ISONAS™
PURE IP ACCESS CONTROL

How to Install a
PowerNet™ IP-Bridge

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Document Version

Date of Revision	Revision	Author	Description
5/20/2013	1.00	Shirl Jones	Initial Release
8/12/2013	1.01	Shirl Jones	Expanded Wiegand Device guidelines
11/13/2013	1.02	Shirl Jones	Described PoE Jumper & Reset button location
2/25/2014	1.03	Shirl Jones	Enhanced power and grounding instructions
5/9/2017	1.04	Melissa Stenger	Updated software information, configuration info, and power instructions
11/11/2020	1.05	Nick Baker	UL294 7th Edition and general updates

1: <u>INTRODUCTION</u>

This document is the complete guide for mounting and wiring the ISONAS IP-Bridge product models IP-Bridge-2 and IP-Bridge-3.

The IP-Bridge has some special capabilities that support multiple types of input power and daisy chaining multiple IP-Bridge's together.

For this reason, it is essential that you read through this entire guide before attempting an installation.

> **Note: Within the Pure Access Software package, these models use the abbreviated model labels IPBR-2 & IPBR-3.**

1.1: <u>BEFORE YOU BEGIN</u>

The following core tasks are involved when installing an ISONAS IP-Bridge:

1. Mount the IP-Bridge in the appropriate indoor location.

2. Wire the IP-Bridge to the door's locks and other components required for physical access control.

3. Supply power to the IP-Bridge unit. This may be accomplished with power being provided on the Ethernet data cable (Power over Ethernet [PoE]) or through an external DC power source (12VDC or 24VDC)

4. Connect the unit to the data network for communication with the host workstation.

5. The IP-Bridge complies with UL 294 7th Edition and is rated for the following Access Control Performance Levels:

Feature	**Level**
Destructive Level Attack	**I**
Line Security	**IV**
Endurance Level	**IV**
Standby Power	**I**
Single Point Locking Device	**I**

1.2: <u>GENERAL INFORMATION & REQUIREMENTS:</u>

- If PoE is not being used, then use only UL-listed, access control, power-limited power supplies with an 'AC on' indicator light clearly visible on the enclosure. ISONAS recommends that Power supplies should provide at least four hours of standby power.

- Never connect power supplies to a switch-controlled receptacle.

- Install the ISONAS system in accordance with the National Electrical Code NFPA 70. (Local authority has jurisdiction.)

- The PoE Power Source needs to comply with National Electric Code, ANSI/NFPA 70, Article 725.121, Power Sources for Class 2 and Class 3 circuits.

- Use only wire or UL-listed cabling recognized as suitable for ISONAS power supply and data communications, in accordance with the National Electrical Code.

- Category 5e cabling is the minimum performance category recommended. The performance category utilized should match the transmission speed required at the installation site.

- The minimum conductor gauge permitted to connect between the PSE or power injector and the PD (powered device) shall be 26 AWG ($0.13mm^2$) for patch cords; 24 AWG ($0.21mm^2$) for horizontal or riser cable.

- For UL compliance, when the product is powered via PoE, the power source must be either compliant with UL 294B or UL 294 7th Edition.

- Compatible with UL 294 compliant PoE Network Switches and Midspan PoE Injectors.

- Where possible, separate ISONAS equipment and cabling from sources of electromagnetic interference (EMI). Where this is not possible, take other steps to reduce the effect of EMI on cabling or equipment.

- Protect the input and output terminals adequately from transient signals. Also, connect these terminals to power-limited circuitry.

- Compliance with IEEE 802.3 (af or at) specifications are not verified.

1.3: POWERNET IP-BRIDGE SPECIFICATIONS:

Input Voltage	PoE per IEEE 802.3at at RJ45 Upstream Port PoE per IEEE 802.3af at RJ45 Upstream Port 12V DC to 28V DC at 5.5mm x 2.5mm Barrel Plug
Current Draw	< 0.26 AMPS @ 12VDC < 0.18 AMPS @ 24VDC PoE: 4 Watts
Maximum Supplied Power for External Devices PoE-Plus power (IEEE 802.3at)	1.60 AMPS @ 12VDC
Maximum Supplied Power for External Devices PoE power (IEEE 802.3af)	0.60 AMPS @ 12VDC
Upstream Ethernet Interface	TCP/IP Over Ethernet 10 Mbps, auto-negotiation
Downstream Ethernet Interface	TCP/IP Over Ethernet 10 Mbps, auto-negotiation Supports 30 downstream IP devices

Inputs/Outputs	For each supported door:
	  4 Inputs:
	    Wiegand; REX; AUX; and Door Sensor
	  5 Outputs:
	    2 TTL Outputs
	    RED LED; GREEN LED; Beeper

Wiegand Data Connection	500 ft Maximum Length
Lock Relay	2.00 amp @ 30V DC (Resistive load) 0.03 amp @ 120V AC (Resistive load)
Standalone Memory Capacity	20000 Cards / Door 5000 Events / Door 32 Time zones / Door
Visual Indicators	6 or 8 LEDs for Normal Operations
Operating Conditions	Indoor Use ONLY, -40° to +80° Celsius
Weight	Approximately 14 Ounces
Size	6.28 L x 3.55 W x 2.26 H (inches)

1.4: <u>INSTALLER TOOLKIT COMPONENTS</u>

Before an installer goes to a customer site, they need to put together their supplies and toolkit. The ISONAS solution is simpler to install than other Access Control Systems, but materials are still needed. Some of those materials may be different than what you are used to carrying. The list below identifies some important items that you should make sure to bring with you, to the customer's site.

A prepared installer will have:

Installer completed the on-line reseller training program.

An installer's Tool Kit should include the following:

1. **The copy of the IP-Bridge Installation and Wiring Guide**
2. **A Volt-Ohm Meter**
3. **A PoE Injector**
4. **A Cross-over Cat5e/Cat6 cable**
5. **A straight-thru Cat5e/Cat6 patch cable.**
6. **Basic Ethernet network cable tester (Tests for: Opens, Shorts, Split Pairs, Mis-wires & Reversals)**
7. **A spare IP-Bridge**
8. **An extra Daisy-Chain power cord:**

   (part numbers IPB-Cbl-Pwr2-3in or IPB-Cbl-Net2-6in)
9. **The ISONAS As-Built forms, which is used to record the details of the door's installation.**

The customer's site should have Internet access. This enables the use of on-line meeting tools, such as GoToMeeting, during any remote support sessions.

2: <u>PHYSICAL INSTALLATION</u>

When selecting the location where you are going to mount the ISONAS IP-Bridge, a few guidelines should be observed.

1) The IP-Bridge should be protected from extreme heat and sunlight. It is rated for indoor use, between -40 to 80 degrees C.

2) The IP-Bridge is designed to be mounted on a standard 35 mm DIN Rail.

3) Mounting the IP-Bridge inside of a control cabinet or a NEMA housing is recommended.

4) When planning a project's DIN rail layout, determine if the door device's electrical return connections will be terminated by the optional modular DIN terminal blocks. If so, adjust the IP-Bridge's location on the DIN rail to allow space for the modular terminal blocks.

5) The IP-Bridge should be located within a 500-foot cable length of the devices being controlled.

2.1: <u>MOUNTING THE IP-BRIDGE</u>

The major steps involved with the physical mounting of the IP-Bridge include:

1) Planning the location of the DIN rail(s)

   a. Typically inside a control cabinet, or NEMA housing.

2) Attaching the DIN rails to housing's mounting surface

3) Snapping the IP-Bridge to its DIN rail

4) Attaching the optional terminal block(s)

5) Repeat the process, for any additional IP-Bridges

2.2: <u>VISUAL STATUS INDICATORS</u>

The IP-Bridge has multiple LED status indicators to assist in monitoring and troubleshooting the status of the unit. LED's are labeled in **Figure 01.** LED's A and B are used to indicate the status of the IP-Bridge itself. The C & D LED pairs indicate the status of individual doors.
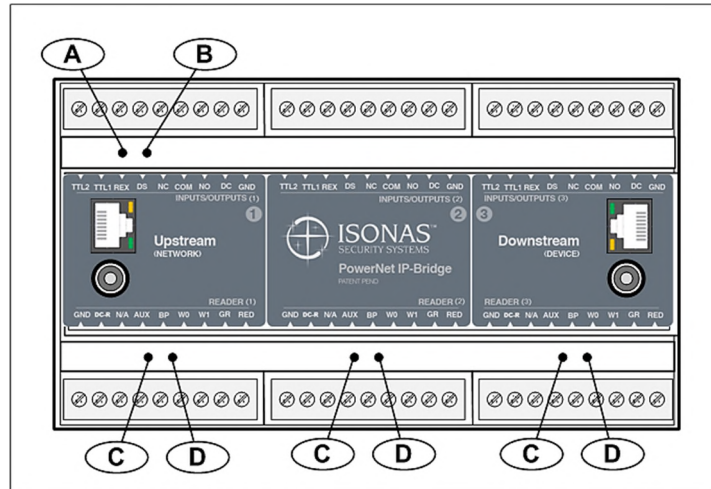
Figure 01

IP-Bridge Status	LED "A" Color	LED "B" Color
IP-Bridge is not powered on	Off	Off
Power Turned On – Waiting in Boot Loader mode (~10 sec)	Red	Red
Performing All IP work, all mode, duration depends on settings	Amber	Red
IP Work completed (except long DNS lookups), ports/DNS	Red	Amber
Startup Complete. No issues reported.	Green	Off
Startup Complete. Errors reported, check history	Green	Amber

| Door Status (occurs once for each supported door)	LED "C" Color	LED "D" Color
Waiting In (Startup) or Performing Boot Load	Amber	Amber
Waiting to be activated (if ever) or door process issue	Off	Amber
Normal Operation	Red	Off
No Door (2-door Bridge)/Deactivated Door	Off	Off
Door is unlocked	Green	Green
Door is in the Lockdown condition	Red	Red
Door is unlocked, for the latch interval	Green	Off

2.3: <u>IP-BRIDGE RESET BUTTON</u>

The PowerNet IP-Bridge has a recessed reset-button located in the position shown on **Figure 02**. It can be used for two different types of resets.

