



# IMPROX iTRT

## ImproX (iTRT) Intelligent Twin Reader Terminal INSTALLATION MANUAL

### SPECIFICATIONS

#### Working Environment

<b>Plastic Housing</b> ..... <b>(XRT910 and XRT920)</b>	Designed to work in an indoor (dry) environment similar to IP40. The Terminal is not sealed against water.
<b>Power Supply Combo</b> ..... <b>(IPS920 and IPS921)</b>	Designed to work in an indoor (dry) environment similar to IP20. The Power Supply Combo is not sealed against water.

#### Power

##### Plastic Housing (XRT910 and XRT920)

<b>Input Voltage</b> .....	10 V DC to 30 V DC, polarity sensitive.	
<b>Power Requirements</b>	<b>Current (mA)</b>	<b>Power (W)</b>
12 V DC with no peripherals connected and relays off .....	75	0.90
24 V DC with no peripherals connected and relays off .....	40	0.96

##### Power Supply Combo (IPS920 and IPS921)

**NOTE:** *The Power Supply Combo includes a 3 A Switch Mode Power Supply which provides power for the (optional) internal unit and for charging the (optional) backup Battery. As the Power Supply Combo needs no more than 1 A, you may power extra devices using up to 2 A continuous current from the provided connector block. DO NOT exceed this 2 A limit on continuous current draw. Devices with a high in-rush current demand, such as certain maglocks and other electromechanical devices, can momentarily draw more than 3 A. The Power Supply then effectively shuts down as directed by its built in protection as exceeding the 3 A rating is considered a short-circuit. Overcome this by installing the recommended 12 V 7 Ahr Battery to help supplement the in-rush current such a device may draw on activation.*

## Power Input

Input Voltage ..... 85 V AC to 265 V AC at 50/60 Hz.

## Power Output

Output Voltage ..... 13.8 V DC  $\pm$ 0.3 V DC.

(Mains Power On)

Output Current..... 2 A continuous (Power Output Terminals).

## System Battery

Battery Type..... 12 V 7 Ahr (Max) Sealed Lead Acid Battery.

Approximate Size

Length ..... 151 mm (6 in) (Max).

Width ..... 65 mm (3 in) (Max).

Height ..... 99 mm (4 in) (Max) including the terminals.

Charge Voltage ..... 13.8 V DC.

The following specifications are common to all models of the ImproX iTRT:

**Relay power Requirements**..... An additional  $\sim$ 0.4 W per Relay in use.

## Real Time Clock (RTC) Backup Battery

Battery Type..... 1 x 3 V, CR2032, Lithium cell Battery.

Battery Life ..... 1 Year with Power OFF,  
5 years with Power ON,  
5 years Storage with Battery Tab in place.

## Terminal Communication

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**Ethernet Port**..... Standard Ethernet RJ45 connector.  
**(XRT920 and IPS921 Only)** 10/100 Base T, half or full duplex.

### 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

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Reader 1 Wiegand and Reader 2 Wiegand allow connection to the following hardware: ImproX (MDR) Multi-discipline Reader, ImproX (XFM) Multi-mode Remotes, Wiegand Readers, ImproX (IR) Infrared Receiver or the ImproX RF 4-channel UHF Receiver. The function is selectable via the DIP-switches (See Table 1).

**Power Output**..... 12 V DC and 5 V DC (selectable) at maximum 200 mA.

**Modes Supported** ..... Tag + PIN-code or Reason Code.

**Baud Rate**..... 9 600.

**Data Format**..... 8 data bits, no parity, 1 stop bit.

<b>Electrical Interface</b> .....	TTL Full Duplex.
<b>Communications Protocol</b> .....	ImproX Proprietary Protocol.

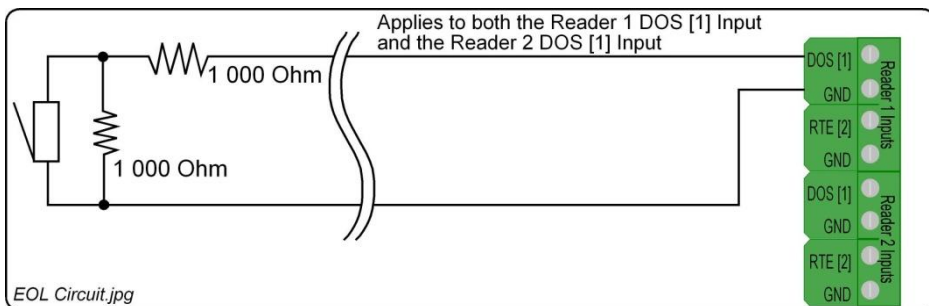
## Relays

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

## Digital Inputs

### General

<b>Type</b> .....	2 Dry-contact inputs with End-of-line (EOL) Sensing and 2 Dry-contact inputs without End-of-line (EOL) Sensing.
<b>Detection Resistance Range</b> .....	< 2 kOhm.
<b>Protection Range</b> .....	+15 V continuous.



**Figure 1: End-of-line (EOL) Sensing Circuit**

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

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

## General

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### LED Status and Diagnostic Indicators

#### Status LED

Power On .....	Continuous Red.
Upgrade Mode .....	Flashing Red (Steady).
Communications Failure .....	Flashing Red (Intermittent).

**Incoming RS485 Data** ..... Flashing Green LED.

**Outgoing RS485 Data** ..... Flashing Red LED.

**Digital Inputs (1-4)** ..... Continuous Green on detected contact closure.

**Relays (1 and 2)** ..... Continuous Red on activation of the Relay.

**Locked** ..... Continuous Green when locked.

**Unlocked** ..... Continuous Green when unlocked.

#### Ethernet LEDs

##### (XRT920 and IPS921 Only)

Ethernet Activity .....	Flashing Red LED.
Ethernet Speed .....	Continuous Red for 100 Mbps (Default) Off for 10 Mbps.

