impro®

MODEL NUMBER:
ISC960-1-0-GB-XX ISC962-1-0-GB-XX
IPS960-1-0-GB-XX IPS961-1-0-GB-XX
IPS962-1-0-GB-XX IPS963-1-0-GB-XX

IXP220 CONTROLLER

ImproX IXP220 Controller
INSTALLATION MANUAL

SPECIFICATIONS

Working Environment

Open Frame Construction (ISC96X)	Designed to work in an indoor (dry) environment. The Controller is NOT sealed against water.
Power Supply Combo (IPS96X) ..	Designed to work in an indoor (dry) environment similar to IP20. The Power Supply Combo is NOT sealed against water.

Power

Open Frame Construction (ISC96X)

Power Input

Main Power Input Port.....	18 V DC to 32 V DC or 16 V AC to 24 V AC.
Battery Input Port	12 V DC to 14 V DC.

Typical Current Distribution

Controller	**Current (mA)**	**Power (W)**
12 V DC with no peripherals connected and relays off.....	90	1.08
24 V DC with no peripherals connected and relays off.....	60	1.4
16 V AC with no peripherals connected and relays off.....	70	1.1
Battery Charging	350 mA Trickle charge at 13.7 V DC maximum.	
External Readers	200 mA continuous at 5 V DC and 12 V DC maximum per port.	
Power Output Port.....	1 A continuous at 12 V DC to 14 V DC.	

Power Input Protection ..... Over-voltage and over-current protection are provided on the Main Power Input.
In-line fuse is provided on the positive Battery lead.

NOTE: EMC emissions only apply when using the main Power Input Port.

NOTE: As an alternative to a battery, power the IXP220 using a 12 V DC uninterrupted power supply connected using the Battery Input.

Power Supply Combo (IPS96X)

NOTE: An integrated transformer supplies power to this model IXP220 Controller.

Transformer

Input Voltage	230 V AC (nominal) at 50 Hz to 60 Hz.
Output Voltage	16 V AC.
Output Current	2 A maximum.

NOTE: When using the integrated transformer the Typical Current Distribution (page 1) for the Open Frame Construction applies.

The following specifications are common to both the Open Frame Construction and the Power Supply Combo options.

Battery

Type	12 V Sealed Lead Acid, 7 Ahr (Max).
Approximate Size	
Length	151 mm (6 in) (Max).
Width	65 mm (3 in) (Max).
Height	99 mm (4 in) (Including the Terminals) (Max).
Charge Voltage	13.8 V DC at 350 mA (Max).

Real Time Clock (RTC) Backup Battery

Battery Type	1 x 3 V, CR2032, Lithium cell Battery.
Battery Life	2 Years (with power OFF).

Controller Communication

USB Port ..... USB Device, Type-B, female connector, 12 Mbps, USB V2.0.

Ethernet Port ..... Standard Ethernet RJ45 connector. 10/100 Base T, half or full duplex.

RS232 Port ..... 9-Way, D-type, female connector or terminal block connection.

Default Baud Rate ..... 38 400.

NOTE: To achieve RS232 connection, use either the 9-way, D-type, female connector or the terminal block connection.

RS485 Controller Port

Electrical Interface	RS485.
Default Baud Rate	38 400.
Data Format	8 data bits, no parity, 1 stop bit.
Communications Protocol	ImproX Secure Communications Protocol.
Line Termination (RS485)	Provision is made for line termination.

Terminal Communication

RS485 Terminal Port

Electrical Interface	RS485.
Baud Rate	38 400.
Data Format	8 data bits, no parity, 1 stop bit.
Communications Protocol	ImproX Secure Communications Protocol.
Line Termination (RS485)	Provision is made for line termination.

Reader Options

Wiegand Ports	2 Fully functional Wiegand Reader Ports.
Power Output	12 V DC and 5 V DC (selectable) at maximum 200 mA.
Modes Supported	Tag + PIN-code or Reason Code.
Antenna Reader Ports	2 Fully functional Antenna Reader Ports.

Relays

Relays

Relay Output	2 x Relays, Form C, each with NO, COM and NC contacts.
Contact Ratings	10 A at 28 V DC, 5 A at 220 V AC, 12 A at 120 V AC.
Operations	100 000 Minimum.

Digital Inputs

Digital Inputs

Input Types	4 x Dry Contact Digital Inputs.
Detection Resistance Range	< 2 kOhm.
Protection Range	+ 20 V continuous.

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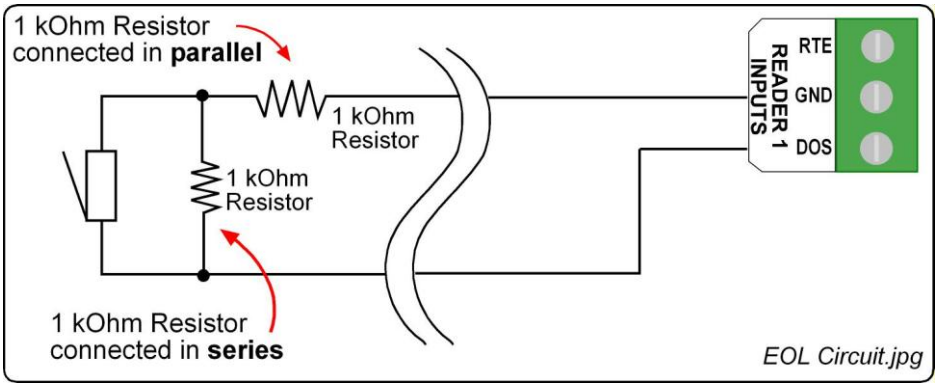

Figure 1: End of Line (EOL) Sensing Circuit

NOTE: *End of Line (EOL) Sensing enables the Controller to raise an alarm when somebody tampers with the circuit (that is, cutting or shorting the wires) between Reader 1 or Reader 2 Input (of DOS [1] or DOS [2]) and GROUND (GND). In other words the Controller distinguishes between tampering on the circuit, and the door being in an actual 'Normally Open' or 'Normally Closed' state.*

By placing Resistors into the circuit between the Reader 1 or Reader 2 Input (of DOS [1] or DOS [2]) and GROUND (GND), the Controller's Digital Input monitors a constant resistance through the circuit. When the circuit is tampered with, the Resistors are bypassed; the Controller detects the resistance change raising an alarm.

Alarm

Alarm Relay

Relay Output	1 x Relay, Form C, with NO, COM and NC contacts.
Contact Ratings	10 A at 28 V DC, 5 A at 220 V AC, 12 A at 120 V AC.
Alarm Signal	IN: Dry Contact Digital Input. GND: Ground reference. OUT: Open Collector Digital Output.

General

SD Card Adapter	Reserved for future use.
Connection	Standard 9-Pin SD Mode Interface, 2 GB max.
Controller Diagnostic Interfaces	
Liquid Crystal Display (LCD)	Reserved for future use.
Characters	16 Characters by 4 lines.
Character Sets	English, Katakana.

Contrast.....	Adjustable using the Trimpot (see Figure 6 for location).
Back-lighting.....	Turned on and off via the Communications Protocol.
Keypad.....	Reserved for future use.
Buttons	12 Alphanumeric and function keys.
Back-lighting.....	Yes.
	NOTE: The LCD and Keypad back-lighting operate independently of each other.
LED Indicators	
Status LED	Steady Red LED (internally visible).
Incoming RS485 Data	Flashing Green LED (internally visible).
Outgoing RS485 Data	Flashing Red LED (internally visible).
Incoming RS232 Data	Flashing Green LED (internally visible).
Outgoing RS232 Data	Flashing Red LED (internally visible).
Speed LED (Ethernet)	Steady Red LED (internally visible).
Link LED (Ethernet).....	Steady Red LED (internally visible).
Active LED (Ethernet).....	Flashing Red LED (internally visible).
Relay LED	Steady Red LED (internally visible).
SD/MMC Active	Steady Red LED (internally visible).
USB Active	Steady Red LED (internally visible).
Digital Inputs.....	Steady Green LED (internally visible).
Antenna Reader Interfaces	2 Individual standard interfaces.
Wiegand Reader Interfaces.....	2 Standard interfaces, including 12 V DC and 5 V DC Power Outputs, 0 and 1 Data Streams, LED Control, Buzzer Control and Scanner Inhibit.

