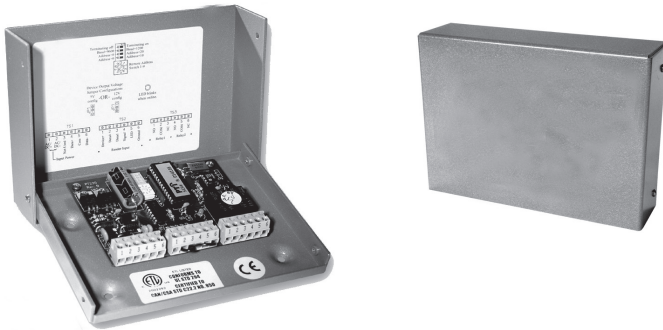




# Wiegand & 2-Channel Relay Board

## Installation and Operation Manual



[www.ptisecurity.com](http://www.ptisecurity.com)

800.331.6224

**SECURITY, ACCESS : CONTROL**

Revised September 2012



Thank you for purchasing the Wiegand & 2-Channel Relay Board. While every effort has been made to ensure the accuracy of the information in this document, PTI Security Systems assumes no liability for any inaccuracies contained herein. We reserve the right to change the information contained herein at any time and without notice.

**NOTE:** This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio TV technician for help.

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

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This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user, at his/her own expense, will be required to take whatever measures may be required to correct the interference.



Incorrect installation of electrical components can result in damage to electronics as well as personal injury.



Cross-wiring the AC power with DC power will damage the electronics.



Cross-wiring the Power wires with the Data wires will damage the electronics.



Cross-wiring the positive and negative on the DC part of the system will damage the electronics.



Do NOT run low voltage system wires in the same conduit as high voltage wiring.

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# Introduction

This is an installation manual for use in setting up the Wiegand & 2-channel relay board. This multi-use board has two functions that can be used either to communicate with a Wiegand protocol device or to function as a 2-channel relay. Wiegand protocol devices include proximity card readers and key fob devices. The 2-channel relay can be used to control gates, doors, lighting zones, or an elevator in a 2 or 3 storey building; as a secure interior relay for UL installation; or as a shunt for alarms or photobeams. The Wiegand & 2-channel relay board is powered by a minimum of 12V to a maximum of 18 VDC or AC power. All remotes should be powered from our 12 VDC power supply. Please read the entire manual before proceeding and follow all steps in order.

# Installation

Use the following procedures to install the Wiegand & 2-channel relay board. While the device is capable of two functions, it can only be wired for one function at a time: either as a Wiegand communication device or as a 2-channel relay device. To use the 2-channel relay function of the board, the jumper wires must be connected from pins 2 to 3 and 3 to 6 of the center terminal block (TS2). The board is shipped with these connected already. Only remove these jumper wires when using the board as a Wiegand communications device.

For either application, communication and power wires must be connected to the controller terminal block using RS485 wire. RS485 is connected directly to the main terminal block and then to the terminal block(s) at other remote devices in-line. Refer to the wiring diagrams starting on page 10 for further clarification. RS485 wire must be 18 AWG, 4-conductor, shielded wire. To purchase this wire or to obtain specifications, contact PTI Security Systems.

## Installation as a Wiegand Protocol Device

The following steps must be used for installation as a Wiegand protocol device. Wiegand protocol devices that can be used with the Wiegand board include proximity readers, key fob entry devices, card readers, etc.

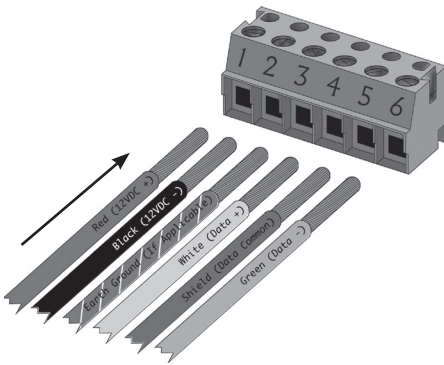
Generally, the Wiegand board should be mounted in a secure location out of general reach of the public but easily accessible for maintenance (i.e., a maintenance closet or in the office). Never install it in a unit. The device that is connected to the Wiegand board should be mounted as per the manufacturer's instructions. The Wiegand board is not weather-resistant and should always be mounted in an interior location.

**NOTE:** Once it has been determined where to install the Wiegand device(s), the location and purpose of the device(s) should be noted on a site security wiring plan that is kept in a safe location for future maintenance and service purposes.

1. After installing the proximity reader, fingerprint reader, or other third-party Wiegand device, run the Wiegand interface cable(s) from the Wiegand protocol device to the Wiegand access device. Most devices limit this distance to 500 linear feet. Refer to manufacturer instructions for the third-party Wiegand protocol device specifications.
2. Open the device by removing the four stainless steel button head machine screws on the sides of the housing using the hex key provided with the unit. The front and back half will separate. Mount the back plate to the desired location using the four holes.
3. Pull the necessary wires through conduit to the housing. Each device should have the following wires:
  - One 18 AWG, 4-conductor, shielded cable coming in from the controller or from the previous AI device in line.
  - One 18 AWG, 4-conductor, shielded cable going out to the next AI device in line (if there is another AI device down the line).
  - One earth ground wire
  - One 18 AWG, 2-conductor cable coming from the door strike or maglock controlled by the device. \*
  - One cable coming from the HID proximity reader, fingerprint reader, or other Wiegand device.