Ethernet Link..... Continuous Red on connection to network.

## INSTALLATION INFORMATION

### Accessories

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Find the following when unpacking the ImproX iTRT Terminal:

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

*NOTE: The 3 V, CR2032 Lithium cell Battery is partially installed in all models of the ImproX iTRT.*

### Plastic Housing (XRT910 and XRT920)

- An ImproX (iTRT) Intelligent Twin Reader Terminal supplied in a Black ABS Plastic housing. The housing consists of a Front Cover Assembly and a Mounting Plate. The Front Cover and Mounting Plate are held together with two Combi Screws (M4 x 10 mm) at the bottom of the housing.
- Two Metal-Oxide Varistors, 25 Vrms, 500 A, 77 V max clamping.
- A 3 V, CR2032, Lithium cell Battery.
- Two extra Combi Screws (M4 x 10 mm).
- An extra Fixed Address Label.

## Power Supply Combo (IPS920 and IPS921)

- An ImproX (iTRT) Intelligent Twin Reader Terminal housed in a Black Mild Steel, powder-coated Cabinet. The Cabinet consists of a hinged Lid and a Base.
- Three Metal-oxide Varistors, 25 Vrms, 500 A, 77 V max clamping.
- A glass Fuse, Slow Blow, 3.15 A, 250 V (5 mm x 20 mm).
- A 3 V, CR2032, Lithium cell Battery.
- Four Combi Screws (No. 4 x 10 mm).
- An extra Fixed Address Label.

## General

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Remember the following when installing the ImproX iTRT Terminal:

### Communications Distance

- If using Ethernet, plug the Terminal into an Ethernet Switch or Hub (or other network device); cable runs must conform to Ethernet cabling specifications.
- The RS485 communications distance between the ImproX Controller and the LAST ImproX iTRT in a cable run, MUST NOT exceed 1 km (1 090 yd). Achieve this by using good quality screened, twisted 2-pair cable, with the screen EARTHED at one end.

### Jumper Links

Long transmission lines or multiple “star” connections, may cause communication problems. Placing a Jumper Link across the jumper (See Figure 3 for position) in the LAST UNIT AT THE END OF THE CABLE RUN should solve the problem.

### Distance between the ImproX iTRT and its Wiegand or Multi-Discipline Readers

**CAUTION:** When implementing the 150 m (164 yd) cable distances with Impro Wiegand Readers use the 12 V power output option. Note, however, that the Multi-discipline Readers only connect using the 12 V power output option.

For maximum, data communications distance, install the Readers no further than 150 m (164 yd) from the Terminal. The cable individual conductor cross-sectional area should not be less than  $0.2 \text{ mm}^2$  ( $0.0003 \text{ in}^2$ ).

### Distance between the ImproX iTRT and its Multi-mode Remote

The maximum cable distance between the ImproX iTRT and its Multi-mode Remote MUST NOT exceed 10 m (33 ft). Achieve this by using good quality screened, twisted pair cable.

### Distance between ImproX Units

You can mount ImproX iTRT's directly next to each other. To avoid mutual interference, install the ImproX Readers at least 500 mm (20 in) apart.

## EARTH Connection

Connect the ImproX iTRT Terminal to a good EARTH point. Using the RS485 Port, connect the ETH Lead to the 'ETH' Terminal. Mains EARTH can be used, but electrical noise may exist.

**CAUTION:** When using the ImproX iTRT with FCC approved accessories, ensure that the RS485 cable is routed through a separate grommet to the power cable. Also ensure that you use a CE approved Power Supply Unit.

## Arc Suppression

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

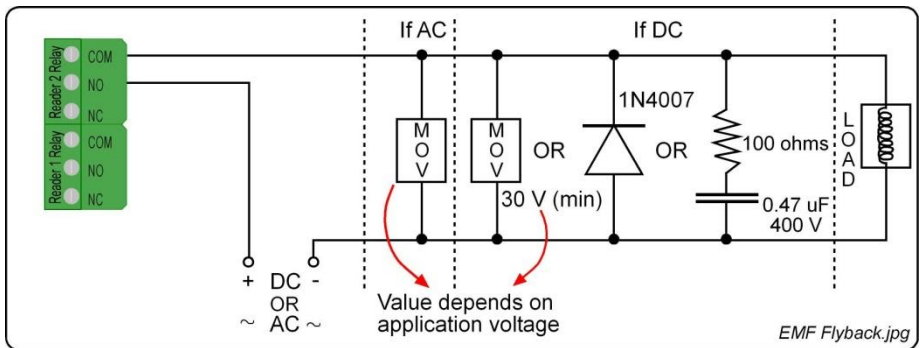


Figure 2: EMF Flyback and Arc Suppression

## Installing the Real Time Clock (RTC) Backup Battery

**CAUTION:** Remove the Battery Tab for the Real Time Clock from the Battery Holder **IMMEDIATELY BEFORE** powering up the ImproX iTRT. **DO NOT** remove the Battery Tag after applying power to the iTRT.

### First Time Use

#### Plastic Housing (XRT910 and XRT920)

1. Ensure that power is NOT applied to the Terminal.
2. Locate the removable Battery Tab.
3. Pull the removable Battery Tab out of the Battery Holder.
4. Immediately apply power to the Terminal.

#### Power Supply Combo (IPS920 and IPS921)

1. Ensure that power is NOT applied to the Power Supply Combo.
2. Open the Cabinet.
3. Locate the removable Battery Tab in the Real Time Clock Battery Holder.
4. Pull the removable Battery Tab out of the Battery Holder.

5. Close the Cabinet.
6. Immediately apply power to the Power Supply Combo.

## Replacement

**NOTE:** *Because of the delicacy of this procedure, we recommend you contact your distributor before trying to replace the Battery.*

## Installing the System Battery into the Power Supply Combo (IPS920 and IPS921)

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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.

