Azure Access BLU-RI2M Hardware Manual

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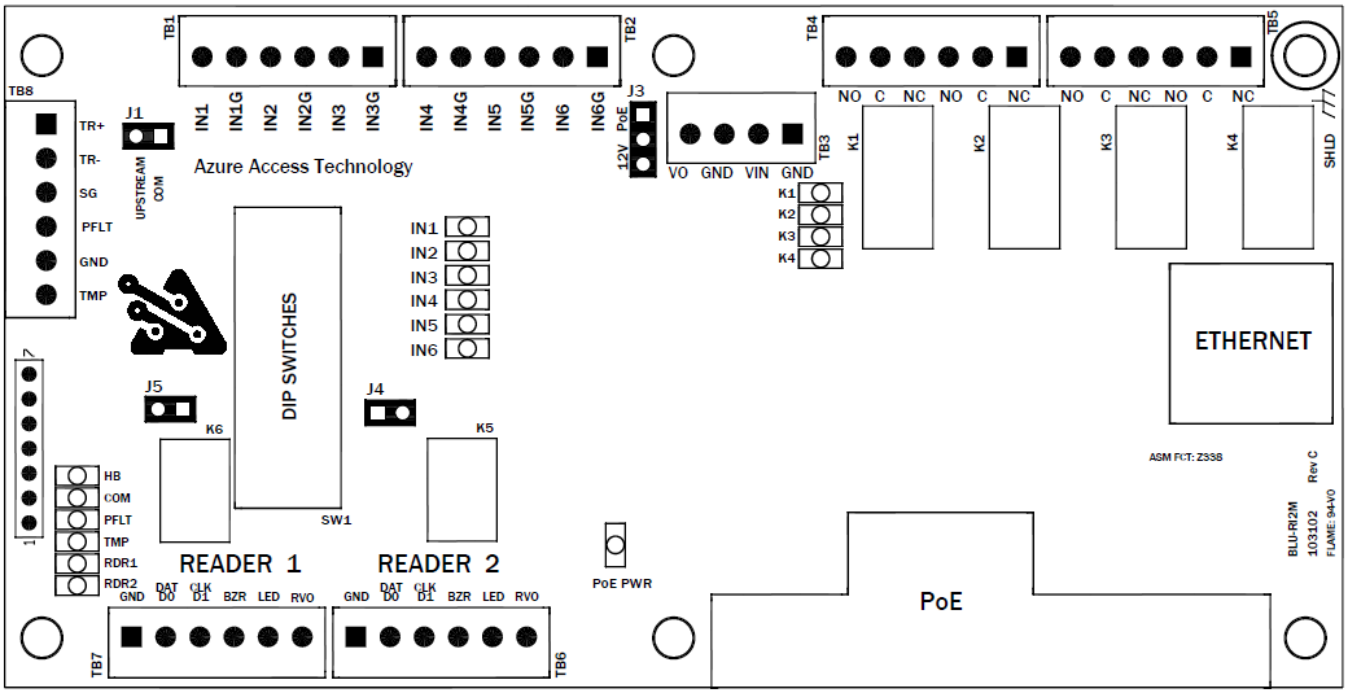
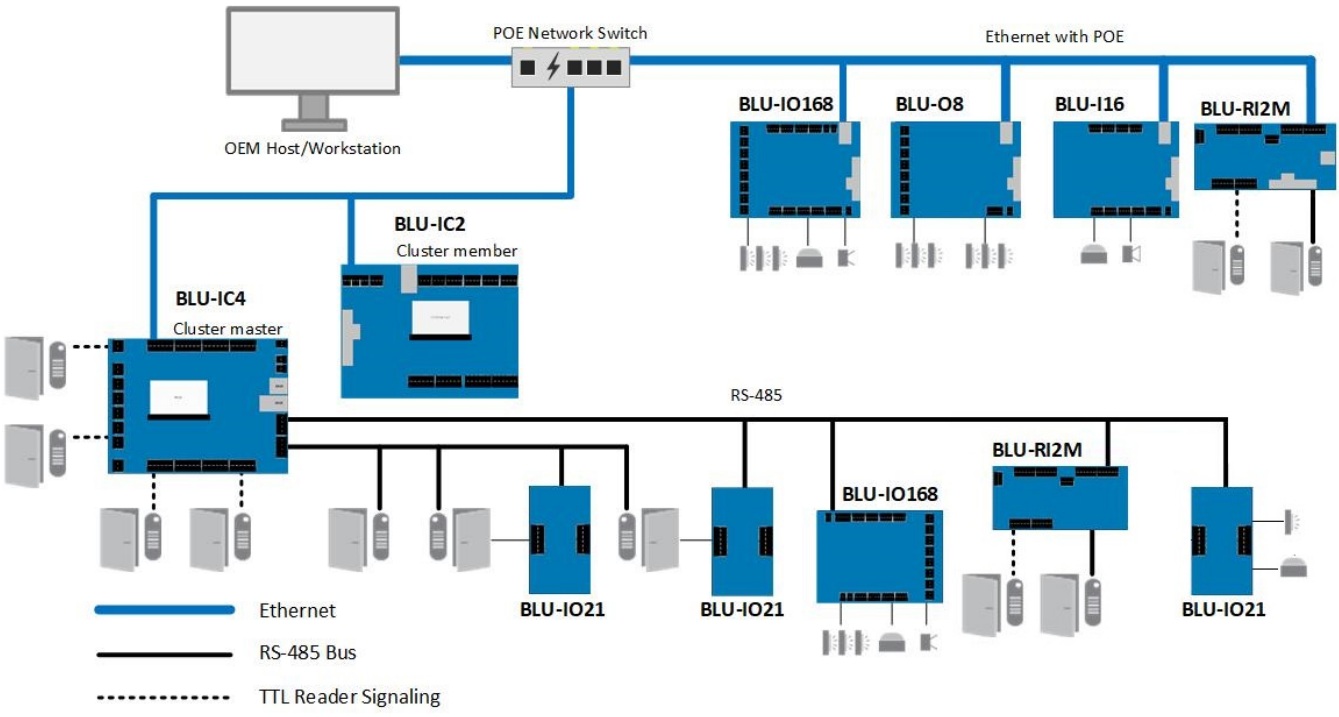
BLU-RI2M Hardware Manual

Downstream 2-Door Reader Interface

by IMRON Corporation





IMPORTANT INFORMATION

W A R N I N G
HIGH VOLTAGE, AC MAIN POWER SHOULD ONLY BE CONNECTED BY QUALIFIED, LICENSED ELECTRICIANS. ALL APPLICABLE LAWS AND CODES MUST BE FOLLOWED. IF THIS PRECAUTION IS NOT OBSERVED, PERSONAL INJURY OR DEATH COULD OCCUR

Power should not be applied to the system until after the installation has been completed. If this precaution is not observed, personal injury or death could occur, and the equipment could be damaged beyond repair.
-Verify that the external circuit breaker which supplies power to the device power supply is turned off prior to installation.
-Verify that the output voltage of the power supply is within specifications prior to connection to the device.

C A U T I O N
Several important procedures should be followed to prevent electro-static discharge (ESD) damage to sensitive CMOS integrated circuits and modules.

-All transport of electronic components, including completed reader assemblies, should be in static shield packaging and containers.
-Handle all ESD sensitive components at an approved static controlled work station. These work stations consist of a desk mat, floor mat and an ESD wrist strap. Work stations are available from various vendors including the 3M company.

FCC Compliant
This device complies with Part 15 of FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this device in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his/her own expense. The user is advised that any equipment changes or modifications not expressly approved by the party responsible for compliance would void the compliance to FCC regulations and therefore, the user's authority to operate the equipment.

Table of Contents

Part I
Introduction

1 Introduction

The BLU-RI2M is the next generation, downstream reader-interface board. This is a low-profile, RS-485, Ethernet and PoE+ device that can be installed near or at the door. *NOTE: As of this writing, only the RS-485 board is supported with UniytyIS*. It features 2-door control with two independent TTL or OSDP reader ports, supporting 6 supervised inputs, and 4 relay outputs. It is a downstream, serial or network device that requires communication with a controller (BLU-IC series) to fully function. The board runs an enhanced version of OSDP protocol to communicate with the controller.

The BLU-RI2M provides interface connections for a variety of card reader technologies, including proximity, smart card, biometric, bar code, and infrared readers. Card readers with standard Wiegand or Clock/Data output can be connected to the BLU-RI2M as well as card readers that use OSDP protocol.