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INSTALLATION INFORMATION

Accessories

Find the following when unpacking the ImproX IXP220 Controller:

- An ImproX IXP220 Controller with an open frame construction. The construction consists of a Trivalent Passivated Mild Steel Mounting Plate and a Biaxially-oriented Polypropylene Cover Plate.
- Or an ImproX IXP220 Controller housed in a Black Mild Steel, powder-coated Cabinet. The Cabinet consists of a hinged Lid and a Base.
- One copy of IXP220 Software on CD.

CAUTION: DO NOT use the Metal-oxide Varistors (25 Vrms, 500 A, 77 V max clamping) with mains power applications.

- Two Metal-oxide Varistors, 25 Vrms, 500 A, 77 V max clamping.
- Four Brass Wood Screws (3.5 mm x 25 mm) and Wall Plugs (7 mm).
- A MAC Address Label.
- An extra Fixed Address Label.

General

Remember the following when installing your IXP220 Controller:

Communications Distance

- The RS485 communications distance between the IXP220 Controller and the LAST Controller or Terminal in a cable run, MUST NOT exceed 1 km (1 090 yd). Achieve this by using good quality screened twisted 2-pair cable, earthed on one side.
- If using Ethernet, plug the Controller into an Ethernet Switch or Hub (or other network device); cable runs for this must conform to Ethernet cabling specifications.
- The RS232 communications distance between the Controller and the connected Host PC MUST NOT exceed 25 m (82 ft). Achieve this by using good quality screened twisted 4-core cable.
- The USB communications distance between the Host PC and the Controller MUST NOT exceed 5 m (16 ft). Please note, however, that the SUPPLIED CABLE CANNOT BE EXTENDED.

Termination Resistors for RS485 Bus Communications

Long transmission lines or multiple “star” connections, may cause communication problems. Placing the Termination Resistor Jumper Link (see Figure 6) in the LAST IXP220 CONTROLLER AT THE END OF THE CABLE RUN should solve the problem (depending on the bus).

Reader Connections

NOTE: The IXP220 Controller has three Fixed Addresses. One Fixed Address is reserved for the Controller. The other two Fixed Addresses (Terminal Addresses) allow connection of either two Antenna Readers or two Wiegand Readers.

Antenna Reader

- The specified cable distance between the IXP220 Controller and its Antenna Reader ranges between 2 m to 16 m (7 ft to 53 ft). Achieve this using a good quality shielded multi-strand 3-pair twisted cable. The cable individual conductor cross-sectional area should not be less than 0.2 mm^2 (0.0003 in^2).
- Ensure that your cable specifications are similar to the following:
  - Conductor Resistance: < 2 ohms.
  - Capacitance, Core to Earth: < 160 pF/m.
  - Capacitance, Core to Core: < 100 pF/m.
- To avoid mutual interference Install dual Antenna Readers from the SAME Controller no closer than 150 mm (6 in) apart.
- To avoid mutual interference Install dual Antenna Readers from DIFFERENT Controllers no closer than 500 mm (20 in) apart.

Wiegand Reader

CAUTION: When implementing the 150 m (164 yd) cable distances with Impro Wiegand Readers use the 12 V power output option.

- For maximum, data communications distance, install the Wiegand Readers no further than 150 m (164 yd) from the Host unit. The cable individual conductor cross-sectional area should not be less than 0.2 mm^2 (0.0003 in^2).
- To avoid mutual interference install Wiegand Readers no closer than 500 mm (20 in) apart.

EARTH Connection

Connect the IXP220 Controller to a good EARTH point. Connect the EARTH Lead to the "ETH" Terminal on the Power Input Port. Mains EARTH can be used, but electrical noise may exist.

Arc Suppression

Snubber devices are recommended for EMF Flyback and Arc Suppression when driving an inductive load with the Relay, see Figure 2.

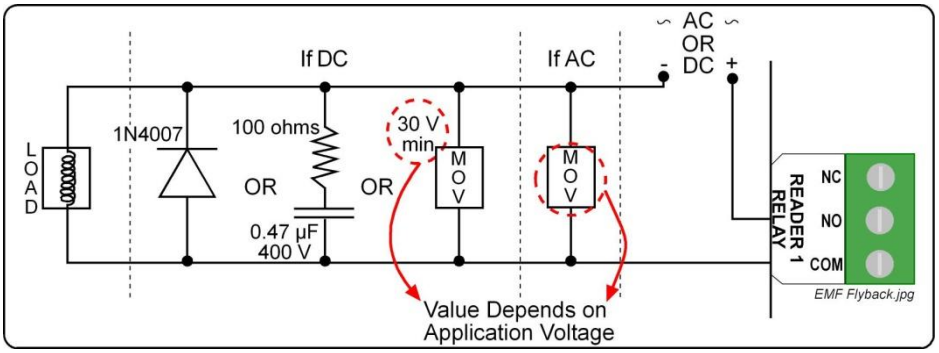

Figure 2: EMF Flyback

Mounting the Controller

CAUTION: Make certain that you mount the Controller on a vibration-free surface.

Select the mounting position of the Controller, considering accessibility, routing of wires and visibility of the externally visible LED.

Secure the Controller to the mounting surface, using four suitable screws and wall plugs (supplied), nuts and bolts or rivets.

Mounting the Power Supply Combo (IPS96X)

Base Mounting Details

1. Fix the Base to the wall using two of the supplied screws in the Mounting Key Holes.
2. Fix the third screw in the Mounting Slot, adjusting the position of the Base if necessary.

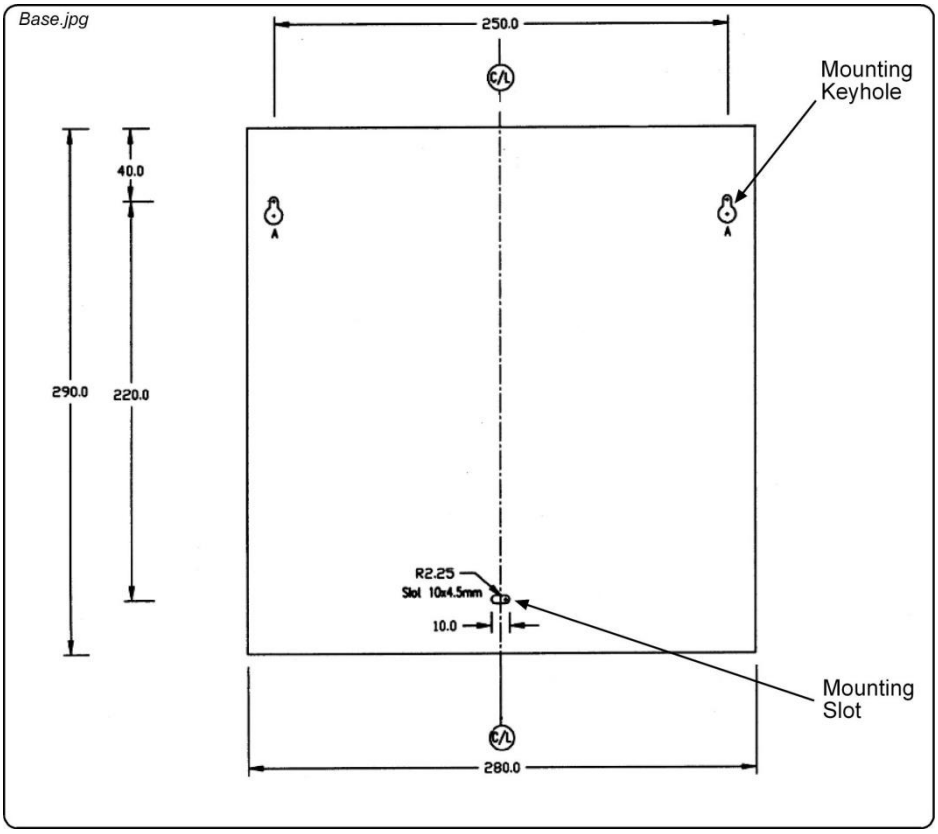

Figure 3: Base Mounting Details

Installing the Real Time Clock (RTC) Backup Battery

CAUTION: Insert the supplied 3 V Lithium Real Time Clock Backup Battery into the Battery Holder BEFORE powering up the IXP220 Controller.