## Mounting the ImproX iTRT

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

**NOTE:** *You can mount the ImproX iTRT onto virtually any surface including metal.*

**NOTE:** *During mounting, we recommend removing the Power Supply Combo's Earth Strap. As indicated in Figure 4, locate and disconnect the Earth Strap from the Lid of the Cabinet. This allows easy removal and replacement of the Lid during installation. After installation, we strongly recommend you reattach the Earth Strap to the Lid.*

Select the mounting position of the ImproX iTRT Terminal, considering accessibility, routing of wires and visibility of the LEDs. Secure the Terminal to the mounting surface, using suitable screws and wall plugs, nuts and bolts or rivets. 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.

## DIP-switch Settings














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**NOTE:** *Once the DIP-switch settings are modified reset the ImproX iTRT to acknowledge the new settings.*

### Reader 1 Select and Reader 2 Select DIP-switch Settings

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

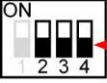





**NOTE:** *Where you have no Advanced Wiegand Reader (ImproX Multi-discipline Reader) connected, setting both Remote DIP-switches to the all off position during an Auto-ID will not return any Fixed Addresses.*

DIP-switch Position	Connections
0  DIP-switch 0 shows all the switches in the OFF position	Advanced Wiegand Reader (ImproX Multi-discipline Readers). Full Tag codes and types.
1  DIP-switch 1 shows switches 2, 3 and 4 in the OFF position	No Remote attached, the Channel is used for Relay and Digital Inputs only.
2 	ImproX Remote (including the ImproX Multi-mode Remote).
3 	ImproX RF 4-Channel Receiver or ImproX (IR) Infrared Receiver.
4 	Magstripe.
5 	Barcode (code 3 of 9) with Checksum.
6 	Barcode (code 3 of 9) without Checksum.
7 	Wiegand 26-bit, 44-bit, 40-bit, 37-bit and Tag + PIN-code or Reason Code Mode. (Sagem MA100, MA200, MA300 or Sagem J-Series).
8 	Wiegand open format.
9 	If the ImproX RF is connected, then Button 1 of the ImproX (QT) Quad Transmitter reports.
10 	If the ImproX RF is connected, then Button 2 of the ImproX (QT) Quad Transmitter reports.
11 	If the ImproX RF is connected, then Button 3 of the ImproX (QT) Quad Transmitter reports.
12 	If the ImproX RF is connected, then Button 4 of the ImproX (QT) Quad Transmitter reports.

**Table 1: Reader 1 Select and Reader 2 Select DIP-switch Settings**



## Door Lock Select DIP-switch Settings

DIP-switch Position	Connections
0  <p>DIP-switch 0 shows switches 2, 3 and 4 in the OFF position</p>	Reserved for future use.
1 	Reserved for future use.
2 	Reserved for future use.
3 	Reserved for future use.
4 	Reserved for future use.
5 	Returns Terminal to Factory Default Settings.  <b>CAUTION:</b> When changing from an Ethernet to an RS485 connection, return the Terminal to factory default settings before continuing with normal operation.  <i>NOTE:</i> Return Switch 1 to the OFF position to resume normal operation.

**Table 2: Door Lock Select DIP-switch Settings**

## Wiegand Modes

Mode	Terminal Action
Tag Only	Treats all codes received as tag codes.
Tag + PIN	Treats the first Wiegand code received as the tag code, and the second Wiegand code received as the PIN-code.
Tag + Reason	Treats the first Wiegand code received as the tag code, and the second Wiegand code received as the Reason Code.
Tag + PIN + Reason	Treats the first Wiegand code received as the tag code. The second and third Wiegand codes received are treated as the PIN-code and Reason Code respectively.