It is helpful to monitoring the amber LAN status LED allows you to determine the status of the reset operation.

- **Reset CPU:** Press, hold (approx. 2 seconds) and release the Reset button. Once the Reset Button <u>is released</u>, all the door status LED's will turn amber, and in 15 seconds return to the normal display. If the door's LEDs do not turn amber, then the reset did not occur.

- **Reset Configuration:** Press and hold the Reset button (approx. 10 seconds), <u>until</u> all door status LED's turn Amber. After the LED's turn Amber, release the Reset button. Selected IP-Bridge configurations are reset to factory defaults. Setting that are changed include:

Setting	Default Value
DHCP	On
IP Address	192.168.1.119
IP Port	10001
Subnet Mask	255.255.0.0
Gateway	0.0.0.0
ACS Server	SrvrAcs
ACS Server IP	0.0.0.0
Clear AES Encryption Configuration	
Reset the IP-Bridge's Password	
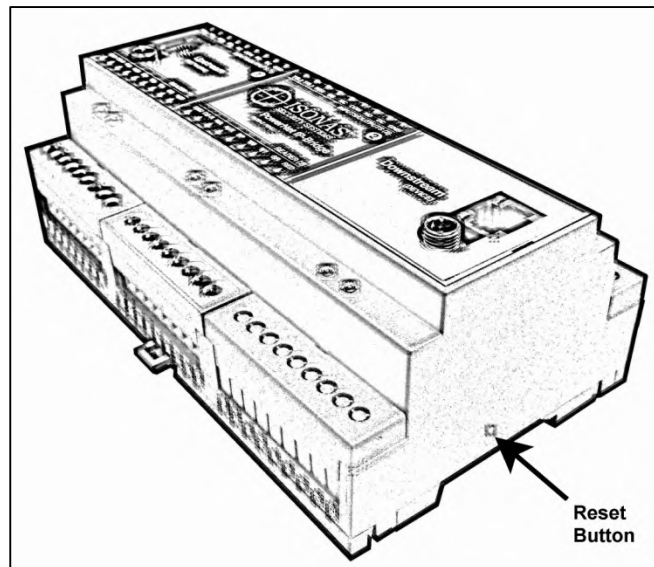
Figure 02

3: <u>NETWORK</u>

The IP-Bridge is connected to the customer's network using the "Upstream" RJ45 port. The IP-Bridge network connection auto-detects the speed between 10MB or 100MB, depending on the speed capabilities of the customer's network.

3.1: <u>NETWORK CONFIGURATION</u>

The ISONAS Configuration utility tool can be used to configure the IP-Bridge's network settings. Here is more information on <u>configuring IP-Bridges</u> to Pure Access.

Items that may be configured include:
1) Is DHCP being used?
    a. Host computer's IP Address, or network alias
2) If DHCP is not used:
    a. Static IP Address.
    b. Subnet Mask.
    c. Gateway Address.
3) IP Port used by the IP-Bridge
4) Is "Client Mode" being used?
    a. Remote Host IP Address or URL
    b. Remote Host IP Port
    c. DNS Server IP Address

3.2: <u>DAISY-CHAINING NETWORK DEVICES</u>

The IP-Bridge supplies the functionality of a two-port network switch. It has two physical RJ45 ports or sockets labeled "Upstream" and "Downstream" as shown in **Figure 03.**

The "Upstream" RJ45 port is used to connect to the customer's network. Some network switches label this as the "uplink" port.

The "Downstream" RJ45 port is used to connect to other Ethernet devices; such as additional IP-Bridges, IP based cameras, etc.

The network traffic going to/from the connected devices via the "Downstream" Port will be directed by the IP-Bridge through the "Upstream" port.

The "Downstream" port will be provided PoE Power, as long as the IP-Bridge is being powered by PoE and sufficient power is available. It is possible to disable the PoE feed going out of the downstream port.
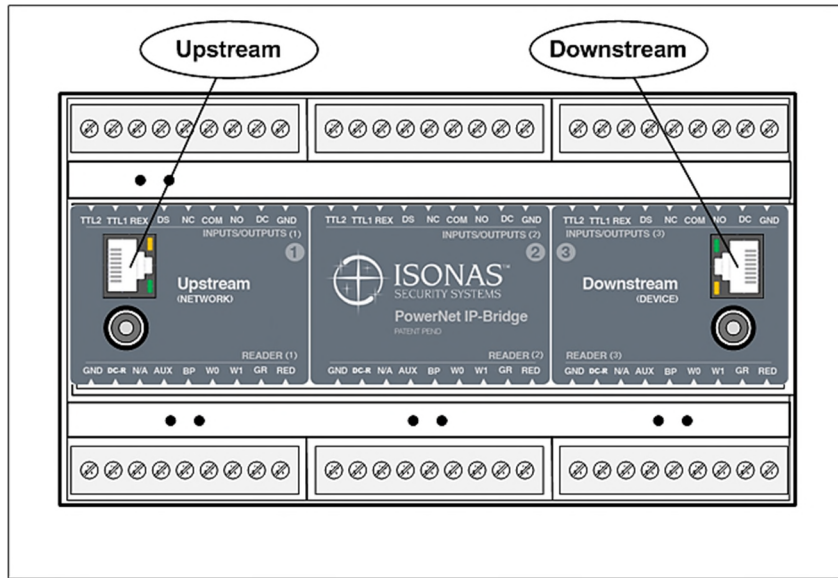
Figure 03

4: <u>IP-BRIDGE POWER</u>

The IP-Bridge can be powered with PoE, PoE+, or DC power in the range of 12VDC to 28VDC.

NOTE: DO NOT power the IP-Bridge with PoE and 12/24VDC. If you are powering with external power, please ensure your network cable is providing data only. Using PoE and 12/24VDC simultaneously will void the warranty.

4.1: <u>PoE POWER</u>

PoE power can used to power the IP-Bridge itself and is commonly used to provide power to the components at the door, such as an electric lock, a Wiegand device, and/or a passive infrared motion detector.

The IP-Bridge can be use two types of PoE.

PoE (IEEE 802.3af) --- 13 watts of power can be supplied to the IP-Bridge, via a PoE network switch that meets the 802.3af standard. 13 watts is enough power for the IP-Bridge itself and a single door's typical hardware (Wiegand reader and lock).

PoE+ (IEEE 802.3at) --- 25.5 watts of power can be supplied to the IP-Bridge, via a PoE network switch that meets the 802.3at standard.

The IP-Bridge will auto-negotiate to accept the type of PoE being supplied by the network switch.

To meet the IP-Bridge's variable PoE power requirements, the IP-Bridge will classify itself with the PoE source as a "Class 0" PoE device, or "Class 4" PoE+ device. The power usage of a "Class 0" PoE device can range between 0.4 to 13.0 watts at the device. The power usage of a "Class 4" PoE+ device can range between 12.95 to 25.5 watts at the device.

4.1.1: <u>PoE POWER CALCULATIONS</u>

When the IP-Bridge is being powered by PoE-Plus, it can supply power to external devices thru three different methods.

- The 10VDC output for the Wiegand devices (via the "DC-R" terminal)

- The 12VDC output for other devices.   (via the "DC" terminal)

- PoE power to network devices that are daisy-chained to the IP-Bridge:

  - Type "B" PoE is supplied downstream.

  - Jumper Pin adjustment is required   (See next section)

Table A is a worksheet that will help you calculate how much power is available for the daisy chained "downstream" devices. **Figure 04** graphically displays the related power flow.

| Diagram Label	Purpose	Milliamps Supplied (mA)	Factor	Calculated Watts (mA) * (Factor)
"A"	"DC-R" Output (10VDC)		**0.0117**	
"B"	"DC" Output (12VDC)		**0.0141**	
IPBridge	Power consumed by IPBridge's electronics			**4**
	Total Power Used by IPBridge	Sum of values listed above		
PoE Input	If using PoE: enter 12.95 watts If using PoE Plus: enter 25.50 watts			
Answer	**PoE Wattage Available Downstream** Answer = (PoE Input) – (Total Power Used)			

Table A
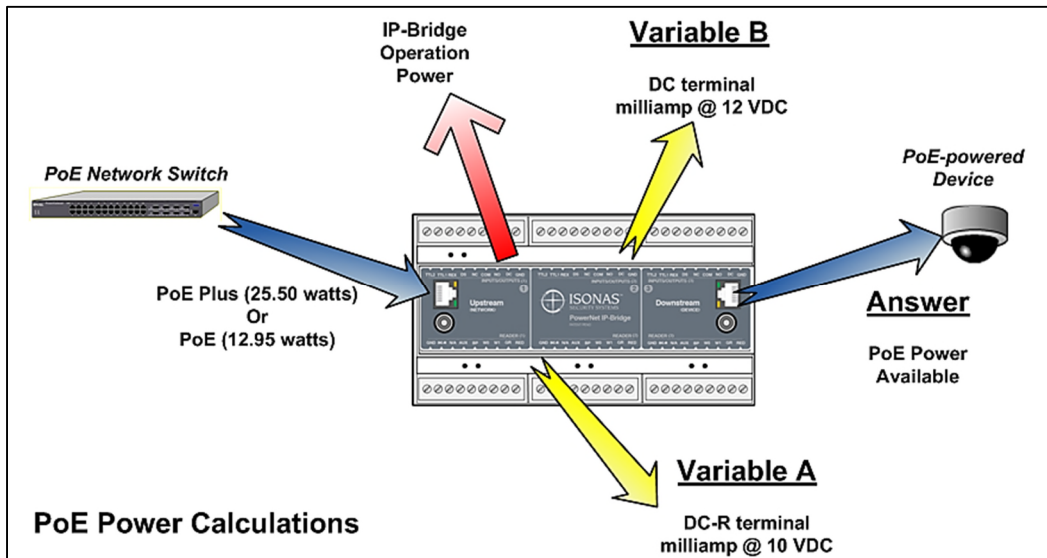
Figure 04

4.1.2: **CONTROLLING DOWNSTREAM PoE**

The IP-Bridge can pass all excess PoE power to the downstream RJ45 connector. This is done with a passive type of PoE, and PoE device-detection is not supported.

