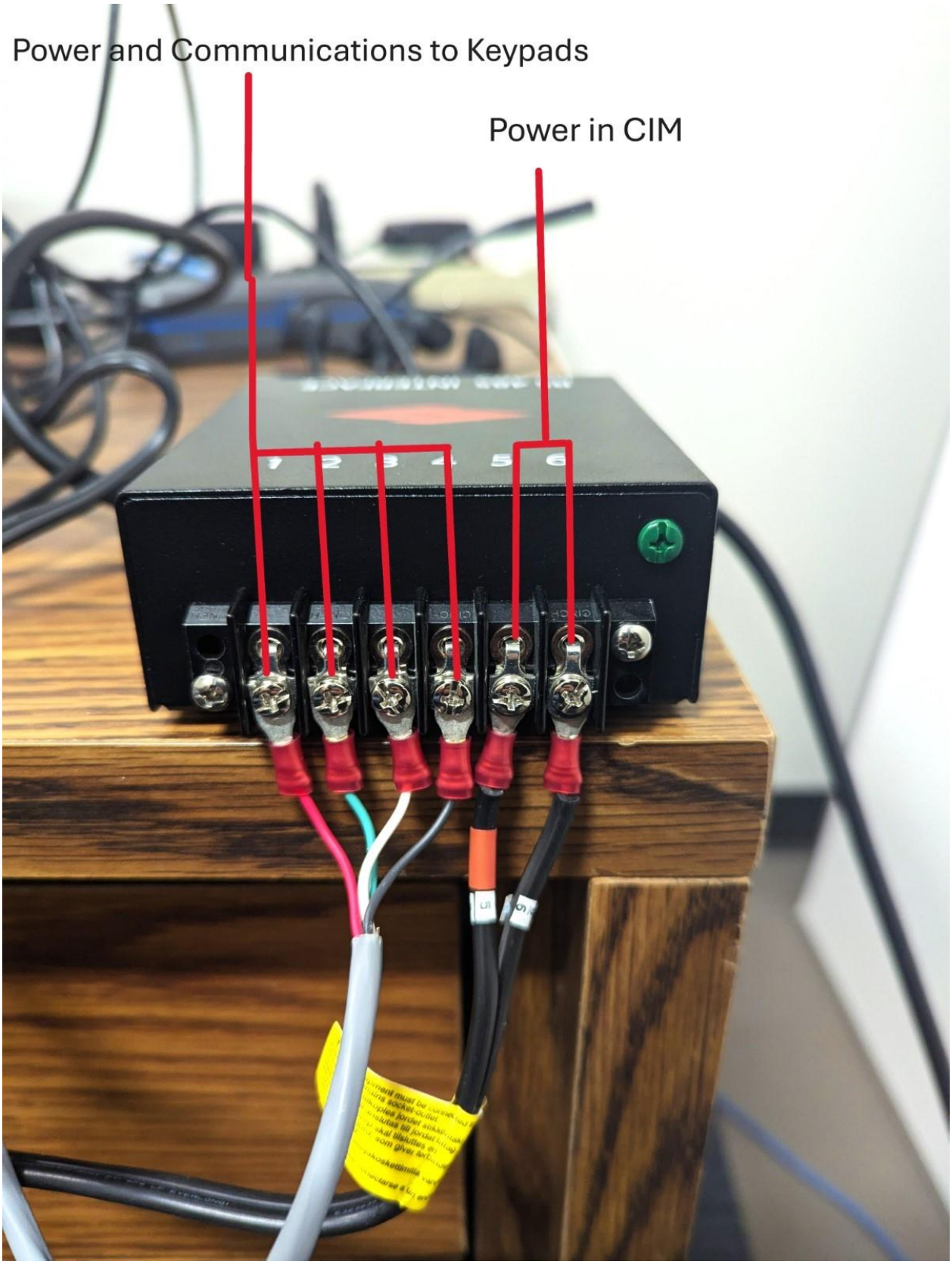


Figure 2 RS485 Wiring to the Keypads

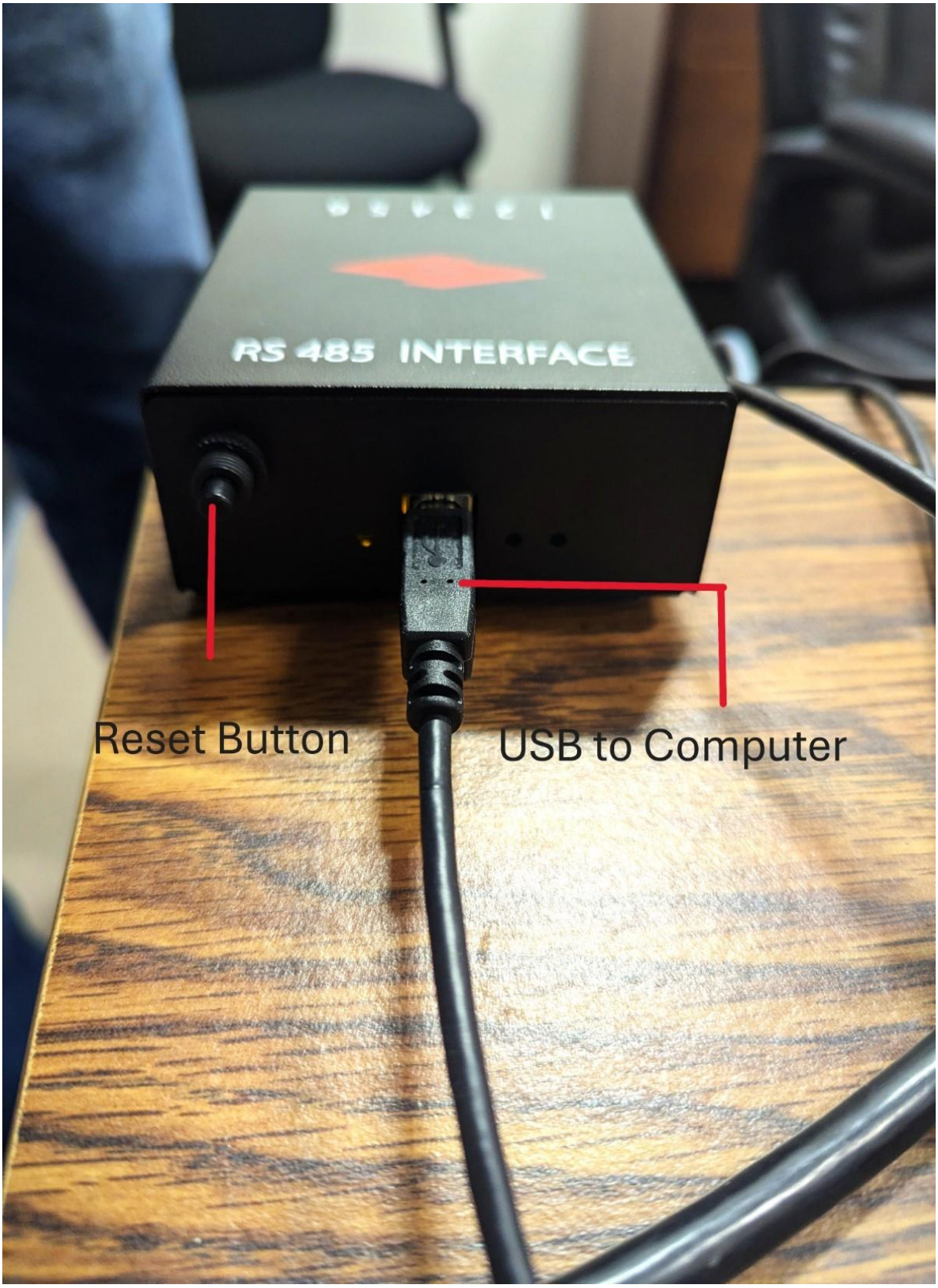
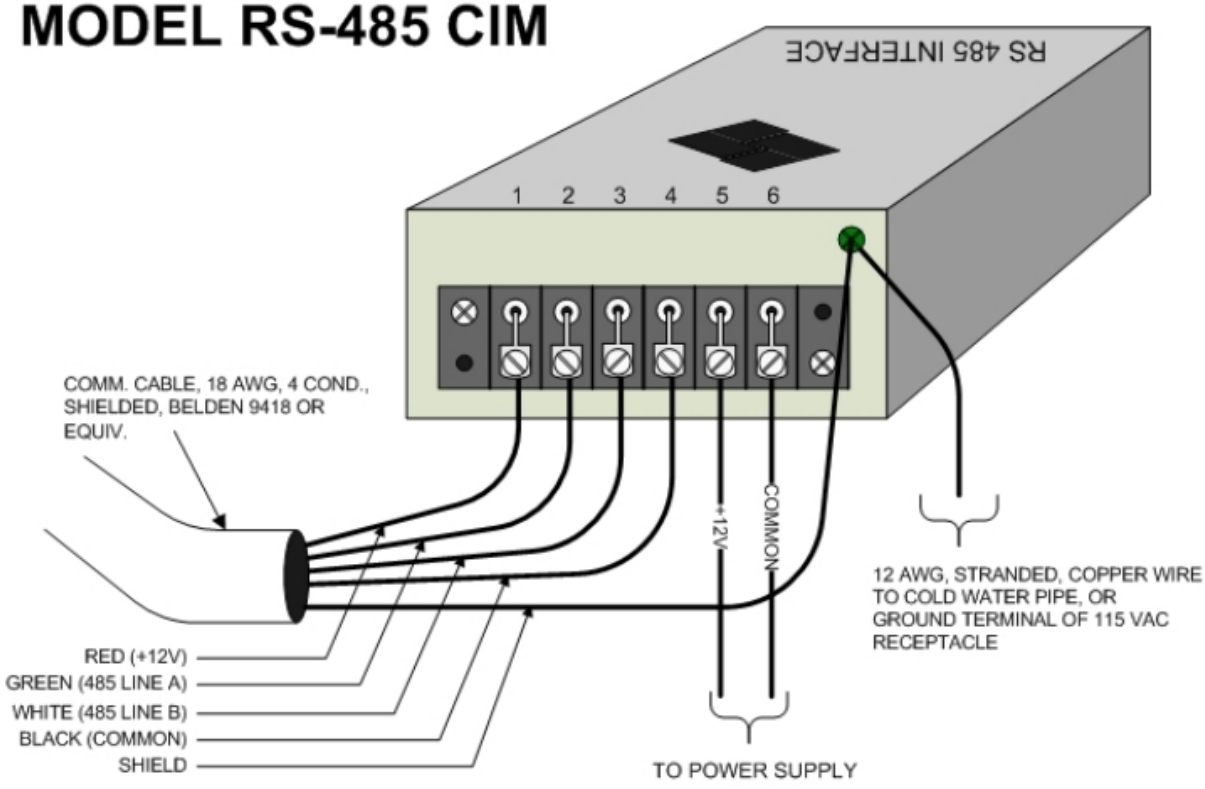
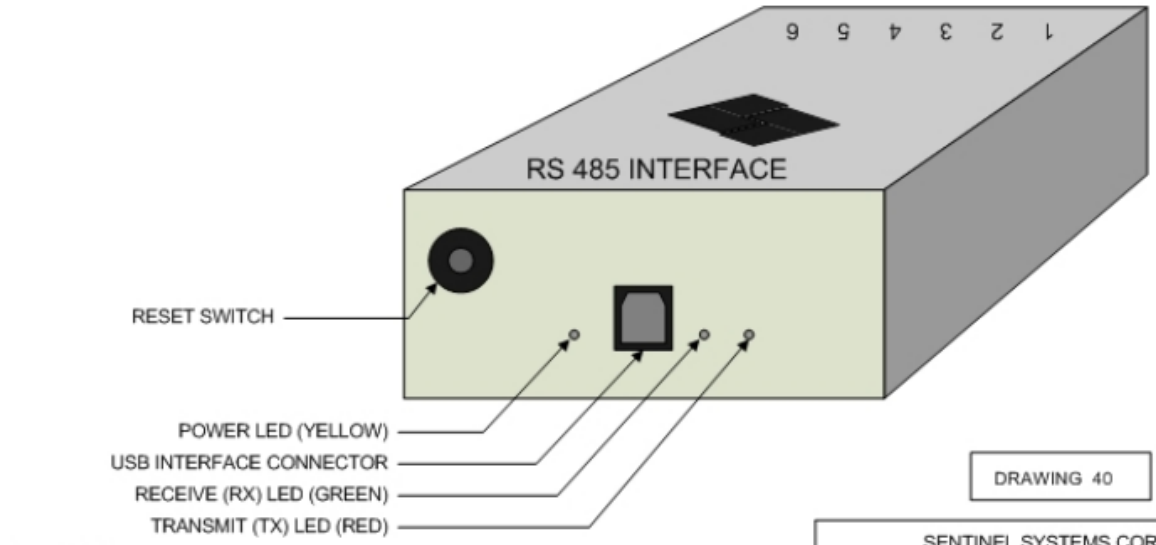


Figure 3 RS485 Wiring to Computer

REV	DESCRIPTION	APPROVAL	DATE
A	DRAWING RELEASE	B. JENNINGS	05/06/2013

MODEL RS-485 CIM





DRAWING 40

NOTES:

1. The Reset Switch provides a power-down reset capability for the devices connected to the CIM. Note, however, that this reset will only function for those devices powered from the CIM. Any devices powered by additional power supplies will NOT be powered-down/reset.

2. The Transmit LED (TX) indicates data is being sent to the USB bus while the Receive LED (RX) indicates data is being received from the USB bus.

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APPROVAL	DATE
DWN BNJ	05/06/2013
CHECKED BNJ	05/062013

TITLE: MODEL RS-485 CIM CONNECTORS AND INDICATORS

SIZE A | DWG NO: 050-1309-01 | REV. A

SCALE: NONE | SHT. 1 OF 1

Installing Drivers for the RS485

1. Open device manager on the machine in which the RS485 is plugged into. The easiest way to do this is by right clicking on the start menu on the bottom of the screen.

