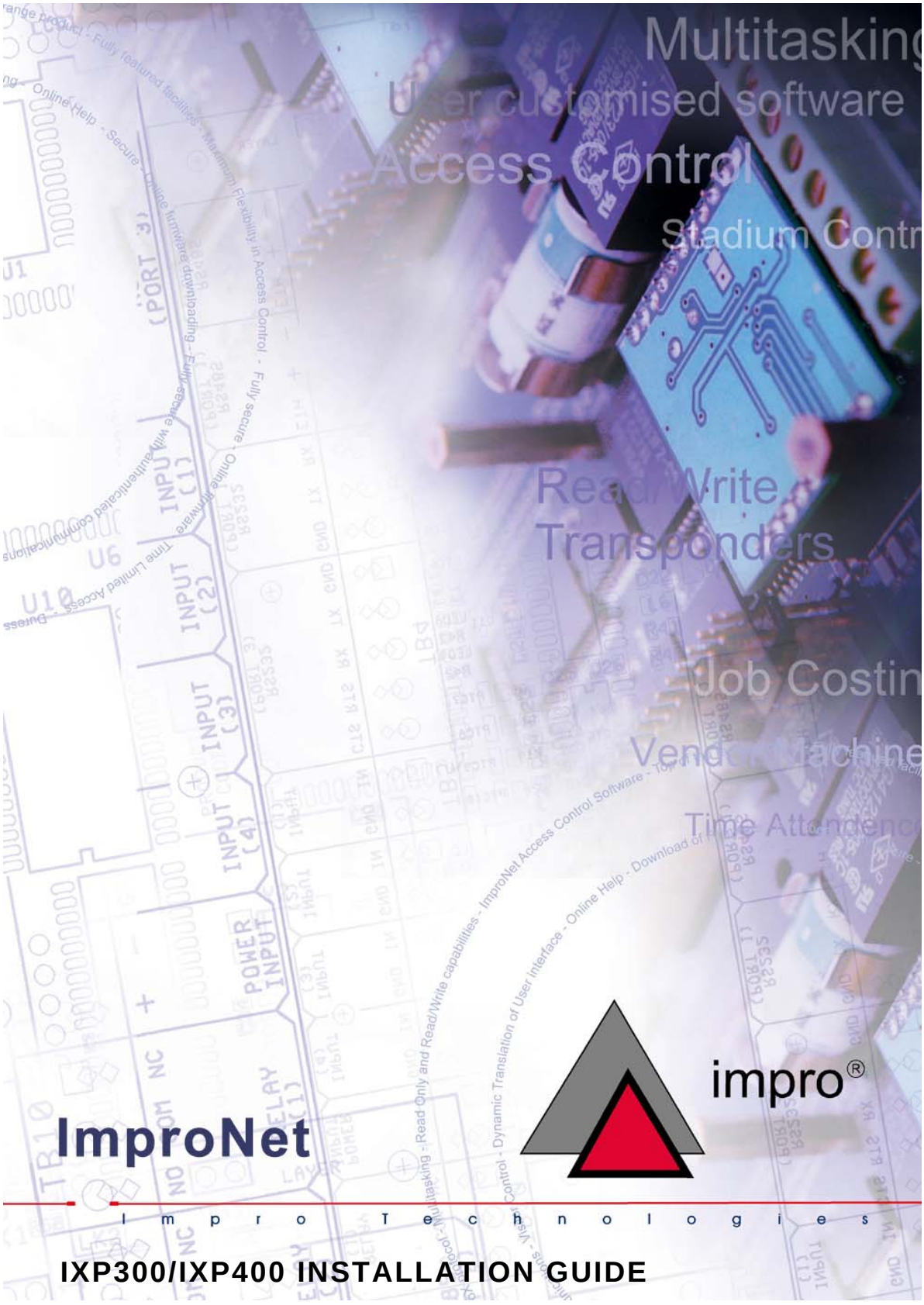

IXP300/IXP400 INSTALLATION GUIDE

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At a Glance

PART I – Hardware Configuration

Provides information to set-up and configure ImproX Hardware prior to configuring the ImproNet software. It includes information on cabling, power, and earthing requirements.

PART II – Getting Started

Provides an overview of the ImproNet System, and the basic steps required for installation and pre-configuration.

PART III – General Configuration

General Configuration provides the nuts-and-bolts procedures for ImproNet Software configuration. All everyday tasks are described in this Part.

PART IV – Advanced Configuration

Details not covered in Parts I, II, or III, are described here. Most information in this Part is not required for everyday configuration.

PART V – Utilities

The ImproNet utility modules enable you to perform administrative and maintenance tasks to the core ImproNet components.

Contents

Introduction

This manual is intended to assist the installer during the installation and configuration stages of the ImproNet Software suite. It is not designed as an operational manual for the end-user. For operational information, please refer to the ImproNet Software User Manual.

This manual is structured to assist the installer with configuring the basic components of the system first, followed by advanced features and functions.

Document Conventions

The following conventions are used in this document:

Note—indicates additional information about a topic

Tip—indicates suggestions and alternative methods to perform tasks

Important—indicates important information

Warning—indicates potential danger to you or the product

Terminology

Impro-Specific Terminology

The following terminology is used in this document:

- **ImproNet**—the commonly used name of the ***IXP300*** / ***IXP400 Series Software Suite***. However, the term *ImproNet* also describes an access solution as a whole; it encompasses all hardware, software, and third-party applications.
- **IXP300**—the ImproNet System based around the **ImproX IC** Controller
- **IXP400**—the ImproNet System based around the **ImproX AC** Controller
- **ImproX Hardware**—the hardware units comprising an ImproNet System. The major ImproX components are **Controllers**, **Terminals**, and **Card Readers**.
- **Tag**—the passive, proximity component used as a unique identifier in an ImproNet access control system

Country-Specific Terminology

Different countries use different words to name or describe the same thing. **Table 1** lists the International terms and their American equivalents used in this document.

International	American
Lift	Elevator
Grounding	Earthing
Ground	Earth
Tag	Card
Registration	Enrollment
Registration Reader	Enrollment Reader
Screen	Shield
Screening	Shielding

Table 1 – International and American Terms

In some cases, terms are used inter-changeably.

Supported Software and Firmware Versions

This release of the IXP300/IXP400 Installation Guide applies to the following Impro Software and Firmware revisions only:

ImproNet Software Suite	**V 7.02**
ImproX AC Controller	**V 7.04**
ImproX IC Controller	**V 7.04**
ImproX RH Registration Interface	**V 1.02**
ImproX ER Terminal	**V 7.03**
ImproX TT Terminal	**V 7.02**

Compliance with UL

Unless otherwise stated, all hardware discussed in this manual has been evaluated and approved by **UL**.

Not Evaluated by UL

Please note that the following have **NOT** been evaluated by **UL**:

- Use of Third Party Tags
- Fire Detection hardware
- Intrusion Detection hardware
- Alarm System hardware
- ImproNet Software
- Lift control
- RS232

Throughout this guide, items not approved by UL are marked with a ★ character.

ImproX Units Evaluated by UL

The following ImproX units have been successfully evaluated by UL and conform to the UL294 Standard:

Comms Interfaces

Unit	Description	Part Number
ImproX RH	Registration Interface	XRH900-1-0

Enrollment Readers

Unit	Description	Part Number
ImproX RRA	Antenna for RH and RS	XPR901-1-0

Controllers

Unit	Description	Part Number
ImproX IC	Controller in the ImproNet system (IXP300). This standard controller can support up to 48 Terminals.	XIC900-1-0
ImproX AC	Controller in the ImproNet system (IXP400). This advanced controller can support up to 64 Terminals	XAC904-1-0

Terminals

Unit	Description	Part Number
ImproX I16	Input Terminal providing 16 digital inputs.	XIT900-0-0
ImproX O16	Output Terminal providing 16 relay outputs.	XOT900-0-0
ImproX TT	Twin Antenna Terminal.	XOT910-1-0
ImproX ER	Extended range Terminal with external antenna	

Readers for ImproX TT

Unit	Description	Part Number
ImproX MMA	Mullion Antenna Reader	XTT901-1-0
ImproX MA	Micro Antenna Reader	XTT902-1-0
ImproX MHA	Metal Antenna Reader	XTT903-1-0
ImproX KHA	Metal Keypad Antenna Reader	XTT904-1-0

Table 2 - ImproX Units Evaluated by UL

PART I – Hardware Configuration

General Hardware Installation Guidelines

Essential Installation Requirements

All units must be installed and wired in accordance with the National Electric Code (ANSI/NFPA 70), local codes, and the authorities having jurisdiction.

Unit Serial Numbers

All ImproX hardware units have a unique serial number. The format of the serial number is as follows:

- XX Y XXXXXXX
  - Unique Sequence Number
  - Year Identifier
  - Month Identifier

*The **Year Identifier** uses letters to denote year. Each year, the letter advances by one. For example, O = 2004, P = 2005, and Q = 2006.*

Power Supply

Requirements

- Power to all units must be supplied by a power-limited, UL Listed, access control or burglar alarm power supply capable of providing the following:
  - Required voltage and current
  - Minimum four-hour standby time
- **One** Power Supply must be installed for each set of Readers and Terminals at a Location. This ensures a reduced current load.
- Each high-current Magnetic Lock must be powered by a separate UL Listed power supply.
- The maximum distance between the Power Supply Unit and the units it supplies with power, depends on the following:
  - Output voltage of the Power Supply Unit
  - Cross-sectional area of cable. Refer to **Table 3** on page **31** for details.

Power Supply Unit Output Voltage	Maximum Distance	Cable Specification
12 V DC	10 m (32.81 ft)	Conductors with a minimum cross-sectional area of **0.5 mm²** (**0.0008 in²**).
24 V DC	20 m (65.62 ft)	Conductors with a minimum cross-sectional area of **0.5 mm²** (**0.0008 in²**).

The input voltage supplied by the Power Supply to a unit, must not exceed the value specified in this Manual. Otherwise, the unit may be damaged.

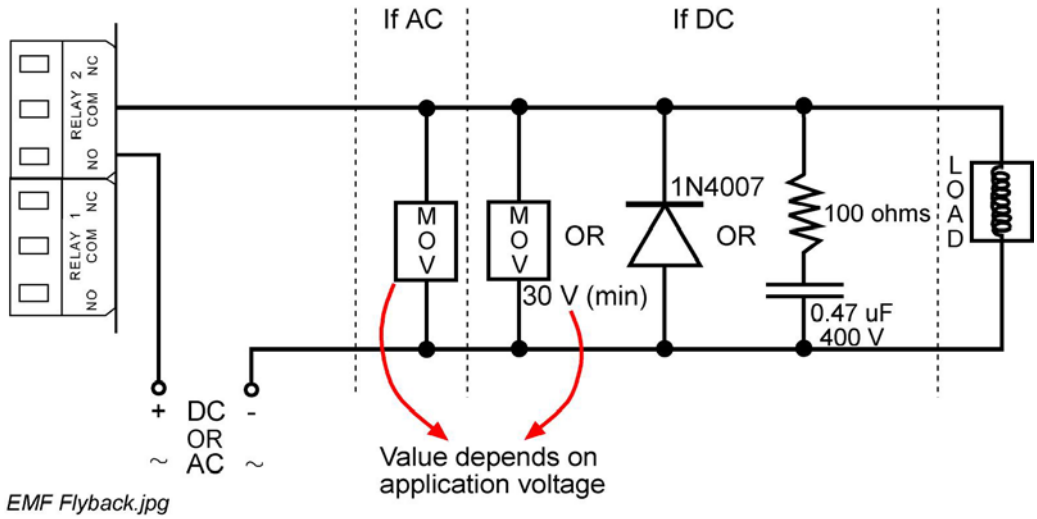
Recommendations

- All mains supplies to the Power Supply should be protected from high voltage surges. You can protect the mains supplies by means of Metal Oxide Varistors (MOV), Line Transformers, or Un-interruptible Power Supply (UPS) systems.
- Power Supplies with battery backup are preferable as they ensure that frequent occurrences of mains *brownouts* have no effect on the Reader or Controller performance. Battery backups should supply a minimum of 4 hours standby time.
- Batteries have a life expectancy of 3 to 4 years. Therefore, ensure they are changed at regular intervals.

Arc Suppression

Arc suppression components must be fitted on all doors and access positions where there are Strike Locks or Magnetic Locks.

Snubber devices are recommended for EMF flyback and arc suppression when driving an inductive load with a Relay.
Figure 1 illustrates technical details.



EMF Flyback.jpg

Figure 1 - Arc Suppression

Surge Protection

In areas where lightning is common, we recommended using surge protection on low voltage power lines and RS485 Communications lines. The **Impro Line Surge Protector**★ is recommended for RS485 Communications Protection. The **Impro Low Voltage Line Protector**★ is recommended for low voltage lines.

Communication

The ImproX range uses **RS232**★ and **RS485** protocols for most communication purposes.

- **RS232** is generally used for short distances up to **25 m** (**82.02 ft**). RS232 connects to a single hardware device via a serial communications port to a PC running the ImproNet Software.

- **RS485** supports longer communications runs. It connects multiple hardware devices to a common bus (Multi-Dropping). The IXP300 and IXP400 systems use RS485 for their Terminal and Controller busses.

- **USB** is used between the ImproX RH and the PC running ImproNet Engine.

Recommended Cable

Choice of cable is a critical part of the installation process. Defective or unspecified cable can result in communication problems. This can result in hardware timeouts and an overall speed reduction of system procedures. Correct cable is particularly important for RS485 buses. Ensure the following when selecting cable:

- Use twisted pair Mylar shielded cable only, for RS485 Comms bus

- For RS485 Ports, the individual cross-sectional area of the cable must not be less than **0.2 mm²** (**0.0003 in²**). The maximum permissible cable length is **1000 m** (**3281 ft**).

- For RS232 Ports, the individual core cross-sectional area of the cable must not be less than **0.2 mm²** (**0.0003 in²**). The maximum permissible cable length is **25 m** (**82.02 ft**).

- Cables must be:
  - Neatly laid out
  - Labelled correctly on both ends with cable markers
  - Earthed correctly—the shield of the cable should be connected to the Earth terminal on the unit. The unit should in turn be connected to a good Earth point. The earth must be a **low resistance** connection to Earth and **not** an arbitrary Earth connection.

    Connect the shield at one end of the cable only.

- Cable joins must be:
  - Connected by proper connecting strips
  - Kept to a minimum

- Shielded cables should be connected as follows:
  - Strip to the required length exposing two internal wires
  - Untwist the excess length of metallic foil and plastic covering and remove the plastic
  - Twist the metallic foil to form a wire tail
  - The shield lead must be connected to the Earth terminal. Earthing is at **one** end of the cable only.

- Cable layout of an installation must be documented
- **Daisy-chain formations** are preferable to **Star formations**
- Sites where transmission lines are long, or multiple star formations are used, may experience timeouts on certain ImproX Controllers or Terminals. These are caused by reflections on the RS485 lines. To solve the problem, it may be necessary to terminate the lines. Termination resistors are added at the end of a cable run only and not at every Terminal. Refer to the **Terminating the Communication Bus** section on page **25** for details

Termination resistors are built into most ImproX Terminals.

Network Topology

Cables should be run in a **daisy chain configuration** to provide effective RS485 communication for ImproX hardware. **Figure 2** illustrates a daisy chain configuration.

Star configurations are not recommended, as they are susceptible to signal reflections and can result in signal degradation. End-of-line termination is also a problem with Star configurations, due to the number of endpoints. If a termination resistor is required at each endpoint, it will overload the RS485 driver.

More than four resistors on four of the star bus connections will overload the driver due to low parallel resistance.

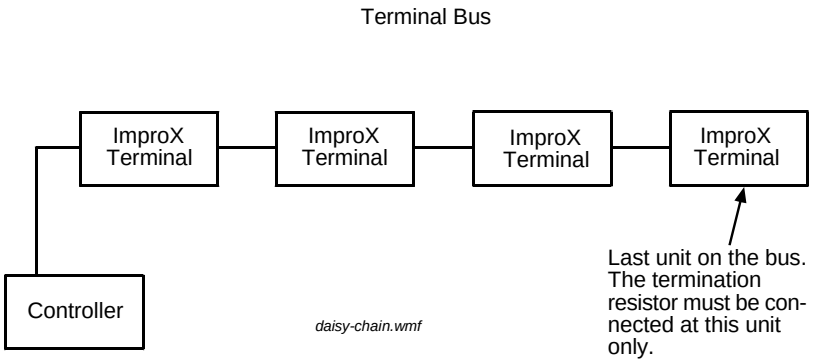


Figure 2 - Daisy-Chain Bus Connection - Good Wiring Practice

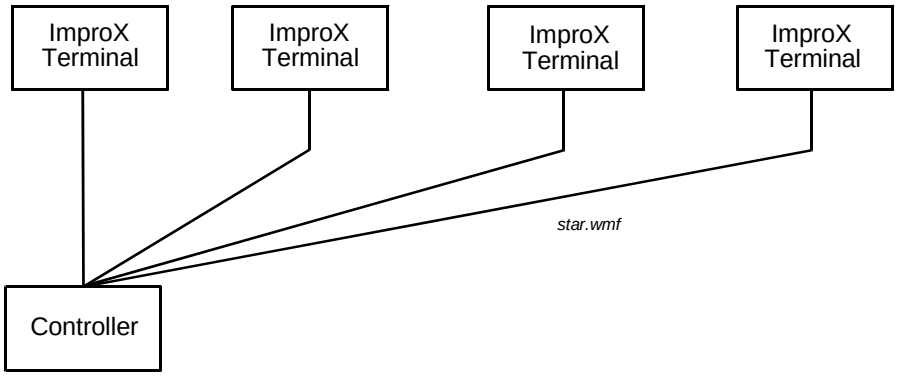


Figure 3 - Star Bus Connection (BAD Wiring Practice)

Placement of ImproX Units

Minimum Distance between ImproX Units

It is important to maintain a minimum distance between adjacent ImproX Terminals or Remote Readers to avoid mutual interference. Ensure a **minimum** distance of **500 mm** (**19.69 in**) between units.

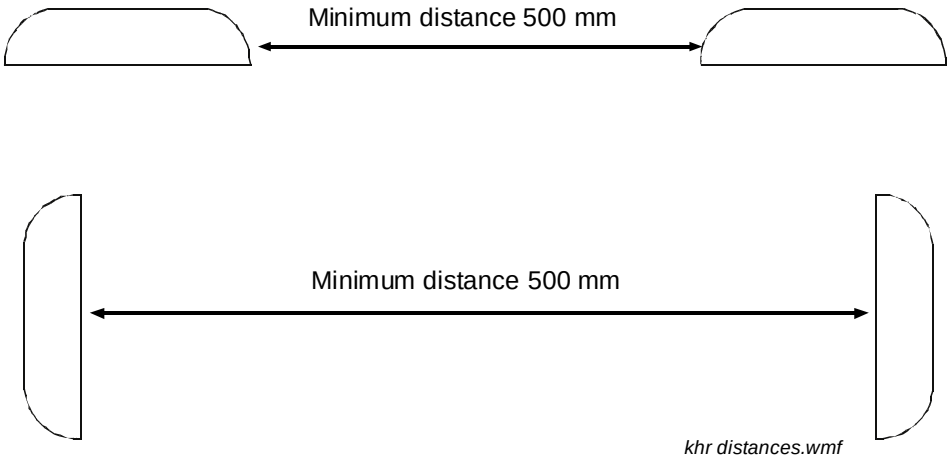


Figure 4 - Minimum Distance between Terminals or Remote Readers

Shielding of Units

In some situations, it is not possible to space the Readers the minimum distance apart. For example, if two Readers are mounted back-to-back on either side of a drywall, place aluminium plate between the two Readers. The dimensions of the plate must be at least **400 mm** X **400 mm** (**15.75 in** x **15.75 in**), and have a thickness of at least **1 mm** (**0.04 in**).

Line Termination—Principles of a Terminating Resistor

Long RS485 cable runs can cause problems with impedance matching and result in degraded signals. The impedance between two units can mismatch when an increase in number of units changes the resistance and capacitance of the connection. Such an impedance-mismatched network creates reflections on signals and data sent on the cable. Reflected signals introduce noise and errors on the connecting line.

Each connected unit adds a small amount of capacitance to the network. The longer the cable run, the more inductance and resistance is added. If this occurs, units on the cable-run can timeout due to the reflections from the end of the cable conflicting with the messages sent from the Terminals.

To overcome this problem, match the impedance by placing a terminating resistor between the A and B line, at the last unit on the run. The terminating resistor inhibits the reflection and enhances the signal or data integrity.

Ensure you adhere to the following criteria when placing terminating resistors:

- Place **one** terminating resistor on a single cable run only. If more are placed, they could lower the resistance too much. As a result, the bus may *hang-up*.
- Place a terminating resistor on the cable run only if the cable has been checked for faults but timeouts are still occurring.

You should use terminating resistors only if the system is experiencing communication problems, or if the combined RS485 comms run is greater than 328 ft.

Grounding the Shield in an IXP400 System

A shield's purpose is to *drain off* electrical noise. A correctly grounded shield leads electrical noise along a path to the ground. Using a **mains ground** is possible, but it must be established *before* hardware installation to determine if it is a suitable option.

To prevent ground loops, a shield must never be grounded at both ends of a RS485 cable run. We recommend that you join - but not ground - the shield for the Controller bus and Terminal bus at each termination point, and ground the shield at one end of the bus only. A suitable grounding position is at the beginning or the end of the bus.

Grounding Controllers and Terminals in an IXP400 System

Common Ground

Figure 5 on page **24** illustrates the recommended grounding procedure when a common ground point is available.

Connecting to a mains ground is acceptable provided it is a common (local) ground. Often, in a single building or structure, each mains ground point is connected to a common ground. However, you must confirm the grounding scenario *before* proceeding with a common ground.

The common ground method is preferred because it conforms to EMC standards. It also provides good electrostatic discharge protection and emission reduction.

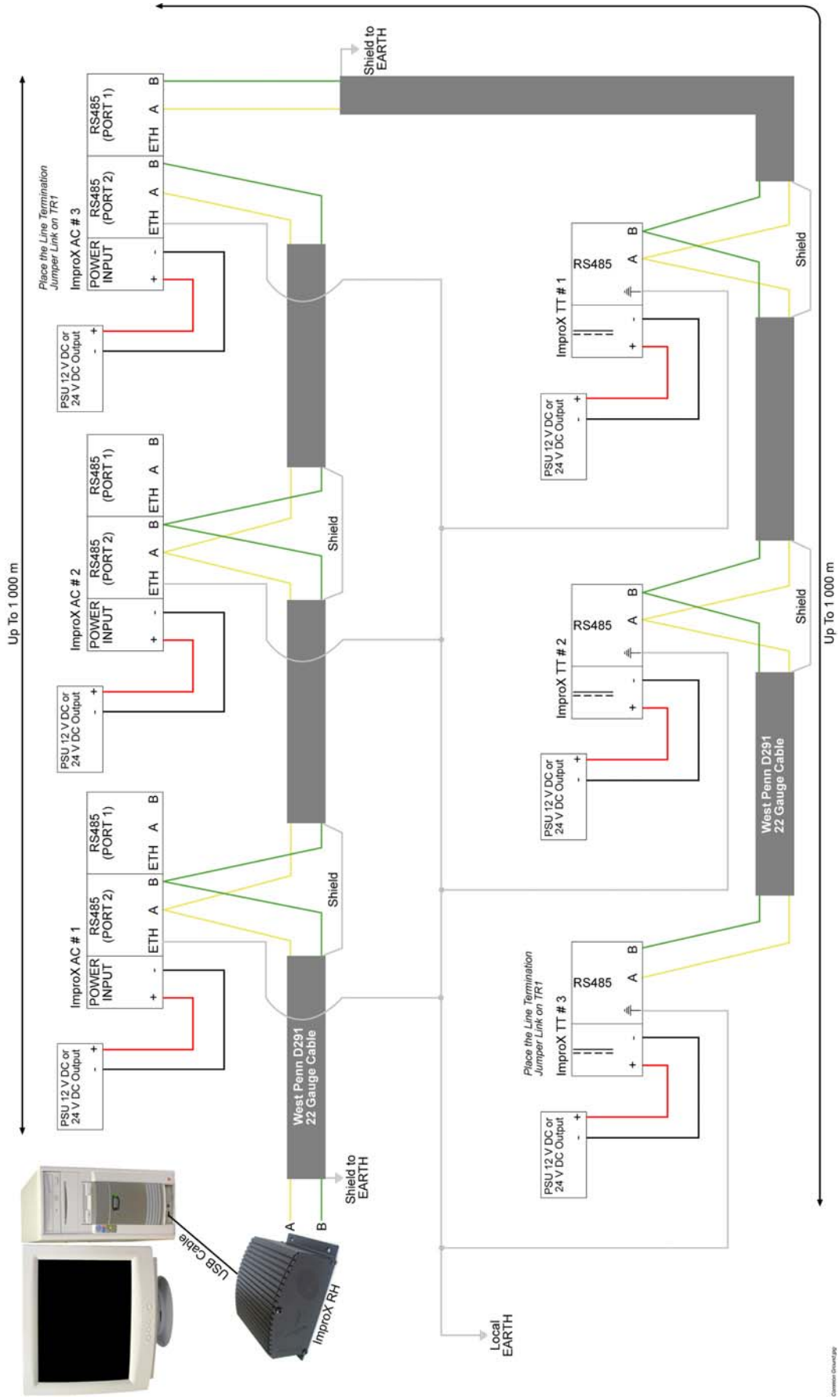


Figure 5 - Common Ground Schematic

Separate Ground Points

Figure 6 on page **26** illustrates the recommended grounding procedure when a common ground reference is *not* available.

This is often the case when the communications bus spans a number of buildings or structures that do not share a common (local) ground. Communication problems can occur if the hardware is grounded to separate (isolated) ground points and a potential difference exists between these points. Therefore, we recommend you do not ground Controllers and Terminals via separate ground points.

In the Separate Ground Point configuration, Controllers and Terminals are floating; therefore, they are susceptible to electrostatic discharge. This method requires true floating power supplies.

Terminating the Communication Bus

The comms bus requires termination to prevent reflections on the line. ImproX Controllers and Terminals have onboard resistors that are used for line termination. Ensure the following when terminating the Communication Bus:

Host Bus (Port 2)

Terminate the Controller comms bus (port 2) at the last Controller on the bus if the combined RS485 comms run is more than 100 m.

Both the ImproX IC (IXP300) and ImproX AC (IXP400) Controllers have onboard termination resistors that are disabled by default. To terminate the comms bus at a particular Controller, short the **TR1** jumper.

Terminal Bus (Port 1)

Terminate the Terminal comms bus (port 1) at the last Terminal on the bus if the combined RS485 comms run is more than 100 m.

To terminate the comms bus at a particular ImproX TT terminal, short the onboard jumper.

To terminate the beginning of the Terminal comms bus at the Controller, short the **TR2** jumper on the Controller.

The ImproX TT, ImproX I16, ImproX O16, and ImproX ER Terminals have a single, onboard, termination resistor. To enable line termination on a particular Terminal, connect the onboard line termination link.

*All onboard termination resistors on Controllers and Terminals are **150 ohms**.*

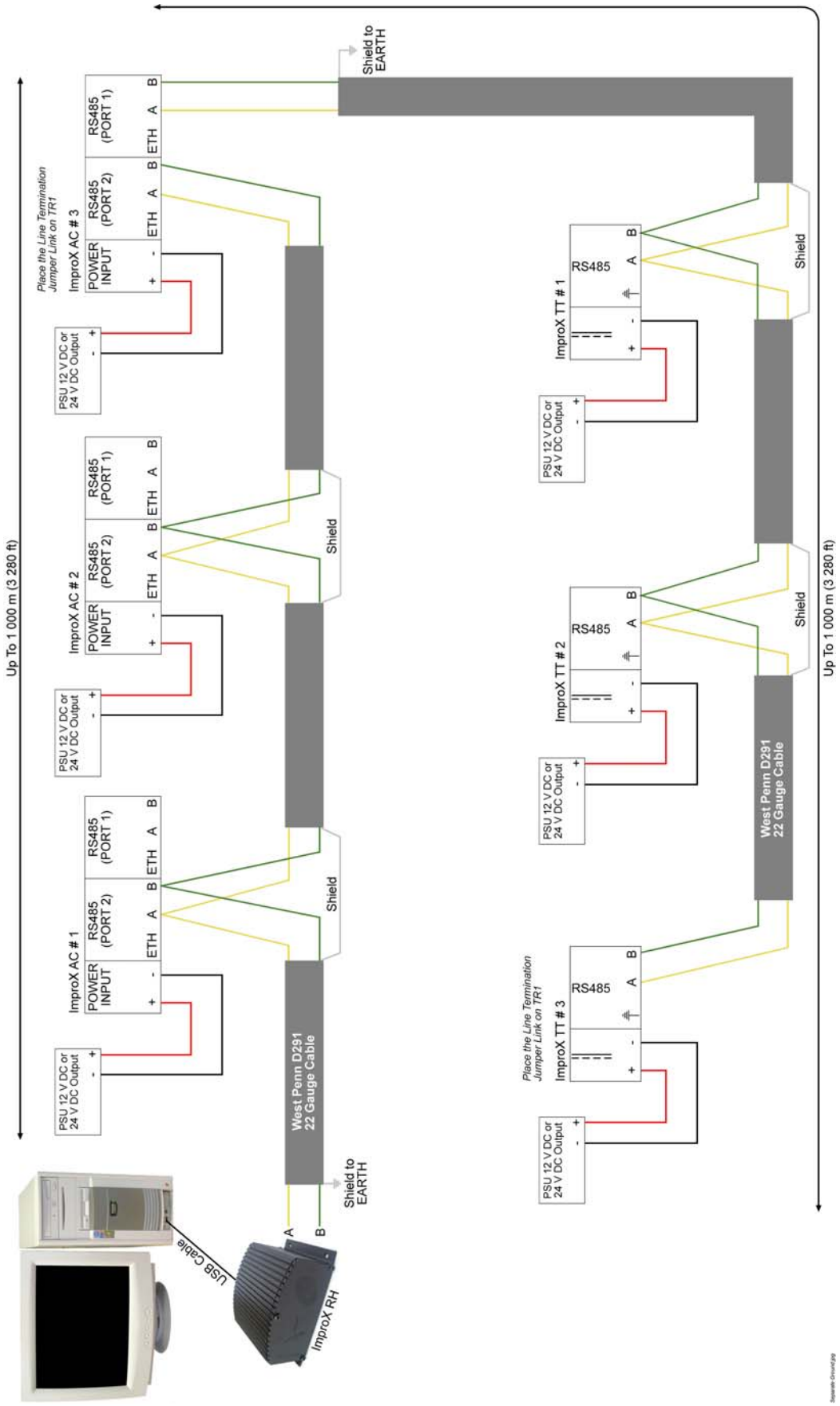


Figure 6 - Separate Ground Schematic

Door Hardware Units

To ensure that Terminal relays function correctly, use only UL Listed strike locks and magnetic locks.

Door Strike

The Door Strike is the usual mechanical type lock but with an electromechanical action enabling it to be actuated by the presence or absence of a current flowing through an internal solenoid.

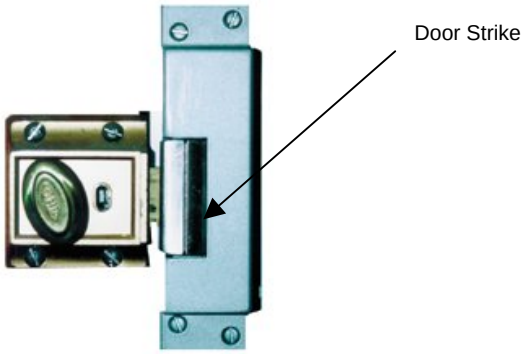


Figure 7 - Door Strike

Figure 7 and **Figure 8** show a type of a door lock called a *door strike*. Door strikes use a small electro-mechanical solenoid to release a *lip*—a metal latch that keeps the door locked.

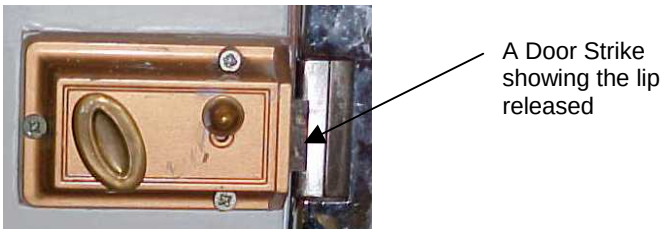


Figure 8 - Door Strike Showing Lip Released

Figure 8 shows the lip in a released position, so the door can be opened.

Strike locks have the advantage of being opened with a key if necessary.

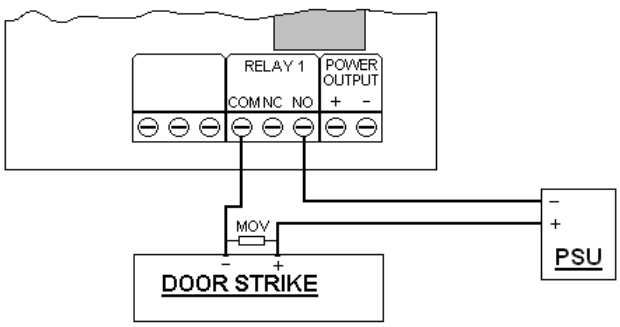


Figure 9 - Typical Wiring to a Door Strike

Magnetic Locks

Magnetic Locks use an electro-magnet to stay closed. When a metal bar on the back of a door makes contact with the magnetic lock, a current in the lock is activated. The current induces a magnetic field in the electro-magnet, which holds the door closed.

If the power to the lock fails, or is switched off, the door is released and can be easily opened. This feature is an advantage in an emergency.

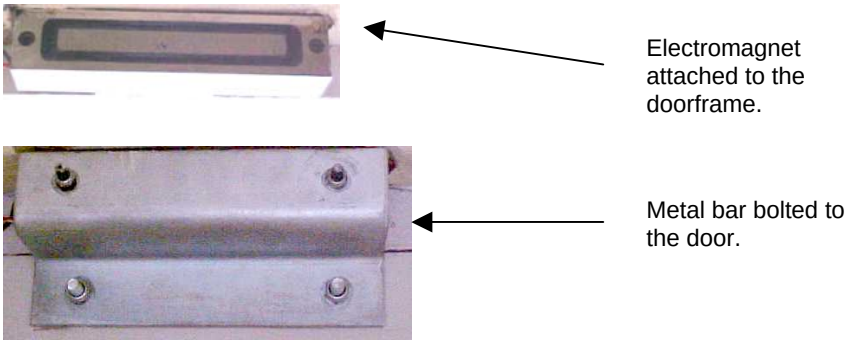


Figure 10 - Magnetic Lock Mounted in the top of a Door Frame

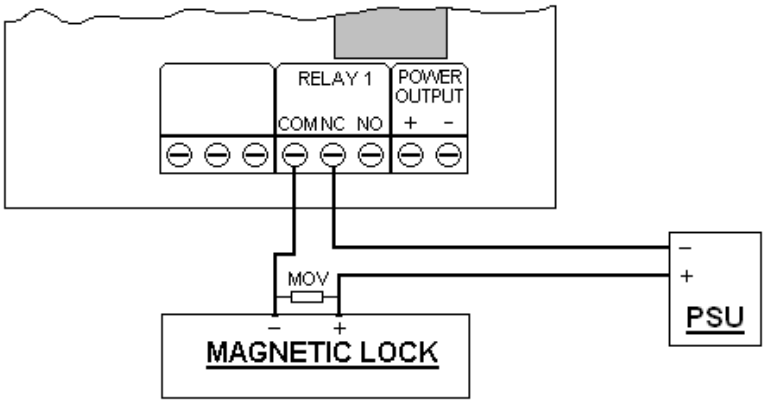


Figure 11 - Typical Wiring to a Magnetic Lock

Summary of Cable Requirements

General Requirements

Table 3 on page **31** provides a summary of cable requirements and related information for ImproX units. The following notes refer to the content of **Table 3**.

Notes

Note 1

Do not attempt to extend the USB cable supplied with the ImproX RH. Rather, obtain a new 5 m cable.

Note 2

We recommend that you run a 2-pair or 3-pair cable with at least a one-pair spare. Although only a single-pair cable is required for Host Bus (Port 2) communication, it is advisable to run 2 or 3 pair cable and have at least one pair spare.

Note 3

We recommend cable specifications similar to the following:

- Conductor Resistance: < 2 ohms
- Capacitance, Core to Earth: > 160 pF/m
- Capacitance Core to Core: < 100 pF/m

A Standard USB cable is 1.8 m long and has one Type A and one Type B Connector.

Metric Conversion

1 m = 3.28 ft
2 m = 6.56ft
0.2 mm^2 = 0.0003 in^2

Unit	Communication Protocol	Cable Specifications	Supplied Cable	Recommend Cable	Maximum Cable Length	Shield Grounding
HI ★	RS232 form HI to PC	4 to 6 core shielded cable, individual conductor. Cross-sectional area must not be less than 0.2 mm.	6 core shielded cable with DB9 serial connector	N/A	25M from HI to PC	Not Required
RH	USB from RH to PC	Standard USB	Standard USB	N/A	5 m from RH to PC See Note 1	N/A
RS ★	USB from RS to PC	Standard USB	Standard USB	N/A	5 m from RH to PC See Note 1	N/A
ProX-Mate ★	RS232 from ProX-Mate to PC or HI	8 core cable, with RJ45 and DB9 connectors	1m (3.28 ft) flat 8 core cable with 2 RJ 45 connectors 1 m (3.28 ft) flat 8 core cable with one RJ45 connector and 1 DB9 serial connector	N/A	20 m from ProX-Mate to PC. This measure *includes* the Interface box	Not Required
RRA	N/A	6 core stranded cable	2m (6.56ft) 6 core cable	N/A	2m (6.56 ft) from RRA to RH or RS unit	N/A
AC	Port 1 - RS485 Port 2 - RS485	Twisted pair (muli-stranded) shielded, with mylar sheath. Cross-sectional area must not be less than 0.2 mm^2.(Single pair required for Port 2) See Note 2	None	West Penn D291 22 gauge stranded single pair, with overall sheild	Port 2 From HI or RH to last Controller on the bus must not exceed 1000m (1093.62 yd)	Ensure that the shield is grounded at only one end of each run between Controllers
IC	Port 1 - RS485 Port 2 - RS485	Twisted pair (muli-stranded) shielded, with mylar sheath. Cross-sectional area must not be less than 0.2 mm^2.(Single pair required for Port 2) See Note 2	None	West Penn D291 22 gauge stranded single pair, with overall sheild	Port 2 From HI or RH to last Controller on the bus must not exceed 1000m (1093.62 yd)	Ensure that the shield is grounded at only one end of each run between Controllers
ER	Port 1 - RS485	Twisted pair (muli-stranded) shielded, with mylar sheath. Cross-sectional area must not be less than 0.2 mm^2.(Single pair required for Port 1)	None	West Penn D291 22 gauge stranded single pair, with overall sheild	Port 1 From Controller to last Terminal (ER) on the bus must not exceed 1000m (1093.62 yd)	Ensure that the shield is grounded at only one end of each run between Terminals

Unit	Communication Protocol	Cable Specifications	Supplied Cable	Recommend Cable	Maximum Cable Length	Shield Grounding
TT	Port 1 - RS485	Twisted pair (muli-stranded) shielded, with mylar sheath. Cross-sectional area must not be less than 0.2 mm^2.(Single pair required for Port 1)	None	West Penn D291 22 gauge stranded single pair, with overall sheild	Port 1 From Controller to last Terminal (TT) on the bus must not exceed 1000m	Ensure that the shield is grounded at only one end of each run between Terminals
O16	Port 1 - RS485	Twisted pair (muli-stranded) shielded, with mylar sheath. Cross-sectional area must not be less than 0.2 mm^2.(Single pair required for Port 1)	None	West Penn D291 22 gauge stranded single pair, with overall sheild	Port 1 From Controller to last Terminal (O16) on the bus must not exceed 1000m	Ensure that the shield is grounded at only one end of each run between Terminals
I16	Port 1 - RS485	Twisted pair (muli-stranded) shielded, with mylar sheath. Cross-sectional area must not be less than 0.2 mm^2.(Single pair required for Port 1)	None	West Penn D291 22 gauge stranded single pair, with overall sheild	Port 1 From Controller to last Terminal (O16) on the bus must not exceed 1000m	Ensure that the shield is grounded at only one end of each run between Terminals
Anttena Readers that connect to TT: MA MHA MMA KHA KA ★	Antennas use non-standard protocols	Shielded, multi-strand, 3-pair twisted cable. Cross-sectional cable area must be at least 0.2 mm^2 See Note 3	None	West Penn D3652 22 gauge stranded twisted three pair, with overall sheild	16 m from Terminal (TT)	Not required
ER Antenna	Antennas use non-standard protocols	RG58 Multi-strand 50 ohm coaxial cable	3 m (9.84 ft) of black coaxial mutil-strand cable with 2 pin connector	N/A	5 m from ImproX ER to Antenna	Not required

Table 3 – Cable Requirements Matrix

Low Voltage Power Supply to ImproX Controllers and Terminals

PSU Output Voltage	Maximum Distance from PSU to Device	Cable Specification	Recommended Cable
12 V DC	10 m (32.81 ft)	Conductors with a minimum cross-sectional area of 0.5 mm^2	**West Penn B4232**, 18 Gauge, 4 Conductor, stranded, unshielded
24 V DC	20 m (65.62 ft)	Conductors with a minimum cross-sectional area of 0.5 mm^2	**West Penn B4232**, 18 Gauge, 4 Conductor, stranded, unshielded

Table 4 – Low Voltage Power Supply cable Requirements

Digital Input Specifications

Terminal	Recommended Cable	Input Specification
ImproX TT	Single Pair	Ensure total resistance of cable is less than 5 KOhm
ImproX I16	Single Pair	Ensure total resistance of cable is less than 5.6 KOhm

Table 5 – Digital Input Specifications

Input Voltage Requirements

This section details the input voltage requirements for ImproX Hardware. Note that all units must be powered by a power-limited, UL Listed access control or burglar alarm power supply capable of the following:

- Providing the required voltage and current
- A minimum 4-hour standby time

Comms Interfaces

ImproX RH

Input Voltage	Current Consumption (All Indicators On)
12 V DC	65 mA
24 V DC	35 mA

ImproX RS★

Input Voltage	Current Consumption (All Indicators On)
5 V DC Supplied by USB Port	200 mA

ImproX HI★

Input Voltage	Current Consumption (All Indicators On)
12 V DC	85 mA
24 V DC	25 mA

Enrollment Readers

ProX-Mate and Utility ProX-Mate★

Input Voltage	Current Consumption (All Indicators On)
5 V DC	200 mA

The ProX-Mate and the Utility ProX-Mate operate at 5 V DC. However, they require a 6 V DC power supply. This is because the power supply connects to the 5 V DC, PC-interface junction-box that connects to the ProX-Mate or ProX-Pal. Refer to the ImproX Registration Reader section for further details.

Controllers

ImproX AC

Input Voltage	Current Consumption (All Indicators On)
12 V DC	60 mA
24 V DC	35 mA

ImproX IC

Input Voltage	Current Consumption (All Indicators On)
12 V DC	245 mA
24 V DC	125 mA

Terminals

ImproX TT

Input Voltage	Current Consumption (One Antenna Reader connected, all indicators and one relay on)	Current Consumption (Two Antenna Readers connected, all indicators and two relays on)
12 V DC	95 mA	140 mA
24 V DC	45 mA	70 mA

ImproX ER

Input Voltage	Current Consumption (One Antenna Reader connected, all indicators and one relay on)	Current Consumption (Two Antenna Readers connected, all indicators and relay on)
12 V DC	520 mA	1100 mA

ImproX O16

Input Voltage	Current Consumption (All relays off)	Current Consumption (All relays on)
12 V DC	35 mA	400 mA
24 V DC	20 mA	160 mA

ImproX I16

Input Voltage	Current Consumption (All indicators off)	Current Consumption (All indicators on)
12 V DC	45 mA	80 mA
24 V DC	20 mA	30 mA

ImproNet Hardware Components

Interface Devices

ImproNet supports the following types of interface device; all connect to the Comms Server:

- **ImproX HI**★
- **ImproX RH**
- **ImproX RS**★

*The **ImproX HI** acts as an RS485 to* RS232 *converter. The **ImproX RH** acts as an RS485 to* USB *converter. Either device can connect to the Comms Server.*

*The **ImproX RS** has protocol conversion functionality. However, this functionality is not used in an ImproNet system. Therefore, the **ImproX RS** is used to interface third-party Tag Enrollment hardware.*

Card Readers

Card readers attach to **ImproX TT**, **ImproX PT**★, and **ImproX DT**★ Terminals, and provide them with proximity Tag-reading functionality.

Controllers

ImproNet supports the following two Controller types:

- **IC Controller** (IXP300)
- **AC Controller** (IXP400)

The main functional difference between the Controllers is memory size. The AC Controller has more memory that the IC Controller. Therefore, the AC Controller supports more Tag Holders and buffers more transactions. It also supports more Tag Holder Access Groups than the IC Controller. For details on differences between the Controllers, refer to **Table 7** on page **40**.

If a combination of IC and AC Controllers are used in a system, the limitations of the IC Controller apply. The only exception is the number of transactions each Controller can buffer.

Controller Operation and Functionality

Controllers perform many functions in an ImproNet System. However, the main functions are as follows:

- **Terminal Polling**—Controllers poll Terminals for Transactions. A Transaction is generated when a Tag or Card is read by a Terminal.

- **Making System Related Decisions**—when a Controller receives a Transaction, it decides whether to **allow** or **deny** access based on pre-defined information stored in its memory.

  When a transaction is processed, the Controller instructs the Terminal to execute Actions associated with the *allowed* or *denied* access **Event**. The decision to grant a Tag Holder access is made by the Controller only; the Terminal only passes Transaction data to the Controller. If Controller communication with Terminals is disrupted, Terminals are disabled until communication is re-established.

- **Offline Transaction Buffering**—if the Host PC or Engine software is offline, the Controller buffers Transactions received from its Terminals. When the Controller is back online, it is polled by the Engine and the stored transactions are downloaded to the Engine PC.

Terminals

There are two groups of Terminals in an IXP400 system; each has a different purpose. The Terminal groups are as follows:

- **Tag Reading Terminals**—provide a Tag reading function
- **Non Tag-Reading Terminals—**perform functions other than reading Tags. For example, Building Management★ and or Elevator Control★.

Tag Reading Terminals

These are access Readers for Locations (Doors) and Elevators and includes Reader Terminals, Remotes, and the following models: **ImproX DT**★, **ImproX PT**★, **ImproX TT**, **ImproX KT**★, **ImproX KHR**★, and **ImproX DL**★.

Non Tag-Reading Terminals

Used for Building Management★ and Elevator Control★, and include the **ImproX I16** and **ImproX O16**. In smaller installations, you can use an **ImproX DR**★ for Building Management★ and Elevator Control★

During the Software configuration process, you must assign Terminals to a Door, an Elevator, or a Building Management function in accordance with installation wiring.

Bus Types

In an IXP400 System, there are two data bus types:

- Host Bus
- Terminal Bus

Host Bus (Controller Port 2)

The connection from the **ImproX HI**★ or **ImproX RH** to the Controller (**ImproX IC** or **ImproX AC**) is known as the Host Bus.

*It is necessary to connect the PC communications port via an **RS232** to **RS485** converter (**ImproX HI**★ in **Figure 12**) to the ImproX AC Terminal Port 2 RS485 terminal block. Alternatively, use the ImproX RH instead of the ImproX HI—the ImproX RH functions as a USB to RS485 converter.*

RS232 has not been evaluated by UL.

Terminal Bus (Controller Port 1)

The connection from the **ImproX IC** or **AC Controller** to the other ImproX Terminals is known as the **Terminal Bus** and uses the **RS485** bus protocol.

System Hardware Combinations

IXP300

The following hardware comprises an **IXP300** system:

- 16 **ImproX IC** Controllers
- Each IC Controller supports up to 16 Locations, with a maximum of three Terminals (Fixed Address) per location. The most commonly used Terminals for door access are the **ImproX DT**★, **ImproX PT**★ and **ImproX TT**.
  - ImproX DT – 1 Fixed Address
  - ImproX PT – 2 Fixed Addresses, if a Remote is connected
  - ImproX TT – 2 Fixed Addresses
- Optional Terminals that may be used for Building Management★ functions, are the **ImproX O16**, **ImproX I16**, and **ImproX DR**★ Terminals (ImproX DR for smaller installations).
- A maximum of five O16 Terminals may be coupled for Elevator Control★ (if Elevator Control is implemented), with one ImproX Reader per Elevator.

IXP400

The following hardware comprises an **IXP400** system:

- 64 **ImproX AC** Controllers
- Each AC Controller supports up to 64 Terminals (Fixed Addresses). The most commonly used Terminals for door access are the **ImproX DT**★, **ImproX PT**★ and **ImproX TT**.
  - ImproX DT – 1 Fixed Address
  - ImproX PT – 2 Fixed Addresses, if a Remote is connected
  - ImproX TT – 2 Fixed Addresses
- Optional Terminals that may be used for Building Management★ functions are the **ImproX O16**, **ImproX I16**, and **ImproX DR** Terminals (DR for smaller installations).
- A maximum of five O16 Terminals may be coupled for Elevator Control★ (if Elevator Control is implemented), with one ImproX Reader per Elevator.

If a single Terminal (Fixed Address) only, is allocated to a Location, it is possible for the Controller to support 64 Locations.

Items marked with a ★have not been evaluated by UL.

ImproX Units that can be used in an IXP300 or IXP400 System

The following Impro units are compatible with IXP300 AND IXP400 systems:

Comms Interfaces

Unit	Description	Part Number	UL Tested
ImproX HI	Host Interface.	XHI900-0-0	No
ImproX RH	Registration Interface	XRH900-1-0	Yes
ImproX RS	Registration Interface	XRS902-1-0	No

Enrollment Readers

Unit	Description	Part Number	UL Tested
ImproX ProxMate	Tag Reader with RS232 connection.	XPM901-1-0	No
ImproX RRA	Antenna for RH and RS	XPR901-1-0	Yes
ImproX RRM	Card Enrollment Reader for RH and RS units	XRM901-4-0	No

Controllers

Unit	Description	Part Number	UL Tested
ImproX IC	Controller in the ImproNet system (IXP300). This standard controller can support up to 48 Terminals.		Yes
ImproX AC	Controller in the ImproNet system (IXP400). This advanced controller can support up to 64 Terminals	XAC904-1-0	Yes

Terminals

Unit	Description	Part Number	UL Tested
ImproX DL	LCD Keypad Terminal.	XDL900-1-0	No
ImproX DT	Door Terminal.	XDT900-0-0	No
ImproX DR	Door relay unit (4 digital inputs and 4 relay outputs).	XDR900-0-0	No
ImproX MT	Micro Terminal.	XMT900-1-0	No
ImproX KT	Keypad Terminal.	XKT900-1-0	No
ImproX MH	Harsh Environment Terminal.	XMH900-1-0	No
ImproX KH	Harsh Environment Keypad Terminal.	XKH900-1-0	No
ImproX I16	Input Terminal providing 16 digital inputs.	XIT900-0-0	Yes
ImproX O16	Output Terminal providing 16 relay outputs.	XOT900-0-0	Yes
ImproX PT	Portal Terminal.	XOT910-1-0	No
ImproX TT	Twin Antenna Terminal.	XOT910-1-0	Yes
ImproX TA	Time and Attendance Terminal	XOT902-1-0	No
ImproX ER	Extended Range Terminal with external antenna		Yes

Readers for ImproX TT

Unit	Description	Part Number	UL Tested
ImproX MMA	Mullion Antenna Reader	XTT901-1-0	Yes
ImproX MA	Micro Antenna Reader	XTT902-1-0	Yes
ImproX MHA	Metal Antenna Reader	XTT903-1-0	Yes
ImproX KMA	Mullion Keypad Antenna Reader	XTT905-1-0	No
ImproX KA	Keypad Antenna Reader	XTT907-1-0	No
ImproX KHA	Metal Keypad Antenna Reader	XTT904-1-0	Yes
ImproX RA	Rod Antenna Reader	XTT906-1-0	No
ImproX DP	Door Entry Panel Antenna Reader	XTT908-1-0	No

Readers for ImproX DT and ImproX PT

Unit	Description	Part Number	UL Tested
ImproX MR	Micro Remote Reader.		No
ImproX MHR	Micro Harsh Environment Remote	XMR901-1-0	No
ImproX KR	Keypad Remote Reader.	XKR900-1-0	No
ImproX KHR	Micro Harsh Environment Keypad Remote.	XKR901-1-0	No

Receivers

Unit	Description	Part Number	UL Tested
ImproX IR	Infra red Receiver.	ITR900-0-0	No
ImproX RF	UHF 433 MHz 4 Channel receiver.	UHR903-0-1	No

Table 6 - ImproX Units Compatible with the IXP300 or IXP400 System

Other IXP300 AND IXP400-compatible units are currently under development.

System Size Limits

This list provides details of a maximum system using either ImproX IC Controllers or ImproX AC Controllers.

Item	IC Controller (IXP300)		AC Controller (IXP400)	
Total Number of Tags	**8000**		**160000**	See Note 1
Total Number of Transactions Buffered per Controller	**9000**	See Note 2	**Up to 500000**	See Note 3
Sites per System	**256**		**256**	
Hosts per Site	**1**		**1**	
Controllers per System	**16**		**64**	
Terminals (Fixed Addresses) per Controller	**48**	See Note 4	**64**	See Note 4
Terminals (Fixed Addresses) per Location	**3**	See Note 4	**3**	See Note 4
Locations per Zone	**16**		**64**	
Zones per Controller	**16**		**64**	
Locations per Controller	**16**		**64**	See Note 5
Tag Holder Access Groups	**256**		**1024**	
Operating Voltage	**12 or 24 V DC**		**12 or 24 V DC**	
Controller Communications Baud Rate	**38400**		**38400**	
Terminal Communications Baud Rate	**38400**		**38400**	
Digital Inputs (not used for access control)	**4**		**None**	
Onboard Relays	**2**		**None**	
Elevator Control ★	**6**	See Note 6	**6**	See Note 6

Table 7 - System Configuration Parameters

*If a Site use a combination of **IC** and **AC** Controllers, it is limited by the IC Controller's parameters. Only the number of transaction types that each Controller can buffer is independent.*

Note 1

160000 Tags require all memory modules in the Controller to be populated.

Note 2

Up to 9000 in Controller Transaction Buffer at one time

Note 3

This amount is relative to the number of Tags in the ImproNet Database, and the number of memory modules in the Controller

Note 4

Terminals with two Fixed Addresses, such as the ImproX TT, are treated as two separate Terminals.

Note 5

In APB mode, two Terminals per Location are required. Therefore, if all locations are in APB mode, the limit is 32 Locations per AC Controller—assuming all Terminals have a single Fixed Address.

Note 6

We recommend a maximum of 6 Elevators. This enables one Access Group per Tag for normal Access control requirements. A maximum of 80 floors per Elevator is supported.