Refer to Figure 6 for the location of the Real Time Clock Backup Battery Holder.

First Time Use

1. Remove the Controller's Cover Plate.
2. Slide the supplied 3 V, CR2032, Lithium cell Battery under the metal clip of the Battery Holder, with the "+" Terminal facing UP.
3. Pull the plastic clip AWAY from the Battery Holder and press the Battery firmly into the Battery Holder.
4. Reattach the Controller's Cover Plate.

Replacement

1. Remove the Controller's Cover Plate.
2. Remove the old 3 V, CR2032, Lithium cell Battery from the Battery Holder by pulling the plastic retaining clip AWAY from the Battery Holder. The Battery Holder is spring- loaded and will raise the Battery out of the Holder.
3. Slide the NEW 3 V, CR2032, Lithium cell Battery under the metal clip of the Battery Holder, with the "+" Terminal facing UP.
4. Pull the plastic clip AWAY from the Battery Holder and press the Battery firmly into the Battery Holder.
5. Reattach the Controller's Cover Plate.

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Power Supply Combo

1. Open the Lid of the Cabinet.
2. Slide the Lid in an upwards direction and unhinge.
3. Place the Battery into the Cabinet with the Battery Terminals in an upwards position.
4. Connect the Red Battery Terminal Lead to the Positive Battery Terminal.
5. Connect the Black Battery Terminal Lead to the Negative Battery Terminal.
6. Re-hinge the Lid and slide it in a downwards direction.
7. Close the Lid of the Cabinet.

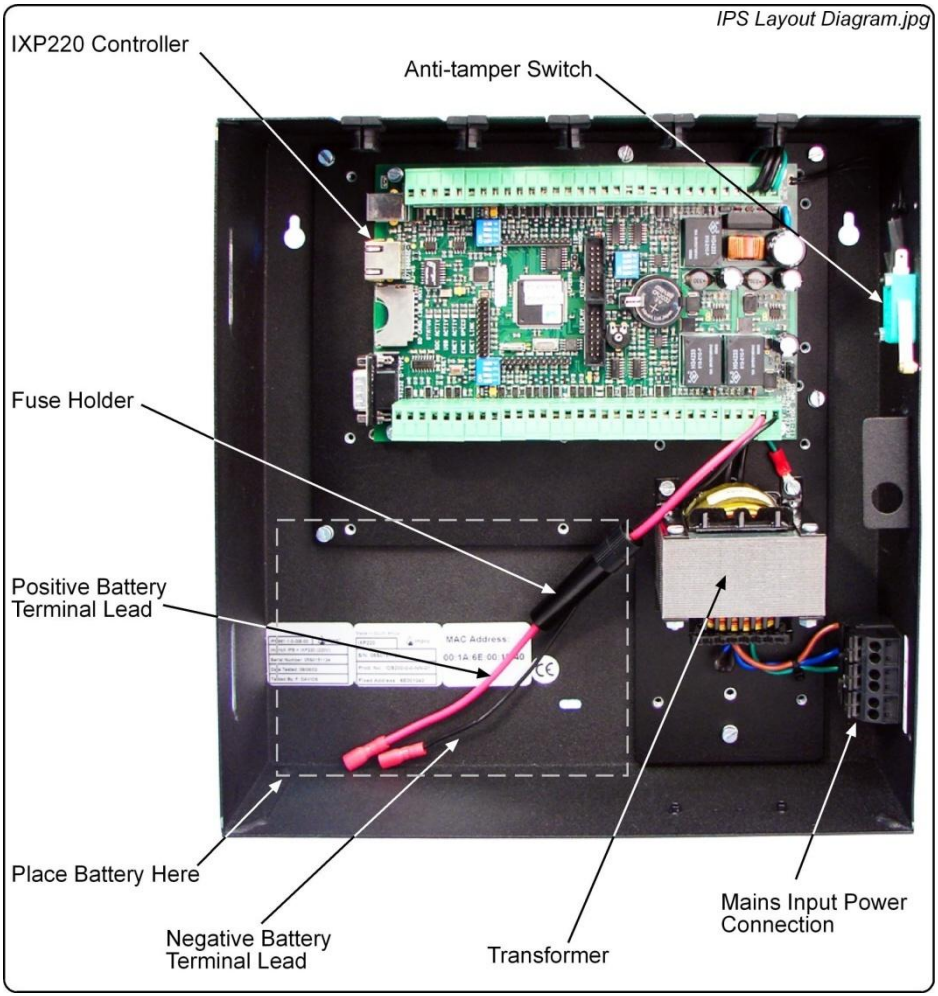


Figure 4: Power Supply Combo Layout – Top View

DIP-switch Settings

NOTE: Once the DIP-switch settings are modified reset the IXP220 Controller to acknowledge the new settings.

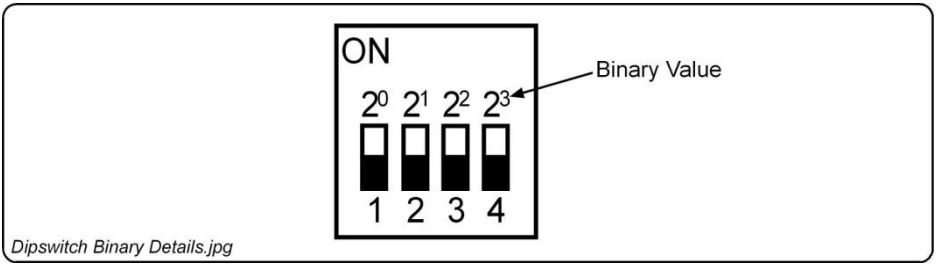
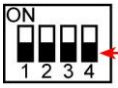
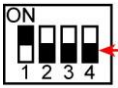


Figure 5: Binary Details for DIP-switch

Reader DIP-switch Settings

Each of the Reader Ports has a 4-way DIP-switch to select the function of that Port.

NOTE: If you set both Reader DIP-switches to the all off position then an Auto-ID will not return any Fixed Addresses.

DIP-switch Position		Connections
0	 DIP-switch 0 shows all the switches in the **OFF** position	Antenna.
1	 DIP-switch 1 shows switches 2, 3 and 4 in the **OFF** position	Reader unused. Does not report a Fixed Address.
2		ImproX (IR) Infrared Receiver.
3		Magstripe.
4		Barcode (code 3 of 9) with Checksum.
5		Barcode (code 3 of 9) without Checksum.
6		Wiegand 26-bit, 44-bit, 40-bit, 37-bit and Tag + PIN-code or Reason Code Mode. (Sagem MA100, MA200 or MA300).
7		Wiegand Open Format.

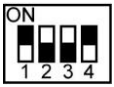
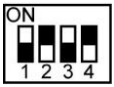
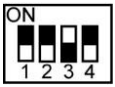
DIP-switch Position	Connections
8 	If the ImproX RF is connected, then Button 1 of the ImproX (QT) Quad Transmitter reports.
9 	If the ImproX RF is connected, then Button 2 of the ImproX (QT) Quad Transmitter reports
10 	If the ImproX RF is connected, then Button 3 of the ImproX (QT) Quad Transmitter reports.
11 	If the ImproX RF is connected, then Button 4 of the ImproX (QT) Quad Transmitter reports.