**Table 3: Wiegand Modes**

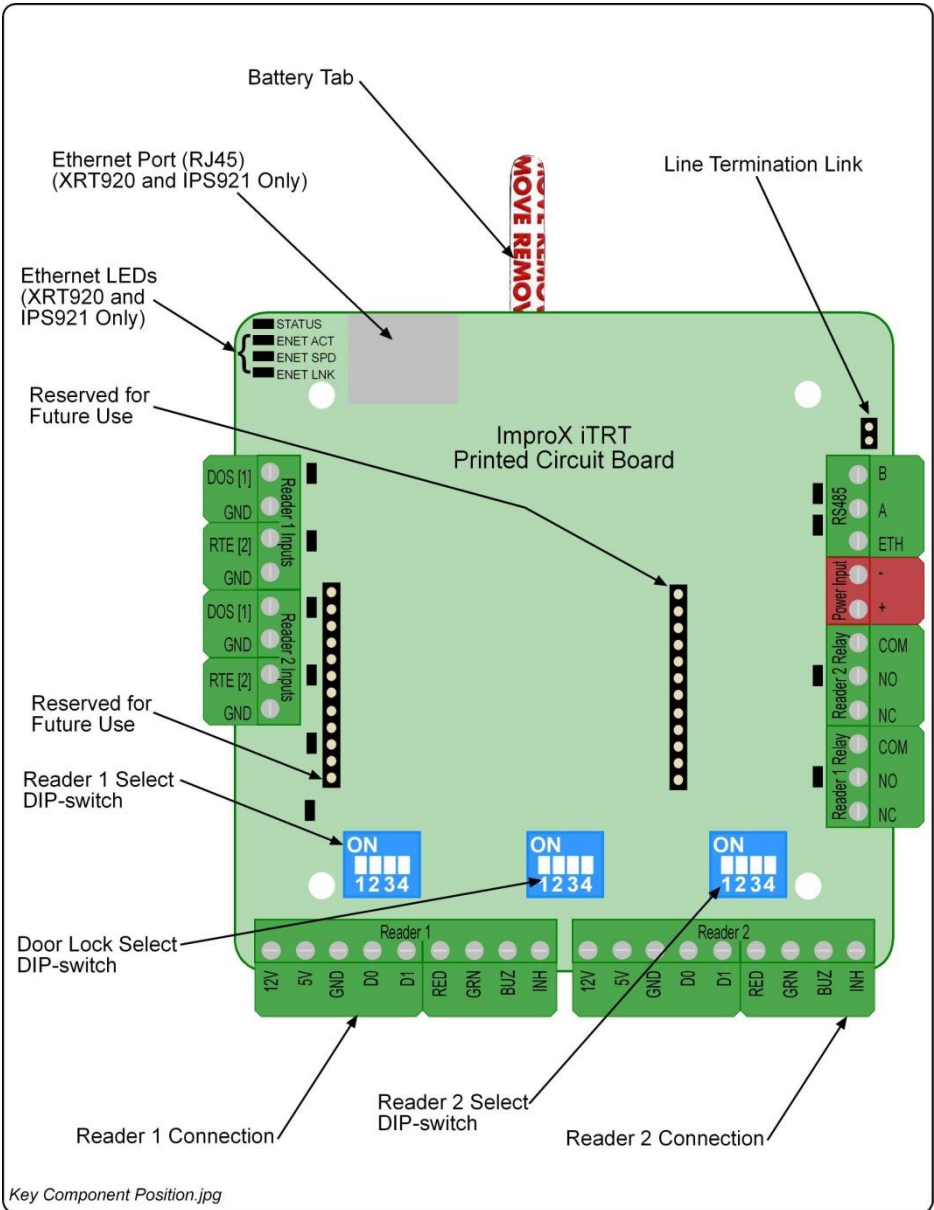
## Wiegand Mode Rules

- Enter PIN-codes or Reason Codes on the Reader within 10 seconds otherwise the Terminal discards the tag code.
- The System allows 10 seconds each for the entry of the PIN-code and the Reason Code in Tag + PIN + Reason Mode.
- If the ImproX iTRT expects a PIN-code and receives a number greater than 65535, then the Terminal assumes the number to be a tag code. The Terminal discards the previously read Tag for the current one and the Terminal will still expect a PIN-code.
- If the ImproX iTRT expects a Reason Code and receives a number greater than 65535, then the Terminal assumes the number to be a tag code. The Terminal discards the previously read Tag for the current one and the Terminal will still expect a PIN-code or Reason Code, depending on the mode.
- If the Terminal expects a Reason code and instead receives a number in the range 100 to 65535, the Terminal assumes this is an error. The Terminal discards the entire transaction, entering a new tag code starts the process again.
- If using PIN-codes and Reason Codes set the ImproX iTRT switches for Wiegand 26-bit, 37-bit, 40-bit and 44-bit, not Wiegand open format.

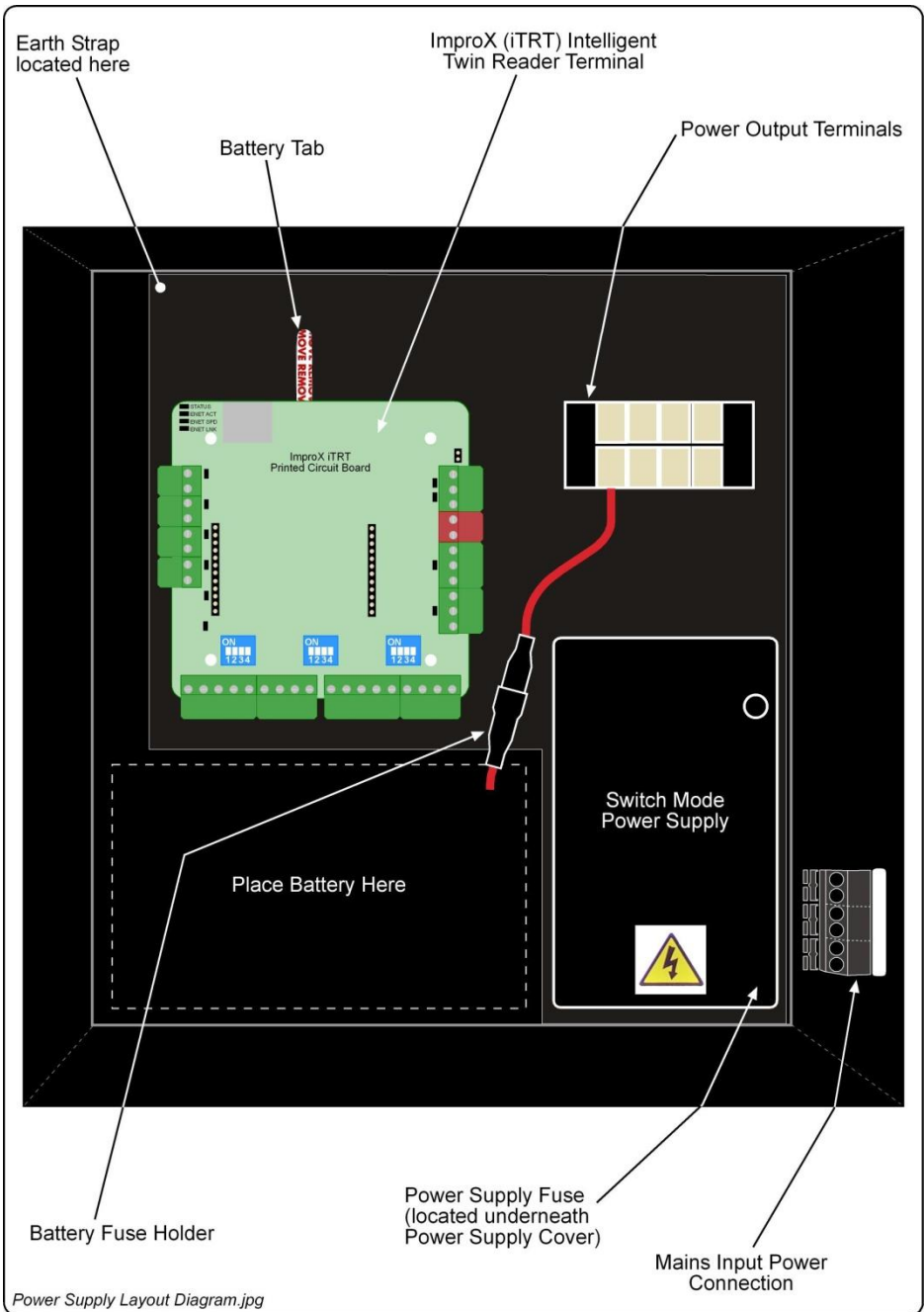
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# ELECTRICAL CONNECTIONS