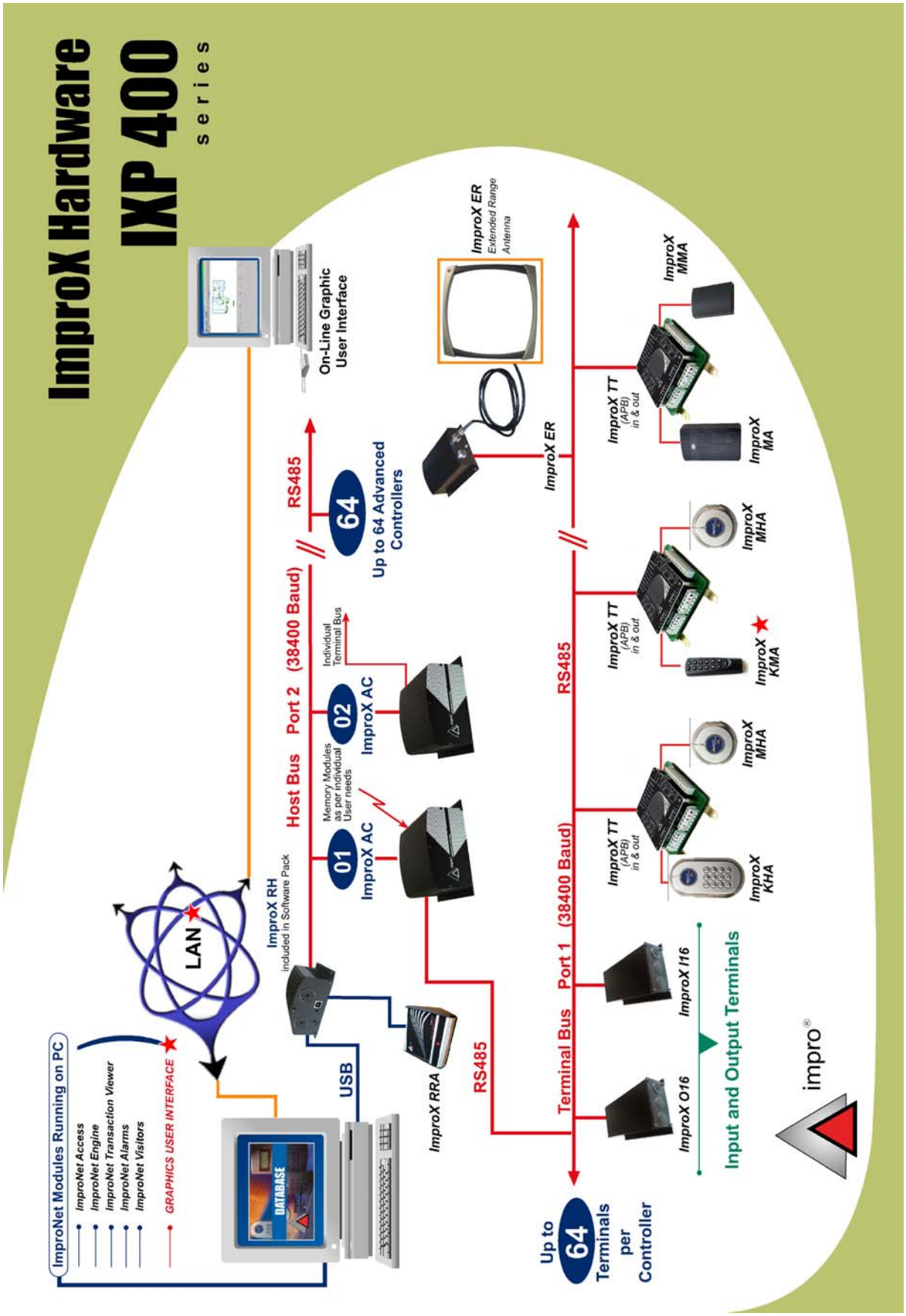


Figure 12 - ImproX Hardware for IXP400

Installation Information

Doors and Zones

Each Location supports up to three ImproX Terminals (Fixed Addresses).

The ImproX AC Controller supports a maximum of 64 Terminals (Fixed Addresses). However, if each Location uses three Terminals, the ImproX AC Controller can only support 21 Locations.

Anti-Passback (APB) mode requires two Readers. Each Location can have its own Zone, or a number of Locations can be grouped together to form an APB Zone. APB Zones are set-up during configuration of an IXP300 or IXP400 system.

Addressing Scheme

Each ImproX Controller and Terminal has two types of addresses: A **Logical Address** and a **Fixed Address**. The following process is performed when the **AutoID** function in the ImproNet Engine Software is run:

1. The Engine polls all Controllers
2. The Controllers poll their Terminals to request unique Fixed Addresses
3. The ImproNet Software assigns a unique Logical Address to each detected Controller and Terminal

*Each ImproX TT and ImproX PT has **two fixed addresses**. Therefore, ImproNet operates each unit as two separate Terminals*

Logical Addresses

A Logical Address is a unique, hexadecimal address assigned by ImproNet Engine to each Controller and Terminal in a system. Logical Addresses are used to identify hardware units and are stored in the units non-volatile memory.

The process of assigning logical addresses to all units is only required on the initial system start-up.

Hardware cannot be configured until it is physically connected to the PC via the serial port, or to the USB port if an ImproX RH is used. Data cannot be entered until the hardware units have been identified and assigned addresses.

Fixed Addresses

A Fixed Address is a unique address allocated to each ImproX unit during manufacture. All ImproX Terminals are programmed with an eight-digit unique address.

Recording Installation Information

This following procedure is required by ImproNet Software Operators when they configure the system.

When you install ImproX Terminals, you **must** record the following information on the **Unit Location Chart**:

- The unit's **Fixed Address**
- The unit's direction—**Entry** or **Exit**
- The unit **type**
- An accurate **description** of the unit's location

*Record the Fixed Address **before** attaching a unit to its mounting surface.*

*The **Unit Location Chart** is a document included with all **IC** and **AC** Controllers.*

*A sticky **label** displaying the unit's Fixed Address is included with every unit—stick this label onto the **Unit Location Chart***

Positioning Units

The Unit Location Chart must correspond with the cable layout diagram specified for the Site. This will enable you to trace units and find faults.

*Arc Suppression Circuitry must be fitted on all doors where there are Strike Locks or Magnetic Locks. Guidelines are provided in the Hardware Installation Manuals. **24 V Metal Oxide Varistors** can be used.*

All units must be attached to the wall as stated in their Installation Manuals. All covers must be attached and in-place at all times.

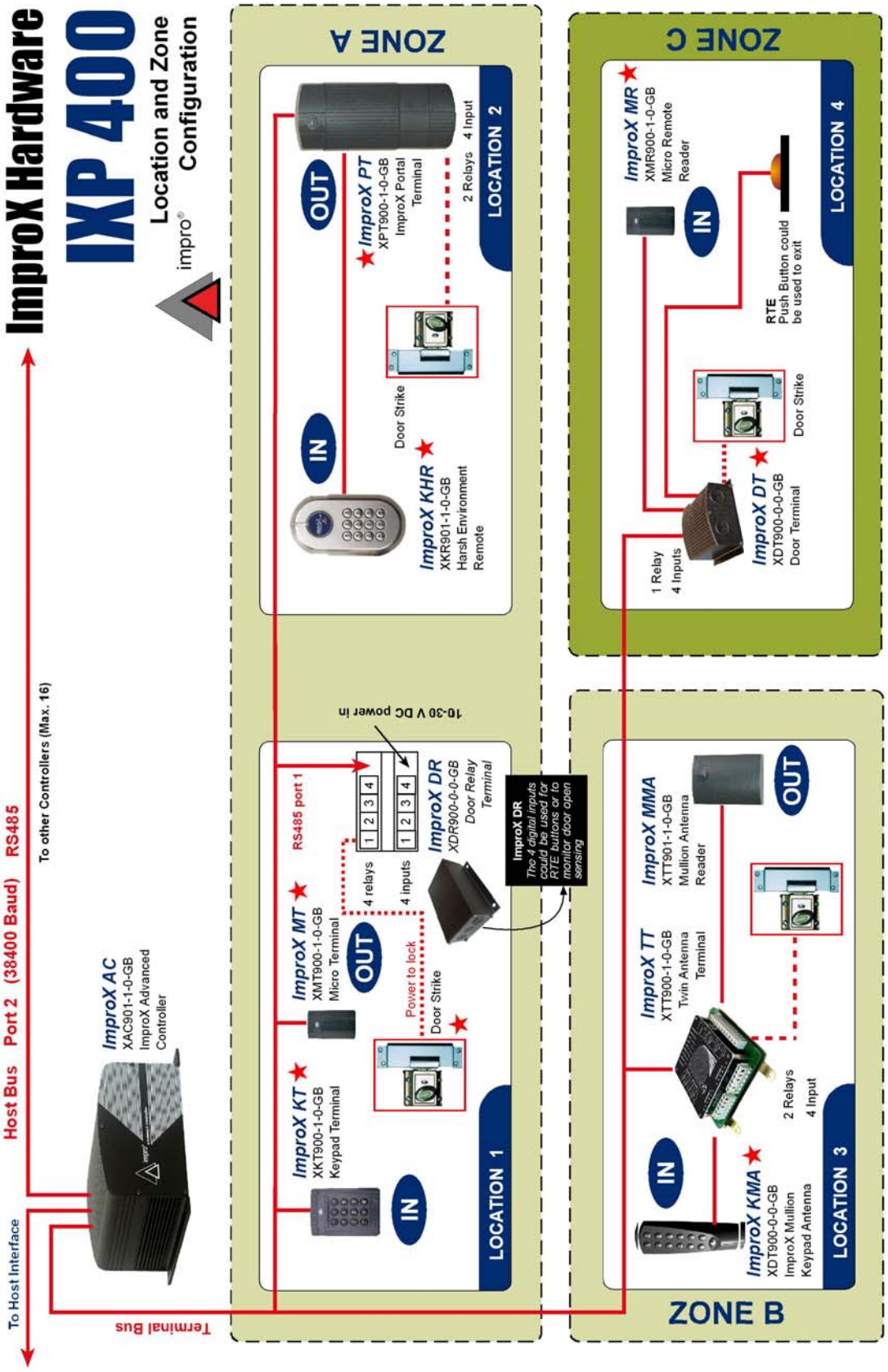


Figure 13 - Location and Zone Configuration Diagram

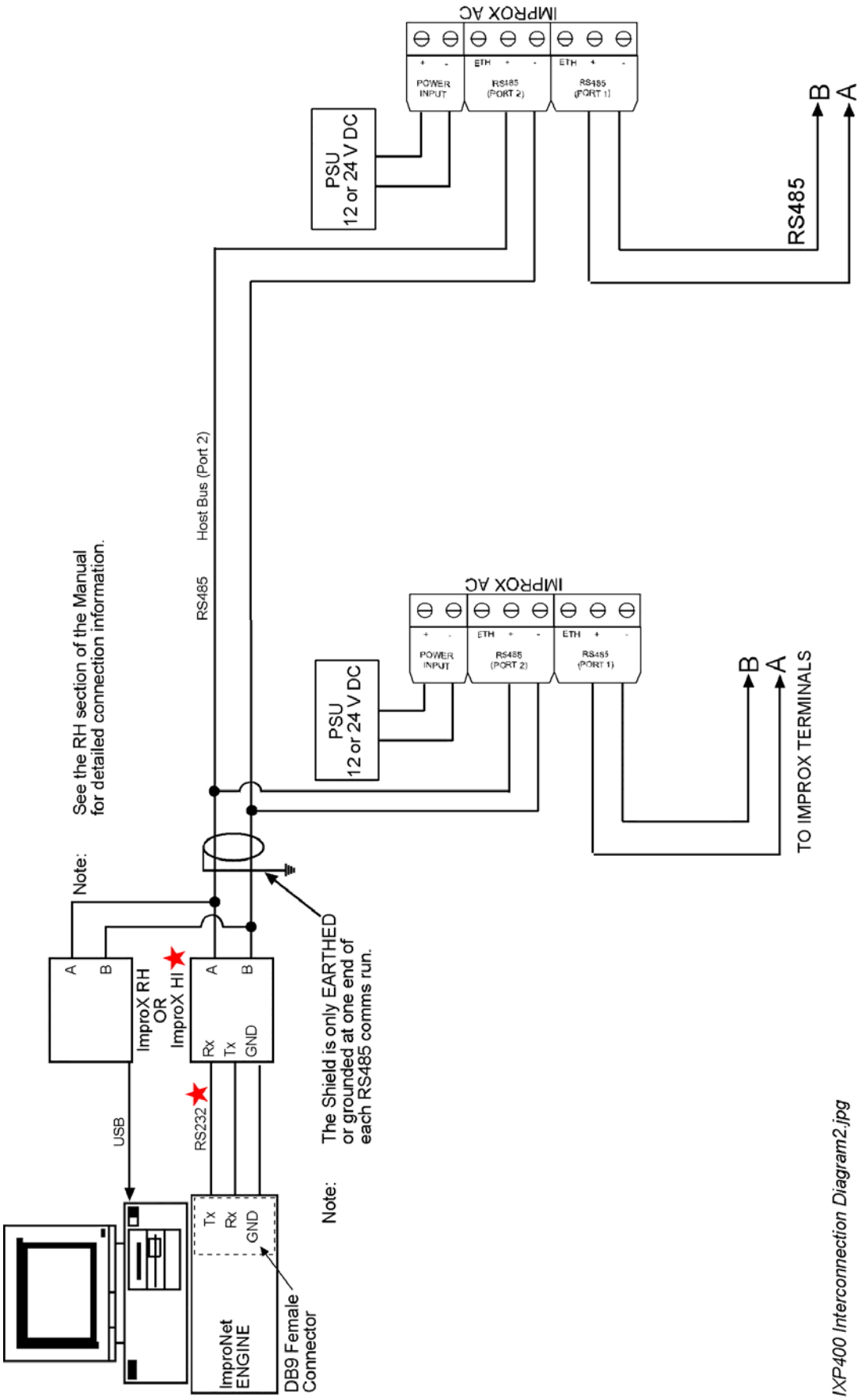


Figure 14 - IXP400 Inter-Connection Diagram 1

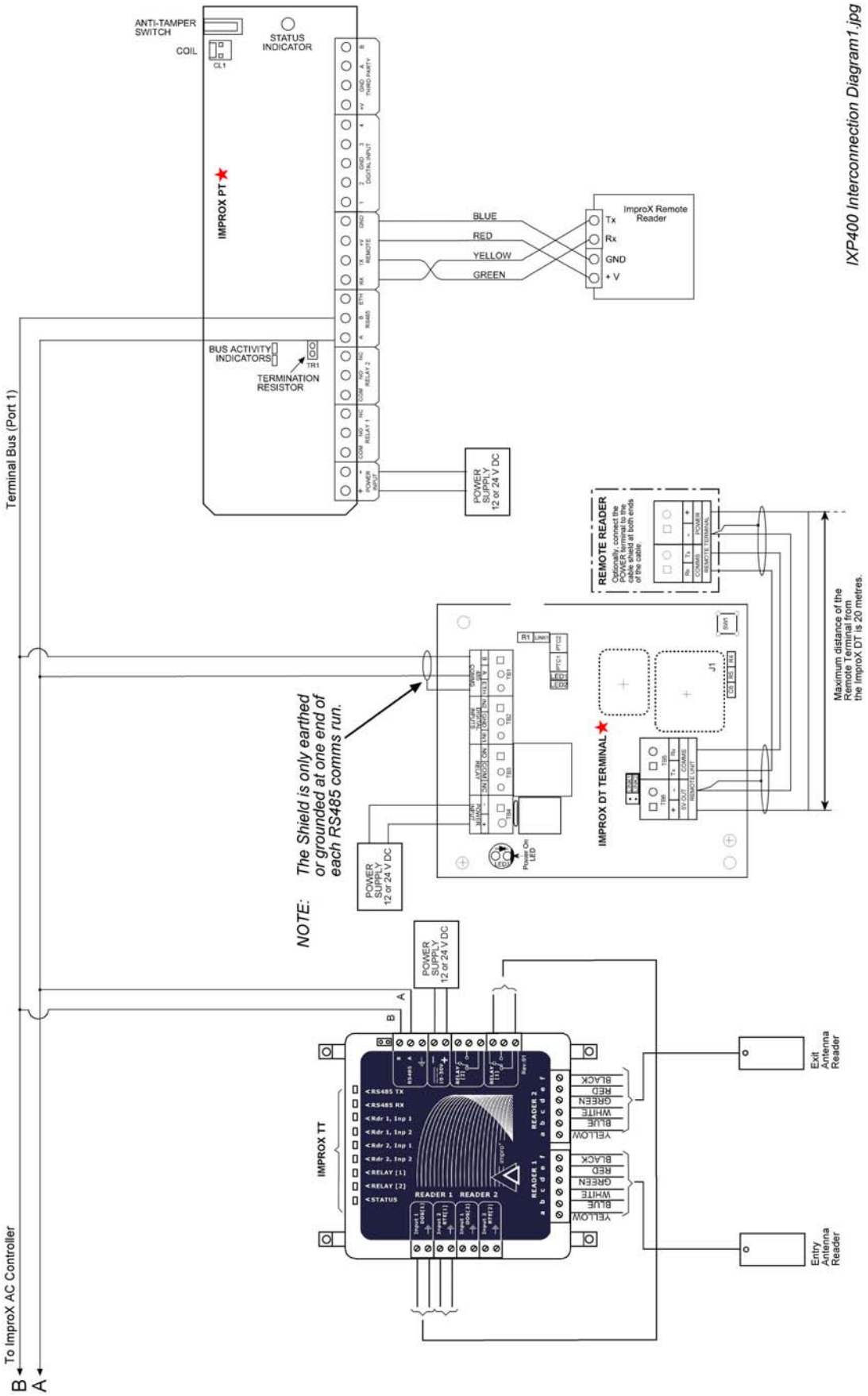


Figure 15 - IXP400 Inter-Connection Diagram 2

ImproX Unit Categories

ImproX hardware comprises the following categories:

Comms Interfaces

- ImproX HI★
- ImproX RH
- ImproX RS★

*The **ImproX RS** has protocol conversion functionality. However, this functionality is not used in an ImproNet system. Therefore, the **ImproX RS** is used to interface third-party Tag Enrollment hardware.*

Enrollment Readers

- ImproX ProX-Mate★
- ImproX RRA

Controllers

- ImproX IC
- ImproX AC

Terminals

- ImproX TT
- ImproX ER
- ImproX O16
- ImproX I16

System Card Readers

- ImproX MA
- ImproX KA
- ImproX KMA★
- ImproX MHA
- ImproX MMA
- ImproX ER Antenna

*The manual includes information on **selected** ImproX units only. For a complete list of ImproX hardware, refer to the **Impro Specification Catalogue**.*

ImproX HI Host Interface

The ImproX HI has not been evaluated by UL.

The ImproX HI forms part of the ImproX range of access control equipment and is primarily intended for use in Impro Technologies IXP300 and IXP400 Series access control systems.

When used in an IXP system, the unit is intended to provide an interface between the Host PC and ImproX IC or AC Controller/s when these are further than 25 m apart, and to provide for communications between ImproX IC or AC Controllers in the system.

RS232 communications with the PC are in 3-wire format without flow control, while communications with Controllers are in RS485 format.

The unit can also be used to communicate with a peripheral such as a printer. Data can be transferred between this peripheral and either the RS232 bus or the RS485 bus.

RS232 communications with the peripheral are in 5-wire format including flow control.

Applications

The following are possible uses of the unit:

- Conversion between RS232 to RS485 data formats
- Control of a 5-wire RS232 peripheral device, such as a printer

Features

The unit provides the following features:

- An RS232 bus port for communication with a PC
- An RS232 bus port with flow control for communications with compatible peripherals
- An RS485 host bus port for communication with ImproX Controllers
- Inter-Controller Communications
- LEDs indicate transmit and receive line activity for diagnostics
- Operation from power inputs in the range 12 V or 24 V DC

Accessories

The ImproX HI Terminal is supplied with the following accessories:

- Wall mounting plugs and screws

- RS232 interface cable with connectors
- Self-adhesive label for address configuration

Specifications

Physical

Dimensions	L = 108 mm (4.25") W = 115 mm (4.52") H = 50 mm (1.96")
Weight	275g. (9.68oz)
Housing Material	Aluminium
Colour	Black

Environmental

Temperature	
Operating	-15°C to +70°C (- 13°F to +176°F)
Storage	-40° C to +80° C (-40° F to +176° F)
Humidity Range	0 to 95% relative humidity at +40 ° C (+104° F) non-condensing
EMC	EN 55024
Electrostatic Discharge	EN6 1000-4-2
Electrical Fast Transients	EN6 1000-4-4
Surge Immunity	EN6 1000-4-5
Radiated Susceptibility	EN6 1000-4-3
Conducted Susceptibility	EN6 1000-4-6
Dust And Splash Resistance	Indoor Unit
Drop Endurance	2m drop (in packaging)

Electrical

Power Requirements	
Voltage	12 V or 24 V DC
Current	120 mA
Permissible Input Supply Ripple Voltage (Maxi-Mum)	1 V_{PP} at 50 Hz
Power Input Protection	Reverse polarity, Over-voltage, Over-current
Anti-Tamper Protection	Internal switch
Memory	
Ram	128 Kbytes
Flash Rom	128 Kbytes
Firmware Upgrade Facility	Via the PC Bus Port (Port 1)
Rs485 Host Bus Port (Port 2)	
Electrical Interface	RS485, ASCII with 16-bit CRC checking
Baud Rates	1200, 2400, 4800, 9600, 19200, 28800, 38400, 57600 and 76800 selectable via the communications

	protocol
Data Format	8 data bits, no parity, 1 stop bit
Communications Protocol	ImproX Secure Communications Protocol
RS232 PC Bus Port (Port 1)	
Electrical Interface	RS232, Full Duplex, No flow control, ASCII with 16-bit CRC checking
Baud Rates	1200, 4800, 9600, 19200, 28800, 38400, 57600 and 76800 selectable via the communications protocol
Data Format	8 data bits, no parity, 1 stop bit
Communications Protocol	ImproX Secure Communications Protocol
RS232 Peripheral Bus Port (Port 3)	This port, as well as being connected to the terminal block labelled port 3, is also connected to the D-type connector on the unit front panel for external use
Electrical interface	RS232, Full Duplex, CTS and RTS available, ASCII with 16-bit CRC checking
Baud rates	1200, 4800, 9600, 19200, 28800, 38400, 57600 and 76800 selectable via the communications protocol
Data format	8 data bits, no parity, 1 stop bit
Communications protocol	ImproX Secure Communications Protocol

Operator Interfaces

Status Indicators	
red LED	Power On Indicator. (Externally visible).
green LED	Incoming RS485 data. (Internally visible).
red LED	Outgoing RS485 data. (Internally visible).
green LED	Incoming RS232 data. (Internally visible).
red LED	Outgoing RS232 data. (Internally visible).

Factory Default Settings

RS485 port Default baud rate	38400
RS232 port Default baud rate	38400

International Standards

The ImproX HI unit complies with the requirements of the following international standards where applicable:

EIA RS-485	Standard for Electrical Characteristics of Generators and Receivers for use in Balanced Digital Multi-point Systems
EN 55024	Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment
EN6 1000-4-1	Electromagnetic Compatibility (EMC) Part 4: Testing and Measurement Techniques Section 1: Overview of Immunity Tests. Basic EMC Publication

EN6 1000-4-2	Electromagnetic Compatibility (EMC) Part 4: Testing and Measurement Techniques Section 2: Electrostatic Discharge Immunity Test. Basic EMC Publication
EN6 1000-4-4	Electromagnetic Compatibility (EMC) Part 4: Testing and Measurement Techniques Section 4: Electrical Fast Transients / Bursts. Basic EMC Publication
EN6 1000-4-3	Electromagnetic Compatibility (EMC) Part 4: Testing and Measurement Techniques Section 3: Radiated, Radio-Frequency, Electro-magnetic Field Immunity Test
EN6 1000-4-6	Conducted Susceptibility
EN6 1000-4-5	Surge Immunity
EN6 1000-4-11	Voltage Dips and Interruptions

Approvals

- CE Approved

Tamper-Proofing

- Internal Switch

Installation Information

Requirements

- A suitable electric drill and suitable drill bits
- A suitable Flat-head screwdriver
- A suitable Phillips-head screwdriver
- Double-sided adhesive tape, if required
- Side-cutters

Positioning

The HI unit can be mounted on virtually any surface. It is recommended that the surface be flat and at least 120 mm (4.72”) x 120 mm (4.72”) in size.

Cabling

The locations of the cable glands and the single 9-way D-type connector are shown in **Figure 16**.

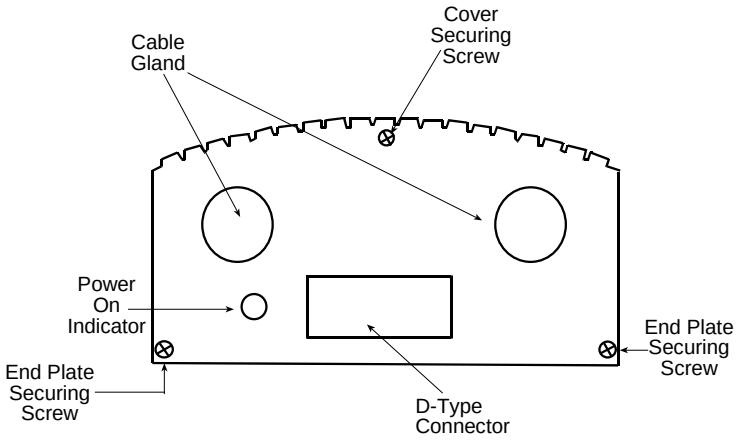


Figure 16 – ImproX HI Connector End Plate

Power

Power must be connected to the unit only at the terminal block labelled POWER INPUT. This input is polarity sensitive and must be connected as indicated by the + and – symbols. Correct connection of the power will illuminate the **Power On** indicator.

Maximum Data Communications Distance

- **RS485—**The distance between the HI and other ImproX units can be increased to a maximum of 1 kilometre using a good quality shielded, twisted-pair cable. The cable individual conductor cross-sectional area should not be less than 0.2 mm^2. The shield of the cable should be connected to the Port 2 terminal block labelled ETH. This point in turn should then be connected to a good Earth point.

- **RS232**—The maximum distance between the ImproX HI and a PC or peripheral is 25 m using a good quality shielded, 4 or 6-core cable. The individual conductor cross-sectional area should not be less than 0.2 mm^2. The shield of the cable should be connected to the Port 2 terminal block labelled ETH.

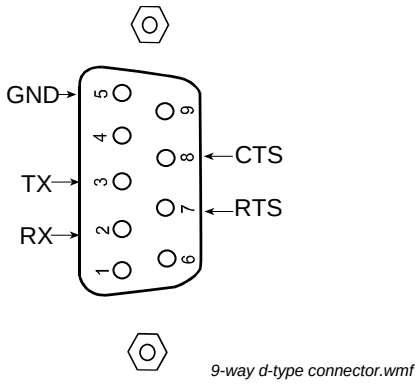


Figure 17 – 9-way D-type connector

Connector Pin-outs

The 9-way D-type connector pin-outs are shown in **Figure 17**. This view is from the solder side of the PCB.

Enclosure

General

The ImproX HI is housed in an aluminium extrusion consisting of four parts, namely a base, two end plates and the cover. The mounting holes are located in the flanges of the base so it is not necessary to remove the cover for mounting purposes.

Cable Exit Points

The cables are inserted through the grommets situated on either side of the D-type connector.

Mounting on a Concrete or Brick Wall

1. Use the ImproX HI as a template and mark off the required holes
2. Drill the four mounting holes using a 5 mm diameter masonry drill bit, to the depth of the length of the wall plug
3. Insert wall plugs into the mounting holes
4. Secure the ImproX HI to the surface using the four mounting screws and wall plugs provided

Mounting on a Hard Wood Surface

1. Use the ImproX HI as a template and mark off the required holes
2. Drill the four mounting holes using a 2,5 mm diameter drill bit to the depth of three-quarters of the length of the mounting screws
3. Secure the ImproX HI to the surface using the four mounting screws provided

Mounting on Metal

The unit may be mounted on metal using four suitable securing devices, such as self-tapping screws, nuts and bolts, or rivets.

1. Use the ImproX HI as a template and mark off the required holes
2. Drill the four mounting holes using a suitable diameter drill bit
3. Secure the ImproX to the surface using the chosen method

Mounting on Glass or Tiles

1. Using a double-sided adhesive tape cut strips and adhere them to the flanges on the bottom of the case
2. Secure the ImproX HI by positioning the unit on the surface and applying pressure

Electrical Connections

Remove the cover by removing the screws that secure the cover to each end plate. Refer to **Figure 16**. Insert the cables through the relevant grommet and connect to the ImproX HI terminal blocks as shown in or **Figure 18**.

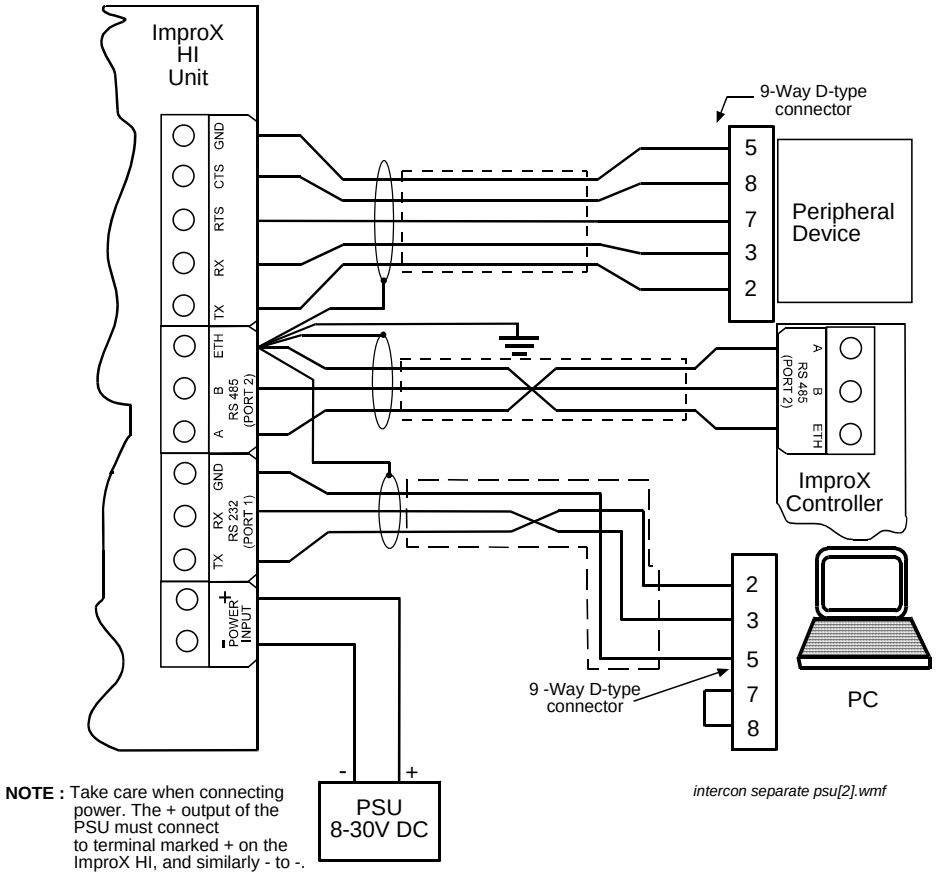


Figure 18 – Terminal cable connections (separate PSU).

Operational Information

Address Allocation

Each ImproX HI unit is allocated a unique fixed Address at the factory. As only one ImproX HI is required per system, the logical address of every unit is set to **127** (**hex 7F**) at the factory.

Remote Firmware Downloading

The Unit provides a remote firmware upgrade facility via the PC Bus Port (PORT1). The firmware upgrade occurs transparently via the communications protocol and the user is not required to enter any special modes of operation.

ImproX RH Registration Interface

The ImproX (RH) Registration Interface forms part of the IXP300 and IXP400 Access Control System, supporting a USB interface.

The Registration Interface performs the following functions:

- Acts as an authentication device for ImproNet Engine.
- Registration of 125 kHz Tags into our IXP300 and IXP400 Software.
- Converts USB to RS485.
-

The Registration Interface includes a single tone Buzzer. You can adjust the Buzzer volume to any one of these four levels (off, low, medium and high). The Registration Interface also includes a single bi-coloured Red or Green Status LED. You can set the functions of the Buzzer and Status LED to suit the needs of your application.

Although the ImproX RH is housed in a Black, Aluminium extruded Cabinet it is still intended for installation in an indoor (dry) environment.

Tag Read/Write Ranges

Typical ranges for the ImproX (RRA) Registration Reader Antenna, placed on a non-metallic surface are shown in **Table 8**.

Tag Type	**Typical Range (Minimum)**	
	(mm)	**(in)**
ISO Credit Card (Slim), 64-bit, Manchester encoded protocol, ASK	20-30	0.80-1.20
Credit Card (Semi Slim), 64-bit, Manchester encoded protocol, ASK	20-30	0.80-1.20
ImproX Credit Card, 64-bit, Manchester encoded protocol, ASK	20-30	0.80-1.20
Key Ring Tag, 64-bit, Manchester encoded protocol, ASK	20-30	0.80-1.20

Table 8: Typical Read/Write Ranges

Typical ranges for the ImproX (RRM) Registration Reader MiFare (not UL evaluated), placed on a non-metallic surface are shown in **Table 9**.

Tag Type	**Typical Range (Minimum)**	
	(mm)	**(in)**
MiFare Credit Card Tag (not UL evaluated)	25-50	1-2

Table 9: Typical Read/Write Ranges

Approvals

- CE
- UL294
- FCC Approval Pending

Specifications

Physical

Dimensions	
Length	84 mm (3.31 in).
Width	116 mm (4.57 in).
Height	54 mm (2.13 in).
Approximate Weight	242 g (0.53 lb) (Excluding the USB Cable).
Cabinet Material	Aluminium.
Colour	Black.

Environmental

Temperature	
Operating	0^{o}C to +49^{o}C (-13^{o}F to +140^{o}F)
Storage	-40^{o}C to +80^{o}C (-40^{o}F to +176^{o}F)
Humidity Range	85% ± 5^{o}C relative humidity at +30^{o}C ± 2^{o}C (86^{o}F ± 3 ^{o}F)
Approvals (Test Information)	
UL Rating	UL 294.
EMC	EN 55022: Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment. EN 55024: Immunity Characteristics, Limits and Methods of Measurement.
Electrostatic Discharge	IEC 61000-4-2: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 2: Electrostatic Discharge Immunity Test. Basic EMC Publication.
Radiated Susceptibility	IEC 61000-4-3: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 3: Radiated, Radio-Frequency, Electromagnetic Field Immunity Test.
Electrical Fast Transients	IEC 61000-4-4: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 4: Electrical Fast Transients /

	Bursts. Basic EMC Publication.
Surge Immunity	IEC 61000-4-5: Surge Immunity.
Conducted Susceptibility	IEC 61000-4-6: Conducted Susceptibility.
Power Frequency Magnetic Field	IEC 61000-4-8: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 8: Frequency Magnetic Field Immunity Test.
Dust and Splash Resistance	The ImproX RH is designed to work in an indoor (dry) environment similar to IP20. The ImproX RH is, therefore, NOT sealed against water.
Drop Endurance	2 m (6.56 ft) drop (in packaging).

Electrical

Power Requirements		
Input Voltage	12 V DC and 24 V DC, polarity sensitive.	
Power Requirements	**Current (mA)**	**Power (W)**
Input Voltage 12 V DC All Indicators ON	65	0.78
Input Voltage 24 V DC All Indicators ON	35	0.84
Permissible Input Supply Ripple Voltage (Max)	0.2 V_{PP} at 50 Hz.	
Third-party Port (Not UL Evaluated)	5 V DC ± 0.1 V is supplied to power the single Reader connected to this Port. A maximum of 100 mA can be supplied from this Port.	

Factory Default Settings

Default Baud Rate	Factory-set to 38 400.

Operator or Installer Interfaces

Buzzer	Four volume, single tone (Software dependent).
Status Indicators	
Registration Interface	
Power Indicator	
Power LED	Blue (steady) (externally visible).
Diagnostic Indicators	
USB Tx LED	Red (flashing) (internally visible).
USB Rx LED	Green (flashing) (internally visible).
RS485 Tx LED	Red (flashing) (internally visible).
RS485 Rx LED	Green (flashing) (internally visible).
ImproX RRA or RRM (not UL evaluated)	
Status Indicator	
Status LED	Bi-colour, Red or Green LED.

Installation Information

Accessories

Find the following when unpacking the Registration Interface:

- An ImproX (RH) Registration Interface is housed in a Black, Aluminium extruded Cabinet. The Cabinet consists of a Top Cover, a Base and two End Plates (each End Plate is attached with three Thread Cutter Screws (M3 x 8 mm)).
- Four Brass Wood Screws (3.5 mm x 25 mm).
- Four Wall Plugs (7 mm).
- A 1.8 m (5.90 ft) standard USB Cable with a Type A to Type B Connector.
- An extra Fixed Address Label.

General

Remember the following when installing the Registration Interface:

- **Communications Distance**
  - The USB communications distance between the Host PC and the Registration Interface MUST NOT exceed 5 m (16.40 ft).
  - DO NOT cut and join the supplied USB Cable. If extension of the USB Cable is required, source a new longer length USB Cable.
- **Distance between the ImproX RH and the Registration Readers** – The maximum cable distance between the ImproX Registration Interface and the ImproX RRM (not UL evaluated) or ImproX RRA, MUST NOT exceed 2 m (6.56 ft).

- **Distance between Registration Readers from Different ImproX RHs** – To avoid mutual interference install the ImproX RRAs or ImproX RRMs (not UL evaluated) no closer than 500 mm (20 in) apart.

Mounting the Cabinet

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

Mounting on a Concrete or Brick Wall

1. Use the Base as a template and mark off the required holes.
2. Drill the four mounting holes using a 7 mm diameter masonry drill bit, to a depth equal to the length of the supplied wall plugs.
3. Insert the wall plugs into the mounting holes.
4. Secure the Base to the surface using the four mounting screws provided.

Mounting on a Hard Wood Surface

1. Use the Base as a template and mark off the required holes.
2. Drill the four mounting holes using a 2.5 mm diameter drill bit to the depth equal to three-quarters of the length of the mounting screws.
3. Secure the Base to the surface using the four mounting screws provided.

Mounting on Metal

Use four suitable securing devices such as screws, nuts and bolts, or rivets to mount the ImproX TT on a metal surface.

1. Use the Base as a template and mark off the required holes.
2. Drill the four mounting holes using a suitable diameter drill bit.
3. Secure the Base to the surface using the chosen method.

DIP-switch Settings

The format selection for each type of device that can be connected to the Third-party Port is made by setting the internal DIP-switches as indicated in **Table 10**.

*Terminals 'A' and 'B' in **Table 10** are on the Third-party Port Terminal Block.*

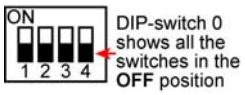
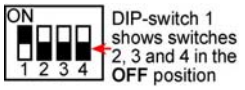
DIP-switch Position		Format	Connections
0		No peripheral Reader	N/A
1		MiFare Remote (ImproX RRM) (not UL evaluated)	Rx to terminal 'A' Tx to terminal 'B'
2		RF Receiver (not UL evaluated)	Data Line to terminal 'B'
3		Magstripe ABA Track 2 (not UL evaluated)	Data Line to terminal 'A' Clock Line to terminal 'B'
4		Barcode Code-39 with Checksum (not UL evaluated)	Data Line to terminal 'B'
5		Barcode Code-39 without Checksum (not UL evaluated)	Data Line to terminal 'B'
6		Wiegand 26/37/40 and 44 (not UL evaluated)	0 Data Line to terminal 'B' 1 Data Line to terminal 'A'
7		Wiegand Open Format (not UL evaluated)	0 Data Line to terminal 'B' 1 Data Line to terminal 'A'

Table 10: DIP-switch Settings

Once the DIP-switch setting is modified reset the ImproX RH to acknowledge the new settings.

Electrical Connections

Connecting the ImproX RH

Figure 19 shows a detailed connection diagram for the ImproX RH.

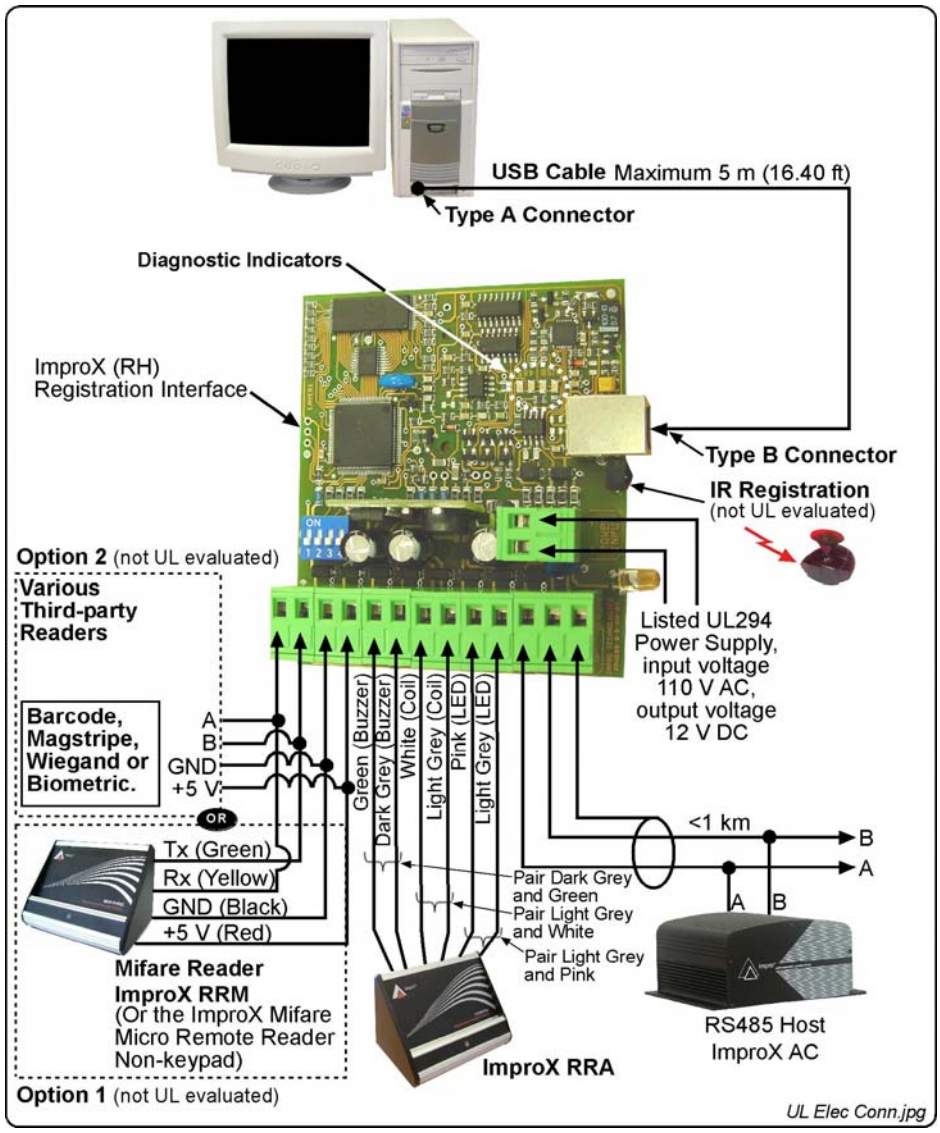


Figure 19: Typical ImproX RH Electrical Connections

Power-on Self-test

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

If any parameter in the Self-test fails, the Registration Reader (i.e. ImproX RRA or ImproX RRM (not UL evaluated)) emits a continuous beep for 2 seconds.

When the Registration Interface passes the Self-test, the Registration Reader (i.e. ImproX RRA or ImproX RRM (not UL evaluated)) emits two short beeps, each 200 ms in duration, separated by a 200 ms inter-beep pause.

Testing the Connection

When the Registration Interface is connected, check that the Power LED is illuminated Blue (steady). This will confirm that the connection is correct and working.

Fixed Address Label

Keep the Fixed Address Label in a safe place, as you may need the Label at a later date if you wish to upgrade your Software.

Operation and Functionality

The ImproX RH operates as comms interface and connects to the comms server (Engine) PC. Refer to page **179** for more information.

ImproX RS Registration Interface

The ImproX RS has not been evaluated by UL

The **ImproX (RS) Registration Interface** supports a USB interface. The Registration Interface performs the following functions:

- Registration of 125 kHz and MiFare 13.56 MHz Tags into the ImproNet Software.

Key Features

- The Antenna Port allows connection to the ImproX (RRA) Registration Antenna Reader (preferred option) or alternatively the standard range of ImproX Antenna Readers.
- Read capability using the following 125 kHz Impro Tags: Slim Tags, Omega Tags, WriTag 128 and WriTag 2048. Reads third-party Tags.
- The Third-party Port can be used to connect to one of the following: Barcode, Magstripe, Wiegand, Biometric Readers, the ImproX (RRM) MiFare Registration Remote Reader (preferred option) or the ImproX MiFare Micro Remote Reader Non-keypad.
- Reads MiFare 13.56 MHz Tags.
- The Registration Interface has a simple user interface, consisting of four Diagnostic Indicators and one Power Indicator LED.
- A four volume, single tone, Software dependent Buzzer, located on the ImproX RRA or ImproX RRM.
- A bi-colour red and green Status LED located on the ImproX RRA or ImproX RRM.
- Infrared registration—the Infrared Receiver is located in the extrusion of the ImproX RS, next to the USB plug.

Typical Read Range

Tag Type	**Typical Range (Minimum)** **(ImproX RRA placed on non-metallic surface)**	
	(mm)	**(in)**
ISO Credit Card (Slim)	25-50	1-2
ISO Credit Card (Omega)	25-50	1-2
ISO Credit Card WriTag 128	25-50	1-2
ISO Credit Card WriTag 2048	25-50	1-2
Third-party Tags (Credit Card)	25-50	1-2

Tag Type	Typical Range (Minimum) (ImproX RRM placed on a non-metallic surface)	
	(mm)	(in)
MiFare Credit Card Tag	25-50	1-2

Approvals

- CE Approved
- FCC Approval Pending

Specifications

Physical

Dimensions	
Length	84 mm (3.31 in)
Width	116 mm (4.57 in)
Height	54 mm (2.13 in)
Approximate Weight	229 g (8.09 oz) (Excluding the USB cable)
Cabinet Material	Aluminium
Colour	Black

Environmental

Temperature	
Operating	-25°C to +60°C (-13°F to +140°F)
Storage	-40°C to +80°C (-40°F to +176°F)
Humidity Range	0 to 95% relative humidity at +40°C (+104°F) non-condensing
Approvals (Test Information)	
EMC	EN 55022: Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment EN 55024: Immunity Characteristics, Limits and Methods of Measurement
Electrostatic Discharge	IEC 61000-4-2: Electromagnetic Compatibility (EMC) Part 4: Testing and Measurement Techniques Section 2: Electrostatic Discharge Immunity Test. Basic EMC Publication
Radiated Susceptibility	IEC 61000-4-3: Electromagnetic Compatibility (EMC) Part 4: Testing and Measurement Techniques Section 3: Radiated, Radio-Frequency, Electromagnetic Field Immunity Test
Electrical Fast Transients	IEC 61000-4-4: Electromagnetic Compatibility (EMC) Part 4: Testing and Measurement Techniques Section 4: Electrical Fast Transients / Bursts. Basic EMC Publication
Surge Immunity	IEC 61000-4-5: Surge Immunity
Conducted Susceptibility	IEC 61000-4-6: Conducted Susceptibility

Power Frequency Magnetic Field	IEC 61000-4-8: Electromagnetic Compatibility (EMC) Part 4: Testing and Measurement Techniques Section 8: Frequency Magnetic Field Immunity Test
Dust and Splash Resistance	The ImproX RS is designed to work in an indoor (dry) environment similar to IP20. The ImproX RS is NOT sealed against water.
Drop Endurance	2 m (6.56 ft) drop (in packaging)

Electrical

Power Requirements		
Input Voltage	5 V DC Supplied from the USB Port.	
Power Requirements	**Current (mA)**	**Power (W)**
Maximum Current Drawn from the USB Port by the ImproX RS	200	1.0
Permissible Input Supply Ripple Voltage (Max)	0.2 V_{PP} at 50 Hz.	
Third-party Port	5 V DC ± 0.1 V is supplied to power the single Reader connected to this Port. A maximum of 100 mA can be supplied from this Port.	

Factory Default Settings

Default Baud Rate	Factory-set to 38 400.
Beep Codes	
Fails Power-on Self-test	Continuous beep for 2 seconds
Passes Power-on Self-test	Two short beeps of 200 ms duration, separated by a 200 ms inter-beep pause

Operator or Installer Interfaces

Installer Interfaces	
Registration Interface	
Power Indicator	
Power LED	Blue (steady) (externally visible)
Diagnostic Indicators	
USB Tx LED	Red (flashing) (internally visible)
USB Rx LED	Green (flashing) (internally visible)
RS485 Tx LED	Red (flashing) (internally visible)
RS485 Rx LED	Green (flashing) (internally visible)
ImproX RRA or RRM	
Status Indicator	
Status LED	Bi-colour, red and green LED
Buzzer	
Volume and Tone	Four volume, single tone

Installation Information

Accessories

You will find the following when unpacking your Registration Interface:

- An ImproX (RS) Registration Interface housed in a Black, Aluminium extruded Cabinet. The ImproX RS consists of a Top Cover, a Base and two End Plates (each End Plate is attached with three Thread Cutter Screws (M3 x 8 mm)).
- Four Brass Wood Screws (3.5 mm x 25 mm)
- Four wall plugs (7 mm)
- A 1.8 m (5.90 ft) standard USB cable with a Type A to Type B Connector
- An extra Fixed Address Label

General

Remember the following when installing your Registration Interface:

- **Communications Distance**—The USB communications distance between the Host PC and the Registration Interface MUST NOT exceed 5 m (16.40 ft). DO NOT cut and join the supplied USB cable. If extension of the USB cable is required, source a new longer length USB cable.

- **Distance between the Registration Interface and the ImproX RRM or ImproX RRA**—The maximum cable distance between the ImproX Registration Interface and the ImproX RRM or ImproX RRA, MUST NOT exceed 2 m (6.56 ft).

Mounting the Cabinet

1. Select the mounting position of the ImproX RS, considering accessibility, routing of wires and visibility of the externally visible LED.
2. Secure the Cabinet to the mounting surface, using four suitable screws and wall plugs (supplied), nuts and bolts, or rivets.

DIP-switch Settings

The format selection for each type of device that can be connected to the Third-party Port is made by setting the internal DIP-switches as indicated in **Table 11**.

*Terminals 'A' and 'B' in **Table 11** are on the Third-party Port Terminal Block.*

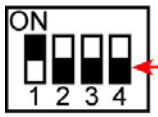
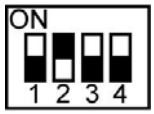
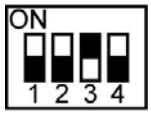
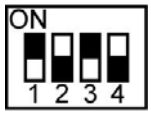
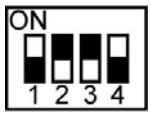
DIP-switch Position		Format	Connections
0	 DIP-switch 0 shows all the switches in the **OFF** position	No peripheral Reader	N/A
1	 DIP-switch 1 shows switches 2, 3 and 4 in the **OFF** position	MiFare Remote (ImproX RRM)	Rx to terminal ‘A’ Tx to terminal ‘B’
2		RF Receiver	Data Line to terminal ‘B’
3		Magstripe ABA Track 2	Data Line to terminal ‘A’ Clock Line to terminal ‘B’
4		Barcode Code-39 with Checksum	Data Line to terminal ‘B’
5		Barcode Code-39 without Checksum	Data Line to terminal ‘B’
6		Wiegand 26/37/40 and 44	0 Data Line to terminal ‘B’ 1 Data Line to terminal ‘A’
7		Wiegand Open Format	0 Data Line to terminal ‘B’ 1 Data Line to terminal ‘A’

Table 11: DIP-switch Settings

Once the DIP-switch setting is modified reset the ImproX RS to acknowledge the new settings.

Electrical Connections

Connecting the Registration Interface

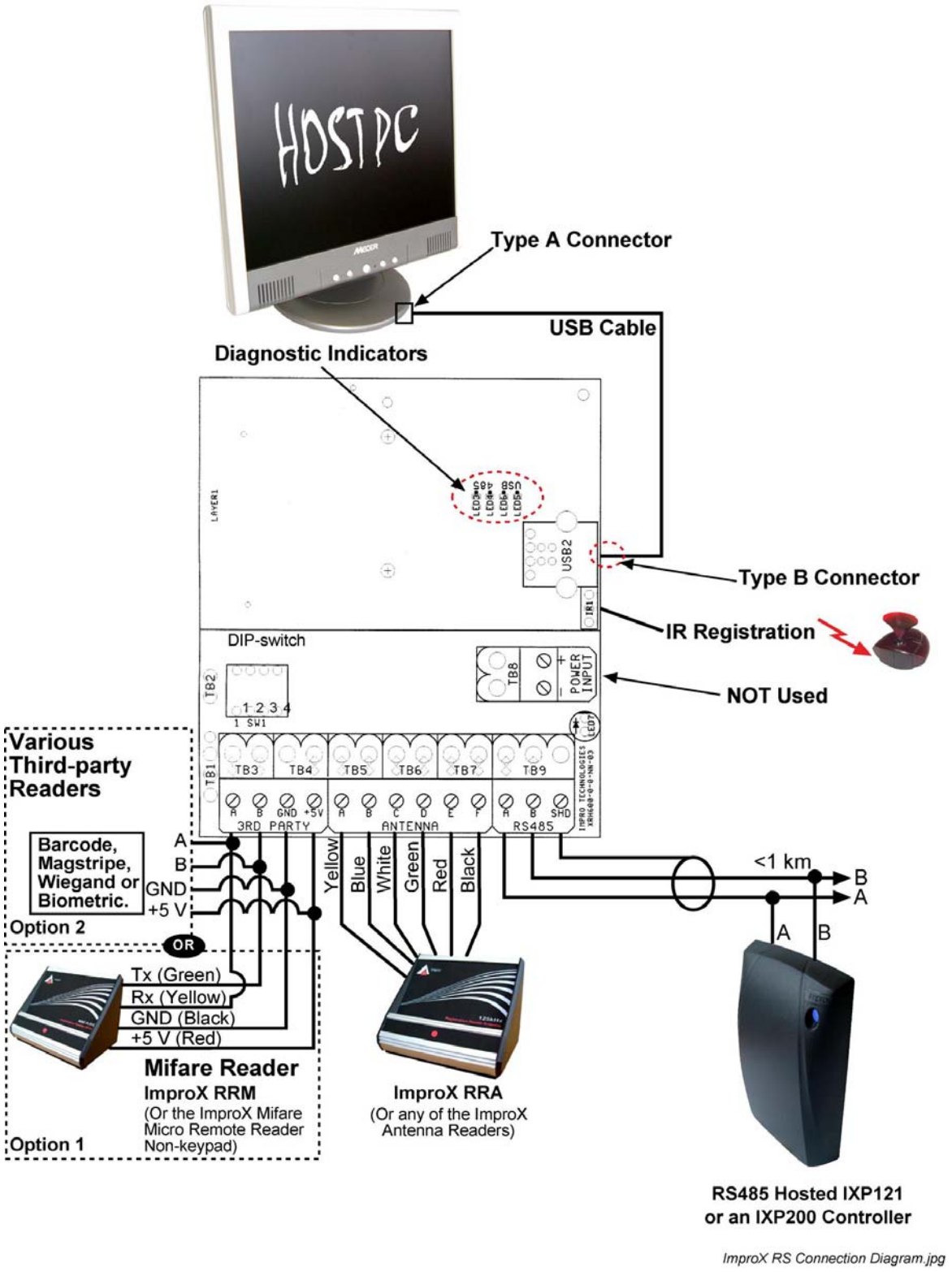


Figure 20 – Typical ImproX RS Electrical Connections

Power-on Self-test

The Power-on Self-test tests the RAM and Flash Checksums. If any parameter in the Self-test fails, the Registration Reader (i.e. ImproX RRA or ImproX RRM) emits a continuous beep for 2 seconds.

When the Registration Interface passes the Self-test, the Registration Reader (i.e. ImproX RRA or ImproX RRM) emits two short beeps, each 200 ms in duration, separated by a 200 ms inter-beep pause.

Testing the Connection

When you connect the Registration Interface to the PC for the first time, the PC will prompt you to install the necessary Drivers, once installed, the Status LED will illuminate Blue (steady). This confirms the Registration Interfaces connection is correct and working. Further connections on the same PC will not call for reloading the Drivers.

Fixed Address Label

Keep the Fixed Address Label in a safe place, as you may need the Label at a later date if you wish to upgrade your Software.

ImproX ProxMate

The ImproX ProxMate has not been evaluated by UL.

This manual provides installation information for the ImproX ProxPal, ProxMate and Utility ProxMate Registration Readers.

The different products are to be used together with:

- ProxMate—ImproNet Access Software Suite and most ImproNet utilities.
- Utility ProxMate—ImproNet utilities, excluding the Access Suite and the CCTV integration.

The Registration Readers are intended for indoor use, and can be located on a desk. An externally mounted, External PC Interface Junction Box is supplied with each of the Registration Readers.

Applications

The following are possible uses of the Registration Readers:

- Tag registration.
- Optical code registration, for Infrared Vehicle Tags.

Features

The Registration Readers provide the following features:

- Read/Write tag capability for various tag types: Slim Tags, Omega Tags, WriTag 128 and WriTag 2048 and ISO Animal Tags
- The registering of Infrared tags
- Three LEDs (one Red, one Green, and one Yellow), these are used as software status indicators
- A buzzer
- RS232 communications interface
- Operation from a **6 V DC** power supply
- The ability to upgrade internal firmware whilst installed on-site, without removal of the Registration Reader

Accessories

The Registration Readers are supplied with the following accessories:

- An External PC Interface Junction Box.
- A 1 m (3.28 ft) interconnection cable supplied with RJ45 connectors at both ends.