**\* The cable to the door strike or gate operator will only be present if the relay inside the particular keypad is being used to trigger the door or gate. The controller can be configured to use relays on the circuit board, on a separate relay board, or on almost any other AI device to trigger a gate or door. For security reasons, the relay in the keypad nearest a door or gate should not be the one used to directly trigger the gate or door.**

4. Strip back the outer insulation and shield foil from both of the 18 AWG, 4-conductor, shielded cables (coming from the controller or previous AI device in line and going out to the next AI device in line), being careful not to cut the bare shield wire. Strip ¼ inch of insulation off the end of each of the individual colored conductor wires.
5. Remove the terminal blocks from the board by sliding them up and off. The terminal blocks may be somewhat difficult to remove as a tight electrical connection is necessary. If they are tight, rock them slightly back and forth while lifting away from the board.
6. Insert both red wires (coming in from the controller and going out to the next AI device in line) into terminal slot 1 on the first terminal block (TS1). Ensure that both wires are seated all the way inside the slot. Use a flathead precision screwdriver to tighten down the terminal screw. Verify that the terminal slot has tightened down on the copper wire and not on the rubber insulation. Repeat this process with each of the remaining wire connections. See Figure 1.



**Terminal Block TS 1 (Left)**

1. Red DC+ \*
2. Black DC- \*
3. Earth Ground, if applicable
4. White Data +
5. Shield \*\*
6. Green Data-

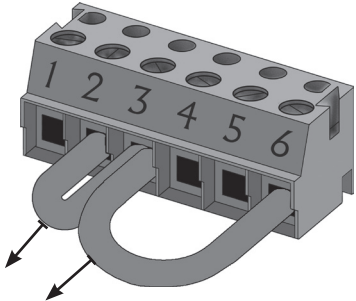
\* If using AC power, place the AC wires in slots 1 and 2. We recommend using 12-18 VDC.

\*\* Shield wire should be insulated with heat shrink or electrical tape.

**Figure 1: Power and Data Communications Connections**

7. In most cases, an earth ground wire should be connected, especially in situations where the device is mounted on a wall that is wood, stone, or other nonconductive material. To connect the ground wire, run a copper wire from a grounded water pipe or from a copper rod in the ground to the keypad and connect it to terminal pin 3 on TS1. This installation must meet applicable code as the type of wire, and depth and size of the rod may vary by municipality.
8. There should be no copper wire showing outside of the terminal slots. Gently tug the wires to verify that they are tightly held.

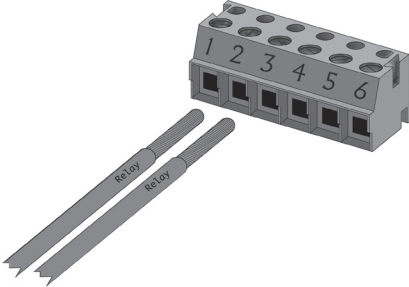
9. The center terminal block (TS2) is used for connection with the Wiegand device. Remove and discard the jumper wires from pins 2, 3, and 6 prior to using this device. See Figure 2. These jumper wires are only necessary when using this device as a 2-channel relay board and will disrupt communication to Wiegand devices if left in. PTI Security Systems uses a 26-bit, V1 Wiegand protocol; any Wiegand devices to be used must be compatible with this protocol.



**Figure 2: Remove Jumper Wires**

10. Strip the Device Power+, Data1, Data0, and Ground wires 3/8" and connect as follows. Connect the Wiegand Device Power+ to pin 1 of TS2 by placing it into the terminal slot and tightening down with a screwdriver. Connect Data1 to pin 2, Data0 to pin 3, and Ground to pin 6 in the same way.

11. The right terminal block (TS3) is used for the relay connection. Pins 1 – 3 are typically used for the door strike or gate operator. Pins 4 – 6 are for a second relay that is not (and cannot be) used with Wiegand devices. If a gate operator or door strike is being triggered directly from this device, the wires will connect to two of these three pins on Relay 1. Refer to the gate or door strike manufacturer's instructions to determine whether it needs to be connected to the normally open and common or to the common and normally closed. See Figure 3.



**Terminal Block TS3 (Right)**

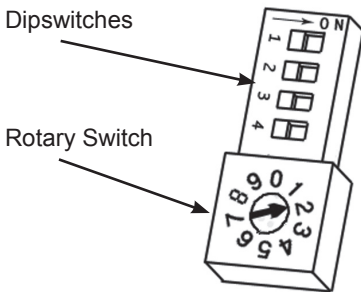
- 1. Relay 1 Normally Open
- 2. Relay 1 Common
- 3. Relay 1 Normally Closed

**Figure 3: Relay Connection Settings**

12. Depending on the Wiegand protocol device connected to the Wiegand board, further programming may need to be done in the Wiegand device. Refer to manufacturer's instructions for more information.