## Key Component Positions



**Figure 3: ImproX iTRT Key Component Positions**

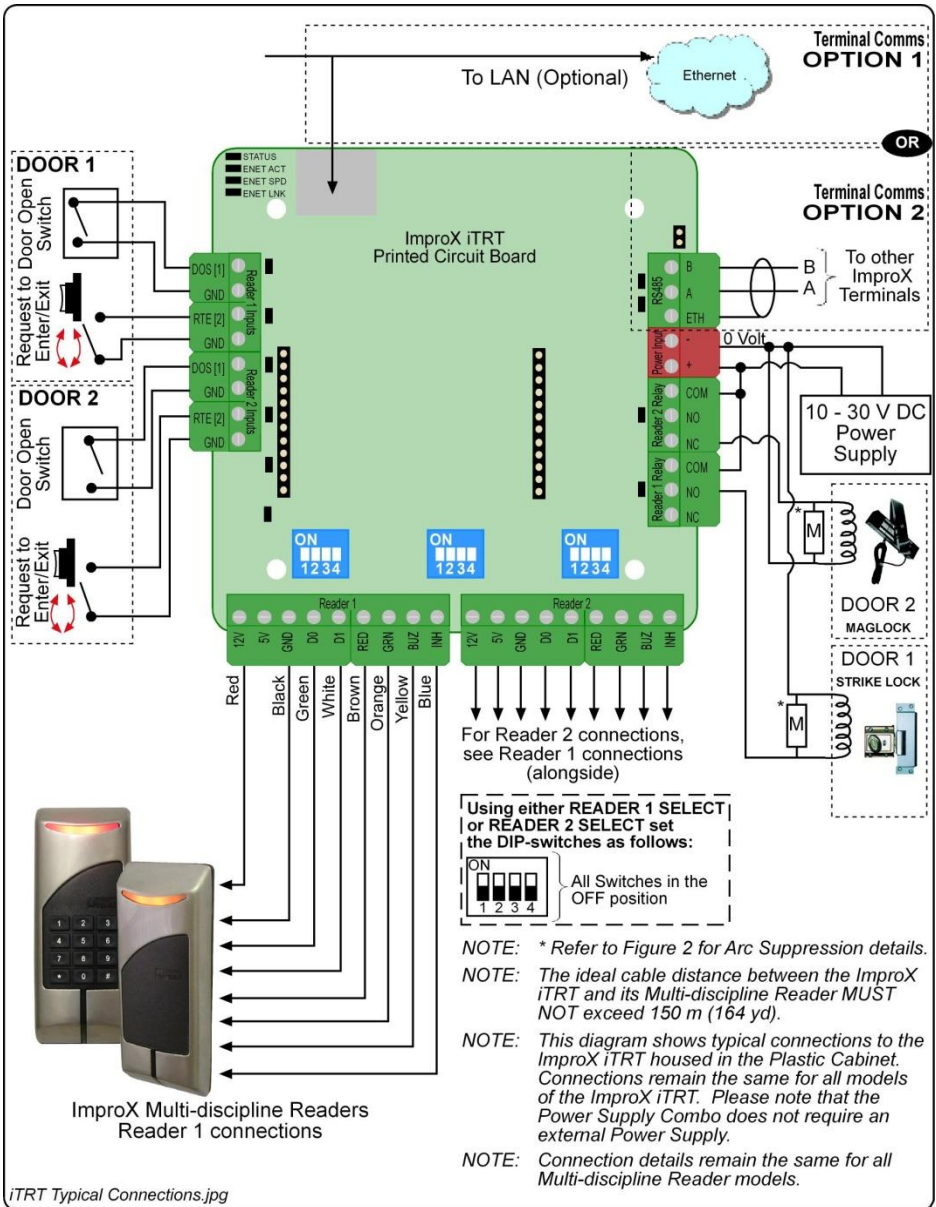


**Figure 4: Power Supply Combo Key Component Positions**

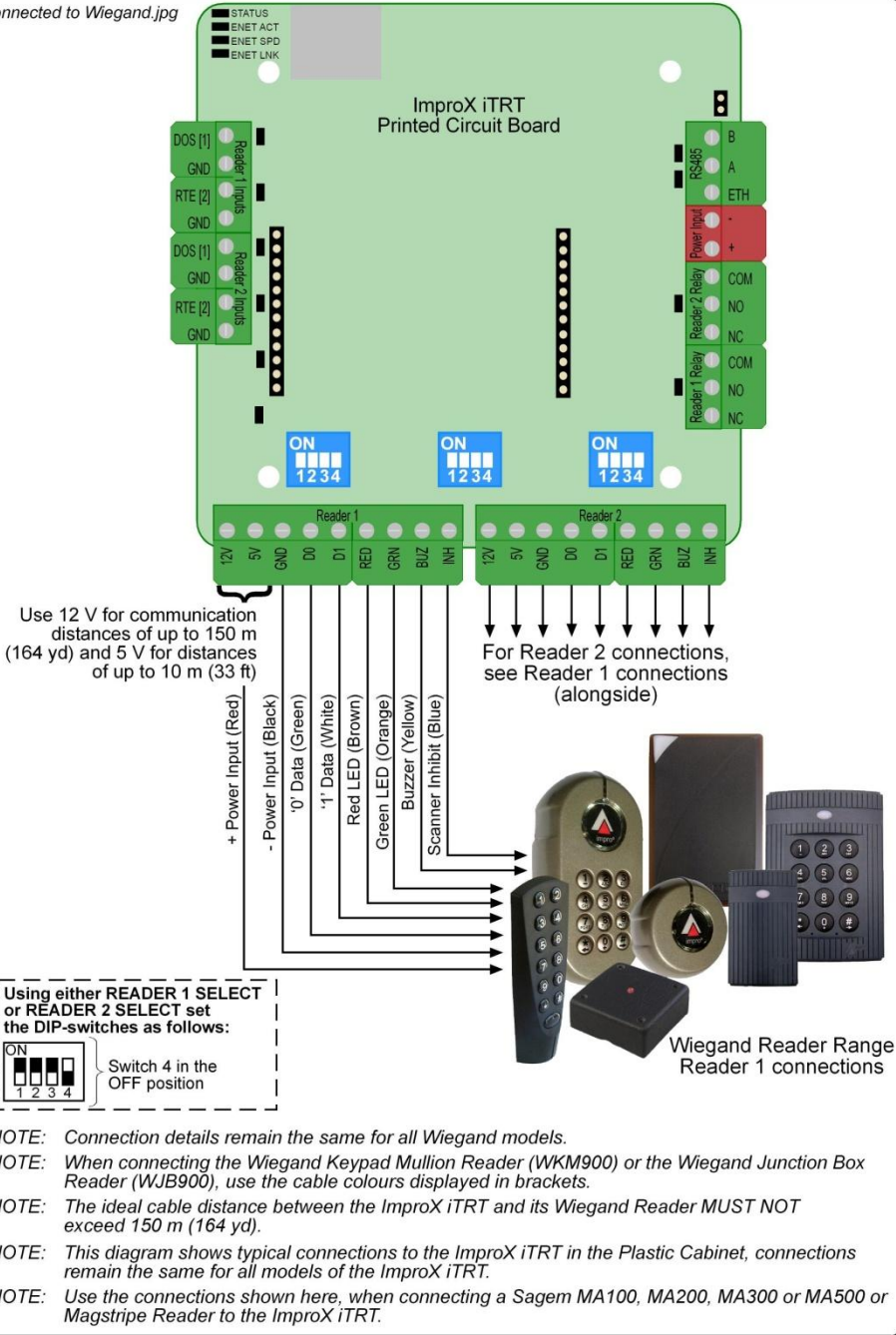