1.1 General Features

- Two onboard reader ports for TTL or OSDP readers with paired reader support
- Communication: One 2-wire RS-485 & one 10/100 Ethernet port
- 6 Supervised Alarm Inputs
  - Configurable termination resistor values for supervised inputs
- 4 Relay Outputs
- Inputs & Outputs fully re-assignable
- One 2-wire RS-485 port for upstream communication
  - Supports proprietary or OSDP protocol
- 1 Unsupervised Cabinet Tamper Input
- 1 Unsupervised Power Fault Input
- 1 LED Output per reader port (tri-state control)
- 1 Buzzer Output (open collector) per reader port
  - Buzzer output can be repurposed for 2-wire LED control
- 12 VDC only or PoE+

Part II
Hardware Layout

2 Hardware Layout

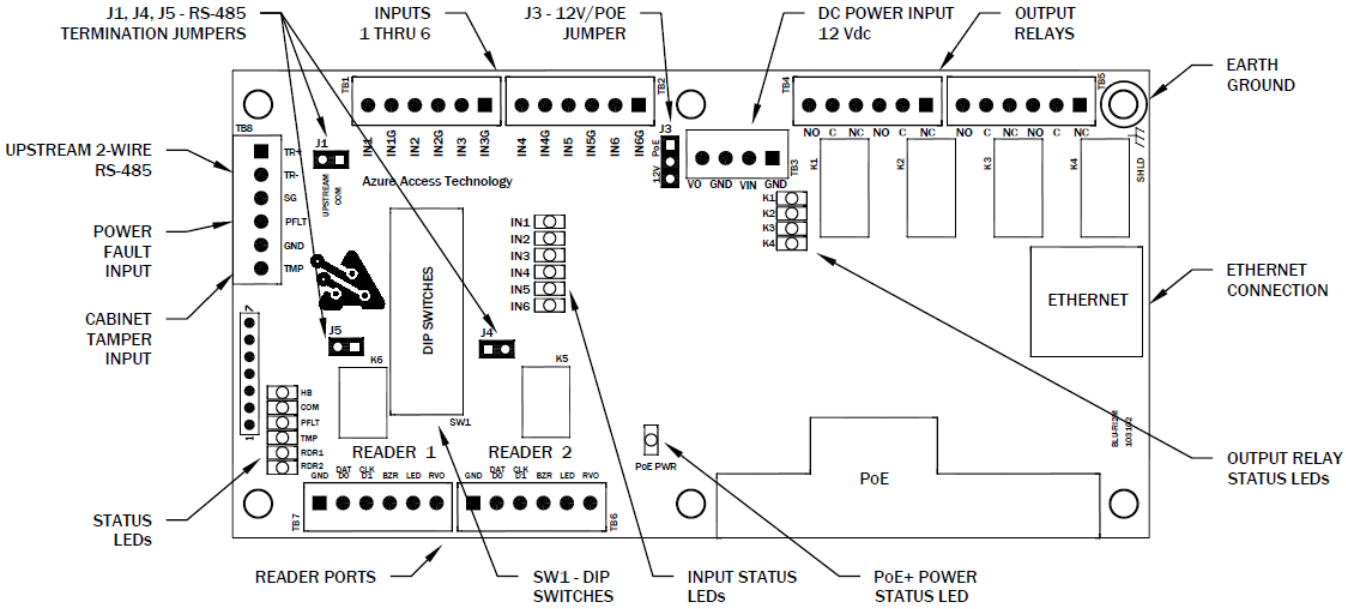


Figure 2.1: BLU-RI2M Diagram

2.1 Terminal Connectors

The BLU-RI2M uses terminal blocks for connecting power, readers & door control signals, communications, supervised alarm inputs, and relay output connections. The connection terminals are factory equipped with removable screw-down quick connectors which are easily removed from the board by firmly grasping the connector and pulling away from the board. If pliers are used to remove the connectors, they should be of the rubber-tipped type. Take care to not damage onboard components when using any tools near the board. The proper location of the quick connectors is outlined in white on the board.

The SDK allows for any readers, inputs, and outputs to be assigned to any door, but a recommended connection is listed in parenthesis in the function column.

BLU-RI2M Terminal Connections			
Location	**Type**	**Label**	**Function (Recommended Connection)**
Reader Connections			
TB6-1	Ground (Reader Power)	GND	Reader 2 Device Connections (Door 2 Reader)
TB6-2	TTL: Data/Data 0 RS485: TR-/B	DAT/ D0	
TB6-3	TTL: Clock/Data 1 RS485: TR+/A	CLK/ D1	
TB6-4	Beeper (Buzzer) Control	BZR	
TB6-5	Green LED Control	LED	
TB6-6	VDC (Reader Power)	RVO	
TB7-1	Ground (Reader Power)	GND	Reader 1 Device Connections (Door 1 Reader)
TB7-2	TTL: Data/Data 0 RS485: TR-/B	DAT/ D0	
TB7-3	TTL: Clock/Data 1 RS485: TR+/A	CLK/ D1	
TB7-4	Beeper (Buzzer) Control	BZR	
TB7-5	Green LED Control	LED	
TB7-6	VDC (Reader Power)	RVO	
Input Connections			
TB1-6	Input 1	IN1	Input 1 (Door 1 Door Contact)
TB1-5	Input 1 Return	IN1G	

TB1-4	Input 2	IN2	Input 2 (Door 1 REX/EPB)
TB1-3	Input 2 Return	IN2G	
TB1-2	Input 3	IN3	Input 3 (Door 1 AUX Input)
TB1-1	Input 3 Return	IN3G	
TB2-6	Input 4	IN4	Input 4 (Door 2 Door Contact)
TB2-5	Input 4 Return	IN4G	
TB2-4	Input 5	IN5	Input 5 (Door 2 REX/EPB)
TB2-3	Input 5 Return	IN5G	
TB2-2	Input 6	IN6	Input 6 (Door 2 AUX Input)
TB2-1	Input 6 Return	IN6G	

Serial Connections

TB8-6	Cabinet Tamper	TMP	Cabinet Tamper & Power Fault with shared GND
TB8-5	Ground	GND	
TB8-4	Power Fault	PFLT	
TB8-3	Signal Ground	SG	Serial 2-wire RS-485
TB8-2	Transmit/Receive Data (-)	TR-	
TB8-1	Transmit/Receive Data (+)	TR+	

Relay Output Connections

TB4-6	Normally Open	NO	OUT1 Relay (Door 1 Strike)
TB4-5	Common	C	
TB4-4	Normally Closed	NC	

TB4-3	Normally Open	NO	OUT2 Relay (Door 2 Strike)
TB4-2	Common	C	
TB4-1	Normally Closed	NC	
TB5-6	Normally Open	NO	OUT3 Relay (Door 1 AUX Output)
TB5-5	Common	C	
TB5-4	Normally Closed	NC	
TB5-3	Normally Open	NO	OUT4 Relay (Door 2 AUX Output)
TB5-2	Common	C	
TB5-1	Normally Closed	NC	
Power Connections			
TB3-4	AUX Power Output	VO	12 Vout AUX Power Connection
TB3-3	Ground	GND	
TB3-2	Input Power	VIN	12 Vin Power Input Connection
TB3-1	Ground	GND	

Table 2.1: BLU-RI2M Terminal Connections

2.2 Jumpers

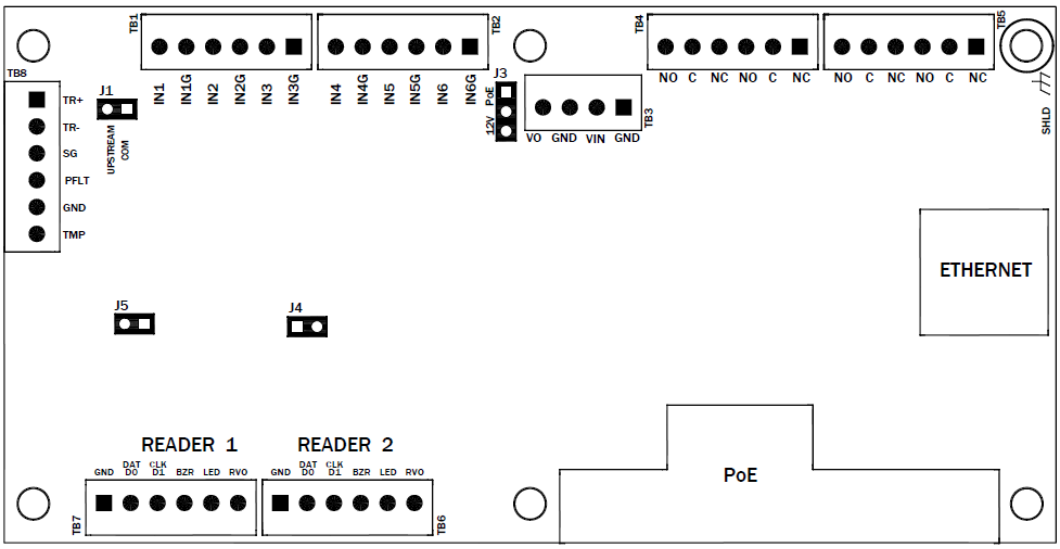


Figure 2.2: BLU-RI2M Jumpers

JUMPER	SETTING	DESCRIPTION
J1	ON/OFF	RS485 termination - Serial Port (UPSTREAM COM)
J3 Labeled PoE VIN	PoE VIN 	12-24V DC/DC Power supply. **DEFAULT**
	PoE VIN 	PoE (*Power over Ethernet) power source*
J4	ON/OFF	RS485 termination - Reader Port 2 (RDR2)
J5	ON/OFF	RS485 termination - Reader Port 1 (RDR1)

Note: RS485 termination jumpers (J1, J4, & J5) are shipped from the factory in the OFF (termination disengaged) position. Only turn ON termination if the RI2M is at the end of the serial bus.

2.3 LEDs

The BLU-RI2M has 19 LEDs for use in monitoring panel functions and diagnosing issues.