Specifications

Physical

Dimensions	L=116 mm (4.56 in)
	W=60 mm (2.36 in)
	H=70 mm (2.75 in)
Approximate Weight	200 g (7.05 oz)
Housing Material	Aluminium
Colour	Anodized, Natural

Environmental Specifications

Temperature	
Operating	-20°C to +70°C (-68°F to +176°F).
Storage	-40°C to +80°C (-40°F to +176°F).
Humidity Range	0 to 95% relative humidity at +40°C (+104°F) non-condensing.
Dust And Splash Resistance	The ProxPal, ProxMate and Utility ProxMate Registration Readers and External PC Interface Junction Box are manufactured in accordance with a dust and splash environment similar to that required for a rating of IP40.
Drop Endurance	2 m (6.56 ft) drop (in packaging)

Electrical Specifications

Power Requirements	Current (mA)	Power (W)
Supply Voltage = 5 V ± 0.2 V DC Indicators all off.	35	0.175
Supply Voltage = 5 V ± 0.2 V DC Indicators all on.	60	0.3
Permissible Input Supply Ripple Voltage (maximum)	1 V_{PP} at 50 Hz	
Power Input Protection	Reverse polarity protection is provided on the Registration Readers. 1 Amp slow blow fuse, 6 mm x 30 mm in-line on the External PC Interface Junction Box	
Firmware Upgrade Facility	Via the RS232 Communications Port	
Rs232 Communications Port		
Electrical Interface	RS232	
Communications Protocol	ImproX Secure Communications Protocol	
Data Format	8 data bits, no parity, 1 stop bit	

Baud Rates	1 200, 2 400, 4 800, 9 600, 19 200, 28 800, 38 400, 57 600 select-able via the RS232 Communications Protocol If used with Impro software suites, the Baud rate is set at a fixed rate of 38 400
Registration Reader Status	Slave
Test Modes	Power-On Self-test - RAM, ROM, Tag Read, EEPROM
Electrical Interface	RS485
Communications Protocol	ImproX Secure Communications Protocol
Data Format	8 data bits, no parity, 1 stop bit
Baud Rates	1 200, 2 400, 4 800, 9 600, 19 200, 28 800, 38 400 and 57 600 selectable via the RS232 Communications Protocol For communication with the ImproX Controllers, the Baud rate is set at a fixed rate of 38 400

The RS232 and RS485 ports will always have the same baud rates. They cannot be set separately

Operator Interfaces

Buzzer	Single tone, adjustable to **on** or **off** via the RS232 Communications Protocol
Status Indicators	Externally visible red, green and yellow LEDs. The function of each LED is application specific and controlled via the RS232 Communications Protocol.

Factory Default Settings

Baud Rate	38 400 **Note:** RS232 and RS485 (ProxPal only) Communications Ports
Buzzer Volume	Off
LEDs	yellow LED on

Approvals

- **CE** approved

Installation Information

General

In a normal installation, the Registration Reader would be located near the Host PC. This is achieved by connecting directly to the Host PC Serial Communications Port using the External PC Interface Junction Box.

The External PC Interface Junction Box is designed for use between a PC and ProxPal, ProxMate or Utility ProxMate Registration Reader only. No other devices must be connected.

Maximum Cabling Distance

The distance between the ImproX ProxPal, ProxMate or Utility ProxMate Registration Reader and the Host PC can be increased to a maximum of 20 m (65.62 ft) using a good quality

shielded, 2-pair twisted pair cable. The cable individual conductor cross-sectional area should not be less than 0.2 mm^2 (0.0003 in^2).

When using flat cable, a maximum reliable distance of 1.5 m (4.92 ft) is possible.

External PC Interface Junction Box Installation

The Junction Box is installed by attaching it to a convenient surface using the supplied double-sided adhesive tape. The electrical connections to the Registration Readers are shown in **Figure 21**.

Connect the PC Interface Junction Box to the following items as shown:

- A suitable **6 V DC** power supply
- A serial port on the system Host PC
- The Registration Reader

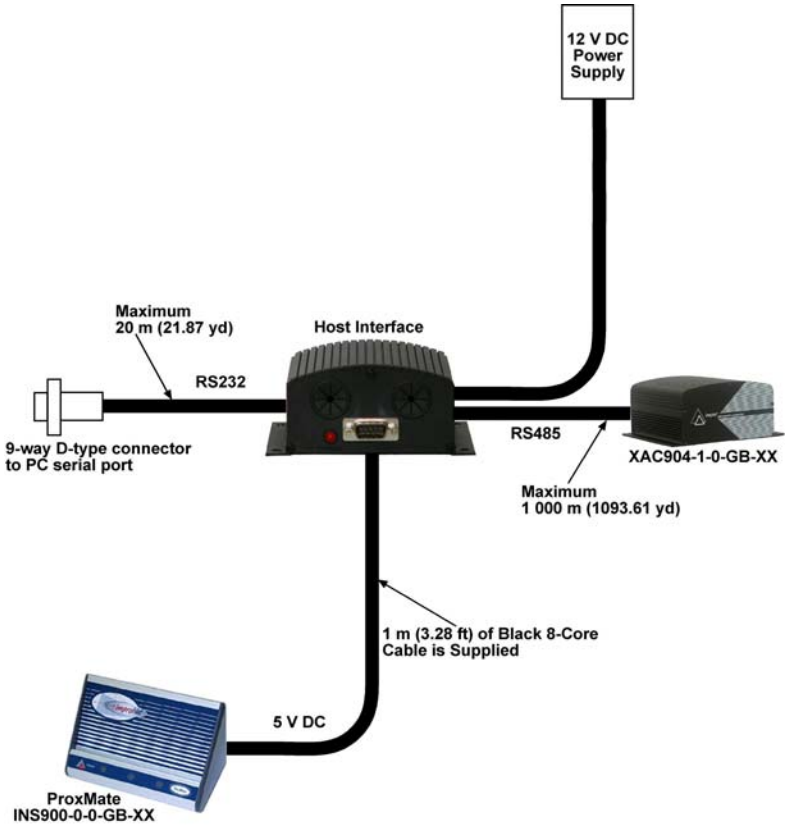


Figure 21 – IXP400 Connection via the Host Interface

Operational Information

The Registration Readers can be controlled by using their **Logical Address 0x7E**. This Logical Address is a fixed value programmed at the factory, and cannot be changed.

Remote Firmware Downloading

The Registration Readers provide a remote firmware upgrade facility via the RS232 Communications Port. The firmware upgrade occurs transparently via the protocol and the user is not required to enter any special modes of operation.

Led Indicator

The functions of the externally visible red, green, and yellow LEDs are determined by the associated system software.

Power-On Self-Test

The Power-On Self-test tests the RAM, ROM checksums, EEPROM checksums, and tag read/write circuitry.

When the Registration Readers pass the Self-test, two short beeps of 200 ms duration are emitted, separated by a 200 ms inter-beep pause and the yellow LED activates.

Placement of the Tag for Registration

The passive tag to be registered can be placed in the recessed area provided during the registration process. The Infrared tag to be registered must be powered up and pointed towards the front of the Registration Reader. No other Infrared tag should be ON in the vicinity and no passive tag should be in the recessed area at the time.

Figure 22 – Placement of the Tag for Registration

Operation Registration Readers LEDs

The Registration Readers have three LEDs on the lower edge of the front panel (see Figure 4). These LEDs are red, green, and yellow. The yellow LED is the **power on** LED.

When the Read Tag button in the IXP400 Software is clicked, the green LED comes on briefly and the buzzer sounds briefly if the tag code is read correctly. If the tag code cannot be read, the red LED comes on briefly and the buzzer emits a longer beep.

ImproX RRA Registration Reader Antenna

The ImproX (RRA) Registration Reader Antenna is a compact Tag Reader, designed for use with the ImproX RH Registration Interface in the IXP300 and IXP400 Access Control Systems.

The ImproX RRA includes a single tone Buzzer, and a bi-coloured Red or Green Status LED. You can set the functions of the Buzzer and Status LED to suit the needs of your application.

The ImproX RRA is intended for indoor use only. The electronic components are housed in a Natural, Anodised, Aluminium extruded Cabinet.

Tag Read/Write Ranges

Tag Type	Typical Range (Minimum)	
	(mm)	(in)
ISO Credit Card (Slim), 64-bit, Manchester encoded protocol, ASK	20-30	0.80-1.20
Credit Card (Semi Slim), 64-bit, Manchester encoded protocol, ASK	20-30	0.80-1.20
ImproX Credit Card, 64-bit, Manchester encoded protocol, ASK	20-30	0.80-1.20
Key Ring Tag, 64-bit, Manchester encoded protocol, ASK	20-30	0.80-1.20

Approvals

- CE
- UL294
- FCC Approval Pending.

Specifications

Physical

Dimensions	
Length	97 mm (3.81 in).
Width	61.40 mm (2.41 in).
Height	68.30 mm (2.68 in).
Approximate Weight	199 g (0.43 lb).

Cabinet Material	Aluminium.
Colour	Natural, Anodised.

Environmental

Temperature	
Operating	0°C to +49°C (-13°F to +140°F)
Storage	-40°C to +80°C (-40°F to +176°F)
Humidity Range	85% ± 5°C relative humidity at +30°C ± 2°C (86°F ± 3 °F)
Approvals (Test Information)	
UL Rating	UL 294.
EMC	EN 55022: Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment. EN 55024: Immunity Characteristics, Limits and Methods of Measurement.
Electrostatic Discharge	IEC 61000-4-2: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 2: Electrostatic Discharge Immunity Test. Basic EMC Publication.
Radiated Susceptibility	IEC 61000-4-3: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 3: Radiated, Radio-Frequency, Electromagnetic Field Immunity Test.
Electrical Fast Transients	IEC 61000-4-4: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 4: Electrical Fast Transients / Bursts. Basic EMC Publication.
Surge Immunity	IEC 61000-4-5: Surge Immunity.
Conducted Susceptibility	IEC 61000-4-6: Conducted Susceptibility.
Power Frequency Magnetic Field	IEC 61000-4-8: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 8: Frequency Magnetic Field Immunity Test.
Dust and Splash Resistance	Approved for indoor use in an environment similar to IP42.
Drop Endurance	2 m (6.56 ft) drop (in packaging).

Operator or Installer Interfaces

Buzzer	
Volume and Tone	Four volume, single tone (Software may support single tone only).
Status Indicators	
Status LED	Bi-coloured Red or Green.

Installation Information

Accessories

Find the following when unpacking the ImproX RRA:

- An ImproX (RRA) Registration Reader Antenna housed in a Natural, Anodised, Aluminium extruded Cabinet. The ImproX RRA consists of a Front Cover, a Base Frame and two Side

Plates. The ImproX RRA assembly includes 2 m (6.56 ft) of West Penn D3652, shielded, 22-gauge, multi-strand, 3-pair twisted cable.

- An extra Serial Number Label.

General

Wire and install the ImproX RRA in accordance with the National Electric Code (ANSI/NFPA 70), local codes, and the authorities having jurisdiction.

- **Distance between the Registration Interface and the ImproX RRA** – The maximum cable distance between the ImproX Registration Interface and the ImproX RRA, MUST NOT exceed 2 m (6.56 ft).

Mounting the Cabinet

There is no installation required for the ImproX RRA. Place the ImproX RRA in a convenient location near the Registration Interface and Host PC.

DO NOT place the ImproX RRA within 500 mm (19.68 in) of the PC Monitor or any other 125 kHz device. Doing so, may reduce the reading range of the ImproX RRA.

The ImproX RRA MUST be located in the same room as the ImproX (RH) Registration Interface to which it is connected.

Electrical Connections

Connecting the ImproX RRA

Figure 23 shows a detailed connection diagram for the ImproX RRA.

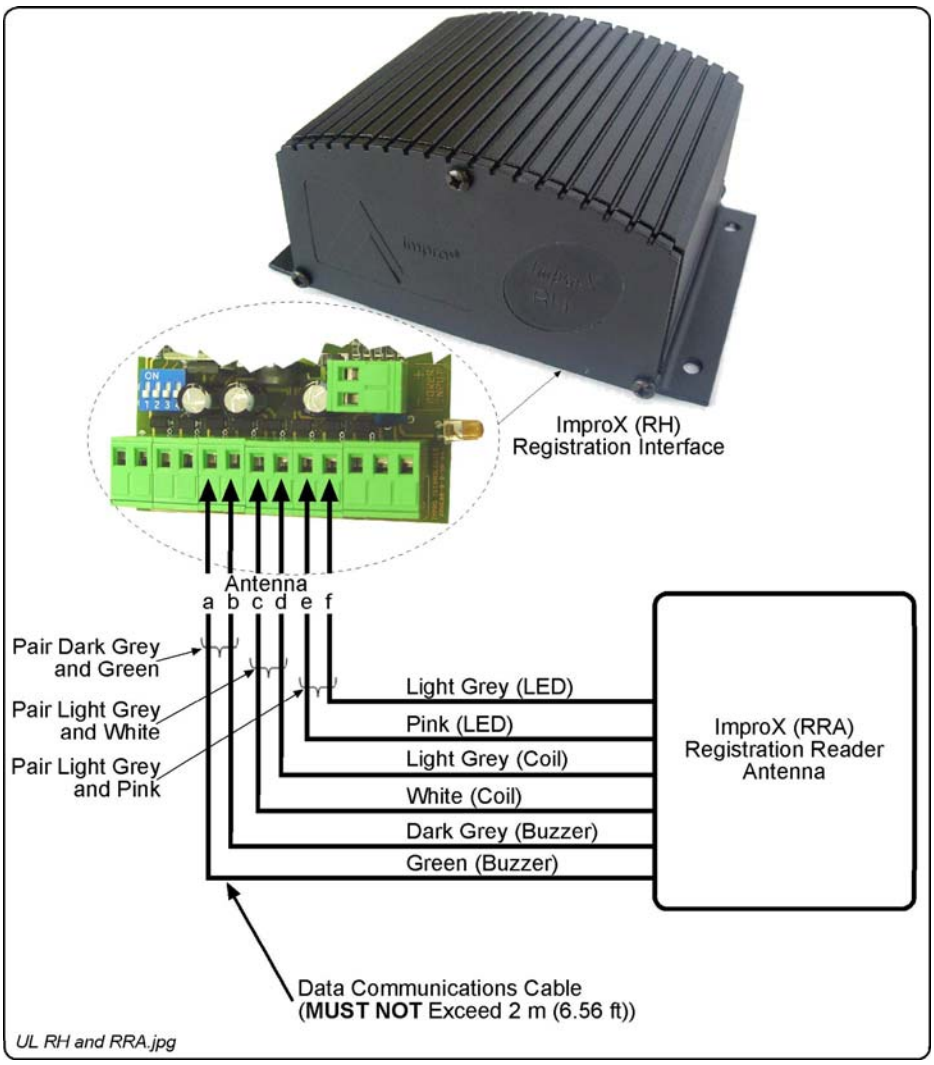


Figure 23: Typical ImproX RRA Electrical Connections

Initial Start-up

On powering up, the ImproX RRA will produce a beep sound and the Status LED will illuminate solid Red.

The ImproX RRA will only read a Tag during the tag enrollment process initiated in the ImproNet Software.

Serial Number Label

The loose Serial Number Label (packaged with the ImproX RRA) identifies the type of product and its Serial Number.

Operation and Functionality

The primary function of the ImproX RRA is to enroll user Cards and Tags into the ImproNet software. During the enrollment process, the ImproX RRA reads the unique Tag code that is written to the ImproNet database. When saved in the database, the Tag code and associated access rights are sent to the IXP300/400 Controllers via the communications infrastructure. The ImproX RRA connects directly to the ImproX RH comms interface.

Refer to the **Read the Tag** section on page **253** for details.

ImproX IC LCD Keypad Controller

The ImproX IC LCD Keypad Controller is a fully featured Controller for use in the IXP300 System. The ImproX IC Controllers applications include:

- Access control
- Alarm control (not UL evaluated).
- Time and attendance monitoring (not UL evaluated).
- Parking garage control (not UL evaluated).

The Controller has a 20-key Keypad and a 16-character by 4-line alphanumeric Liquid Crystal Display (LCD). Both the Keypad and the LCD include back-lighting. The back-lighting for the Keypad and the LCD work in conjunction and are switched on or off via the Communications Protocol. The Controller offers 4 “Bus Activity LED Indicators” for the installer and 1 “Power-on Indicator”. The “Bus Activity LED Indicators” indicate incoming and outgoing RS232 (not UL evaluated) and RS485 Data.

Functionality of the Keypad and Liquid Crystal Display are not employed in the IXP300 System (as such, the Keypad and Liquid Crystal Display are not UL evaluated).

The Controller is capable of communicating with other ImproX units via an RS485 Terminal Bus Port and with a PC via an RS232 or RS485 Host Bus Port.

The ImproX IC is housed in a Dark Grey ABS Plastic Cabinet. As the Cabinet is not weatherproof, the Controller is intended for installation in an indoor (dry) environment.

Approvals

- CE
- UL294
- FCC Approval Pending.

Specifications

Physical

Dimensions	
Length	204 mm (8.03 in).
Width	121 mm (4.76 in).
Height	45 mm (1.77 in).
Approximate Weight	510 g (1.12 lb).
Cabinet Material	ABS Plastic.

Colour	Dark Grey.

Environmental

Temperature	
Operating	0°C to +49°C (32°F to +120°F).
Storage	-40°C to +80°C (-40°F to +176°F).
Humidity Range	85% ± 5°C relative humidity at +30°C ± 2°C (86°F ± 3 °F)
Approvals (Test Information)	
UL Rating	UL 294.
EMC	EN 55022: Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment. EN 55024: Immunity Characteristics, Limits and Methods of Measurement.
Electrostatic Discharge	IEC 61000-4-2: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 2: Electrostatic Discharge Immunity Test. Basic EMC Publication.
Radiated Susceptibility	IEC 61000-4-3: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 3: Radiated, Radio-Frequency, Electromagnetic Field Immunity Test.
Electrical Fast Transients	IEC 61000-4-4: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 4: Electrical Fast Transients / Bursts. Basic EMC Publication.
Surge Immunity	IEC 61000-4-5: Surge Immunity.
Conducted Susceptibility	IEC 61000-4-6: Conducted Susceptibility.
Power Frequency Magnetic Field	IEC 61000-4-8: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 8: Frequency Magnetic Field Immunity Test.
Dust and Splash Resistance	Designed to work in an indoor (dry) environment similar to IP40. The Controller is, therefore, NOT sealed against water.
Drop Endurance	2 m (6.56 ft) drop (in packaging).

Electrical

Power Requirements		
Input Voltage	12 V DC and 24 V DC, polarity sensitive.	
Power Requirements	**Current (mA)**	**Power (W)**
Input Voltage 12 V DC Relays all ON	245	2.94
Input Voltage 24 V DC Relays all ON	125	3.0
Permissible Input Supply Ripple Voltage (Max)	1 V_{PP} at 50 Hz.	
Power Input Protection	Reverse polarity, over-voltage and over-current protection are provided on the Controller.	
Ethernet Port	Not Applicable.	
Terminal Bus Port (Port 1)		
Electrical Interface	RS485, ASCII with 16-bit CRC checking.	

Baud Rates	1 200, 2 400, 4 800, 9 600, 19 200, 28 800, 38 400, 57 600 and 76 800 selectable via the Protocol.
Data Format	8 data bits, no parity, 1 stop bit.
Communications Protocol	ImproX Secure Communications Protocol.
Line Termination	Provision is made for line termination.
Default Mode	Transmit Mode.
Host Bus Port (Port 2)	
Electrical Interface	RS232 (full duplex, no flow control) or RS485, ASCII with 16-bit CRC checking, selectable via the Protocol.
Baud Rates	1 200, 2 400, 4 800, 9 600, 19 200, 28 800, 38 400 and 57 600 selectable via the Communications Protocol.
Data Format	8 data bits, no parity, 1 stop bit.
Communications Protocol	ImproX Secure Communications Protocol.
Line Termination	Provision is made for line termination.
Default Mode	Receive Mode.
Unit Status	Slave.
Serial Peripheral Port (Port 3)	
Electrical Interface	RS232 (full duplex, RTS and CTS flow control available).
Baud Rates	1 200, 2 400, 4 800, 9 600, 19 200, 28 800, 38 400, 57 600 and 76 800 selectable via the Communications Protocol.
Data Format	8 data bits, no parity, 1 stop bit.
Interface Protocol	Determined by the peripheral device used.
Relays	
Relay Output	2 x Relays, each with NO, COM and NC contacts.
Contact Rating	4 A at 24 V AC, 4 A at 24 V DC.
Digital Input (Not UL Evaluated)	
Input Type	4 x Dry Contact Inputs.
Detection Resistance Range	+15 V and -15 V continuous.
	Note: The IXP300 system does not support Inputs.
Anti-tamper Protection	An internal infra-red beam detects when the Front Cover is removed from the Controller. This event detection is reported by the Controller via the Protocol.
Memory	
RAM (Non-volatile)	512 KBytes.
Flash ROM	128 KBytes.
Battery Backup (for RAM)	
Battery Type	1 x 3.6 V Lithium, size ½ AA
Battery Life	5 Years (with power OFF).

Factory Default Settings

Test Modes	
Power-on Self-test	RAM, Flash-ROM, Tag Read/Write, RTC and stuck keys.
Baud Rate	
Terminal Bus Port	38 400.
Host Bus Port	38 400.
Back-lighting	
LCD and Keypad	On.
Contrast (LCD)	Level 3.
Host Port Mode	RS232.
Buzzer	
Tone	25.
Volume	Level 4 (maximum).

Operator or Installer Interfaces

Liquid Crystal Display (LCD)	
Characters	16 Characters by 4 lines.
Character Sets	English, Katakana.
Contrast	Adjustable in 8 discrete steps via the Communications Protocol.
Back-lighting	Turned on and off via the Communications Protocol.
Keypad	
Buttons	20 Alphanumeric and function keys.
Back-lighting	Turned on and off via the Communications Protocol.
	Note: The LCD and keypad backlighting operate in conjunction.
Buzzer	
Volume and Tone	5-Step adjustable volume, 36 different tones. Selectable via the Communications Protocol.
LED Indicators	
Power-on Indicator	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).
Status Indicator	Bi-colour Red or Green LED (externally visible), function programmable via the Communications Protocol.

Installation Information

Accessories

Find the following when unpacking the ImproX IC Controller:

- An ImproX IC LCD Keypad Controller housed in a Dark Grey ABS Plastic Cabinet. The Cabinet will consist of a Front and Back Cover secured with a Thread Cutter Screw (M3 x 8 mm).
- A 3.6 V, >950 mAH, ½ AA Cylindrical Lithium Battery.
- Four Wood Screws (3.5 mm x 25 mm).
- Four Wall Plugs (7 mm).
- An extra Fixed Address Label.

General

Remember the following when installing your ImproX IC Controller:

- **Communications Distance** – The RS485 communications distance between the ImproX IC Controller and the LAST ImproX Unit in a cable run, MUST NOT exceed 1 km (3 281 ft). Achieve this by using West Penn D291 22 gauge, stranded, single pair cable with the overall shield EARTHED at one end.

  The individual conductor cross sectional area of the each cable conductor must not be less than 0.2 mm² (0.0003 in²).

- **Distance between ImproX IC Controllers** – To avoid mutual interference Install the Controllers no closer than 500 mm (20 in) apart.

- **Termination Resistors for RS485 Bus Communications** – Long transmission lines or multiple “star” connections, may cause communication problems. Placing the Terminating Resistor Jumper Link in the LAST UNIT AT THE END OF THE CABLE RUN should solve the problem (depending on the bus). The termination resistor has a value of 150 ohms.

- **EARTH Connection** – Connect the ImproX IC Controller to a good EARTH point. Using either of the RS485 Ports, connect the EARTH Lead to the “ETH” Terminal. Mains EARTH can be used, but electrical noise may exist. The EARTH Lead to the ImproX IC Controller should have a minimum cross-sectional area of 1 mm^2 (0.001 in^2) and can be either solid or stranded.

Installing the Battery – First Time Use

Insert the Battery into the Battery Holder BEFORE powering up the ImproX IC Controller.

The Battery Holder is located in the middle right-hand side of the ImproX IC Controllers Printed Circuit Board (PCB), directly below the “Bus Activity LED Indicators”.
Insert the 3.6 V Lithium Battery into the Battery Holder, with the "+" Terminal facing AWAY from the Terminal Blocks.

Replacement

DO NOT disconnect Power from the ImproX IC Controller during this operation. Disconnecting the Power could result in the RAM loosing data.

1. With the Controller powered up, remove the Controllers Front Cover. DO NOT disconnect the Ribbon Cable Connectors.
2. Remove the Battery from the Battery Holder.
3. Insert the new 3.6 V Lithium Battery into the Battery Holder, with the "+" Terminal facing AWAY from the Terminal Blocks.
4. Attach the Controllers Front Cover.

Mounting the Controller

Select the mounting position of the ImproX IC 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.

Electrical Connections

Connecting the ImproX IC Controller

Figure 24 shows typical connecting details for the ImproX IC Controller.

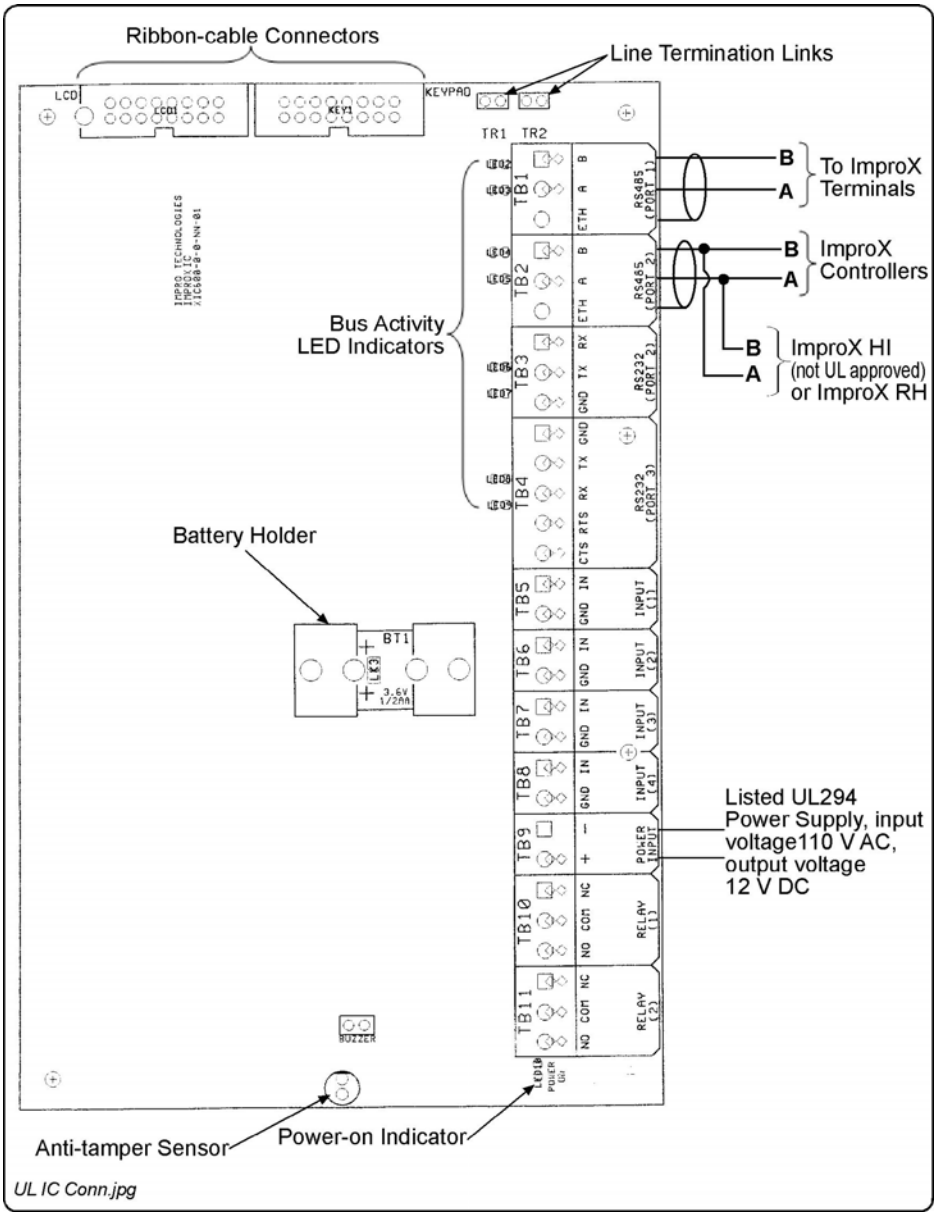


Figure 24: Typical ImproX IC Electrical Connections

Power-on Self-test

The Power-on Self-test test the RAM, Flash-ROM checksums, RTC, read/write circuitry and stuck keys.

The results of the Self-test are made available as diagnostic information via the protocol to the associated Controller or PC.

If any parameter in the Self-test fails, the Controller emits a continuous beep for 2 seconds.

When the Controller passes the Self-test, the Controller emits two short beeps of 200 ms duration, separated by a 200 ms inter-beep pause.

Fixed Address Label

Once the ImproX IC Controller is installed, attach the additional loose Fixed Address Label (packaged with the Controller) in position on the Unit Location Chart. When the system installation is complete and all the units are represented on the Unit Location Chart by their Fixed Address Labels, file the document for future reference.

Operation and Functionality

Refer to the **Controllers** section on page **35** for details.

ImproX AC Advanced Controller

The ImproX (AC) Advanced Controller is a fully featured Controller that forms part of the IXP400 range of access control equipment. This Controller is capable of increased Tag and transaction storage as it is fitted with two Memory Modules (storage of up to 30 000 Tags and 37 000 transactions).

The Controller offers two “Bus Activity LED Indicators” for the installer and one “Power-on Indicator”. The “Bus Activity LED Indicators” indicate incoming and outgoing RS485 Data.

The Controller is capable of communicating with other ImproX units via an RS485 Terminal Bus Port, with a PC and or other Controllers via an RS485 Host Bus Port.

The Controller is enclosed in an Aluminium Cabinet, and is intended for indoor use only. The ImproX AC is, therefore, NOT waterproof.

Approvals

- CE
- UL294
- FCC Approval Pending.

Specifications

Physical

Dimensions	
Length	168 mm (6.61 in).
Width	197 mm (7.75 in).
Height	89 mm (3.50 in).
Approximate Weight	1.2 kg (No Battery) (2.64 lb).
Housing Material	Aluminium.
Colour	Black.

Environmental

Temperature	
Operating	0^{o}C to +49^{o}C (-13^{o}F to +140^{o}F).
Storage	-40^{o}C to +80^{o}C (-40^{o}F to +176^{o}F).

Humidity Range	85% ± 5°C relative humidity at +30°C ± 2°C (86°F ± 3 °F)
Approvals (Test Information)	
UL Rating	UL 294.
EMC	EN 55022: Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment. EN 55024: Immunity Characteristics, Limits and Methods of Measurement.
Electrostatic Discharge	IEC 61000-4-2: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 2: Electrostatic Discharge Immunity Test. Basic EMC Publication.
Radiated Susceptibility	IEC 61000-4-3: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 3: Radiated, Radio-Frequency, Electromagnetic Field Immunity Test.
Electrical Fast Transients	IEC 61000-4-4: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 4: Electrical Fast Transients / Bursts. Basic EMC Publication.
Surge Immunity	IEC 61000-4-5: Surge Immunity.
Conducted Susceptibility	IEC 61000-4-6: Conducted Susceptibility.
Voltage Dips and Short Interruptions	IEC 61000-4-11: Voltage Dips and Interruptions.
Dust and Splash Resistance	Designed to work in an indoor (dry) environment similar to IP30. The Controller is, therefore, NOT sealed against water.
Drop Endurance	2 m (6.56 ft) drop (in packaging).

Electrical

Power Requirements		
Input Voltage	12 V DC and 24 V DC.	
Power Requirements	**Current (mA)**	**Power (W)**
Input Voltage 12 V DC All Indicators ON	60	0.72
Input Voltage 24 V DC All Indicators ON	35	0.84
Permissible Input Supply Ripple Voltage (Max)	1 V_{PP} at 50 Hz.	
Power Input Protection	Reverse polarity on DC power inputs, over-voltage and over-current protection are provided on the Controller.	
Terminal Bus Port (Port 1)		
Electrical Interface	RS485, ASCII with 16-bit CRC checking.	
Baud Rates	1 200, 2 400, 4 800, 9 600, 19 200, 28 800, 38 400, 57 600 and 76 800 selectable via the Protocol.	
Data Format	8 data bits, no parity, 1 stop bit.	
Communications Protocol	ImproX Secure Communications Protocol.	
Line Termination	Provision is made for line termination.	
Default Mode	Receive Mode.	

Host Bus Port (Port 2)	
Electrical Interface	RS485, ASCII with 16-bit CRC checking.
Baud Rates	1 200, 2 400, 4 800, 9 600, 19 200, 28 800, 38 400 and 57 600 selectable via the Communications Protocol.
Data Format	8 data bits, no parity, 1 stop bit.
Communications Protocol	ImproX Secure Communications Protocol.
Line Termination	Provision is made for line termination.
Default Mode	Receive Mode.
Unit Status	Slave.
Anti-tamper Protection	Internal switch.
Memory	
RAM (Non-volatile)	2 MBytes standard, 8 MBytes maximum.
Flash ROM	128 KBytes.
Battery Backup (for RAM)	
Battery Type	1 x 3 V, CR2032, Lithium cell Battery.
Battery Life	5 Years (with power OFF).
Type	16-bit Micro-controller operating at 16 MHz.
Ram Memory	2 K Byte.
Flash Memory	64 K Byte.

Factory Default Settings

Test Modes	
Power-on Self-test	RAM, Flash-ROM, RTC.
Baud Rate	
Terminal Bus Port	38 400.
Host Bus Port	38 400.

Operator or Installer Interfaces

LED Indicators	
Power-on Indicator	Red LED (internally visible).
Incoming RS485 Data	Flashing Green LED (internally visible).
Outgoing RS485 Data	Flashing Red LED (internally visible).

Installation Information

Accessories

Find the following when unpacking the ImproX AC:

- An ImproX AC Controller, fitted with two Memory Modules. The ImproX AC is supplied housed in a Black, powder coated, Aluminium extruded Cabinet. The Cabinet will consist of a Top Cover and a Base sealed at each end with a Mild Steel End Plate, secured with 5 Thread Cutter Screws (M3 x 8 mm).

- A 3 V, CR2032, Lithium cell Battery.
- Four Wood Screws (3.5 mm x 25 mm).
- Four Wall Plugs (7 mm).
- An extra Fixed Address Label.

General

Remember the following when installing your ImproX AC Controller:

Wire and install the Controller in accordance with the National Electric Code (ANSI/NFPA 70), local codes, and the authorities having jurisdiction.

DO NOT connect Power Supply cables to Port 1 and Port 2 terminals, as this will cause serious damage to the Controller.

- **Communications Distance** – The RS485 communications distance between the ImproX AC Controller and the LAST ImproX Unit in a cable run, MUST NOT exceed 1 km (3 281 ft). Achieve this by using West Penn D291 22 gauge, stranded, single pair cable with the overall shield EARTHED at one end.

  The individual conductor cross sectional area of the each cable conductor must not be less than 0.2 mm² (0.0003 in²).

- **Termination Resistors for RS485 Bus Communications** – Long transmission lines or multiple “star” connections, may cause communication problems. Placing the Terminating Resistor Jumper Link in the LAST UNIT AT THE END OF THE CABLE RUN should solve the problem (depending on the bus). The termination resistor has a value of 150 ohms.

- **EARTH Connection** – Connect the ImproX AC Controller to a good EARTH point. Using either of the RS485 Ports, connect the EARTH Lead to the “ETH” Terminal. Mains EARTH can be used, but electrical noise may exist. The EARTH Lead to the ImproX AC Controller should have a minimum cross-sectional area of 1 mm^2 (0.001 in^2) and can be either solid or stranded.

Installing the Battery – First Time Use

Insert the Battery into the Battery Holder BEFORE powering up the ImproX AC Controller.

The Battery Holder is located in the top left-hand side of the ImproX AC Controllers Printed Circuit Board (PCB).

1. Remove the Controllers Top Cover.
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 horizontally AWAY from the Battery Holder and press the Battery firmly into the Battery Holder.
4. Attach the Controllers Top Cover.

Installing the Battery – Replacement

DO NOT disconnect Power from the ImproX AC Controller during this operation. Disconnecting the Power could result in the RAM loosing data.

1. With the Controller powered up, remove the Top Cover. DO NOT disconnect the Ribbon Cable Connector.
2. Remove the Battery from the Battery Holder, by pulling the plastic retaining clip horizontally 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 horizontally AWAY from the Battery Holder and press the Battery firmly into the Battery Holder.
5. Attach the Controllers Top Cover.

Installing Extra Memory Modules (Optional Extra)

Add additional Memory Modules for applications where additional memory is required:

It is important that the Memory Modules are inserted correctly. Pin 1 as indicated on the Memory Module must correspond with Pin 1 on the ImproX AC Controller.

1. Remove the power from the ImproX AC Controller.
2. Remove the Controllers Top Cover and the LCD Display Cover (if installed).
3. Carefully insert the Memory Modules into the positions JP3 to JP8 as indicated on the ImproX AC Controller.
4. Re-attach the Controllers Top Cover and if necessary the LCD Display Cover and re-apply power to the Controller.
5. On power-up a diagnostic test will run on the inserted Memory Modules added to the system. The diagnostic test will display on the LCD Display Cover (if installed).

Mounting the Controller

Select the mounting position of the ImproX AC Controller, considering accessibility and routing of wires.

Mounting on a Concrete or Brick Wall

1. Use the Base as a template and mark off the required holes.
2. Drill the four mounting holes using a 7 mm diameter masonry drill bit, to a depth equal to the length of the supplied wall plugs.
3. Insert the wall plugs into the mounting holes.
4. Secure the Base to the surface using the four mounting screws provided.

Mounting on a Hard Wood Surface

1. Use the Base as a template and mark off the required holes.
2. Drill the four mounting holes using a 2.5 mm diameter drill bit to the depth equal to three-quarters of the length of the mounting screws.
3. Secure the Base to the surface using the four mounting screws provided.

Mounting on Metal

Use four suitable securing devices such as screws, nuts and bolts, or rivets to mount the ImproX AC on a metal surface.

1. Use the Base as a template and mark off the required holes.
2. Drill the four mounting holes using a suitable diameter drill bit.
3. Secure the Base to the surface using the chosen method.

Electrical Connections

Connecting the ImproX AC Controller

Figure 25 shows various connection options for the ImproX AC Controller.

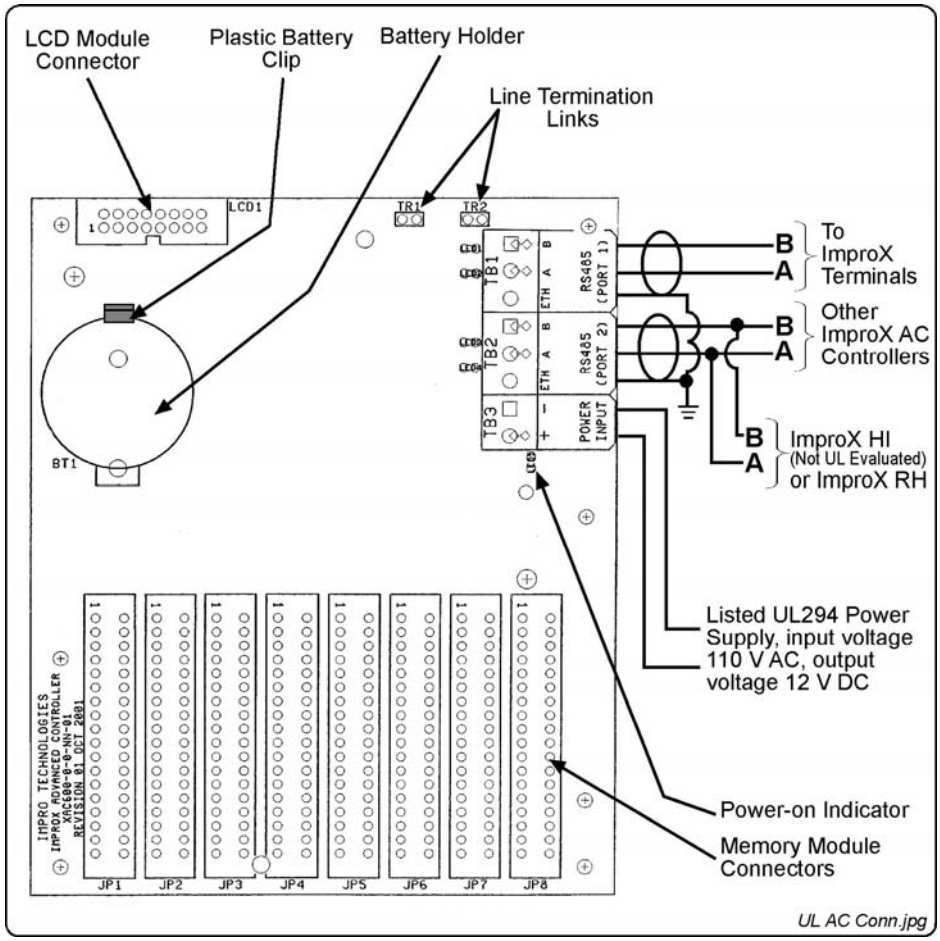


Figure 25 – Typical ImproX AC Electrical Connections

Power-on Self-test

The Power-on Self-test tests the RAM, Flash-ROM checksums and RTC.
The results of the Self-test are made available as diagnostic information via the protocol to the associated Controller or PC.

Fixed Address Label

Once the ImproX AC Controller is installed, attach the additional loose Fixed Address Label (packaged with the Controller) in position on the Unit Location Chart. When the system installation is complete and all the units are represented on the Unit Location Chart by their Fixed Address Labels, file the document for future reference.

Operation and Functionality

Refer to the **Controllers** section on page **35** for details.

ImproX TT Twin Antenna Terminal

The ImproX (TT) Twin Antenna Terminal is designed to interface with the IXP300 and IXP400 Access Control Systems via the RS485 Bus Connection.

The low-cost ImproX TT is designed to provide access control to one door in Full Anti-passback Mode (APB) (using two Antenna Readers on the door), or two doors in Relaxed Anti-passback Mode (APB) (using one Antenna Reader per door). We offer a wide range of Antenna Readers suitable for most installations:

- ImproX (MMA) Mullion Antenna Reader.
- ImproX (MA) Micro Antenna Reader.
- ImproX (MHA) Metal Antenna Reader.
- ImproX (KHA) Metal Keypad Antenna Reader.

The ImproX TT offers 9 preset LED “Diagnostic Indicators”, these indicate: Power On, Upgrade Mode, RS485 Communications Failure, Incoming and Outgoing RS485 Data, Contact Closure on the Digital Inputs and Activation of the Relays.

The Terminal is housed in a robust Black; Aluminium extruded Cabinet suitable for indoor installation. A label mounted on the inside of the Top Cover shows the functions of the various terminal block connections and the LEDs.

Tag Read/Write Ranges

Tag Type	Typical Range (Minimum)	
	(mm)	(in)
ISO Credit Card (Slim), 64-bit, Manchester encoded protocol, ASK	60	2.36
Credit Card (Semi Slim), 64-bit, Manchester encoded protocol, ASK	60	2.36
ImproX Credit Card, 64-bit, Manchester encoded protocol, ASK	50	1.96
Key Ring Tag, 64-bit, Manchester encoded protocol, ASK	40	1.58

The distances indicated are for the Terminal mounted on a non-metallic surface. Mounting the Terminal on a metallic surface will reduce the Tag reading range slightly.

Approvals

- CE
- UL294
- FCC Approval Pending.

Specifications

Physical

Dimensions	
Length	104 mm (4.09 in).
Width	150 mm (5.90 in).
Height	53.70 mm (2.11 in).
Approximate Weight	502 g (1.10 lb).
Cabinet Material	Aluminium.
Colour	Black.

Environmental

Temperature	
Operating	0^{o}C to +49^{o}C (32^{o}F to +120^{o}F).
Storage	-40^{o}C to +80^{o}C (-40^{o}F to +176^{o}F).
Humidity Range	85% ± 5^{o}C relative humidity at +30^{o}C ± 2^{o}C (86^{o}F ± 3^{o}F)
Approvals (Test Information)	
UL Rating	UL 294.
EMC	EN 55022: Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment. EN 55024: Immunity Characteristics, Limits and Methods of Measurement.
Electrostatic Discharge	IEC 61000-4-2: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 2: Electrostatic Discharge Immunity Test. Basic EMC Publication.
Radiated Susceptibility	IEC 61000-4-3: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 3: Radiated, Radio-Frequency, Electromagnetic Field Immunity Test.
Electrical Fast Transients	IEC 61000-4-4: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 4: Electrical Fast Transients / Bursts. Basic EMC Publication.
Surge Immunity	IEC 61000-4-5: Surge Immunity.
Conducted Susceptibility	IEC 61000-4-6: Conducted Susceptibility.
Power Frequency Magnetic Field	IEC 61000-4-8: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 8: Frequency Magnetic Field Immunity Test.
Dust and Splash Resistance	Approved for indoor use in an environment similar to IP40.
Drop Endurance	2 m (6.56 ft) drop (in packaging).

Electrical

Power Requirements		
Input Voltage	**12 V DC and 24 V DC, polarity sensitive.**	
Power Requirements	**Current (mA)**	**Power (W)**
Input Voltage 12 V DC One Antenna Reader Connected, all Indicators and One Relay ON	95	1.14
Input Voltage 12 V DC Two Antenna Readers Connected, all Indicators and Two Relays ON	140	1.68
Input Voltage 24 V DC One Antenna Reader Connected, all Indicators and One Relay ON	45	1.08
Input Voltage 24 V DC Two Antenna Readers Connected, all Indicators and Two Relays ON	70	1.68
Permissible Input Supply Ripple Voltage (Max)	1 V_{PP} at 50 Hz.	
Power Input Protection	Reverse polarity, over-voltage and over-current protection are provided on the Terminal.	
Terminal Bus Port		
Electrical Interface	RS485, ASCII with 16-bit CRC checking.	
Baud Rates	1 200, 2 400, 4 800, 9 600, 19 200, 28 800, 38 400 (default), 57 600 and 76 800 selectable via the Communications Protocol.	
Data Format	8 data bits, no parity, 1 stop bit.	
Communications Protocol	ImproX Secure Communications Protocol.	
Unit Status	Slave.	
Relays		
Relay Output	2 x Relays, each with NO, COM and NC contacts.	
Contact Rating	3 A at 24 V DC. 3 A at 24 V AC.	
Digital Inputs		
Input Type	4 x Dry-contact inputs.	
Detection Resistance Range	< 5 kOhm.	
Protection	+ 50 V to – 50 V continuous, + 80 V to – 80 V surge.	
Processor		
Type	16-bit CPU operating at 16 MHz.	
Ram Memory	2 K Byte.	
Flash Memory	64 K Byte.	
Anti-tamper Switch	2 Switches detect opening of the enclosure.	

Factory Default Settings

Default Baud Rate	Factory-set to 38 400.
Default Mode	Receive (Slave Mode).
Buzzer Volume	Level 3 (maximum).
Beep Codes	
Fails Power-on Self-test	Continuous beep for 2 seconds.
Passes Power-on Self-test	Two short beeps of 200 ms duration, separated by a 200 ms inter-beep pause.

Operator or Installer Interfaces

Status Indicators	
Power On	Continuous Red.
Upgrade Mode	Flashing Red (Steady).
RS485 Communications Failure	Flashing Red (Intermittent).
Relay 2	Continuous Red on activation of the Relay.
Relay 1	Continuous Red on activation of the Relay.
Reader 2, Inp 2	Continuous Green on detected contact closure.
Reader 2, Inp 1	Continuous Green on detected contact closure.
Reader 1, Inp 2	Continuous Green on detected contact closure.
Reader 1, Inp 1	Continuous Green on detected contact closure.
RS485 RX	Flashing Green as per incoming data.
RS485 TX	Flashing Red as per outgoing data.

Interface Details

RS485 Terminal Bus Port

The RS485 Terminal Bus Port lets you connect the ImproX TT Terminal to other ImproX Terminals and the Controller in the IXP300 or IXP400 Access Control System.
The interface is made by connecting the “A” and “B” lines on the ImproX TT to the “A” and “B” lines on the other ImproX units. Incoming and outgoing information on this Port is shown on the RS485 TX and RX LED “Diagnostic Indicators” on the ImproX TT.

Relays

The ImproX TT has two independent single-pole, double-throw (SPDT) Relay Outputs. These, user configurable, Relay Outputs let you interface to door strikes and magnetic locks.

Dry Contact Digital Inputs

The ImproX TT has four user configurable Dry Contact Digital Inputs. These Digital Inputs let you interface with a variety of devices such as reed switches and push-buttons; you can perform specific tasks such as:

- Door Open Sensing.
- Request to Exit.
- Scanner Inhibit.

- Alarm Interface (not UL evaluated).
- Action Request.

End of Line (EOL) Sensing

Digital Inputs are Software configurable in Normal Sensing Mode and in End of Line (EOL) Sensing Mode.

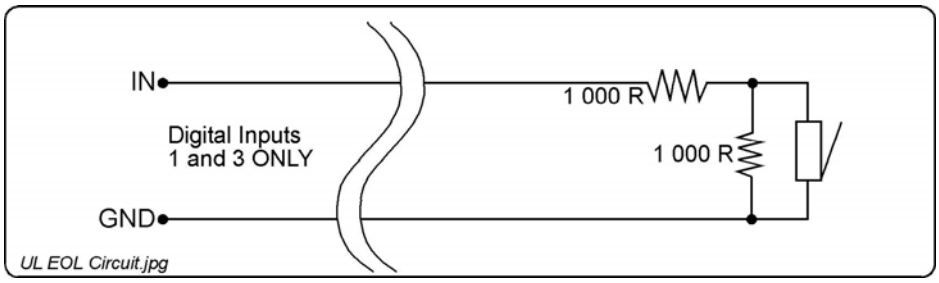


Figure 26 – End of Line (EOL) Sensing Circuit

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 the Digital Input (IN 1 and IN 3) 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 the Digital Input (IN 1 and IN 3) 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.

Installation Information

Accessories

Find the following when unpacking the ImproX TT Terminal:

- An ImproX (TT) Twin Antenna Terminal housed in a Black, Aluminium extruded Cabinet. The Cabinet consists of a Top Cover, a Base and two End Plates. Each End Plate is attached with four Thread Cutter Screws (2.2 x 5 mm).

  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).
- Four Wall Plugs (7 mm).
- An extra Fixed Address Label.

General

Wire and install the Terminal in accordance with the National Electric Code (ANSI/NFPA 70), local codes, and the authorities having jurisdiction.

- **Communications Distance** – The RS485 communications distance between the first ImproX TT and the LAST ImproX unit in a cable run, MUST NOT exceed 1 km (3 270 ft). Achieve this by using West Penn D291 22 gauge, stranded, single pair cable with the overall shield EARTHED at one end.

- **Jumper Links for Termination Resistor** – Long transmission lines or multiple "star" connections, may cause communication problems. Placing a Jumper Link across the jumper [TR1] in the LAST UNIT AT THE END OF THE CABLE RUN should solve the problem. The termination resistor has a value of 150 ohms.

- **Antenna Reader Distance** – The ideal cable distance between the ImproX TT and its Antenna Reader ranges between 2 m to 16 m (7 ft to 53 ft). Achieve this by using good quality screened, twisted pair cable.

- **Distance between Antenna Readers from the SAME Terminal** – To avoid mutual interference, install the Antenna Readers alongside each other at least 150 mm (6 in) apart.

- **Distance between Antenna Readers from DIFFERENT Terminals** – To avoid mutual interference, install the Antenna Readers alongside each other at least 500 mm (20 in) apart.

ImproX TT Terminals can be mounted alongside each other.

EARTH Connection

Connect the ImproX TT Terminal to a good EARTH point. Using the RS485 Port, connect the EARTH Lead to the '⏚' Terminal. 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 27**.

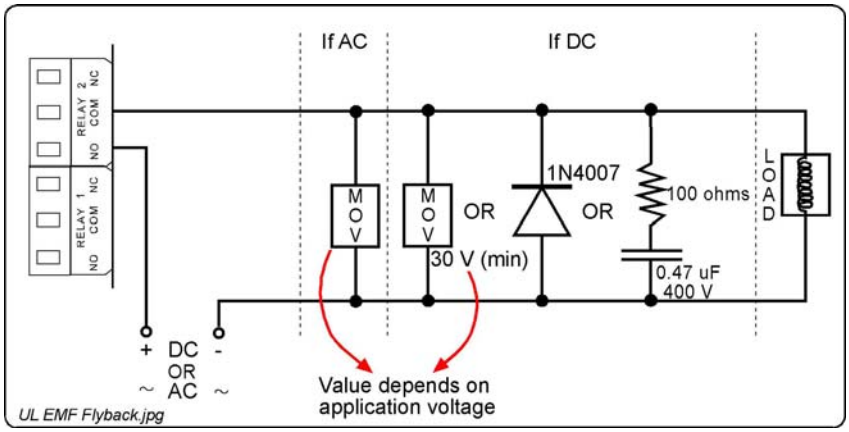


Figure 27 – EMF Flyback and Arc Suppression

Mounting the ImproX TT

Select the mounting position of the ImproX TT Terminal, considering accessibility, routing of wires and visibility of the LEDs.

The ImproX TT can be mounted onto virtually any surface including metal.

Cable Exit Holes

The Terminals design offers a choice of three rubber cable glands and one bushing plug located in the Terminals Back End Plate (see **Figure 28**).

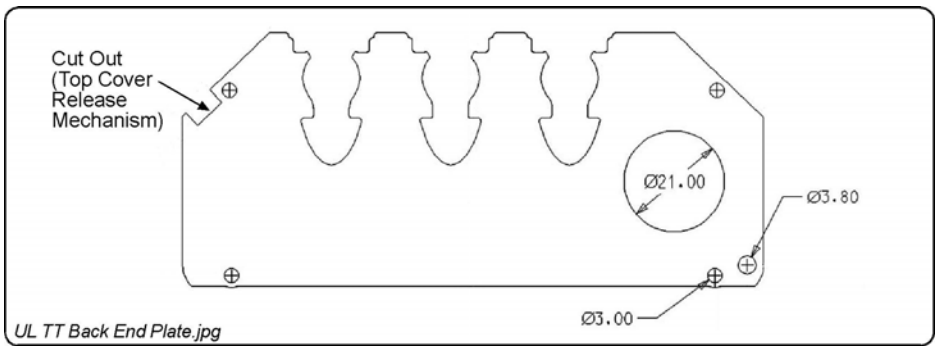


Figure 28 – Back End Plate

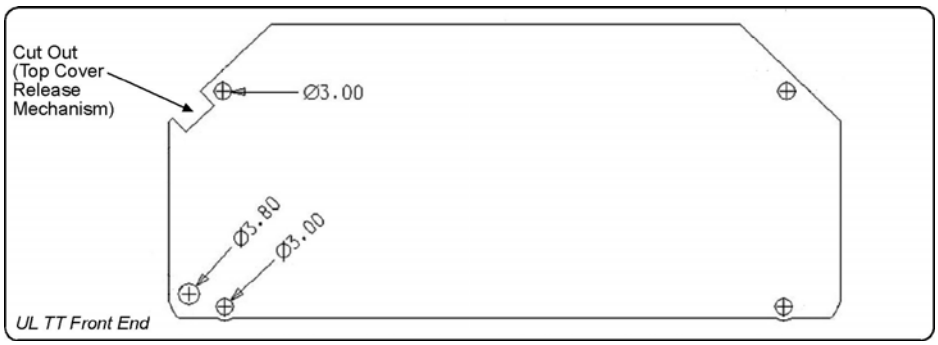


Figure 29 – Front End Plate

Top Cover Release Mechanism

1. Remove the top two Thread Cutter Screws (2.2 x 5 mm) from each of the End Plates.
2. Insert a flat head screwdriver (maximum 7 mm) into the cut out in either of the two End Plates. Swivel the screwdriver until the Top Cover makes a click sound.
3. Insert the screwdriver in the gap (on the side of the ImproX TT) between the Top Cover and the Base. Swivel the screwdriver again, to release the Top Cover from the Base.
4. Remove the remaining Thread Cutter Screws (2.2 x 5 mm) from each of the End Plates.

Mounting on a Concrete or Brick Wall

1. Use the Base as a template and mark off the required holes.
2. Drill the four mounting holes using a 7 mm diameter masonry drill bit, to a depth equal to the length of the supplied wall plugs.
3. Insert the wall plugs into the mounting holes.
4. Secure the Base to the surface using the four mounting screws provided.

Mounting on a Hard WoodSurface

1. Use the Base as a template and mark off the required holes.
2. Drill the four mounting holes using a 2.5 mm diameter drill bit to the depth equal to three-quarters of the length of the mounting screws.
3. Secure the Base to the surface using the four mounting screws provided.

Mounting on Metal

Use four suitable securing devices such as screws, nuts and bolts, or rivets to mount the ImproX TT on a metal surface.

1. Use the Base as a template and mark off the required holes.
2. Drill the four mounting holes using a suitable diameter drill bit.
3. Secure the Base to the surface using the chosen method.