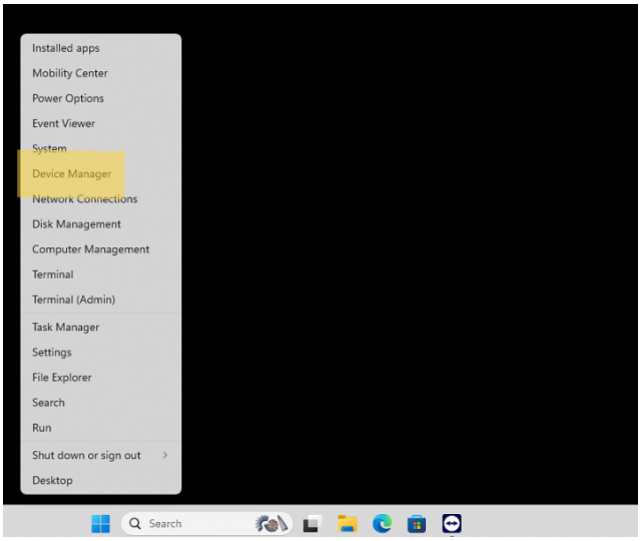


Figure 4 Opening Device Manager

2. Once Device Manager is open, the RS485 will appear in Other Devices with an error next to it.

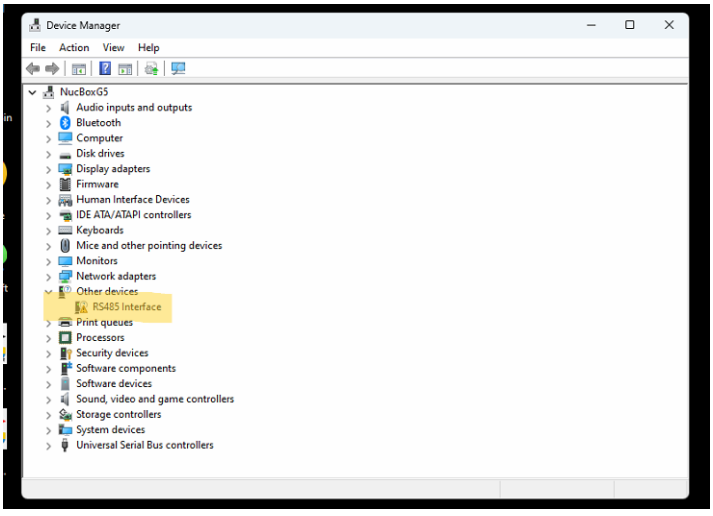


Figure 5 RS485 under Other Devices

3. To make the RS485 active, drivers will need to be added to it. The drivers can be added by right clicking on the RS485, selecting properties, and then selecting update driver.

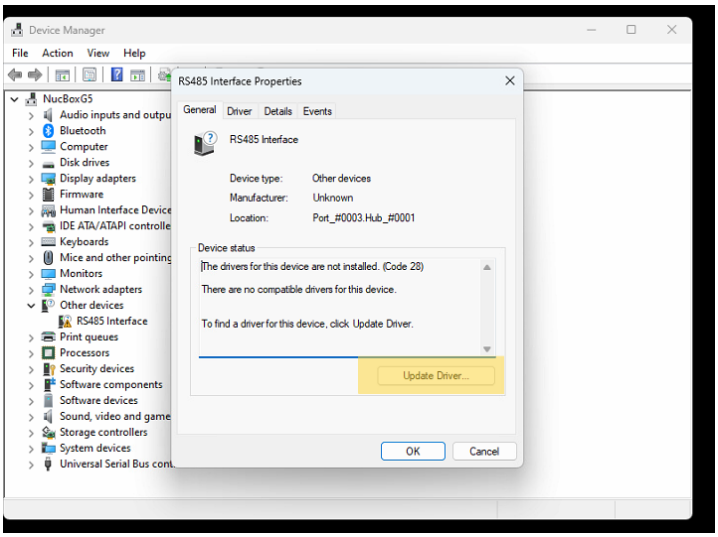


Figure 6 Select Update Driver

4. The drivers for the RS485 are not provided by Windows so they will have to be browsed to. The drivers can be found by going to: C:\Program Files (x86)\Sentinel Systems\Platinum\FTDI_Unified on the computer that the RS485 is plugged into.

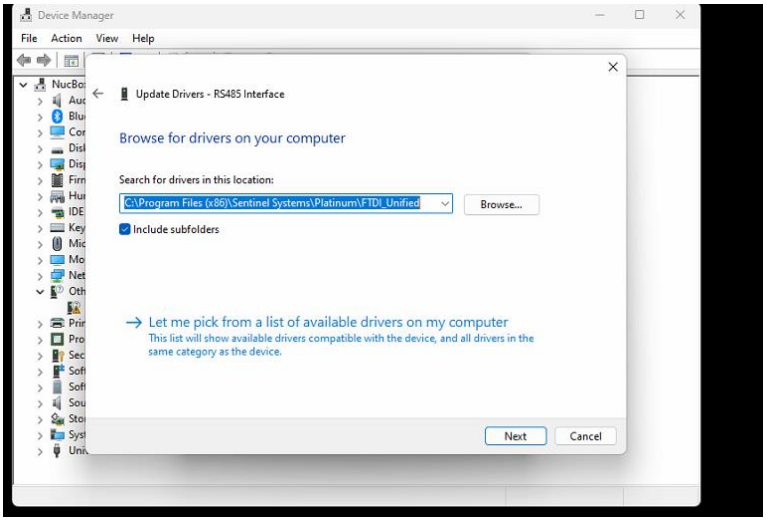


Figure 7 Browsing to the Drivers

5. Once the driver is installed with the RS485 it will appear under the Universal Serial Bus Controller in the Device Manager without any error symbol connected to it.

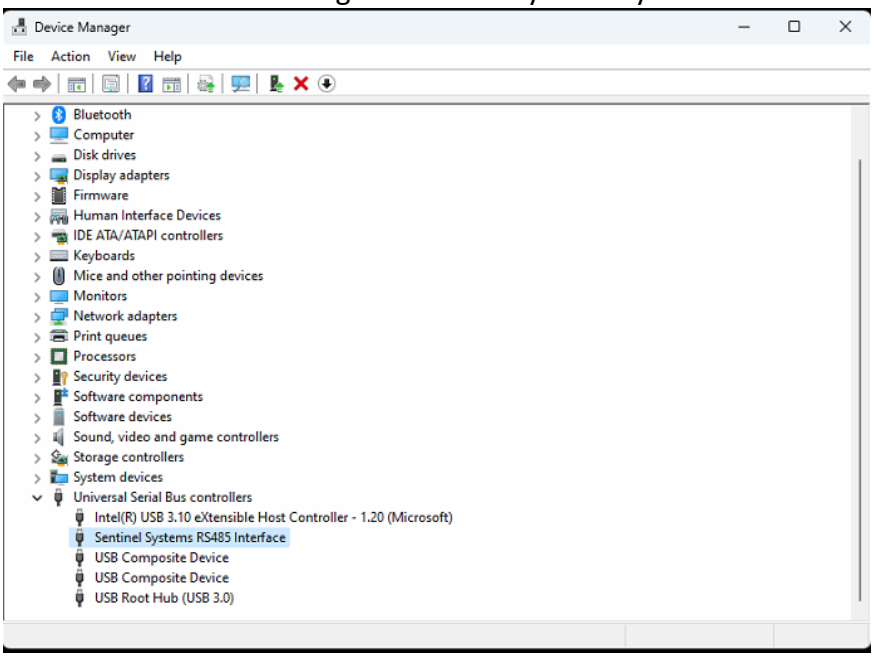


Figure 8 RS485 with updated drivers

6. If there is an error when installing the driver onto the RS485 it is usually because the computer we are installing on is a new machine and it has Core Isolation turned on. Core Isolation is a Windows Security feature that prevents drivers that are not provided from Windows from being loaded onto devices. It can be easily accessed by typing Core Isolation into the search bar. After turning Core Isolation off the computer will need to be rebooted. After the reboot the new driver will be installed.