13. Some Wiegand devices will have Signal and LED wires. The signal wire generally will be a card presence indicator and is connected to pin 4 of TS2. The LED wire generally allows the device to activate a green LED when the access is approved. The LED wire is connected to PIN 5 of TS2. The installer can also connect an LED of their own if the device does not have one by connecting it to pin 5 and pin 6 of TS2.
14. After all wires are connected, the unit must be addressed. Use a small precision standard screwdriver to turn the Rotary Switch to an address number from 0 – 9. Use dipswitches 2 – 4 to add 10, 20, or 30 to that number. This allows any address from 1 – 69 to be created. DO NOT address the relay to 22 as this address is reserved for Site Graphics. As with keypads, multiplexers, and other AI devices, the address must be unique with no duplication between devices.



Dipswitches	
OFF	ON
1 Terminating Off *	Terminating On *
2 Address + 0	Address +30
3 Address +0	Address +20
4 Address +0	Address +10

Rotary Switch
0 – 9 adds 0 – 9 to the Address

**Figure 4: Dipswitch Settings**

\* Dipswitch # 1 (the terminating resistor) places a communication line terminating resistor across the RS485 data lines when turned on and should never be turned on instructed to by a Tech Support Representative. This is only turned if the Wiegand & 2-channel relay board is the last remote device on a communication line that is more than 800 feet from the controller. On all other devices the terminating resistor should be turned off. If this is turned on at more than one AI device or on a healthy system with no signal reflection, it can cause communications problems.

**Note:** There should only be one remote device (keypad, Wiegand, etc) in the entire access control system with a terminating resistor turned on.

15. When the unit is programmed, close the housing and screw it back together.

## Installation as a 2-Channel Relay Board

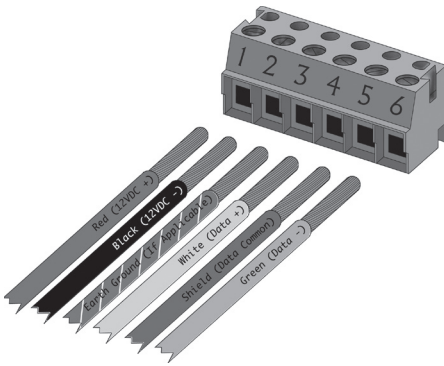
The following steps must be used for installation as a 2-channel relay device. The relay function can be used for alarm shunts, secure relays, elevators, and lighting zones.

Generally, the 2-channel relay board should be mounted in a secure location out of general reach of the public but easily accessible for maintenance (i.e., a maintenance closet or in the office). Never install it in a unit. The device(s) connected to the 2-channel relay board should be mounted as per the manufacturer's instructions. The 2-channel relay board is not weather-resistant and should always be mounted in an interior location.

1. Open the device by removing the four stainless steel button head machine screws on the sides of the housing using the hex key provided. The front and back half will separate. Mount the back plate to the desired location using the four holes.
2. Pull the necessary wires through conduit to the housing. Each device should have the following wires:
  - One 18 AWG, 4-conductor, shielded cable coming in from the controller or from the previous AI device in line.
  - One 18 AWG, 4-conductor, shielded cable going out to the next AI device in line (if there is another AI device down the line).
  - One earth ground wire
  - One or two 18 AWG, 2-conductor cables coming from the gate operator, door strike, elevator, lighting zone, or other relay controlled device. \*

**\*The 2-channel relay board can be used to control elevators on a 2 or 3 storey building, 2 lighting zones, 1 or 2 secure interior relays, or any number of other relay functions that can be programmed into the access control software.**

3. Strip back the outer insulation and shield foil from both of the 18 AWG, 4-conductor, shielded cables (coming from the controller or previous AI device in line and going out to the next AI device in line), being careful not to cut the bare shield wire. Strip ¼ inch of insulation off the end of each of the individual colored conductor wires.
4. Insert both red wires into terminal slot 1 on the first terminal block (TS1). Ensure that both wires are seated all the way inside the slot. Use a flathead precision screwdriver to tighten the terminal screw. Verify that the terminal slot has tightened down on the copper wire and not on the rubber insulation. There should be no copper wire showing outside of the terminal slot. Gently tug the wires to verify that they are tightly held inside the terminal slot. Repeat this process with each of the remaining wire connections. See Figure 5.



#### Terminal Block TS 1 (Left)

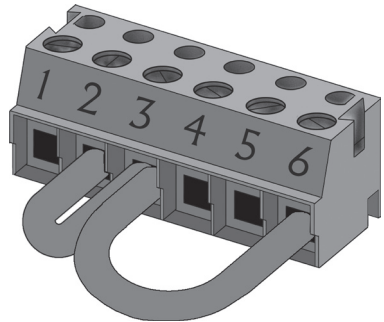
1. Red DC+ \*
2. Black DC- \*
3. Earth Ground, if applicable
4. White Data +
5. Shield \*\*
6. Green Data-

\* If using AC power, place the AC wires in slots 1 and 2. We recommend using 12-18 VDC.

\*\* Shield wire should be insulated with heat shrink or electrical tape.

**Figure 5: Power and Data Communications Connections from Controller**

5. The center terminal block (TS2) is only used for connections when the board is used for Wiegand devices. The board comes with jumper wires between pins 2 – 3 and 3 – 6. These ground any potential radio frequency interference on the Wiegand circuit and must be left in place when the board is being used as a 2-channel relay board. If the wires have been removed, they must be replaced to prevent any interference. See Figure 6.