HB	Heartbeat & Offline / Online status Offline: 200ms ON, 800ms OFF Online & Unencrypted: 800ms ON, 200ms OFF Online & Encrypted: 0.1 sec ON, 0.1 sec OFF, 0.1 sec ON, 0.1 sec OFF, 0.1 sec ON, 0.1 sec OFF, 0.1 sec ON, 0.3 sec OFF
COM	RS-485 Serial Port – Flashes when data is received
TMP	Cabinet Tamper – ON when in ALARM, OFF when SECURE. See Note 1
PFLT	Power Fault – ON when in ALARM, OFF when SECURE. See Note 1
RDR1	Reader Port 1 – OSDP Reader: Always ON Wiegand Reader: Flashes ON when receiving data
RDR2	Reader Port 2 – OSDP Reader: Always ON Wiegand Reader: Flashes ON when receiving data
Alarm Zone Inputs LEDs	
IN1	Input IN1 Status: OFF = Secure, ON = Alarm, Flash = Fault. See Note 1
IN2	Input IN2 Status: OFF = Secure, ON = Alarm, Flash = Fault. See Note 1
IN3	Input IN3 Status: OFF = Secure, ON = Alarm, Flash = Fault. See Note 1
IN4	Input IN4 Status: OFF = Secure, ON = Alarm, Flash = Fault. See Note 1
IN5	Input IN5 Status: OFF = Secure, ON = Alarm, Flash = Fault. See Note 1
IN6	Input IN6 Status: OFF = Secure, ON = Alarm, Flash = Fault. See Note 1
Output Relays	
K1	Relay OUT 1 (K1): ON = Energized
K2	Relay OUT 2 (K2): ON = Energized
K3	Relay OUT 3 (K3): ON = Energized
K4	Relay OUT 4 (K4): ON = Energized

Ethernet – P1	
Speed (left side)	Green: OFF = 10Mbps, ON = 100Mbps
Link (right side)	Yellow: flashing – network activity
PoE Power	
PoE PWR	ON = PoE power available (Power over Ethernet)

Note 1: Every 4 seconds the LED is pulsed to its opposite state for 0.1 seconds

2.4 Dip Switches

DIP Switch Functions

The BLU-RI2M has 12 DIP switches. These switches are used to set various configuration options.

Communications Address Sets this device's address on the RS-485 bus. Address must be unique for each device on a single RS-485 communications line.					
1	**2**	**3**	**4**	**5**	Address
OFF	OFF	OFF	OFF	OFF	0
ON	OFF	OFF	OFF	OFF	1
OFF	ON	OFF	OFF	OFF	2
ON	ON	OFF	OFF	OFF	3
OFF	OFF	ON	OFF	OFF	4
ON	OFF	ON	OFF	OFF	5
OFF	ON	ON	OFF	OFF	6
ON	ON	ON	OFF	OFF	7
OFF	OFF	OFF	ON	OFF	8
ON	OFF	OFF	ON	OFF	9
OFF	ON	OFF	ON	OFF	10
ON	ON	OFF	ON	OFF	11
OFF	OFF	ON	ON	OFF	12
ON	OFF	ON	ON	OFF	13
OFF	ON	ON	ON	OFF	14
ON	ON	ON	ON	OFF	15
OFF	OFF	OFF	OFF	ON	16
ON	OFF	OFF	OFF	ON	17
OFF	ON	OFF	OFF	ON	18
ON	ON	OFF	OFF	ON	19
OFF	OFF	ON	OFF	ON	20
ON	OFF	ON	OFF	ON	21
OFF	ON	ON	OFF	ON	22
ON	ON	ON	OFF	ON	23
OFF	OFF	OFF	ON	ON	24
ON	OFF	OFF	ON	ON	25
OFF	ON	OFF	ON	ON	26
ON	ON	OFF	ON	ON	27
OFF	OFF	ON	ON	ON	28
ON	OFF	ON	ON	ON	29
OFF	ON	ON	ON	ON	30
ON	ON	ON	ON	ON	31

Baud Rate (Upstream RS-485 Port) **Note:** The baud rate must be the same for every device on this port.	**6**	**7**
9600 Baud	OFF	OFF
38400 Baud	ON	OFF
57600 Baud	OFF	ON
115200 Baud	ON	ON

DIP RS485 Config Override Select if OSDP cmds are accepted to set baud and address	**8**
Accept OSDP cmds to set baud/address	OFF
Do not accept OSDP cmds to set baud and address and instead honor DIP switch settings	ON
Network Configuration (not supported at this time)	**9**
Use user config	OFF
Use default config	ON
Default Network Login Disable or Enable default login (not supported at this time)	**10**
Disable Default Login	OFF
Enable Default Login	ON
FACT/OSDP Key Reset	**11**
Power up board with switch ON and all LEDs blink 50ms ON, 50ms OFF, repeating for 3 seconds. If the switch is turned OFF then ON within the 3 seconds, the board performs factory reset including wiping out custom OSDP keys. Toggling this DIP switch during normal operation does nothing.	Toggle
Reserved	**12**
X	OFF

Table 2.1: BLU-RI2M DIP Switch Settings

2.5 Mounting

Eight holes are provided for mounting the BLU-RI2M. Mount at least 0.25 inches above the conductive surfaces. One mounting hole is plated for connecting to Chassis (Earth) ground.

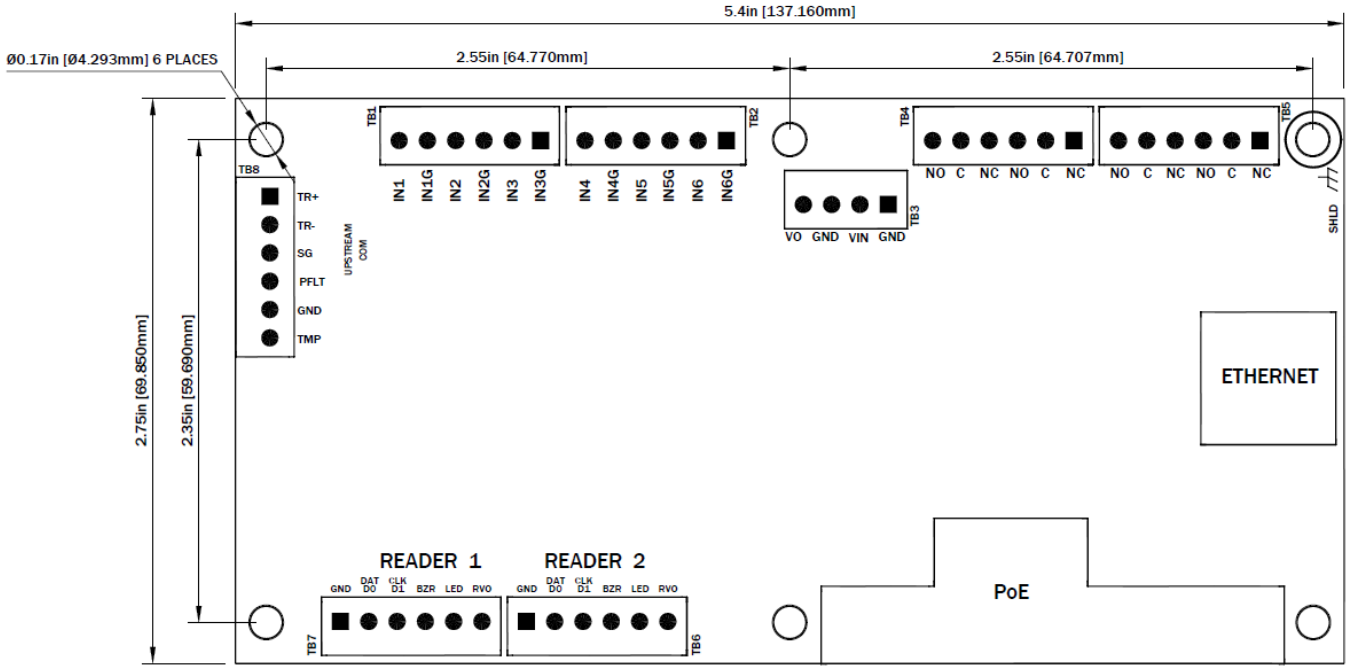
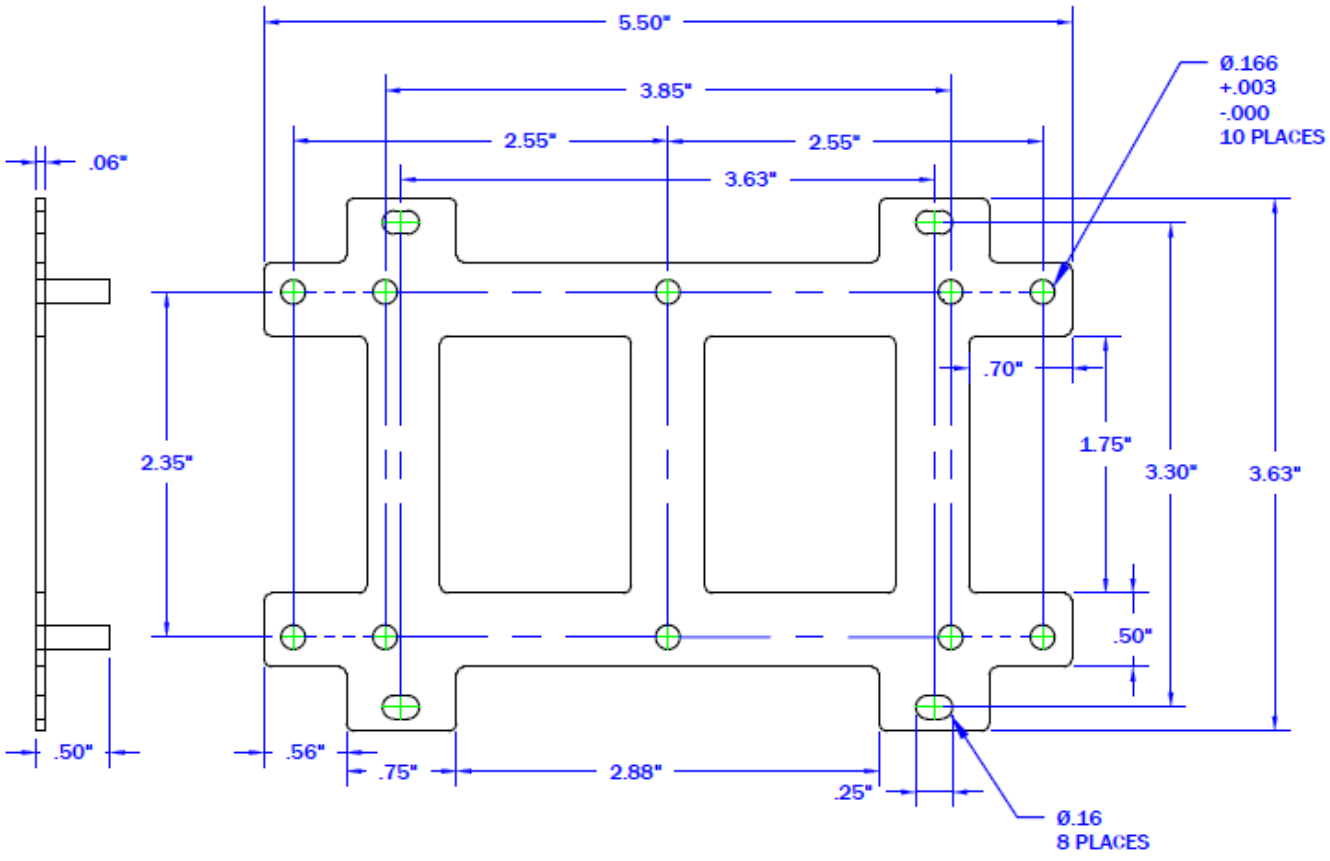