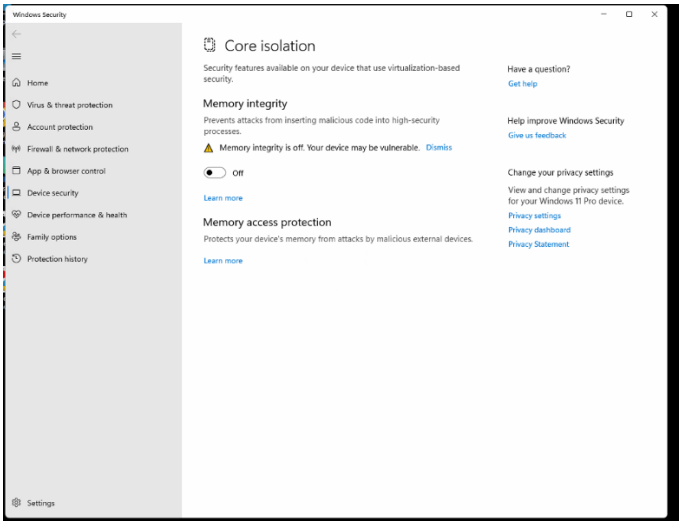


Figure 9 Turning off Core Isolation

7. After successful installation of the CIM drivers, it will need to be set as the active communication device inside of the software being used on the computer. This is done by going to Configure>>>Communication Ports.

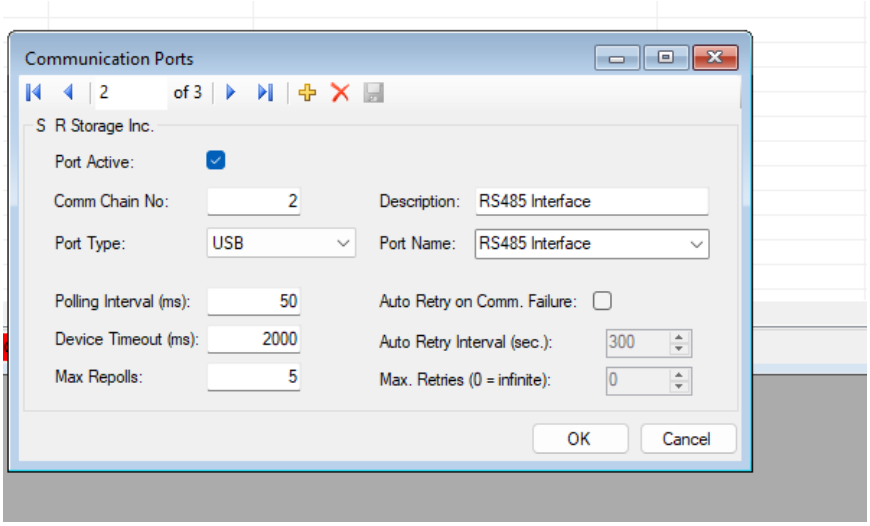


Figure 10 Making Ports Active

Defender and Defender Lite Wiring

The Defender and Defender Lite keypad can be wired directly to the RS485 or to another keypad in a daisy chain configuration. The wiring of the individual keypad is no different no matter what is on the other end of the keypad. The wiring used for this process should be 18/4 shielded wire, just as at the RS485, and any deviation from this wire type can lead to malfunctioning hardware. Inside of the keypad there are four (4) separate terminal blocks that will be labeled as TB1, TB2, TB3, and TB4. Terminals TB1- TB3 can be used for the wiring between the RS485 and the keypads. TB4 is designated as the terminal that is the relay to open the gate. TB1-3 will be labeled with R, B, W, G, S to help with the wiring of the keypads as it should correspond with the color of the wiring being used through the system.

R- Red

B- Black

W- White

G- Green

S- Silver/Shield

TB4 will be labeled with its own designations of NO, C, and NC.

NO- Normally Open

C- Common

NC- Normally Closed

The wires that will be attached to TB4 will be the wiring that is the connection between the keypad and the gate operator. This wiring is 22g wire and is usually black and red. The red wire is going to be the live wire with the black wire being the common wire. When connecting the wiring to TB4 the black common wire will be connected to C (common) and the red wire will generally be connected to NO (Normally Open). However, this can differ from gate operator to gate operator, so it is always good to confirm in the gate operator manual for connections.