Table 1: Reader DIP-switch Settings

Door Lock Select DIP-switch Settings

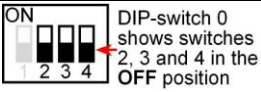
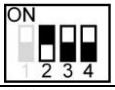
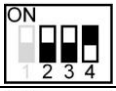
DIP-switch Position	Connections
0 	No special lock control.
1 	Motor Lock.
2 	Pulse or Repeating Lock.
3 	Fail Safe or Fail Secure with Locked or Unlocked Status (Solenoid Lock).
4 	Normal Lock, no Lock or Unlock Sensors, only Emergency Mode support.
5 	Returns Controller to Factory Default Settings. *NOTE: Ensure you that you return Switch 1 to the OFF position to resume normal operation.*

Table 2: Door Lock Select DIP-switch Settings

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IXP220 Controller

Key Component Positions

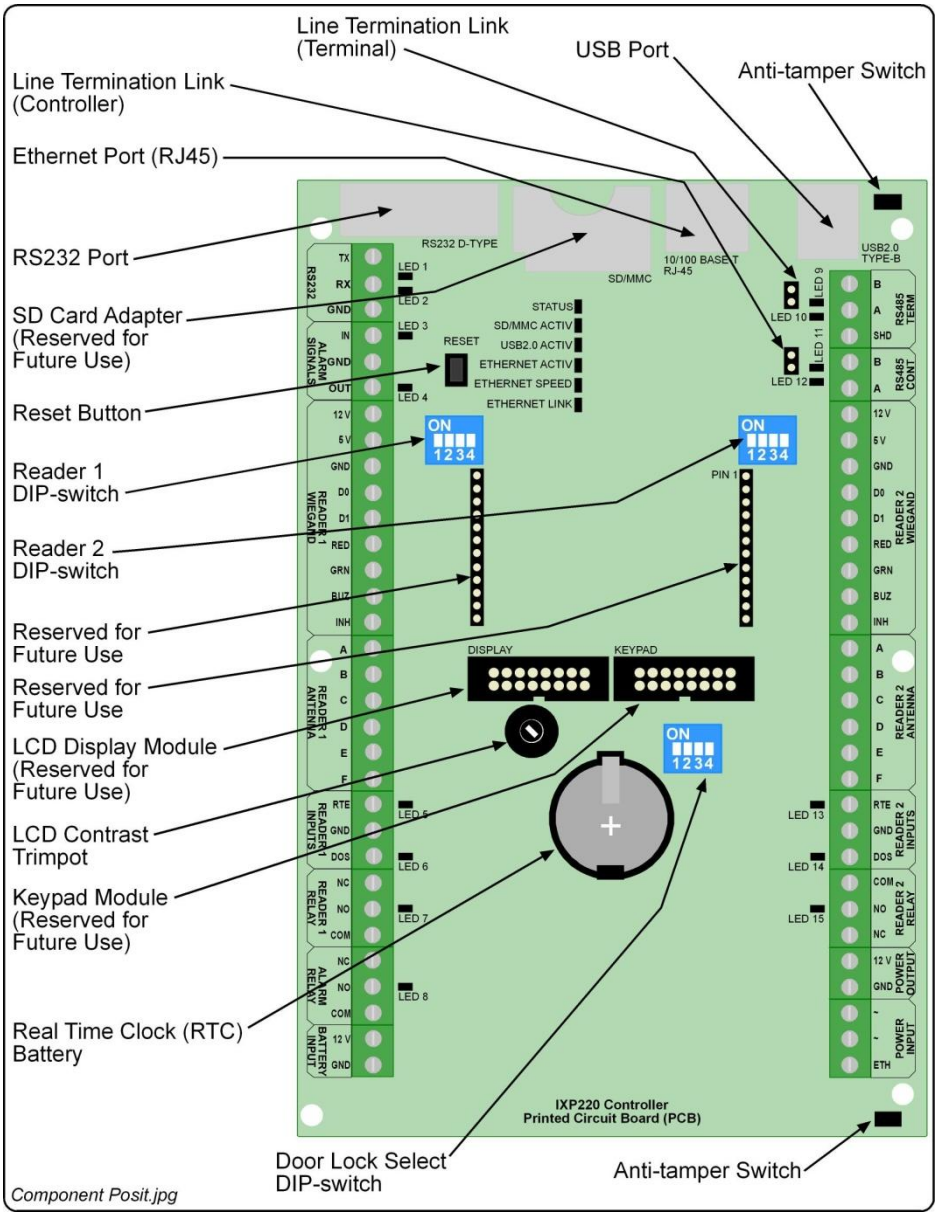

Figure 6: Key Component Positions

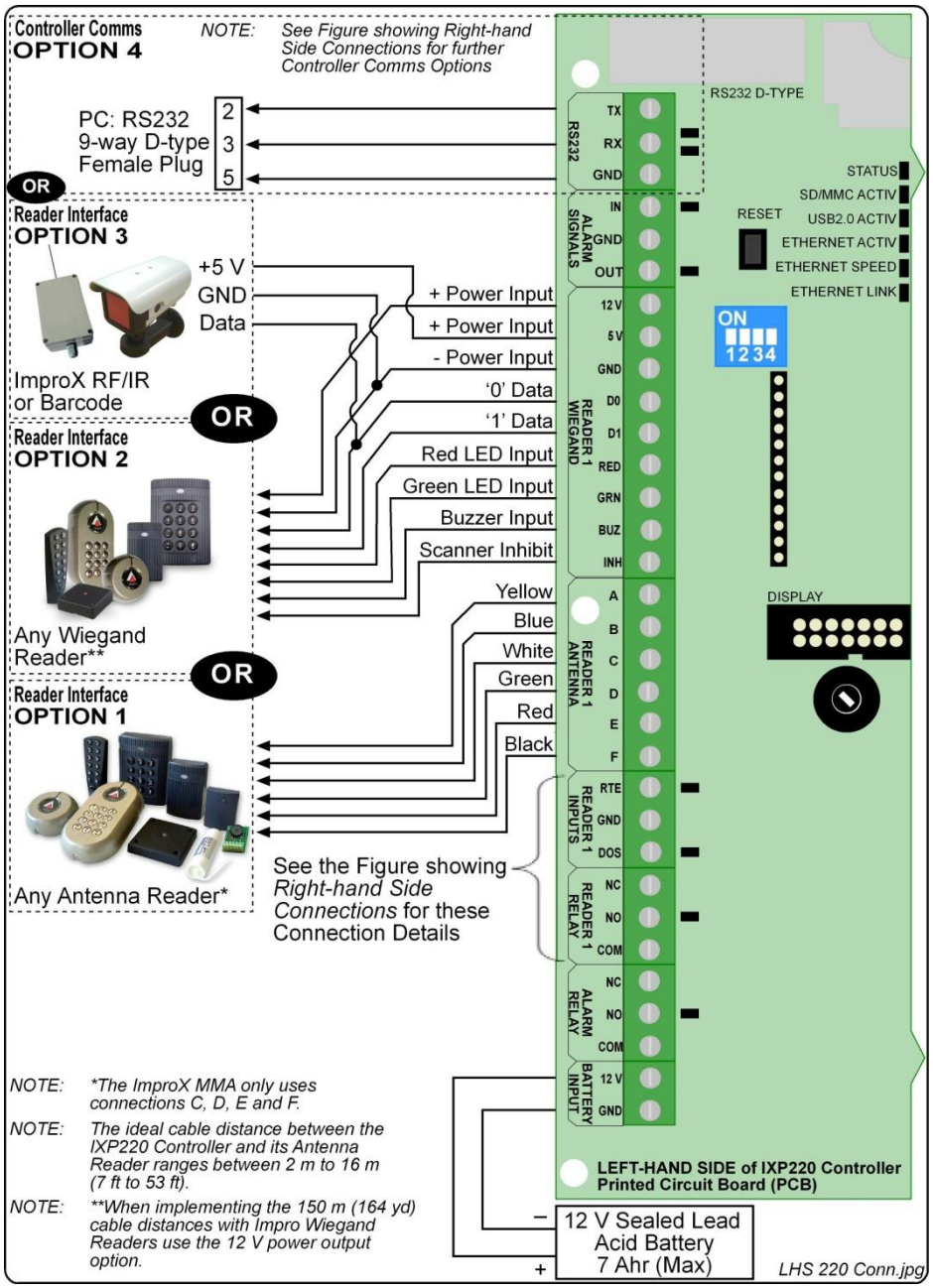

Figure 7: IXP220 Controller Left-hand Side Connection Details

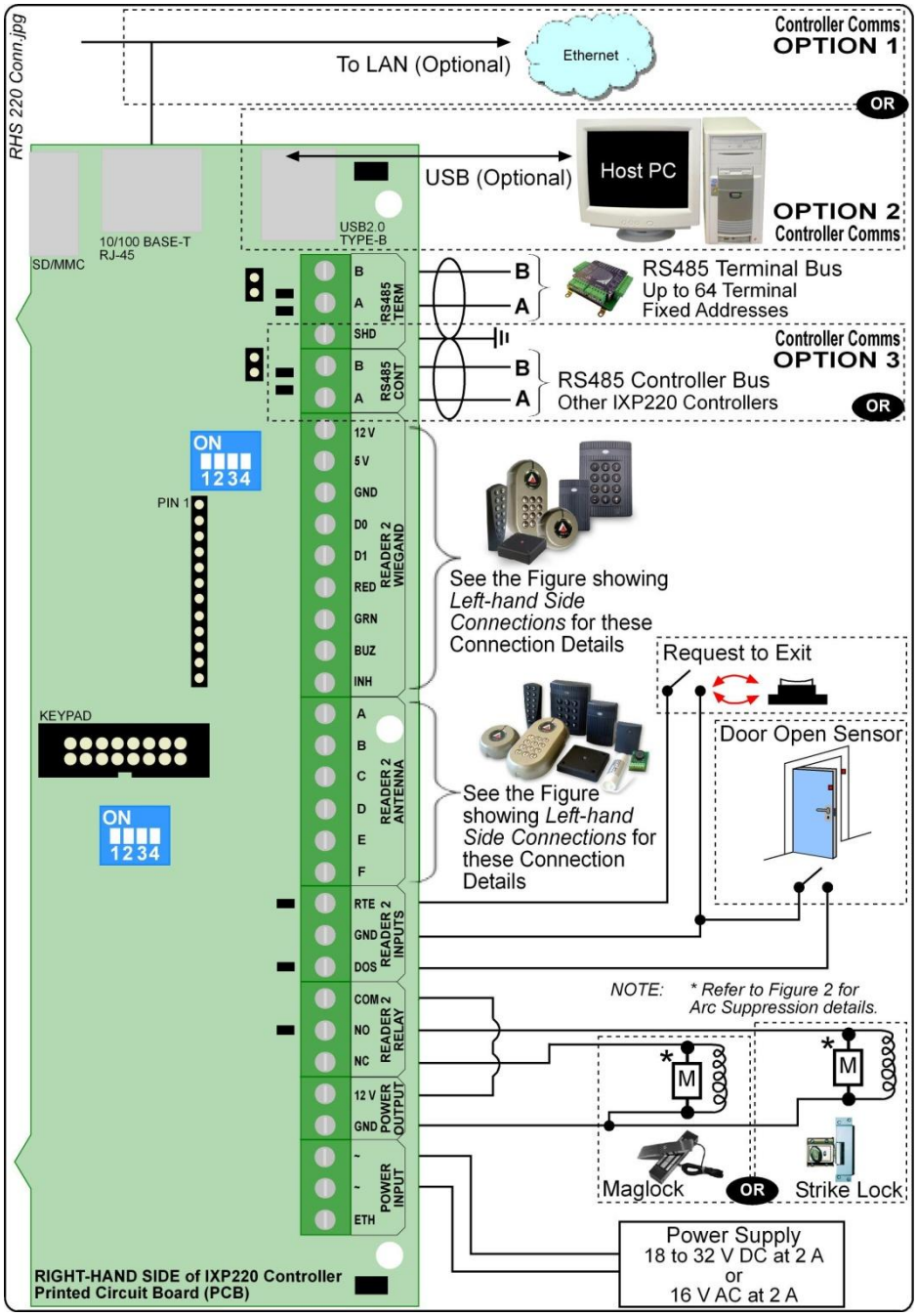

Figure 8: IXP220 Controller Right-hand Side Connection Details

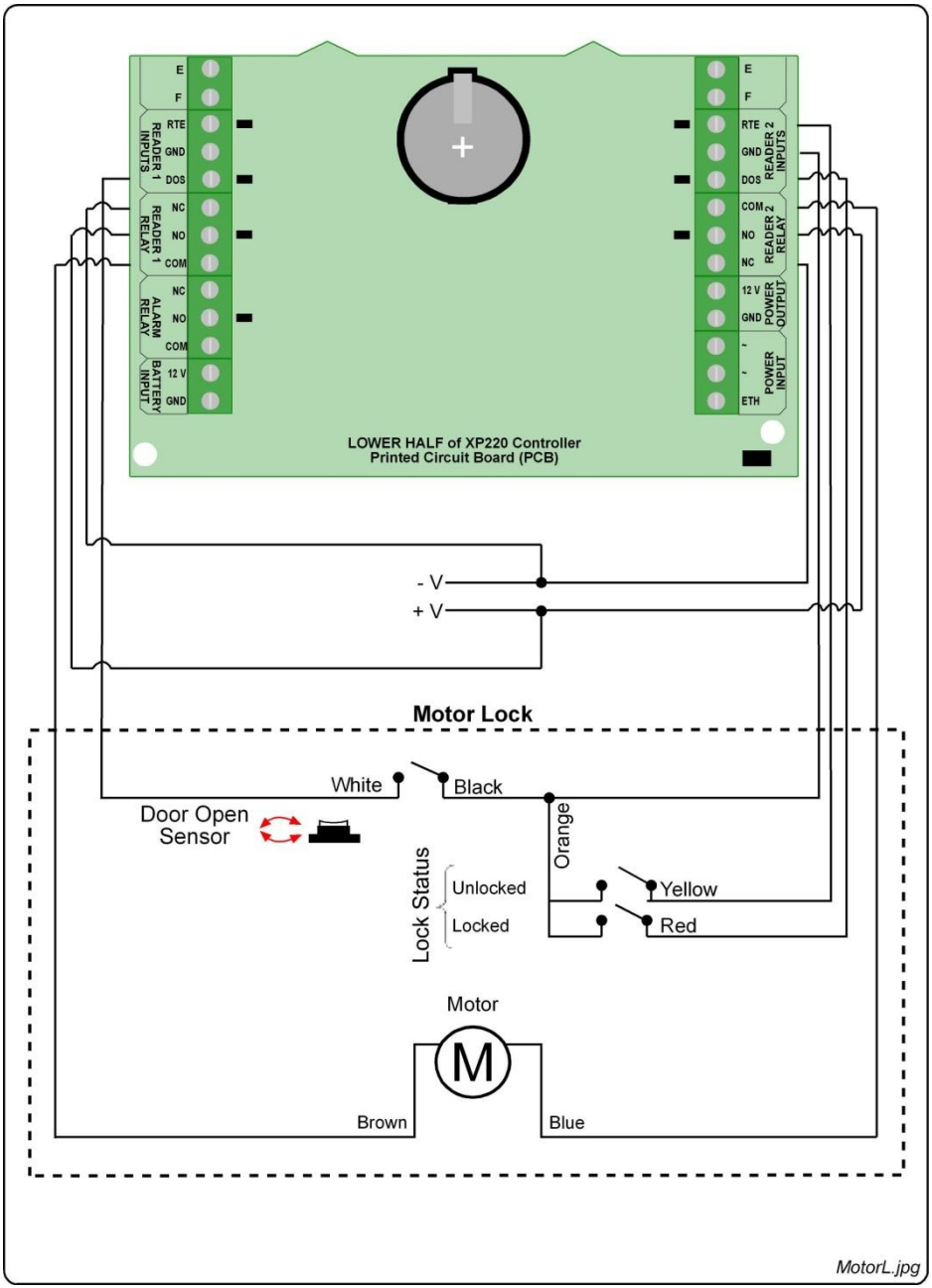

Figure 9: IXP220 Controller Connected to MIWA AL3M Motor Lock