# Connecting the ImProX iTRT Terminal

**CAUTION:** Please take careful note of the position of D1 and D0.

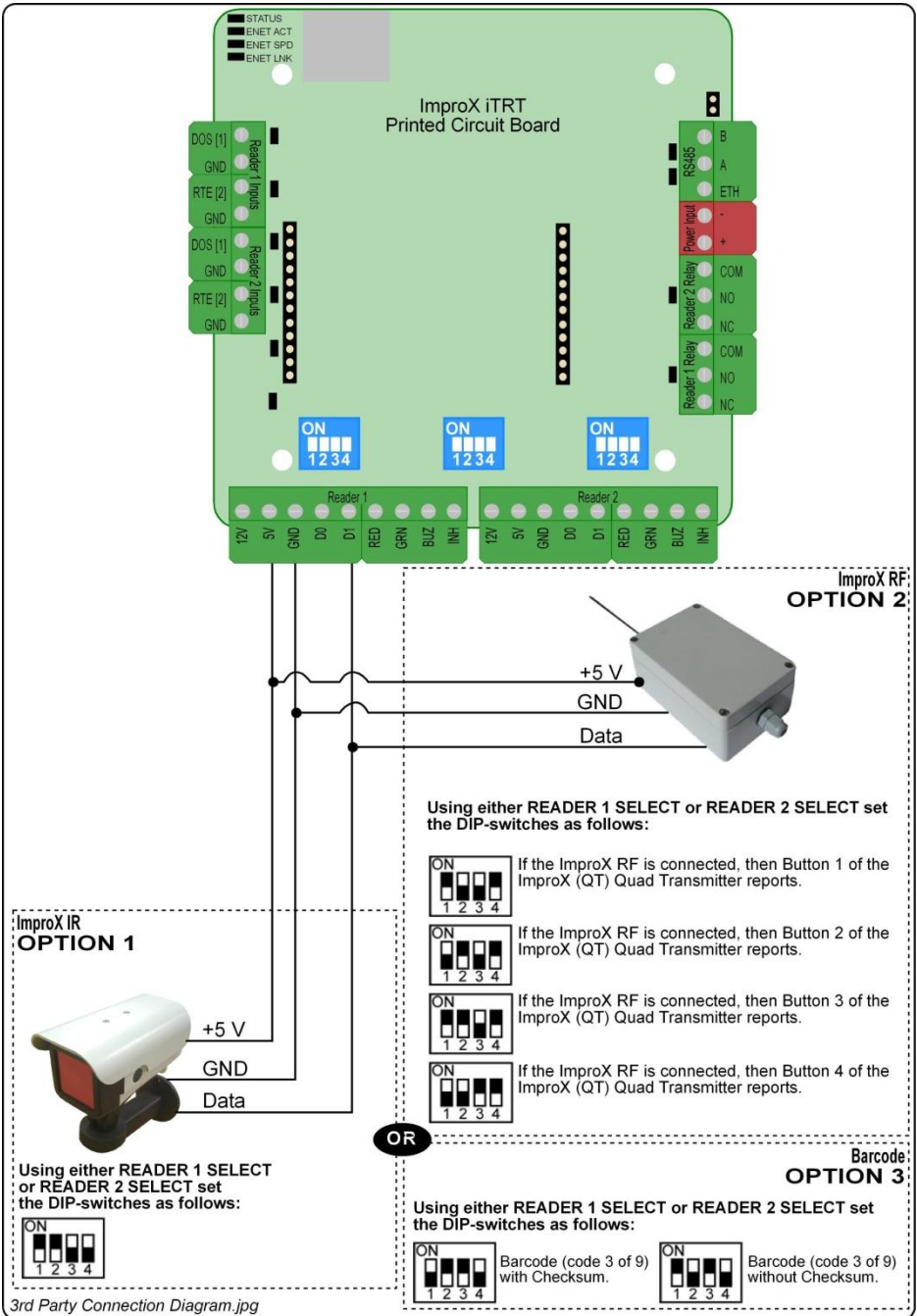
Figure 5 shows a typical electrical connection diagram for the ImProX iTRT Terminal.