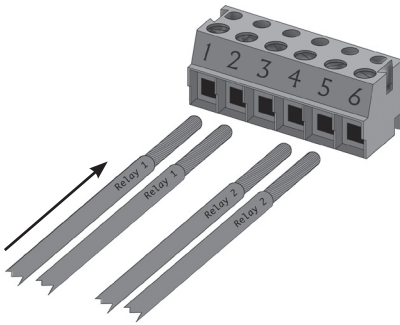
**Figure 6: Jumper Wire Settings**

6. The terminal block on the bottom right corner of the board (TS3) has two relays that are used for the relay connection. Pins 1 – 3 are Relay 1 and pins 4 – 6 are Relay 2.

Relay 1: Pin 1 is the Normally Open connection, Pin 2 is the common ground, and Pin 3 is the Normally Closed connection.

Relay 2: Pin 4 is the Normally Open connection, Pin 5 is the common ground, and Pin 6 is the Normally Closed connection. See Figure 7.

Remove the terminal blocks from the board by sliding them up and off. The terminal blocks may be somewhat difficult to remove as a tight electrical connection is necessary. If they are tight, rock them slightly back and forth while lifting away from the board.



**Terminal Block TS3 (Right)**

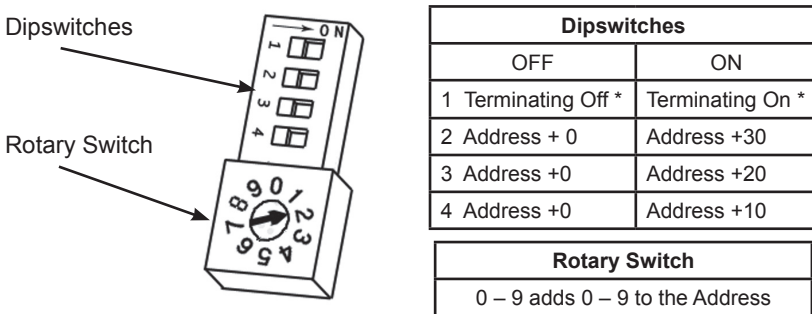
1. Relay 1 Normally Open
2. Relay 1 Common
3. Relay 1 Normally Closed
4. Relay 2 Normally Open
5. Relay 2 Common
6. Relay 2 Normally Closed

**Figure 7: Relay Connection Settings**

Whether controlling a gate, lights, elevator, door strike, or other device, two wires will connect directly to two of the pins on 1 – 3 and another device can be connected to two of the pins on 4 – 6. Refer to the manufacturer’s instructions for the door strike, gate, elevator, or lights to determine whether it needs to be connected to the normally open and common or to the common and normally closed.

7. Connections to door strikes, gate operators, and maglocks can generally be done by the installer. Connections to elevators generally must be completed by a licensed elevator installer. It is important to schedule installation with the elevator company in advance. In some cases, connections to high voltage lights will require a licensed electrician as these connections (devices that switch over 30V) require a contactor block to be used.
8. An earth ground wire should be connected in situations where the device is mounted on a wall that is wood, stone, or other nonconductive material. To connect the ground wire, run a copper wire from a grounded water pipe or from a copper rod in the ground to the keypad and connect it to terminal slot 3 on TS1. This installation must meet applicable code as the type of wire, and depth and size of the rod may vary by municipality.
9. The relays on this board are low voltage only and must not be used for more than 30VAC or DC. For gate motors and certain light connections using more than 30V, a contactor block should be used to handle the higher voltage.

10. An optional switch can be wired to 'P2' in the upper right-hand corner of the circuit board. Closing this switch triggers both relays simultaneously and holds them as long as the switch is closed. This can be used for a manual override or for emergency fire department access and egress.
11. After all of the wires are connected, the unit must be addressed. Use a small precision standard screwdriver to turn the Rotary Switch to an address number from 0 – 9. Use dipswitches 2 – 4 to add 10, 20, or 30 to that number. DO NOT address the relay to 22 as this address is reserved for Site Graphics. This allows any address from 1 – 69 to be created. As with keypads, multiplexers, and other AI devices, the address must be unique with no duplication between devices. See Figure 8.