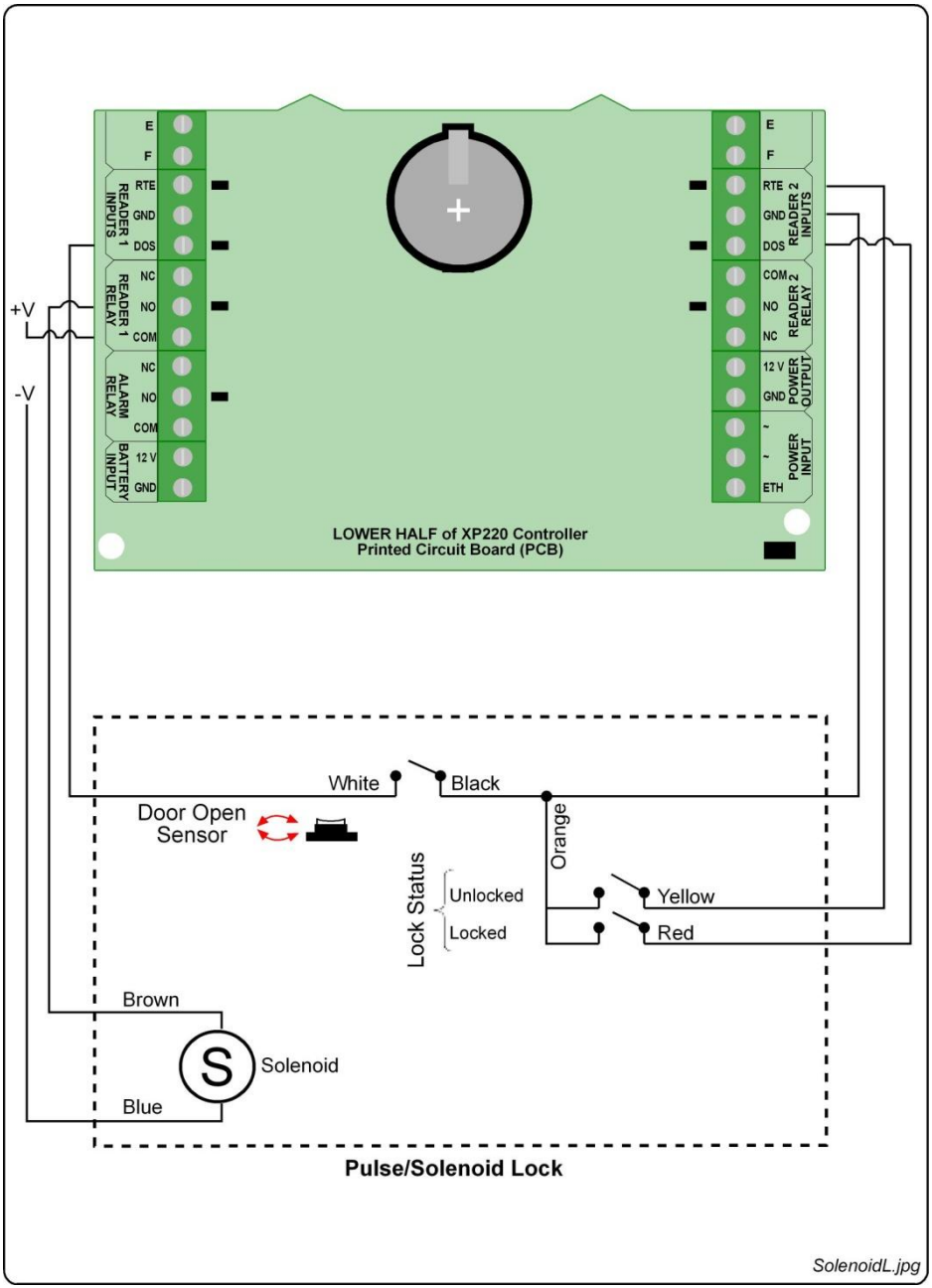

Figure 10: IXP220 Controller Connected to a Pulse or Solenoid Lock

Modes of Operation

The IXP220 System provides two “Modes of Operation”. These Modes are selected via the PC Software.

Power Control Mode

In this Mode, the Alarm Relay switches on or off various building devices, such as lights air conditioners.

CAUTION: Refer to the Alarm Relays maximum current and voltage ratings listed under Alarm (page 4).

Use the Alarm Relay to drive an external switching device (for example, a contactor) in order to switch high voltages or to handle the high current associated with building devices.

To activate Power Control Mode, there must be at least one Anti-passback (APB) Zone. The Controller will count the number of Tags inside the Zone(s) and switch off the Alarm Relay when the count is zero.

The “Emergency Open” input will unlock all doors in the System.

Alarm Mode

In this Mode, the Controller interfaces with an Alarm Panel to either, arm or disarm, or trigger the Alarm Panel.

Arming

1. In the IXP220 Software, designate a Reader as an “Alarm Arming Reader”, by selecting the Alarm Arm checkbox.