A jumper pin (JP-1) is used to enable or disable the downstream port's PoE power feed. JP-1 is located inside the IP-Bridge. Refer to **Figure 05**.

To reach the jumper, use a small screwdriver to pry the cover up at the points indicated (Start at point #1).

To enable the provisioning of PoE power out the downstream RJ45 port, place a jumper across pins 2 & 3 of JP-1.
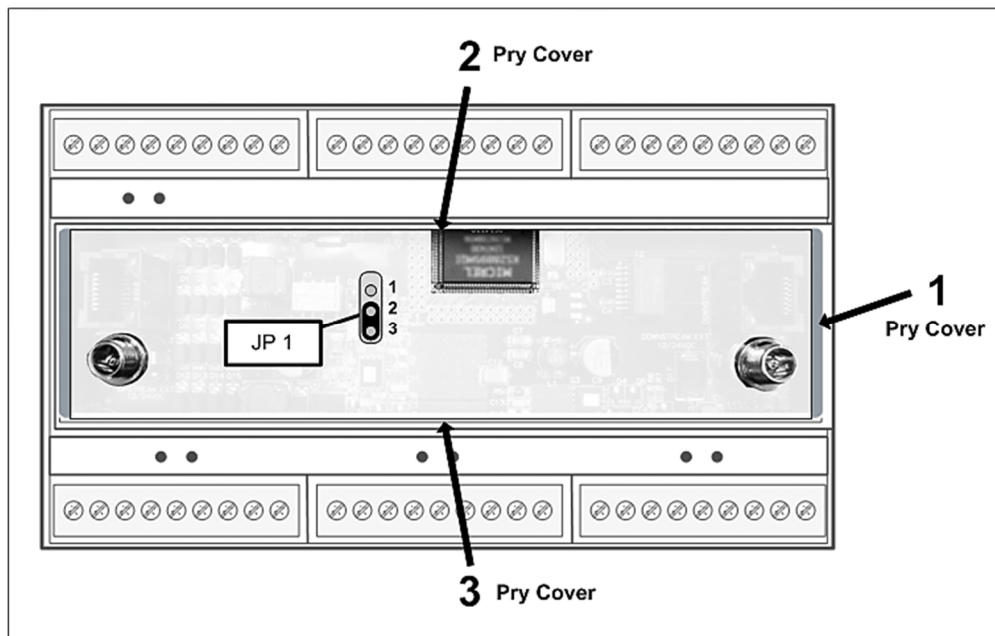
Figure 05

Removing the jumper from JP-1 will disable the flow of PoE power out the downstream RJ45 port.

4.2: __USING DC POWER__

The IP-Bridge can be powered by external DC power. The IP-Bridge will accept DC power in the range of 12VDC to 28VDC. The DC power is fed into the IP-Bridge via a standard 5.5mm x 2.5mm center positive male barrel plug cable attached to connector "AA" shown **Figure 06** (ISONAS PN IPB-Cbl-Pwr1-3ft). The 2nd end of the input power cable is attached to screw terminals on a standard DC power supply.

Figure 06

If multiple IP-Bridges are being installed, the 2nd IP-Bridge can be powered with a short male-to-male barrel plug cable such as the ISONAS PN: IPB-Cbl-Pwr2-3in. One end of the cable is attached to connector "BB" on the 1st IP-Bridge, and then the cable is daisy-chained to connector "AA" on the 2nd IP-Bridge. See **Figure 07.**

Figure 07

When powered with PoE, the input DC barrel plug power cord is not required. If two IP-Bridges are daisy-changed, and are using PoE, the coaxial daisy-chain power cord is not required (use ISONAS PN: IPB-Cbl-Net2-6in). Please note that the daisy-chained power connection is rated for 4.0 A @ 12VDC (2.0 A @ 24VDC).

4.3: <u>COMMON ELECTRICAL CONNECTIONS</u>

## 4.3.1: <u>INDEX OF TERMINAL CONNECTIONS</u>

External devices are connected to the IP-Bridge through the screw terminals located on along the sides of the IP-Bridge. A summary of the purpose of each terminal connection is detailed in the table below. Refer to the IP-Bridge's label for the locations of each terminal connector.

Terminal Block	Connection Identifier	Purpose

I/O	TTL2	Logic output.
		Default action is:
		    5 VDC is output, when in the "Off" state
		    0 VDC when in the "On" state.
		Action can be reversed in the software configuration.
		Supplies 20mA

I/O	TTL1	Logic output.
		Default action is:
		    5 VDC is output, when in the "Off" state
		    0 VDC when in the "On" state.
		Action can be reversed in the software configuration.
		Supplies 20mA

I/O	REX	Logic Input from a **R**equest-to-**EX**it device Default Action: When connection to "Gnd" is completed, the input goes active. Action can be reversed in the software configuration.
I/O	DS	Logic Input from a Door Status Sensor Default Action: When connection to "Gnd" is opened, the input goes active. Action can be reversed in the software configuration.
I/O	NC	Output. "Normally Closed" connection from IP-Bridge's door control relay (form C)
I/O	COM	Output. "Common" connection from IP-Bridge's door control relay (form C)
I/O	NO	Output. "Normally Open" connection from IP-Bridge's door control relay (form C)

Terminal Block	Connection Identifier	Purpose
I/O	DC	Output: When IP-Bridge is powering from PoE, the "DC" terminal supplies regulated 12 VDC. When IP-Bridge is powering from 12 or 24 VDC, the "DC" terminal supplies the voltage that is input to the IP-Bridge.
I/O	GND	Common Ground Connects with all ground terminals on the IP-Bridge terminal blocks and coaxial cable
Reader	GND	Common Ground Connects with all ground terminals on the IP-Bridge terminal blocks and coaxial cable
Reader	DC-R	Output: Supplies regulated 10 VDC.
Reader	N/A	Not Used
Reader	AUX	Logic Input Default Action: When connection to "Gnd" is completed, the input goes active. Action can be reversed in the configuration.
Reader	BP	Output: Allows control of the Wiegand device's beeper.
Reader	W0	Input. Connects to Wiegand data "0" from Wiegand device
Reader	W1	Input. Connects to Wiegand data "1" from Wiegand device
Reader	GR	Output: Allows control of the Wiegand Green LED.
Reader	RED	Output: Allows control of the Wiegand Red LED.

4.3.2: <u>DC POWER FOR THE DOOR COMPONENTS</u>

The IP-Bridge can supply DC power for external devices. This power is made available to each door at the terminal connectors labeled "DC" and "GND". See **Figure 08.**
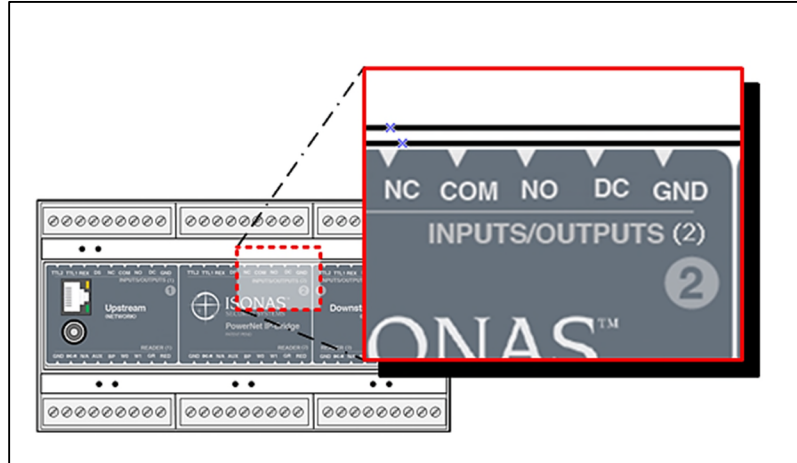
Figure 08

The voltage supplied by the "DC" terminal connection is determined by the method that the IP-Bridge is being powered.

If the IP-Bridge is powered with <u>PoE</u>, then regulated <u>12VDC</u> is available on the "DC" terminal connection

If the IP-Bridge is powered with <u>DC power</u>, then the <u>input DC voltage</u> is made available on the "DC" terminal connection.

> **For example, if the IP-Bridge is receiving 24VDC through its barrel plug power cable, then the "DC" terminal will supply 24VDC.**

The "DC" power's return connection will be attached to the IP-Bridge's Signal Ground. See the next "Signal Ground Connections" section of the manual for more information regarding this part of the connection.

4.3.3: SIGNAL GROUND CONNECTIONS

For the electrical signals going to the door's components to function, they need to have a connection to the IP-Bridge's Signal Ground. For some doors, only one or two ground wires are needed, and these wires can easily be directly connected to the IP-Bridge's "Gnd" terminals.

Other installations may require multiple electrical connections, with each requiring a connection to the Signal Ground. To support this, an optional DIN Terminal block can be mounted next to the IP-Bridge.

The DIN Terminal Block is connected to one of the IP-Bridge's Signal Ground terminals. Up to 15 each, 22 gage wires can be connected to a single connection on the DIN terminal block. See **Figure 09.**
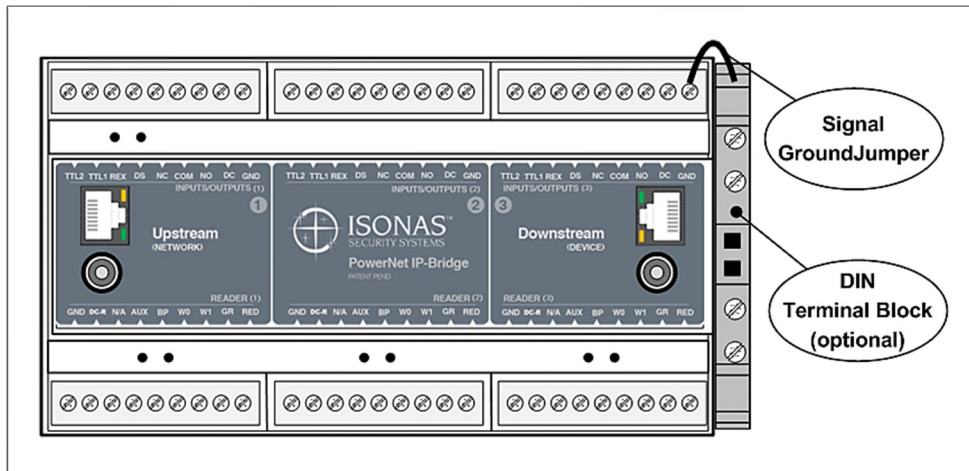
Figure 09

5: IP-BRIDGE DOOR OUTPUTS

Warning: The IP-Bridge should not be powered until all connections have been made and tested. Remove power prior to changing any connections.