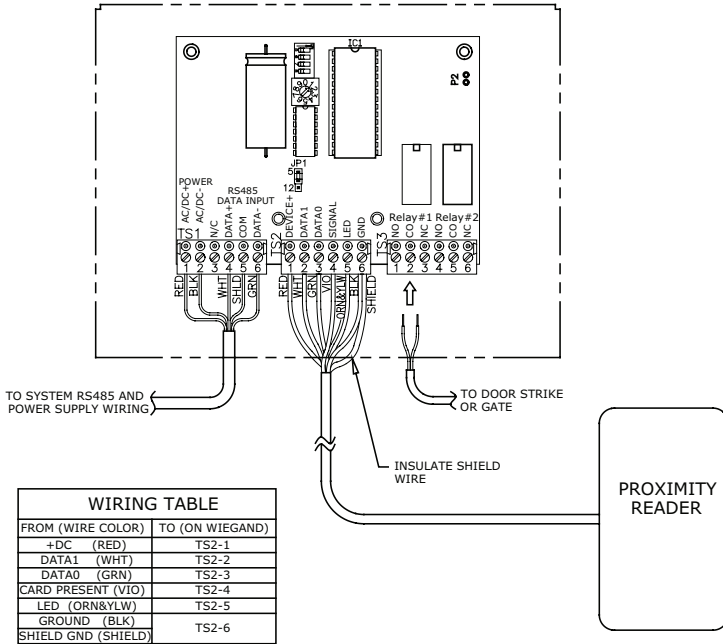
**Figure 8: Dipswitch Settings**

\* Dipswitch # 1 (the terminating resistor) places a communication line terminating resistor across the RS485 data lines when turned on and should never be turned on instructed to by a Tech Support Representative. This is only turned if the Wiegand & 2-channel relay board is the last remote device on a communication line that is more than 800 feet from the controller. On all other devices the terminating resistor should be turned off. If this is turned on at more than one AI device or on a healthy system with no signal reflection, it can cause communications problems.

**Note:** There should only be one remote device (keypad, Wiegand, etc) in the entire access control system with a terminating resistor turned on.

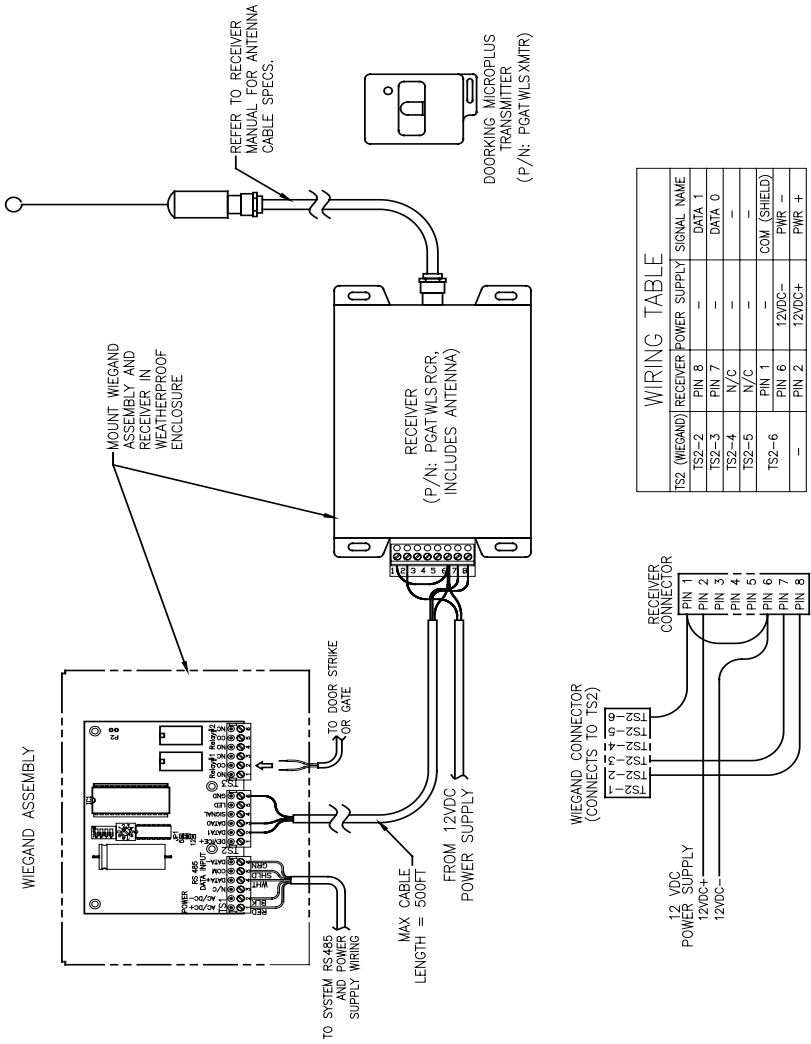
12. When the unit is programmed, close the housing and screw it back together.