2. Present an Administrator or Supervisor Tag to the “Alarm Arming Reader”.
3. Press the “#” key on the Keypad Reader, within 10 seconds of presenting the Tag. The Reader beeps for 30 seconds, before activating the Alarm Relay, giving you sufficient time to vacate the Alarm Zone.

The “Armed” Input is used to detect if the Alarm Panel is armed. This Input sets the “Alarm Arming Readers” Status LED to blink, indicating that the Alarm is armed.

When the System is armed, the “Alarm Arming Reader” will deny Normal or Visitor Tags access.

Disarming

Present an Administrator or Supervisor Tag to the “Alarm Arming Reader”. The Alarm Relay will deactivate, signaling the Alarm Panel to disarm.

Alarm Events

The Controller has several Events that can trigger the Alarm Panel when it is armed. These are:

- Door Forced.
- Anti-tamper.

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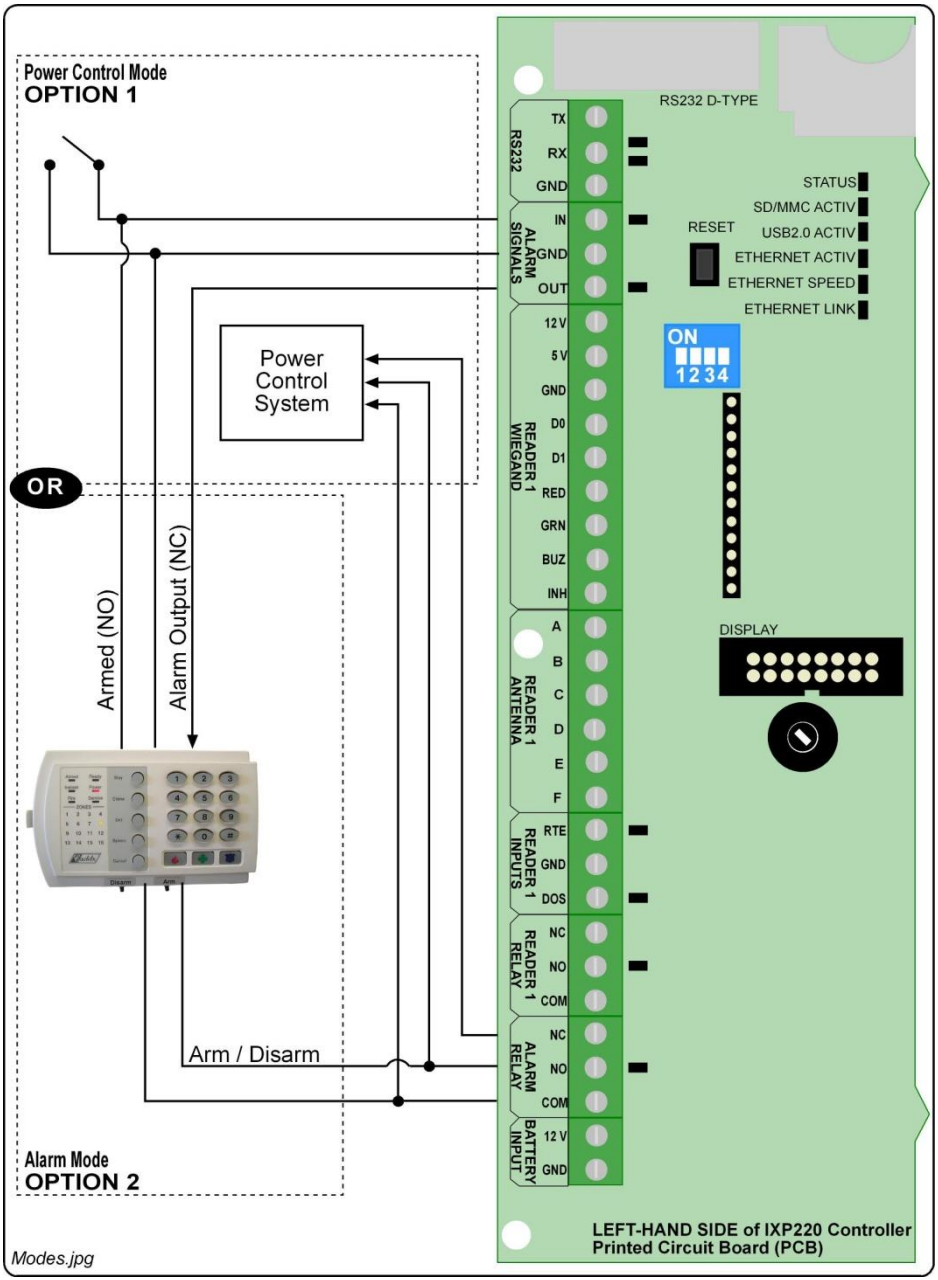


Figure 11: Modes of Operation

Settings Specific to the Power Supply Combo

CAUTION: DO NOT exceed the Input Voltage specified.