Electrical Connections

Connecting the ImproX TT

Figure 30 shows a detailed connection diagram for the ImproX TT.

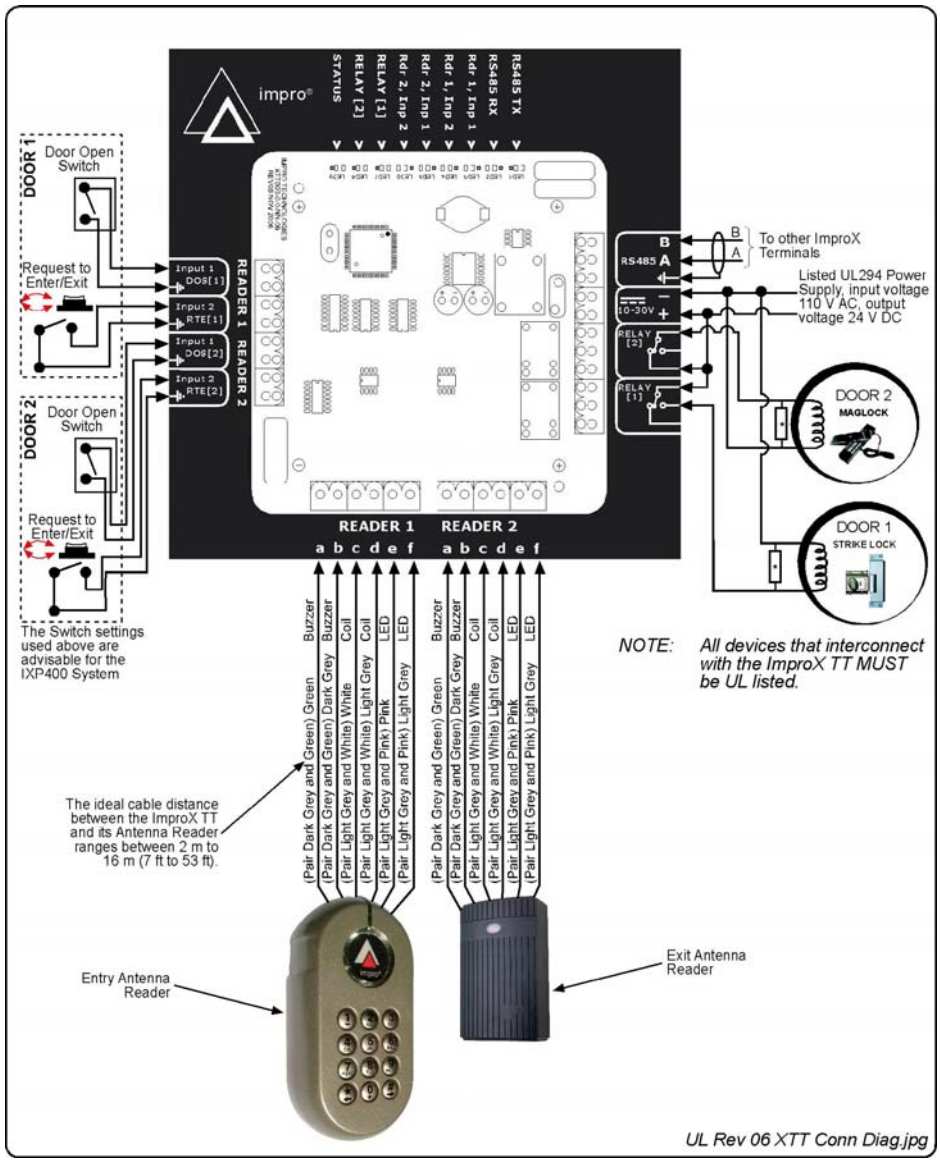


Figure 30: Typical ImproX TT Electrical Connections

Power-on Self-test

The Power-on Self-test tests the RAM and Flash Checksums and the Read/Write Circuitry. The results of the Self-test are available as diagnostic information from the Controller or PC.
If any parameter in the Self-test fails, the Antenna Reader** emits a continuous beep for 2 seconds.

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

*The **ImproX MMA Antenna Reader DOES NOT include a Buzzer.*

ImproX TT Address Information

Each ImproX TT Terminal is, in fact, two Terminals in one. The first “Terminal” Fixed Address is associated with Reader [1], and the second with Reader [2].

Each ImproX TT is allocated two unique Fixed Addresses at the factory. These addresses are stored in the Terminals memory. When the Terminal is installed in an IXP300 or IXP400 System, the System allocates two separate Logical Addresses to the Terminal for communication purposes.

Address Allocation

IXP Software Suites allocate Logical Addresses to the Terminal, either on initial software start-up, or on request, depending on the system configuration.

Fixed Address Label

Once the ImproX TT 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.

Operation and Functionality

The ImproX TT acts as an interface for card readers (ImproX Antenna readers). Because it is a Terminal, it must be connected to a system Controller via comms bus port 1, to function correctly.

Before a Tag can be read, it must first be presented within the specified read range of the Antenna reader. When within range, the ImproX TT decodes the Tag code. Because Terminals do not initiate communication with Controllers, the ImproX TT buffers the Tag code until it is polled by the Controller. Then, it passes the buffered Tag code, as a transaction, to the Controller. The Controller determines whether to allow or deny access based on information in its database.

Next, the Controller instructs the ImproX TT to execute Actions associated with the Allowed or Denied Event. A relay Action is commonly used to drive the access control door hardware (door strike or magnetic lock), to enable physical access through a door. One of the ImproX TT’s two onboard relays is normally connected to the door hardware. The ImproX TT has 4 digital inputs which can be configured for various functions; examples include door status monitoring and interfacing a request-to-exit (RTE) push-button.

ImproX ER Extended Range Terminal and Fibreglass Antenna

The ImproX (ER) Extended Range Terminal and 350 mm x 350 mm Fibreglass Antenna are ideally suited for use as a “hands-free” access control system or for OEM custom requirements (not UL evaluated) where extended read range is necessary (product and asset management) (not UL evaluated). The Terminal is designed to be used as an access point interfacing with the IXP300 and IXP400 Access Control Systems.

The Terminal includes four LED Indicators providing a useful user interface for the installer. These LED Indicators include a bi-colour Status LED, an Auto-tuning Status LED and two LEDs indicating data transfer on the RS485 Terminal Bus. The ImproX ER includes a single tone Buzzer. You can adjust the Buzzer volume to any one of these four levels (off, low, medium and high).

The Terminal is enclosed in an Aluminium Cabinet, however, as the Cabinet is NOT waterproof the Terminal is intended for indoor use only. The Antenna is housed in a fibreglass housing and is fully potted. The Antenna is therefore rated for both indoor and outdoor (not UL evaluated) installation.

Due to its extended read range, this Terminal is capable of being used in situations where the use of a normal short-range Passive Proximity Reader would not be effective. A simple, auto-tuning procedure allows the Terminal to be placed in various locations where different amounts of metal are found.

Tag Read Ranges

Tag Type	Typical Range (Minimum)	
	(mm)	(in)
ISO Credit Card (Slim), 64-bit, Manchester encoded protocol, ASK	500	19.68
Credit Card (Semi Slim), 64-bit, Manchester encoded protocol, ASK	500	19.68
ImproX Credit Card, 64-bit, Manchester encoded protocol, ASK	400	15.74
Key Ring Tag, 64-bit, Manchester encoded protocol, ASK	250	9.84

Table 12 – Typical Read Ranges

Tag ranges stated are for one Antenna only.

Approvals

- CE
- UL294
- FCC Approval Pending

Specifications

Physical – ImproX (ER) Extended Range Terminal

Dimensions	
Length	150 mm (5.90 in).
Width	116 mm (4.56 in).
Height	51 mm (2.00 in).
Approximate Weight	430 g (0.94 lb).
Housing Material	Aluminium.
Colour	Black.

Physical – 350 mm x 350 mm Fibreglass Antenna

Dimensions	
Length	350 mm (13.78 in).
Width	350 mm (13.78 in).
Height	16 mm (0.63 in).
Approximate Weight	600 g (1.32 lb).
Housing Material	Fibreglass.
Colour	Black and Satin Nickel.

Environmental – ImproX (ER) Extended Range Terminal

Temperature	
Operating	0^{o}C to +49^{o}C (-13^{o}F to +140^{o}F)
Storage	-40^{o}C to +80^{o}C (-40^{o}F to +176^{o}F)
Humidity Range	85% ± 5^{o}C relative humidity at +30^{o}C ± 2^{o}C (86^{o}F ± 3 ^{o}F)
Approvals (Test Information)	
UL Rating	UL 294.
EMC	EN 55022: Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment. EN 55024: Immunity Characteristics, Limits and Methods of Measurement.
Electrostatic Discharge	IEC 61000-4-2: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 2: Electrostatic Discharge Immunity Test. Basic EMC Publication.
Radiated Susceptibility	IEC 61000-4-3: Electromagnetic Compatibility (EMC). Part 4:

	Testing and Measurement Techniques. Section 3: Radiated, Radio-Frequency, Electromagnetic Field Immunity Test.
Electrical Fast Transients	IEC 61000-4-4: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 4: Electrical Fast Transients / Bursts. Basic EMC Publication.
Surge Immunity	IEC 61000-4-5: Surge Immunity.
Conducted Susceptibility	IEC 61000-4-6: Conducted Susceptibility.
Power Frequency Magnetic Field	IEC 61000-4-8: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 8: Frequency Magnetic Field Immunity Test.
Dust and Splash Resistance (Not evaluated by UL)	Designed to work in an indoor (dry) environment similar to IP30. The ImproX ER is, therefore, NOT sealed against water.
Drop Endurance	1 m (3.28 ft) drop (in packaging).

Environmental – 350 mm x 350 mm Fibreglass Antenna

Temperature	
Operating	0^{o}C to +49^{o}C (-13^{o}F to +140^{o}F)
Storage	-40^{o}C to +80^{o}C (-40^{o}F to +176^{o}F)
Humidity Range	85% ± 5^{o}C relative humidity at +30^{o}C ± 2^{o}C (86^{o}F ± 3 ^{o}F)
Approvals (Test Information)	
UL Rating	UL 294.
EMC	EN 55022: Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment. EN 55024: Immunity Characteristics, Limits and Methods of Measurement.
Electrostatic Discharge	IEC 61000-4-2: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 2: Electrostatic Discharge Immunity Test. Basic EMC Publication.
Radiated Susceptibility	IEC 61000-4-3: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 3: Radiated, Radio-Frequency, Electromagnetic Field Immunity Test.
Electrical Fast Transients	IEC 61000-4-4: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 4: Electrical Fast Transients / Bursts. Basic EMC Publication.
Surge Immunity	IEC 61000-4-5: Surge Immunity.
Conducted Susceptibility	IEC 61000-4-6: Conducted Susceptibility.
Power Frequency Magnetic Field	IEC 61000-4-8: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 8: Frequency Magnetic Field Immunity Test.
Dust and Splash Resistance (Not evaluated by UL)	Designed to work in an indoor or outdoor environment similar to IP66. The Antenna is, therefore, sealed against water.

Electrical – ImproX (ER) Extended Range Terminal

Power Requirements		
Input Voltage	12 V DC.	
Power Requirements	Current (mA)	Power (W)
Input Voltage 12 V DC One Antenna Connected, all Indicators and one Relay ON	520	6.24
Input Voltage 12 V DC Two Antennas Connected, all Indicators and one Relay ON	1 100	13.20
Permissible Input Supply Ripple Voltage (Max)	0.5 V_{PP} at 50 Hz.	
Power Input Protection	Reverse polarity, over-voltage and over-current protection are provided on the Terminal.	
Terminal Bus Port		
Electrical Interface	RS485, ASCII with 16-bit CRC checking.	
Baud Rates	1 200, 2 400, 4 800, 9 600, 19 200, 28 800, 38 400 (default), 57 600 and 76 800 selectable via the Communications Protocol.	
Data Format	8 data bits, no parity, 1 stop bit.	
Communications Protocol	ImproX Secure Communications Protocol.	
Relays		
Relay Output	1 Relay, SPDT, with NO, COM and NC contacts.	
Contact Rating	4 A at 24 V AC. 4 A at 24 V DC.	
Digital Inputs		
Input Type	2 Dry-contact inputs.	
Protection	+50 V to -50 V continuous, +80 V to -80 V surge.	
Processor		
Type	16-bit Micro-controller operating at 16 MHz.	
Ram Memory	2 K Byte.	
Flash Memory	64 K Byte.	

Electrical – 350 mm x 350 mm Fibreglass Antenna

Frequency	134.2 kHz.

Operator or Installer Interfaces

LED Indicators	
Status LED	Red or Green LED (externally visible).
Incoming RS485 Data	Green LED (flashing) (internally visible).
Outgoing RS485 Data	Red LED (flashing) (internally visible).
Auto-tuning Status	Green LED (internally visible).

Installation Information

Accessories

Find the following when unpacking the Terminal:

- An ImproX (ER) Extended Range Terminal housed in a Black, Aluminium extruded Cabinet. The ImproX ER consists of a Top Cover, a Base and two End Plates. Each End Plate is attached with three Thread Cutter Screws (M3 x 8 mm).
- Four Brass Wood Screws (3.5 mm x 25 mm).
- Four Wall Plugs (7 mm).
- An extra Fixed Address Label.

Find the following when unpacking the Fibreglass Antenna:

- An ImproX ER 350 mm x 350 mm Fibreglass Antenna. The Antenna includes 3 m (9.84 ft) of Black RG58, Multi-strand 50 ohm Coaxial Cable.
- Four Mirror Screws (25 mm).
- Four Wall Plugs (7 mm).

General

Wire and install the Terminal in accordance with the National Electric Code (ANS/NFPA 70), local codes, and the authorities having jurisdiction.

Remember the following when installing the Terminal and the Antenna:

- **Important Installation Considerations**
  - DO NOT mount the Antenna directly on to a metal surface.
  - **Always connect the Negative Power Input terminal to a good EARTH (Ground) point in order to get maximum read range.**
  - DO NOT run power and RS485 communications in the same run of cable.
  - DO NOT run the Antennas cables alongside any other communications or power cable, including the power and RS485 cables to the Terminal.
  - DO NOT position the Antenna within 3 m (9.84 ft) of data-carrying communications cables or high-voltage power lines.
  - Always secure the Antenna cable neatly.
  - DO NOT position the Antenna where it can be bumped or disturbed, to prevent micro-phonics.
  - DO NOT position the Antenna of one ImproX ER within 10 m (32.82 ft) of the Antenna of a second ImproX ER.
  - Each ImproX ER is supplied with 2 Protection Caps, these Protection Caps must only be removed if an Antenna is connected. If no Antenna is connected the Proection Cap must remain in position, to protect the ImproX ER from dust and electrostatic discharge.

- **Communications Distance** – The RS485 communications distance between the first ImproX ER and the associated Controller, MUST NOT exceed 1 km (3 270 ft). Achieve this by using West Penn D291 22 gauge, stranded, single pair cable with the overall shield EARTHED at one end.

The individual conductor cross sectional area of the each cable conductor must not be less than 0.2 mm² (0.0003 in²).

- **Jumper Link for Termination Resistor** – Long transmission lines or multiple "star" connections, may cause communication problems. Placing a Jumper Link across the Line Termination Link [TR1] in the LAST UNIT AT THE END OF THE CABLE RUN should solve the problem. The termination resistor has a value of 150 ohms.

- **Distance between the Antenna and the Terminal** – You may extend the Antennas supplied cable beyond the 3 m (9.84 ft) supplied length to a maximum of 5 m (16.40 ft). However, please keep in mind that this will decrease the Tag reading range.

- **Distance between Antennas Connected to the SAME Terminal** – Where more than one Antenna is connected to the SAME ImproX ER, install the Antennas no closer than 800 mm (2.63 ft) apart.

- **Distance between Antennas Connected to DIFFERENT Terminals** – Where more than one ImproX ER is installed, install the adjacent Antennas no closer than 10 m (32.82 ft) apart.

- **Distance between Terminals** – You may install other ImproX Terminals, with lower sensitivity Antennas, within 5 m (16.41 ft) of the ImproX ER.

- **EARTH Connection** – Connect the Terminal to a good EARTH point. Using the RS485 Port, connect the EARTH Lead to the 'SHD' terminal. Use a cable with a conductor cross sectional area of at least 1.0 mm² (0.002 in²) and Keep the EARTH line as short as possible. Use a good quality copper EARTH spike if possible. Mains EARTH can be used, but electrical noise may exist.

  This ETH point must only be connected at one end of the cable.

- **Arc Suppression** – Snubber devices are recommended for EMF Flyback and Arc Suppression when driving an inductive load with the Relay, see **Figure 31**.

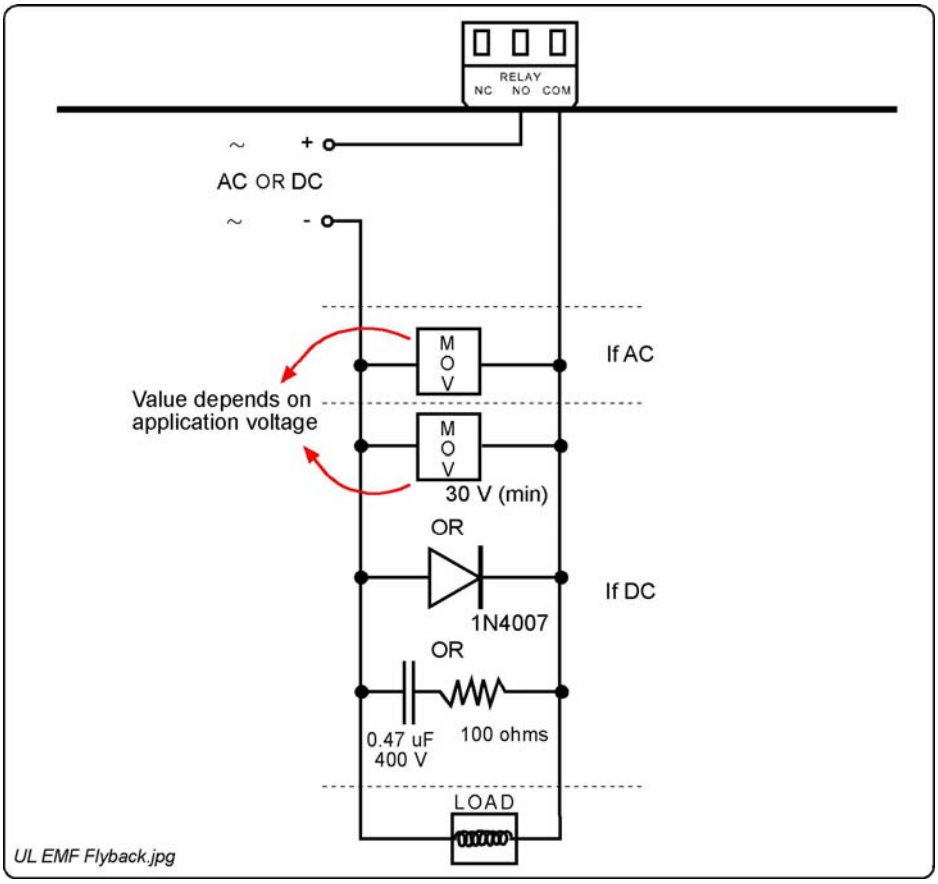


Figure 31:

EMF Flyback and Arc Suppression

Mounting the Terminal and the Antenna

Please keep the following information in mind, when selecting the mounting position of the ImproX ER and the Antenna.

Secure the Terminal and the Antenna to the mounting surface, using four suitable screws and wall plugs, nuts and bolts or rivets.

Antenna Detection Patterns

The various Antenna configurations that can be used with the Terminal (single Antenna, dual Antennas in-phase, or dual Antennas anti-phase) have Tag detection patterns that determine the range of detection for Tags presented in various orientations to the Antennas.

Single Antenna Installation

In an installation where only a single Antenna is used, the Antenna must be connected to the Channel 1 Output. The orientation of the Tag is critical, so position the Antenna so that it most suits the orientation of the Tag (**Figure 32**).

A typical installation would be access through a single door.

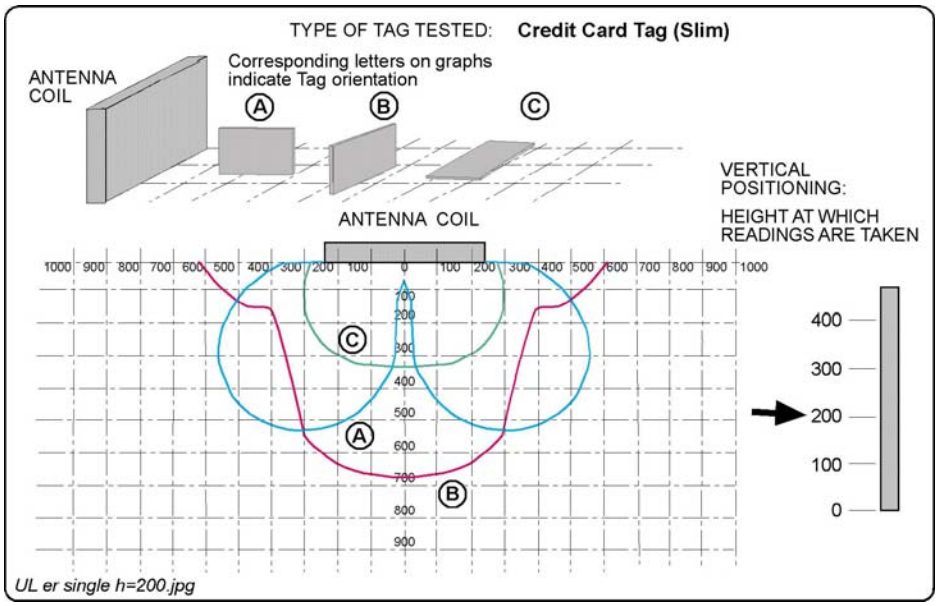


Figure 32: Single Antenna Field Diagram

All drawing dimensions are in millimeters.

Figure 32 *shows the field for ONE side of the Antenna only. Be aware that the field is duplicated on the rear side of the Antenna. This means that you may present a Tag on either side of the Antenna.*

Dual Antenna Installation

In an installation where dual Antennas are used, the Antennas are connected to the Channel 1 and Channel 2 outputs respectively. Phasing of the two Antennas is critical for the best performance of the System. Set the phasing of the Antennas in such a way that most suits the orientation of the Tag (**Figure 33** and **Figure 34**).

A typical installation would be access through a corridor.

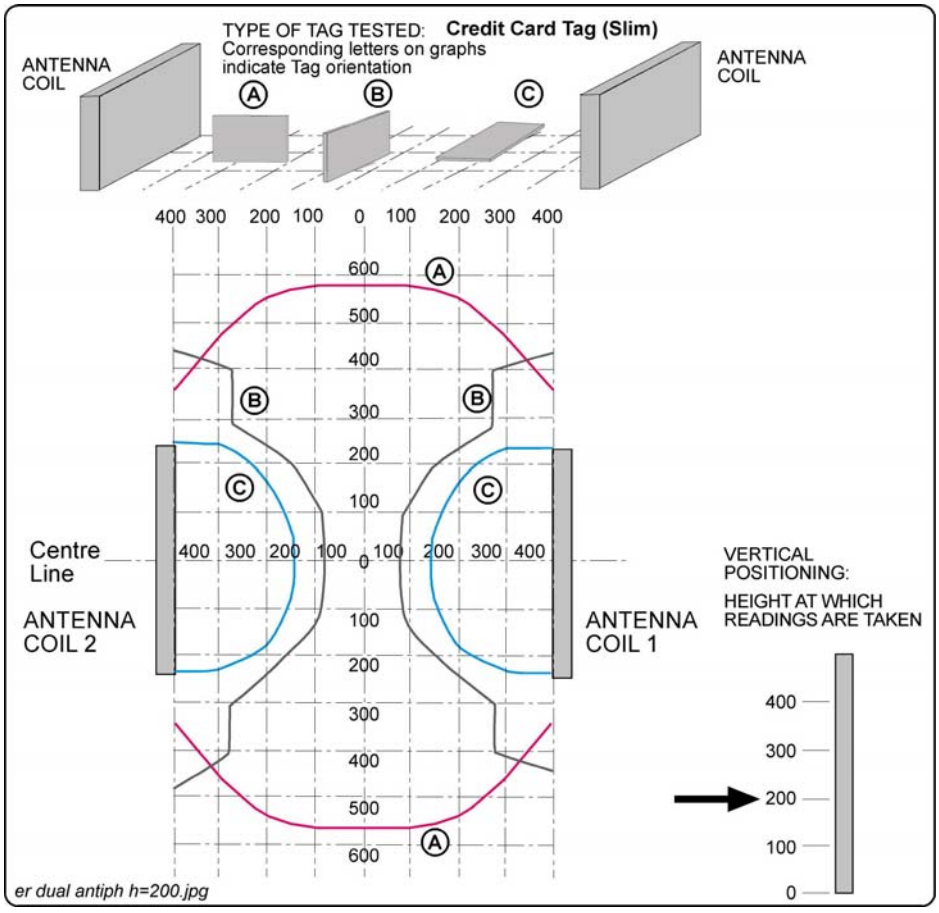


Figure 33: Dual Anti-phase Antenna Field Diagram

All drawing dimensions are in millimeters.

*With the Antennas facing each other, connect the Antenna Phasing Link (LK3) to position 1. This configuration is best for Tag orientation A. (**Figure 35** shows the position of the Antenna Phasing Link).*

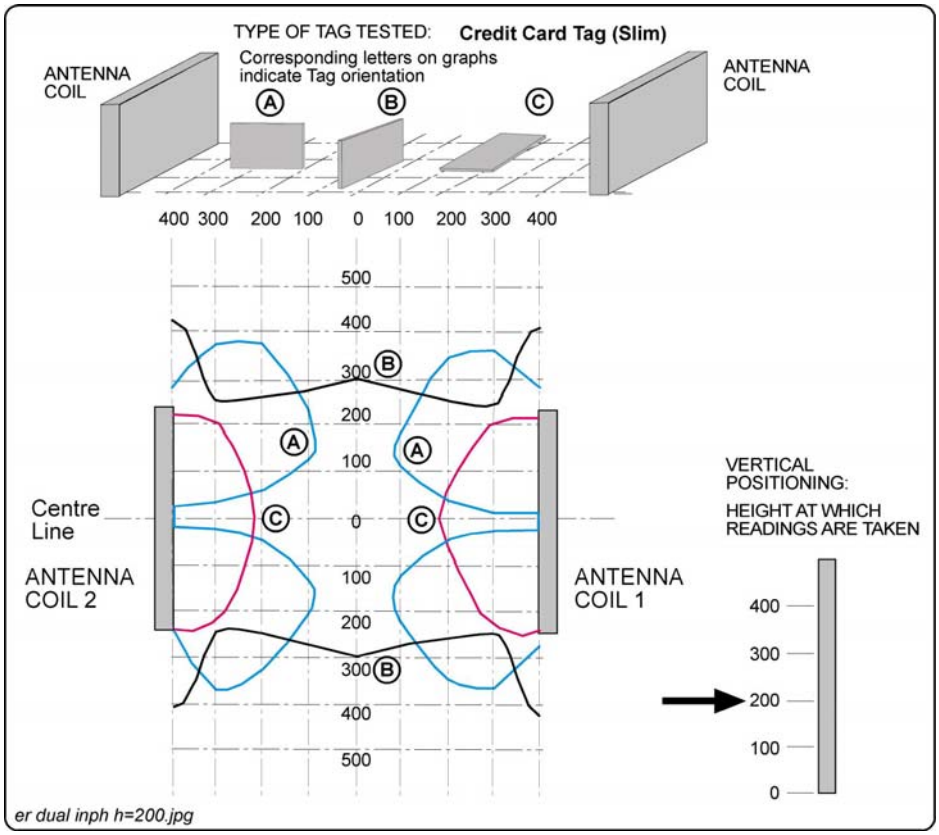


Figure 34: Dual In-phase Antenna Field Diagram

All drawing dimensions are in millimeters.

*For this configuration with the Antennas facing each other, connect the Antenna Phasing Link (LK3) to position 2. This configuration is best for Tag orientation B. (**Figure 35** shows the position of the Antenna Phasing Link).*

Auto-tuning

The ImproX ER is capable of automatically tuning and re-tuning itself if the environment surrounding the Antenna changes. This occurs when a metallic object is placed in the vicinity of the Antenna.

If the metallic object, placed within the Antenna Field, is large or too near the Antenna, you could reach the auto-tuning limit.

Auto-tuning Indicator

We provide a visual indicator on the ImproX ER as an aid in auto-tuning and installing the Terminal. The visual indicator is a low intensity LED indicator located in the ImproX ER Cabinet. There are three tuning states that the Terminal can be in: 'Tuned', 'Busy Tuning' and 'Not Able to Tune'. Each of these states has a visual indication and is described in **Table 13**.

Status	LED State
Tuned	ON
Busy Tuning	Flashing
Not Able to Tune	OFF

Table 13: Auto-tuning Indicators

If the Terminal indicates 'Not Able to Tune', check whether the Antenna is obstructed by, or mounted on, a metallic surface. If so, re-position the Antenna or remove the metallic interference.

Disabling the Auto-tuning Facility

Although the auto-tuning facility is required under normal conditions, disabling the facility is sometimes necessary. This condition is typical, where a Tag is mounted on a metallic object (including vehicles or conveyors) that is constantly moving through the Antenna Field. This prevents the ImproX ER from constantly trying to compensate for the moving metallic object.

1. Install and set up the Terminal and Antenna.
2. Position the metallic object into position and allow the ImproX ER auto-tuning to compensate for the metallic object.
3. Place the jumper over the Tuning Disable Link (LK1). Refer to **Figure 35** for the location of this Link. The ImproX ER will now refrain from auto-tuning.

Once the metallic object is removed from the Antenna Field the Visual Tuning Indicator may switch OFF. This is natural as when the metallic object is re-introduced into the Antenna Field the Antenna will once again be tuned, the Visual Tuning Indicator will switch ON and the Tag will be read optimally.

If the power is removed and then re-introduced to the Terminal and the Tuning Disable Link is in place the Terminal will return to the tuning value stored when the Link was last placed. To resume the auto-tuning facility, remove the Tuning Disable Link.

Failure to Tune

If the Terminal indicates the state 'Not Able to Tune' then check the following:

- Is either of the Antennas obstructed by, or mounted on a metallic object? If so re-position the Antennas or remove the metallic object.
- Is either of the Antenna connectors not properly connected to the ImproX ER?
- Is either of the Antennas damaged?

Electrical Connections

Connecting the ImproX ER

Figure 35 shows a detailed electrical connection diagram for the ImproX ER.

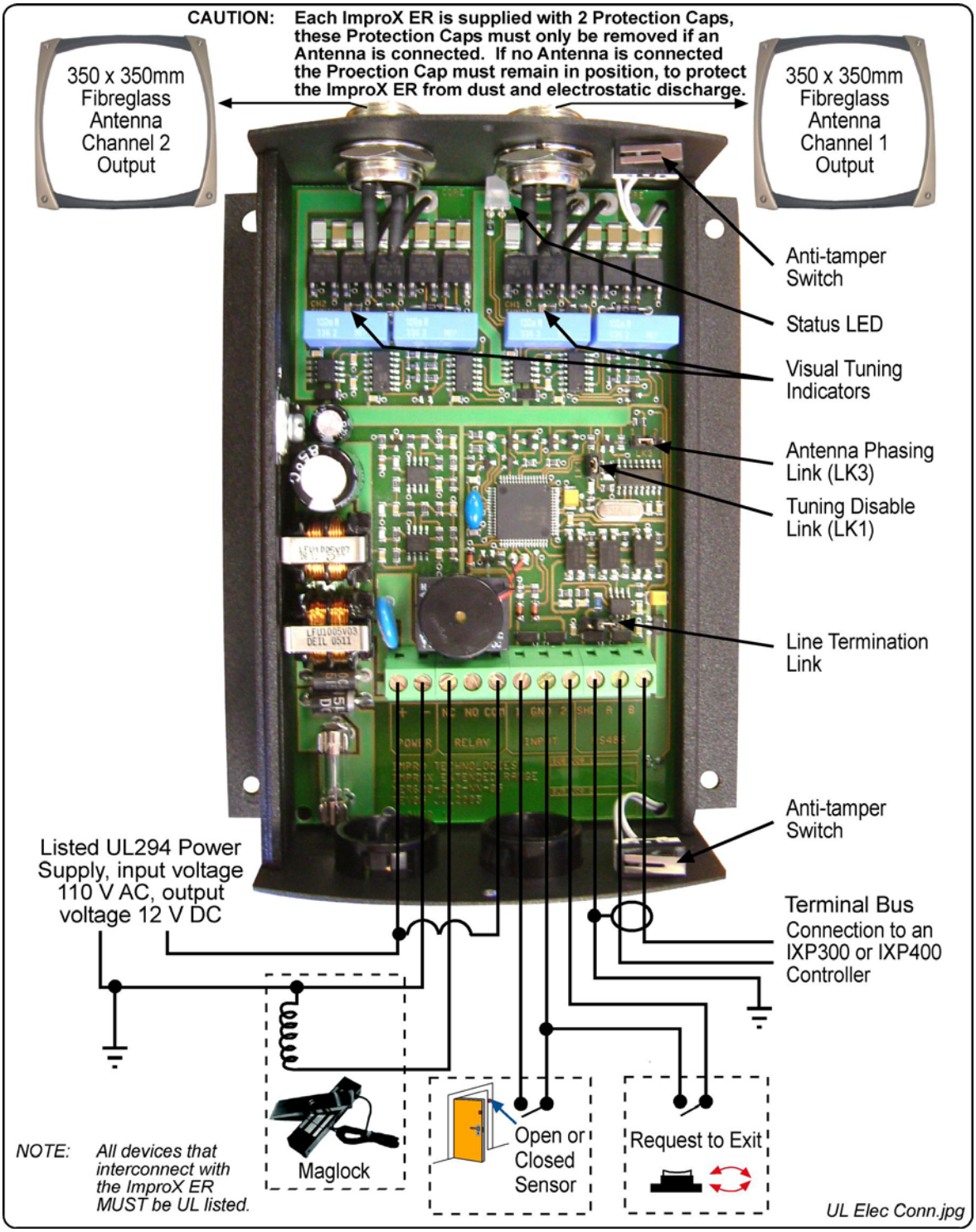


Figure 35: Typical ImproX ER Electrical Connections

Installation Test Mode

As an aid during installation, the ImproX ER contains a test facility to indicate the Tag reading status.

To access the Test Mode do the following:

1. Remove the RS485 communications from the ImproX ER. Wait approximately 10 seconds until the ImproX ER's Status LED indicates a Red intermittent flash.
2. Present Tags to the Antenna. When a Tag is read the Status LED will go solid Green and the Buzzer will emit an audible tone.

To return to normal operation power the ImproX ER down, reconnect the RS485 Bus and power up.

This Test Mode only applies to Firmware version 5.14 and upwards.

Power-on Self-test

The Power-on Self-test tests the RAM, ROM checksums, and Tag read circuitry. The results of the Self-test are made available as diagnostic information, via the protocol, to the associated Controller or PC.

If any parameter in the Self-test fails, the Terminal emits a continuous beep for 2 seconds. When the Terminal passes the Self-test, the Terminal emits two short beeps of 200 ms duration, separated by a 200 ms inter-beep pause.

Fixed Address Label

Once the ImproX ER 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.

Operation and Functionality

The ImproX ER is a Terminal and must be connected to a Controller via comms bus port 1, to function correctly. To read Tags, the XER902 Antenna reader must be connected to the ImproX ER.

Before a Tag can be read, it must first be presented within the specified read range of the Antenna reader. When within range, the ImproX ER decodes the Tag code. Because Terminals do not initiate communication with Controllers, the ImproX ER buffers the Tag code until it is polled by the Controller. Then, it passes the buffered Tag code, as a transaction, to the Controller. The Controller determines whether to allow or deny access based on information in its database.

Next, the Controller instructs the ImproX ER to execute Actions associated with the Allowed or Denied Event. A relay Action is commonly used to drive the access control door hardware (door strike or magnetic lock), to enable physical access through a door.

For details on configuring the ImproX ER via the ImproNet Access software, refer to the **Terminals** section on page **231**.

ImproX I16 16 Channel Input Terminal

The ImproX I16 16 Channel Input Terminal is a general-purpose module, designed to interface with the IXP400 Access Control System via the RS485 Bus Connection.

The ImproX I16 is an Input Terminal, providing sixteen Digital Inputs with optional End of Line Sensors for door open or closed sensing.

The Terminal is housed in a durable Aluminium, Black anodized Cabinet, sealed with ABS Plastic End Plates. The Terminal offers twenty LED Status Indicators; these Status Indicators are visible through the Front End Plate.

Approvals

- CE
- UL294
- FCC Approval Pending

Specifications

Physical

Dimensions	
Length	194 mm (7.63 in).
Width	119.60 mm (4.70 in).
Height	57.60 mm (2.26 in).
Approximate Weight	465 g (1.03 lb).
Cabinet Material	Aluminium.
Colour	Black anodized.

Environmental

Temperature	
Operating	0°C to +49°C (-13°F to +140°F)
Storage	-40°C to +80°C (-40°F to +176°F)
Humidity Range	85 % ±5 % Relative Humidity at 30°C ±2°C (86°F ±3°F)
Approvals (Test Information)	
UL Rating	UL 294.

EMC	EN 55022: Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment. EN 55024: Immunity Characteristics, Limits and Methods of Measurement.
Electrostatic Discharge	EN 61000-4-2: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 2: Electrostatic Discharge Immunity Test. Basic EMC Publication.
Radiated Susceptibility	EN 61000-4-3: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 3: Radiated, Radio-Frequency, Electromagnetic Field Immunity Test.
Electrical Fast Transients	EN 61000-4-4: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 4: Electrical Fast Transients / Bursts. Basic EMC Publication.
Surge Immunity	EN 61000-4-5: Surge Immunity.
Conducted Susceptibility	EN 61000-4-6: Conducted Susceptibility.
Dust and Splash Resistance	Mounted vertically, with the Cable Entry Glands at the lower side, the Terminal is designed to work in an indoor environment similar to IP43.
Drop Endurance	2 m (6.56 ft) drop (in packaging).

Electrical

Power Requirements		
Input Voltage	12 V DC and 24 V DC, polarity sensitive.	
Power Requirements	Current (mA)	Power (W)
Input Voltage 12 V DC Indicators all OFF	45	0.55
Input Voltage 12 V DC Indicators all ON	80	0.96
Input Voltage 24 V DC Indicators all OFF	20	0.47
Input Voltage 24 V DC Indicators all ON	30	0.75
Permissible Input Supply Ripple Voltage (Max)	1 V_{PP} at 50 Hz.	
Power Input Protection	Reverse polarity and over-voltage protection are provided on the Terminal.	
Terminal Bus Port		
Electrical Interface	RS485, ASCII with 16-bit CRC checking.	
Baud Rates	1 200, 2 400, 4 800, 9 600, 19 200, 28 800, 38 400 (default), 57 600 and 76 800 selectable via the Communications Protocol.	
Data Format	8 data bits, no parity, 1 stop bit.	
Communications Protocol	ImproX Secure Communications Protocol.	
Unit Status	Slave.	
Digital Inputs		
Type	16 Dry-contact Digital Inputs.	
Protection Range	+80 V to -80 V single pulse, +35 V to -30 V continuous.	
Memory		

Flash ROM	128 KBytes.
RAM	2 KBytes.
Anti-tamper Switch	Detects the opening of the Terminals Cabinet.

Factory Default Settings

Default Baud Rate	Factory-set to 38 400.
Default Mode	Receive (Slave Mode).

Operator or Installer Interfaces

Status Indicators	
Input Status	16 Green LEDs (Software controllable, indicates when Input is high or low), (externally visible).
Power Polarity Indicator	Red LED (internally visible).
Incoming RS485 Data	Flashing Green LED (externally visible).
Outgoing RS485 Data	Flashing Red LED (externally visible).
Unit Status	Red LED (Software controllable) (externally visible).

Interface Details

RS485 Terminal Bus Port

The RS485 Terminal Bus Port lets you connect the ImproX I16 to other ImproX Terminals and the Controller in your ImproNet System. The interface is made by connecting the 'A' and 'B' lines on the ImproX I16 to the 'A' and 'B' lines on the other ImproX units. Incoming and outgoing information on this Port is shown on the RS485 'TX' and 'RX' LED Status Indicators on the ImproX I16.

Dry Contact Digital Inputs

The ImproX I16 has sixteen Dry Contact Digital Inputs. These Digital Inputs let you interface with a variety of devices such as reed switches, push-buttons and alarm panels (not UL evaluated).

The Digital Inputs should be connected to a dry Normally Open or Normally Closed contact. Digital Inputs are Software configurable in Normal Sensing Mode and in End of Line (EOL) Sensing Mode.

End of Line (EOL) Sensing

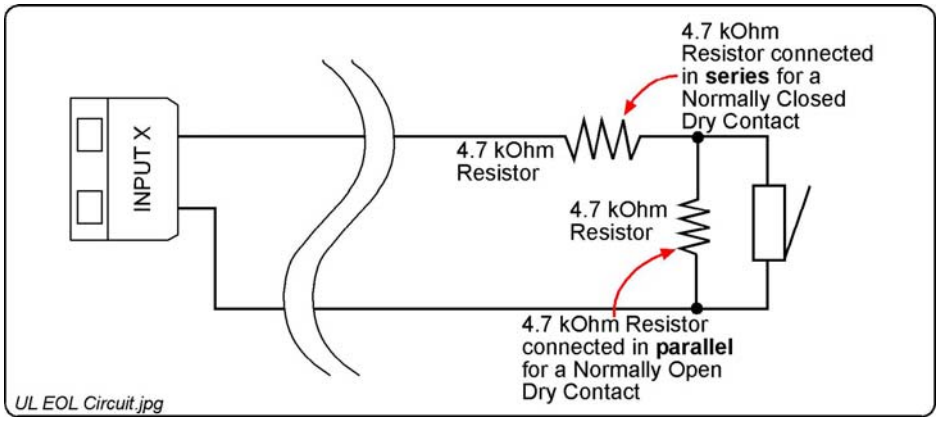


Figure 36 – End of Line (EOL) Sensing Circuit

These Inputs can be individually configured to have End of Line (EOL) Sensing in the Software via the Communications Protocol. With End of Line Sensing active, the Input detects when the input line has gone open or closed circuit. Connect a 4.7 kOhm Resistor either in series with, or in parallel to, the Dry Contact, mounted as close as possible to the Dry Contact for effective End of Line Sensing.

The recommended connection of the Resistor for Normally Closed (NC) and Normally Open (NO) contacts is shown in **Figure 36**. For Normally Closed Dry Contacts, connect the 4.7 kOhm Resistor in series with the contact; while for Normally Open contacts connect the Resistor in parallel with the contact, see **Figure 36**.

Use in the IXP300 and IXP400 System

In the IXP300/400 System, the sixteen Digital Inputs are user configurable (can perform specific tasks such as):

- Door Open Sensing.
- Request to Exit.
- Scanner Inhibit.
- Alarm Interface (not UL evaluated).
- Action Request.

Status Indicators

The Terminals LEDs indicate Bus activity, as an aid in fault finding. Green LEDs indicate incoming Bus activity and Red LEDs indicate outgoing Bus activity; the LEDs flash when data is being received or transmitted on the associated Bus. See **Figure 37** for the positions of the various LEDs.

The Rx and Tx LEDs are continuously on when the Terminal is communicating correctly. If they flash intermittently, there are communication problems. The Relay LEDs indicate when the processor has sent a command for a particular relay to activate.

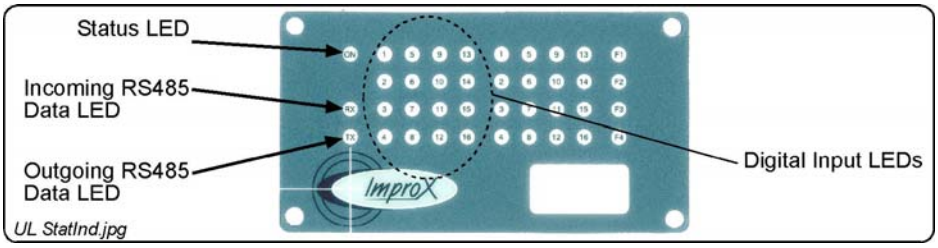


Figure 37 – Position of the Status Indicators on the Front End Plate

Installation Information

Accessories

Find the following when unpacking the ImproX I16 Terminal:

- An ImproX I16 16 Channel Input Terminal housed in a Black powder-coated Aluminium extruded Cabinet. The Cabinet is sealed at each end with a Nylon End Plate, secured with 4 Allen Head Screws (M3 x 12 mm).
- Two Plastic Bushing Plugs (20.6 mm).
- A 2.5 mm Allen Key.
- Four Brass Wood Screws (3.5 mm x 25 mm).
- Four Wall Plugs (7 mm).
- An extra Fixed Address Label.

General

Wire and install the Terminal in accordance with the National Electric Code (ANSI/NFPA 70), local codes, and the authorities having jurisdiction.

- **Communications Distance** – The RS485 communications distance between the first ImproX Controller and the LAST ImproX unit in a cable run, MUST NOT exceed 1 km (1 094 yd). Achieve this by using West Penn D291 22 gauge, stranded, single pair cable with the overall shield EARTHED at one end.

- **Jumper Links for Termination Resistors** – Long transmission lines or multiple 'star' connections, may cause communication problems. Placing a Jumper Link across the jumper [LNK1] in the LAST UNIT AT THE END OF THE CABLE RUN should solve the problem. The termination resistor has a value of 150 ohms.

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

Mounting the ImproX I16

Select the mounting position of the Terminal, considering accessibility, routing of wires and visibility of the externally visible LEDs.

Mounting on a Concrete or Brick Wall

1. Use the Base as a template and mark off the required holes.
2. Drill the four mounting holes using a 7 mm diameter masonry drill bit, to a depth equal to the length of the supplied wall plugs.
3. Insert the wall plugs into the mounting holes.
4. Secure the Base to the surface using the four mounting screws provided.

Mounting on a Hard Wood Surface

1. Use the Base as a template and mark off the required holes.
2. Drill the four mounting holes using a 2.5 mm diameter drill bit to the depth equal to three-quarters of the length of the mounting screws.
3. Secure the Base to the surface using the four mounting screws provided.

Mounting on Metal

Use four suitable securing devices such as screws, nuts and bolts, or rivets to mount the ImproX I16 on a metal surface.

1. Use the Base as a template and mark off the required holes.
2. Drill the four mounting holes using a suitable diameter drill bit.
3. Secure the Base to the surface using the chosen method.

Electrical Connections

Connecting the ImproX I16

Figure 38 shows a detailed connection diagram for the ImproX I16.

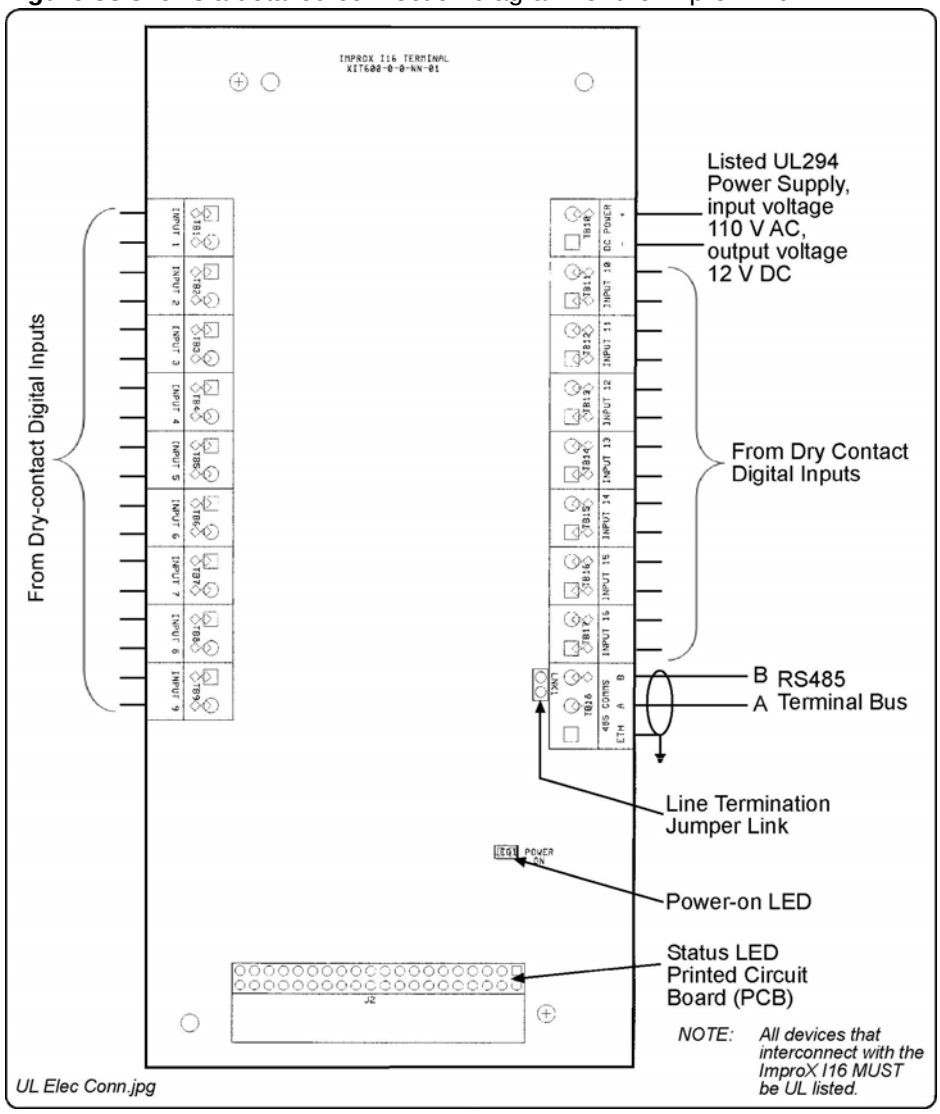


Figure 38 – Typical ImproX I16 Electrical Connections

ImproX I16 Address Information

Each ImproX I16 is allocated a unique Fixed Address at the factory. This address is stored in the Terminals memory. When the Terminal is installed in the ImproNet System, the System allocates a separate Logical Address for communication purposes.

The ImproNet Software Suite allocates a Logical Address to the Terminal, either on initial software start-up, or on request, depending on the system configuration.

Fixed Address Label

Once the ImproX I16 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.

Operation and Functionality

The ImproX I16 is a Terminal and must be connected to a Controller via comms bus port 1, to function correctly.

The I16 has 16 digital inputs that can be configured to report a contact open, or contact closed signal. When the I16 detects one of these conditions, it reports the Event (transaction) to the Controller during the next poll cycle. The Controller then determines the Action to be executed. Examples of this process include a push-button connected to one of the inputs; when the contact signal is received from the push-button, a relay connected to a door strike on another Terminal is activated. Access is then granted.

For details on configuring the ImproX I16 via the ImproNet Access software, refer to the **Terminals** section on page **231**.

ImproX O16 16 Channel Output Terminal

The ImproX O16 16 Channel Output Terminal is a general purpose module, designed to interface with the IXP400 Access Control System via the RS485 Bus Connection.

The ImproX O16 is an Output Terminal, providing sixteen Relays for controlling door strikes and other equipment.

The ImproX O16 is housed in a durable Aluminium, Black anodized Cabinet, sealed with ABS Plastic End Plates. The Terminal offers twenty LED Status Indicators; these Status Indicators are visible through the Front End Plate.

Approvals

- CE
- UL294
- FCC Approval Pending.

Specifications

Physical

Dimensions	
Length	194 mm (7.63 in).
Width	119.60 mm (4.70 in).
Height	57.60 mm (2.26 in).
Approximate Weight	555 g (1.22 lb).
Cabinet Material	Aluminium.
Colour	Black anodized.

Environmental

Temperature	
Operating	0^{o}C to +49^{o}C (-13^{o}F to +140^{o}F)
Storage	-40^{o}C to +80^{o}C (-40^{o}F to +176^{o}F)
Humidity Range	85% ± 5^{o}C relative humidity at +30^{o}C ± 2^{o}C (86^{o}F ± 3 ^{o}F)
Approvals (Test Information)	
UL Rating	UL 294.
EMC	EN 55022: Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment. EN 55024: Immunity Characteristics, Limits and Methods of Measurement.

Electrostatic Discharge	EN 61000-4-2: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 2: Electrostatic Discharge Immunity Test. Basic EMC Publication.
Radiated Susceptibility	EN 61000-4-3: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 3: Radiated, Radio-Frequency, Electromagnetic Field Immunity Test.
Electrical Fast Transients	EN 61000-4-4: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 4: Electrical Fast Transients / Bursts. Basic EMC Publication.
Surge Immunity	EN 61000-4-5: Surge Immunity.
Conducted Susceptibility	EN 61000-4-6: Conducted Susceptibility.
Dust and Splash Resistance	Mounted vertically, with the Cable Entry Glands at the lower side, the Terminal is designed to work in an indoor environment similar to IP43.
Drop Endurance	2 m (6.56 ft) drop (in packaging).

Electrical

Power Requirements		
Input Voltage	**12 V DC and 24 V DC, polarity sensitive.**	
Power Requirements	**Current (mA)**	**Power (W)**
Input Voltage 12 V DC Relays and Indicators all OFF	35	0.42
Input Voltage 12 V DC Relays and Indicators all ON	400	4.8
Input Voltage 24 V DC Relays and Indicators all OFF	20	0.45
Input Voltage 24 V DC Relays and Indicators all ON	160	3.9
Permissible Input Supply Ripple Voltage (Max)	1 V_{PP} at 50 Hz.	
Power Input Protection	Reverse polarity and over-voltage protection are provided on the Terminal.	
Terminal Bus Port		
Electrical Interface	RS485, ASCII with 16-bit CRC checking.	
Baud Rates	1 200, 2 400, 4 800, 9 600, 19 200, 28 800, 38 400 (default), 57 600 and 76 800 selectable via the Communications Protocol.	
Data Format	8 data bits, no parity, 1 stop bit.	
Communications Protocol	ImproX Secure Communications Protocol.	
Unit Status	Slave.	
Relays		
Relay Output	16 Relays, each with NO, COM and NC contacts.	
Contact Rating	1 A at 30 V DC. 1 A at 24 V AC.	
Memory		
Flash ROM	128 KBytes.	

RAM	2 KBytes.
Anti-tamper Switch	Detects the opening of the Terminals Cabinet.

Factory Default Settings

Default Baud Rate	Factory-set to 38 400.
Default Mode	Receive (Slave Mode).
Relays	Off.

Operator or Installer Interfaces

Status Indicators	
Relay Status	16 Red LEDs (On when Relay operates), (externally visible).
Power Polarity Indicator	Red LED (internally visible).
Incoming RS485 Data	Flashing Green LED (externally visible).
Outgoing RS485 Data	Flashing Red LED (externally visible).
Unit Status	Red LED (Software controllable) (externally visible).

Interface Details

RS485 Terminal Bus Port

The RS485 Terminal Bus Port lets you connect the ImproX O16 to other ImproX Terminals and the Controller in your ImproNet System. The interface is made by connecting the ‘A’ and ‘B’ lines on the ImproX O16 to the ‘A’ and ‘B’ lines on the other ImproX units. Incoming and outgoing information on this Port is shown on the RS485 ‘TX’ and ‘RX’ LED Status Indicators on the ImproX O16.

Relays

The ImproX O16 has sixteen independent single-pole, double-throw (SPDT) Relay Outputs. These Relay Outputs let you interface to door strikes, magnetic locks and other third party devices (for example alarm panels or lighting) (not UL evaluated).

Relay functions are user configurable in the IXP300 and IXP400 System.

Status Indicators

The Terminals LEDs indicate Bus activity, as an aid in fault finding. Green LEDs indicate incoming Bus activity and Red LEDs indicate outgoing Bus activity; the LEDs flash when data is being received or transmitted on the associated Bus. See **Figure 39** for the positions of the various LEDs.

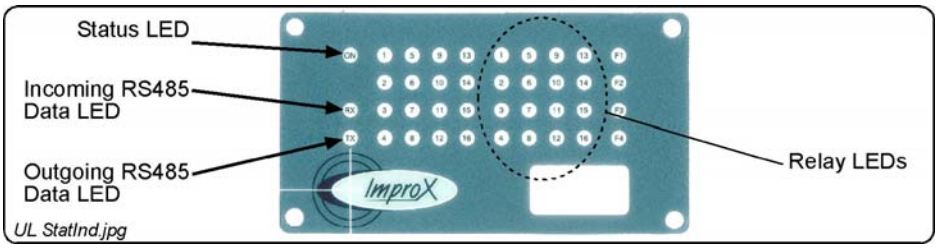


Figure 39 – Position of the Status Indicators on the Front End Plate

Installation Information

Accessories

Find the following when unpacking the ImproX O16 Terminal:

- An ImproX O16 16 Channel Output Terminal housed in a Black powder-coated Aluminium extruded Cabinet. The Cabinet is sealed at each end with a Nylon End Plate, secured with 4 Allen Head Screws (M3 x 12 mm).
- Two Plastic Bushing Plugs (20.6 mm).
- A 2.5 mm Allen Key.
- Four Brass Wood Screws (3.5 mm x 25 mm).
- Four Wall Plugs (7 mm).
- An extra Fixed Address Label.