**Figure 5: Typical ImProX iTRT Electrical Connections**

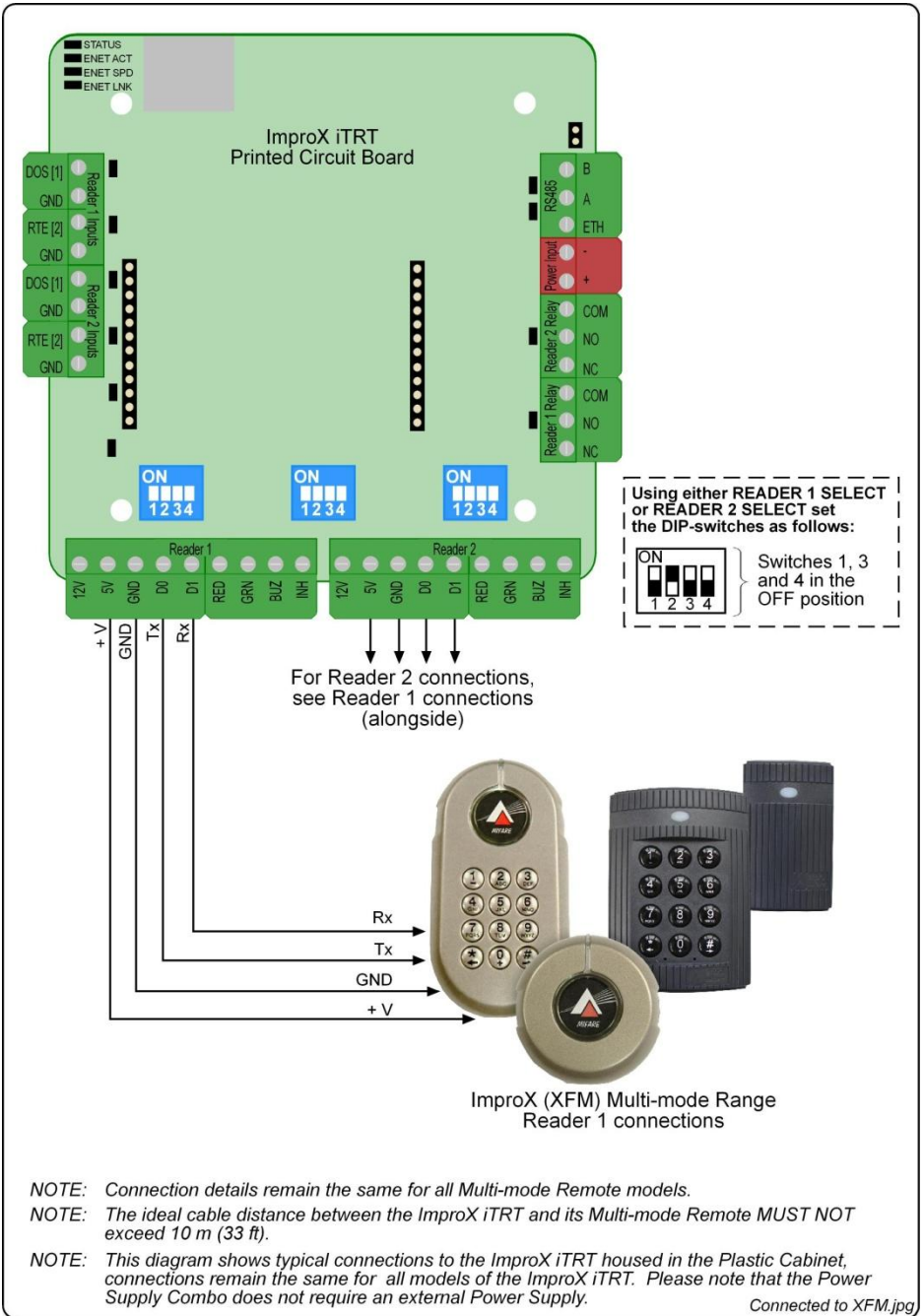


**Figure 6: ImproX iTRT connected to Wiegand Reader**



**Figure 7: Remote Port Data Connections for Third-party Devices**





**Figure 8: ImproX iTRT Connected to a Multi-mode Remote**



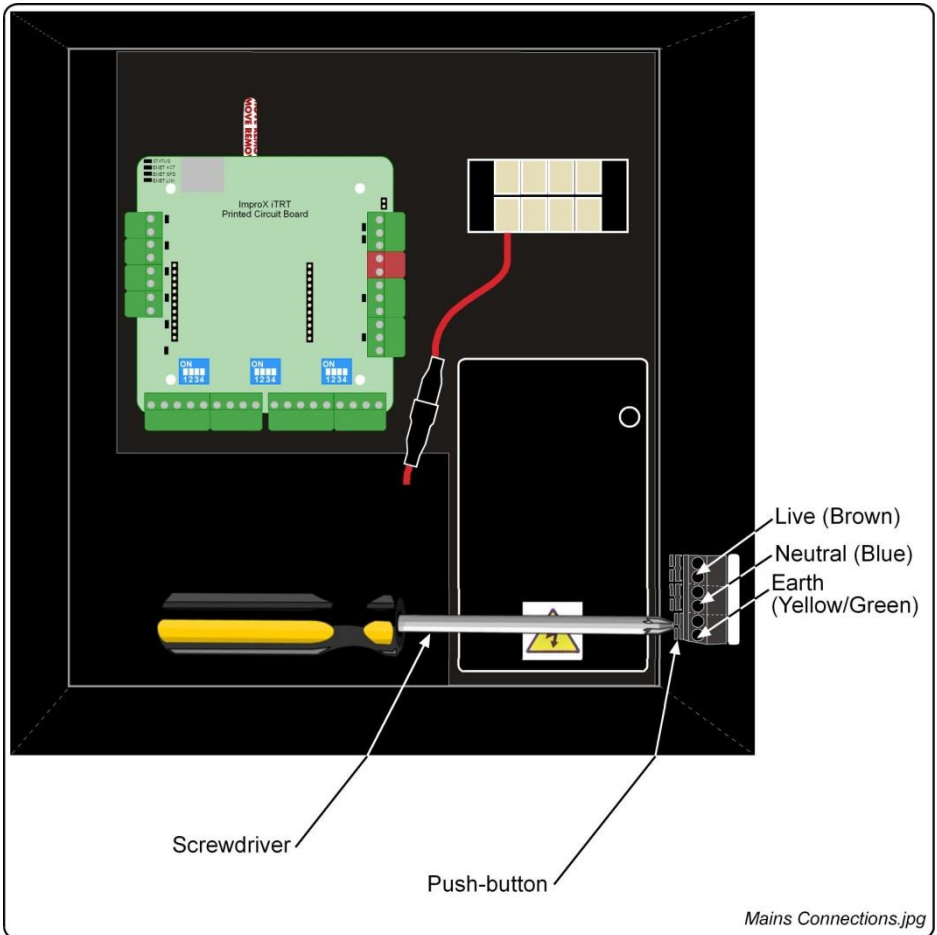
## Settings Specific to the Power Supply Combo (IPS920 and IPS921)

**WARNING: DO NOT REMOVE THE PLASTIC COVER PROTECTING THE SWITCH MODE POWER SUPPLY. REMOVING THE COVER PUTS YOU AT RISK OF ELECTRICAL SHOCK.**

**CAUTION: DO NOT** exceed the Input Voltage specified.

### 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 9: Mains Connections**

Connect the Power Supply Combo (IPS920 and IPS921) to mains power as follows:

1. Open the Cabinet.
2. Using a suitable screwdriver, press and hold down the Push-button.

3. Insert the wire.
4. Release the Push-button.
5. Repeat steps 2 to 4 for each connection.
6. Attach a suitable Mains Input Power Plug using the following connections:
  - Live (Brown)
  - Neutral (Blue)
  - Earth (Yellow/Green)
7. Close the Cabinet.

## Fuse Information

Fuse Type	Purpose	Rating
Battery Fuse	This fuse protects the Battery from overload as well as incorrect polarity connection.	3.15 A 250 V Slow-blow (5 mm x 20 mm)
Power Supply Fuse	This fuse protects the Power Supply from overload as well as incorrect polarity connection.	4 A 250 V Slow-blow (5 mm x 20 mm)

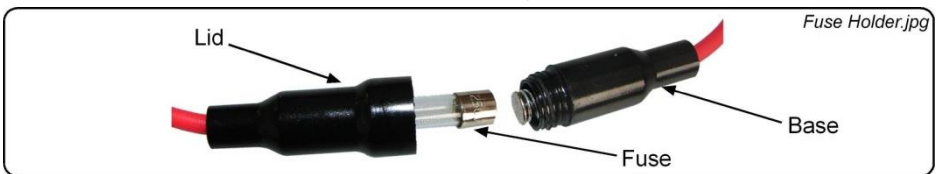
**Table 4: Fuse Ratings**

**NOTE:** *Because of the delicacy of the replacement procedure, we recommend you contact your distributor before trying to replace the Power Supply Fuse.*

## Replacing the Battery Fuse

**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.**

1. Disconnect the mains power supply to the Power Supply Combo.