Use the supplied Connection Leads for the low voltage connections to the Power Supply Combo, see Figure 4. Using the supplied Quick Click Glands or Gland Breakouts, neatly lead the wires out of the Cabinet.

Wiring the Mains Input Power Cord

WARNING: DO NOT TOUCH ANY PART OF THE CIRCUIT ONCE YOU'VE APPLIED POWER TO THE POWER SUPPLY COMBO.

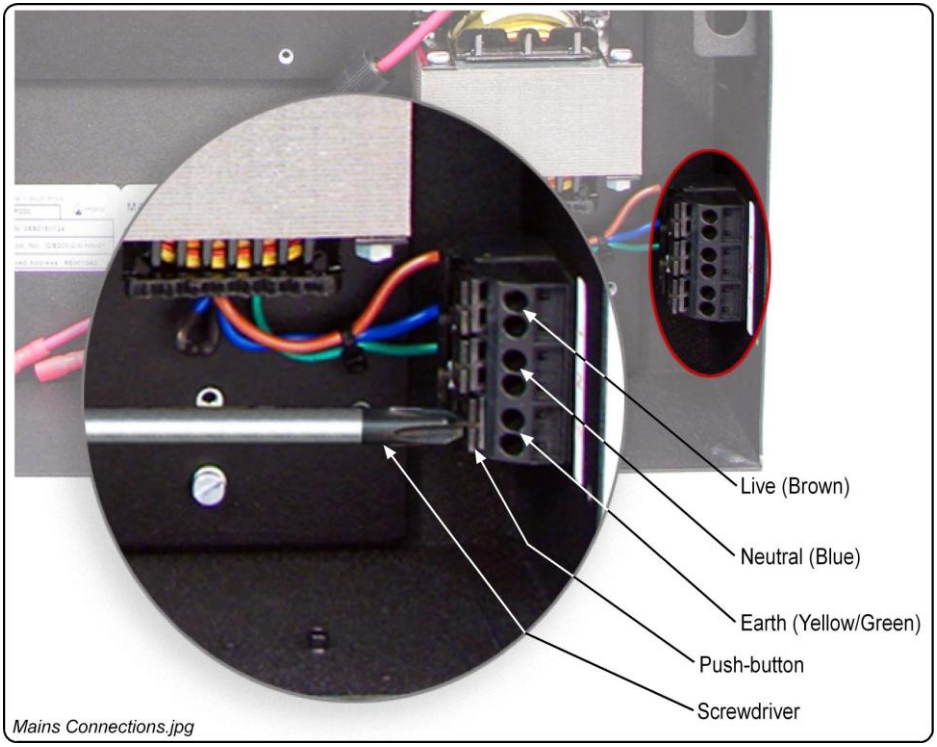


Figure 12: Mains Connections

Connect mains power as follows:

1. Using a suitable screwdriver, press and hold down the Push-button.
2. Insert the wires.
3. Release the Push-button.
4. Repeat steps 1 to 3 for each connection.

Connecting the Mains Input Power Plug

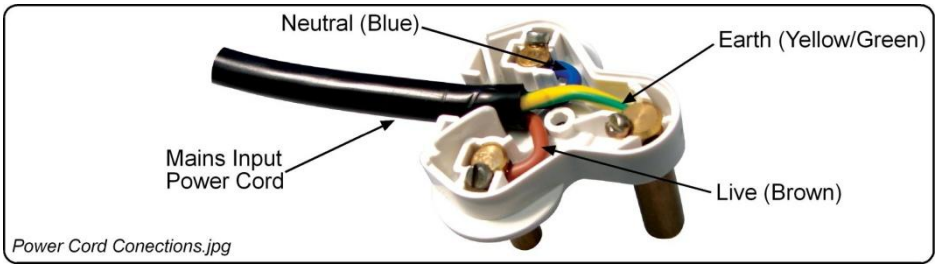


Figure 13: Mains Plug Connections

Fuse Information

Fuse Type	Purpose	Rating
Slow-blow	This fuse protects the Battery from overload as well as incorrect polarity connection.	3.15 A 250 V (6 mm x 30 mm)

Table 3: Fuse Ratings

CAUTION: Ensure that you have disconnected the mains power supply to the Power Supply Combo, and removed the Positive Lead from the Battery before replacing the fuse.

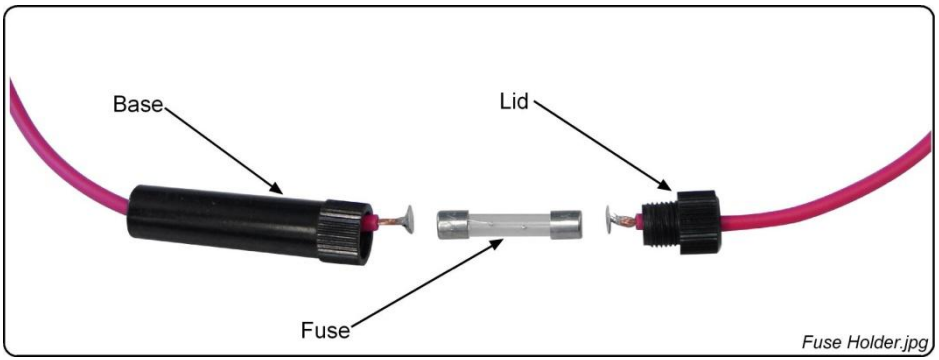


Figure 14: Fuse Holder

1. Disconnect mains power supply.
2. Open the Cabinet.
3. Disconnect the Positive Lead from the Battery.
4. Unscrew the Fuse Holder's Lid from the Base.
5. Insert the new Fuse into the longer end of the Fuse Holder.
6. Screw the Fuse Holder's Lid onto the Base.
7. Reconnect the Positive Lead to the Battery.
8. Close the Cabinet.
9. Reconnect mains power supply.

ADVANCED SETTINGS

The following settings are common to all the IXP220 Controller Models.

Adjusting the Liquid Crystal Display (LCD) Contrast (for future use)

Using a 2 mm flat screwdriver, adjust the Trimpot (See Figure 6 for location) as follows:

1. Remove the Controller's Cover Plate.
2. Place the tip of the screwdriver in the recess.
3. Turn the screwdriver to make your adjustment:
   - Clockwise: Text appears lighter.
   - Anti-clockwise: Text appears darker.
4. Reattach the Controller's Cover Plate.

Hardware Reset

Restart the IXP220 Controller manually, without removing the power connections, by pressing the Reset button (See Figure 6 for location).

Restoring Factory Default Settings

If you assign an invalid IP address to the Controller, it will no longer communicate. Correct this problem, by restoring the Controller's factory default settings as follows:

1. Remove the Controller's Cover Plate.
2. Set the **Door Lock Select** DIP-switch Switch 1 to the **ON** position (see Table 2, row 5 for details).
3. Press the **Reset** button (See Figure 6 for details). Alternatively, reset the Controller by removing and then reapplying the power source.
4. With the Controller running, set the **Door Lock Select** DIP-switch Switch 1 back to the **OFF** position (see Table 2, row 5 for details).
5. Reattach the Controller's Cover Plate.

UNIT ADDRESS IMFORMATION

Fixed Address

Once the IXP220 Controller is installed, sketch a rough site plan. Attach the loose (additional Fixed Address Label packaged with the Controller) Fixed Address Label in the position of the Controller on the sketched site plan. When the system installation is complete and all the units are represented on the site plan by their Fixed Address Labels, file the site plan for future reference.

The Fixed Address Label included with the Controller is the Fixed Address for the Controller only. In addition to the Controller Fixed Address, the IXP220 Controller reports up to two Terminal Fixed Addresses.