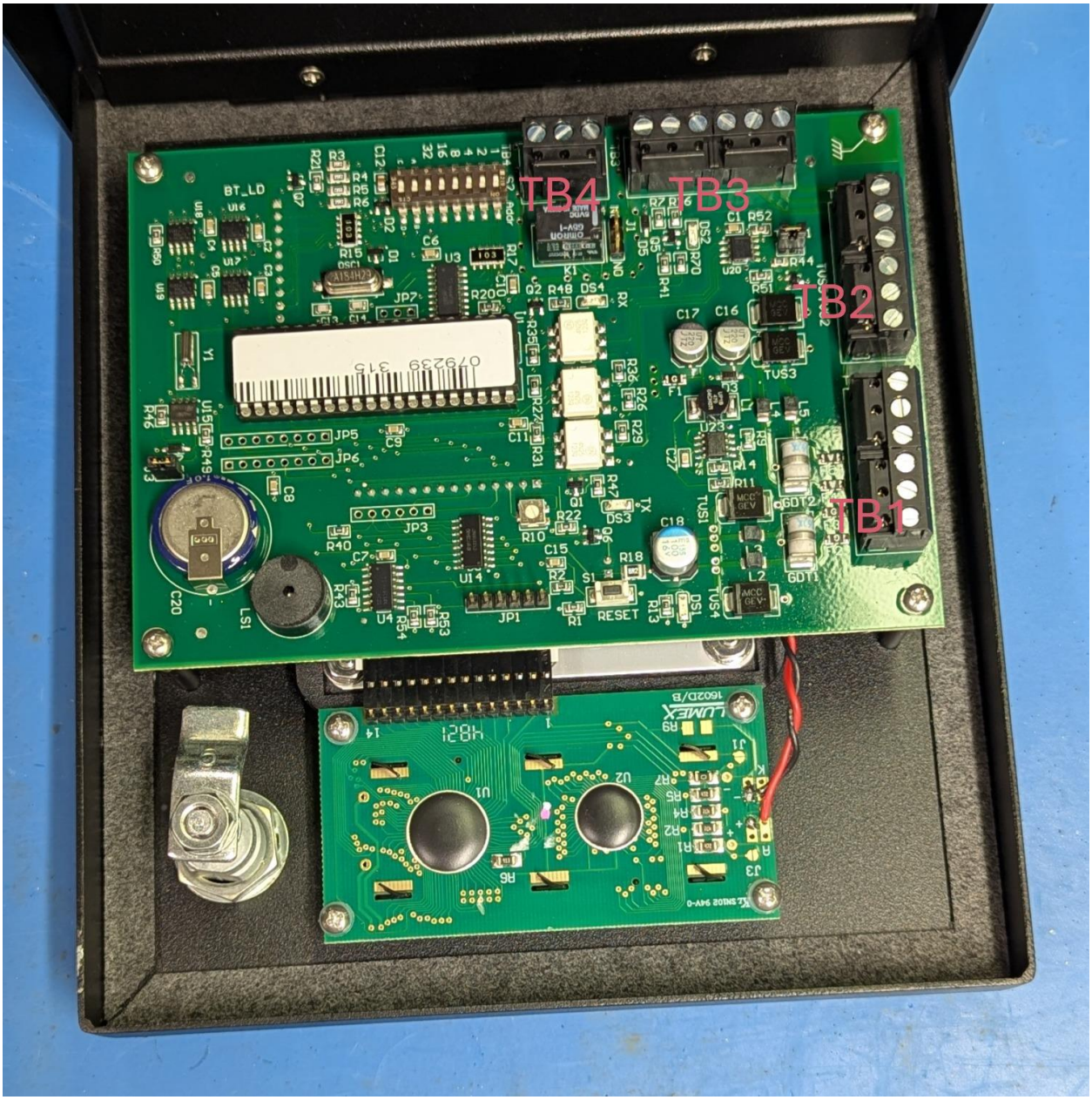


Figure 11 TB Locations inside of a Defender

As shown in Figure 12, TB1 through TB3 are labeled with the designations of the correct wiring. Figure 13 then shows how the keypad will look once the wiring has been connected. Figure 14 shows how TB 4 is labeled for the wiring to the gate operator and Figure 15 demonstrates the wiring to the gate operator.