# Installation Wiring Diagrams – Wiegand Protocol Devices



**Figure 9: Installation as an HID Proximity Reader**

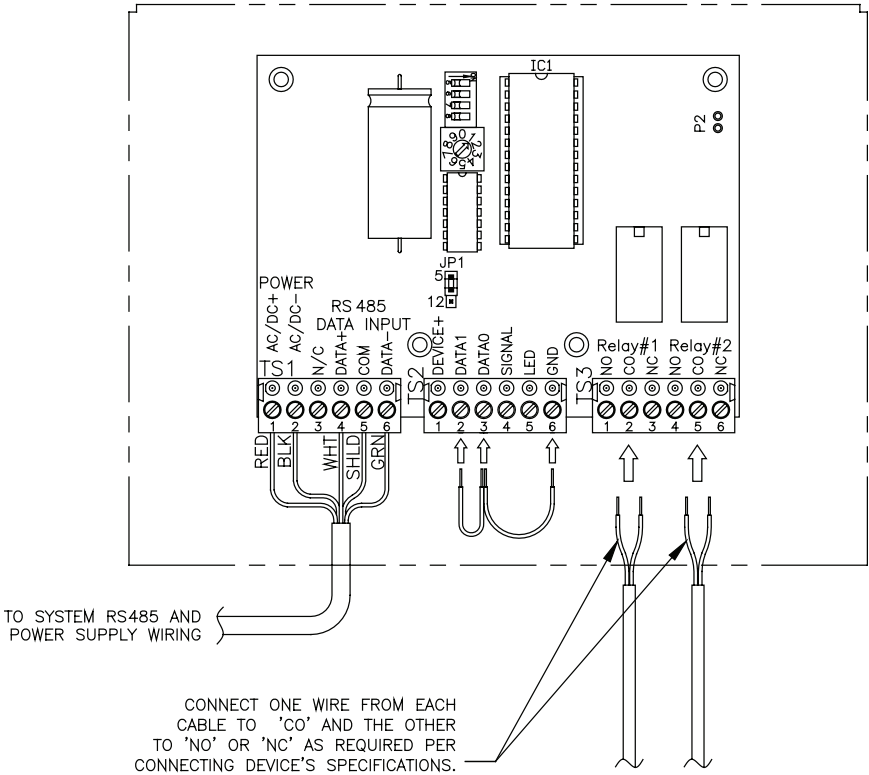
The Wiegand & 2-channel relay board can be installed with a proximity reader to allow access through a door or gate. In most cases, up to two readers can be installed to the same Wiegand & 2-channel relay board (as long as there is sufficient power for each reader). The wires from each reader go into the same holes on TS2. See Figure 9. Typically, this can be used to control a door with a Proximity reader on each side of the door connected to the same Wiegand & 2-channel relay board.



**Figure 10: Installation as a Wireless Key fob Access**

Similar to the proximity reader, the key fob reader can be installed to allow access through a gate or door. Depending on the placement of the antenna, you may only need one Wiegand & 2-channel relay board and receiver, however, two receivers may be used if needed.

# Installation Wiring Diagrams – 2-Channel Relay Device

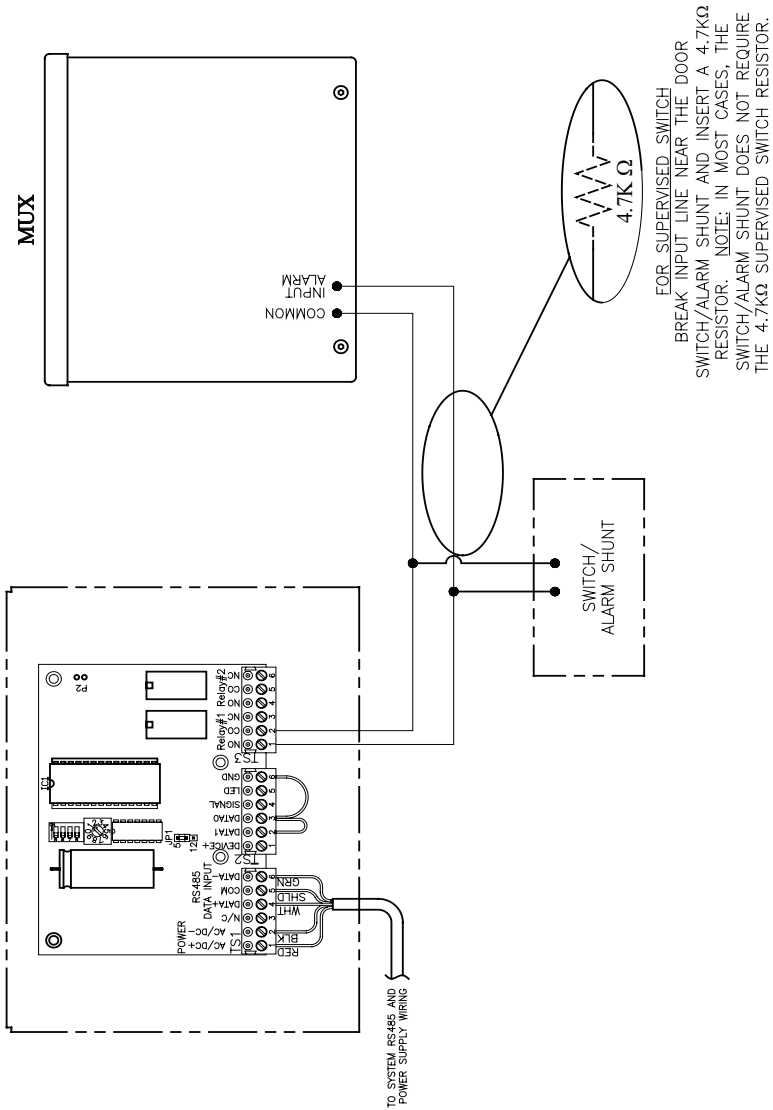


**Figure 11: Installation as a 2-Channel Relay Device**

The Wiegand & 2-channel relay board can be used in situations where both relays are needed (such as lighting zones, elevators, multiple alarm shunts, etc.). In these cases, the Wiegand function cannot be used and the Wiegand protocol Data1 and Data0 on pins 2 and 3 of TS2 must be tied to ground on pin 6 of TS 2. The relays must be set up in access control software.