The IP-Bridge can control and power multiple items at the door. Control of standard electrical locks is supported. Supplying electrical power and additional logic outputs are also features provided by the IP-Bridge. Controlling the LEDs and beeper on a Wiegand device is supported.

5.1: <u>DOOR LOCK RELAY</u>

The IP-Bridge is equipped with a lock-relay for each door lock supported. The relay is a Form C relay that is rated for 2.0 amps at 30 VDC.

Connections to the relay's "Normally Closed", "Common", and "Normally Open" contacts are available on the terminal strip and are labeled as "NC", "COM" and "NO" respectively. See **Figure 10.**
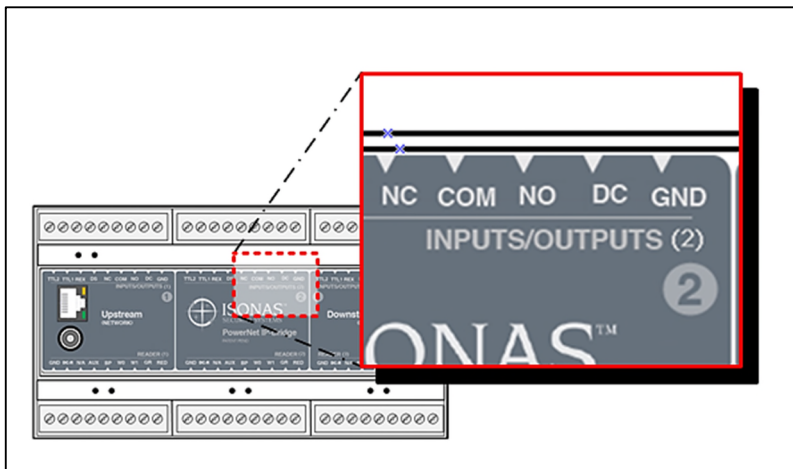
Figure 10

A block-diagram of the lock-relay is shown in **Figure 11.** The relay provides a "dry contact". For many installations, the IP-Bridge will be supplying the DC power for the door lock. For these installs, a wire jumper will be placed between the "DC" and "COM" terminal connections.
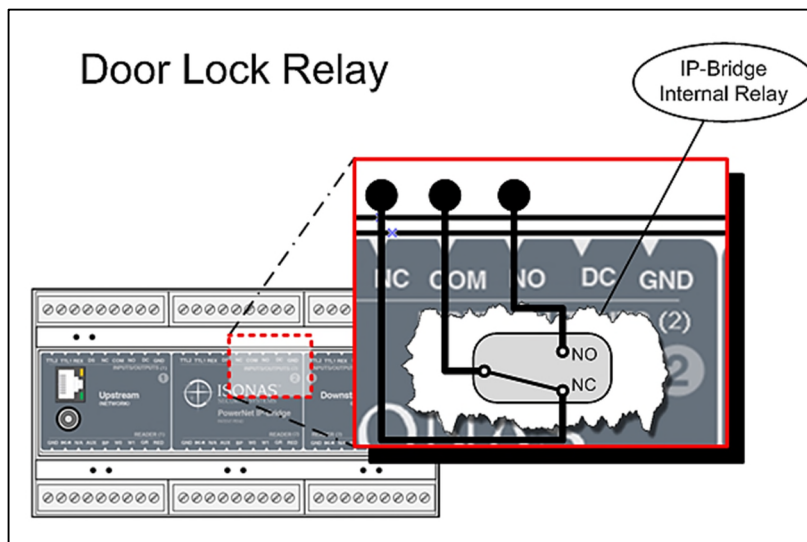
Figure 11

5.1.1: BACK EMF PROTECTION FOR THE LOCK CIRCUIT

Most door latches use a **relay coil** that powers up and down to open and close the door. When power is removed from the coil, the collapse of the magnetic field creates a problem known as **Back EMF** that can interfere with the IP-Bridge's operation and create radio interference.

Switching off a typical 12 VDC relay coil can produce a back EMF of 300 volts or more. If this relay is switched via an output, that voltage appears across the terminals of the output. The problem gets worse as switching voltage/current rises.

Figure 12 shows the recommended solution. You can virtually eliminate back EMF by installing a **transient suppression device (diode)**. Always check that the diode is correctly rated for the circuit voltage. For optimum performance, the diode should be installed at the lock or close to the lock. Standard diodes have a stripe-band marking on one side. That side of the diode should be connected to the "+" wire of the lock circuit.
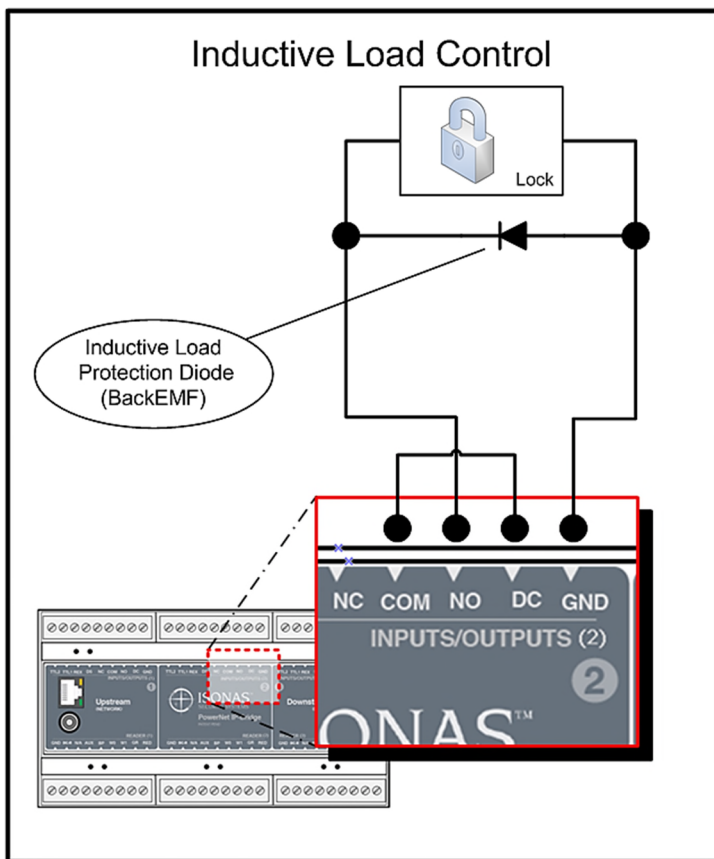
Protect the Digital Output

Which type of transient suppressor should you install? This depends mainly on the type of inductive load being switched. Some locks have Back EMF protection built into the lock itself.

For Back EMF in low-voltage DC applications, a 1N4007 diode will suffice (ISONAS PN ACC-BackEMF-DIODE).

However, for protection against other transient voltages (i.e. lightening), we recommend using a fast-switching transient voltage suppressor, such as a transient-voltage-suppression (TVS) diode (or bipolar TransZorb).

Figure 12

5.1.2: IN-RUSH CURRENT PROTECTION FOR THE LOCK CIRCUIT

Some **<u>Magnetic Locks</u>** with advanced quick-release circuitry will generate an initial surge of current when the lock is turned on. This surge of current can be 20 times greater than the lock's steady state current requirements. The lock relay is rated for 2 amp of current. This in-rush current can greatly exceed that rating and shorten the useful life of the IP-Bridge.

Figure 13 shows the solution to this. Installing an in-rush suppressor in the lock circuit will prevent any detrimental effects on the IP-Bridge.
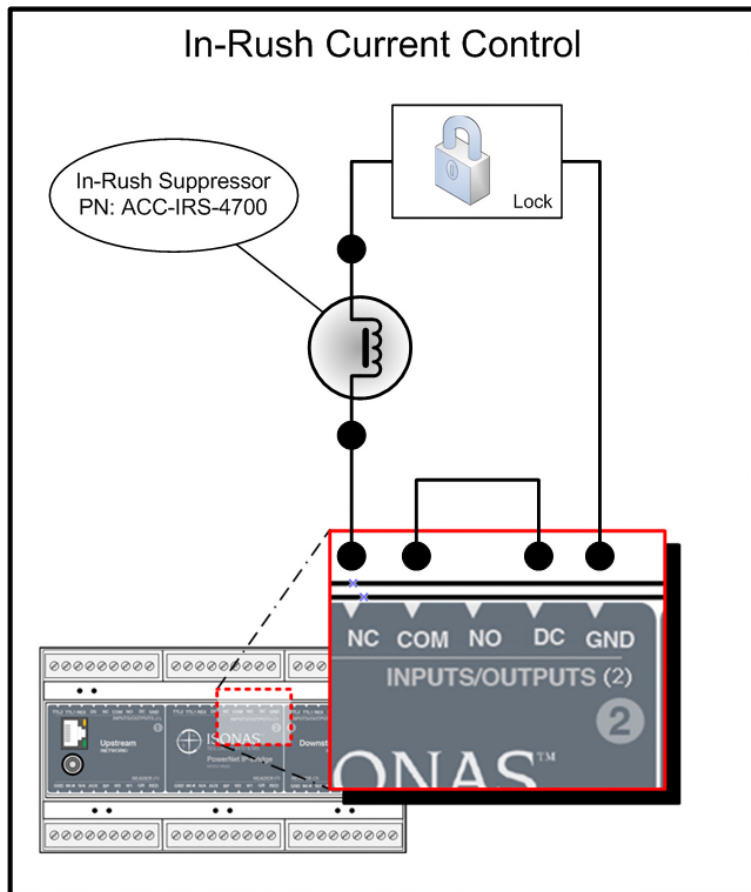
Figure 13

5.2: TTL OUTPUTS

The IP-Bridge supplies two TTL outputs for each door, as shown in **Figure 14**. The **TTL1** and **TTL2** leads are logical output leads. In their "normal" state, there is a 5VDC potential on the leads. When the leads "activate", this voltage potential is removed (0 VDC).