- Controller's Fixed Address: 6E XX XX XX.
- Reader 1's Fixed Address: 6F XX XX XX.
- Reader 2's Fixed Address: 7O XX XX XX.

NOTE: Where additional Terminals connect to the Controller, extra Fixed Addresses for the respective Terminals appear during the Software's Auto-ID process.

MAC Address

Each IXP220 Controller is supplied with a separate MAC Address Label, much like the one shown in Figure 15, which uniquely identifies each Controller.

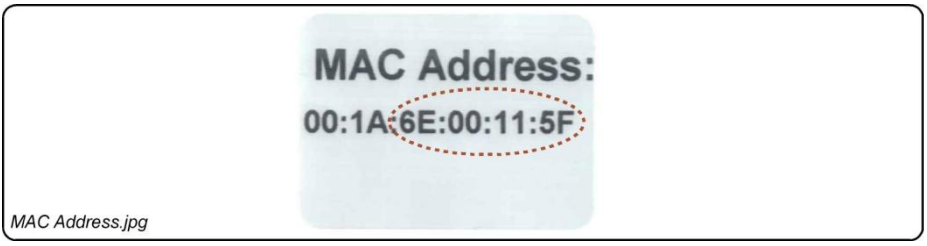
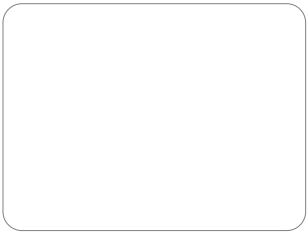
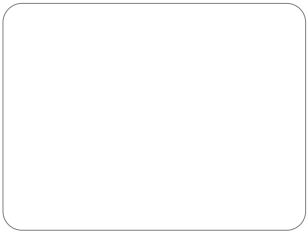
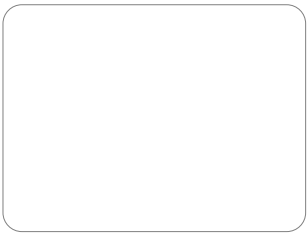


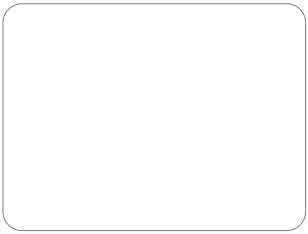
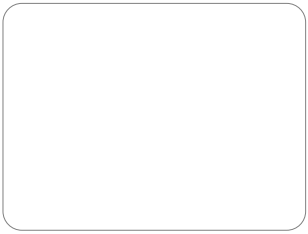
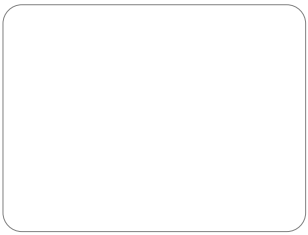
Figure 15: Sample MAC Address Label

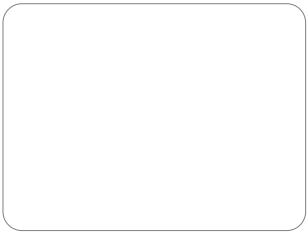
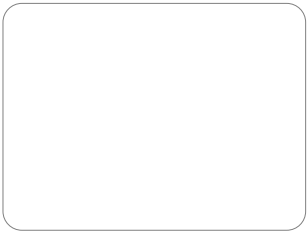
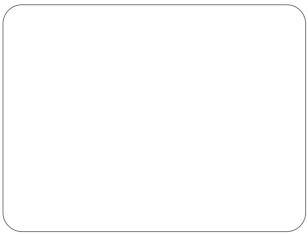
Attach the extra loose MAC Address Label, alongside the Fixed Address Label, to the Unit Location Chart enclosed (or your sketched site plan).

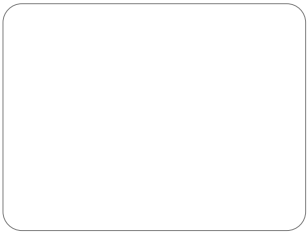
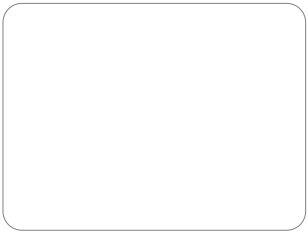
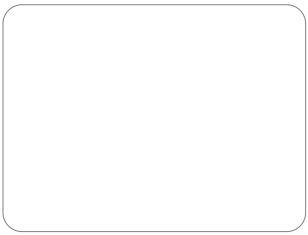
Unit Location Chart

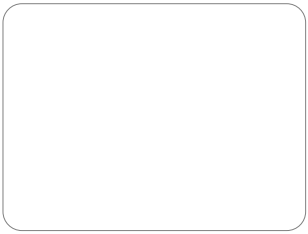
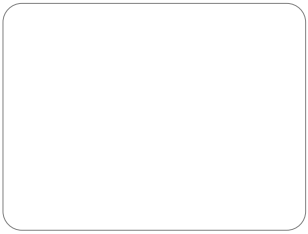
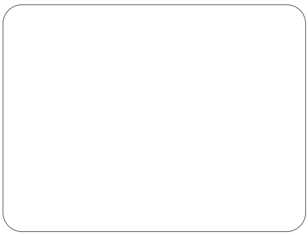
Fixed Address Label	Unique Location Description

Fixed Address Label	Unique Location Description
	
	
	
	
	

Fixed Address Label	Unique Location Description
	
	
	
	
	

Fixed Address Label	Unique Location Description
	
	
	
	
	

Fixed Address Label	Unique Location Description
	
	
	
	
	

Fixed Address Label	Unique Location Description
	
	
	
	
	

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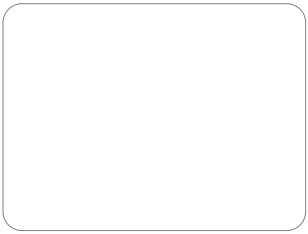	
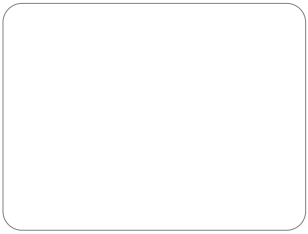	
	
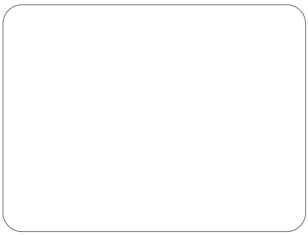	

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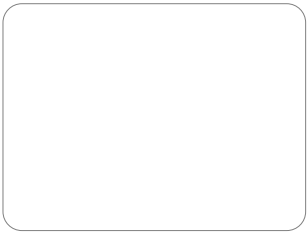	
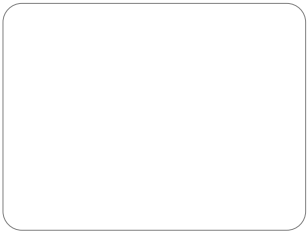	
	
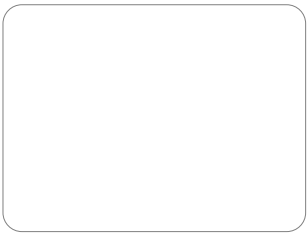	

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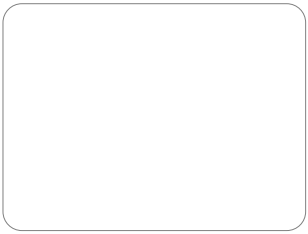	

Table 4: Unit Location Chart

GUARANTEE OR WARRANTY

CAUTION: We reserve the right to nullify the products guarantee or warranty where you have not properly installed the Metal-oxide Varistors.

This product conforms to our Guarantee or Warranty details placed on our Web Site, to read further please go to www.impro.net.

USER NOTES

This manual is applicable to the ImproX IXP220 Controller, ISC960-1-0-GB-00, ISC962-1-0-GB-00, IPS960-1-0-GB-00, IPS961-1-0-GB-00, IPS962-1-0-GB-00 and IPS9631-0-GB-00 (The last two digits of the Impro stock code indicate the issue status of the product).			
ISC300-0-0-GB-01	Issue 02	Dec 2008	IXP220\Controller\English Manuals\LATEST ISSUE\IXP220C-insm-en-02.docx