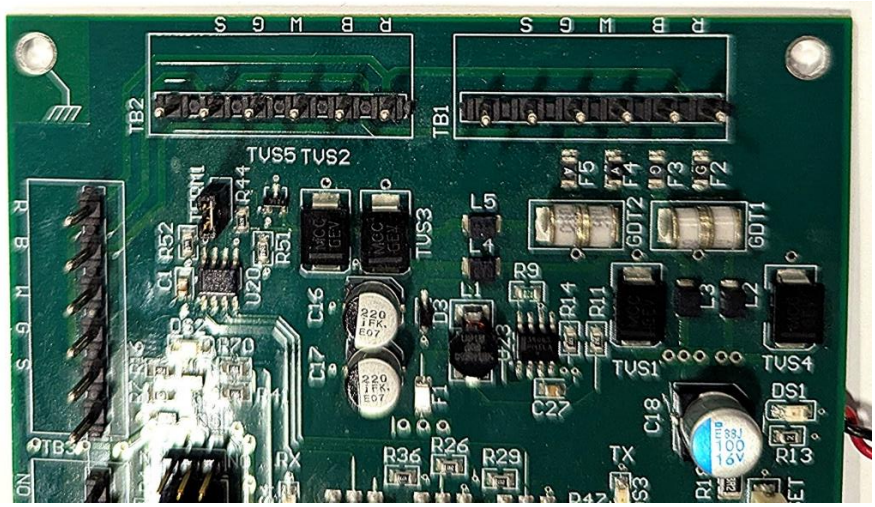


Figure 12 Defender Terminal Blocks

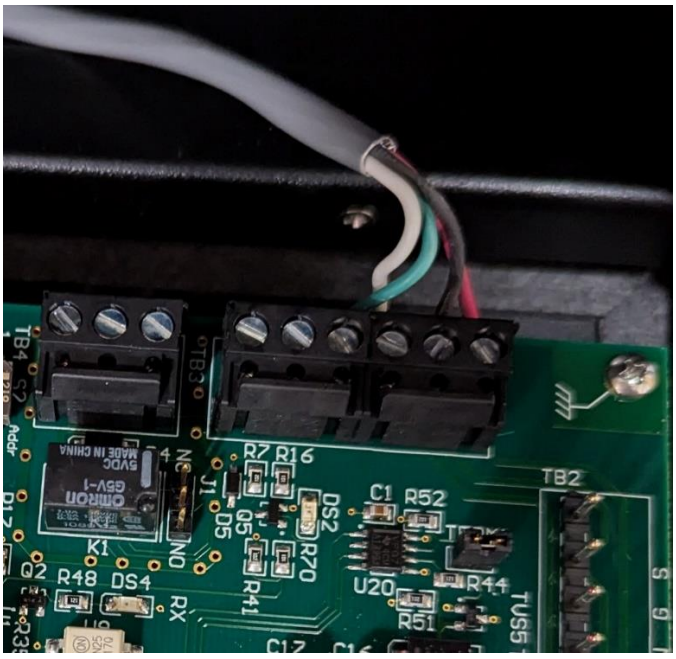


Figure 13 Wiring Connected to a Defender Keypad on TB3

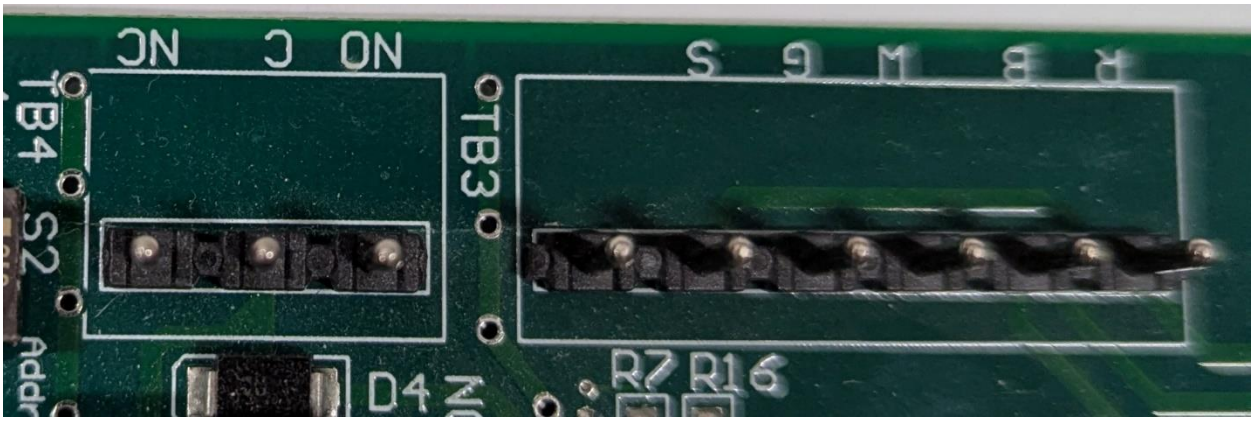


Figure 14 TB3 and TB4

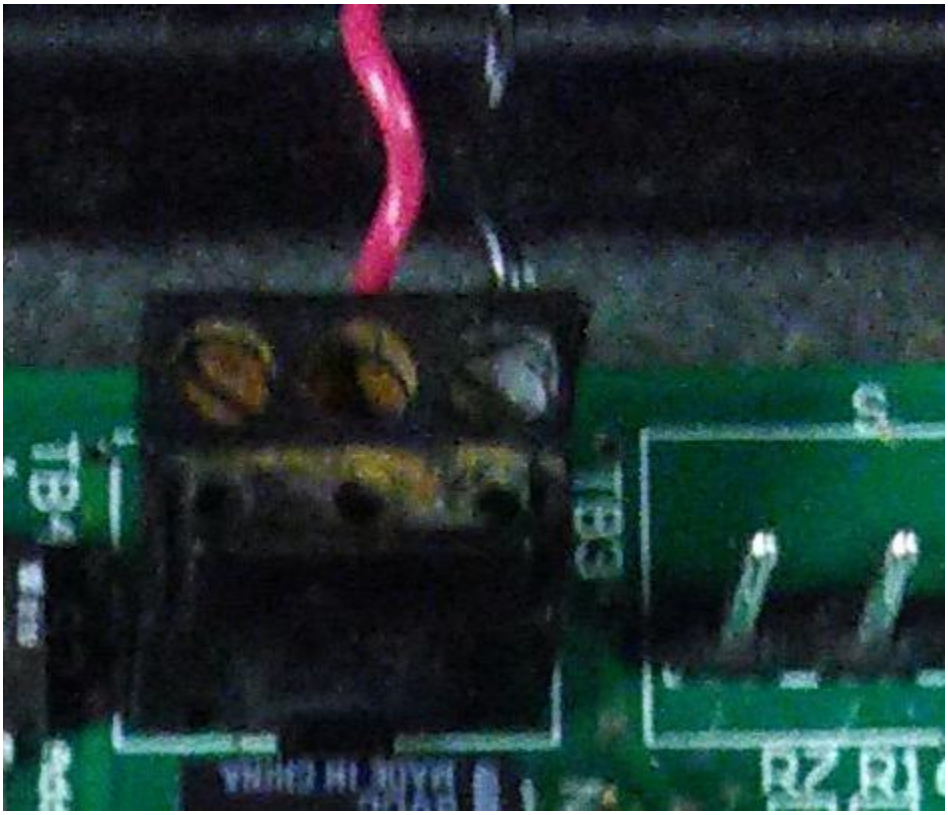


Figure 15 TB4 Wired to the Gate Operator

Defender Pro Wiring

The Defender Pro can be wired directly to the RS485 or to another keypad in a daisy chain configuration. The wiring of the individual keypad is no different no matter what is on the other end of the keypad. The wiring used for this process should be 18/4 shielded wire, just as at the RS485, and any deviation from this wire type can lead to malfunctioning hardware. Inside of the keypad there are two (2) separate terminal blocks referred to as JP5 and JP6. These terminals can be used for the wiring between the RS485 and the keypads. There is a third terminal block referred to as JP1 that is designated for the relays to open the gate, with there being two relays on that terminal. This gives the Defender Pro the ability to open to things at the same time (For example a gate and a door strike). When opening the Defender Pro keypad, the terminal blocks will be on the bottom closest to you, with JP1 being on the left. JP5 in the middle and JP6 on the right.

R- Red

B- Black

W- White

G- Green

S- Silver/Shield

TB3 will be labeled with its own designations of NO, C, and NC.

NO- Normally Open

C- Common

NC- Normally Closed

The wires that will be attached to TB4 will be the wiring that is the connection between the keypad and the gate operator. This wiring is 22g wire and is usually black and red. The red wire is going to be the live wire with the black wire being the common wire. When connecting the wiring to TB4 the black common wire will be connected to C (common) and the red wire will generally be connected to NO (Normally Open). However, this can differ from gate operator to gate operator, so it is always good to confirm in the gate operator manual for connections.

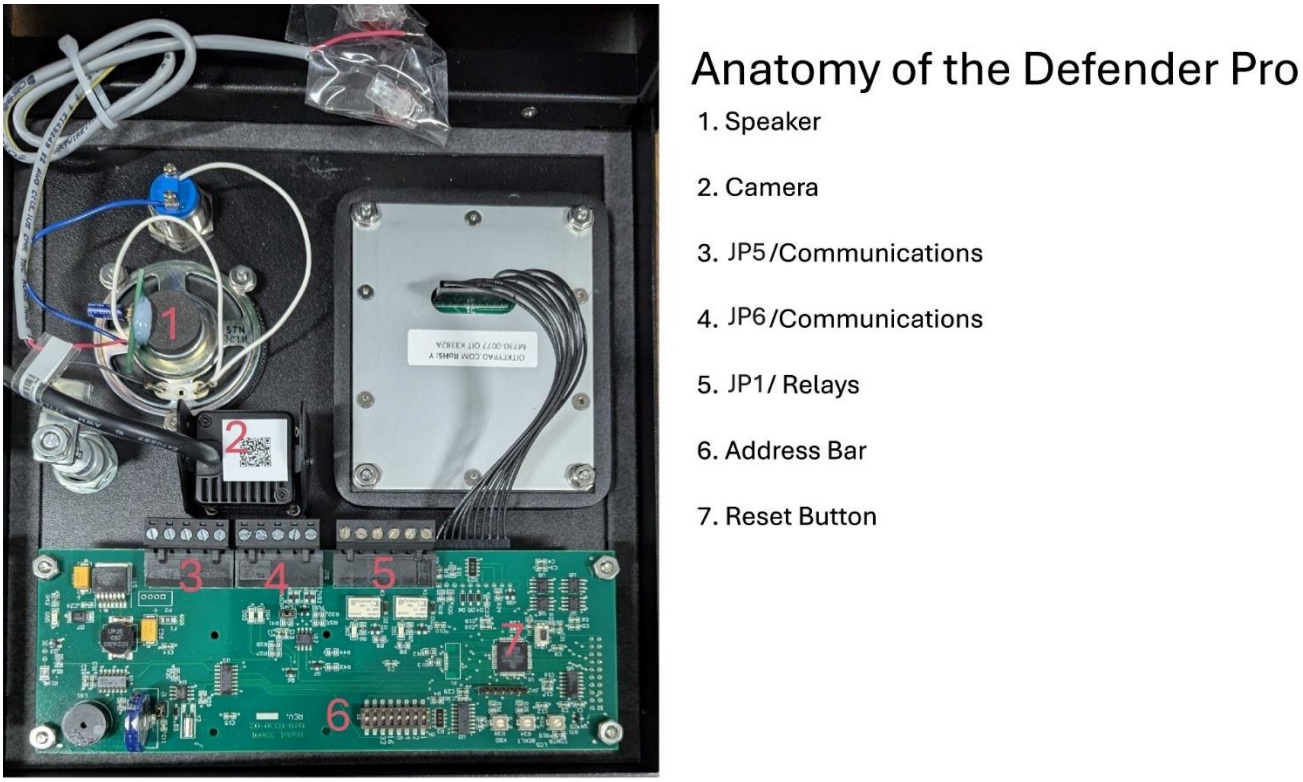


Figure 16 Anatomy of a Defender Pro

The wiring order of the Defender Pro differs from the wiring order of the other Defender keypads, so it is important to make sure it is done correctly. When the Defender Pro is opened and the installer is facing the keypad straight on, the terminals will be on the top of the board with JP5 being on the far left, JP6 in the middle, and JP1 on the right. When installing the wires from left to right on JP5 and JP6, the order should be as followed:

1. Shield Wire (Bare Grounding Wire)
2. Black Wire (Black Grounding Wire)
3. Red (Red Power in Wire)
4. White (White Communications Wire)
5. Green (Green Communications Wire)

When wiring JP1 we must remember that there are two relays on this terminal. The first three openings on the terminal will be for the first relay and the last three openings for the second relay. These should be wired in correspondence with the wiring for the relay terminal on the gate operator.