General

Wire and install the Terminal in accordance with the National Electric Code (ANSI/NFPA 70), local codes, and the authorities having jurisdiction.

- **Communications Distance** – The RS485 communications distance between the first ImproX Controller and the LAST ImproX unit in a cable run, MUST NOT exceed 1 km (1 094 yd). Achieve this by using West Penn D291 22 gauge, stranded, single pair cable with the overall shield EARTHED at one end.

- **Jumper Links for Termination Resistor** – Long transmission lines or multiple ‘star’ connections, may cause communication problems. Placing a Jumper Link across the jumper [LNK1] in the LAST UNIT AT THE END OF THE CABLE RUN should solve the problem. The termination resistor has a value of 150 ohms.

- **EARTH Connection** – Connect the Terminal to a good EARTH point. Using the RS485 Port, connect the EARTH Lead to the ‘ETH’ Terminal. 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 40**.

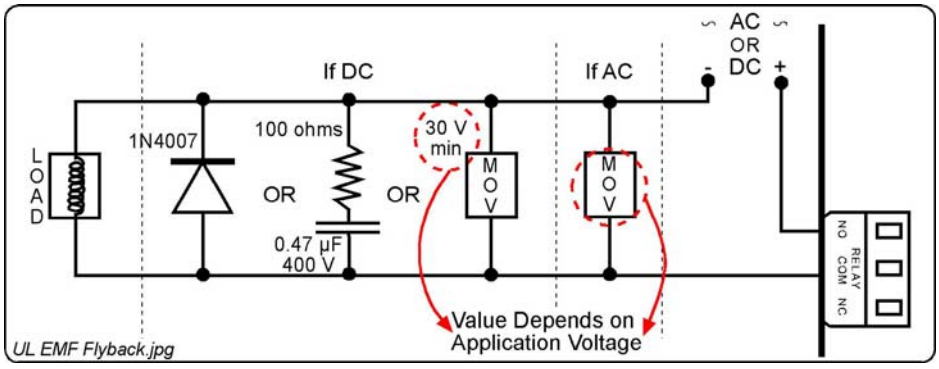


Figure 40 – EMF Flyback and Arc Suppression

Mounting the ImproX O16

Select the mounting position of the Terminal, considering accessibility, routing of wires and visibility of the externally visible LEDs.

Mounting on a Concrete or Brick Wall

1. Use the Base as a template and mark off the required holes.
2. Drill the four mounting holes using a 7 mm diameter masonry drill bit, to a depth equal to the length of the supplied wall plugs.
3. Insert the wall plugs into the mounting holes.
4. Secure the Base to the surface using the four mounting screws provided.

Mounting on a Hard Wood Surface

1. Use the Base as a template and mark off the required holes.
2. Drill the four mounting holes using a 2.5 mm diameter drill bit to the depth equal to three-quarters of the length of the mounting screws.
3. Secure the Base to the surface using the four mounting screws provided.

Mounting on Metal

Use four suitable securing devices such as screws, nuts and bolts, or rivets to mount the ImproX O16 on a metal surface.

1. Use the Base as a template and mark off the required holes.
2. Drill the four mounting holes using a suitable diameter drill bit.
3. Secure the Base to the surface using the chosen method.

Electrical Connections

Connecting the ImproX O16

Figure 51 shows a detailed connection diagram for the ImproX O16.

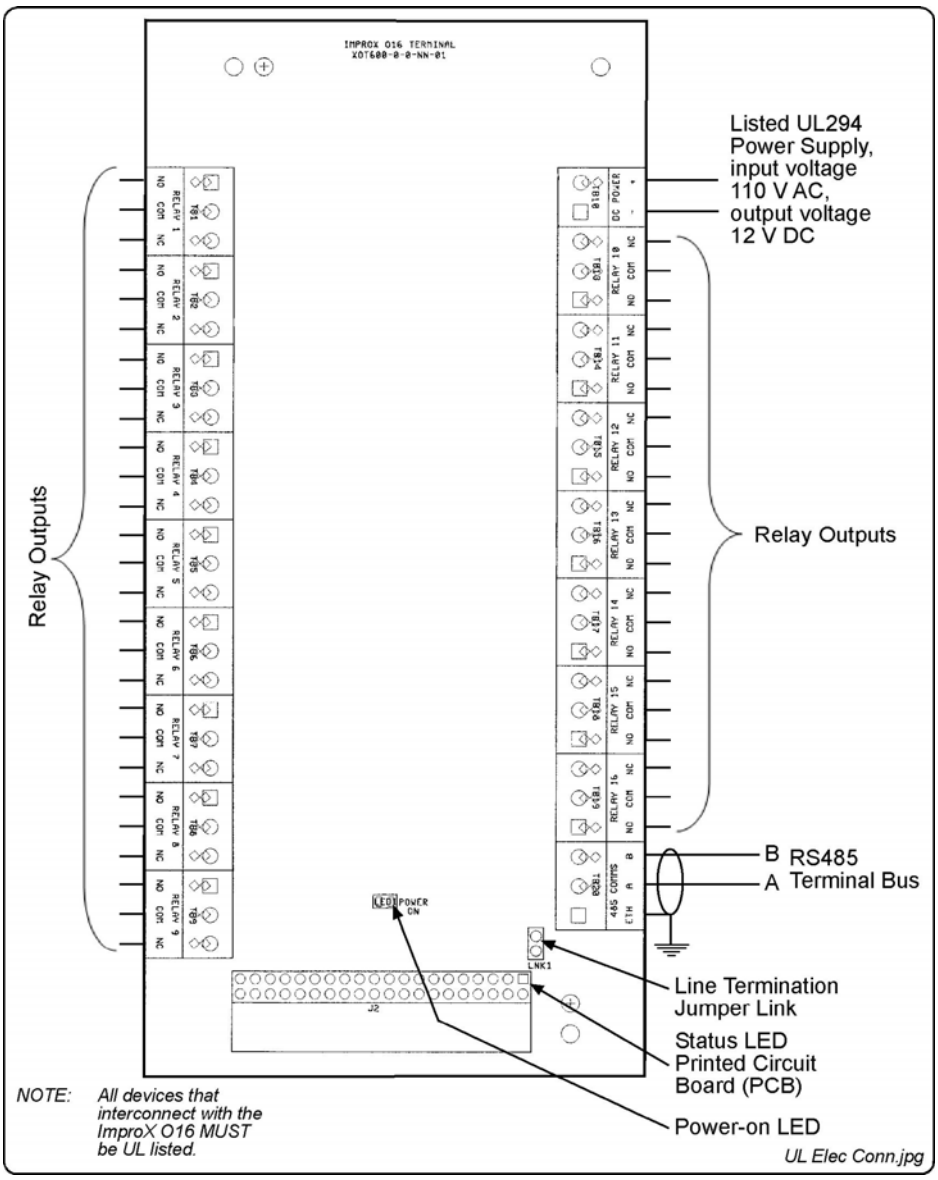


Figure 41 – Typical ImproX O16 Electrical Connections

ImproX O16 Address Information

Each ImproX O16 is allocated a unique Fixed Address at the factory. This address is stored in the Terminals memory. When the Terminal is installed in the ImproNet System, the System allocates a separate Logical Address for communication purposes.

The ImproNet Software Suite allocates a Logical Address to the Terminal, either on initial software start-up, or on request, depending on the system configuration.

Fixed Address Label

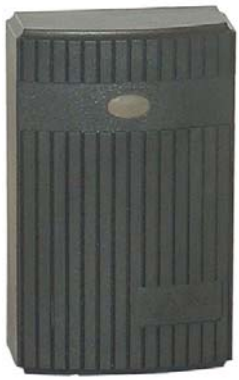
Once the ImproX O16 is installed, sketch a rough site plan. Attach the loose (additional Fixed Address Label packaged with the Terminal) Fixed Address Label in the position of the Terminal on the sketched site plan. When the system installation is complete and all the units are represented on the site plan by their Fixed Address Labels, file the site plan for future reference.

Operation and Functionality

The ImproX O16 is a Terminal and must be connected to a Controller via comms bus port 1, to function correctly.

The O16 has 16 relays. Each relay can be individually configured to activate for a specific system Event or Device Time Pattern via ImproNet Access software. Relays fall into the category of system Actions. For details on configuring relays, refer to the **Actions** section on page **263**.

ImproX MA Micro Antenna Reader



The ImproX (MA) Micro Antenna Reader is a compact Tag Reader for use with an ImproX (TT) Twin Antenna Terminal in the ImproX IXP300 and IXP400 Access Control Systems.

The Antenna Reader includes a single tone Buzzer. You can adjust the Buzzer volume to any one of these four levels (off, low, medium and high). The Antenna Reader includes a single bi-coloured Red or Green Status LED. You can set the functions of the Buzzer and Status LED to suit the needs of your application.

The Antenna Reader is intended for indoor or outdoor (not UL evaluated) use. The electronic components are fully potted in a Dark Grey, ABS Plastic housing. The potting compound prevents vandals tampering with the electronic components.

Tag Read/Write Ranges

Tag Type	Typical Range (Minimum)	
	(mm)	(in)
ISO Credit Card (Slim), 64-bit, Manchester encoded protocol, ASK	60	2.36
Credit Card (Semi Slim), 64-bit, Manchester encoded protocol, ASK	60	2.36
ImproX Credit Card, 64-bit, Manchester encoded protocol, ASK	50	1.96
Key Ring Tag, 64-bit, Manchester encoded protocol, ASK	40	1.58

The distances indicated are for the Antenna Reader mounted on a non-metallic surface. Mounting the Antenna Reader on a metallic surface will reduce the Tag reading range slightly.

Approvals

- CE
- UL294
- FCC Approval Pending.

Specifications

Physical

Dimensions	
Length	88 mm (3.46 in).
Width	54 mm (2.12 in).
Height	25 mm (0.98 in).
Approximate Weight	100 g (0.22 lb).
Housing Material	ABS Plastic.
Colour	Dark Grey.

Environmental

Temperature	
Operating	0°C to +49°C (-13°F to +140°F)
Storage	-40°C to +80°C (-40°F to +176°F)
Humidity Range	85% ± 5°C relative humidity at +30°C ± 2°C (86°F ± 3 °F)
Approvals (Test Information)	
UL Rating	UL 294.
EMC	EN 55022: Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment. EN 55024: Immunity Characteristics, Limits and Methods of Measurement.
Electrostatic Discharge	IEC 61000-4-2: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 2: Electrostatic Discharge Immunity Test. Basic EMC Publication.
Radiated Susceptibility	IEC 61000-4-3: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 3: Radiated, Radio-Frequency, Electromagnetic Field Immunity Test.
Electrical Fast Transients	IEC 61000-4-4: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 4: Electrical Fast Transients / Bursts. Basic EMC Publication.
Surge Immunity	IEC 61000-4-5: Surge Immunity.
Conducted Susceptibility	IEC 61000-4-6: Conducted Susceptibility.
Power Frequency Magnetic Field	IEC 61000-4-8: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 8: Frequency Magnetic Field Immunity Test.
Dust and Splash Resistance	The Antenna Reader is sealed (potted) and is therefore suitable for indoor or outdoor installation in an environment similar to IP53.
Drop Endurance	2 m (6.56 ft) drop (in packaging).

Operator or Installer Interfaces

Buzzer	
Volume and Tone	Single tone, 4-step adjustable volume.
Status Indicators	
Status LED	Bi-coloured Red or Green.

Installation Information

Accessories

Find the following when unpacking the Antenna Reader:

- An ImproX MA Antenna Reader housed in a Dark Grey, ABS Plastic housing. The ImproX MA consists of a Front Cover and a Backing Plate (the Backing Plate is attached with a Self-tapping Screw (M2 x 6 mm)). The Front Cover (including the potted electronic components) assembly includes 2 m (6.56 ft) of West Penn D3652, shielded, 22-gauge, multi-strand, 3-pair twisted cable.
- Four Brass Wood Screws (3.5 mm x 25 mm).
- Four Wall Plugs (7 mm).
- An extra Serial Number Label.

General

Wire and install the Antenna Reader in accordance with the National Electric Code (ANSI/NFPA 70), local codes, and the authorities having jurisdiction.

- **Maximum Data Communications Distance** – The ideal cable distance between the ImproX TT and its Antenna Reader ranges between 2 m to 16 m (7 ft to 53 ft). Achieve this by using West Penn D3652, shielded, 22-gauge, multi-strand, 3-pair twisted cable. The cross-sectional area of the cable must be at least 0.2 mm^2 (0.0003 in^2). The cable specifications should be similar to the following:

  - Conductor Resistance: < 2 ohms.
  - Capacitance, Core to Earth: < 160 pF/m.
  - Capacitance, Core to Core: < 100 pF/m.

- **Distance between Antenna Readers from the SAME Terminal** – To avoid mutual interference, install the Antenna Readers no closer than 150 mm (6 in) apart.

- **Distance between Antenna Readers from DIFFERENT Terminals** – To avoid mutual interference, install the Antenna Readers no closer than 500 mm (20 in) apart.

Mounting the ImproX MA

Select the mounting position of the ImproX MA Antenna Reader, considering accessibility, routing of wires and visibility of the externally visible Status LED.

Secure the ImproX MA to the mounting surface, using four suitable screws and wall plugs, nuts and bolts, rivets. or double-sided adhesive tape (not UL evaluated).

Cable Exit Holes

The Antenna Readers design offers a choice of three cable exit holes. These are:

- Through the top of the Front Cover, see **Figure 42**.
- Through the centre of the Backing Plate, see **Figure 43**.

- Through the bottom of the Backing Plate, see **Figure 43**.

To access these exit holes, remove the Front Cover as follows:

1. Using a screwdriver, remove the Self-tapping Screw (M2 x 6 mm) from the bottom of the Antenna Reader.
2. Lift the bottom edge of the Backing Plate away from the Front Cover.
3. Pull the Backing Plate away until it clears the top of the Front Cover.

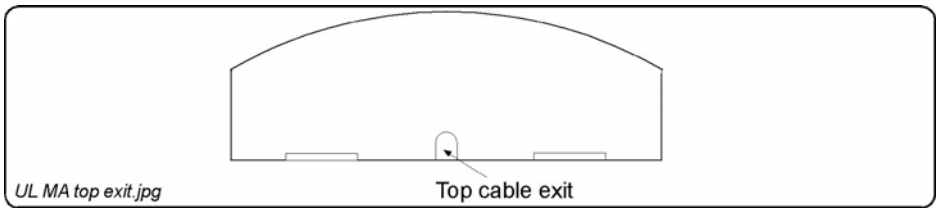


Figure 42 - Top Cable Exit Hole (Front Cover)

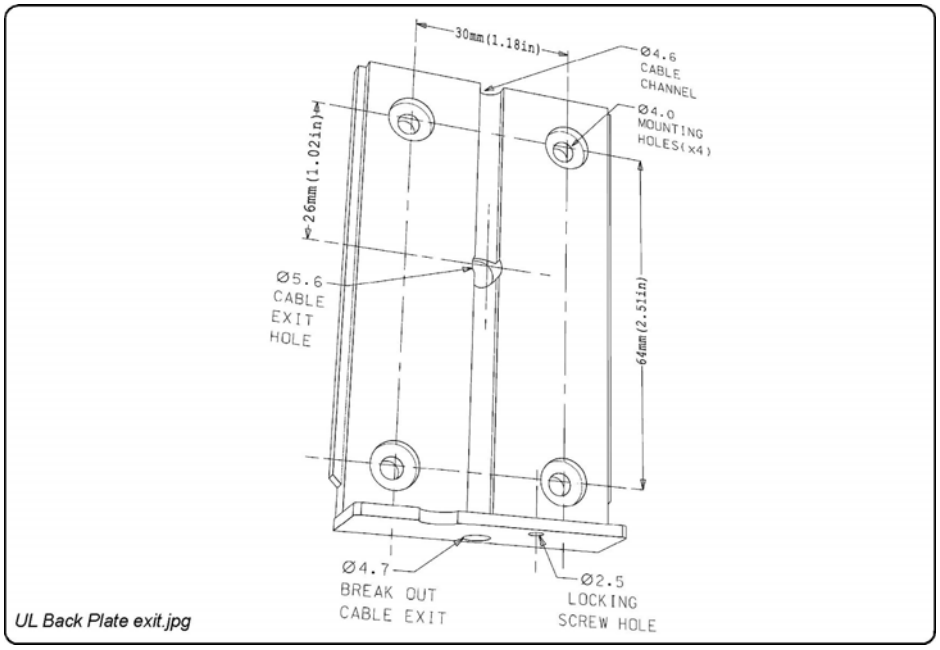


Figure 43 – Backing Plate

If you are going to use the cable exit hole at the centre of the Backing Plate, drill a corresponding hole in the mounting surface. Use the Backing Plate as a template to mark the position for this hole.

If you are going to use the cable exit hole in the bottom of the Backing Plate, remove the central plastic plug from the hole using a screwdriver.

If you are going to use the cable exit hole at the top of the Front Cover, remove the thin plastic wall using a sharp tool.

Mounting on a Concrete or Brick Wall

1. Use the Backing Plate as a template and mark off the required holes.
2. Drill the four mounting holes using a 7 mm diameter masonry drill bit, to a depth equal to the length of the supplied wall plugs.
3. If required, drill the centre hole through the wall (for the cable), using a 5 mm diameter (minimum) masonry drill bit.
4. Insert the wall plugs into the mounting holes.
5. Secure the Backing Plate to the surface using the four mounting screws provided.

Mounting on a Hard Wood Surface

1. Use the Backing Plate as a template and mark off the required holes.
2. Drill the four mounting holes using a 2.5 mm diameter drill bit to the depth equal to three-quarters of the length of the mounting screws.
3. If required, drill the centre hole through the wood (for the cable), using a 5 mm diameter (minimum) drill bit.
4. Secure the Backing Plate to the surface using the four mounting screws provided.

Mounting on Metal

Use four suitable securing devices such as screws, nuts and bolts, or rivets to mount the ImproX MA on a metal surface.

1. Use the Backing Plate as a template and mark off the required holes.
2. Drill the four mounting holes using a suitable diameter drill bit.
3. If required, drill the centre hole through the metal (for the cable), using a 5 mm diameter (minimum) drill bit.
4. Secure the Backing Plate to the surface using the chosen method.

Mounting the Front Cover onto the Backing Plate using the Centre Cable Exit

1. Feed the cable through the centre hole in the Backing Plate, through to the other side of the mounting surface.
2. Pull the cable until the Front Cover meets the Backing Plate.
3. Clip the Front Cover over the top of the Backing Plate.
4. Push the Front Cover towards the Backing Plate until it is in position.
5. Insert the Self-tapping Screw (M2 x 6 mm) through the Backing Plate into the Front Cover, and tighten it.

Mounting the Front Cover onto the Backing Plate using the Top or Bottom Cable Exit

1. Feed the cable via the cable channel to the top or bottom of the Antenna Reader. Ensure that the cable is underneath the securing screw.
2. Clip the Front Cover over the top of the Backing Plate.
3. Push the Front Cover towards the Backing Plate until it is in position.
4. Insert the Self-tapping Screw (M2 x 6 mm) through the Backing Plate into the Front Cover, and tighten it.

Electrical Connections

Connecting the ImproX MA

Figure 44 shows a detailed connection diagram for the ImproX MA.

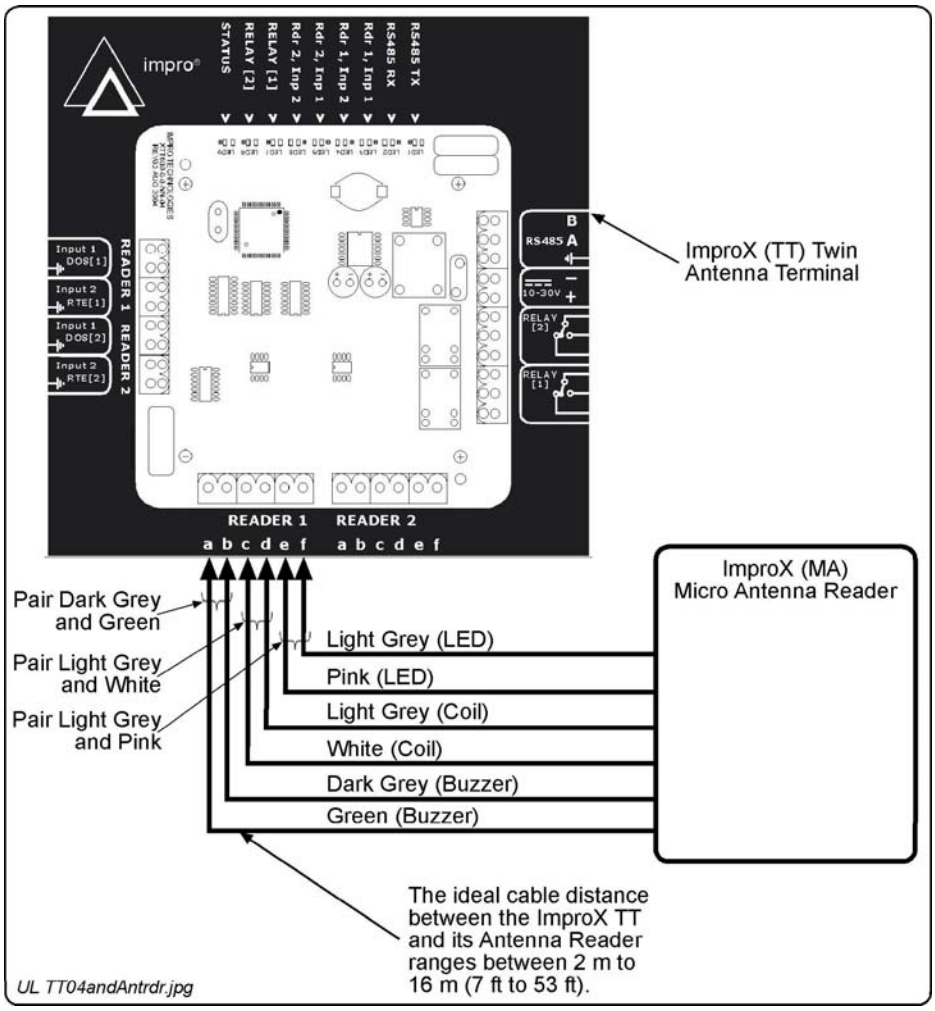


Figure 44: Typical ImproX MA Electrical Connections

Initial Start-up

On powering up, the Antenna Reader will produce a beep sound and the Status LED will illuminate solid Red.

The ImproX MA will not read Tags until configured in the Software.

Serial Number Label

Once the ImproX MA is installed, sketch a rough site plan. The loose Serial Number Label (packaged with the Antenna Reader) should be used (paired) in conjunction with the ImproX TTs Fixed Address Label.

The Antenna Reader does not have its own Fixed Address. When connected to an ImproX TT it is assigned one of the available Fixed Addresses.

The Serial Number Label identifies the type of Antenna Reader, and the Fixed Address Label (shipped with the ImproX TT) identifies the Fixed Address. Both these labels should be attached to the site plan to assist in identifying the hardware once an Auto-ID is performed.

Operation and Functionality

The **ImproX MA Micro Antenna Reader** is supported by the ImproX TT. An Antenna Reader's primary function is to read proximity cards and Tags. Some ImproX Antenna readers have keypads that enable input of PIN codes and reason codes. To function correctly, Antenna readers must be connected to an ImproX TT Terminal. Functionally, Antenna readers are an extension of the ImproX TT terminal; all processing and scanner circuitry is onboard the ImproX TT.

When a Tag is presented within reading range to an Antenna reader, the Antenna reader in combination with the ImproX TT energizes the Tag and decodes the Tag code. During operation and configuration, the ImproX TT and Antenna readers are not seen as separate system components but rather as a single Terminal component. In ImproNet Access Antenna readers are configured as Terminals. Refer to the **Terminals** section on page **231** for details.

ImproX MHA Metal Antenna Reader

The ImproX (MHA) Metal Antenna Reader is a compact Tag Reader for use with an ImproX (TT) Twin Antenna Terminal in the ImproX IXP300 and IXP400 Access Control Systems.

The Antenna Reader includes a single tone Buzzer. You can adjust the Buzzer volume to any one of these four levels (off, low, medium and high). The Antenna Reader includes a single bi-coloured Red or Green Status LED. You can set the functions of the Buzzer and Status LED to suit the needs of your application.

The Antenna Reader is intended for indoor or outdoor (not UL evaluated) use, in harsh environments (not UL evaluated), such as industrial areas. The electronic components are fully potted and housed in a die-cast housing. This enhances its resistance to vandalism or tampering.

Tag Read/Write Ranges

Tag Type	Typical Range (Minimum)	
	(mm)	(in)
ISO Credit Card (Slim), 64-bit, Manchester encoded protocol, ASK	60	2.36
Credit Card (Semi Slim), 64-bit, Manchester encoded protocol, ASK	60	2.36
ImproX Credit Card, 64-bit, Manchester encoded protocol, ASK	50	1.96
Key Ring Tag, 64-bit, Manchester encoded protocol, ASK	40	1.58

The distances indicated are for the Antenna Reader mounted on a non-metallic surface. Mounting the Antenna Reader on a metallic surface will reduce the Tag reading range slightly.

Approvals

- CE
- UL294
- FCC Approval Pending.

Specifications

Physical

Dimensions	
Length	75 mm (2.95 in).
Width	72 mm (2.83 in).
Height	27 mm (1.06 in).
Approximate Weight	220 g (0.48 lb).
Housing Material	Die-cast Zinc Alloy.
Colour	Satin Nickel.

Environmental

Temperature	
Operating	0°C to +49°C (-13°F to +140°F)
Storage	-40°C to +80°C (-40°F to +176°F)
Humidity Range	85% ± 5°C relative humidity at +30°C ± 2°C (86°F ± 3 °F)
Approvals (Test Information)	
UL Rating	UL 294.
EMC	EN 55022: Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment. EN 55024: Immunity Characteristics, Limits and Methods of Measurement.
Electrostatic Discharge	IEC 61000-4-2: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 2: Electrostatic Discharge Immunity Test. Basic EMC Publication.
Radiated Susceptibility	IEC 61000-4-3: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 3: Radiated, Radio-Frequency, Electromagnetic Field Immunity Test.
Electrical Fast Transients	IEC 61000-4-4: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 4: Electrical Fast Transients / Bursts. Basic EMC Publication.
Surge Immunity	IEC 61000-4-5: Surge Immunity.
Conducted Susceptibility	IEC 61000-4-6: Conducted Susceptibility.
Power Frequency Magnetic Field	IEC 61000-4-8: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 8: Frequency Magnetic Field Immunity Test.
Dust and Splash Resistance	The Antenna Reader is sealed (potted) and is therefore suitable for indoor or outdoor installation in an environment similar to IP53.
Drop Endurance	2 m (6.56 ft) drop (in packaging).

Operator or Installer Interfaces

Buzzer	
Volume and Tone	Single tone, 4-step adjustable volume.
Status Indicators	
Status LED	Bi-coloured Red or Green.

Installation Information

Accessories

Find the following when unpacking the Antenna Reader:

- An ImproX MHA Antenna Reader housed in a Zinc alloy die-cast housing. The ImproX MHA consists of a Front Cover and a Backing Plate (the Backing Plate is attached with a Hexagonal Screw (M3 x 8 mm)). The Front Cover (including the potted electronic components) assembly includes 2 m (6.56 ft) of West Penn D3652, shielded, 22-gauge, multi-strand, 3-pair twisted cable.
- An Allen Key (2 mm).
- Four Brass Wood Screws (3.5 mm x 25 mm).
- Four Wall Plugs (7 mm).
- An extra Serial Number Label.

General

Wire and install the Antenna Reader in accordance with the National Electric Code (ANSI/NFPA 70), local codes, and the authorities having jurisdiction.

- **Maximum Data Communications Distance** – The ideal cable distance between the ImproX TT and its Antenna Reader ranges between 2 m to 16 m (7 ft to 53 ft). Achieve this by using West Penn D3652, shielded, 22-gauge, multi-strand, 3-pair twisted cable. The cross-sectional area of the cable must be at least 0.2 mm^2 (0.0003 in^2). The cable specifications should be similar to the following:

  - Conductor Resistance: < 2 ohms.
  - Capacitance, Core to Earth: < 160 pF/m.
  - Capacitance, Core to Core: < 100 pF/m.

- **Distance between Antenna Readers from the SAME Terminal** – To avoid mutual interference, install the Antenna Readers no closer than 150 mm (6 in) apart.

- **Distance between Antenna Readers from DIFFERENT Terminals** - To avoid mutual interference, install the Antenna Readers no closer than 500 mm (20 in) apart.

Mounting the ImproX MHA

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

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

Access the Cable Exit Hole

To access the Cable Exit Hole, remove the Front Cover as follows:

1. Using the 2 mm Allen Key supplied, remove the Hexagonal Screw (M3 x 8 mm) from the bottom of the Antenna Reader.
2. Pull the bottom edge of the Backing Plate away from the Front Cover.
3. Pull down the Front Cover until it clears the top of the Backing Plate.

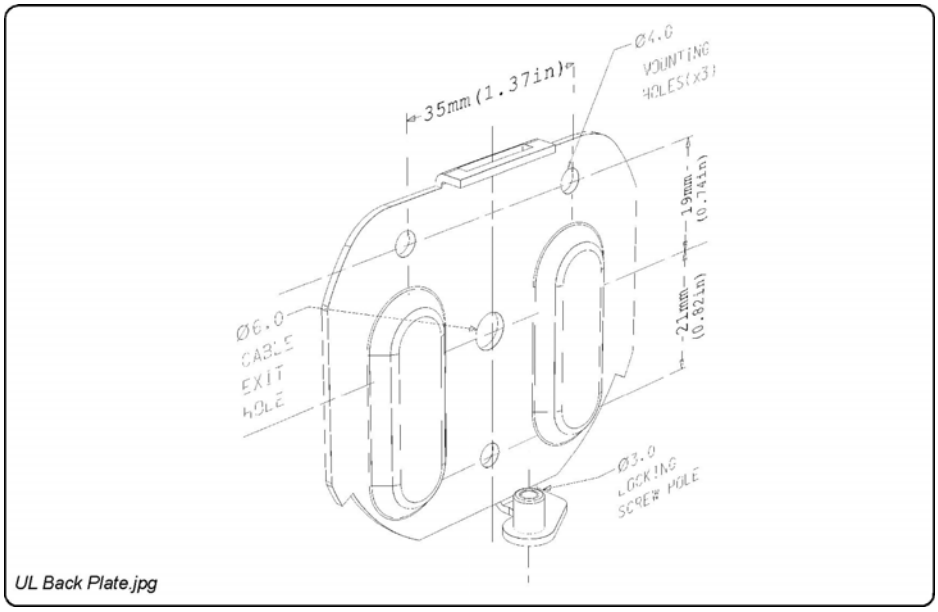


Figure 45 – Backing Plate

Mounting on a Concrete or Brick Wall

1. Use the Backing Plate as a template and mark off the required holes.
2. Drill the four mounting holes using a 7 mm diameter masonry drill bit, to a depth equal to the length of the supplied wall plugs.
3. If required, drill the centre hole through the wall (for the cable), using a 5 mm diameter (minimum) masonry drill bit.
4. Insert the wall plugs into the mounting holes.
5. Secure the Backing Plate to the surface using the four mounting screws provided.

Mounting on a Hard Wood Surface

1. Use the Backing Plate as a template and mark off the required holes.
2. Drill the four mounting holes using a 2.5 mm diameter drill bit to the depth equal to three-quarters of the length of the mounting screws.
3. If required, drill the centre hole through the wood (for the cable), using a 5 mm diameter (minimum) drill bit.
4. Secure the Backing Plate to the surface using the four mounting screws provided.

Mounting on Metal

Use four suitable securing devices such as screws, nuts and bolts, or rivets to mount the ImproX MHA on a metal surface.

1. Use the Backing Plate as a template and mark off the required holes.
2. Drill the four mounting holes using a suitable diameter drill bit.
3. If required, drill the centre hole through the metal (for the cable), using a 5 mm diameter (minimum) drill bit.
4. Secure the Backing Plate to the surface using the chosen method.

Mounting the Front Cover onto the Backing Plate Using the Centre Cable Exit

1. Feed the cable through the centre hole in the Backing Plate, through to the other side of the mounting surface.
2. Pull the cable until the Front Cover meets the Backing Plate.
3. Clip the Front Cover over the top of the Backing Plate.
4. Push the Front Cover towards the Backing Plate until it is in position.
5. Insert the Hexagonal Screw (M3 x 8 mm) through the cover into the Backing Plate. Tighten the Hexagonal Screw (M3 x 8 mm) using the 2 mm Allen Key supplied.

Electrical Connections

Connecting the ImproX MHA

Figure 46 shows a detailed connection diagram for the ImproX MHA.

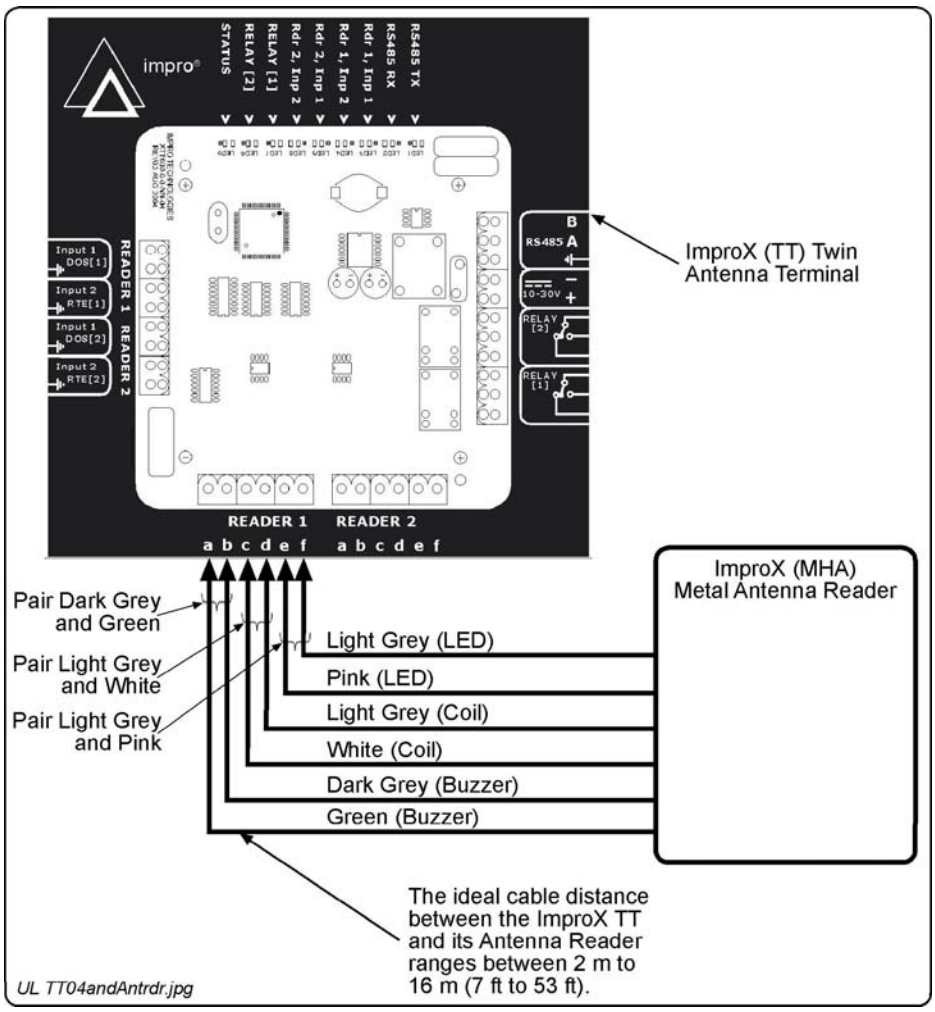


Figure 46: Typical ImproX MHA Electrical Connections

Initial Start-up

On powering up, the Antenna Reader will produce a beep sound and the Status LED will illuminate solid Red.

The ImproX MHA will not read Tags until configured in the Software.

Serial Number Label

Once the ImproX MHA is installed, sketch a rough site plan. The loose Serial Number Label (packaged with the Antenna Reader) should be used (paired) in conjunction with the ImproX TTs Fixed Address Label.

The Antenna Reader does not have its own Fixed Address. When connected to an ImproX TT it is assigned one of the available Fixed Addresses.

The Serial Number Label identifies the type of Antenna Reader, and the Fixed Address Label (shipped with the ImproX TT) identifies the Fixed Address. Both these labels should be attached to the site plan to assist in identifying the hardware once an Auto-ID is performed.

Operation and Functionality

The **ImproX MHA Metal Antenna Reader** is supported by the ImproX TT. An Antenna Reader's primary function is to read proximity cards and Tags. Some ImproX Antenna readers have keypads that enable input of PIN codes and reason codes. To function correctly, Antenna readers must be connected to an ImproX TT Terminal. Functionally, Antenna readers are an extension of the ImproX TT terminal; all processing and scanner circuitry is onboard the ImproX TT.

When a Tag is presented within reading range to an Antenna reader, the Antenna reader in combination with the ImproX TT energizes the Tag and decodes the Tag code. During operation and configuration, the ImproX TT and Antenna readers are not seen as separate system components but rather as a single Terminal component. In ImproNet Access Antenna readers are configured as Terminals. Refer to the **Terminals** section on page **231** for details.

ImproX MMA Mullion Antenna Reader

The ImproX (MMA) Mullion Antenna Reader is a compact Tag Reader for use with an ImproX (TT) Twin Antenna Terminal in the ImproX IXP300 and IXP400 Access Control Systems.

The Antenna Reader includes a single bi-coloured Red or Green Status LED. You can set the function of the Status LED to suit the needs of your application.

The Antenna Reader is intended for indoor or outdoor (not UL evaluated) use. The electronic components are fully potted in a Dark Grey, ABS Plastic housing. The potting compound prevents vandals tampering with the electronic components.

Tag Read/Write Ranges

Tag Type	Typical Range (Minimum)	
	(mm)	(in)
ISO Credit Card (Slim), 64-bit, Manchester encoded protocol, ASK	60	2.36
Credit Card (Semi Slim), 64-bit, Manchester encoded protocol, ASK	60	2.36
ImproX Credit Card, 64-bit, Manchester encoded protocol, ASK	50	1.96
Key Ring Tag, 64-bit, Manchester encoded protocol, ASK	40	1.58

The distances indicated are for the Antenna Reader mounted on a non-metallic surface. Mounting the Antenna Reader on a metallic surface will reduce the Tag reading range slightly.

Approvals

- CE
- UL294
- FCC Approval Pending.

Specifications

Physical

Dimensions	
Length	59 mm (2.32 in).
Width	43 mm (1.69 in).
Height	16 mm (0.62 in).
Approximate Weight	67 g (0.14 lb).
Housing Material	ABS Plastic.
Colour	Dark Grey.

Environmental

Temperature	
Operating	0°C to +49°C (-13°F to +140°F)
Storage	-40°C to +80°C (-40°F to +176°F)
Humidity Range	85% ± 5°C relative humidity at +30°C ± 2°C (86°F ± 3 °F)
Approvals (Test Information)	
UL Rating	UL 294.
EMC	EN 55022: Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment. EN 55024: Immunity Characteristics, Limits and Methods of Measurement.
Electrostatic Discharge	IEC 61000-4-2: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 2: Electrostatic Discharge Immunity Test. Basic EMC Publication.
Radiated Susceptibility	IEC 61000-4-3: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 3: Radiated, Radio-Frequency, Electromagnetic Field Immunity Test.
Electrical Fast Transients	IEC 61000-4-4: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 4: Electrical Fast Transients / Bursts. Basic EMC Publication.
Surge Immunity	IEC 61000-4-5: Surge Immunity.
Conducted Susceptibility	IEC 61000-4-6: Conducted Susceptibility.
Power Frequency Magnetic Field	IEC 61000-4-8: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 8: Frequency Magnetic Field Immunity Test.
Dust and Splash Resistance (not UL evaluated)	Approved for indoor use. The Antenna Reader is sealed (potted) and is therefore suitable for outdoor installation in an environment similar to IP66.
Drop Endurance	2 m (6.56 ft) drop (in packaging).

Operator or Installer Interfaces

Buzzer	
Volume and Tone	Not Applicable.
Status Indicators	
Status LED	Bi-coloured Red or Green.

Installation Information

Accessories

Find the following when unpacking the Antenna Reader:

- An ImproX MMA Antenna Reader housed in a Dark Grey, ABS Plastic housing. The ImproX MMA consists of a Front Cover and a Backing Plate. The Front Cover (including the potted electronic components) assembly includes 2 m (6.56 ft) of West Penn D3652, shielded, 22-gauge, multi-strand, 3-pair twisted cable.
- Four countersunk, Brass Wood Screws (3.5 mm x 25 mm).
- Four Wall Plugs (7 mm).
- An extra Serial Number Label.

You will find the following when unpacking the ImproX MMA accessory pack (XTT901-0-0-UL-99)

- A dark grey, ABS Plastic Backing Plate

General

Wire and install the Antenna Reader in accordance with the National Electric Code (ANSI/NFPA 70), local codes, and the authorities having jurisdiction.

- **Maximum Data Communications Distance** – The ideal cable distance between the ImproX TT and its Antenna Reader ranges between 2 m to 16 m (7 ft to 53 ft). Achieve this by using West Penn D3652, shielded, 22-gauge, multi-strand, 3-pair twisted cable. The cross-sectional area of the cable must be at least 0.2 mm^2 (0.0003 in^2).

- **Cable Specifications** – The cable specifications should be similar to the following:

  - Conductor Resistance: < 2 ohms.
  - Capacitance, Core to Earth: < 160 pF/m.
  - Capacitance, Core to Core: < 100 pF/m.

- **Distance between Antenna Readers from the SAME Terminal** – To avoid mutual interference, install the Antenna Readers no closer than 150 mm (6 in) apart.

- **Distance between Antenna Readers from DIFFERENT Terminals** – To avoid mutual interference, install the Antenna Readers no closer than 500 mm (20 in) apart.

Mounting the ImproX MMA

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

Secure the ImproX MMA to the mounting surface, using two suitable screws and wall plugs, nuts and bolts, rivets or double-sided adhesive tape (not UL evaluated).

Cable Exit Holes

The ImproX MMAs design offers a choice of three cable exit holes. These are:

- Through the centre of the Backing Plate, see **Figure 47**
- Through the top of the Front Cover, see **Figure 48**.
- Through the bottom of the Front Cover, see **Figure 48**

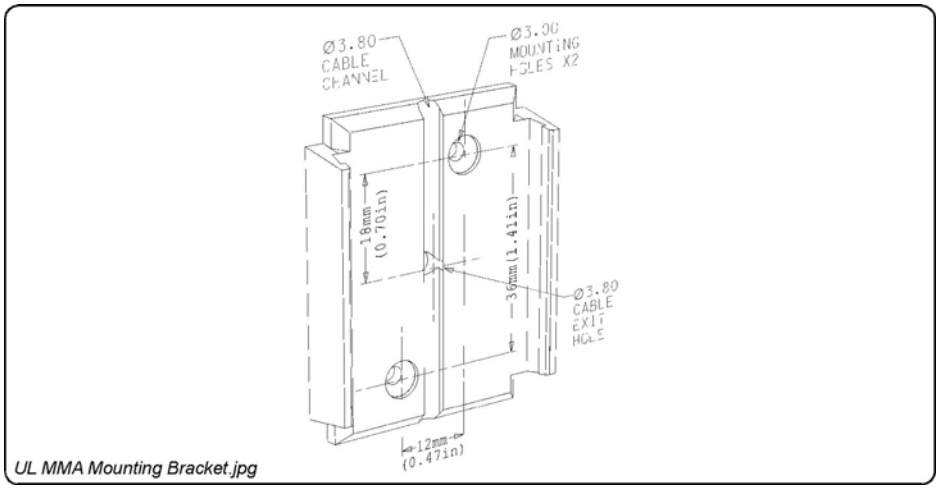


Figure 47 – Backing Plate

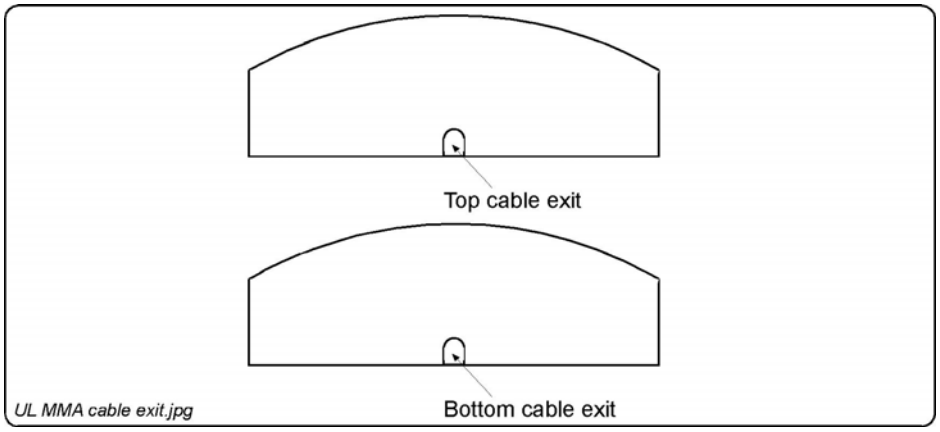


Figure 48 - Cable Exit Holes (Front Cover)

If you are going to use the cable exit hole at the centre of the Backing Plate, drill a corresponding hole in the mounting surface. Use the Backing Plate as a template to mark the position for this hole.

If you are going to use the cable exit hole at the top or bottom of the Front Cover, remove the thin plastic wall using a sharp tool.

Mounting on a Concrete or Brick Wall

1. Use the Backing Plate as a template and mark off the required holes.
2. Drill the two mounting holes using a 7 mm diameter masonry drill bit, to a depth equal to the length of the supplied wall plugs.
3. If required, drill the centre hole through the wall (for the cable), using a 5 mm diameter (minimum) masonry drill bit.
4. Insert the wall plugs into the mounting holes.
5. Secure the Backing Plate to the surface using two of the mounting screws provided.

Mounting on a Hard Wood Surface

1. Use the Backing Plate as a template and mark off the required holes.
2. Drill the two mounting holes using a 2.5 mm diameter drill bit to the depth equal to three-quarters of the length of the mounting screws.
3. If required, drill the centre hole through the wood (for the cable), using a 5 mm diameter (minimum) drill bit.
4. Secure the Backing Plate to the surface using two of the mounting screws provided.

Mounting on Metal

Use four suitable securing devices such as screws, nuts and bolts, or rivets to mount the ImproX MMA on a metal surface.

1. Use the Backing Plate as a template and mark off the required holes.
2. Drill the two mounting holes using a suitable diameter drill bit.
3. If required, drill the centre hole through the metal (for the cable), using a 5 mm diameter (minimum) drill bit.
4. Secure the Backing Plate to the surface using the chosen method.

The Backing Plate and Front Cover clip together firmly, separation is likely to damage the clips.

If it is necessary to separate the Front Cover from the Backing Plate, insert a 5 mm flat head screwdriver between the Front Cover and the Backing Plate (either at the top or bottom end). Apply sufficient force to unclip the Front Cover.

If the Backing Plate is damaged during this process a replacement Backing Plate can be ordered from your local Impro Distributor, using the following part number: XTT901-0-0-UL-99.

Mounting the Front Cover onto the Backing Plate Using the Centre Cable Exit

1. Feed the cable supplied through the centre hole in the Backing Plate, through to the other side of the mounting surface.
2. Pull the cable until the Front Cover meets the Backing Plate.
3. Push the Front Cover towards the Backing Plate until it clips securely.

Mounting the Front Cover onto the Backing Plate Using the Top or Bottom Cable Exit

1. Feed the cable via the cable channel to the top or bottom of the Antenna Reader.
2. Push the Front Cover towards the Backing Plate until it clips securely.

Electrical Connections

Connecting the ImproX MMA

Figure 49 shows a detailed connection diagram for the ImproX MMA.

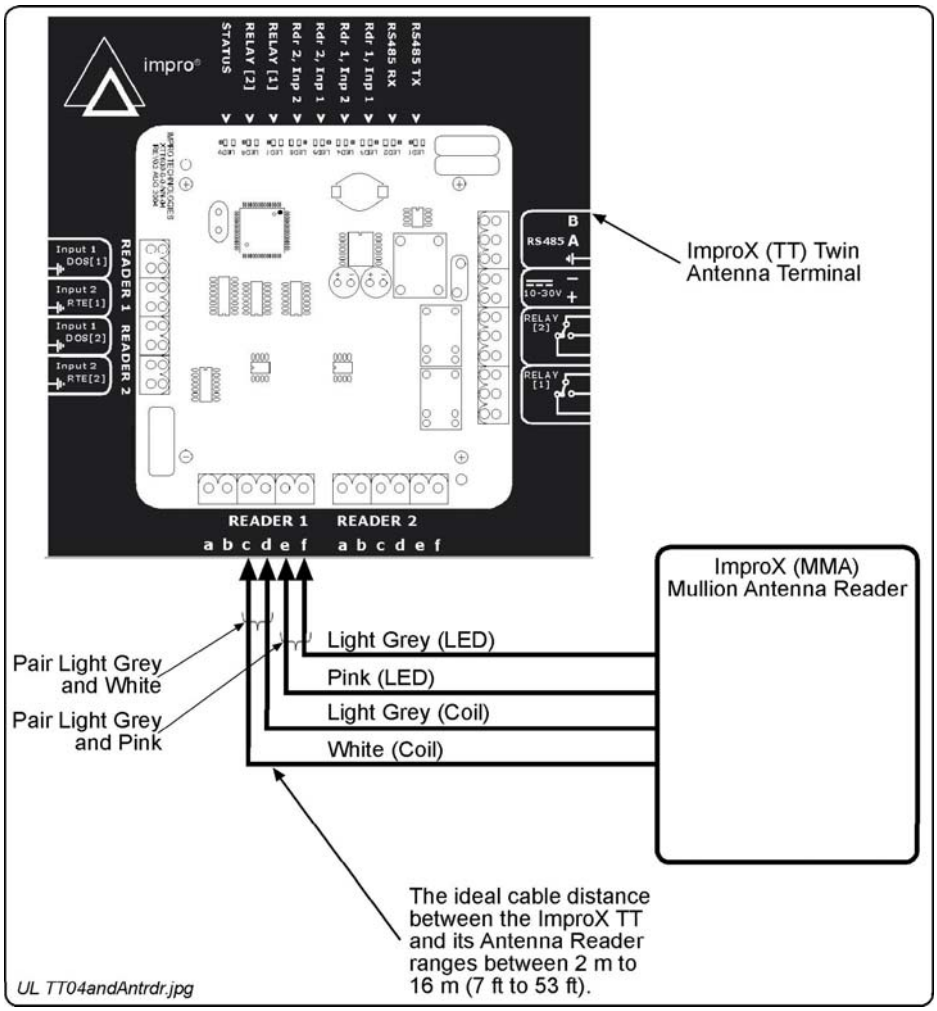


Figure 49 – Typical ImproX MMA Electrical Connections

The ImproX MMA does NOT make use of the Buzzer facility. The ImproX MMA, therefore, does not have the Green and Dark Grey wires and can therefore NOT make use of connections "A" and "B" on the ImproX TT.

Initial Start-up

On powering up, the Antenna Readers Status LED will illuminate solid Red. The ImproX MMA will not read Tags until configured in the Software.

Serial Number Label

Once the ImproX MMA is installed, sketch a rough site plan. The loose Serial Number Label (packaged with the Antenna Reader) should be used (paired) in conjunction with the ImproX TTs Fixed Address Label.

The Antenna Reader does not have its own Fixed Address. When connected to an ImproX TT it is assigned one of the available Fixed Addresses.

The Serial Number Label identifies the type of Antenna Reader, and the Fixed Address Label (shipped with the ImproX TT) identifies the Fixed Address. Both these labels should be attached to the site plan to assist in identifying the hardware once an Auto-ID is performed.

Operation and Functionality

The **ImproX MMA Mullion Antenna Reader** is supported by the ImproX TT. An Antenna Reader's primary function is to read proximity cards and Tags. Some ImproX Antenna readers have keypads that enable input of PIN codes and reason codes. To function correctly, Antenna readers must be connected to an ImproX TT Terminal. Functionally, Antenna readers are an extension of the ImproX TT terminal; all processing and scanner circuitry is onboard the ImproX TT.

When a Tag is presented within reading range to an Antenna reader, the Antenna reader in combination with the ImproX TT energizes the Tag and decodes the Tag code. During operation and configuration, the ImproX TT and Antenna readers are not seen as separate system components but rather as a single Terminal component. In ImproNet Access Antenna readers are configured as Terminals. Refer to the **Terminals** section on page **231** for details.

ImproX KHA Metal Keypad Antenna Reader

The ImproX (KHA) Metal Keypad Antenna Reader is a compact Tag Reader for use with an ImproX (TT) Twin Antenna Terminal in the ImproX IXP300 and IXP400 Access Control Systems.

The Antenna Reader includes a single tone Buzzer, a single bi-coloured Red or Green Status LED and a 12-button alphanumeric Keypad. The Antenna Readers Buzzer volume is adjustable to any one of these four levels (off, low, medium and high). You may use the Keypad for Personal Access Code (PAC), PIN-Code or Reason Code entry. Set the functions of the Buzzer and Status LED to suit the needs of your application.

The Antenna Reader is intended for indoor or outdoor use (not UL evaluated), in harsh environments (not UL evaluated), such as industrial areas. The electronic components are fully potted and housed in a die-cast housing. This enhances its resistance to vandalism or tampering.

Tag Read/Write Ranges

Tag Type	Typical Range (Minimum)	
	(mm)	(in)
ISO Credit Card (Slim), 64-bit, Manchester encoded protocol, ASK	60	2.36
Credit Card (Semi Slim), 64-bit, Manchester encoded protocol, ASK	60	2.36
ImproX Credit Card, 64-bit, Manchester encoded protocol, ASK	50	1.96
Key Ring Tag, 64-bit, Manchester encoded protocol, ASK	40	1.58

Table 14 – Typical Read/Write Ranges

The distances indicated are for the Antenna Reader mounted on a non-metallic surface. Mounting the Antenna Reader on a metallic surface will reduce the Tag reading range slightly.

Approvals

- CE
- UL294
- FCC Approval Pending

Specifications

Physical

Dimensions	
Length	142 mm (5.59 in).
Width	76 mm (2.99 in).
Height	27 mm (1.06 in).
Approximate Weight	510 g (1.12 lb).
Housing Material	Die-cast Zinc Alloy.
Colour	Satin Nickel.

Environmental

Temperature	
Operating	0°C to +49°C (-13°F to +140°F)
Storage	-40°C to +80°C (-40°F to +176°F)
Humidity Range	85% ± 5°C relative humidity at +30°C ± 2°C (86°F ± 3 °F)
Approvals (Test Information)	
UL Rating	UL 294.
EMC	EN 55022: Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment. EN 55024: Immunity Characteristics, Limits and Methods of Measurement.
Electrostatic Discharge	IEC 61000-4-2: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 2: Electrostatic Discharge Immunity Test. Basic EMC Publication.
Radiated Susceptibility	IEC 61000-4-3: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 3: Radiated, Radio-Frequency, Electromagnetic Field Immunity Test.
Electrical Fast Transients	IEC 61000-4-4: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 4: Electrical Fast Transients / Bursts. Basic EMC Publication.
Surge Immunity	IEC 61000-4-5: Surge Immunity.
Conducted Susceptibility	IEC 61000-4-6: Conducted Susceptibility.
Power Frequency Magnetic Field	IEC 61000-4-8: Electromagnetic Compatibility (EMC). Part 4: Testing and Measurement Techniques. Section 8: Frequency Magnetic Field Immunity Test.
Dust and Splash Resistance (not UL evaluated)	Approved for indoor use. The Antenna Reader is sealed (potted) and is therefore suitable for outdoor installation in an environment similar to IP53.
Drop Endurance	2 m (6.56 ft) drop (in packaging).

Operator or Installer Interfaces

Buzzer	
Volume and Tone	Single tone, 4-step adjustable volume.
Status Indicators	
Status LED	Bi-coloured Red or Green.
Keypad	
Keys	12 alphanumeric keys.