2. Open the Cabinet.
3. Disconnect the Positive Lead from the Battery.



**Figure 10: Fuse Holder**

4. Unscrew the Fuse Holder's Lid from the Base.
5. Remove the old fuse.
6. Insert a new fuse into the longer end of the Fuse Holder.
7. Screw the Fuse Holder's Lid onto the Base.
8. Reconnect the Positive Lead to the Battery.

9. Close the Cabinet.
10. Reconnect the mains power supply to the Power Supply Combo.

### **Power-on Self-test**

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The Power-on Self-test tests the RAM and Flash Checksums.

If any parameter in the Self-test fails, the Terminal emits a continuous beep for 2 seconds before the 2 short start-up beeps.

When the Terminal passes the Self-test, it emits two short beeps, each 200 ms in duration, separated by a 200 ms inter-beep pause.

### **Fixed Address Label**

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Once the ImproX iTRT is installed, sketch a rough site plan. Attach the loose (additional Fixed Address Label packaged with the Terminal) Fixed Address Label in the position of the Terminal 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.

## **GUARANTEE OR WARRANTY**

**CAUTION: We reserve the right to nullify the product's 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](http://www.impro.net).

## **USER NOTES**



This manual is applicable to the ImproX (iTRT) Intelligent Twin Reader Terminal, XRT910-0-0-GB-08, XRT920-0-0-GB-08, IPS920-0-0-GB-05 and IPS921-0-0-GB-05. (The last two digits of the Impro stock code indicate the issue status of the product).

XRT305-0-0-GB-05	Issue 06	Apr 2011	ImproX iTRT\English Manuals\LATEST ISSUE\ XiTRT-in-sm-en-06.docx
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