1. Normally Open
2. Common

3. Normally Closed
4. Normally Open
5. Common
6. Normally Closed

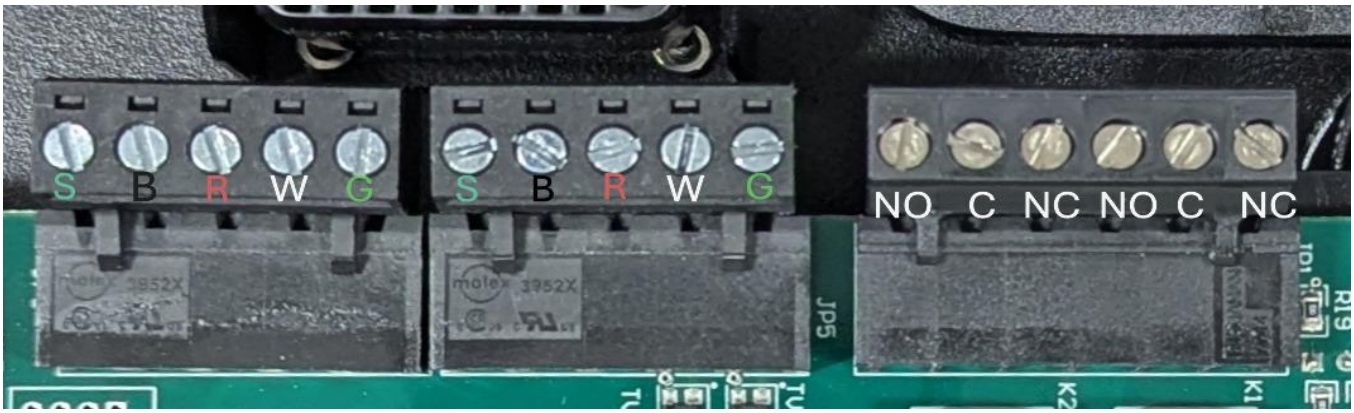


Figure 17 Defender Pro Wiring Terminals

The speaker and camera inside of the Defender Pro connect to third party intercom systems and DVR systems. For help with these items please refer to the manuals for those systems.

Wiring Multiple Devices Together

The Sentinel ecosystem is designed to have the ability to have multiple devices on the communication chain. The keypads are designed to be daisy chained, creating a network of devices known as a Bus Topology. A Bus Topology is when there is a start and end of a network where the information travels from the start point to the end point and then returns to the start point. The style of network is made possible by the multiple TBs that are found on the keypad. When wiring in the bus configuration the start point is the computer, and the end point will be the last keypad in the chain.

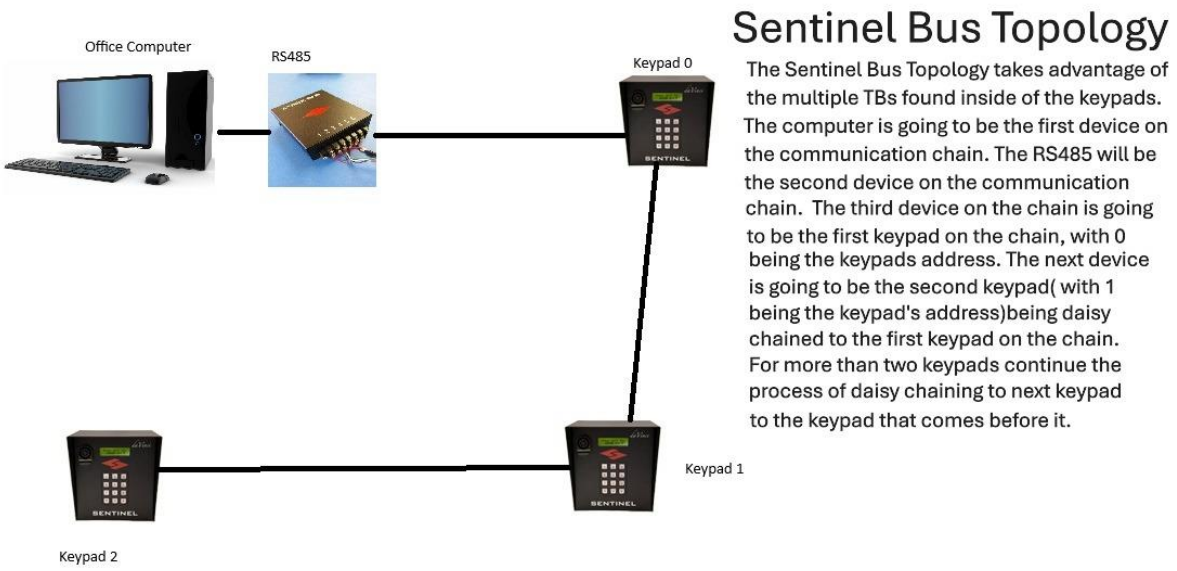
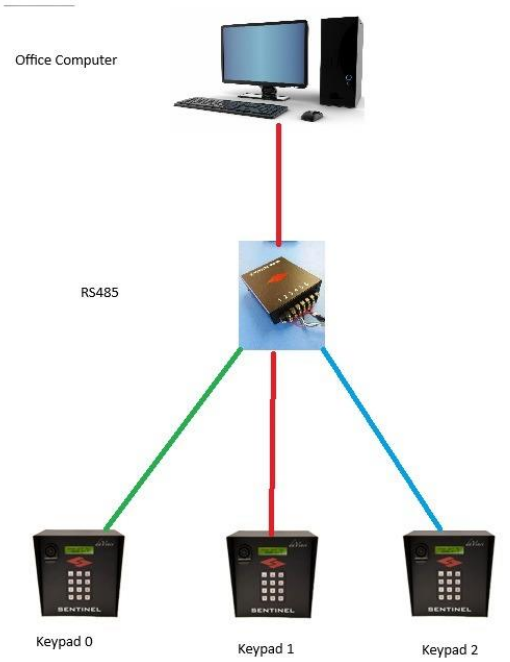


Figure 18 Sentinel Ecosystem Bus Topology

The Bus Topology is not the only topology that can be used inside of the Sentinel ecosystem, but it is the most efficient. The other topology that is used often is Star Topology. In this topology the keypads are not daisy chained together but rather have their own separate line of wires running back to either a RS485 or a junction box. This is not the preferred topology, but it is understood that sometimes it cannot be avoided. It is just important to remember that when wiring a Star Topology, that room for error in wiring is extremely minimal.



Sentinel Star Topology

The Sentinel Star Topology is the second most common way in which the Sentinel Systems ecosystem can be wired. This wiring setup starts with the computer being the first device on the communication chain. The second device will be the RS 485. In the Star Topology the wiring can go straight to the keypads from the RS485, however a junction box is often placed between the RS485 and the keypads. From the RS485 or junction box there will be a line of wire ran to each keypad that will only service that one keypad. If using Star topology it is wise to make sure to document the use and location of a junction box to help with troubleshooting if errors in communication are ever to arise.

Figure 19 Sentinel Ecosystem Star Topology

Bus versus Star Topology

As both topologies can work inside the Sentinel ecosystem, Bus is the one with the less drawback and the one we suggest is used when possible.