Installation Information

Accessories

Find the following when unpacking the Antenna Reader:

- An ImproX KHA Antenna Reader housed in a Zinc alloy die-cast housing. The ImproX KHA consists of a Front Cover and a Backing Plate (the Backing Plate is attached with a Hexagonal Screw (M3 x 8 mm)). The Front Cover (including the potted electronic components) assembly includes 2 m (6.56 ft) of West Penn D3652, shielded, 22-gauge, multi-strand, 3-pair twisted cable.
- An Allen Key (2 mm).
- Four Brass Wood Screws (3.5 mm x 25 mm).
- Four Wall Plugs (7 mm).
- An extra Serial Number Label.

General

Wire and install the Antenna Reader in accordance with the National Electric Code (ANSI/NFPA 70), local codes, and the authorities having jurisdiction.

- **Maximum Data Communications Distance** – The ideal cable distance between the ImproX TT and its Antenna Reader ranges between 2 m to 16 m (7 ft to 53 ft). Achieve this by using West Penn D3652, shielded, 22-gauge, multi-strand, 3-pair twisted cable. The cross-sectional area of the cable must be at least 0.2 mm^2 (0.0003 in^2).

- **Cable Specifications** – the cable specifications should be similar to the following:
  - Conductor Resistance: < 2 ohms
  - Capacitance, Core to Earth: < 160 pF/m
  - Capacitance, Core to Core: < 100 pF/m

- **Distance between Antenna Readers from the SAME Terminal** – To avoid mutual interference, install the Antenna Readers no closer than 150 mm (6 in) apart.

- **Distance between Antenna Readers from DIFFERENT Terminals** – To avoid mutual interference, install the Antenna Readers no closer than 500 mm (20 in) apart.

Mounting the ImproX KHA

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

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

Access the Cable Exit Hole

To access the Cable Exit Hole, remove the Front Cover as follows:

1. Using the 2 mm Allen Key supplied, remove the Hexagonal Screw (M3 x 8 mm) from the bottom of the Antenna Reader.
2. Pull the bottom edge of the Backing Plate away from the Front Cover.
3. Pull down the Front Cover until it clears the top of the Backing Plate.

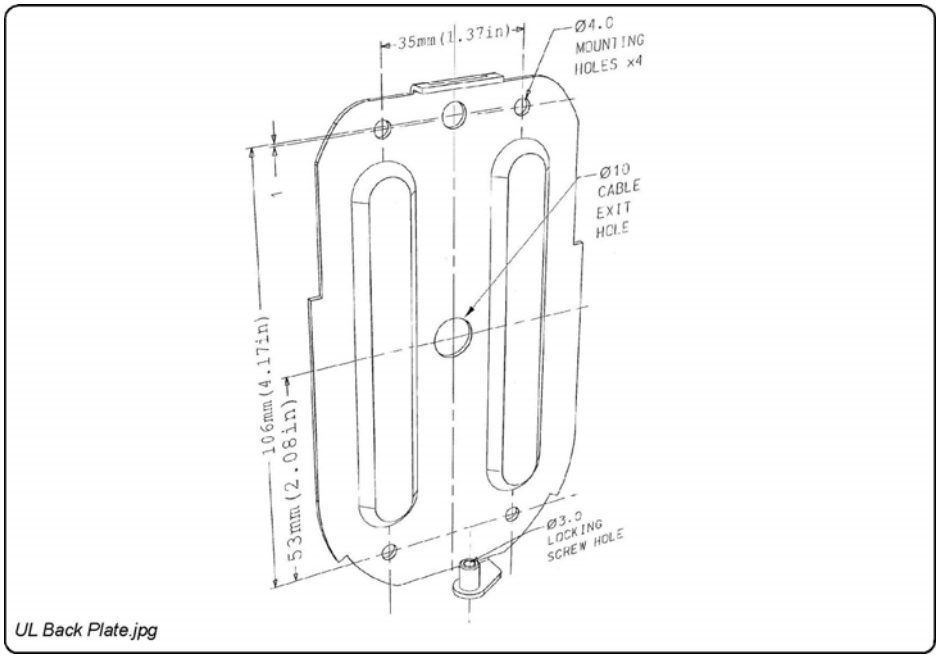


Figure 50: Backing Plate

Mounting on a Concrete or Brick Wall

1. Use the Backing Plate as a template and mark off the required holes.
2. Drill the four mounting holes using a 7 mm diameter masonry drill bit, to a depth equal to the length of the supplied wall plugs.
3. Drill the centre hole through the wall (for the cable), using a 5 mm diameter (minimum) masonry drill bit.
4. Insert the wall plugs into the mounting holes.
5. Secure the Backing Plate to the surface using the four mounting screws provided.

Mounting on a Hard Wood Surface

1. Use the Backing Plate as a template and mark off the required holes.
2. Drill the four mounting holes using a 2.5 mm diameter drill bit to the depth equal to three-quarters of the length of the mounting screws.
3. Drill the centre hole through the wall (for the cable), using a 5 mm diameter (minimum) masonry drill bit.
4. Secure the Backing Plate to the surface using the four mounting screws provided.

Mounting on Metal

Use four suitable securing devices such as screws, nuts and bolts, or rivets to mount the ImproX KHA on a metal surface.

1. Use the Backing Plate as a template and mark off the required holes.
2. Drill the four mounting holes using a suitable diameter drill bit.
3. Drill the centre hole through the wall (for the cable), using a 5 mm diameter (minimum) masonry drill bit.
4. Secure the Backing Plate to the surface using the chosen method.

Mounting the Front Cover onto the Backing Plate

1. Feed the cable through the centre hole in the Backing Plate, through to the other side of the mounting surface.
2. Pull the cable until the Front Cover meets the Backing Plate.
3. Clip the Front Cover over the top of the Backing Plate.
4. Push the Front Cover towards the Backing Plate until it is in position.
5. Insert the Hexagonal Screw (M3 x 8 mm) through the cover into the Backing Plate. Tighten the Hexagonal Screw (M3 x 8 mm) using the 2 mm Allen Key supplied.

Electrical Connections

Connecting the ImproX KHA

Figure 51 shows a detailed connection diagram for the ImproX KHA.

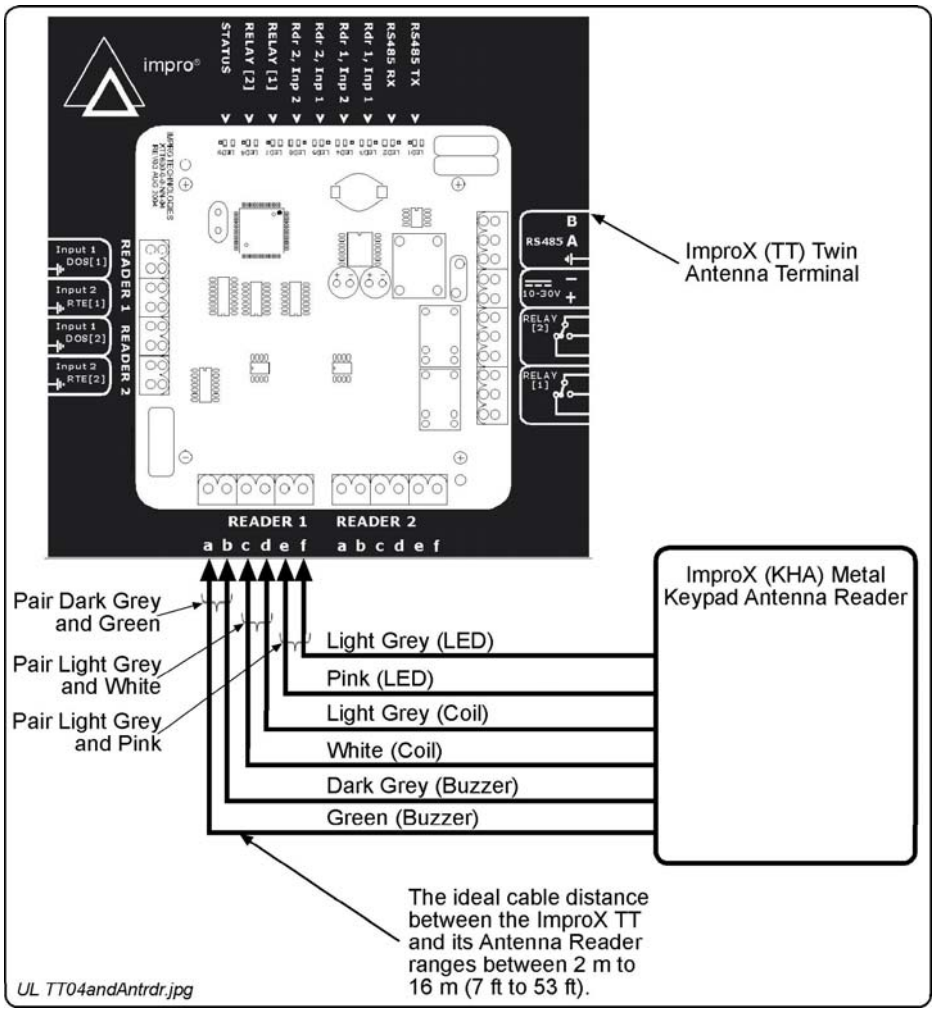


Figure 51 – Typical ImproX KHA Electrical Connections

Initial Start-up

On powering up, the Antenna Reader will produce a beep sound and the Status LED will illuminate solid Red. The ImproX KHA will not read Tags until configured in the Software.

Serial Number Label

Once the ImproX KHA is installed, sketch a rough site plan. The loose Serial Number Label (packaged with the Antenna Reader) should be used (paired) in conjunction with the ImproX TT's Fixed Address Label.

The Antenna Reader does not have its own Fixed Address. When connected to an ImproX TT it is assigned one of the available Fixed Addresses.

The Serial Number Label identifies the type of Antenna Reader, and the Fixed Address Label (shipped with the ImproX TT) identifies the Fixed Address. Both these labels should be attached to the site plan to assist in identifying the hardware once an Auto-ID is performed.

Operation and Functionality

The **ImproX KHA Metal Keypad Antenna Reader** is supported by the ImproX TT. An Antenna Reader's primary function is to read proximity cards and Tags. Some ImproX Antenna readers have keypads that enable input of PIN codes and reason codes. To function correctly, Antenna readers must be connected to an ImproX TT Terminal. Functionally, Antenna readers are an extension of the ImproX TT terminal; all processing and scanner circuitry is onboard the ImproX TT.

When a Tag is presented within reading range to an Antenna reader, the Antenna reader in combination with the ImproX TT energizes the Tag and decodes the Tag code. During operation and configuration, the ImproX TT and Antenna readers are not seen as separate system components but rather as a single Terminal component. In ImproNet Access Antenna readers are configured as Terminals. Refer to the **Terminals** section on page **231** for details.

Hardware Maintenance

Maintenance Overview

Periodic hardware maintenance ensures the following:

- Units continue to run efficiently
- Problems requiring attention are noted

Impro does not support on-site repairs. Should an ImproX unit fail, return it to your local Impro Distributor. They will repair or replace the unit.

*For the **Impro USA contact details**, refer to the front inside cover of this document.*

Basic Maintenance

Cleaning Unit Housing

Wipe unit with a damp cloth. Do not use detergents or solvents.

Cleaning Inside Unit

Use a high-pressure air hose to clean *inside* ImproX unit.

Do not use water, detergents, or other chemicals inside an ImproX unit.

Maintenance Tools

Software – ImproNet Firmware Upgrade utility

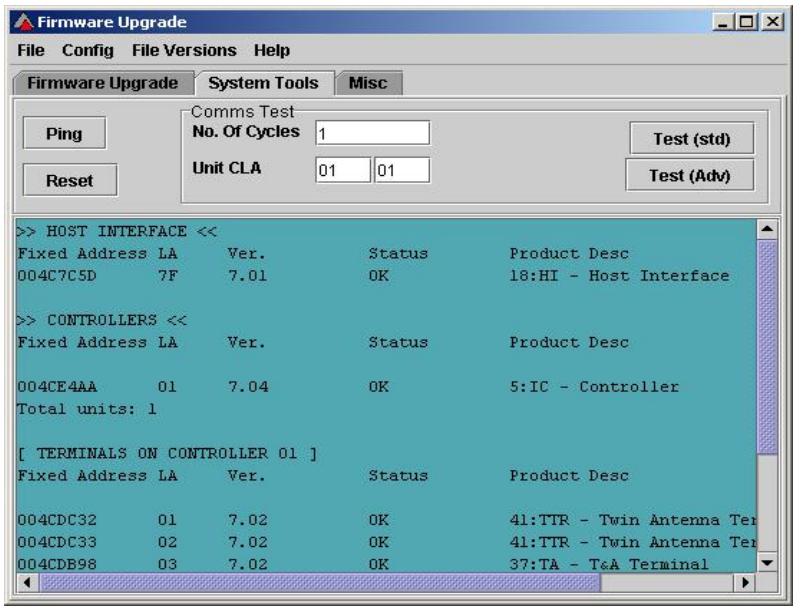
The following functions in the **ImproNet Firmware Upgrade** utility can be used for maintenance and fault-detection in ImproX hardware:

- **Ping test** – indicates the installed ImproX hardware that is communicating on the comms busses. The Ping test detects the comms interface, Controllers, and Terminals. Refer to the **Firmware Upgrade** section on **303** for operational details.

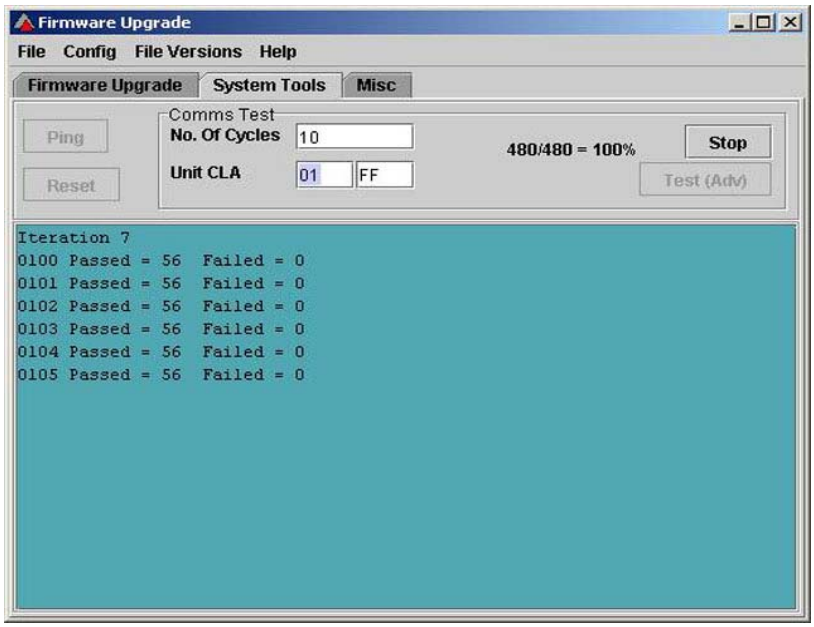
- **Comms Test** – run to determine the quality of communications on the Controller comms bus (Port 2), and Terminal comms bus (Port 1). To prevent potential communications errors, tested units should return a pass of 100 percent. A pass rate less than 100 percent indicates potential problems with the hardware or communications media.

Performing a Comms Test

*You must perform a Ping Test **before** you run a comms test.*



- The **No. of Cycles** field specifies the number of times that the Comms test cycles through sending and receiving data packets from units.
- The **Test (std)** button displays the Comms Test window in a simple format.
- The **Test (Adv)** button displays the Comms Test window in a detailed grid format



Hardware Diagnostics

- **Onboard LEDs** – Some ImproX hardware devices have onboard LEDs that indicate the communication, inputs, and relays statuses. Therefore, LEDs are a useful in field-diagnostic tools when Host PC is unavailable. Various diagnostic options are discussed later in this chapter.

Hardware Testing

Communications

- **Ping test** – used to test whether a connection between units or the Host PC is present. Details are provided for each unit in the **Specific Maintenance** section on page **163**.

- **Onboard diagnostic LEDs** – units display communication status via onboard LEDs. This is useful if you are working on the unit or do not have access to the Host PC.

Card Reading

Test the read range of a Reader by presenting a Card form a distance and moving it closer to the Reader. When the card is read, the Reader beeps or flashes its LED depending on its features and settings. Refer to the **ImproX TT** section on page **166** for more details.

Buzzer

Units with buzzers make a *beep* sound on presentation of a Tag. However, the buzzer must be enabled via the ImproNet Access software application to work.

LEDs

LEDs provide a visual indicator for unit communication status and Tag reading status.

Specific Maintenance

ImproX RH

- **Ping Test** – use the **Firmware Upgrade** utility to run a Ping test. Ensure that the unit responds.
- **Comms Test** – use the **Firmware Upgrade** utility to run a Comms test. This ensures that communication between the unit and Host PC is present.
- **Diagnostic LEDs:**
  - **USB LED** illuminates when ImproNet Engine is polling
  - **RS485 LED** illuminates when communication is established between the Controller and the ImproX RH
- **POST Test** – on power-up, the Controller automatically runs a **Power On Self Test** (POST). During this test, the diagnostics LEDs indicate unit status.

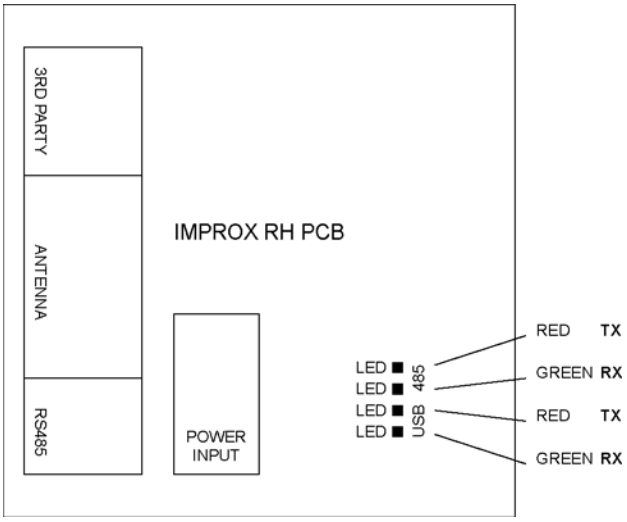


Figure 52 - ImproX RH Diagnostic LEDs

ImproX RRA

- **Tag Reading Test** – place a Tag on the unit. In ImproNet Access, create a new Tag Holder. Select **Read Tag**. The Tag's number should display in **Tag Code** textbox. Refer to the **Add or Edit a Tag Holder** section on page **251** for details.
- **POST Test** – on power-up, the Reader automatically runs a **Power On Self Test** (POST). During this test, the LED illuminates RED and the buzzer beeps.

The LED changes from red to green, and the buzzer beeps when a Tag is read.

ImproX IC

- **Ping Test** – use the **Firmware Upgrade** utility to run a Ping test. Ensure that the Controller responds.
- **Comms Test** – use the **Firmware Upgrade** utility to run a Comms test. This ensures that communication between the Controller and Host PC is present.
- **Onboard LEDs** provide real-time indication of communication status for Port 1 (Terminal) and Port 2 (Controller) comms busses. When you have configured the attached Terminals in ImproNet Access, LEDs 2, 3, 4, and 5 are permanently on.
  - **LEDs 2** and **3** indicate that the Controller is sending and receiving information from its Terminals. Intermittently flashing LEDs indicate potential communication problems; probable causes are bad wiring bad wiring, induced noise on the comms bus, or faulty Terminals on the comms bus.
  - **LEDs 4** and **5** indicate the Controller comms bus state. If both LEDs are on, there is good communication between the ImproX HI (not UL evaluated) and the ImproX RH. The LEDs are off if the HI or RH is offline.
- **Power LED** – remove power form unit. Reconnect power to unit – the power LED illuminates when sufficient voltage is available.

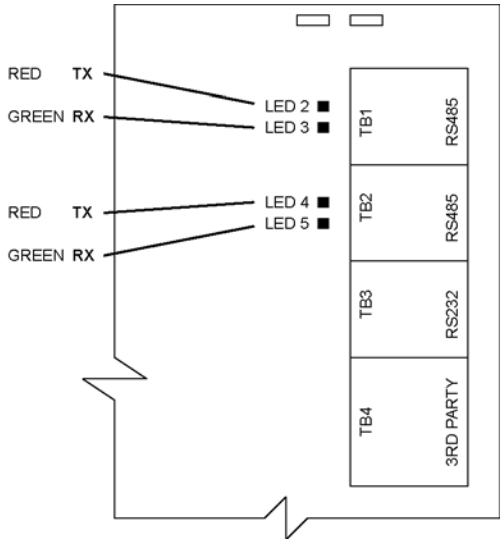


Figure 53 - ImproX IC Diagnostic LEDs

ImproX AC

- **Ping Test** – use the **Firmware Upgrade** utility to run a Ping test. Ensure that the Controller responds.
- **Comms Test** – use the **Firmware Upgrade** utility to run a Comms test. This ensures that communication between the Controller and Host PC is present.
- **Onboard LEDs** provide real-time indication of communication status for Port 1 (Terminal) and Port 2 (Controller) comms busses. When you have configured the attached Terminals in ImproNet Access, LEDs 1, 2, 3, and 4 are permanently on.
  - **LEDs 1** and **2** indicate that the Controller is sending and receiving information from its Terminals. Intermittently flashing LEDs indicate potential communication problems; probable causes are bad wiring bad wiring, induced noise on the comms bus, or faulty Terminals on the comms bus.
  - **LEDs 3** and **4** indicate the Controller comms bus state. If both LEDs are on, there is good communication between the ImproX HI (not UL evaluated) Interface and the ImproX RH. The LEDs are off if the ImproX HI or ImproX RH is offline.

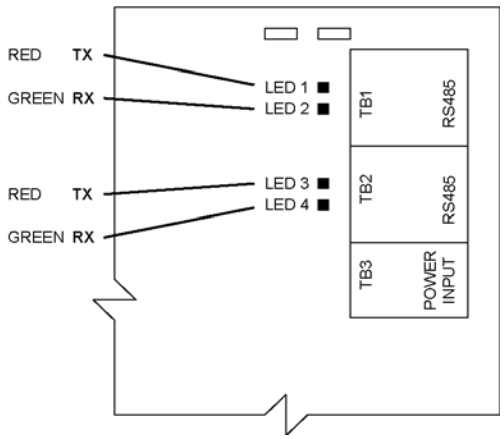


Figure 54 - ImproX IC Diagnostic LEDs

ImproX TT

- **Ping Test** – use the **Firmware Upgrade** utility to run a Ping test. Ensure that the Terminal responds.
- **Comms Test** – use the **Firmware Upgrade** utility to run a Comms test. This ensures that communication between the Terminal and Controller is present.
- **POST Test** – on power-up, the Terminal automatically runs a **Power On Self Test** (POST). POST tests the RAM and Flash Checksums, and the Read/Write Circuitry. The results of the POST are available as diagnostic information from the Controller or PC.
  - If a parameter fails, the antenna Reader emits a continuous beep for 2 seconds
  - When POST is complete, the Terminal emits two short beeps
- **Onboard Diagnostic LEDs:**
  - RS485 Rx and Tx.
  - Reader 1 and 2, Input 1 and 2.
  - Relay 1 and 2.
  - Status LED.
- **Test Mode –** Tests Readers attached to ImproX TT. This mode indicates when a Tag is in range and being read by the Reader.

  To access Test Mode, remove the RS485 communications cable from the ImproX TT. Wait for approximately 10 seconds until the red LED on the Antenna attached to the ImproX TT flashes intermittently. Present a Tag to the Reader. When the Tag is read the LED changes to solid red and the buzzer emits a continuous, long beep while the Tag is in range. Use this procedure to verify that a Reader is reading a Tag, or to determine the Tag reading range.

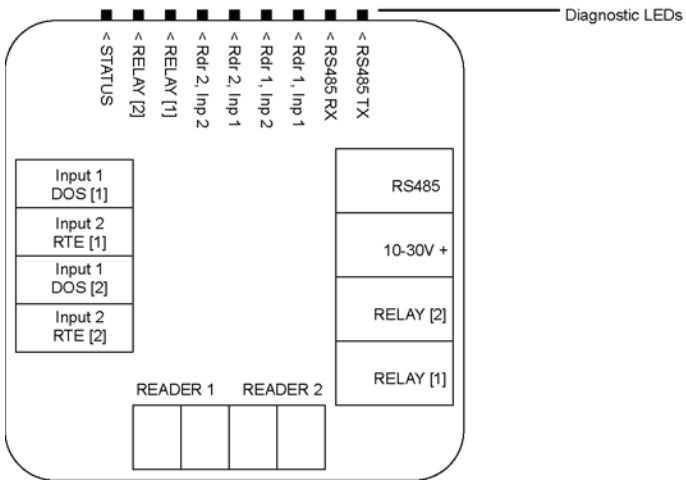


Figure 55 - ImproX TT Diagnostic LEDs

ImproX O16

- **Ping Test** – use the **Firmware Upgrade** utility to run a Ping test. Ensure that the Terminal responds.
- **Comms Test** – use the **Firmware Upgrade** utility to run a Comms test. This ensures that communication between the Terminal and Controller is present.
- **Status LEDs** – Terminal bus comms is correct if the green LED and the Red LED on the Terminal are flashing. The Rx and Tx LEDs are continuously on when the Terminal is communicating correctly. If they flash intermittently, there are communication problems.

The Relay LEDs indicate when the processor has sent a command for a particular relay to activate.

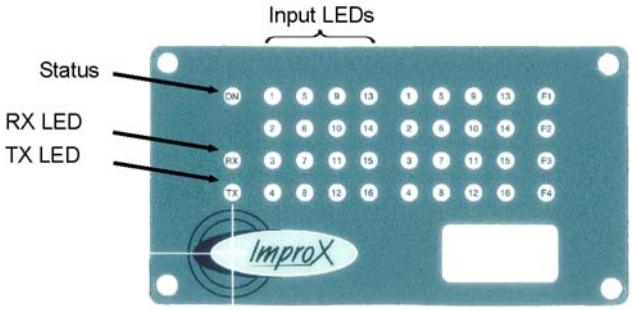


Figure 56 – Position of the Status Indicators on the Front End Plate

ImproX I16

- **Ping Test** – use the **Firmware Upgrade** utility to run a Ping test. Ensure that the Terminal responds.
- **Comms Test** – use the **Firmware Upgrade** utility to run a Comms test. This ensures that communication between the Terminal and Controller is present.
- **Status LEDs** – Terminal bus comms is correct if the green LED and the Red LED on the Terminal are flashing. The Rx and Tx LEDs are continuously on when the Terminal is communicating correctly. If they flash intermittently, there are communication problems. The Relay LEDs indicate when the processor has sent a command for a particular relay to activate.

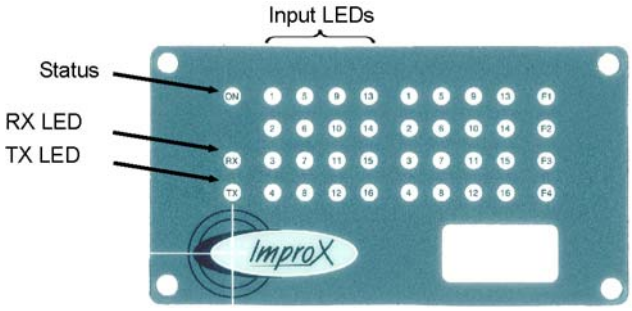


Figure 57 – Position of the Status Indicators on the Front End Plate

ImproX ER

- **Ping Test** – use the **Firmware Upgrade** utility to run a Ping test. Ensure that the Terminal responds.
- **Comms Test** – use the **Firmware Upgrade** utility to run a Comms test. This ensures that communication between the Terminal and Controller is present.
- **Test Mode** – Testing Readers attached to ImproX ER. This mode indicates when a Tag is in range and being read by the Reader.

  To access Test Mode, remove the RS485 communications cable from the ImproX ER. Wait for approximately 10 seconds until the ImproX ER's red status LED flashes intermittently. Present a Tag to the Reader. When a Tag is read the Status LED changes to solid Green and the Buzzer emits a long, continuous beep while the Tag is in range. Use this procedure to verify that a Reader is reading a Tag, or to determine the Tag reading range.

ImproX MMA

- **Tag Reading Test** – present a Tag to the Reader by moving in from a distance. The status LED illuminates when the Tag is read. Ensure that the read distance is adequate.
- **LED Test** – using ImproNet Access, set the Reader's LED state to **red strobe green**, and then to **green strobe red**. Ensure that the LED flashes red and green for both settings. For details, refer to the **Status LED** section on page **239**.

ImproX Card Readers

Card Readers' are dependant on their host Terminal. Therefore, refer to the **ImproX TT** maintenance section on page **166** for details.

PART II – Getting Started with ImproNet Software

ImproNet Software has not been evaluated by UL

Minimum PC Specifications

You need to consider a number of factors to determine the correct PC specifications for different scenarios.

The Database Server usually has the highest specification requirements. Consider the following factors when specifying the Database Server:

- Number of doors (Terminals)
- Number of Tag Holders supported by the system
- Number of client (Module) connections to the database

Database Server

Scenario 1

- **1 to 5000 Tag Holders**
- **Less than 5 client modules connecting to Database Server**
- **Less than 100 doors**

Hardware	Requirement
CPU	Pentium II 450MHz or faster
Memory	256 MB RAM
Hard Disk	1GB available space
Display	800x600, 16-bit colour
Graphics Card	800x600, 16-bit colour
Optical Drive	CD-ROM drive
Input Devices	Mouse and keyboard
Power supply	250W Uninterruptible power supply unit or as specified in mainboard manual
Software	**Requirement**
Operating System	Windows 2000, XP, or NT
Database System	FireBird 1.5 by the Open Source Community. (Supplied on the installation CD)

Scenario 2

- **5 000 to 10 000 Tag Holders**
- **Greater than 5 client modules connecting to Database Server**
- **Greater than 100 doors**

Hardware	**Requirement**
CPU	Pentium III 1GHz or faster
Memory	512 MB RAM
Hard Disk	2GB available space
Display	800x600, 16-bit colour
Graphics Card	800x600, 16-bit colour
Optical Drive	CD-ROM drive
Input Devices	Mouse and keyboard
Power supply	300W Uninterruptible power supply unit or as specified in mainboard manual
Software	**Requirement**
Operating System	Windows 2000, XP, or NT
Database System	FireBird 1.5 by the Open Source Community. (Supplied on the installation CD)

Scenario 3

- **Greater than 10 000 Tag Holders**
- **Greater than 10 client modules connecting to Database Server**
- **Greater than 150 doors**

Hardware	**Requirement**
CPU	Pentium 4 1.6GHz or faster
Memory	1GB RAM
Hard Disk	4GB available space
Display	800x600, 16-bit colour
Graphics Card	800x600, 16-bit colour
Optical Drive	CD-ROM drive
Input Devices	Mouse and keyboard
Power supply	300W Uninterruptible power supply unit or as specified in mainboard manual
Software	**Requirement**
Operating System	Windows 2000, XP, or NT
Database System	FireBird 1.5 by the Open Source Community. (Supplied on the installation CD)

ImproNet Module PCs

Engine	
• **Part number: INS902-0-0-GB-xx**	
Hardware	**Requirement**
CPU	Pentium II 400MHz or faster
Memory	128MB RAM
Hard Disk	500MB available space
Display	800x600, 16-bit colour
Graphics Card	800x600, 16-bit colour
Ports	Free RS232 Serial port
Optical Drive	CD-ROM drive
Input Devices	Mouse and keyboard
Power supply	250W Uninterruptible power supply unit or as specified in mainboard manual
Software	**Requirement**
Operating System	Windows 2000, XP, or NT
Database System	FireBird 1.5 by the Open Source Community. (Supplied on the installation CD)

Access, Quicktag, Visitor, Transaction Viewer, Alarms	
• **Part number: INS904-1-0-GB-xx**	
Hardware	**Requirement**
CPU	Pentium II 450MHz or faster
Memory	256MB RAM
Hard Disk	1GB available space
Display	1024x768, 16-bit colour
Graphics Card	1024x768, 16-bit colour
Ports	Free RS232 Serial port
Optical Drive	CD-ROM drive
Input Devices	Mouse and keyboard
Power supply	250W Uninterruptible power supply unit or as specified in mainboard manual
Printer (optional)	Standard Inkjet or Laserjet
Software	**Requirement**
Operating System	Windows 2000, XP, or NT
Database System	FireBird 1.5 by the Open Source Community. (Supplied on the installation CD)

Graphics Modules—Designer and Runtime	
• **Part number: IXP331-0-0-GB-xx (Designer)** • **Part number: IXP332-0-0-GB-xx (Runtime)**	
Hardware	**Requirement**
CPU	Pentium III 1GHz or faster
Memory	512MB RAM
Hard Disk	1GB available space
Display	1024x768, 16-bit colour
Graphics Card	1024x768, 16-bit colour
Ports	Free RS232 Serial port
Optical Drive	CD-ROM drive
Input Devices	Mouse and keyboard
Power supply	250W Uninterruptible power supply unit or as specified in mainboard manual
Printer (optional)	Standard Inkjet or Laserjet
Software	**Requirement**
Operating System	Windows 2000, XP, or NT
Database System	FireBird 1.5 by the Open Source Community. (Supplied on the installation CD)

Known Issues

- There have been isolated cases of ImproNet not installing correctly on some **Dell** PCs.

ImproNet Applications

The ImproNet Software Suite consists of a collection of Modules and Utilities. The Modules form the core of the ImproNet Suite and provide control for everyday and important functions. The Utilities provide support for advanced configuration and system maintenance. This section provides a brief description of the ImproNet Modules and Utilities.

*UL has evaluated the IXP300/400 system as a **stand-alone** type access control system. In other words, it operates as intended and does not rely on a constant, dedicated PC connection.*

ImproNet Modules

It is possible to run the entire ImproNet Software Suite on a single PC. However, the Suite is designed to operate on multiple PCs in a Client-Sever configuration. Therefore, to ensure correct functioning, it is essential to have dedicated PCs as specified in this manual.

The configurable aspect of the ImproNet modules enables efficient operation in LAN and WAN infrastructures; Each ImproNet module performs a specific function.

ImproNet Access

ImproNet Access is the configuration module for ImproNet. It performs a number of important functions including:

- Site and Host configuration
- Hardware configuration—enables installer to define and configure ImproX hardware such as Terminals and Controllers
- Tag Holder Access Group configuration. The key element of access control—A Tag Holder Access Group is a combination of **when** (Access Time Patterns) and **where** (Areas) Tag Holders have access

ImproNet Engine

ImproNet Engine is the communications module. It is required to do the following:

- Monitor the database for edits made by ImproNet client applications such as ImproNet Access, or Quicktag. Edits or changes are communicated to the ImproX Controllers.
- Polls the ImproX Controllers for transactions, then logs the transactions to the ImproNet database.
- Runs the ImproNet Reports web server. Note that the Engine must be running for web reports to run.
- Open socket connection ports for modules such as ImproNet Graphics, which make a direct connection to the Engine.

ImproNet Quicktag
The Quicktag module is used for enrolling and editing of Employee and Visitor tags.

ImproNet Visitor
The Visitor module is used for enrolling Visitor tags. You can assign tags to the **Visitor Tag Holder Access Groups** in this module only. Employee Tag Holder Access Groups are not accessible from the Visitor module.

ImproNet Graphics Designer
Used to create a graphic plan representation of a Site. It enables arranging of icons that represent ImproX hardware units, on a floor plan.

ImproNet Graphics Runtime
Provides real-time graphical monitoring of the site.

ImproNet Alarms
Provides real time monitoring of alarm transactions.

ImproNet Transaction Viewer
Provides real-time monitoring of transactions

ImproNet Utilities

Archive
The Archive utility enables you to create copies of the ImproNet Database on specified dates. You can use these Database copies to generate transaction reports for a particular historical period. Running Archive also decrease the size of the ImproNet Database.

DBUpgrade
The DBUpgrade enables automatic updating of the ImproNet Database. The utility checks for available update scripts and processes them automatically.

IBConsole
IBConsole is a third-party database configuration and administration tool. You can use it to perform advanced configuration and administration tasks on the ImproNet Database.

Import
This utility is used to import comma separated value (CSV) files into the ImproNet Database. You can use it to import data such as employee records from other applications, to the ImproNet Database. Refer to the **CSV Import** on page **296** for details.

Find Duplicates
Importing CSV files into the ImproNet Database can result in duplicate records. The Find Duplicates utility enables you to search the Database for, and delete duplicate records.

IXP200 Conversion

The IXP200 Conversion utility facilitates conversion of IXP200 data to the ImproNet format. Note that this utility converts user data only. Site information must be re-configured in ImproNet.

Pump

Pump transfers user-defined data from the existing ImproNet Database to a new empty database when ImproNet is upgraded to a new version.

Translate

This utility facilitates changing the field names in the ImproNet Database to words of another language. The Translate utility requires you to manually enter replacement text.

Unlock

The Unlock utility enables you to activate applications that are otherwise disabled. You do this by entering a code called a *Product Unlock Key* into the utility.

Peripheral Hardware

ImproNet use various peripheral hardware devices to perform a software protection function. Some ImproNet modules search for these devices on start-up. If the required device is not present, the module does not run. Some devices also perform tag Enrollment and communication functions.

ProX-Mate★

The ProX-Mate performs a **tag Enrollment** and **software protection** function. It connects directly to the PC's RS232 serial port or to the Host Interface that connects to the PC. There are two versions of ProX-Mates.

INS900

INS900 is bundled with the **INS904** software package. The following software modules run with the XPM:

- ImproNet Access
- ImproNet Quicktag
- ImproNet Visitor
- Graphics Designer
- Graphics Runtime

*An additional unlock code is required if the ProX-Mate is required to run the **iNet DVR** integration. Contact your local Impro Distributor for more information.*

Utility ProX-Mate – XPM910★

XPM910 Utility ProX-Mate is generally used when ImproNet modules are required to run on multiple PC's. The Utility ProX-mate enables you to run the following modules:

- QuickTag
- Visitor
- Graphics Runtime
- Graphics Designer

The Utility ProX-Mate requires an additional unlock code to run ImproNet Access.

Host Interface—Serial Communications Converter★

The Host Interface does the following:

- Acts as an RS232 to RS485 converter
- Performs a software protection function
- Facilitates Inter Controller communications

USB Enrollment Readers

USB Enrollment Readers are compatible with ImproNet software V6.4.4 or later only.

USB Enrollment Readers perform similar functions to standard Enrollment readers, but have a different communications architecture and support additional features.

New Features

- USB connectivity
- Support for third-party readers and tag Enrollment★
- HID tag support★
- MiFare tag support★

ImproX RH

The ImproX RH is a USB version of the Host Interface. It is used for the following:

- RS485 to USB converter.
- Software protection—ImproNet Engine requires an ImproX RH Host Interface to start-up.

Facilitates Inter Controller Communications—the ImproX RH must be connected to an external battery backed-up power supply to ensure that Inter Controller communications is maintained during a power failure or PC reboot.

The ImproX RH does not support the ProX-Mate. However, the following alternatives are available:

- **ImproX RRA**—supports the Enrollment of **125KHz Impro** and **HID** tags.
- **ImproX RRM**—supports the Enrollment of **MiFare** tags.

The ImproX RH also supports the standard **ImproX Antenna** readers and **MiFare** remotes.

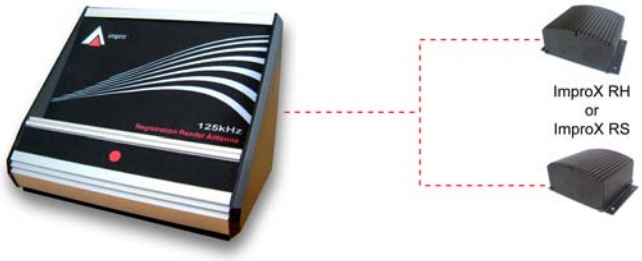
ImproX RS★

The ImproX RS enables third-party readers such as **Barcode** and **Magstripe** readers, to interface with the ImproNet system as Enrollment readers.

It also perform a software protection function for the same modules supported by the Utility ProX-Mate:

- QuickTag
- Visitors
- Graphics Designer
- Graphics Runtime

ImproX RRA



The ImproX RRA is an external Enrollment reader that connects to an ImproX RH or ImproX RS unit.

The ImproX RRA is used to read **125KHz** Tags.

ImproX RRM★

The ImproX RRM is an external Enrollment reader that connects to an ImproX RH or ImproX RS unit.

The ImproX RRM is used to read **MiFare** 13.56 MHz Tags.

ImproNet Network Specifications

The ImproNet suite is designed to run over a network in Client-Server mode. However, it *can* also run successfully on a single PC.

Architecture

Client-Server

Client-Server architecture consists of users' PCs (Clients) connected via a network to a central host (Server). In most situations, Client PCs are workstations that access files or databases, or applications running on one or more Servers.

In ImproNet, the following are **Server** components:

- ImproNet Engine
- ImproNet Database

The rest of the applications are **Client** components

Software Connection Relationships

Figure 58 illustrates the relationship between the ImproNet Database and ImproNet Client applications. **Socket connections** enable communication between PCs. **Database connections** enable communication between PCs and the ImproNet Database. **Jaybird** is an interface component installed with the Firebird database; it facilitates database interaction.

Network Hardware

An ImproNet compatible network requires the following hardware:

- **CAT5** or **CAT6 UTP** cabling
- **100Mbps** or faster, **TCP/IP** enabled Network Interface Cards (NICs)

Routers

If routers or switches are used, they must conform to the following:

- **TCP/IP** protocol
- **100Mbps** or faster

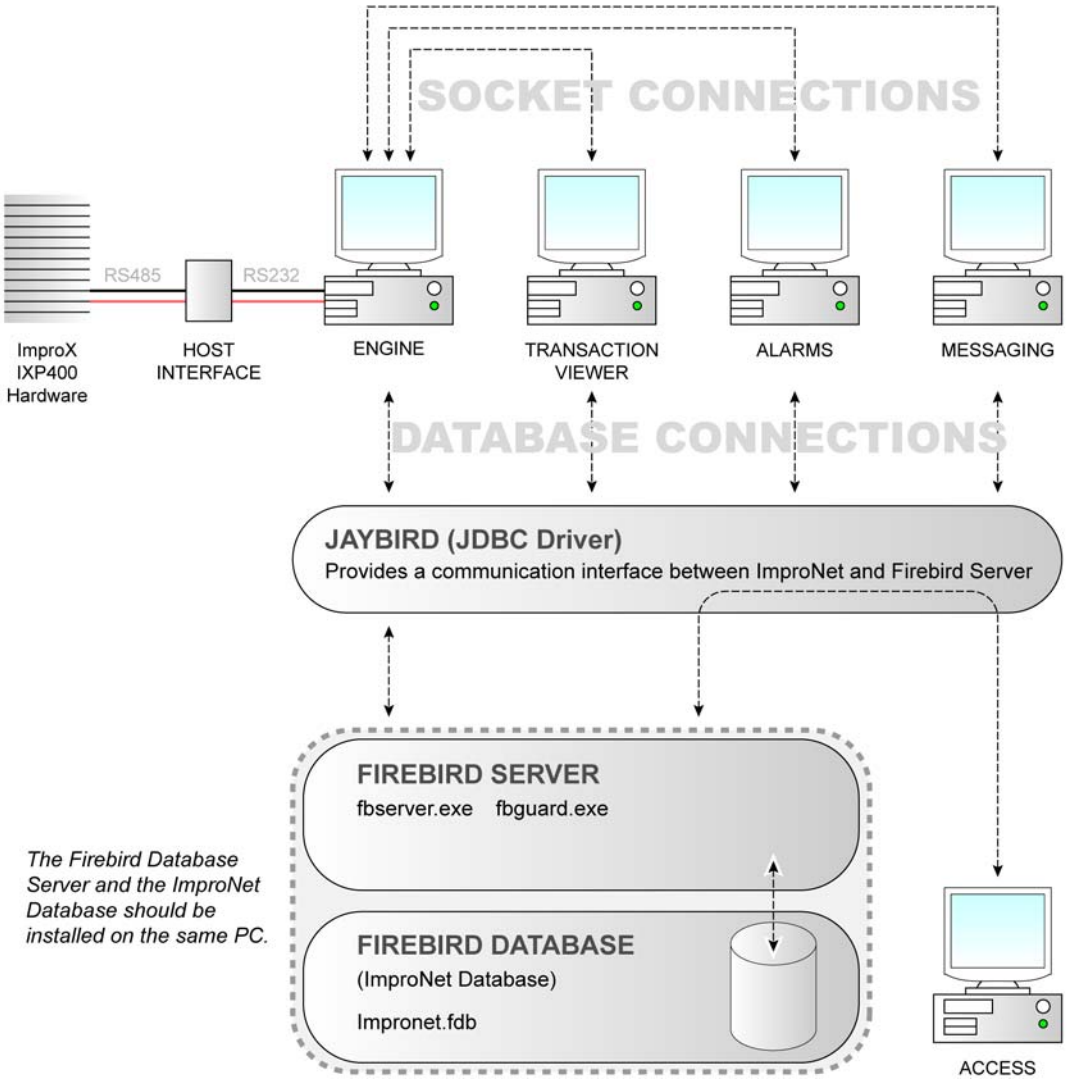


Figure 58 – Software Connection Relationships Diagram

ImproNet Modules in a Network Environment

The ImproNet suite is designed to run over a network in Client-Server architecture. However, all modules can run on a stand alone PC if required. The following components are important when running ImproNet over a LAN or WAN:

- **ImproNet Database**
- **Firebird Database Server**
- **ImproNet Engine**

ImproNet Database

ImproNet uses a **Firebird** database by default. It is installed with ImproNet during the Software installation process. The default location for the Database is as follows:

- **`C:\ImproNet\Database\Impronet.fdb`**

***Impronet.fdb** is the name of the database file.*

Firebird is an open-source product—it has no licensing fee. For more information refer to the following websites: http://www.opensource.org and http://www.firebirdsql.org/

Firebird Server

Firebird Server is a Database Server program that facilitates connections between the **ImproNet Database** and ImproNet Applications such as **Engine**, and **Access**.

Firebird Server must be installed in the same PC as the ImproNet Database.

ImproNet Engine

ImproNet Engine functions primarily as a **Comms Server**. It performs the following functions:

- Retrieves transactions from ImproX Controllers
- Monitors the ImproNet Database for changes
- Communicates Database changes to the ImproX Controllers

Some of Client Applications, such as **Graphics Runtime**, **Transaction Viewer**, and **Alarms**, process and report information in real-time. Therefore, they use a **TCP/IP** socket connections to connect to the Engine, because it is more efficient than a direct database connection.

Socket connections are also used to send messages to ImproNet Engine. For example, when a Graphics Runtime initiates a **Door Unlock** command, it is sent to the Engine via a socket connection. The Engine then, sends the command to the Access Control hardware. **Table 15** displays the Socket ports used by ImproNet.

Ports	Port Number
Transaction	26663
Alarm	26661
Messaging	26665
Host Validation	26669
Door Status	26667
Firebird Server	3050

Table 15 - ImproNet Socket Ports

You can configure Socket Ports in ImproNet Access

The following ImproNet client modules connect to the Engine, or the ImproNet Database, or to both.

- Access
- Quicktag
- Visitor
- Alarms
- Transaction Viewer
- Graphics Designer
- Graphics Runtime

General Network Requirements

The following requirements are essential for ImproNet to operate over a network:

- Network hardware must support the **TCP/IP** protocol
- The network must support **100 Mb/s** bandwidth or greater

Running ImproNet Applications across a LAN

Figure 59 illustrates the network configuration for running ImproNet across a Local Area Network (LAN).

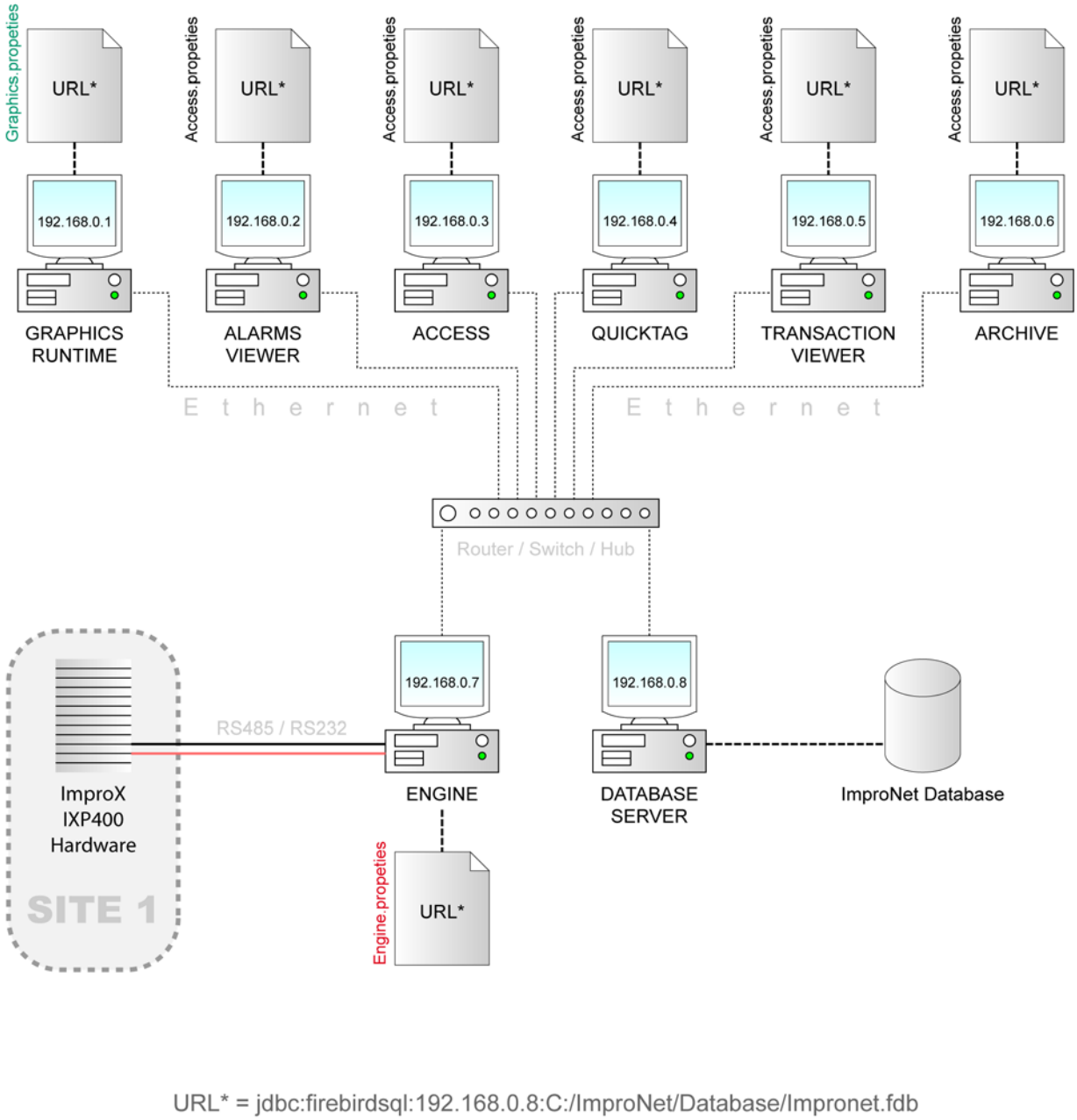
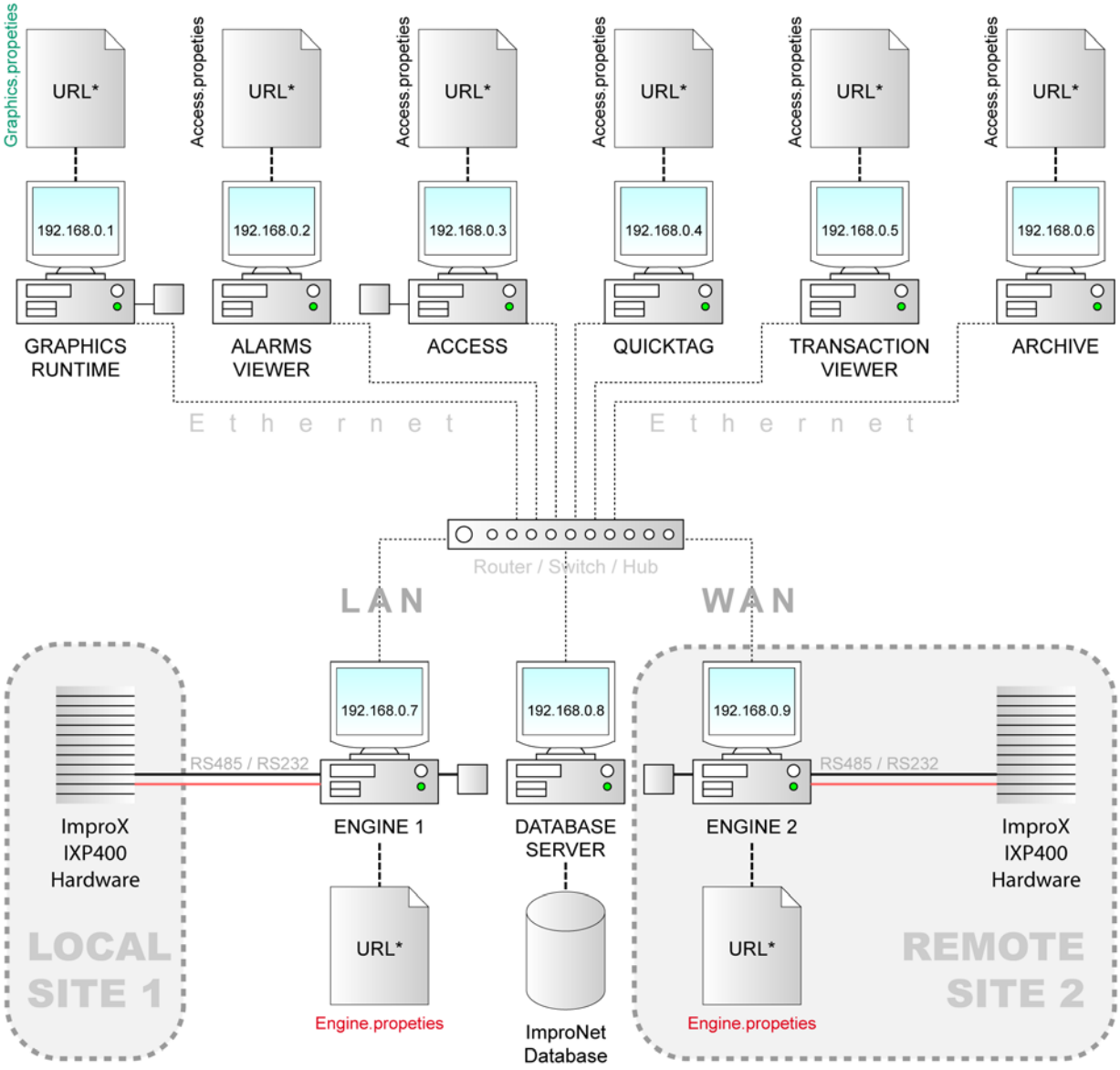


Figure 59 - ImproNet Configuration across a LAN

Running ImproNet Applications across a WAN

Figure 60 illustrates the network configuration for running ImproNet across a Wide Area Network (WAN).

Figure 60 - ImproNet Configuration across a WAN



URL* = jdbc:firebirdsql:192.168.0.8:C:/ImproNet/Database/Impronet.fdb

Communication across a WAN is generally slower than across a LAN. Therefore, a WAN's performance must be carefully assessed before ImproNet is implemented across it.

Minimum WAN Requirements

A WAN must support a minimum speed of **1Mb/s** per Engine.

Properties Files

ImproNet Client applications store their connection settings in an editable text files called **Properties Files**. These files contain URLs that specify the location of the Database Server. If the URL is incorrect, the application will not function.

Properties Files are stored in the ImproNet root folder. The following applications have their own Properties files:

- **Access**
- **Archive**
- **Engine**
- **Graphics**
- **Pump**

The files have the same name as their application. For example, the Properties file for ImproNet Access is called **Access.properties**, and is stored in **C:\Impronet**. Other ImproNet applications including **Quicktag**, **Visitor**, **Alarms**, and **Transaction Viewer** use the **Access.properties** file.

*There is one **Access.properties** file per PC.*

Configuring ImproNet Modules for a Stand Alone (Single PC) System

This section provides the requirements for installing all ImproNet modules, including the Database Server, on a single PC.

Connecting to the Database

The ImproNet suite is installed by default to **C:\Impronet**. The URL in each Client **Properties File** points to the following default Database location:

- **`C:\Impronet\Databases\Impronet.fdb`**

If you move the Database to another location on the PC, you must to change the URL in each Properties file to point to the new Database location.

For security reasons, we recommend that you do not share the Database folder.

The following code is the default format for the Database URL:

- **`access.database.Interbase.URL=jdbc:firebirdsql://localhost/C:/ImproNet/Database/Impronet.fdb`**

If you move the ImproNet Database, you must update this code to reflect the new location. For example, if you move the **IMPRONET.FDB** file to a folder called **Site1** on drive **D**, you must change the URL to the following:

- **`access.database.Interbase.URL=jdbc:firebirdsql://localhost/D:/Site1/Impronet.fdb`**

*If other ImproNet Applications are installed on the Database Server, the URLs in each Client **Properties File** must use a local path, not a network path.*

Configuring ImproNet Modules for a LAN

LAN Networking has not been evaluated by UL.