These leads are typically used to connect to an alarm system. Certain alarm conditions of the IP-Bridge can be configured to activate these leads. An example would be having **TTL2** activate when the door is held open too long.
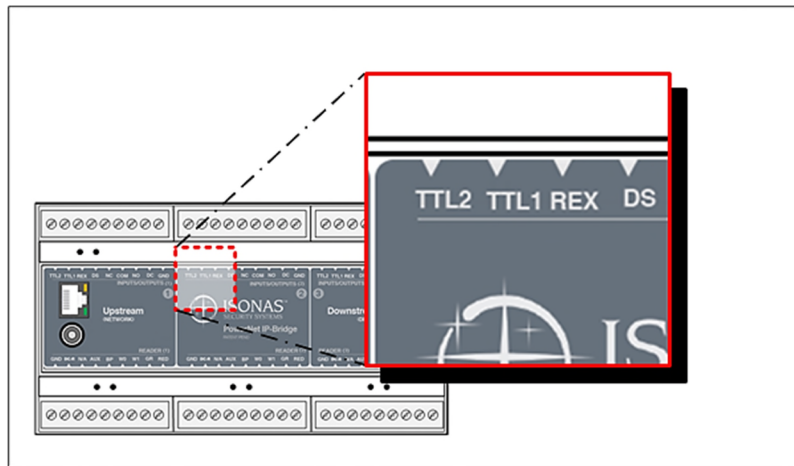
Figure 14

The "TTL" signal's return connection will be attached to the IP-Bridge's Signal Ground. See the previous "Signal Ground Connections" section of the manual for more information regarding this part of the connection.

5.2.1: TTL'S CONTROLLING A SECONDARY RELAY MODULE

The Quad Secondary Relay Module (QSRM) is available to enhance the IP-Bridge's ability to control devices located at the door.

The QSRM provides a set of form-C relay contacts, which are controlled by one of the IP-Bridge's TTL outputs.

The QSRM is commonly used to control a device located at the door, in addition to the door's lock. A diagram of this QSRM usage is shown below in **Figure 15.**
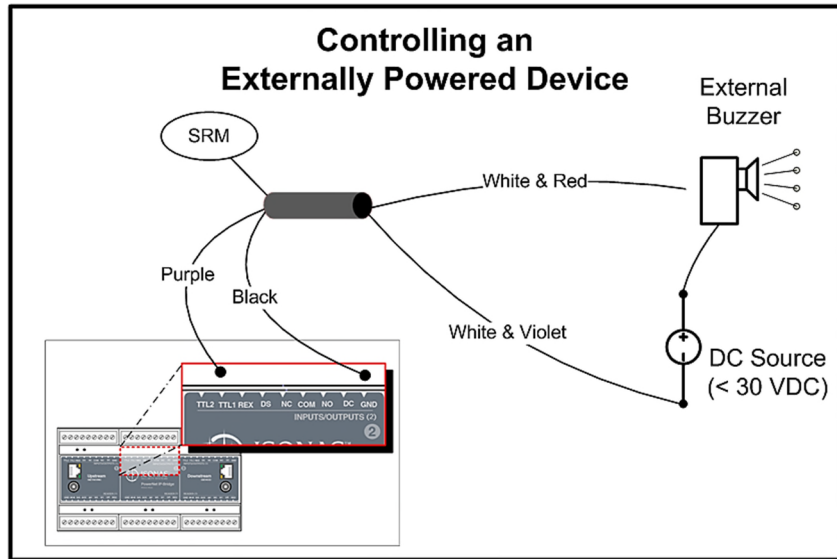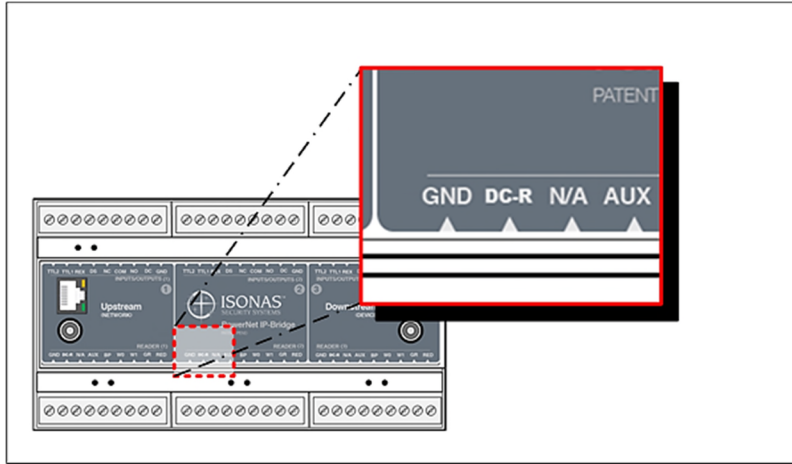

Figure 15

QSRM's wiring color code

Color	Function
Purple	TTL input to QSRM. Connected to the IP-Bridge's "TTL1" or "TTL2" terminal
Black	Signal Ground from IP-Bridge. Connects to IP-Bridge's "GND" terminal
White / Red	QSRM Relay Common contact
White / Violet	QSRM Relay Open contact (when TTL is inactive)
White / Yellow	QSRM Relay Closed contact (when TTL is inactive)

5.3: <u>READER DC POWER OUTPUT (10 VDC)</u>

The IP-Bridge provides up to 500mA @ 10 VDC regulated power supply for use when powering many Wiegand devices. This 10VDC power is provided on the "DC-R" terminal, and a convenient GND terminal is located adjacent to the DC-R connection. **See Figure 16.**

Figure 16

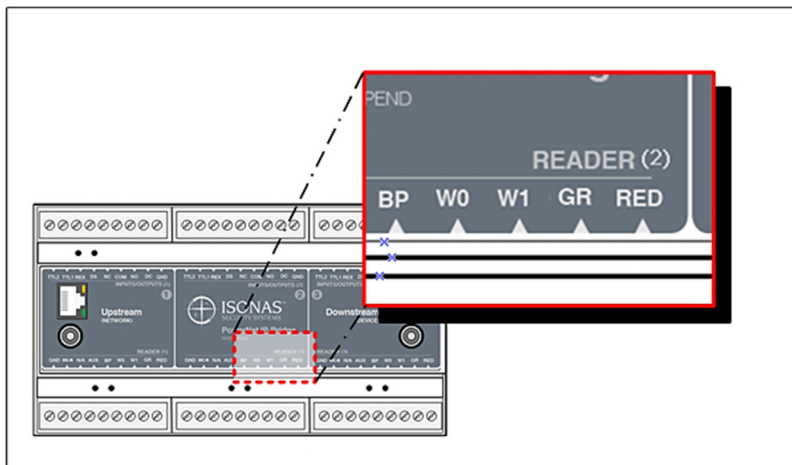## 5.4: <u>READER INDICATOR OUTPUTS</u>

"BP" Terminal Connection:
 The "BP" will be an output for controlling a beeper on the remote reader.
"GR" Terminal Connection:
 The "GR" will be an output for controlling a green LED beeper on the remote reader.
"RED" Terminal Connection:
 The "RED" will be an output for controlling a red LED on the remote reader.

Figure 17

6: IP-BRIDGE DOOR INPUTS

Warning: The IP–Bridge should not be powered until all connections have been made and tested. Remove power prior to changing any connections.

The IP-Bridge can monitor items located at the door. It supports receiving credential data from a Wiegand device and the control of standard electrical locks.

6.1: WIEGAND DATA INPUT

The IP-Bridge receives the user's credential information from a Wiegand-based device, such as a card reader.

Three (3) Wiegand conductors from the reader are connected to the IP-Bridge's "W0", "W1", and "GND" terminals. The Wiegand ground conductor can be connected to any "GND" terminal on the IP-Bridge.

The Wiegand ground connection should be dedicated to the Wiegand signal. A separate wire conductor would be used to ground any other door components to the IP-Bridge.

Wiegand signal should be a "driven 5 VDC signal", provided by the Wiegand device (may be accomplished thru a biasing resistor within the reader)

The reader's "W0" and "W1" terminals are shown in **Figure 18.**
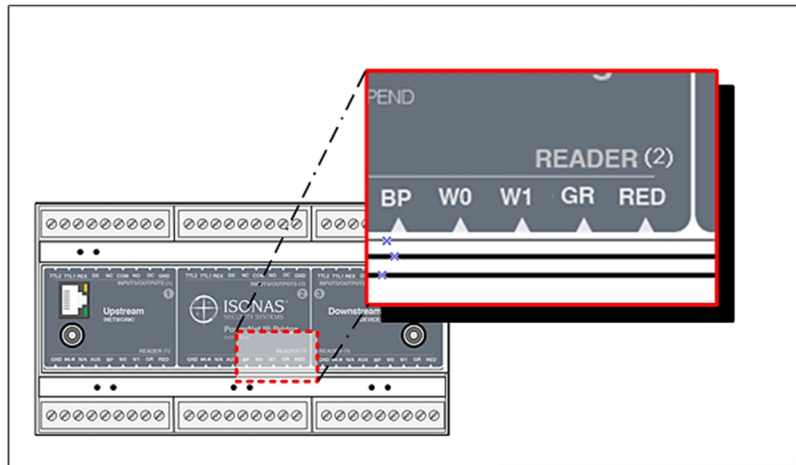
Figure 18

The Wiegand signal's return connection will be attached to the IP-Bridge's Signal Ground. See the previous "Signal Ground Connections" section of the manual for more information regarding this part of the connection.