Bus Topology	Star Topology
All devices are daisy chained together	All devices have their own dedicated line
If a keypad fails, the keypads behind it fail as well.	If a keypad fails, the rest will continue to work.
No need for any extra items	Generally, a junction box is needed
Wiring is easy and straight forward	Wiring can become messy with little to no room for error
Easy to troubleshoot and repair	Harder to troubleshoot

Addressing the Keypads

It is important to make sure that when a keypad after a keypad is installed, it is addressed to the correct address. Addresses in the Sentinel ecosystem starts with 0 and increase by one as devices are added to the communication chain. The keypads are addressed by using the address bar on the circuit board of the keypad by moving the corresponding dip switch inside the address bar, *Figure 20*. The addresses are done by counting in binary as seen in the chart in *Figure 21.* Once the address has been set always hit the reset button on the circuit board*, Figure 22.*

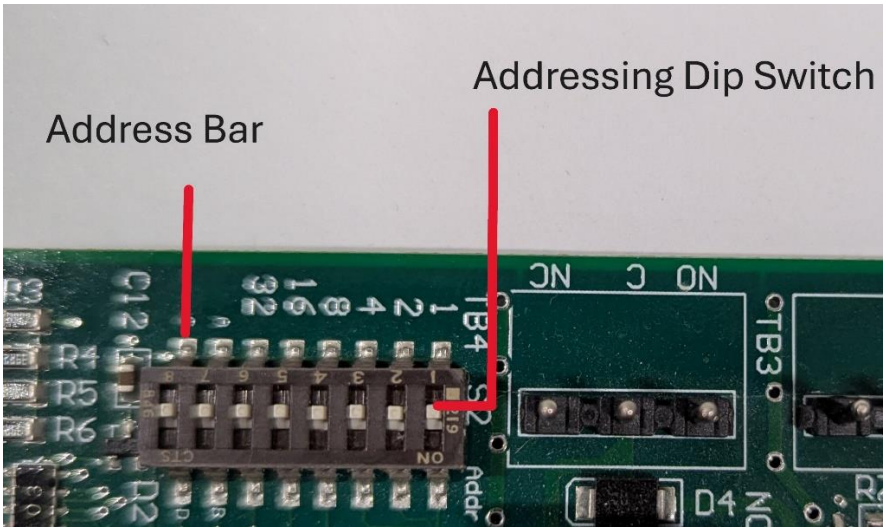


Figure 20 Address Bar and Address Dip Switch

Switches On	Address
No Switches On	0
1	1
2	2
1,2	3
4	4
4,1	5
4,2	6
4,2,1	7
8	8

Figure 21 Address Switches and Corresponding Address

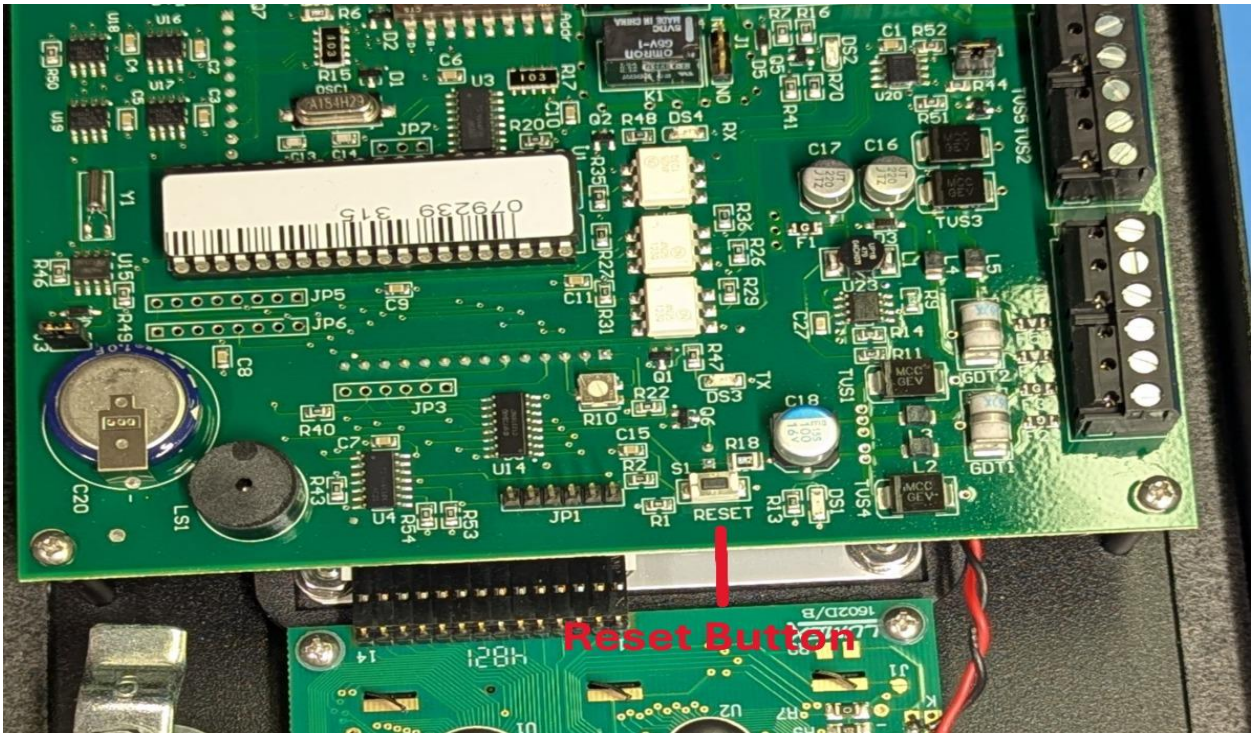


Figure 22 Reset Button on Keypad

Frequently Asked Questions

Q: **I am not a mechanical person, can you come out and install my keypads for me?**

A: Sentinel Systems does not have technicians to come out to do physical installs, but we do have a list of dealers that work with our products that can be found at: https://www.sentinelsystems.com/dealers

Q: **Are the wires going to shock me?**

A: It is always a good rule of thumb to shut off power when working with electricity to prevent injury to yourself and to equipment. However, with the Devender Keypad system and RS485, they run off of 12 volts dc so it is a very low voltage system meaning any potential shock would be very minimal.

Q: **I can't find the color of the wiring that matches the manual, can I use another color combination?**

A: If the wire being used is 18-guage it will work, but using other color combinations can lead to confusion down the line. However, Sentinel Systems sells the wire as specified in this manual and it can easily be purchased by reaching out to the Sales Department at (303) 242- 2000 ext. 1.

Q: **When I start my communications, my keypads say 'OK' one at a time and then switch to repolling, what can I do?**

A: This often is from keypads having the same address, double check all the keypads to make sure they have different addresses. If the addresses are different, it could be as simple as forgetting to hit the reset button on the keypad so make sure to do this as well when checking the keypad addresses.

Q: **My status says ‘OK’ then will randomly fail. If I hit restart communications, the keypad says ‘OK’ again. What is wrong?**

A: It is very likely that there is a loose wire inside of the keypad that is not making a good connection to keep the ‘OK’ status going. This can be caused by something as simple as fluctuating temperatures between hot and cold throughout the year. Opening the keypads up and tightening the wire connections should remedy the issue and is an overall good practice to do once or twice a year.

Q: **Why is the screen on my keypad all jumbled and how do I fix it?**

A: The screen of the keypad can become jumbled if it gets an electric shock and the keypad is not grounded correctly. The usual suspect for this electric shock would be from static electricity from a customer sliding on the car seat to use the keypad. To fix the jumbled screen you just must remove power from the keypad for 10 seconds and to prevent any other issues check to make sure the keypad is grounded correctly.

Q: **I lost my key to my keypads; can I replace it?**

A: Yes! Replacement keys can be purchased by contacting the Sales Department at (303)242-2000 ext. 1.

Q: **I can’t seem to get the system working, who can help me?**

A: Sentinel Systems has a top-notch technical Support Team that is available to help you by calling (303)242-2000 ext. 2