Figure 2.3: BLU-RI2M Mounting Holes [inches (mm)]

The BLU-RI2M also has an optional, metal mounting bracket with standoffs for installation in a triple-gang box



Part III
System Wiring & Setup

3 System Wiring & Setup

This section will provide installation and wiring instructions as well as hardware interface information as it applies to the access control system. To guard personal safety and avoid damaging equipment it is important to have a full understanding of electrical wiring best-practices and safety. The following sections provide general guidelines relating to the BLU-RI2M, but are not a substitute for formal training in safely handling electrical systems!

3.1 Power (TB3)

DC/DC

Take care when selecting a power supply for use with the BLU-RI2M. Most power supplies on the market today provide good input/output isolation, however those which do not provide isolation (or have high leakage capacitance), coupled with accidental AC power line interchange, presents serious ground fault problems for installers. With ground fault, the signal reference between subsystems may be 115 Vac (230 Vac) apart. If these subsystems are interconnected, the large potential difference will cause equipment damage or personal injury. Azure Access recommends the use of isolated continuous power from supplies only.

In the case of over-current, solid-state fuses integrated on the BLU-RI2M panel will 'trip' to protect the components of the panel. In many cases, the solid-state fuses will reset automatically when normal current resumes, however it may be necessary to interrupt the supply of power to allow the fuses to reset.

3.1.1 Powering Peripherals

The BLU-RI2M has multiple output ports for distributing power to peripheral devices. Each port has its own voltage and current specs and have overcurrent protection.

The installer must adhere to overall current maximums of the power supply, whether PoE or DC/DC from the wall. Detailed electrical specs are located in the "Specifications" section of this document (section 6).

To maximize longevity, it is not recommended to fully load all peripheral power ports when operating at the top of the operating temperature range.

Auxiliary Output Power "VO" (TB3 – pin 4)

The VO port can be used to power peripheral devices such as strikes, IO modules, readers, etc. This port is a direct passthrough from the primary power VIN (same voltage as VIN), whether using PoE or wall supply. This port has a 1 Amp current maximum.

Reader Port Power "RVO" (TB6 – pin 6) & (TB7 – pin 6)

Readers can be powered directly from the two reader ports. Each port has a maximum current rating of 500mA.

3.2 Grounding

3.2.1 DC Ground

This is typically the minus (-) side of the DC output of the power supply. It is to be connected to the DC ground input of all devices being powered by one supply. It must not be connected in any way to any of the RS-485 signals or the AC side of the line including Safety (Earth) ground.

Note: AC Ground ("Safety" / "Earth" / "Chassis" Ground)

To avoid ground loop current, there must be only ONE point at which the AC ground connects to the DC

ground (usually through the DC/DC power supply). The plated, “chassis” mounting hole should be electrically connected the conductive surface of the mounting plate or enclosure.

3.3 Upstream RS-485 Serial Port (TB8)

RS-485 is an electrical interface standard for multi-point communication on bus transmission lines. It allows high speed data transfer over extended distance (4000ft, 1219m). An RS-485 Serial Bus is a typical connection for field devices (such as the BLU-RI2M) to a controller. The BLU-RI2M is a client node device on the bus that responds to communications from the controller.

3.3.1 Device Wiring

2-wire RS-485 consists of three wires; TR+, TR-, & SG (signal ground). Both TX and RX are done on the same pair of wires. Match the polarities; connect positive (+) to positive and negative (-) to negative. Wiring recommendation of 24 AWG, shielded twisted-pair. Wiring requirements satisfied by Belden 9841 or equivalent.

3.3.2 Bus Configuration

The maximum number of field devices on one RS-485 communications bus is 32. Communication cables for RS-485 should be laid out in a "multi-drop topology". This means that there should only be two ends to the line and devices should be located directly along this line. The BLU-RI2M can be located at any point along the line. Long stubs (T connection) and Star Topology will cause communication problems and must be avoided. Each field device must have a unique address, and all the devices must use the same baud rate. All devices on the RS-485 bus must be communicating with the same protocol.

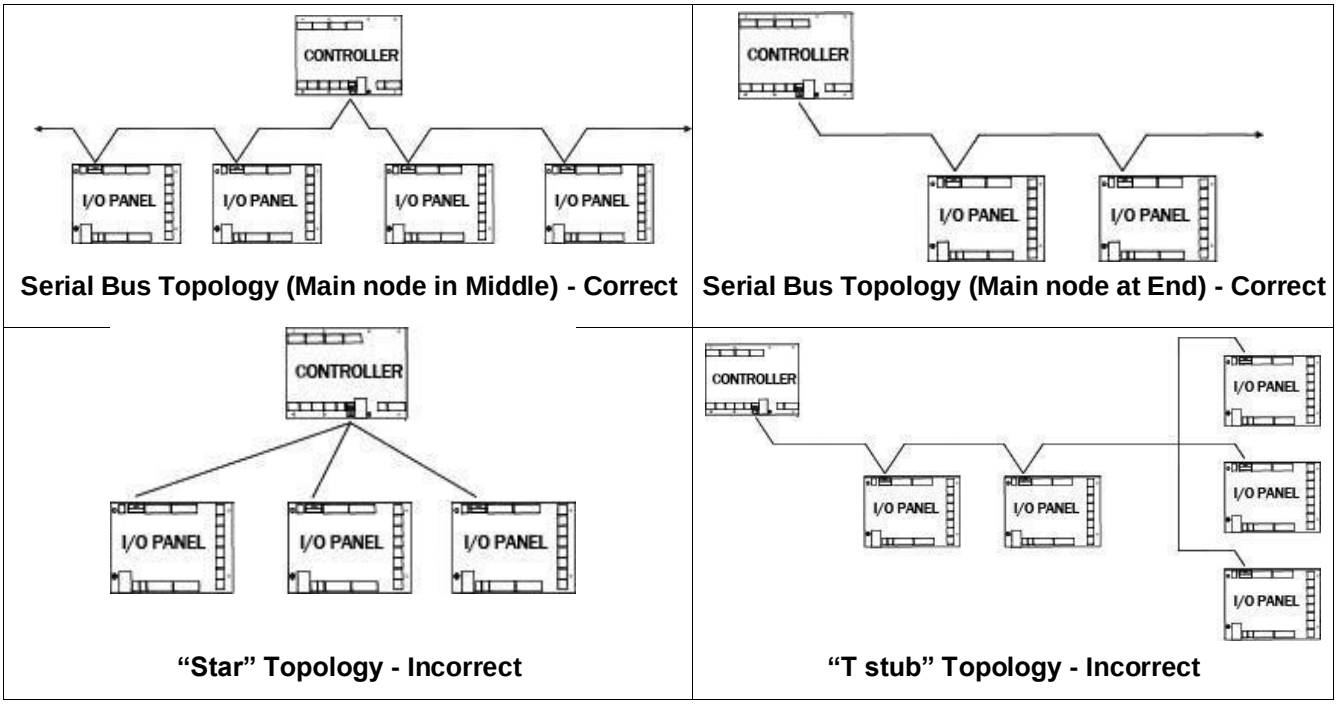


Figure 3.1: RS-485 Bus Topologies

3.3.3 Termination

For the most reliable communications, the RS-485 bus must be terminated at both ends. The terminators are integrated on the board and are engaged via user installed jumpers. Never engage termination of devices in the middle of the communication bus.