Wiegand Data

The Wiegand protocol has been used since 1980, so many devices exist that use this protocol.

The ISONAS solution can interpret the incoming Wiegand data in one of 3 ways.

1) As a raw 64-bit binary number, so the card format is not a factor.
2) As a HID formatted credential number, with the ISONAS bit masking processing rules applied
3) As a HID formatted credential, with the ISONAS data mangle processing rules applied.

The recommended system integrator evaluation process is to use either an IP-Bridge or PowerNet w/WIM and test against the existing hardware and credentials. Validate that the reported credentials really use the Wiegand protocol, and that the existing card format is handled appropriately.

If you need assistance, and can supply the appropriate materials to ISONAS, we will test your configuration at the factory

Required items include:

- A reader that is known to work with the currently installed equipment.

- 5 working credentials, to verify credential formatting.

- Installation instructions for the supplied reader, for power and operation instructions.
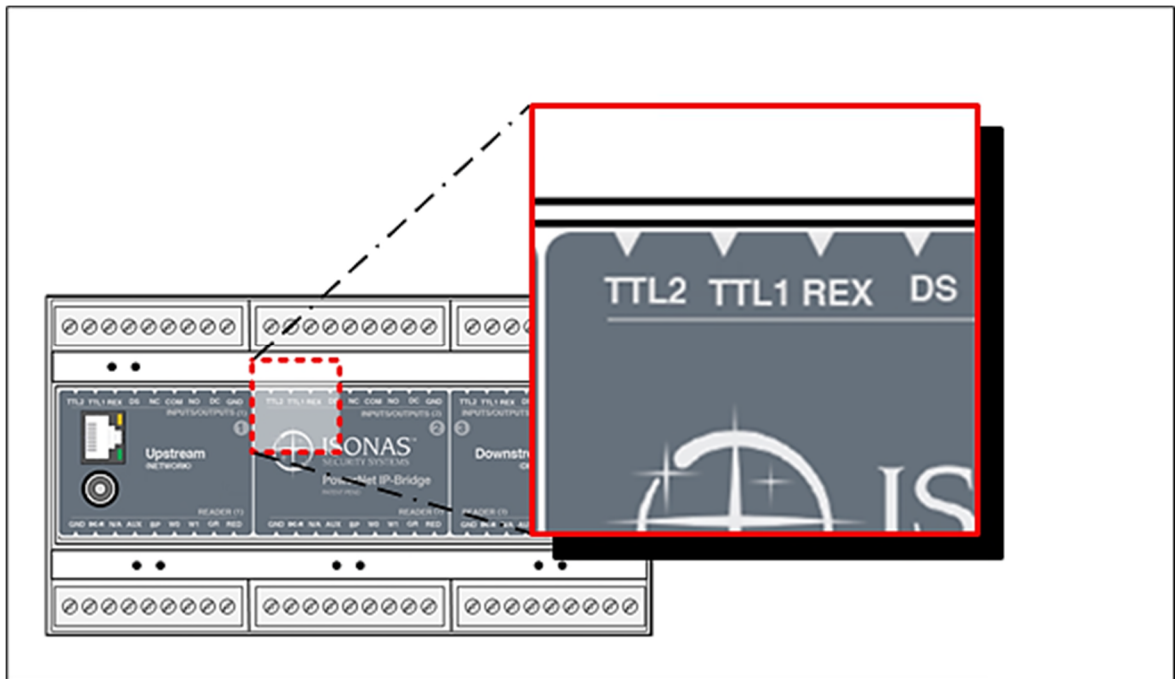
6.2: <u>WIRING THE REX INPUT</u>

The REX (Request for Exit) signal expected by the ISONAS IP-Bridge is a **momentary closure**. You can generate this signal with a pushbutton, infrared motion detector, or other simple device. Typically, the REX is placed adjacent to the door so that people can press the button and let themselves out the door without setting off the alarm. When pressed, this button tells the ISONAS IP-Bridge that someone wishes to pass through the door, and the latch releases. In the ISONAS Crystal software you can configure how the door responds to the REX button.

About REX Input

The REX input is connected to a "Normally Open" contact on the external device.

The REX event is created with the external device closes its contact.

The momentary switch is directly connected to the ISONAS IP-Bridge. First, connect one conductor from the switch to the IP-Bridge's "REX" terminal, as shown in **Figure 19.** Then, connect the switch's other conductor to one of the IP-Bridge's "GND" terminals.

Figure 19

The "REX" input's return connection will be attached to the IP-Bridge's Signal Ground. See the previous "Signal Ground Connections" section of the manual for more information regarding this part of the connection.

6.3: <u>WIRING THE AUX INPUT</u>

In host mode, the AUX Input is another momentary contact closure which functions exactly like the REX button. The AUX Input might be controlled by a relay on an intercom at the door. This would allow the receptionist to unlock the door using the intercom system's functionality.

In the ISONAS Crystal software you can configure how the door responds to the AUX button.

In local mode, the door will stay unlocked for the period that the AUX switch is closed.

The momentary switch is directly connected to the ISONAS IP-Bridge. First, connect one conductor from the switch to the IP-Bridge's "REX" terminal, as shown in **Figure 20.** Then, connect the switch's other conductor to one of the IP-Bridge's "GND" terminals.

> **About AUX Input**
>
> The AUX input is connected to a "Normally Open" contact on the external device.
>
> The AUX event is created with the external device closes its contact.
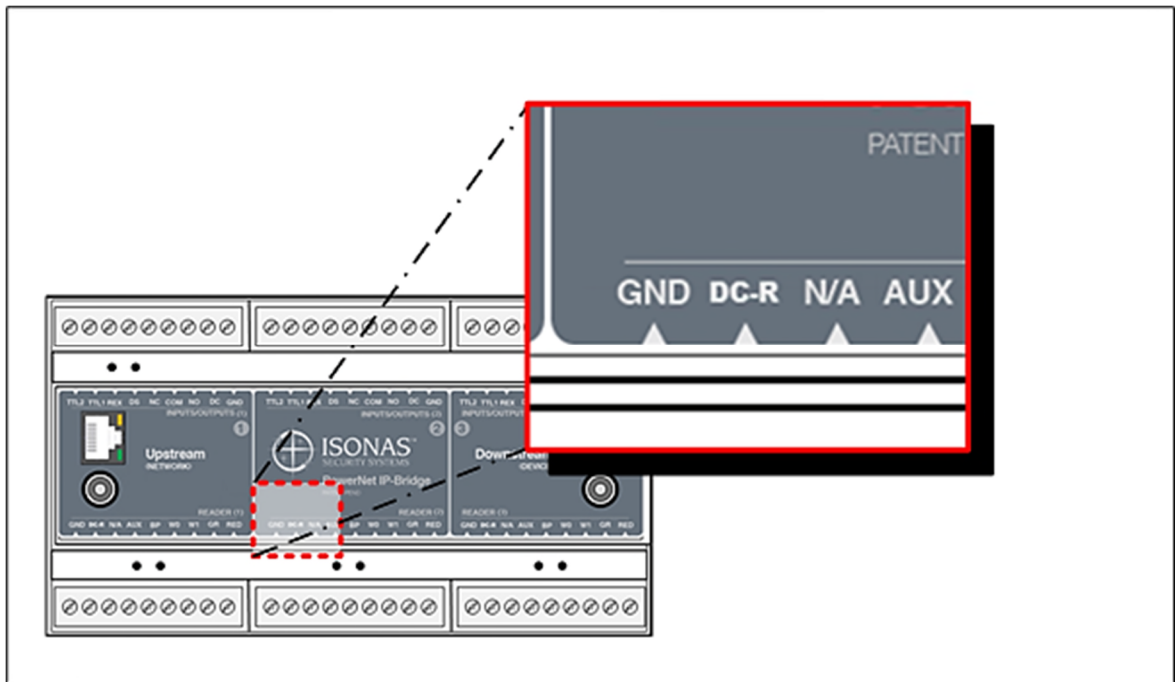
Figure 20

The "AUX" input's return connection will be attached to the IP-Bridge's Signal Ground. See the previous "Signal Ground Connections" section of the manual for more information regarding this part of the connection.

6.4: __WIRING THE DOOR SENSOR INPUT__

Connecting the ISONAS IP-Bridge to a door sensor allows the Pure Access software to determine whether that door is physically open. Then the Pure Access software can create alarms based on the door's state. This wiring task is like wiring the REX or AUX buttons.

The momentary switch is directly connected to the ISONAS IP-Bridge. First, connect one conductor from the switch to the IP-Bridge's "DS" terminal, as shown in **Figure 21.** Then, connect the switch's other conductor to one of the IP-Bridge's "GND" terminals.

About the Door Sense

The door sense is connected to a "Normally Closed" input.