If ImproNet modules are distributed across a LAN, Properties files must be edited to point to the Database Server PC, and the location of the Database on the PC.

Connecting to the Database

Figure 61 shows an example the **Engine.Properties** file when ImproNet is installed over a network.

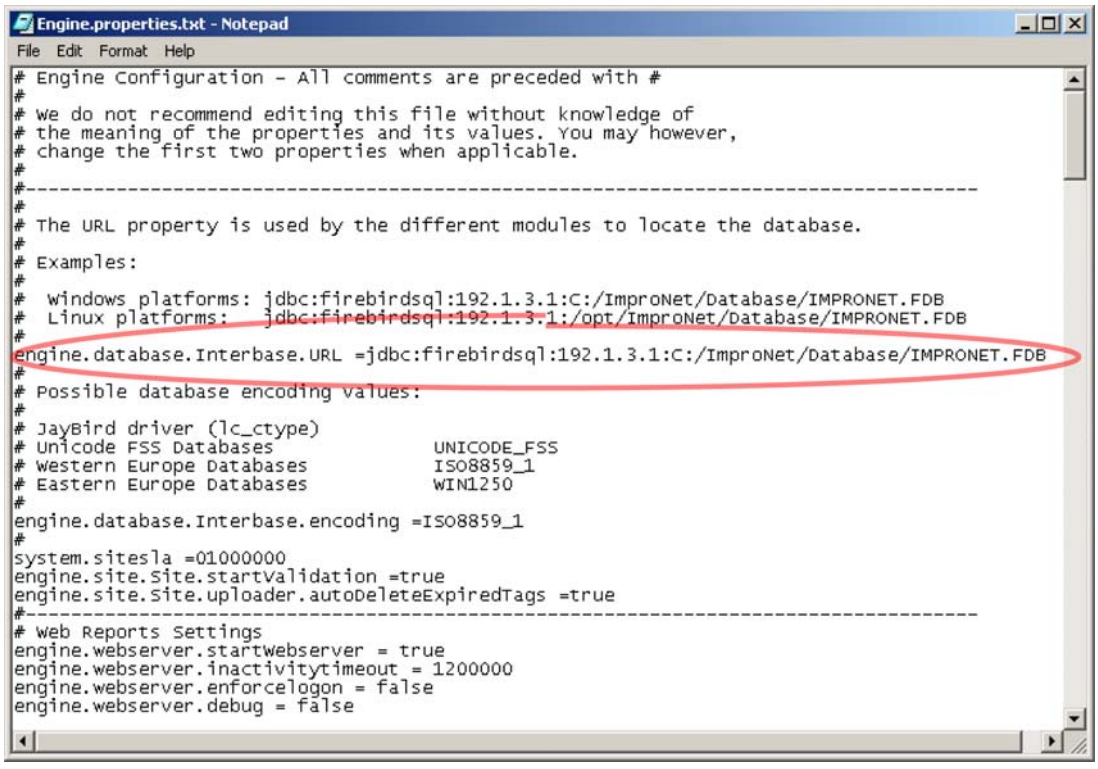


Figure 61 - Edited Engine Properties File

In **Figure 61**, the Database resides on a PC with an IP address of **192.1.3.1**. In a stand-alone configuration, the default computer address is always **Localhost**. In a networked environment, replace **Localhost** with the **IP Address** or **Machine Name** of the Database Server.

Configuring ImproNet Modules for a WAN

WAN Networking has not been evaluated by UL.

Running ImproNet across a WAN is similar to running ImproNet across a LAN. However, WANS generally have slower performance. ImproNet has options to minimize the resources required by a slower-than-usual architecture.

Advanced Engine Settings

The following text box displays an extract from the **Engine.properties** file. Lines beginning with a # are comments describing the settings. Edit the highlighted settings as required to compensate for the Engine running across a WAN:

```
# uploader.cycleDelay is the delay in-between uploader cycles
# Increase this to reduce network traffic on a wan eg. 60000 (1 minute)
# Note that changes to the controllers will be delayed by this amount when editing
# Default is 10000 (10 seconds)
engine.comms.uploader.cycleDelay = 10000
#
# uploader.interTable delay is the delay in processing each table in the Uploader
# Increase this if you wish to reduce network traffic on a wan during an Upload cycle eg. 1000
# Default is 10
engine.comms.uploader.interTableDelay = 10
#
# Daily start and end times for uploader - it will upload only within these times
# Set start time greater than end time if you wish upload only at night eg. 2100 to 0600
# Default is 0000 to 2400
engine.comms.uploader.dailyStartTime = 0000
engine.comms.uploader.dailyEndTime = 2400
#
# interPollDelay is the delay between successive polls
# Use this to poll less often to reduce network traffic over etherpads on a wan  eg. 2000
# Default is 200
engine.comms.poller.interPollDelay = 200
#
# Daily start and end times for the poller - it will poll only within these times
# Set start time greater than end time if you wish poll only at night eg. 2100 to 0600
# Default is 0000 to 2400
engine.comms.poller.dailyStartTime = 0000
engine.comms.poller.dailyEndTime = 2400
```

```
#
# The uploader database connection is reset periodically every so often
# This releases memory resouces - default is reset once a day - should not need to change this
# Default is 86400000 (once a day)
engine.uploader.databaseConnectionResetTime = 86400000
```

You can also edit these settings via the ImproNet Engine software. Refer to the ***Advanced Properties*** *section on page* ***220*** *for details.*

Figure 60 on page **186** illustrates a possible ImproNet Configuration where a second site is connected via a WAN. In this type of scenario, it is important to determine how much bandwidth is available to the Engine Server. If resources are limited, we recommend editing the advanced Engine settings to further reduce the bandwidth that Engine requires to operate efficiently.

Connecting to the Database

Refer to **Figure 60** on page **186**—to connect the **Engine 2** PC on **Site 2** to the **Database Server**, edit the **Engine.properties** file on Engine 2 to point to the Database Server.

Because a second Engine (Site) has been added, you must update the **Engine.properties** file on **Engine 2** to reflect Site 2. You must do this **before** you execute an Auto ID procedure.

In this example, change the **System Site SLA** from **system.sitesla = 01000000** to **system.sitesla = 02000000**

Using Routers Configuration

The following factors affect bandwidth when a router is used:

- Number of hardware devices configured in ImproNet Access
- Number of Tag Holders
- Existing WAN load usage
- Number of ImproNet client application that access data via a router

Router Configuration

WAN routers must enable *pass-through communication* on the port that the Database Server is using for connection. This is essential if the router has a built-in firewall.

Firebird Port

Firebird uses port **3050** by default. Therefore, ensure that WAN routers have **TCP/IP** enabled for network traffic sent to port 3050.

Bandwidth Requirements

Every ImproNet installation will have different bandwidth requirements. For example, an Engine that uploads 200 Tags to a single Controller can do so through a 64k ISDN line. However, an

Engine that has to upload 5000 tags to five Controllers needs at least a 768k dedicated ISDN line.

It is impossible to specify the exact requirement for a WAN. However, we recommend a *minimum* WAN connection bandwidth of **512k/s**. For *optimal* performance across a WAN, we advise you to consider a connection with at least **1Mb/s** of bandwidth.

Bandwidth-intense activities such as uploading Tag data to Controllers can be performed after-hours to reduce network load during normal hours.

System Concepts

System Architecture Concepts

An ImproNet Access Control System comprises the following elements:

- Sites
- Controllers
- Locations
- Zones

The ImproNet System Architecture is illustrated in **Figure 12** on page **41**.

Sites

Each System consists of one or more **Sites**. Sites are independent of each other. Each Site can have only one Host. The Host is the **Engine** module for a particular Site.

Controllers

An IXP300 Site supports up to 16 **IC Controllers**. Each Controller supports up to 48 **Terminals (fixed addresses)**.

An IXP400 Site supports up to 64 **AC Controllers**. Each Controller supports up to 64 **Terminals (fixed addresses)**.

Sites using IC and AC Controllers are also possible. However, a Site using both Controller types is limited to the parameters of the IC Controller. For example, such a Site will accept a maximum of 16 Controllers and 8000 Tags instead of the AC Controller limit of 160000 Tags.

Location

A location is a physical access control point. It comprises a group of **Terminals** servicing an access control point such as a Door. A Location supports up to three terminals for the following functions.

- Door Entry
- Door Exit
- Door Relay Control

Zones

A **Zone** is a group of Locations (access control points). Entry and exit to and from a Zone is achievable via its Locations only. Generally, a Zone is a physically bounded area containing one or more locations.

A Zone can also contain other Zones within it. This enables an Operator to configure settings such as Anti-Passback settings. These Zones are referred to as *Nested Zones*.

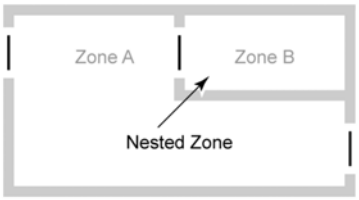


Figure 62 - Nested Zone

Zone Grouping is when one Zone is linked to another Zone to form a *Common Zone*. This enables Tag Holders to enter via a Location in one Zone and exit via a Location in another Zone. For more information on Common Zones, refer to the **Common Zones** section on page **270**.

Adjacent Zoning is a form of Zone grouping. It is when two neighbouring Zones use a single Location to go from the one Zone to the other Zone.

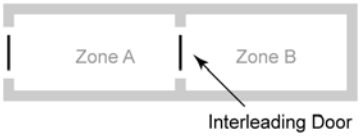


Figure 63 - Adjacent Zoning

System Building Blocks

ImproNet Software Suite

The ImproNet Software Suite is designed to run on Microsoft Windows NT, 2000, and XP. Refer to the section on page **169** for more information. These limitations are important for the efficiency and reliability of the system.

Supervisory Elements—Host PC

Each Site requires a Host PC for Control and Supervision of the Site. Alternatively, multiple PCs can be used for the same function.

*In this manual, the term **Host PC** refers to computers that perform control and supervisory functions, regardless of the number of PCs used.*

On a typical Site, the following functions are performed by the Host PC:

- **Database Server**—dedicated to the Site Database
- **Site Engine**—dedicated to processing communications between the Database Server and the Controllers. It also performs a polling function from the Server to the Controllers.
- **Client Workstation**—dedicated to supervisory aspects. These include entering and deleting data, viewing Graphics Runtime and Alarms, preparing Transaction reports, and running Utilities. Note that some monitoring installations may need a dedicated PC to run Graphics Runtime.

- **CCTV★**—required when Cameras are installed as part of the monitoring system

Additional, dedicated CCTV PCs may be required depending on the number of cameras.

*The CCTV **DVR Server** must be a dedicated PC.*

System Buses

There are two systems buses in an Access Control system:

- **The Host Bus**—An RS232 or RS485 bus that links the Host PC via the Host Interface Unit (ImproX HI or ImproX RH), to the Controllers. Each Site in a System requires its own Host Bus

- **The Terminal Bus**—An RS485 bus that connects each Controller to its Terminals. There is one Terminal Bus per Controller.

Serial Peripheral Ports

Some hardware units have an RS232 Serial Peripheral Port. They can be connected to a single peripheral device.

Host Interface Unit

The Host Interface unit converts RS232 to RS485. It serves as an interface between the Host PC and the Controllers.

RH Interface Unit

The RH is the USB equivalent of the Host Interface unit. It converts RS485 to USB. It serves as an interface between a USB enabled Host PC and the Controllers.

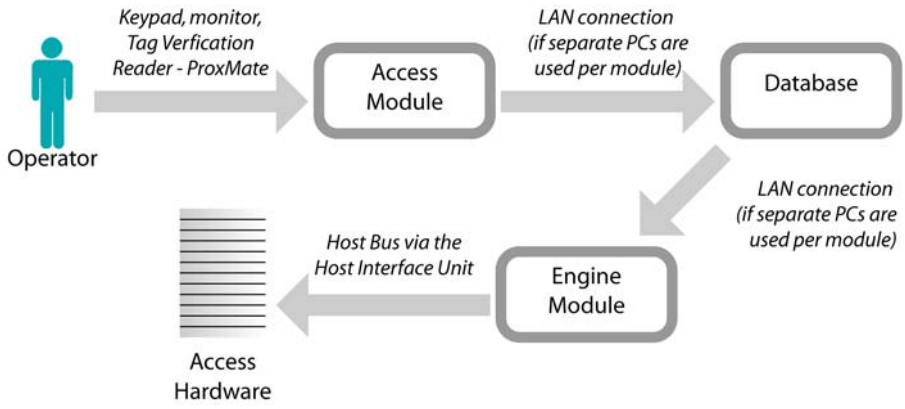


Figure 64 - Access System Communications Paths

Software Installation Procedure

ImproNet does not support Windows 95 / 98.

Windows NT, 2000, and XP Professional are recommended operating systems.

Windows 2003 Server requires a different installation. Refer to the ***Windows 2003 Server*** *section on page* ***197*** *for more information.*

ImproNet ***Engine*** *and* ***Access*** *modules are validated to run on a Linux operating system. However, no other ImproNet modules are validated yet.*

You must be logged on to Windows with Administrator privileges to install ImproNet.

New ImproNet Installation

The ImproNet Software Suite is supplied on an installation **CD-ROM**. Before you install it, ensure you have read the following:

PC Hardware Requirements

Refer to the section on page **169**.

Disk Space Requirements

Installing both the Access and Engine modules, requires 98MB of available disk space. Installing the Access module only, requires 50MB of available disc space. The Installation Wizard verifies that enough space is available. The Database Server requirements are dependent on the database size.

TCP/IP Network

TCP/IP is required for single and multiple Host PC scenarios to provide IP addresses. A single Host PC without a Network Interface Card (NIC) installs a Virtual Network adapter such as the *Microsoft Loopback* Adapter or the *Microsoft Virtual Private Networking (VPN)* Adaptor. These are virtual software adapters only; no additional hardware is required. Install the TCP/IP protocol using the Windows Control Panel.

Do not install any software until the TCP/IP protocol is installed, and the machine is assigned an IP address.

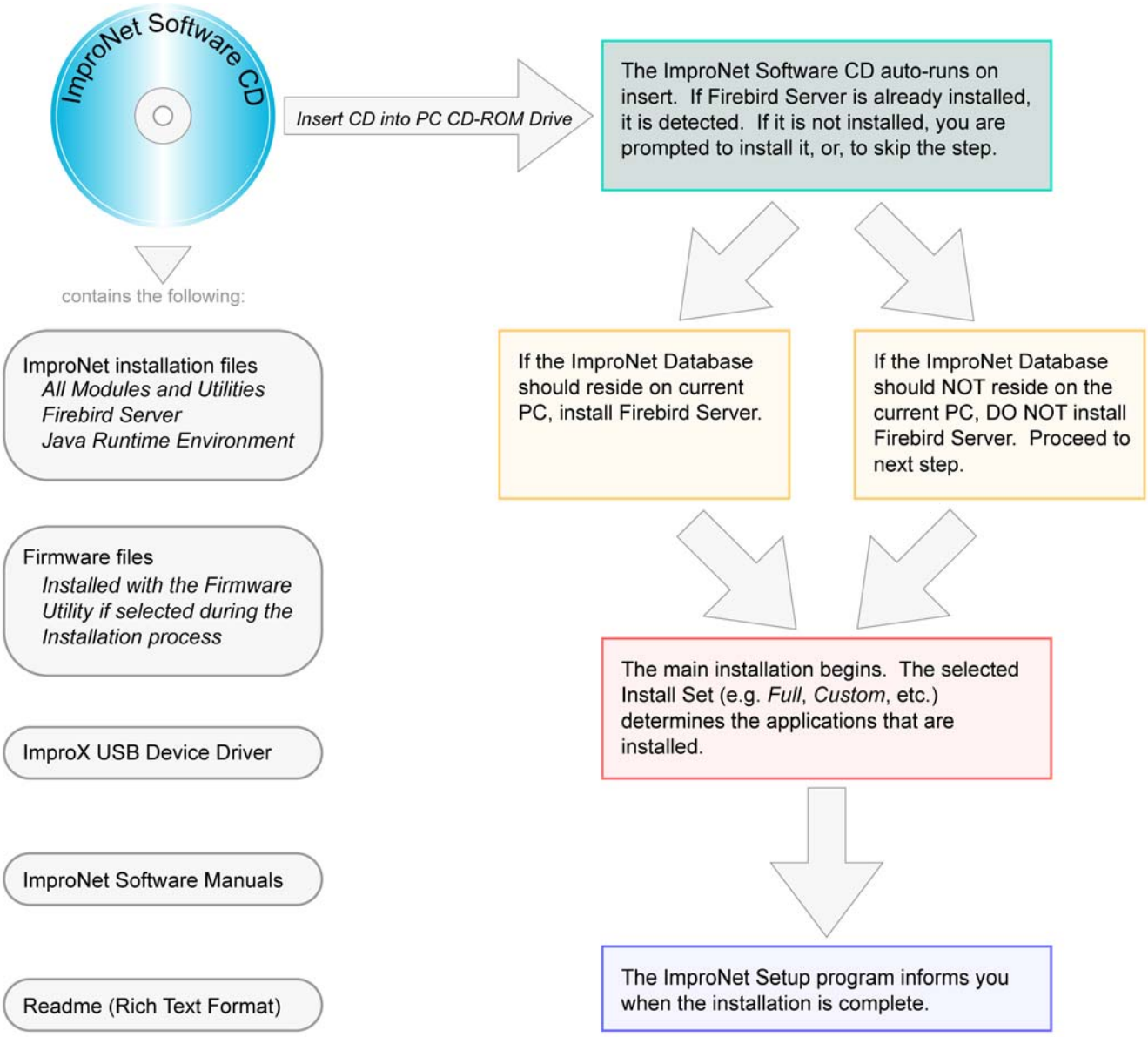


Figure 65 - ImproNet Software Installation Flowchart

Firebird Server must be installed on the same PC that stores the ImproNet Database.

Windows 2003 Server

To install the **Engine** module and **IBConsole** utility on a *Windows 2003 Server* PC, do the following:

1. Open Windows Explorer
2. Navigate to the **ImproNet** install files on the **ImproNet CD**
3. Right-click on **Setup.exe** and select **Properties**
4. Select the **Compatibility** tab
5. Check the **Run this program in compatibility mode for** option
6. Select **Windows 2000** from the drop-down list
7. Click **OK**
8. Run **Setup.exe** using default settings

Installation Sequence

The ImproNet Installation CD uses an automated, interactive Installation Wizard to guide you through the installation process. The Wizard prompts you at various stages to select installation options. This makes it possible to customize the ImproNet Software Suite.

Install the Software in the following sequence:

1. **Database Sever**—this is ESSENTIAL. Refer to the next section, **Installing the Database Server**
2. **Applications**—Modules and Utilities
3. **Database**—Installed with the Engine module
4. **USB Driver**—Only if USB Enrollment readers or Converters are used.

*If you have an earlier version of **InterBase**, **InterServer**, or **InterClient** installed on the PC, you **must** uninstall them before running the Software Installation Wizard. New versions of these software programs are installed. If the Installation program detects an earlier version, you are prompted to remove the earlier version and start again.*

*We recommend that you read the **Release Notes** on the Installation CD. The following items are specifically mentioned: Removal of Interbase V6; Default Username and Password; Database update, Coding and error settings; Windows XP Restore feature; Controller and Firmware versions; New software features.*

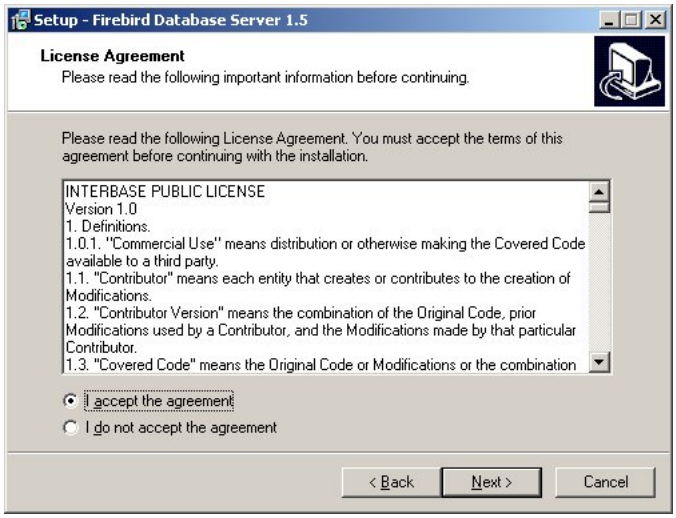
Installing the Database Server

A Database Server is required to host the ImproNet Database. If the ImproNet Suite is installed on to a single PC, the Database Server is installed automatically. However, if more than one PC is used to host the ImproNet Software, you must install the Database Server manually.

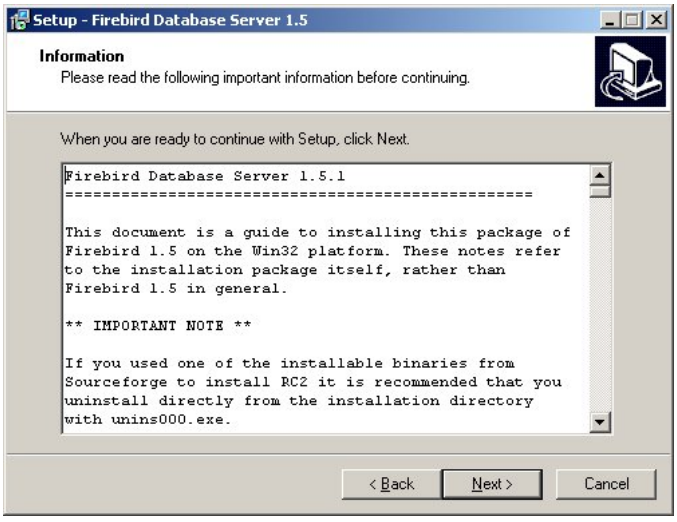
Any PC on the network can host the Database Server. ImproNet use **Firebird 1.5** as its Database Server. To install Firebird 1.5 manually, proceed as follows:

1. Select a PC to host the Database Server
2. Insert the ImproNet Installation CD in the PC's CD-ROM drive
3. Browse to the **\database\firebird** directory on the ImproNet Installation CD
4. Double-click **Firebird.exe**

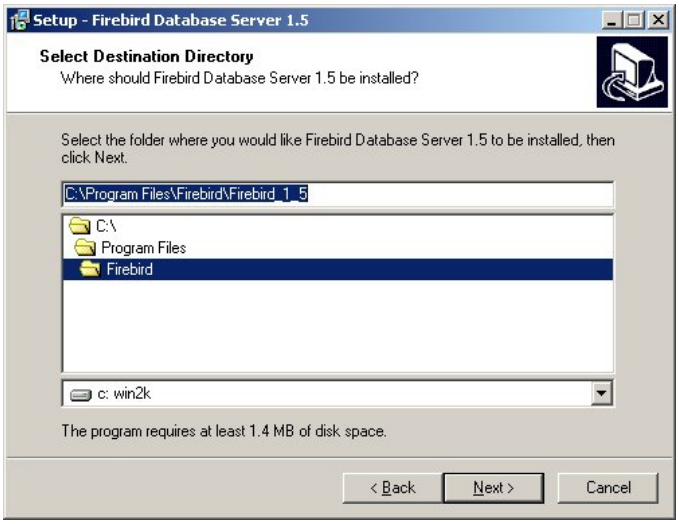
5. Follow the onshield instructions



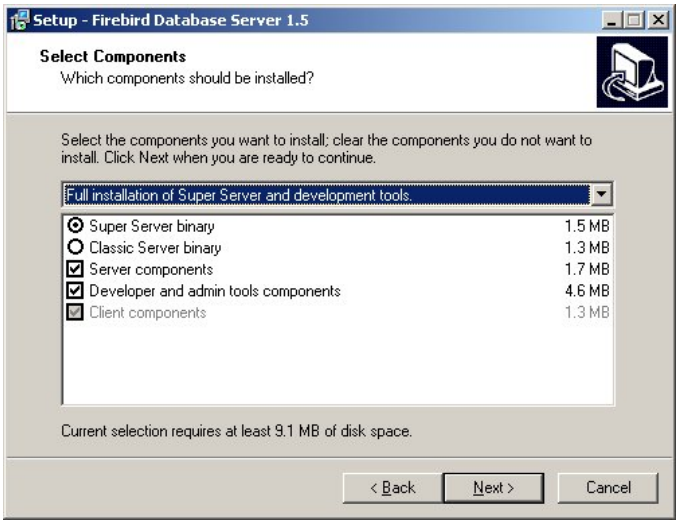
6. Accept the Licence Agreement



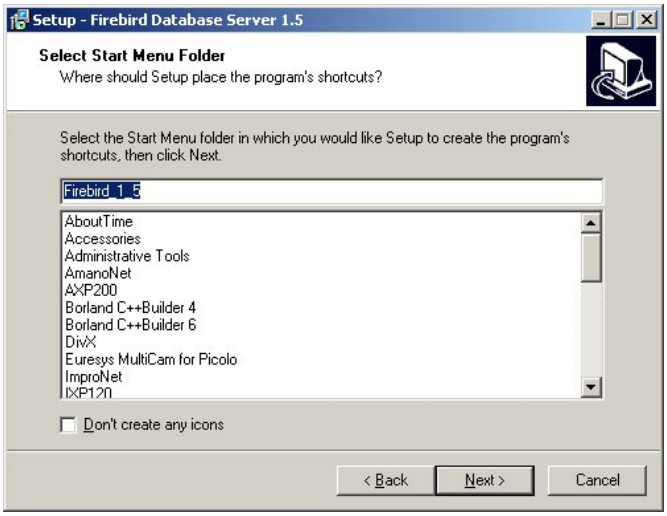
7. Select the **Destination Directory**—we recommend that you use the default location of **C:\Program Files\Firebird\Firebird_1_5**



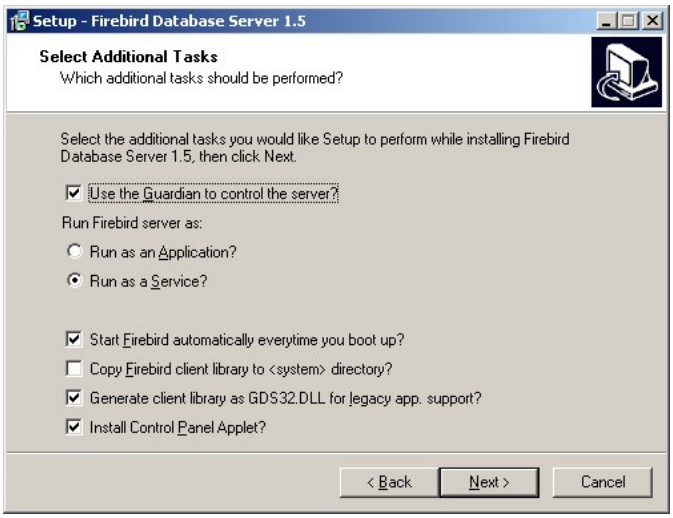
8. Select the **Full installation of Super Server and development tools** option



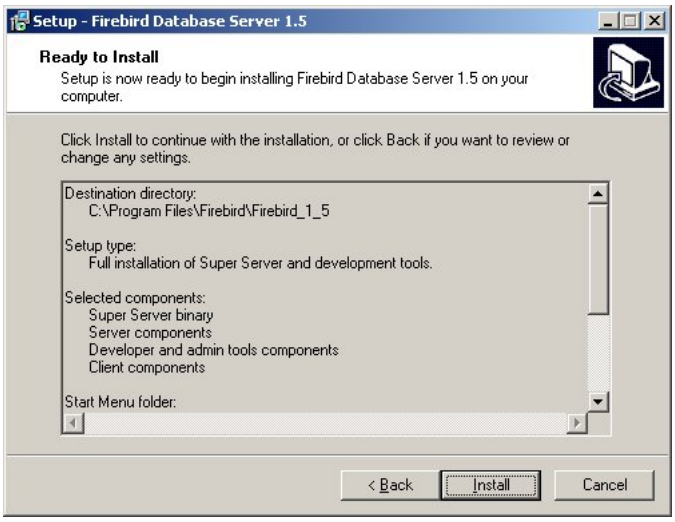
9. Click **Next**



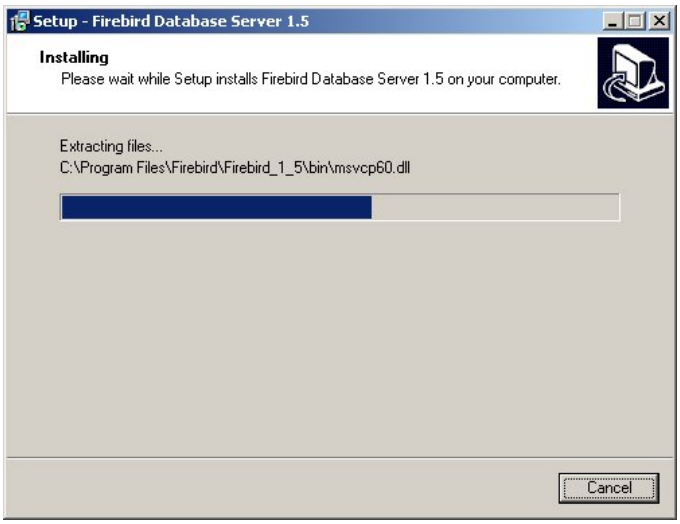
10. On the **Select Additional Tasks** screen:
    - Select the **Use the Guardian to control the server?** option
    - Select **Run as A Service?** option
    - Select the **Start Firebird automatically everytime you boot up?** option
    - Select the **Copy Firebird client library to <system> directory?** option
    - Select the **Generate client library AS GDS32.DLL for legacy app. support?** option
    - Select the **Install Control Panel Applet?** option



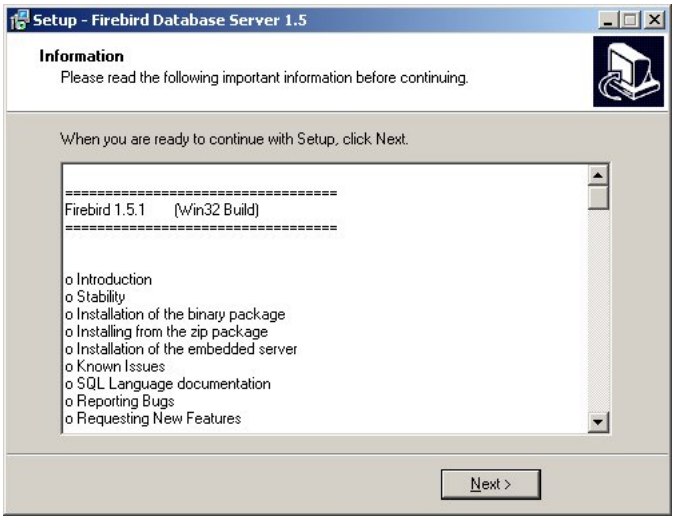
11. Click **Install**



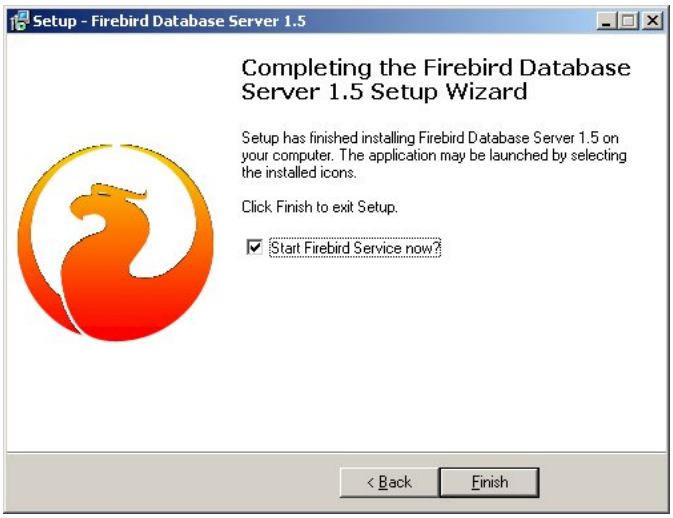
12. Wait for file to be extracted



13. Click **Next**



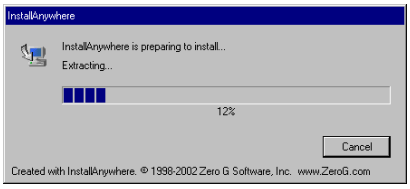
14. Click **Finish**



ImproNet Installation Procedure

To install the ImproNet Software Suite on a *single Host PC* proceed as follows:

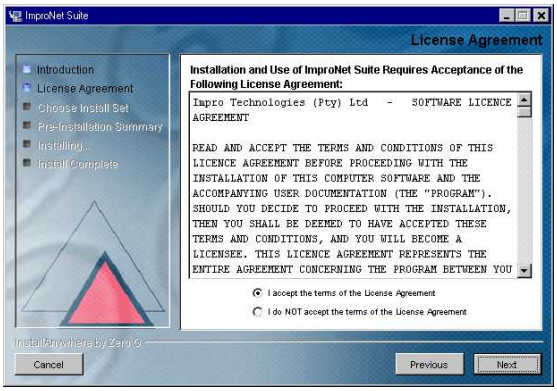
15. Insert the ImproNet Installation CD into the CD-ROM drive. If the CD does not start up automatically, browse to the CD in Windows Explorer and double-click **Setup.exe**
16. The **Install Anywhere** screen is displayed and files are extracted



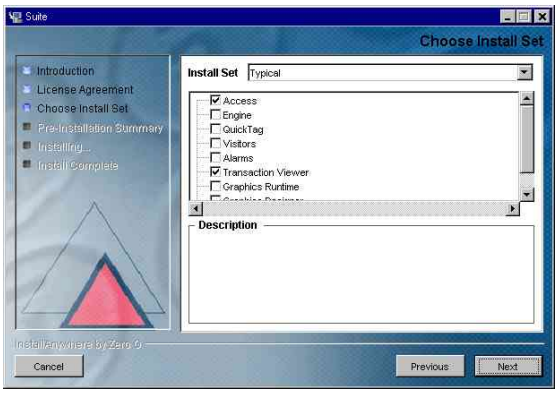
17. Select **English** as the language option

18. Click **OK**. If no Database Server is present, one is installed. Follow the onscreen instructions for this.

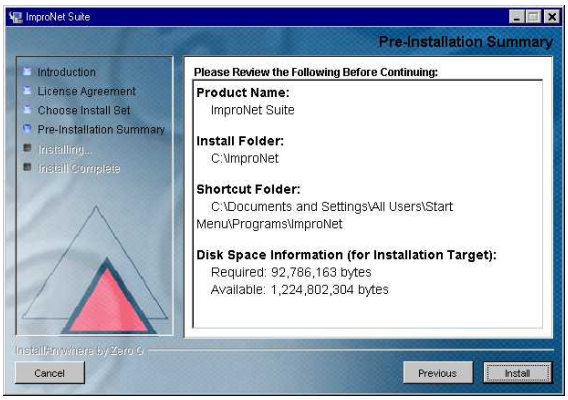
19. Click **Next**. The License Agreement screen is displayed.



20. Ensure that the **I accept the terms of the licence agreement** is selected
21. Click **Next**. The **Choose Install Folder** screen is displayed.
22. Click **Next**
23. Select an option from the **Install Set** menu. An Install Set is a collection of pre-selected applications suitable for specific scenarios. Customize an Install Set option by selecting or de-selecting applications from the list.



24. Click **Next**
25. Click **Install**



Installing the Access or Engine Modules Only

This Section describes the installation procedure for the Access and Engine modules, and the Database Server only.

Installing ImproNet Access Only

To Install the Access module only, proceed as follows:

1. Insert the ImproNet Installation CD into the CD-ROM drive. If the CD does not start up automatically, browse to the CD in Windows Explorer and double-click **Setup**
2. The **Install Anywhere** screen is displayed and files are extracted.
3. Select **English** as the language option
4. Click **OK**. If a Database Server is present, it is detected. If no Database Server is present, one is installed. Follow the onscreen instructions for this.
5. Click **Next**. The License Agreement screen is displayed.
6. Ensure that the **I accept the terms of the licence agreement** is selected
7. Click **Next**. The **Choose Install Folder** screen is displayed.
8. Click **Next**
9. Select the **Custom** option form the **Install Set** menu
10. Select the **Access** checkbox from the list
11. Clear all other checkboxes
12. Click **Next**

Installing ImproNet Engine Only

To Install the Engine module only, proceed as follows:

1. Insert the ImproNet Installation CD into the CD-ROM drive. If the CD does not start up automatically, browse to the CD in Windows Explorer and double-click **Setup.exe**
2. The **Install Anywhere** screen is displayed and files are extracted.
3. Select **English** as the language option
4. Click **OK**. If a Database Server is present, it is detected. If no Database Server is present, one is installed. Follow the onscreen instructions for this.
5. Click **Next**. The License Agreement screen is displayed.
6. Ensure that the **I accept the terms of the licence agreement** is selected
7. Click **Next**. The **Choose Install Folder** screen is displayed.
8. Click **Next**
9. Select the **Custom** option form the **Install Set** menu
10. Select the **Engine** checkbox from the list
11. Clear all other checkboxes
12. Click **Next**
13. Click **Install**

*During the Engine module installation, a blank Database is created in **C:\ImproNet\Database**.*

*The Installation Wizard prompts you to install **Firebird** database if there is no Database Server on the PC. If the Database Server is installed on another PC, cancel the Database install set-up.*

Next, proceed as follows:

1. Connect the ImproX hardware via the Host Interface to the RS232 Serial port on the **Engine PC**.
2. If the Database is not installed to **C:\ImproNet\Database** on the Engine PC, set the **Database Connection URL** to the location of the Database. For further information on Engine Properties configuration, refer to the **Properties Files** section on page **187**.

Database Encoding

The default database uses **UNICODE-FSS** encoding. **ISO 8859_1** (Western Europe) and **WIN1250** (Eastern Europe) are provided for archiving support and for installations that need ImproNet Pump.

Install USB Driver for USB Registration Reader Interface

ImproNet uses a USB Registration Reader Interface to read Tags. Some Interface versions also provide an RS485 communication link to the Controllers.

The ImproNet Installation CD includes a USB driver for the USB Registration Reader Interface. You can find the USB driver in the following locations:

- **ImproX_USB_Device_Driver** directory on the CD
- The **ImproNet** folder on the Host PC

To install the driver, proceed as follows:

*If there are old USB Drivers on the PC, delete them **before** installing the provided driver.*

1. Plug the **USB Registration Reader Interface** into a USB port on the PC. The **Found New Hardware** wizard is displayed.
2. Follow the onscreen instructions. In some cases, two drivers are installed; one for the **USB Registration Reader** and one for the **COM port to USB Bridge**. Therefore, the wizard will pop-up twice.

In **Windows XP**, proceed as follows:

1. The second time the wizard pops up, select **Install from a list or specified location**
2. Click **Next**
3. Select **Search for best driver in these locations** and select **include this location**. The Location specified should be the **ImproX_USB_Device_Driver** folder.
4. Click **Next**. Ignore any *warning* dialog screen if they are displayed.
5. Click **Finish**

*On some PCs, the **New Hardware Found** wizard is displayed every time a **USB Registration Reader Interface** with a new USB Serial Number (Fixed Address) is plugged in. If this happens, choose the option to automatically install the unit; The **New Hardware Found** wizard will not be displayed again.*

Upgrading an Existing Installation

1. Backup the existing ImproNet Database
2. Copy the **properties** files if ImproNet is running on a LAN or WAN
3. Uninstall existing ImproNet Modules
4. Install New ImproNet Modules
5. Ensure that the Database Server is **Firebird 1.5** or higher. If not, uninstall the existing version and replace it with the newer version
6. Upgrade the ImproNet database if necessary. Refer to the **Database Upgrade Procedures** section on page **302** for details.
7. Upgrade the Controller and Terminal firmware if necessary

This procedure installs the Engine module on the Server and sets each executable file to run in Windows 2000 compatibility mode.

Pre-Configuration Procedure

When *all* ImproNet Software components are installed, you need to perform a pre-configuration procedure. This procedure is necessary to determine if the hardware communication infrastructure is functioning correctly.

It is critical that there are no communication problems prior to software configuration. Otherwise, the system will not function.

The ImproNet hardware operates on a two-tier communications architecture that comprises:

- **Host Comms**—Connects to ImproX Controllers and the Host Interface, or ImproX RH
- **Terminal Comms**—Connects to ImproX Terminals

Identifying the Hardware

When the ImproX hardware is physically connected and powered, perform the following steps to determine if the hardware is communicating correctly:

*Ensure that the Engine has a working connection to the ImproNet database. Configure this connection in the **Engine.properties** file. For more information, refer to page **187** for a single PC, page **188** for a LAN, or page **189**for a WAN.*

Auto-ID

You can perform an Auto-ID process at any time. During an Auto-ID, the engine polls attached controllers and terminals, identifies their **type**, and their **logical address**. Hardware detected for the first time receives a logical address. To open ImproNet Engine and run Auto-ID, proceed as follows:

1. In Windows, click **Start** > **Programs** > **ImproNet** > **Engine**
2. Click the 

button. The Auto-ID process is started.

When a logical address has been allocated, it is never changed. This ensures continuity in the ImproNet Database.

Ensure the Engine is stopped before executing the Auto-ID.

Ping the Hardware

After the AutoID is performed, use the **ImproNet Firmware Upgrade** utility to ping the hardware. To open the Firmware Upgrade utility, proceed as follows:

- In Windows, click **Start** > **Program Files** > **ImproNet** > **Utils** > **Firmware Upgrade**

For more information on the Firmware Upgrade utility, refer to page **303**.

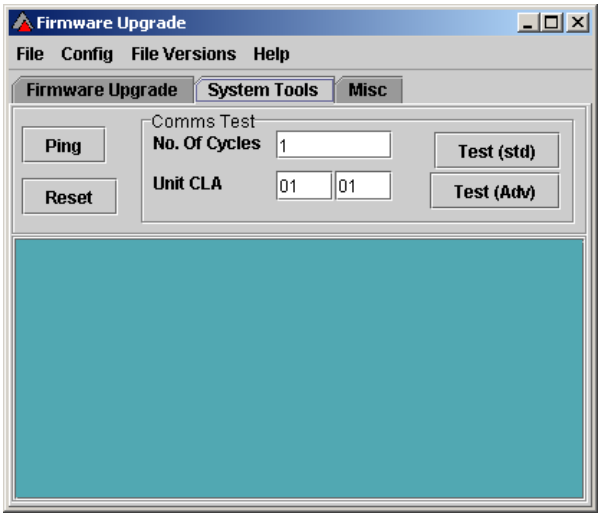
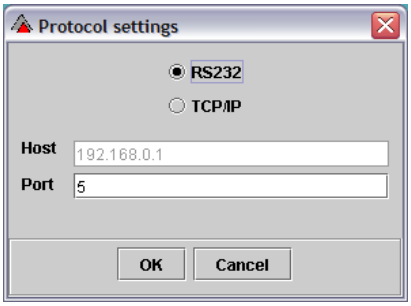


Figure 66 - Firmware Upgrade Utility

Perform Ping Test

The Ping test requests ImproX Controllers and Terminals to transmit their Fixed Address, Product ID, and Logical Address. To execute a Ping test, proceed as follows:

3. Open the Firmware Upgrade utility,
4. On the menu, select **Config** > **Protocol**
5. If an ImproX HI or ImproX RH comms interface device is used, select the **RS232** option and enter the relevant com **Port** number



6. Click the **Ping** button
7. Ensure that all Terminals and Controllers have been identified. We recommend that a list of each terminal and its physical location be updated during the hardware installation process. This ensures an efficient software configuration process.
8. Open the **ImproNet Firmware Upgrade** utility and run a Comms test. Ensure a pass rate of 100% is achieved.

It essential that the communication infrastructure is working correctly before you proceed with configuring ImproNet.

PART III – General Configuration

Configuration Overview

ImproNet Access is the software application used to configure an ImproNet Access Control System.

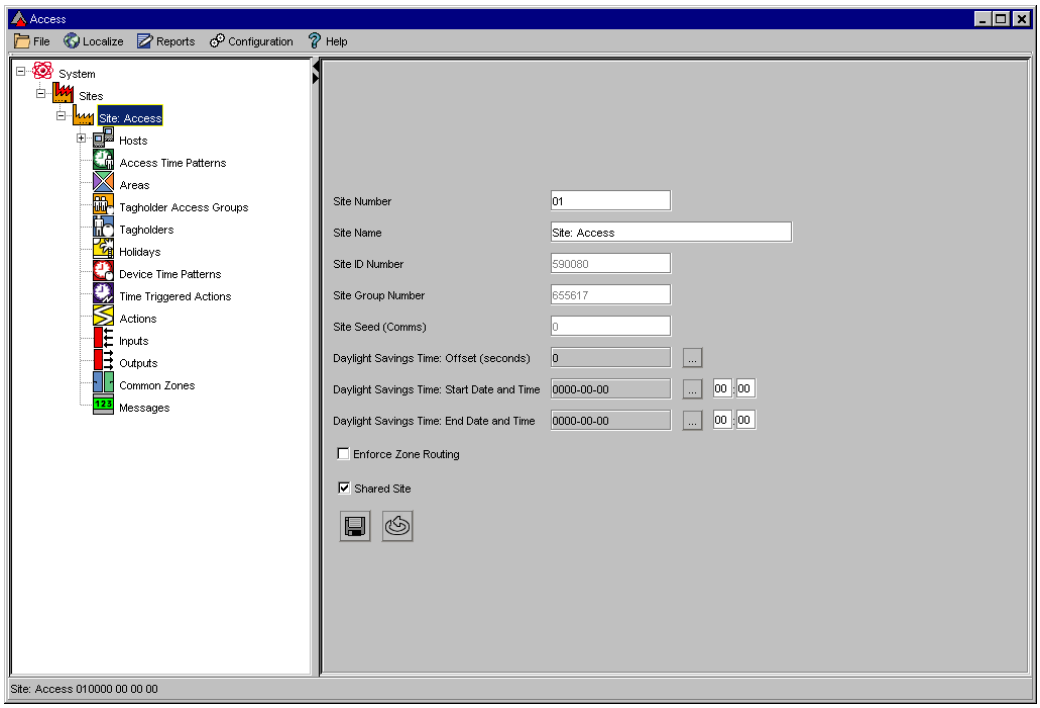
*Run the **Auto-ID** process in **ImproNet Engine** to find what hardware is installed and to assign addresses to the hardware.*

*Ensure that the **Unit Location Chart** for **IC Controllers** and **AC Controllers** is correctly filled in when the Controllers are physically installed.*

Using ImproNet Access

The following panels comprise the ImproNet Access interface:

- Menu
- Navigator
- Main



Menu Bar

The Menu contains drop-down lists that enable you to navigate to different screens in ImproNet Access

Navigator Pane

The Navigator provides an expanding *hierarchical tree* menu. It enables you to view and navigate to different items. The Navigation Tree consists of *nodes* that display components by connection.

Main Pane

Items selected in the Navigation Tree display their details in the Main pane.

Common Interface Controls

The following types of controls enable you to interact with the ImproNet Access interface:

Buttons

Open another screen or window when clicked on. They are usually different colours. Examples include the following:

Icons

Similar function to buttons except they are located in the Navigation tree. Examples include the following:

Radio buttons

Used to select an option. Only one radio button in a group can be selected. Click to enable or disable.

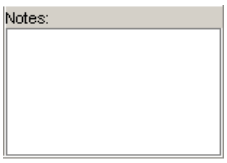
Checkboxes

Used to select multiple options. Any number of checkboxes in a group can be selected. Click to enable or disable.

Textboxes

Enable you to enter text such as an item name. Click the checkbox and type some text.

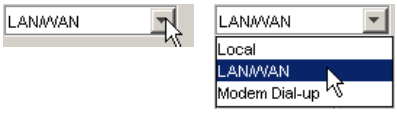
Text areas



Same function as a textbox, except a text area displays multiple lines of text.

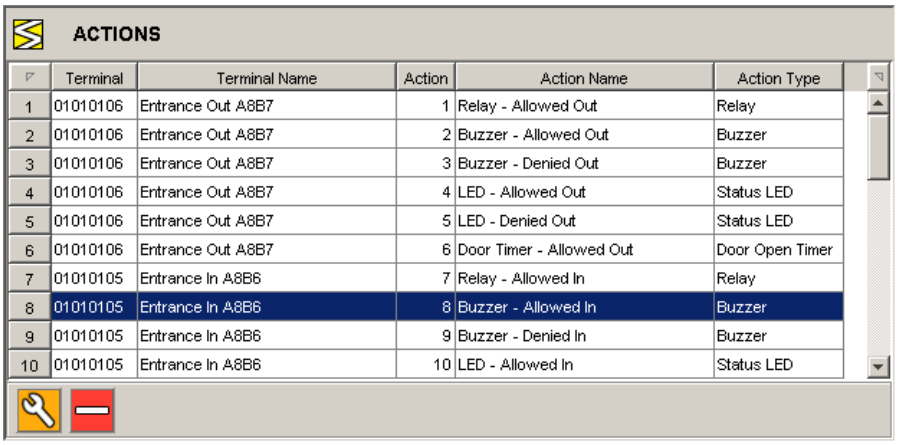
Drop-down lists

Used to select an option from a list. Click the button with the arrow to display the list. Then, click a list item to select it.



Records

Records are *rows* of information displayed in a grid format. A record is a collection of fields that that correspond to *column* names. In the following example, record number **8** is selected. It has the following fields: **Terminal**, **Terminal Name**, **Action**, **Action Name**, and **Action Type**. Click a record to select it.



	Terminal	Terminal Name	Action	Action Name	Action Type
1	01010106	Entrance Out A8B7	1	Relay - Allowed Out	Relay
2	01010106	Entrance Out A8B7	2	Buzzer - Allowed Out	Buzzer
3	01010106	Entrance Out A8B7	3	Buzzer - Denied Out	Buzzer
4	01010106	Entrance Out A8B7	4	LED - Allowed Out	Status LED
5	01010106	Entrance Out A8B7	5	LED - Denied Out	Status LED
6	01010106	Entrance Out A8B7	6	Door Timer - Allowed Out	Door Open Timer
7	01010105	Entrance In A8B6	7	Relay - Allowed In	Relay
8	01010105	Entrance In A8B6	8	Buzzer - Allowed In	Buzzer
9	01010105	Entrance In A8B6	9	Buzzer - Denied In	Buzzer
10	01010105	Entrance In A8B6	10	LED - Allowed In	Status LED

A Note on Screenshots

This manual displays screenshots of various screens in ImproNet Access. Some of the details displayed in a screenshot may not be available in your copy of ImproNet Access. This is because some details are dependant on the hardware installed on a Site.

System Configuration Parameters

Table 16 displays important configuration parameters for the ImproNet system. Some parameters have additional requirements—these are indicated by reference notes displayed after the table.

Item	IC Controller (IXP300)		AC Controller (IXP400)	
Total Number of Tags	**8000**		Up to **160000** See Note 1	
Maximum Sites per System	**255**		**255**	
Maximum Controllers per Site	**16**		**64**	
Maximum Terminals (Fixed Addresses) per Controller	**48**	See Note 2	**64**	See Note 2
Maximum Terminals (Fixed Addresses) per Location	**3**	See Note 2	**3**	See Note 2
Max Locations per Controller	**16**		**Up to 64** See Note 3	
Maximum Locations per Zone	**16**		**64**	
Access Time Patterns per site	**128**		**128**	
Tag Holder Access Groups per site	**256**		**1024**	
Holidays per site per site	**32**		**32**	
Device Time Patterns per site	**128**		**128**	
Time Triggered Actions per site	**512**		**512**	
Actions per site	**10000**		**10000**	
Common Zone	**16**	See Note 4	**32**	See Note 5
Hosted Visitors per site	**1500**		**1500**	
Elevator Control	**6**	See Note 6	**6**	See Note 6

Table 16 - System Configuration Parameters

*If a Site use **IC** and **AC** Controllers, it is limited by the IC Controller's parameters. Only the number of transaction types that each Controller can buffer is independent.*

Note 1

160000 Tags require all memory modules in the Controller to be populated.

Note 2

Terminals with two Fixed Addresses, such as the ImproX TT, are treated as two separate Terminals.

Note 3

In APB mode, two Terminals per Location are required. Therefore, if all locations are in APB mode, the limit is 32 Locations per Controller—assuming all Terminals have a single Fixed Address.

Note 4

A Zone can be part of **one** Common Zone only. The Maximum number of Common Zones supported per IXP300 Site is **16**.

Note 5

A Zone can be part of **one** Common Zone only. The Maximum number of Common Zones supported per IXP400 Site is **32**.

Note 6

We recommend a maximum of 6 Elevators (Elevators). This enables one **Access Group** per Tag for normal Access control requirements. A maximum of 80 floors per Elevator (Elevator) is supported.

A Note on Fixed Addresses

Most Terminals have one fixed address. Other Terminals, such as the ImproX TT have two fixed addresses. Fixed addresses limit how many physical units a device such as a Controller can connect to.

To avoid confusion, we recommend that you count each fixed Address as a separate Terminal. For example, count 48 fixed addresses as 48 Terminals.

Engine Functions

Engine Menu Functions

ImproNet Engine has the following user-controlled functions:

- Engine Start
- Engine Stop
- Upload
- Auto-ID
- Advanced

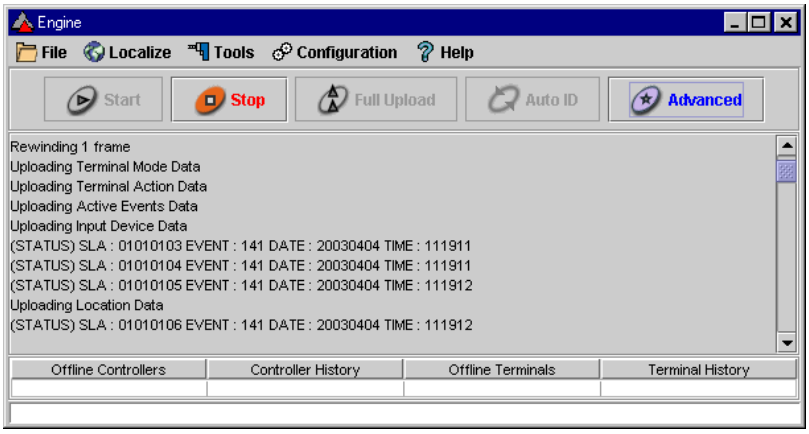


Figure 67 – Engine started

Engine Start

Starts the Engine. Transactions are downloaded from the Controllers and logged to the Database. In addition, changes are uploaded to the Controllers.

Run this only after you have performed an Auto-ID and a Full Upload.

Engine Stop

Stops all Engine processes and procedures.

Full Upload

Uploads all data in the ImproNet Database to the Controllers. The Engine polls each Controller three times to verify its presence before starting the upload. The engine stops when the upload is complete.

You must perform a Full Upload when the Terminals and Controllers are initially configured, and each time that major hardware changes are made to a Site.

During a Full Upload, the selected Site is offline.

Auto-ID

Auto-ID is a process that polls Controllers to identify their type and the logical address. Similarly, other units such as Terminals are also polled and identified. Newly connected units are assigned logical addresses.