External termination modules (ATM-48) are not required but can be used. If using the ATM-48 termination module, DO NOT install the jumpers on the board. The wiring is as follows:

ATM-48 Pin 1 -> TR+
ATM-48 Pin 2 -> TR-

3.3.4 Signal Ground (SG)

When devices are powered from different power supplies, a common ground reference must be established on the RS-485 bus. This is the ground (GND) connection on the Serial port connector. Failure to have a common ground between devices may cause communication errors. If connecting the RS-485 bus with shielded wire, the shielding can be used as the signal ground connection. Or, if the environment is known to be electrically noisy, the wire's shield can be connected to safety/chassis/Earth ground and a separate wire can be used for signal ground.

Grounding Potential Difference Checks Before Connecting

Before a device is connected to an RS-485 subsystem, it must be checked for ground fault. Ground faults can damage all devices connected to the RS-485 communication line. To check if there is ground fault for a new unit, follow the steps below:

1. Apply power to all devices already successfully connected to the RS-485 line.
2. Power up the new unit, but DO NOT connect it to the RS-485 line.
3. Connect the signal ground (SG) of the RS-485 line through a 10k limiting resistor.
4. Measure the AC and DC voltage across the resistor. There should NOT be more than 1 volt across the resistor. Otherwise find and clear the fault.
5. Connect the new unit to the RS-485 line only if no ground fault is found.

3.4 Unsupervised Cabinet Tamper & Power Fault (TB8)

The cabinet tamper (TMP) and power fault (PFLT) inputs only support unsupervised configurations. The cabinet tamper input is wired to the enclosure and detects when the enclosure door is opened and closed. The power fault input is wired to the power supply and detects when there is an issue with the power supply. Wire these inputs with 24 AWG minimum. See "Unsupervised" in Section 3.6.1 wiring diagram.

Note: Even though PFLT and TMP share a GND connection, both inputs will report separately during normal operation. However, if the shared GND connection comes loose, both a PFLT and TMP alarm will be reported simultaneously.

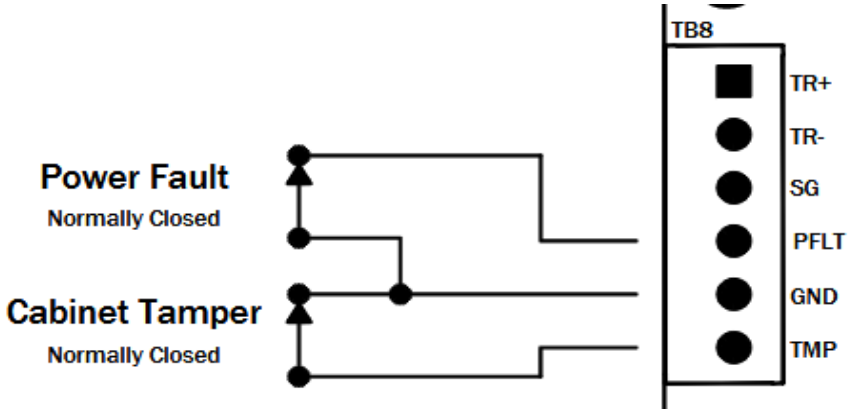


Figure 3.2: Cabinet Tamper & Power Fault Wiring

3.5 Reader Ports (TB6 & TB7)

The BLU-RI2M has two onboard reader ports that support both TTL (Wiegand, Clock & Data, etc) and RS-

485 (OSDP) readers. The RS-485 reader bus is a true RS-485 port, meeting all requirements of the electrical standard.

PIN	DESCRIPTION
GND	Ground connection for the reader
DAT/D0 & CLK/D1	TTL or RS-485 reader data connections (see 3.5.1 and 3.5.2 below).
BZR	Open-collector buzzer output. Can also be used for 2-wire LED control
LED	Tri-state LED signal
RVO	Reader power; jumper selectable to either be VIN passthrough or a regulated 12VDC

3.5.1 TTL Readers

Each reader port on the BLU-RI2M can support one TTL reader. TTL reader types include Wiegand, magnetic stripe, proximity, bar code, smart card, biometric, keypad, etc. A different type of reader can go on each port.

TTL readers usually utilize all pins on the reader port. The wiring to a TTL reader should be made using 24 AWG minimum, shielded cable with 6 conductors (Belden 9536 or equivalent). Do not exceed 500 feet (152 m) between the BLU-RI2M and reader. 18 AWG cable may be required for long cable lengths or for large current requirements. If twisted pair cable is used, do not wire Data 1/Clock and Data 0/Data in the same pair. Connect the shield drain wire of the cable at the GND terminal of the appropriate reader connector on the BLU-RI2M. Carefully insulate the drain wire with sleeving for a reliable installation.

Power for each reader port is provided through the “RVO” pins. Power supplied on RVO is a passthrough of VIN (12 VDC). Each reader port can supply 500mA. If the readers have a greater total power requirement, or if there are other wiring concerns, external power supplies should be used to power the readers. In this case, only connect the reader power lines to the external power supply; do not connect the reader to two power supplies.

For basic operation of the reader, at a minimum the Data 1/Clock and Data 0/Data wires must be connected from the reader to the BLU-RI2M and power supplied to the reader. LED and beeper control lines do not have to be connected, but in this case, the LED and beeper may not function on the reader.

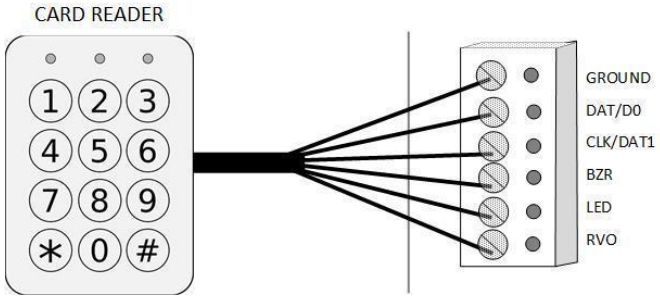


Figure 3.3: BLU-RI2M TTL Reader Wiring

3.5.2 RS-485 (OSDP) Readers

Both reader ports on the BLU-RI2M can communicate with RS-485 readers; OSDP being the most popular. The Reader Port is a true RS-485 port meeting TIA-485-A. By default, the firmware allows up to four OSDP readers which is enough for paired-reader configuration on two doors/access points.

In this section, “OSDP reader” will be used to represent what is really any RS-485 reader. The OSDP protocol standard expands the functionality of readers by enabling a large (and growing) command set.

OSDP uses a 2-wire interface (transmit and receive on same wires). Always observe polarity of the lines; connecting positive (+) to positive and negative (-) to negative terminals. The Signal Ground (GND) must be connected between the readers and the reader port for reliable communications. “Star” wiring or “T stubs” longer than 10ft must never be used!

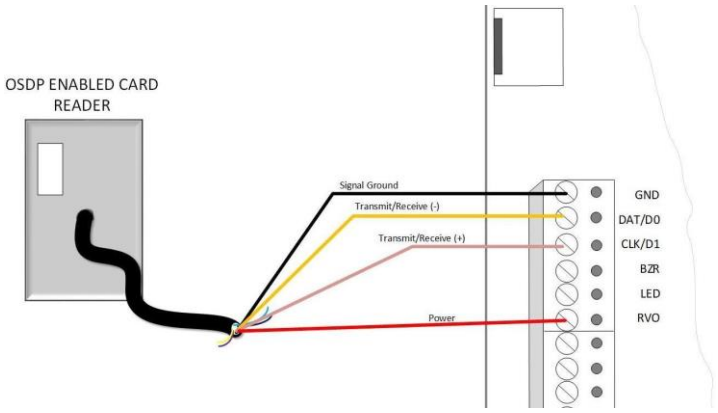


Figure 3.4: OSDP Wiring

OSDP connections should be made observing polarity of the lines from the reader. Signal ground should always be connected.

3.6 Supervised Alarm Inputs (TB1 & TB2)

The BLU-RI2M has 6 Supervised Alarm Inputs. These inputs are multi-purpose and are configured with the Host software. Any input can be assigned as a door contact, REX, or auxiliary alarm input (i.e. motion or glass-break sensors). With the use of end-of-line termination resistors, the alarms are monitored for not only secure and alarm states, but also the detection of fault conditions from tampering and accidental damage.

These alarm inputs can be configured as either “Normally Open” or “Normally Closed” and can also operate in an Unsupervised mode. Unsupervised configuration does not require any external, end of line resistors.