No action is taken until the input is opened.
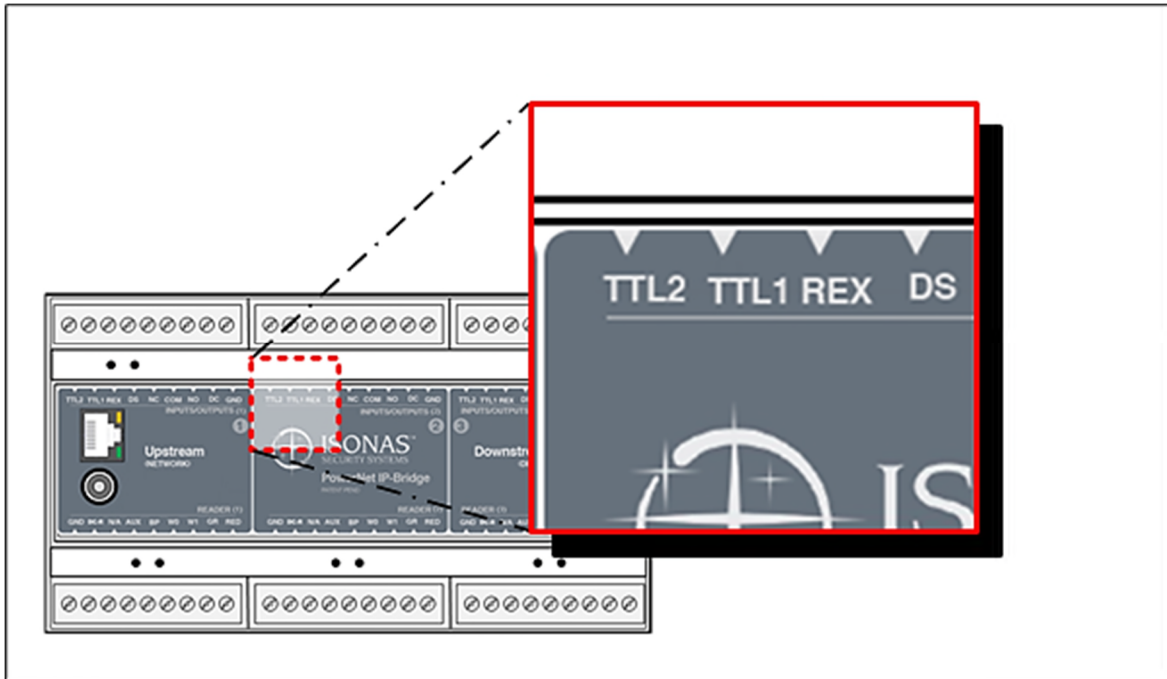
Figure 21

The "DS" input's return connection will be attached to the IP-Bridge's Signal Ground. See the previous "Signal Ground Connections" section of the manual for more information regarding this part of the connection.

IMPORTANT: If There Is No Door Sense Switch

If you choose NOT to install a door sense switch, then you __must permanently ground__ the "DS" terminal to a "GND" terminal so the system will not see the door as "open"

7: <u>CONFIGURATION EXAMPLES</u>

Several wiring examples are shown below. Please refer to previous detailed sections for more information about each example provided.

7.1: <u>LOCK STRIKE & WIEGAND DEVICE</u>

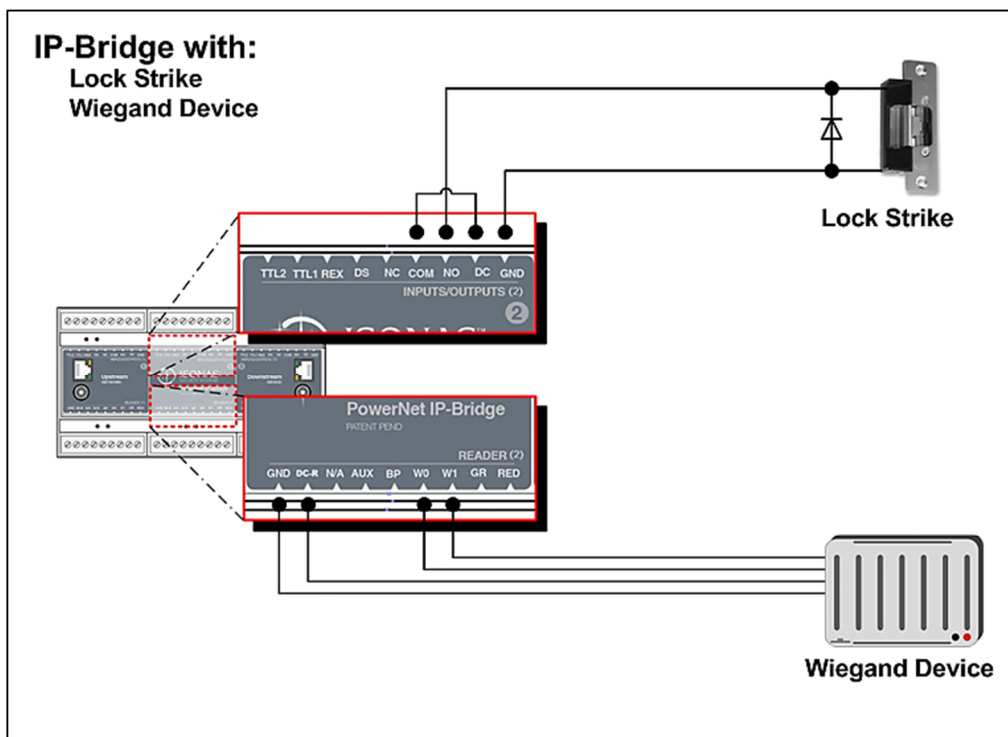In **Figure 22**, a standard lock strike is being powered from the IP-Bridge.

The DC power being supplied to the lock is either:
    12VDC -- if the IP-Bridge is powered by PoE or 12VDC.
        Or
    24VDC -- if the IP-Bridge is powered by 24VDC.

The Wiegand device is being powered with 10VDC from the IP-Bridge.
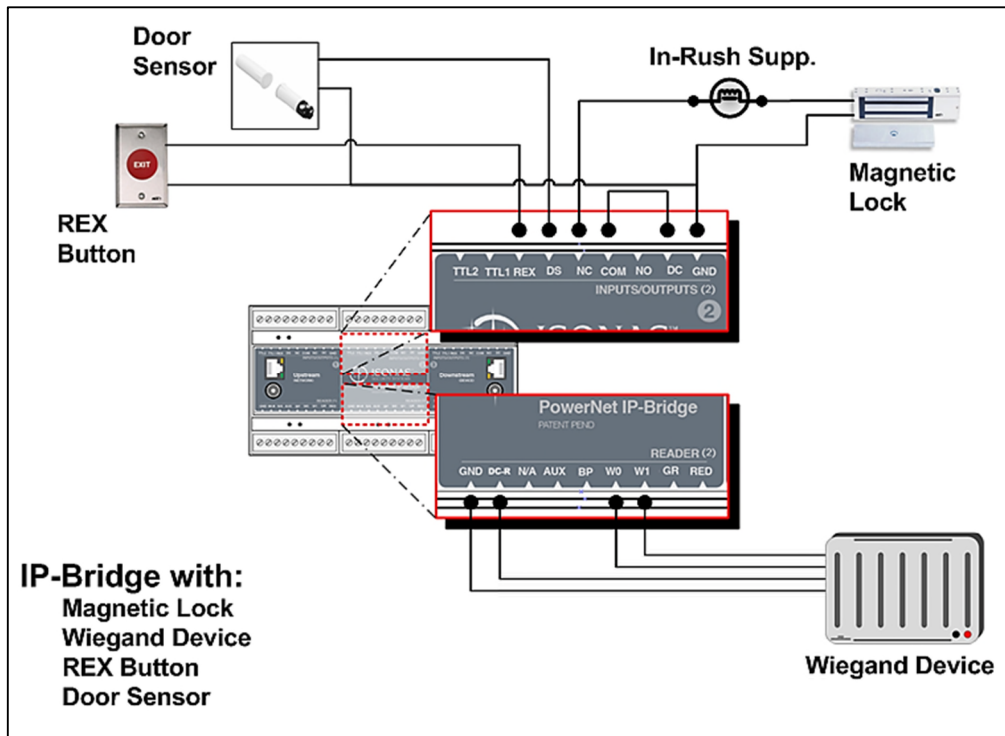

Figure 22

7.2: <u>MAGNETIC LOCK, REX, DOOR SENSOR, & WIEGAND DEVICE</u>

In **Figure 23**, a standard magnetic lock is being powered from the IP-Bridge.
A door sensor and REX button are also being used.

The DC power being supplied to the lock is either:

    12VDC -- if the IP-Bridge is powered by PoE or 12VDC
       Or
    24VDC -- if the IP-Bridge is powered by 24VDC.

The Wiegand device is being powered with 10VDC from the IP-Bridge.

Figure 23

7.3: LOCK STRIKE & WIEGAND DEVICE WITH TAMPER

In **Figure 24**, a standard lock strike is being powered from the IP-Bridge.

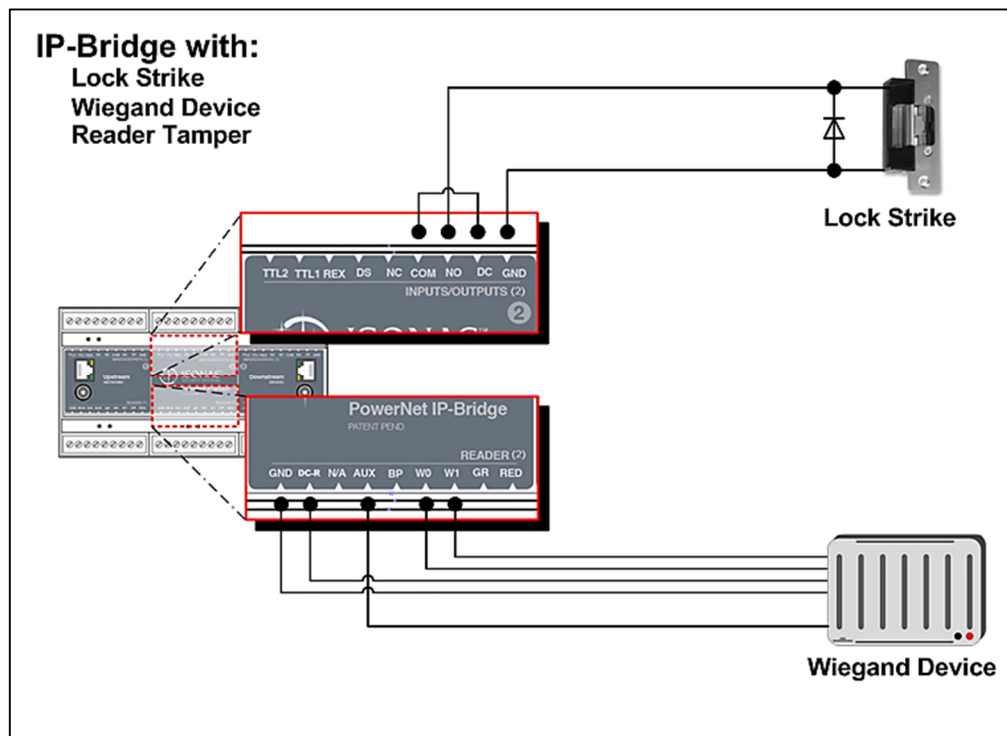The DC power being supplied to the lock is either:
　　12VDC -- if the IP-Bridge is powered by PoE or 12VDC.
　　　　Or
　　24VDC -- if the IP-Bridge is powered by 24VDC.