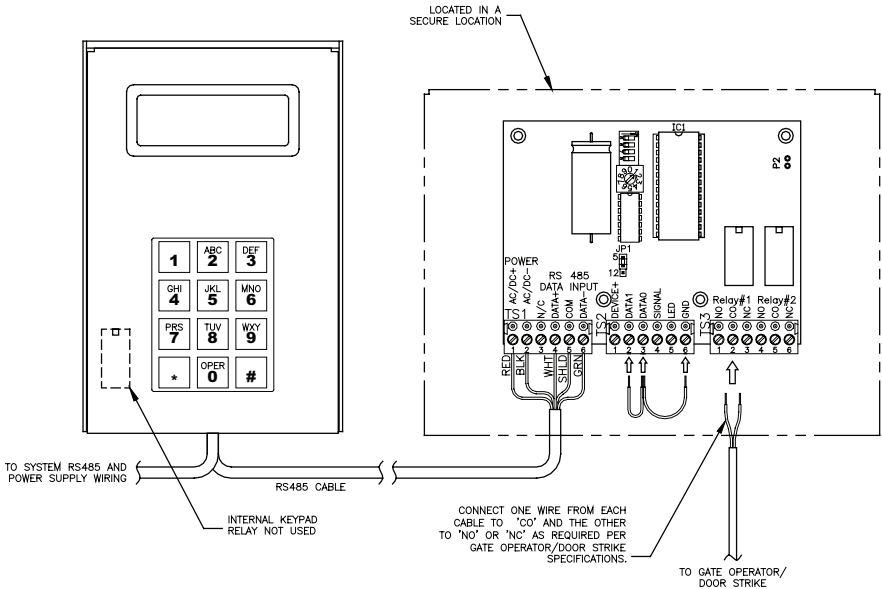


# Optional 2-Channel Relay Setup Wiring Diagrams



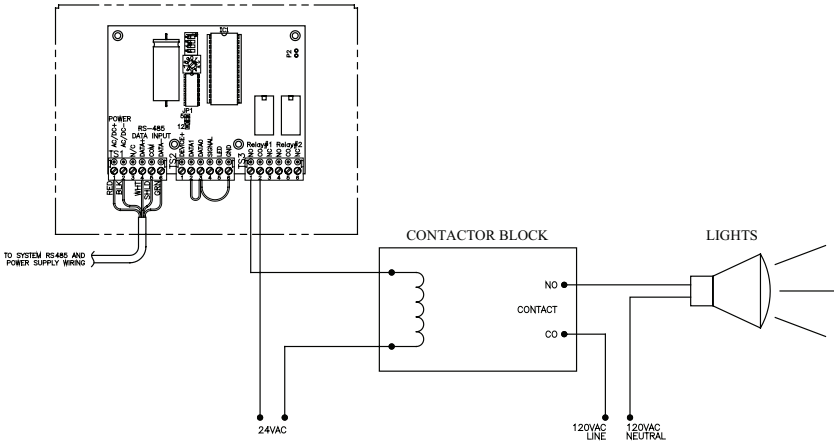
**Figure 12: Alarm Shunt Connections**

Alarm shunts are used to allow exit from a specific alarmed door or through an area covered by motion sensors by holding the relay for a certain amount of time. This allows the manager to set a door alarm, photo beam, or motion sensor while inside the zone and still be able to exit the zone without triggering the alarm. The alarm will be set after the preset relay time has run out.



**Figure 13: Secure Interior Relay**

Secure interior relays are recommended for high security installations. The keypad (or other access device) is located outside of the secured area to allow the customer to enter their code for access. However, the access control software is programmed to trigger the relay inside the relay board or the controller to actually open the secured door or gate. The relay inside the keypad or other access device is not used. This prevents someone from opening the keypad and placing a jumper over the relay wires to gain access.

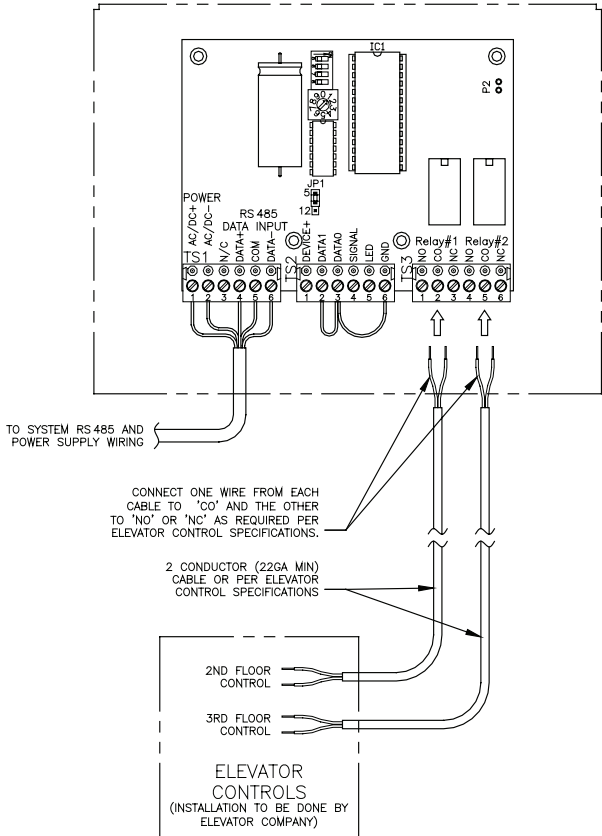


**Figure 14: Lighting Zone Controls**

Lighting zones are used to control lights for power conservation on a site or photo beams for access control. By connecting hallway lights to the Wiegand & 2-channel relay board via a contactor block, the lights will remain off when no one is in that area or on that floor. The lights turn on automatically when someone with a unit in that area logs onto the property and they turn off again after they leave. Programming for this feature is covered in the access control software Help Files.