However, unsupervised mode is the least secure and damage or tampering of the line can go undetected, resulting in missed or false alarms. The unsupervised configuration should not be used in any situation that requires security. An example of unsupervised input wiring can be seen in Figure 3.5.

Input wiring requires minimum 22 AWG up to 1,000ft (304.8m) and a maximum of 30 Ohms of loop resistance.

3.6.1 End of Line (EOL) Termination Resistors

Using two End-of-Line (EOL) termination resistors, the Supervised mode can detect fault conditions resulting from accidental damage or tampering. The BLU-RI2M will not confuse this condition with a valid secure or alarm condition. For maximum security, the end-of-line termination resistors should be placed at the END of the cable, farthest away from the BLU-RI2M. There are multiple EOL options, ranging from ready-made terminal block connectors to individual, hand-placed resistors. The following wiring diagram shows some of the pre-defined termination resistor configurations. For ease of installation, pre-assembled resistor packs for termination are available; the ATM-30 is 300/10K Ohms & ATM-3D is 3K/4.5K Ohms.

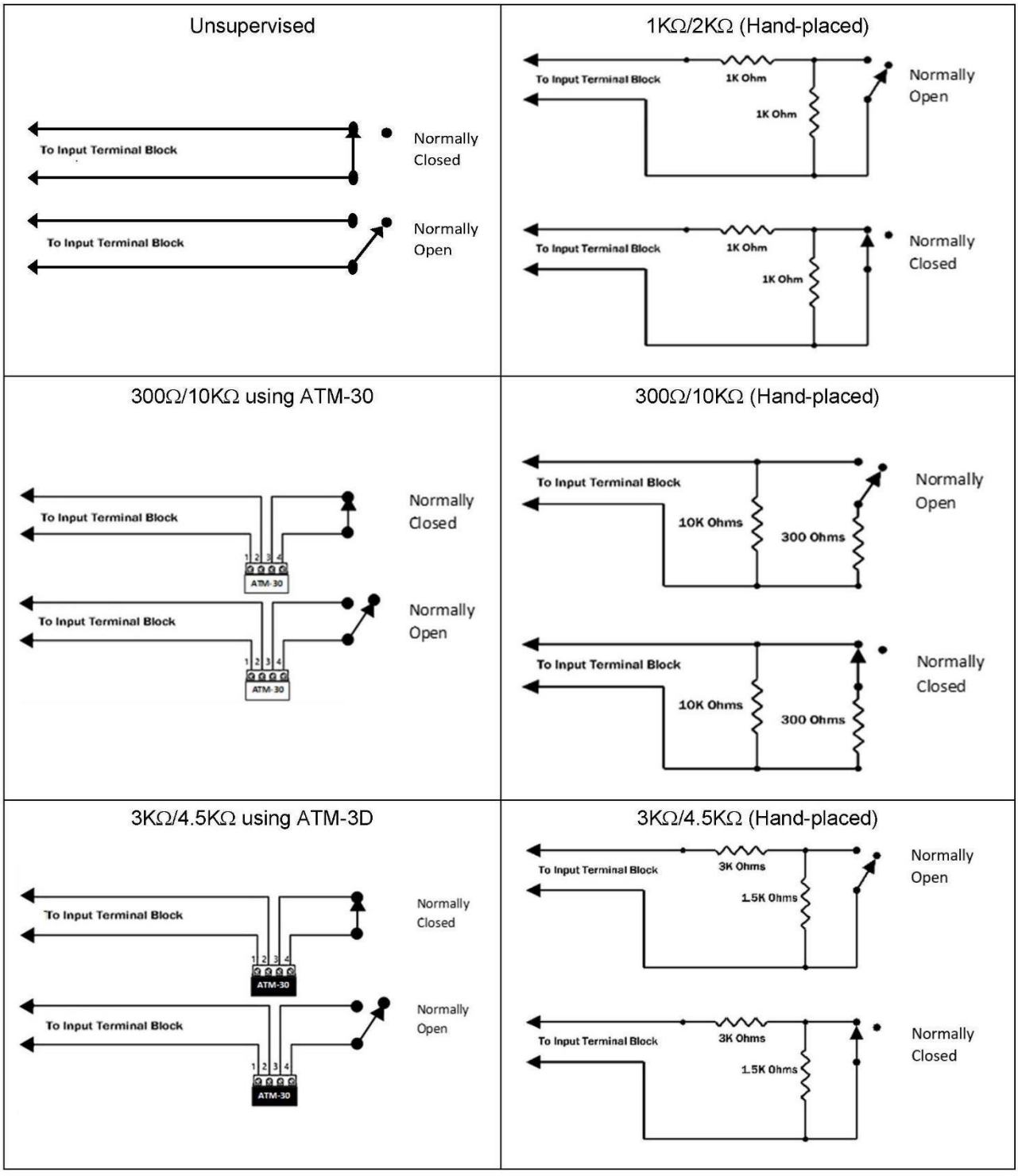


Figure 3.5: Input Supervision

Supervised inputs can be configured with Host Software to use different EOL resistor combinations.

3.7 Output Relays (TB4 & TB5)

The BLU-RI2M has four output relays onboard. These relays can either control a door strike (lock) or other electrical device connections or other miscellaneous output control. Relay functions are defined in the Host software. The onboard relays are capable of switching up to 2A @ 30VDC or 0.5A @ 120VAC.

3.7.1 Door Strike Wiring

A typical electric door strike (lock) will require around 250mA (0.25 Amps) to operate. If the particular locking device requires more than 2 Amps to control, another external power-switching device/relay of adequate power rating must be used. Some strikes such as magnetic strikes are inductive loads, in which case is recommended to derate the relay's rated current by 50%.

Wiring between the strike power supply, strike relay (internal or external) and the electric lock should be of sufficient gauge (16 to 18 AWG recommended) to prevent excessive voltage drop under all circumstances.

The strike can be wired in a fail-safe (door unlocks on power outage) or fail-secure (door locks on power outage) manner by using either the Normally Closed (NC) or Normally Open (NO) relay contacts.

3.7.2 Auxiliary Output Relay

Aside from controlling door strikes, relay outputs can be used for controlling other audible and visual devices. Auxiliary relay functionality is configured via the Host software.

3.7.3 Voltage Spike Suppression

Due to inductive nature of a door strike, energizing and deenergizing of the relay can cause voltage spikes across the relay contacts. If no suppression is used to defend against these voltage spikes, communication problems and permanent damage to the hardware may occur.

Strike Type	Suppression Method
DC Strike	Reverse-biased DIODE with a continuous current rating of at least 1x the strike current and a breakdown voltage (Vbr) rating of at least 2x the strike voltage. Usually a 1N4001 – 1N4006 will work.
AC Strike	A Metal Oxide Varistor (MOV) will usually be included with the strike. If a MOV does not come with the strike, contact the strike manufacturer for the appropriate MOV ratings. Be sure to use a UL approved MOV.

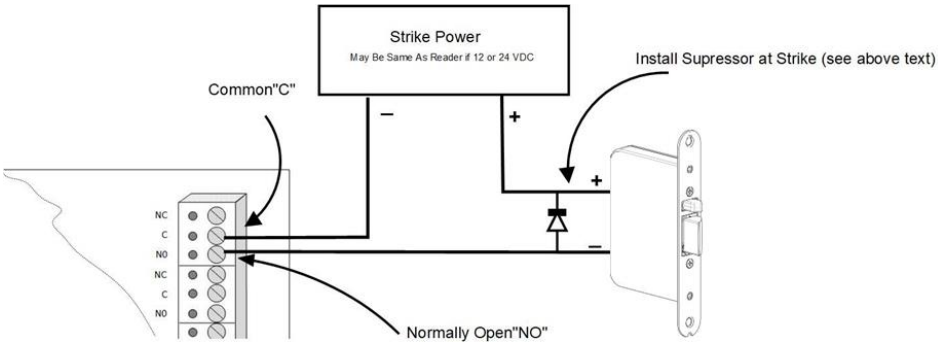


Figure 3.6: Strike Wiring Diagram (DC w/ Diode)

Both DC and AC suppression components are placed identically; across the output device's electrical terminals.

3.8 Door / Access Point Setup

An Access Point (sometimes referred to simply as "Door") is the grouping of at least one reader, supervised inputs, and relay outputs to yield full control and monitoring of a door/entryway. A "complete" Access Point consists of at least one reader, two supervised inputs (for door contact and REX), and one relay output controlling the door strike. The BLU-RI2M supports 2 complete Access Points with onboard interfaces. Configuration and assignment of the Access Point's interfaces is done through the Host software. Recommended connections are listed in the Terminal Block table in section 2.