The Wiegand device is being powered with 10 VDC from the IP-Bridge.

The Wiegand device's Tamper switch is being monitored by the AUX input on the IP-Bridge.
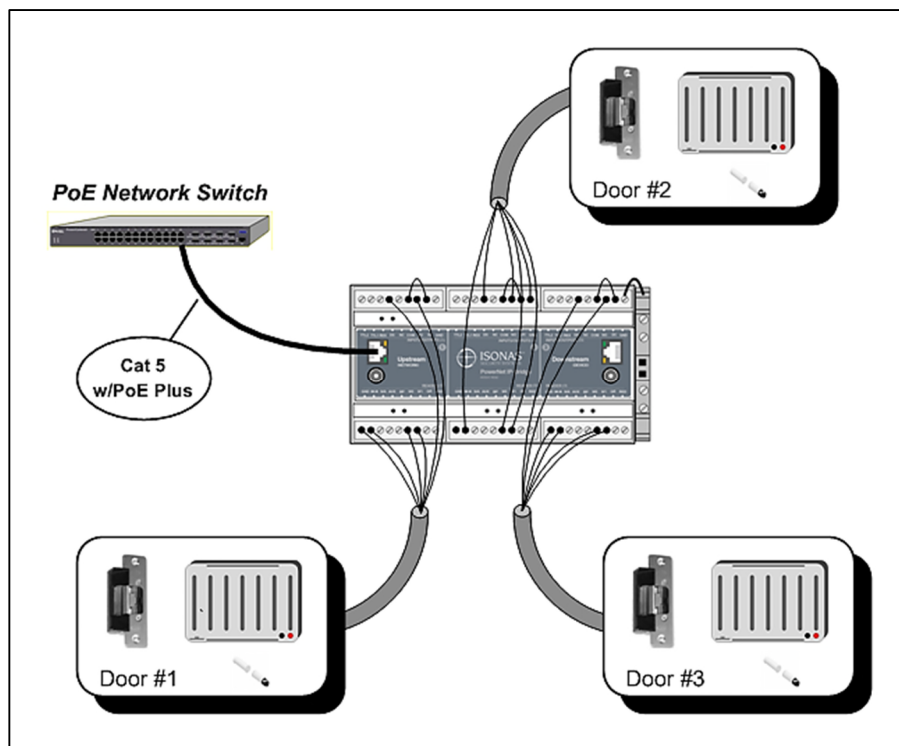

Figure 24

7.4: <u>CONTROLLING THREE DOORS</u>

In **Figure 25**, three doors are being controlled.

Items of note include:

- PoE+ is providing power for all doors
- Standard lock strikes are being used.
  - 12VDC is powering the lock strikes.
- Each door has a door sensor switch installed
- Wiegand devices are at each door
  - The Wiegand devices are being powered with 10 VDC

Figure 25

The table below describes each door's connections in Figure 25.

Terminal Block	Connection Identifier	Description
I/O	DS	Connected to the Door Sensor at the door.
I/O	COM	Connected to the "DC" terminal, which supplies 12VDC for the locks
I/O	NO	Connected to the Door Lock
I/O	DC	Connected to the "COM" terminal to supply DC power to the lock, thru the Lock Relay
I/O	GND	Provides return for all connections from the door.
Wiegand Device	GND	Provides return for all connections from the door.
Wiegand Device	DC-R	Output: Supplies regulated 10 VDC for the Wiegand device.
Wiegand Device	W0	Input. Wiegand data "0" input lead, from the Wiegand device
Wiegand Device	W1	Input. Wiegand data "1" input lead, from the Wiegand device

7.5: 1 DOOR & 1 IP CAMERA

In **Figure 26**, access-control for a single door and an IP-camera are being supported from a single Cat5e/6 cable run. A PoE+ injector is providing the power required.

Items of note include:

- Connections from the door components are the same as described in example 7.4, including:
  - o PoE+ is providing power for door access and IP camera
  - o Standard lock strike is being used.
    - 12VDC is powering the lock strike.
  - o A door sensor switch is installed
 - o Wiegand device is at the door
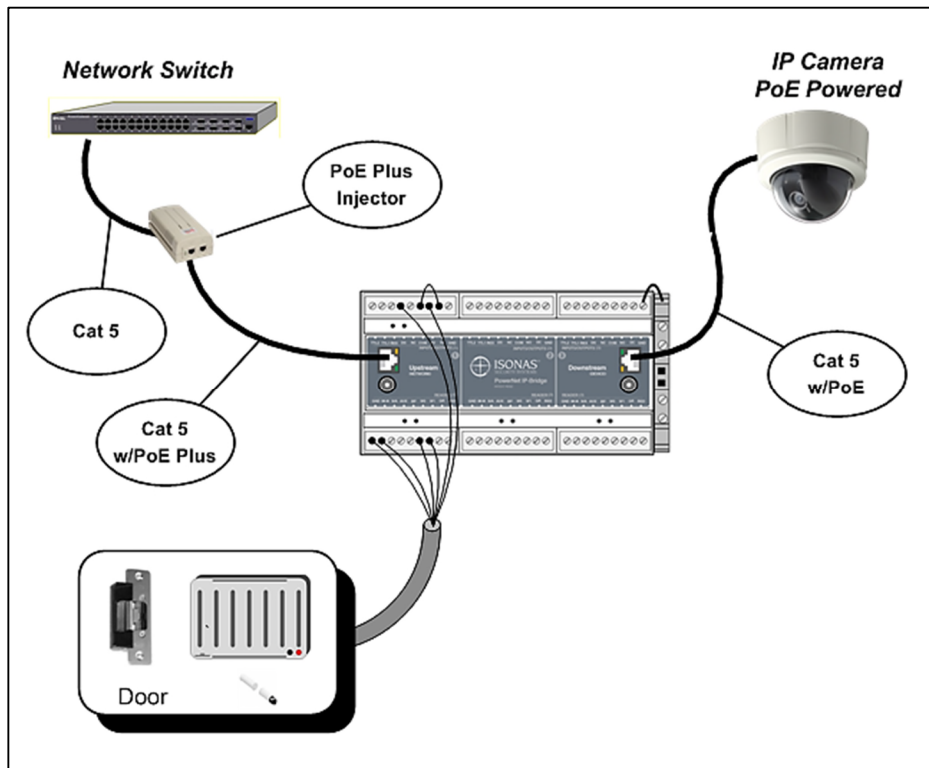
Figure 26

7.6: EXTERNAL POWER W/DAISY-CHAIN

In **Figure 27**, the daisy-chaining of two IP-Bridges is illustrated. External Power is being used, instead of PoE. High-powered PoE could be used, if the total power draw across the two IP-Bridges is under the PoE power limitation.

The Ethernet data for both units is supplied with a single network cable connection. The IP traffic for the 2nd unit is passed through the 1st unit.

- Connections from the door components are the same as described in example 7.4, including:
  - Standard lock strikes are being used.
    - 12VDC is powering the lock strike.
  - A door sensor switch is installed at each door
  - Wiegand devices are at the doors
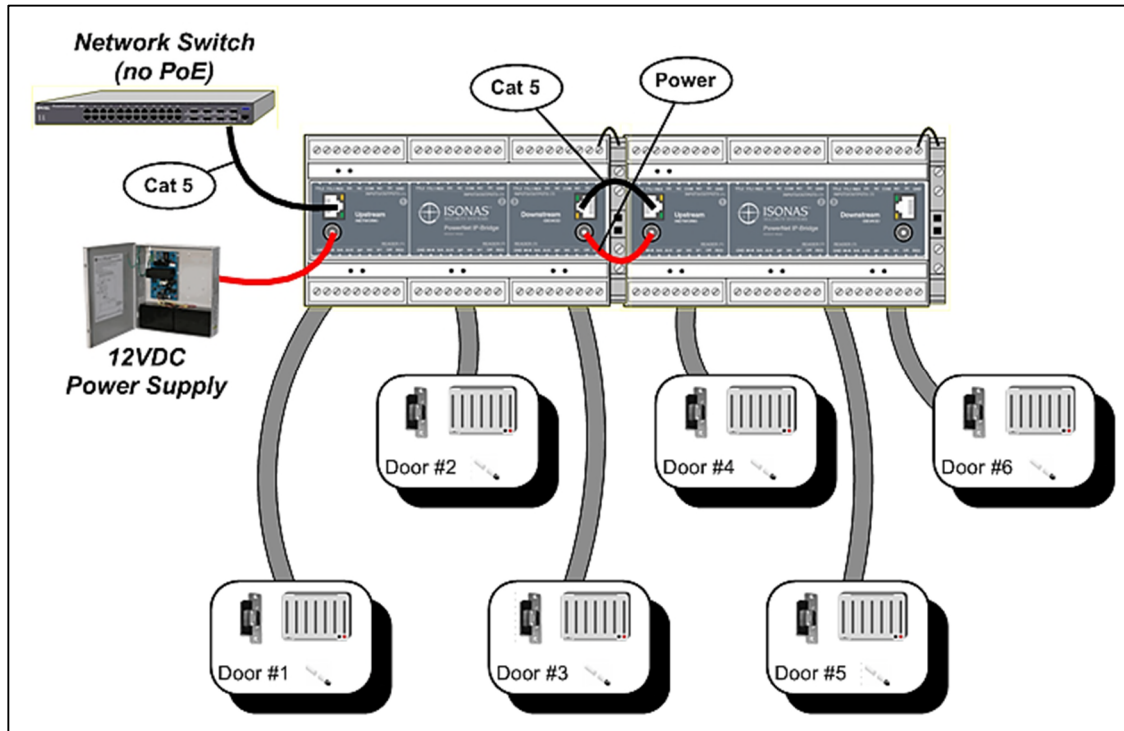
Figure 27

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