Photo beams can be used in the same way, securing an area until a customer whose unit is in that area comes on-site. Then the beam will be shut off until the customer logs off the site. A Wiegand & 2-channel relay board can control up to 2 lighting zones.

**Caution:** High voltage relay connections (over 30V) must be run through a contactor block as this exceeds the relay tolerances on the Wiegand & 2-channel relay board. Lighting zones must be set up in the access control software.



**Figure 15: Elevator Controls**

Elevator controls are similar to lighting zones. When the elevator floor controls are connected through the Wiegand board, only customers with units on a certain floor can gain access to that floor. The keypad or proximity reader is placed immediately outside the elevator or inside the elevator car. The elevator buttons will not function until the user inputs a valid access code. Then, only the button(s) to the floor(s) the user has access to will become operational. Users are unable to push buttons to go to any other floor. A Wiegand & 2-channel relay board can control an elevator only on a 2 or 3 storey building.

**Caution:** High voltage relay connections (over 30V) must be run through a contactor block as this exceeds the relay tolerances on the Wiegand & 2-channel relay board. Elevators must be set up in the access control software.

# Warranty & Disclaimer

PTI Security Systems warrants its products and equipment to conform to its own specifications and to be free from defects in materials and workmanship, under normal use and service, for a period of one year from the date of shipment. Within the warranty period, PTI Security Systems will repair or replace, at its option, all or any part of the warranted product which fails due to materials and/or workmanship. PTI Security Systems will not be responsible for the dismantling and/or re-installation charges. To utilize this warranty, the customer must be given a Return Materials Authorization (RMA) number by PTI Security Systems. The customer must pay all shipping costs for returning the product.

This warranty does not apply in cases of improper installation, misuse, failure to follow the installation and operating instructions, alteration, abuse, accident, tampering, natural events (lightning, flooding, storms, etc.), and repair by anyone other than PTI Security Systems.

This warranty is exclusive and in lieu of all other warranties, expressed or implied, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. PTI Security Systems will not be liable to anyone for any consequential or incidental damages for breach of this warranty or any other warranties.

This warranty will not be modified or varied. PTI Security Systems does not authorize any person to act on its behalf to modify or vary this warranty. This warranty applies to PTI Security Systems products only. All other products, accessories, or attachments used in conjunction with our equipment, including batteries, will be covered solely by their own warranty, if any. PTI Security Systems will not be liable for any direct, incidental, or consequential damage or loss whatsoever, caused by the malfunction of product due to products, accessories, or attachments of other manufacturers, including batteries, used in conjunction with our products. This warranty does not warrant the replacement of batteries that are used to power PTI Security Systems products.

The customer recognizes that a properly installed and maintained security system may only reduce the risk of events such as burglary, robbery, personal injury, and fire. It does not insure or guarantee that there will be no death, personal damage, and/or damage to property as a result. PTI Security Systems does not claim that the Product may not be compromised and/or circumvented, or that the Product will prevent any death, personal and/or bodily injury and/or damage to property resulting from burglary, robbery, fire, or otherwise, or that the Product will in all cases provide adequate warning or protection.

PTI Security Systems products should only be installed by qualified installers. The customer is responsible for verifying the qualifications of the selected installer.

PTI Security Systems shall have no liability for any death, injury, or damage,

however incurred, based on a claim that PTI Security Systems Products failed to function. However, if PTI Security Systems is held liable, directly or indirectly, for any loss or damage arising under this limited warranty or otherwise, PTI Security Systems's maximum liability will not in any case exceed the purchase price of the Product, which will be fixed as liquidated damages and not as a penalty, and will be the complete and exclusive remedy against PTI Security Systems

**Warning: The User should follow all installation, operation, and maintenance instructions.** The User is strongly advised to conduct Product and systems test at least once each week. Changes in environmental conditions, electric or electronic disruptions, and tampering may cause the Product to not perform as expected.

**Warning: PTI Security Systems warrants its Product to the User.** The User is responsible for exercising all due prudence and taking necessary precautions for the safety and protection of lives and property wherever PTI Security Systems Products are installed. PTI Security Systems does not authorize the use of its Products in applications affecting life safety.

**Notice.** Some PTI Security Systems products use 900Mhz wireless technology. Other devices at the site such as cordless telephones or alarm components may cause interference that will disrupt the operation of the system or may be interfered with by the system. PTI Security Systems assumes no liability for any problems caused by interference. It is the sole responsibility of the user to identify and correct such problems.



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