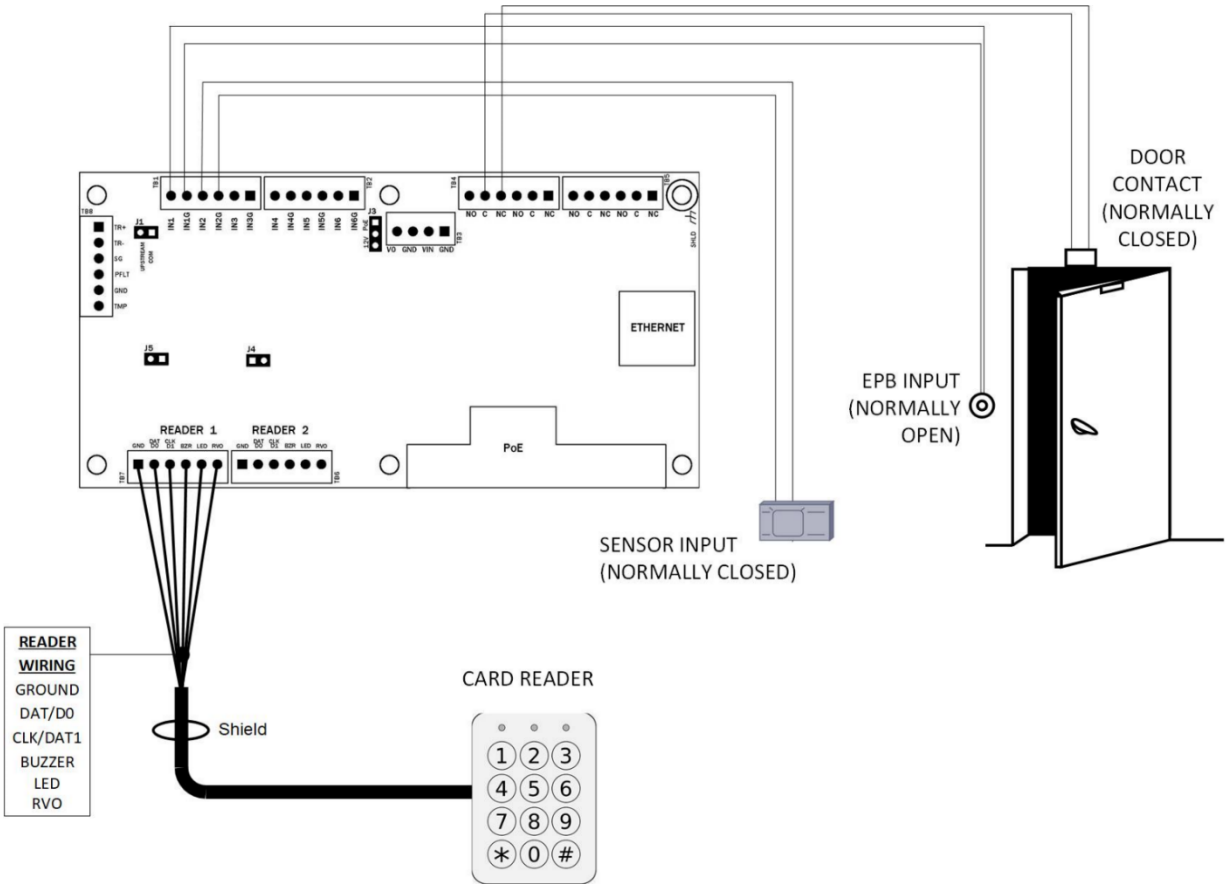


Figure 3.7: Door / Access Point Wiring

3.8.1 Reader

An Access Point needs at least one reader to receive credentials. The BLU-RI2M supports both TTL and RS-485 (OSDP readers). Access Points can also use two readers in a “paired” configuration.

3.8.2 Door Contact & Exit Pushbutton/REX Inputs

The door contact input is a normally closed input used to monitor the position of the door (open or closed). This will typically be connected to a magnetic sensor in the frame of the door that will provide a short circuit when the door is closed and an open circuit when the door is opened. Door Contact inputs are required for features that require knowledge of door usage; such as Anti-Passback, Door Forced / Held Open, and more precise strike timing.

The Exit Pushbutton, sometimes referred to as a REX (Request-to-Exit/Enter) input, is a Normally Open input that is used to inform the Access Point the door needs to, or will be opening without an access request being made with a user’s credential (card, pin, etc). It is usually in the form of a pushbutton, but it could also be in the form of a motion sensor or other user-activated sensor. Note that different types of sensors will require different strike timing calibrations.

If input supervision is enabled (see Part 3.6.1 above), end of line (EOL) terminating resistors must be installed. The terminating resistors should be installed as close to sensor (away from the BLU-RI2M) as possible.

3.8.3 Door Strike

Door strikes come in a variety of different styles. They can come in different voltages (both AC and DC), and can operate in a Fail-Secure or Fail-Safe manner. The most common voltages are 12 & 24 Volts. A Fail-Safe door uses electrical current to keep the strike locked; meaning in the case of power failure, the strike will default to an unlocked state. A Fail-Secure strike uses electrical current to unlock the door; meaning in a power failure situation, the door will default to a locked state.

Part IV
Operation

4 Operation

4.1 Firmware

The BLU-RI2M is field-programmable. The firmware can be updated from the Host through the controller or with the “Debug Tool” desktop application.

4.2 Serial COM Configuration

To configure the RS-485 Serial Port for communications to the controller, use DIP switches 1-5 to set address and 6 & 7 to set the baud rate (see section 2.2).

Note: All devices on the serial bus must use the same baud rate. Each device needs to have a unique address.

4.3 Network (*Note: this section/subsections not supported as of this writing*)

The BLU-RI2M’s IP address and relevant network settings can be configured via the web server (accessed with a web browser) or over Telnet. The BLU-RI2M and the PC being used to access it must be on the same network.

The default network settings are as follows…

IP Address:	192.168.10.178
Subnet:	255.255.240.0
Gateway:	192.168.10.1
User Name:	admin
WWW Password:	admin
Telnet Port:	9999
Telnet Password:	admin

TELNET & WWW PASSWORDS SHOULD BE IMMEDIATELY CHANGED TO PREVENT UNAUTHORIZED ACESS TO THE BOARD OVER THE NETWORK!

Note: If Telnet and WWW (Web) are both disabled, there will be no way to access and make changes to the board’s network configuration. The board will need to be reset to factory defaults.

4.3.1 Web Server

To access the board’s web server, type the IP address (http://192.168.10.178) into the address field of your browser and press <enter> to display the login screen. The default values are listed above.

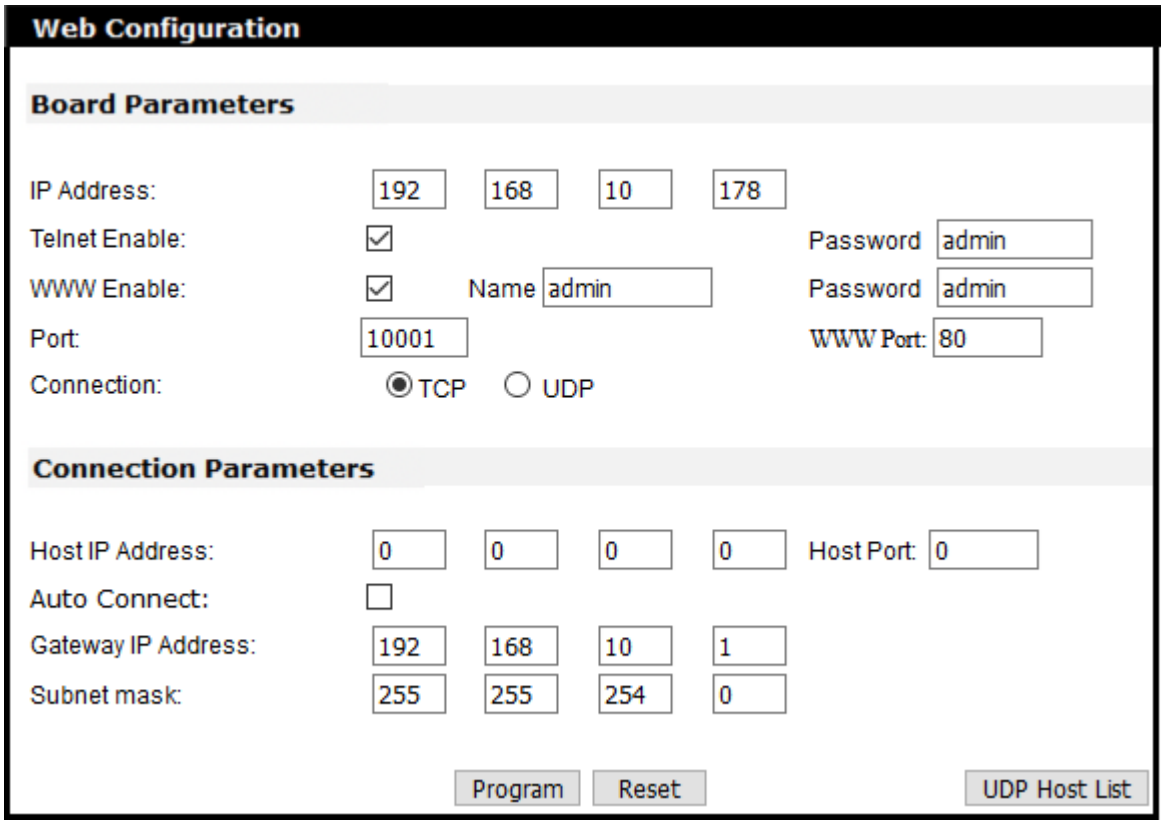


Figure 4.1: Main web page where the network settings can be modified

IP Address: IP address of the BLU-RI2M. This is a static IP address so the network administrator must verify that it will not be used elsewhere in the system.

Telnet Enable: When checked, enables Telnet access to the web page and configuration files stored in the BLU-RI2M.

Telnet Password: Password that must be entered to log in the Telnet server in the BLU-RI2M. There is no User Name for Telnet access.

WWW Enable: When checked, enables web page access for configuring the BLU-RI2M.

WWW Username and Password: User name and password that must be entered to access the configuration via the web page.

Port: The TCP port number that must be used to open a network connection to the BLU-RI2M. This should be an unused port on your network. Consult your system administrator for more information.

WWW Port: The HTTP port that the web server will use to display the configuration pages. The default value is 80 which is used by default by most web browsers. If it is necessary to set another port, it will be necessary to specify the port when accessing the configuration page. For example, if port 8080 were used, it would be necessary to specify this port in addition to the IP address such as entering in the browser address bar: http://192.168.0.200:8080.

Connection: Select either a TCP or UDP connection. UDP should be used for communicating with devices over the network with a controller. Also use UDP if you need to communicate to devices on different networks using the host list.

Connection Parameters

Host IP Address/Port: When auto-connect is enabled, this is the host address/port of another device which a connection will be established with. For incoming connections might be used like a filter. These parameters supposed to be used with TCP connections only.

Auto Connect: If checked will cause the BLU-RI2M to automatically connect to the Host Address given. This address should be another device that is not set to auto connect.

Gateway IP Address and Subnet Mask: These are used to connect to another device that is not on the same network when the Auto Connect box is checked.

UDP Host List

From the main screen clicking the ***UDP Host List*** button will display the Host List configuration. In addition to the Host IP Address on the main configuration page, up to 9 other IP addresses may be used for a total of 10 UDP destinations. When serial data is received it is sent in a UDP packet to all of the Host IP addresses. Because the messages are sent to ALL devices, the devices at these different IP addresses should have different hardware addresses. The different IP addresses of the devices do not substitute for the device addresses.

After changing any of the above configuration options, click the “Program” button at the bottom of the page. The settings will be saved and the board will reset. Clicking the “Reset” button at the bottom of the page will reset the values to their current configuration. If you do not wish to change any configuration options, simply close the browser window without pressing either button.

4.3.2 Telnet

The BLU-RI2M supports telnet connections over the network. Access the board over telnet using the command line (or equivalent utility) using the command:

*telnet *IP_Address* *port #**

The default values for IP address and port number are shown at the beginning of section 4. Then enter the password within 5 seconds of being prompted, or the connection will be closed.

Network settings can be changed with the configuration menu. When finished, use the Save and Exit menu option. For options, (N)=No and (Y)=Yes, pressing <ENTER> sets the default value as noted in parentheses.

The following security settings are exclusively configurable over Telnet:

- Disable Telnet Setup – Enable/Disable Telnet setup
- Disable Web Setup – Disable the web server, blocking access via web browser
- Enable Encryption – See Encryption Configuration below
- Change Key – See Encryption Configuration below
- Key length in bits (128) – See Encryption Configuration
- Enter Key – See Encryption Configuration

4.3.3 Encryption Configuration

For heightened security, the BLU-RI2M can operate in encrypted mode to secure communication. This will prevent tampering or monitoring of the communication between devices. To enable encryption first configure the IP address and communication settings, then use a Telnet client to connect to the device.

On connecting to the board via telnet follow the prompts to set up the HEX key…

Telnet Menu Prompt	User Entry	Function
Change Setup: 0 Server configuration 1 Channel 1 configuration 6 Security 7 Factory defaults 8 Exit without save 9 Save and exit Your choice?	6 <Enter>	Select Security menu item
Disable Telnet Setup (N)?	<Enter>	Accept default config
Disable Port 77FEh (N)?	<Enter>	Accept default config
Disable Web Setup (N)?	<Enter>	Accept default config
Enable Encryption (N)?	Y	Enable encryption
Change key (N)?	Y	Change key
Key Length in Bits (128)?	128, 192 or 256 <ENTER>	Select key length
Enter key:	Enter key (see instructions below)	Enter the key. Length will depend on what your selection in previous step was
Change Setup: 0 Server configuration 1 Channel 1 configuration 6 Security 7 Factory defaults 8 Exit without save 9 Save and exit Your choice?	9 <Enter>	Save settings and exit

Note: These steps will need to be repeated with each device, using the same Key Length and hexadecimal string for each of the devices that will communicate together. This procedure only outlines setting the encryption configuration. Additional security options can be chosen according to preference.

KEY GENERATION

The key must be made of Hexadecimal characters, which are composed of the letters 0-9 or the letters A-F. Thus, only these characters may be used in the key. For 128, 192 and 256 Key lengths, the key must consist of 32, 48 or 64 characters, respectively.

Example Keys:

128-bit:
000102030405060708090A0B0C0D0E0F

192-bit:
000102030405060708090A0B0C0D0E0F0001020304050607

256-bit:
000102030405060708090A0B0C0D0E0F000102030405060708090A0B0C0D0E0F

For generating secure random keys, there many utilities available for download on the Internet. If you have more questions about generating keys, contact your Azure support personnel.

PART V
Troubleshooting

5 Troubleshooting

5.1 Serial RS-485

- Verify DIP switch setting for baud rate and communication address:
  - All devices on the communication port MUST use the same baud rate
  - Each device on the communication port MUST have a unique address
- Check proper voltage on the RS-485 line (-7 to +12VDC). If values are out of range, check termination and grounding.

5.2 Alarm Device Input

If zones report fault (in supervised mode), check the resistance of the line. The resistance should not exceed +/- 15% of the EOL value used. The entire loop wiring resistance must not exceed 30 ohms. Improper wire gauge may create increased resistance and therefore false faults on the line.

5.3 Output Relays

If the device attached to the relay is producing the opposite result than expected (e.g., siren turns off when should turn on), wire the device to the opposite pole than which it is currently connected (NC to NO). If relays are not switching properly, check the power load which is not to exceed 2A @ 30Vdc. Check the polarity of the suppression diode.

PART VI
Specifications

6 Specifications

Specifications are subject to change without notice.

Primary Power (VIN)	**DC/DC:** 12 VDC ± 10%; Current (No readers or Aux power): ● 12VDC: Board operating: 450mA max ● 12VDC: Full load powering peripherals: 2.45 Amps max **PoE+** Source: 42.5-57V Board operating: 130mA max Full load powering peripherals: 700mA max
Auxiliary Power (VOUT)	VIN Passthrough; 1000mA (1A) Max
Reader Power (RVO)	VIN Passthrough or 12VDC Regulated 500mA max each port (added directly to Primary Current if VIN Passthrough)
Network Com (x1)	10BaseT/100Base-TX Ethernet
Upstream Serial Com (x1)	RS-485; 2-wire (half-duplex), 9,600 to 115,200 baud
Tamper & Power Fault	Unsupervised digital inputs for cabinet tamper and power supply failure.
Alarm Inputs (x6)	Unsupervised/supervised, configurable End-Of-Line resistor values. 1K/2K, 3K/4.5K, 300/10K are default, custom values available. Use 1 %, ¼ W resistors
Output Relays (x4)	Dry, Form-C contacts. 2A @ 30VDC or 0.5A @ 120VAC Max **Note:** When connecting an inductive load like a magnetic strike, it is recommended to derate the relay's current rating by 50%.
Reader Ports (x2)	**Reader Power:** VIN; 12VDC. 500mA Max each port. **Data Input:** Supports F/2F, TTL (Wiegand or Clock/Data) or 2-wire RS-485 (9,600 to 115,200 baud) for OSDP readers. **Buzzer Output:** Open collector, 18 Vdc maximum, sink 50mA maximum. **LED Output:** Tri-State LED output. TTL levels, high>3 V, low<0.5 V, Low=Active, 20 mA source or sink maximum

Cable Requirements	**DC Power:** 18 AWG minimum, 1 twisted pair **Ethernet/PoE+:** Cat 5 minimum **RS-485:** 24 AWG. 1 shielded twisted pair. 4000 ft. (1,219m) maximum. Belden 9841 or equivalent. **Reader Data (TTL):** 4 to 6 wires, 500 ft. (152 m) maximum. 22 to 18 AWG depending on cable length. Should be non-twisted pairs. **Inputs:** Unsupervised/supervised: 1 twisted pair, 22 AWG minimum, 1000 ft. (304.8 m) 30 Ω maximum loop resistance **Relay outputs:** 16 to 18 AWG. Should be of sufficient gauge to avoid voltage loss.
Environmental	**Temperature:** -40 to 85ºC operating and storage; Indoors **Humidity:** 5 to 95% RHNC.
Mechanical	**Dim:** 5.4 in. (137.16 mm) W x 2.75 in. (69.85 mm) L x .75 in. (19.05 mm) H **Weight:** 0.28 lbs. (126 grams)

PART VII
Revision History

7 Revision History

Rev	Date	Description of changes	Editor
A1	3/28/2022	Initial draft	Evan Z
A2	5/18/2022	Pre-release content update and formatting fixes. Fix baud rate DIP table.	Evan Z
A3	6/10/2022	Fix spec of number of readers allowed on each reader port	Evan Z