*Stop the Engine **before** executing Auto-ID.*

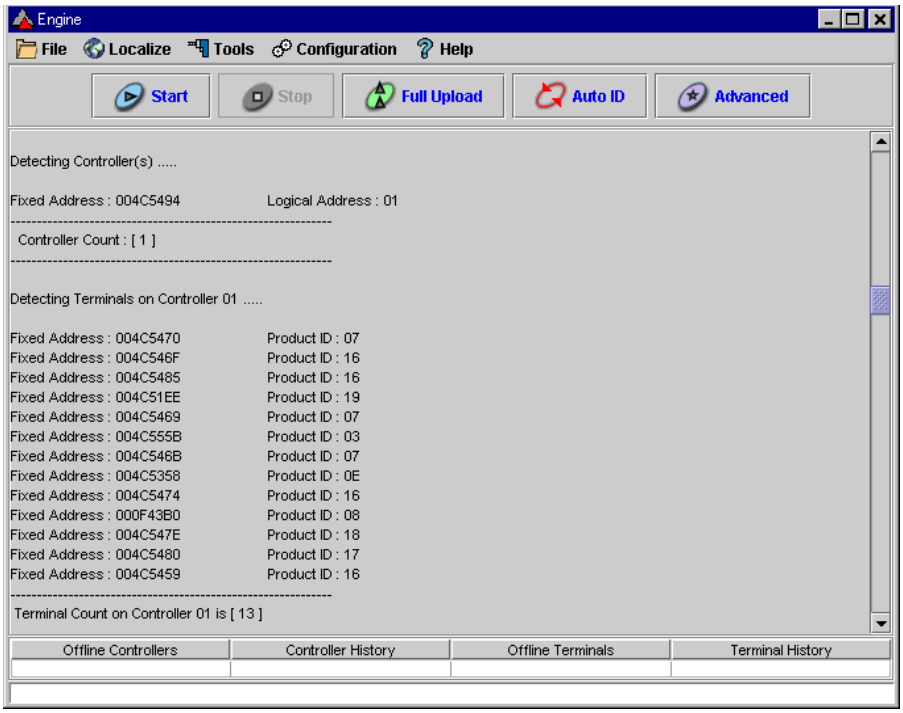


Figure 68 – Auto ID Complete

Advanced

The Advanced function provides a Command Prompt that enables you to manually enter and execute specific commands. The Command prompt is illustrated in **Figure 69**, and is recommended for advanced users only. Some common commands include the following:

- **Start AutoID**—starts the Auto ID process
- **Start Download 01**—downloads data from **Controller 1** to the ImproNet Database
- **Start Upload 01 03 05**—uploads data from the ImproNet Database to **Controller 1**, **Controller 3**, and **Controller 5**
- **AlarmServer**—starts the Alarms Server Software so that the Alarm Status of the System is displayed
- **Estart**—places the Site in **Emergency Mode**
- **Estop**—reverts the Site from Emergency Mode to **Normal Mode**
- **APB Reset**—resets the APB status of all Tags

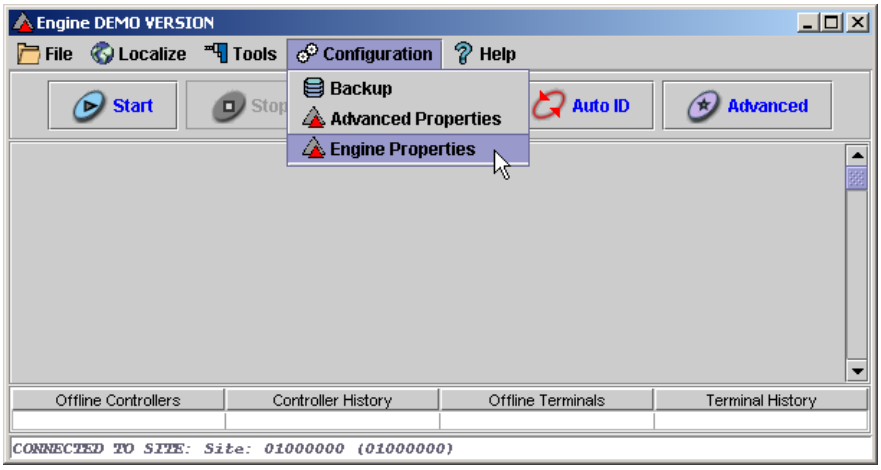
Figure 69 – Advanced Screen Command Prompt

Engine Properties

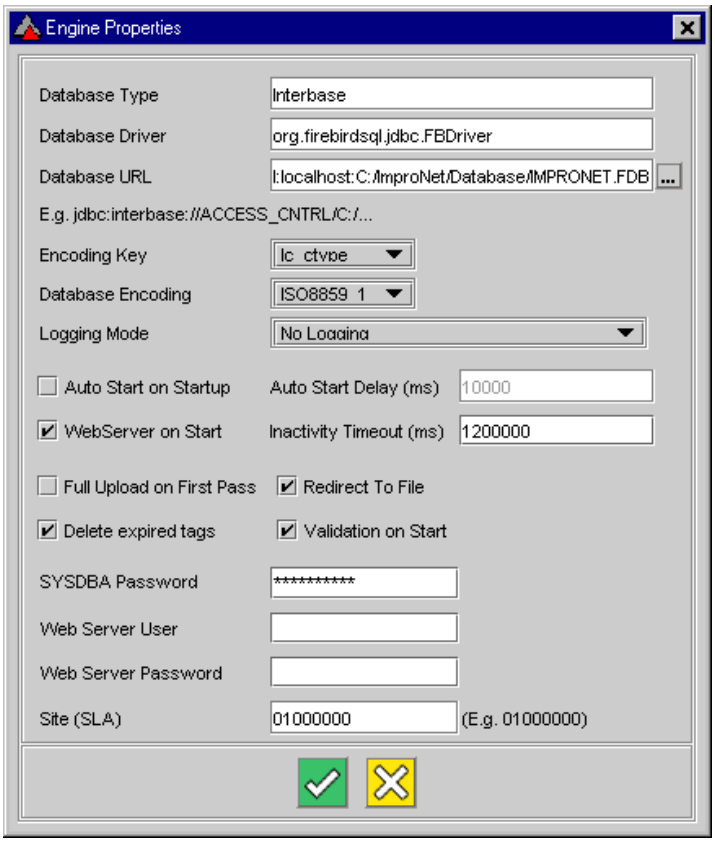
Open Advanced Properties

To open ImproNet Engine, **Engine Properties**, proceed as follows:

1. In Windows, click **Start** > **Programs** > **ImproNet** > **Engine**
2. In ImproNet Engine, select **Engine Properties** from the **Configuration** drop-down menu



The **Engine Properties** window is displayed.



The **Engine Properties** window enables you to view and change the following settings:

*Settings described in this section are stored in the **Engine.Properties** file*

Database

- **Type**—the name of the ImproNet Database type. The default is **Interbase**—the name of the company that produced Firebird
- **Driver**—specifies the driver file for the ImproNet Database
- **URL**— specifies the location of the ImproNet Database. Click the ... button to browse. Note that you cannot select Mapped network drives from the browse dialog.

Encoding Key

Refers to the type of database driver used. Jaybird is the default the database driver. In the **Engine.properties** file, the encoding key is **lc_ctype**.

Database Encoding

Specifies the applicable database-encoding format as displayed in **Table 17**.

Encoding format lc_ctype	Encoding format charSet
ISO8859_1	8859_1
WIN1250	Cp1250
UNICODE_FSS	UTF_8

Table 17 – Database Encoding Format

Logging Mode

Used for diagnostic purposes when there are communication problems between the Engine and Controllers.

Auto Start on Startup

Enables the Engine to start when it is opened. By default, you have to manually start the Engine.

Autostart Delay

Specifies the amount of time to delay starting the Engine after it is opened. For example, a setting of **50000** ms delays the Engine starting by five seconds after it is opened.

WebServer on start

Sets the Web Server to start when the Engine is started.

Inactivity Timeout

Sets the time-out delay for the Web Server.

Full Upload on First Pass

Sets the Engine to perform a full upload on startup.

Redirect to File

Specifies Error that messages are written to a Log file.

Delete Expired Tags

Deletes expired Tags from the database.

Validation on start

Validate the ImproNet Database on startup.

SYSDBA Password

Changes the SYSDBA password.

Site SLA

The Site's Logical Address.

Advanced Properties

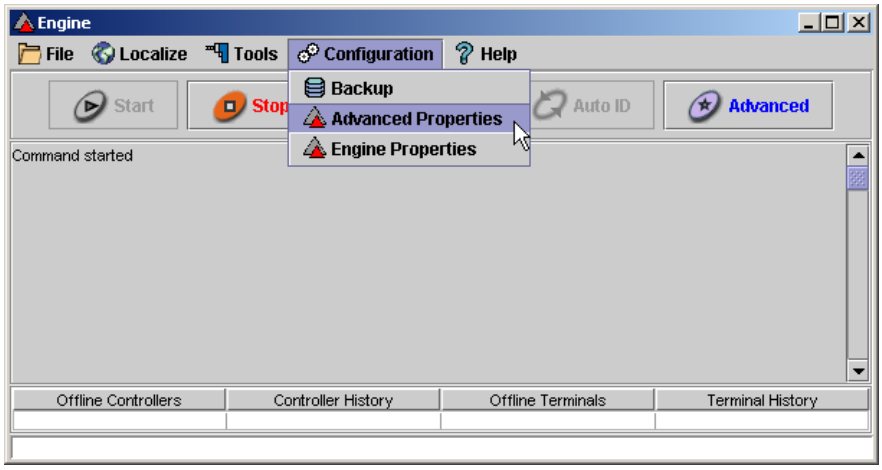
The **Advanced Properties** window in ImproNet Engine enables you to fine-tune the timing between ImproNet Engine, the ImproNet Database, and System Hardware.

We recommend that you do not change the Engine settings for a standard configuration. You should only edit Engine settings to improve the efficiency of ImproNet across a WAN.

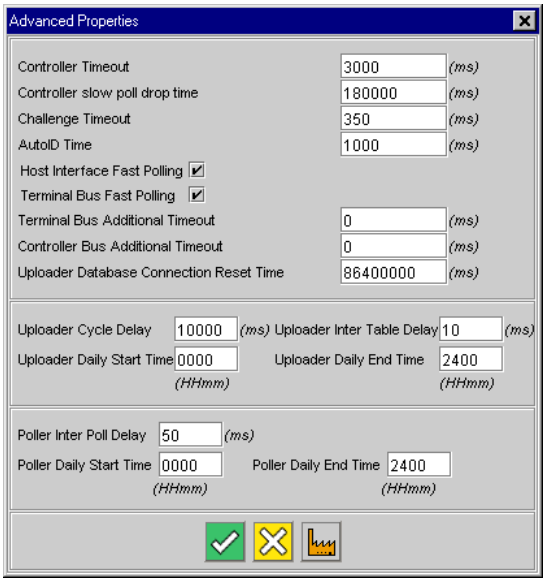
Open Advanced Properties

To open ImproNet Engine **Advanced Properties**, proceed as follows:

1. In Windows, click **Start** > **Programs** > **ImproNet** > **Engine**
2. In ImproNet Engine, select **Advanced Properties** from the **Configuration** drop-down menu



The **Advanced Properties** window is displayed



The **Advanced Properties** enables you to view and change the following settings:

All times are measured in ms (milliseconds), unless stated otherwise. 1000 ms = 1 second.

Controller Timeout

The length of time that the Engine will wait for a reply from a Controller. The default time is **3000**.

- Increase to **5000** if Ethernet converters or radio modems are used
- Increase the value if **Controller Dropped** error messages are displayed

Controller Slow Poll Drop Time

The amount of time that a Controller is dropped from the poll sequence, if it times out. The default is **180 000** (3 minutes). After the drop time has passed, polling continues normally.

Challenge Timeout

Amount of time allowed for detecting a Host Interface. If a Host Interface is not detected within the **Challenge Timeout** time, the **Not Authorised to Run** error message is displayed. The Default is **350**. If a valid Host Interface is connected and all connections are correct, you can extend the time to 800

AutoID Time

Amount of time a Controller allows to *AutoID* its Terminals. The default is **1000**. Increase AutoID Time to 2000 if there are AutoID problems over Ethernet, radio modem, or WAN.

Host Interface Fast Polling

Enables fast polling of the Controllers by the Host Interface, and facilitates inter-Controller communication. If Ethernet converters or radio modems are used, you can disable fast polling. The default is **true**.

Terminal Bus Fast Polling

Enables fast polling. Default value **=true**.

Controller Bus Additional Timeout

Increases the timeout duration for the Controllers and Host Interface fast polling. The default is **0**. We recommend that you use the default value

Terminal Bus Additional Timeout

Increases the timeout duration for Fast Polling Terminals. Default value is **0**. We recommend that you use the default value.

Uploader Cycle Delay

Sets the delay between upload cycles to the Controllers. Default is **10 000**. If operating on a Wide Area Network (WAN), increase the **Uploader Cycle Delay** to **60 000** (1 minute) to reduce network traffic.

Uploader Inter Table Delay

Time taken between processing Database tables in the uploader. Default value is **10**. Increase to **1000** to reduce bandwidth usage on a Wide Area Network (WAN).

Uploader Daily Start Time

Sets the start time for the upload cycle. The default is **0000**. Change this value to specify starting an upload during specific periods. For example, running an upload after-hours does not reduce network usage during office hours.

Uploader Daily End Time

Sets the end time for the upload cycle. The default is **2400** (midnight). If uploading is limited to after-hours, set the **Uploader Daily End Time** to **0600** – this ensures that upload cycles are stopped before the work day begins.

Poller Inter Poll Delay

Sets the time between successive polls. The default is **200**. Increase to **2000** to reduce network traffic over Ethernet converters on a WAN.

Poller Daily Start Time

Specifies when the Engine starts polling Controllers. The default **0000**.

Poller Daily End Time

Specifies when the Engine stops polling Controllers. The default **2400**.

Uploader Database Connection Reset

Limits amount of PC memory used by the software. This value is reset periodically. We recommend that you do not change it. The default is **86400000** (once a day).

System Configuration Procedure

It is important to perform the configuration procedure in the following order:

1. **Sites**
   - Host PC
   - Hardware auto-detection
2. **Controller**
   - Identify
   - Name
   - Configure
   - Assign Terminals to Zones and Locations
   - Configure Zones and Locations
3. **Terminals**
   - Identify
   - Name
   - Configure
   - Readers
   - Inputs
   - Outputs
   - Parameters
4. **Events and Actions**
5. **Access Time Patterns**
6. **Areas**
7. **Access Groups**
   - Time Patterns
   - Areas
8. **Tag holders**
   - Tags
   - Assign Tags
9. **Time Triggered Actions**
   - Actions
   - Inputs
   - Outputs
10. **Common Zones**
11. **Messages**

Sites

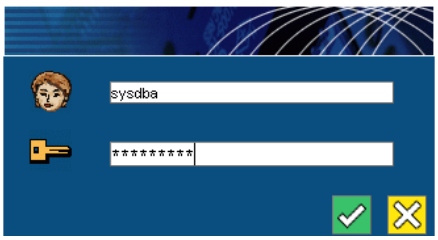
To set up a Site, you need to configure the following components:

- Host PC
- Controllers
- Terminals
- Zones and Locations

Open ImproNet Access

To ImproNet Access, proceed as follows:

1. In Windows, click **Start** > **Programs** > **ImproNet** > **Access**
2. Enter your **Username** and **Password**



*The default username is **SYSDBA**. The default password is **masterkey**.*

In the Navigator pane, click the icon to create a new Site. A new Site *node* is added to the tree. Click the icon. The new Site's details are displayed in the **Main** pane.

The **Host** node expands to display the Host PC icon. Click the icon. In the Main pane, enter the Host PC details.

Run Auto-ID to Detect Access Hardware

Before you can use ImproNet Access to configure hardware, you must run the **Auto-ID** function in the ImproNet Engine to detect the hardware.

*If ImproNet Engine and ImproNet Access are on different Host PCs, you must change the **Engine.Properties** file. For more information, refer to the **ImproNet Modules in a Network Environment** on page **182**.*

To open ImproNet Engine and run Auto-ID, proceed as follows:

1. In Windows, click **Start** > **Programs** > **ImproNet** > **Engine**
2. Click the Auto ID button. The Auto-ID process is started.

When hardware units are detected, they are added to the ImproNet Database and become available in the ImproNet Access tree. Controllers are assigned default names that contain their logical addresses. Each Controller has a node displaying its unassigned Terminals.

Use your Unit Location Chart to re-name Controllers and Terminals.

Deleting Nodes

You can delete Terminals, Controllers, Zones, and Locations only, from the Navigator tree. Other node types cannot be deleted. Note, to delete a unit, you must first delete its child components. For example, to delete a Controller, you must first delete its Terminals, Zones, and Locations.

Shared Data

ImproNet Access includes user-configurable data that is shared by other Modules; Deleting this data can result in other Modules functioning incorrectly. The following data is shared:

- Device Time Patterns
- Access Time Patterns
- Tag Holder Access Groups
- Areas

Do not delete Tag Holder Access Groups or Areas unless you are sure that they are not required by other Site components.

About Time Patterns

There are two types of time patterns:

- **Device Time Patterns**— determine *when* a device is physically operational
- **Access Time Patterns**—determine *when* Zones and Locations are accessible

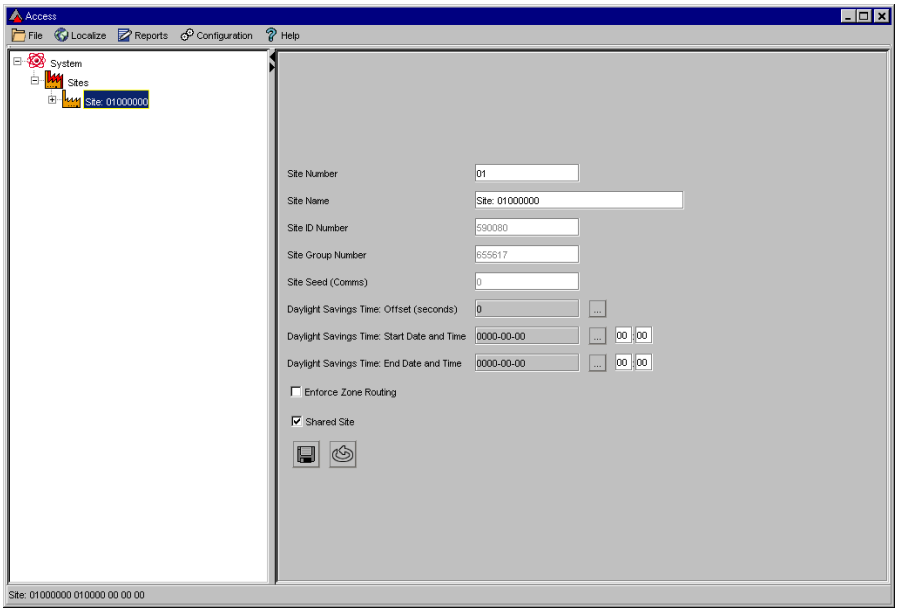
Device Time Pattern

A Device Time Pattern (DTP) determines when an electrical function or mechanical state on a hardware device is active. Device Time Patterns must be active for the same duration as all Access Time Pattern, and Tag Holder Time Patterns that use a relevant device.

Access Time Pattern

An Access Time Pattern (ATP) determines when a Tag Holder has access to an Area. When an **Access Time Pattern** and an **Area** are linked, they form an **Access Description**.

Configure Site



Select a Site in the Navigator pane. Complete the following fields in the Main pane:

- **Site Number**—enter a number for the Site
- **Site Name**—enter a name for the Site
- **Daylight Savings Time**—if applicable, click the ... button and enter a daylight savings offset
- **Enforce Zone Routing**—requires Tag Holders to access Zones in a specified sequence. Refer to page **230** for details.

*The **Daylight Savings Time** setting only works if the PC's Operating System has the **Daylight Savings Offset** feature enabled.*

Leave other fields with their default values.

Add Site

To add a new Site, proceed as follows:

1. In the Navigator pane, click the button
2. In the Main pane, click the button. The new Site is added to the Navigator tree.

Delete Site

To delete a Site, proceed as follows:

1. In the Navigator pane, click the button
2. In the Main pane, select the row containing the Site to delete.
3. Click the button
4. Enter the ImproNet Access password to confirm the action

Set Up the Host PC

*ImproNet Engine enters Host PC's **IP address** and **Computer Name** (network name) when it runs the Auto ID process.*

Specify the Host PC for a Site as follows:

1. In ImproNet Access, select a Site
2. Click the button

About Hardware Configuration

Types of Address

Each hardware unit is allocated a unique *Fixed Address* when it is built. ImproNet Engine allocates a *Logical Address* to the unit for communication purposes.

Recording Installation Information

You must ensure the following information is recorded on the **Unit Location Chart** when a new hardware unit is received:

- Fixed Address—supplied on a label included with the unit
- A unique description of the unit's physical Location

A Unit Location Chart is provided with every Controller.

Address Allocation

ImproNet Engine assigns Logical Addresses to hardware units when it starts-up, or on request, depending on the system configuration.

Controller

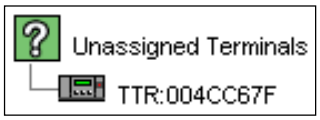
To configure a Controller, proceed as follows:

1. In the Navigator pane, select a Controller by clicking the icon
2. Change the default **Controller Name** to the name specified on the Unit Location Chart
3. Click the **Edit Controller Parameters** button. The **Controller Parameters Screens** is displayed.
4. In the **Enable Tag Types** section, select the types of Tags to be used. If **HiD** Tags are used, enable them here.
5. In the **Terminal Port Baud Rate** section, leave the default setting of **38400**
6. Click the button to accept

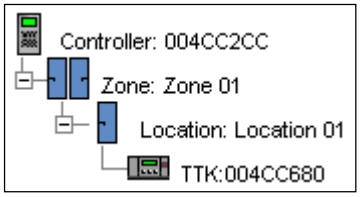
Assign Terminals

The first step in configuring a Controller is to assign its Terminals to Zones and Locations. Terminals must be manually assigned to a Controller before they can be configured for Zones and Locations. Unassigned Terminals are terminals that the Auto-ID process has identified, but not assigned to a Location. To assign Terminals to a Controller, proceed as follows:

1. In the Navigator Pane, select a Controller, an **Unassigned Terminals** node is displayed



2. Double-click the icon to expand the Unassigned Terminals node
3. Drag-and-drop unassigned Terminals onto a **Controller**. A new **Zone** containing a **Location** is created. **Terminals** are displayed in the Location.



Move Terminal

If you placed a Terminal in the wrong Location, drag-and-drop it to another Location.

Create New Zones and Locations

- To add another Terminal to an existing Location, drag-and-drop an unassigned Terminal to that Location.
- To create a new Location within an existing Zone, drag-and-drop an unassigned Terminal to the existing Zone

There is a limit of three Terminals (Fixed Addresses) per Location.

A Terminal can be assigned to one Controller only.

Name each Terminal and Location according to the Unit Location Chart.
Configure the Controller

Configure Zones and Locations

Locations in the same physically bounded vicinity are grouped into Zones. The total number of Zones per Controller is dependant on the number of Locations per Zone.

*The **IXP300** IC Controller supports a maximum of 16 Zones. However, there is a limit of 16 Locations per Controller. Therefore, if there is more than one Location per Zone, the total number of Zones is less than 16.*

*The **IXP400** AC Controller supports a maximum of 64 Zones.*

Configure Zones

To configure Zones, proceed as follows:

1. In the Navigator pane, click a  icon to select a Zone. The Zones settings are displayed in the Main pane
2. Enter a name for the Zone in the **Zone Name** textbox
3. Set the **Anti-Passback** (APB) mode
   - **None**—APB off
   - **Relaxed**—Once a Tag Holder has entered a Zone, they must exit the Zone using their Tag *before* they can re-enter. However, Tag Holders can use their Tags for multiple, consecutive exits in this mode.
   - **Strict**—APB Zone rules are enforced for **in** and **out** directions. A Tag Holder cannot enter or exit a Zone consecutively.
4. **Supervisor Group for this Zone**—specifies the Supervisor group that must have entered a Zone before a non-supervisor Tag Holder is permitted access to that Zone. The default value for this option is none (no value). For more information, refer to the **Supervisor Unlock** section on page **279**.
5. **Fully Nested within Zone**—select an option from this drop-down list if the Zone is physically contained within another Zone. This option is useful for **Zone Routing**.
6. **Part of Common Zone**—select an option if the Zone is part of a Common Zone. Refer to the **Common Zones** on page **270** for details
7. **Relaxed Exit Conditions for this Zone**—enables a Tag Holder to exit a Zone even if the Access Time Pattern for the Zone has expired. The default value is **Yes**.

8. **Anti-Passback Lockout Time**—enter a time in minutes to enforce APB. Only available if **Relaxed** or **Strict APB** mode is selected. Refer to point **3** for APB details.
9. **Limit Tags Inside the Zone to**— enter the maximum number of Tags permitted in the Zone at the same time. Only available if **Strict APB** mode is selected.

Configure Locations

A Location is a physical point of access. Examples include doors, turnstiles, vehicle gates, and Time and Attendance points. A Location can have a maximum of three Terminals, but can also host a non-scanner Terminal such as the **I16** 16 Channel Input Terminal. To configure Locations, proceed as follows:

1. In the Navigator pane, select a Location. The Location settings are displayed in the Main pane.
2. Enter a descriptive **Location Name**
3. If the Location is a Time and Attendance point, select the **Time and Attendance** option from the Location Type drop-down list
4. If the Location accesses an Interleading Zone, select it from the **Interleading Zone** drop-down list
5. Click **Enforce Interleading Zone Routing** if required
6. To specify **Multiple Tag Access**, select the **2 Tags** option. This option is a security feature that requires two Tag Holders to access a Zone.

Zone Routing

Zone Routing ensures that a Tag Holder accesses Zones in a specified sequence. To set up Zone Routing, proceed as follows:

1. In the Navigator pane, select a Site
2. In the Main pane, select the **Enforce Zone Routing** option
3. In the Navigator pane, select a nested Zone
4. In the Main pane, select a Zone from the **Fully Nested Within Zone** drop-down list to specify the selected outer Zone.

Nested Zone must be configured on the same Controller.

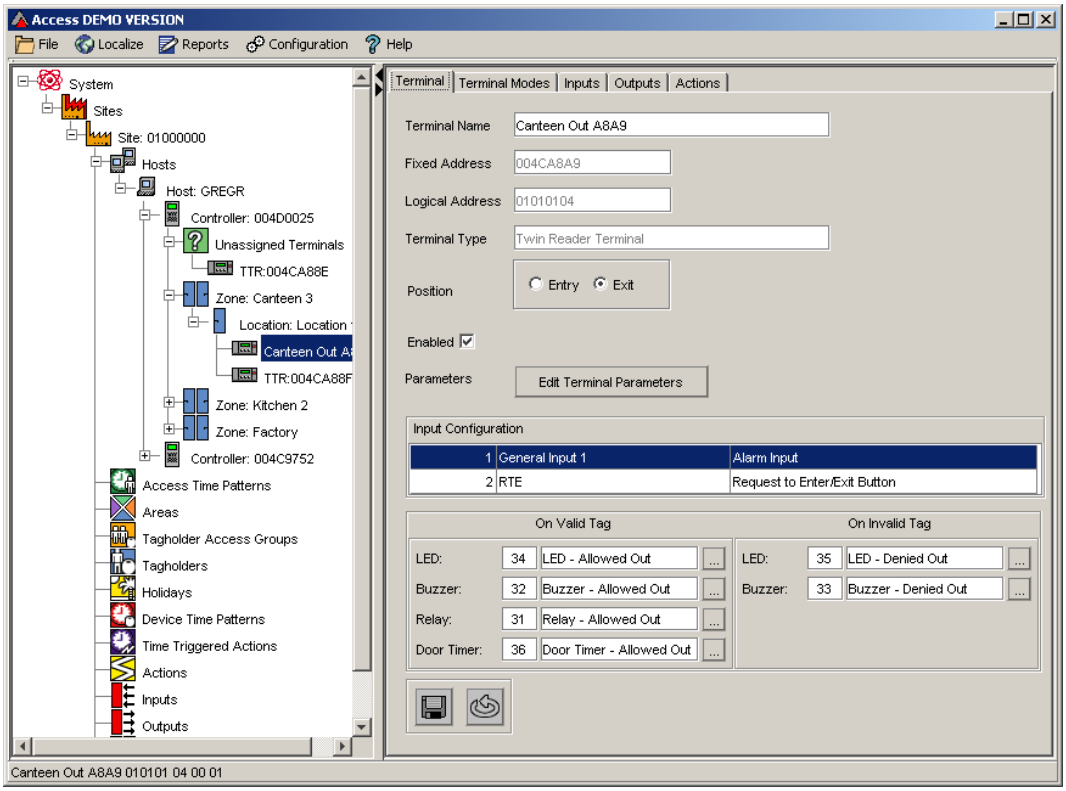
Terminals

The Terminals screen enables you to configure a Terminal and set-up it Actions, Inputs, and Outputs. To configure a Terminal, proceed as follows:

1. In the Navigator pane, click a Terminal to select it. The **Terminal** tab is displayed
2. Enter a descriptive **Terminal Name**
3. Select whether the Reader is an **Entry** or **Exit** reader.

This step is important because it determines the default Actions assigned to the Reader.

4. Click the  button to save the settings



Edit Terminal Parameters

Terminal Parameters are different for each Terminal type. This section provides information on the most common parameters only.

We recommend the default settings for standard configurations.

1. Click the **Edit Terminal Parameters** button. The Terminal Parameters screen is displayed.
2. Select a **Buzzer Volume**
3. Enter the value for **Same Tag Timeout** in milliseconds—this is the minimum time that must elapse before the same Tag can be re-read at the Terminal.
4. Select a **Tag Validation** option:
   - **Controller Validation**—the Tag is authenticated by the Controller. This is the default setting.
   - **Host Validation**—the Tag is authenticated by the Host PC. With this option, the Reader does not respond if the Host PC is offline.
5. Enter **Random Search** values if required. Refer to page **281** for details
6. Click the button to save the settings

*The **Host Validation** option should only be enabled if third-party software is being used and requires validation.*

Special Codes

You can use Special Codes to manually activate specific Actions, such as opening a door or sounding a siren.

Special Codes are only available on Terminals with a Keypad. However, they are not available if the Terminal is configured for Personal Access Code (PAC) mode.

We recommend restricting Special Codes to specific Tag Holders.

Select **Activate Special Key Codes** in **Keypad Transaction Reporting** to enable this feature. The Special Code format has a maximum of five digits in the following configurations:

- Three digits and a hash. For example, 123#
- Four digits and a hash. For example, 1234#
- Five digits up to the number 65535.

Duress Codes

Duress Codes generate an Alarm action when entered on a Keypad Terminal. You can allocate them to Tag Holders who have a pin code. The Duress Code format is one digit higher or lower than the Tag Holder's pin code. For example, if the pin code is 1234**5**, the Duress Code is 1234**4** or 1234**6**.

Terminal Mode Configuration

*Device Time Patterns must be set-up **before** Terminal Modes can be configured.*

Terminal Mode specifies the state of a Terminal during a selected Time Pattern. The following Terminal Modes and access conditions are available:

- **Tag Mode**—the Terminal requires a valid Tag to be accessible. This is the default mode.
- **Locked Mode**—the Terminal is Locked and access is denied, even to valid Tags.

- **Unlocked Mode**—the Terminal is Unlocked
- **Tag + PIN**— the Terminal requires a Valid Tag *and* a PIN Code for to be accessible
- **Tag + Reason Code—** the Terminal requires a Valid Tag *and* a Reason Code to be accessible
- **Tag + PIN + Reason Code—** the Terminal requires a Valid Tag *and* a PIN Code *and* a Reason Code to be accessible
- **PAC—** the Terminal requires a valid Personal Access Code (PAC) *or* Tag to be accessible

To configure Terminal Modes, proceed as follows:

1. In the Main pane, select the **Terminal Mode** tab
2. Select the **Default Terminal Mode** form the drop-down list
3. Click the button to create a new Terminal Mode
4. Click the **Device Time Pattern** field and select an existing Device Time Pattern
5. Select a corresponding Terminal Mode from the **Terminal Mode** field
6. Select the **Report** checkbox to enable reporting of all access actions
7. Click the button to save

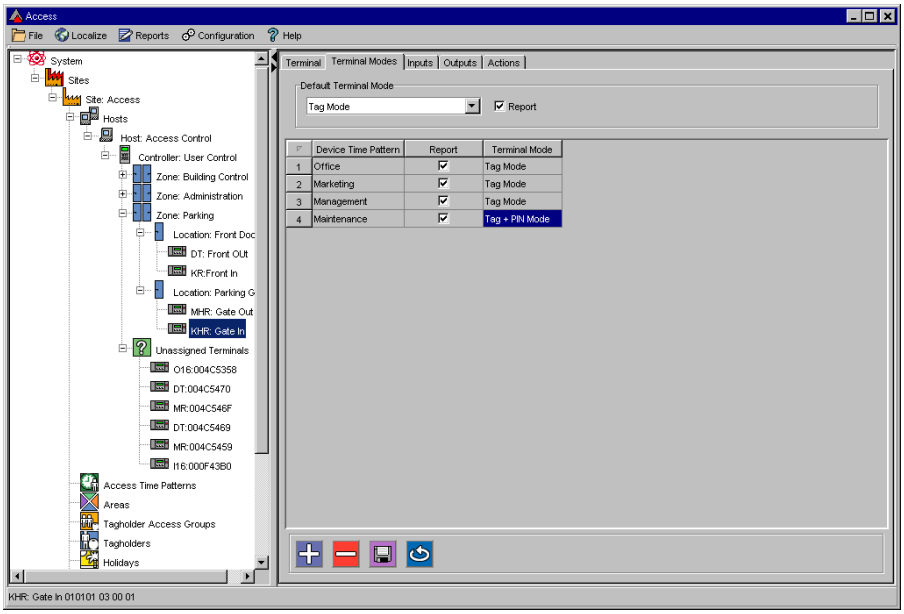


Figure 70 - Terminal Mode Configuration Screen

ImproNet supports up to 128 Device Time Patterns. Each Terminal can have up to eight Device Time Patterns.

Inputs

The **Inputs** tab enables you configure the inputs on the **I16**, **DR**, **DL**, **KT**, **DT**, **PT**, and **TT** Terminals. However, Inputs can also be edited and assigned, directly from the Terminals tab. **Figure 71** shows the area of the **Terminal** tab where you can edit Inputs and assign Actions. Configure Inputs for the following:

- **Request to Enter / Exit** buttons
- **Door Open / Door Forced** sensing
- **Inhibit Scanner** function
- **Alarm** monitoring★

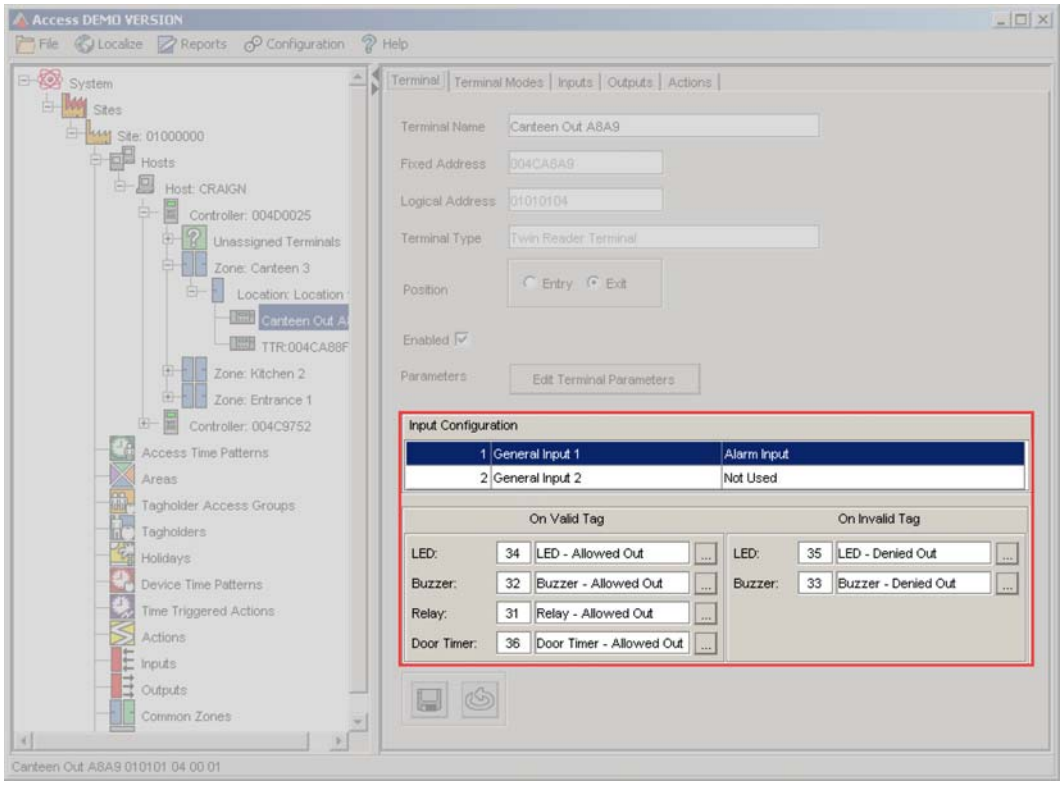


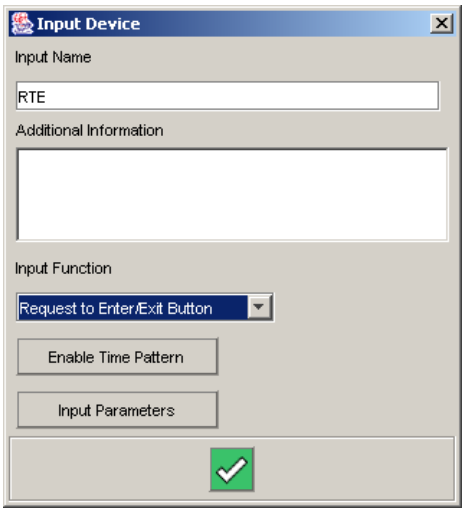
Figure 71 - Terminal Input Configuration

Example of Input Configuration

The following example demonstrates how to create an RTE configuration from the **Terminal** tab:

1. In the **Input Configuration** field, double-click a General Input that is **Not Used**. The **Input Device** window is displayed

2. Enter RTE for the **Input Name**
3. Select **Request to Enter/Exit Button** from **Input Function** drop-down list

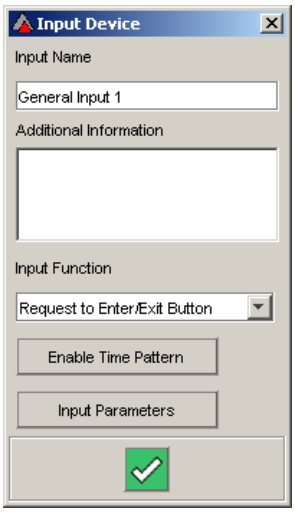


4. Click the button to save. You are returned to the **Terminal** tab

Input Configuration

To configure Terminal Inputs, proceed as follows:

1. In the Main pane, select the **Input** tab
2. Select an Input row
3. Click the button. The **Input Device** window is displayed.

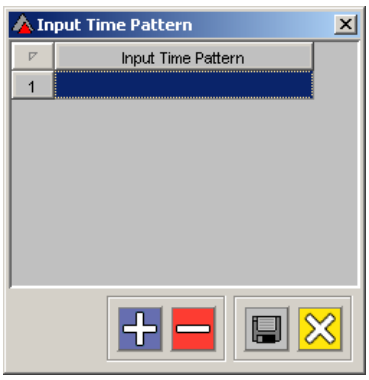


4. Enter an **Input Name**, or use the default name
5. Select an **Input Function** from the drop-down list. The following options are available:
6. **Not Used**—select if the input is unused
7. **Request to Enter/Exit Button**—select if the input is connected to a Request To Enter or Exit (RTE) button
8. **Door Open Sensor**—select if the input is connected to a Door Open Sensor (DOS)
9. **Alarm Input**—select this option if the Input is connected to a third-party alarm system

Enable Time Patterns

Time Patterns determine when a Terminal Input is active. To configure Time Patterns, proceed as follows:

1. On the **Input Device** window, click the **Enable Time Pattern** button.

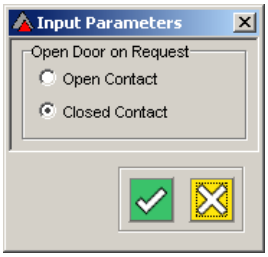


2. Click the empty, highlighted field.
3. Select a Time Pattern from the pop-up window and click **OK**. The selected Time Pattern is enabled for the relevant Input. Click the button to add additional Time Patterns.
4. Click the button to save

Input Parameters

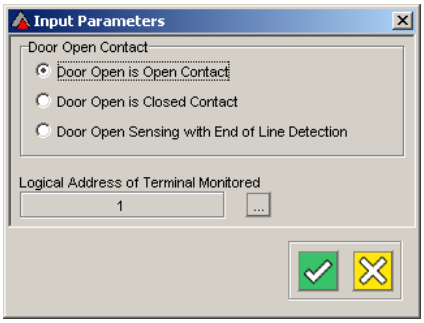
The Input Parameter setting provides options for the selected **Input Function**. Proceed as follows to configure Input Parameters:

1. On the **Input Device** window, click the **Input Parameters** button
2. For the **Request to Enter/Exit Button** Input Function, the following options are available:
   - **Contact Open**—Door opens when Input receives an open-contact signal
   - **Contact Closed**—Door opens when Input receives a closed-contact signal



3. Click the button to accept.
4. For the **Door Open Sensor** Input Function, the following options are available:
   - **Door Open is Open Contact**—Input reports that Door is open when an open-contact signal is received
   - **Door Open is Closed Contact**— Input reports that Door is open when an closed-contact signal is received
   - **Door Open Sensing with End of Line Detection**—enables End of Line sensing option

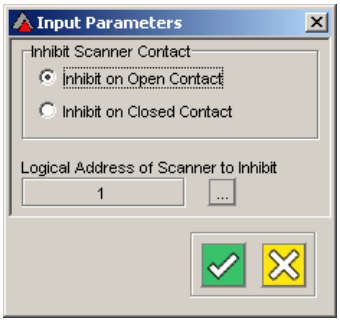
5. Click the ... button to select the Logical Address of Terminal Monitored.
6. Click the ✓ button to accept.



The **Inhibit Scanner** Input function disables a Tag Reader from reading Tags. The following **Inhibit Scanner** options are available:

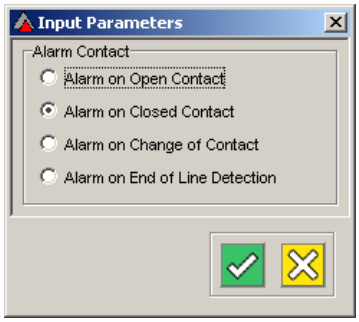
- **Inhibit on Open Contact**—The Reader does not read Tags if the Input detects a Door open-contact signal
- **Inhibit on Closed Contact**— The Reader does not read Tags if the Input detects a Door closed-contact signal

1. Click the ... button to select the Logical Address of Scanner to Inhibit
2. Click the ✓ button to accept.



For the **Alarm Input** Function, the following options are available:

- **Alarm on Open Contact**—an Alarm event is generated if the Input receives an open-contact signal
- **Alarm on Closed Contact**—an Alarm event is generated if the Input receives a closed-contact signal
- **Alarm on Change of Contact**—an Alarm event is generated if the Input receives a change-in-contact-state signal
- **Alarm on End of Line Detection**—an Alarm event is generated if the Input receives an End-of-Line-Detection contact signal. This option is recommended for the ImproX I16 Terminal.



3. Click the ✓ button to accept.

Be sure to click the ✓ button when you exit the Input Device window.

End of Line Sensing for ImproX TT

End of line sensing on the ImproX TT is only possible if Door Open Sensing is configured. Only Inputs 1 and 3 on the ImproX TT have end of line sensing functionality. The Input must be configured as a Door Open Sensor, and Door Opens Sensing with End of Line Detection must be selected from the input parameters list.

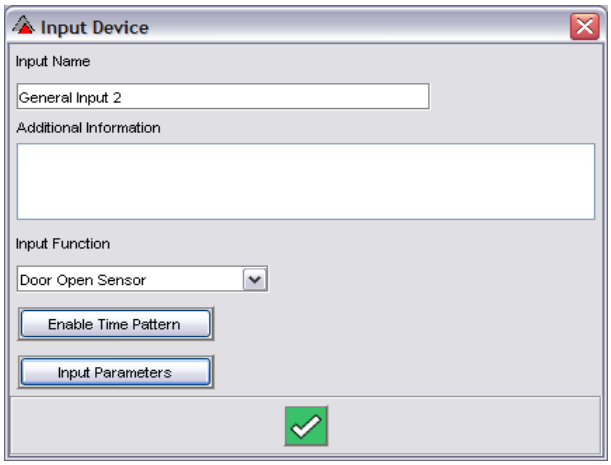


Figure 72 – Input Device Window

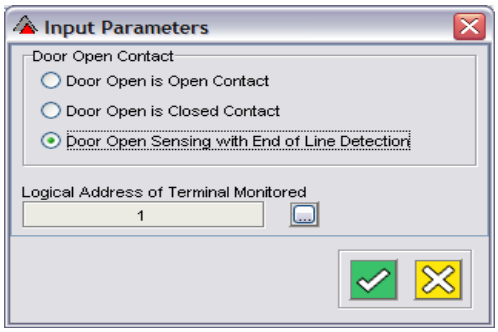


Figure 73 – Input Parameters Window

Outputs

The **Outputs** tab enables you to configure a Terminal's LED and Relay states for different Terminal modes.

We recommend setting different LED states for different Terminal Modes, as this will help Tag Holders identify Terminal Mode changes.

To configure Terminal Outputs, proceed as follows:

1. In the Main pane, select the **Output** tab
2. Select an Output row
3. Click the button. The **Output Device** window is displayed.

The content in the Output Device window is one of the following depending on the function of the output device.

- General Relay
- Status LED

General Relay

If the output device is a General Relay, select a **Relay Contact State** for each of the following:

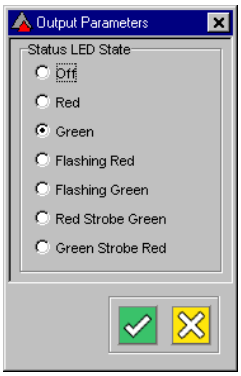
- Relay during Locked Mode
- Relay during Unlocked Mode
- Relay during Tag Mode
- Relay during Emergency Mode

The following **Relay Contact States** are available:

- **Do NOT drive relay in this mode**
- **Drive relay in this mode**

Status LED

If the output device is a Status LED, select a **Status LED State** for each of the following:



- Status LED during Locked Mode
- Status LED during Unlocked Mode
- Status LED during Tag Mode
- Status LED during Emergency Mode

The following Status LED States are available:

- Off
- Red
- Green
- Flashing Red
- Flashing Green
- Red Strobe Green
- Green Strobe Red

Actions

About Actions

ImproNet enables you to define Actions for Terminals and in some cases, Controllers. Actions are instructions stored in a Controller's memory, and are triggered by **Events** or by the **Time Triggered Actions** function. The following are examples of common Actions:

- Driving a Relay
- Sounding a Buzzer
- Changing LED state
- Displaying LCD message

When a Terminal is assigned to a Location, default actions for the Terminal are created. **Figure 74** displays the default actions created for the **On Valid Tag** event, and for the **On Invalid Tag**. These Actions are executed when a Tag is presented at the Terminal.

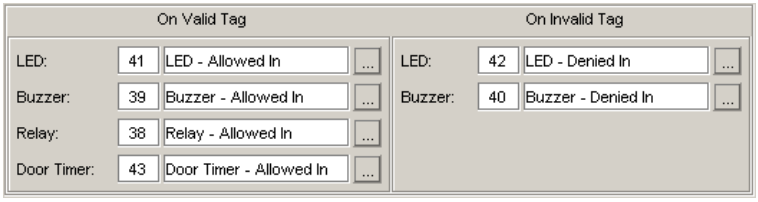


Figure 74 - Default Terminal Actions

The **On Valid Tag** event encompasses *all* valid Tag Events. Therefore, the **On Valid Tag** section on the Terminal tab enables you to assign actions to all valid Tag Events in a bulk procedure. Similarly, the **On Invalid Tag** event encompasses *all* invalid Tag Events. Therefore, the **On Invalid Tag** section on the Terminal tab enables you to assign actions to all invalid Tag Events in a bulk procedure.

To customize the settings of the default actions, proceed as follows:

1. On the Terminal tab, click the ... button next to the Action that you want to edit. The Action Parameters window is displayed.
2. Change the settings as necessary
3. Click the button to accept

*The **Actions** tab lists all Actions currently assigned to the selected Terminal and enables you to assign additional actions to the **On Valid Tag** and **On Invalid Tag** events.*

About Events

System Events are activated by a Controller when a particular procedure or process is performed. For example, when a Reader detects a Tag, the Tag is validated by the Controller, and the Event **Allowed_Normal_In** or **Allowed_Normal_Out** is activated. In this example, the actual Event depends on whether the Reader is an Entry or Exit Reader. When an Event is generated, the Controller executes the Actions linked to the Event.

Active System Events

The **Active System Events Editor** enables you to link Actions to *Allowed* Events and *Denied* Events. You can have up to five of the following Action types per Event:

- **Relay**—created by default when you specify a Terminal as an Entry or Exit Reader
- **Buzzer**—created by default when you specify a Terminal as an Entry or Exit Reader
- **LED**—created by default when you specify a Terminal as an Entry or Exit Reader
- **Door Open Timer**—created by default when you specify a Terminal as an Entry or Exit Reader
- **LCD**—optional Action described in **Table 18**

- **Emergency Mode**—optional Action described in **Table 18**
- **Reset Digital Input**—optional Action described in **Table 18**
- **Multiple Actions**—optional Action described in **Table 18**

An Action is not created for a Terminal if the hardware does not support the Action.

Action	Description
Door Open Timer	The Door Open Timer Action is created by default for XDT, XPT, and XTT Terminals. However, it is not enabled until a Terminal Input is configured as a Door Open Sensor (DOS). A **Door Open Timer** Action prevents a **Door Forced Alarm** Event from being activated if a door is opened under the following conditions: – A valid Tag Event precedes the door opening – A valid **RTE** Event precedes the door opening
LCD	An LCD Action displays a user-configurable text message on a Terminal or Controller with an LCD.
Emergency Mode	Emergency Mode Actions are only executed on Controllers and Terminals that have been configured for Emergency Mode. Refer to section **Emergency Unlock** on page **273** for details.
Multiple Actions	A Multiple Action groups up to five other Actions together so that they execute as a single Action. Multiple Actions are useful for Elevator control.
Reset Digital Inputs	Resets Digital Inputs

Table 18 - Optional Actions

Configure Active System Events

On the **Actions** tab, click the **Active System Events** button. The **Active System Events Editor** window is displayed. The Active System Events Editor enables you to assign up to five Actions to the **On Valid Tag** and **On Invalid Tag** events. Available Actions are listed in sequence. If the middle block of an Action is empty, it is unused.

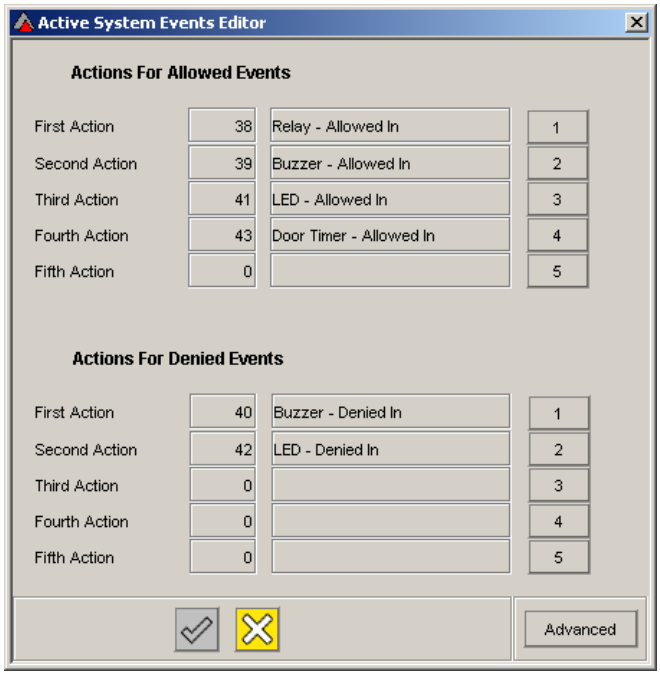


Figure 75 - Active Systems Event Editor

To assign new actions to an event, proceed as follows:

1. Click the number button to the right of an unused Action
2. The **Action Selector** window is displayed
3. Click an Action to select it
4. Click the  button

Advanced Active Systems Events

The **Active Systems Events** window enables you to assign up to five Actions to any system Event. To access this facility, click the **Advanced** button on the **Active Systems Event Editor** window, and select an Event from the **Active System Events** drop-down list

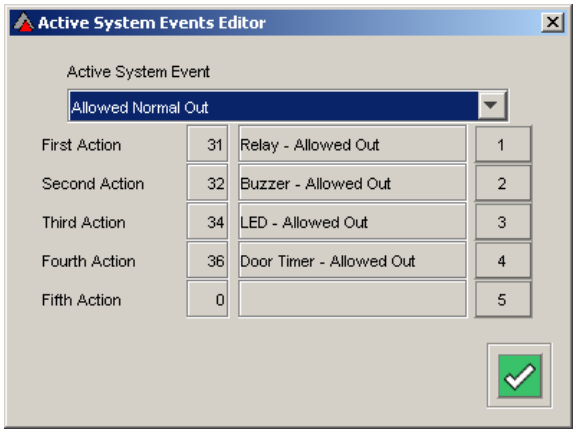


Figure 76 - Advanced Active Systems Events Window

Access Time Patterns

Access Time Patterns specify times when access is permitted. Tag Holders Access Groups are assigned one or more Access Time Patterns. When an **Access Time Pattern** and an **Area** are linked, they form an **Access Description**.

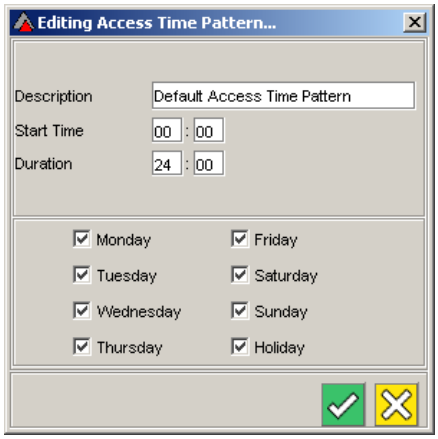
An Access Time Pattern is similar to a Device Time Pattern, but it has no start and end dates. Access Time Patterns regulate Tag Holder access times. Device Time Patterns regulate Terminal operation times.

Terminal modes override Access Time patterns. For example, if a Tag Holder has access from 6am to 6pm, but the Terminal is locked from 5:30pm, the Tag Holder will be denied in after 5:30pm.

Configure Access Time Patterns

To configure an Access Time Pattern, proceed as follows:

1. In the Navigator pane, click the icon. In the Main pane, the Default Access Time Pattern is displayed.
2. Do one of the following:
   - Select an Access Time Pattern, and click the button. The **Edit Access Time Pattern** screen is displayed
   - Click the button to create a new Access Time Pattern



3. Enter a **Description** for the Access Time Pattern
4. Enter a **Start Time**—this is the time of day when the Access Time Pattern becomes active
5. Enter a **Duration** in hours and minutes—this is how long after the start time, the Access Time Pattern is active
6. Select the days of the week when the Access Time Pattern is enabled
7. Create as many Access Time Patterns as necessary

If a lockout period between regular access periods is required, you need to create two Access Time Patterns. For example, to disable access during a lunch hour, you need to create an Access Time Pattern that ends when lunch starts, and another Access Time Pattern that starts when lunch ends.

Areas

An Area consists of a number of Locations that are grouped together to form a logical unit. An Area is *not* a physically bounded building or place; it is a collection of Locations that a group of Tag Holders has access to.

The purpose of an Area is to group Locations with the *same access requirements* together. This enables you to assign the same access rights to multiple locations at the same time. **Figure 77**, illustrates the concept of Areas. In the schematic, Locations are assigned to the **Management**, **Factory Workers**, or **Design Staff** Areas. Note that a single Location can be assigned to more than one Area.

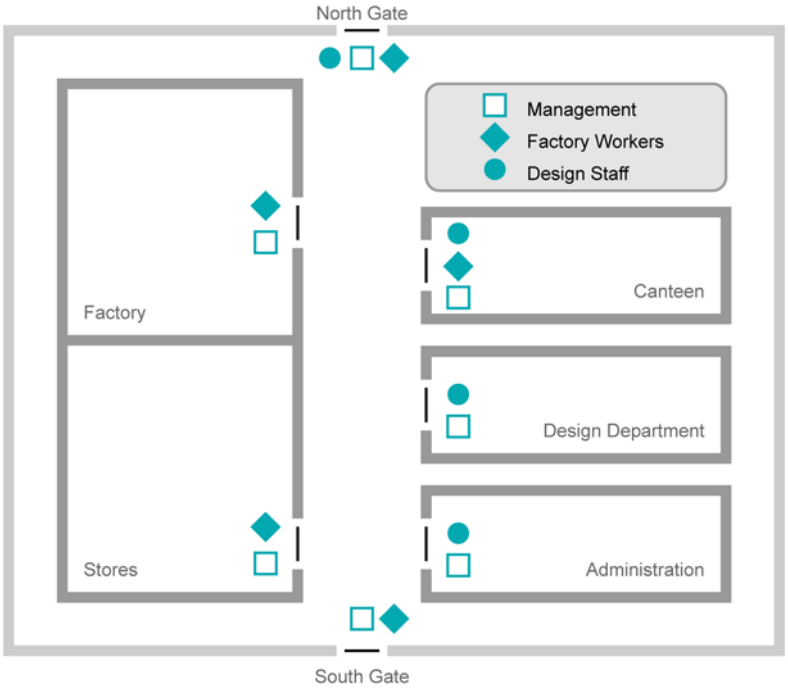


Figure 77 - Area Schematic

Select Area

To select an existing Area, proceed as follows:

1. In the Navigator pane, click the button
2. Select an Area from the **Area Name** drop-down list

An Area that has no Locations assigned to it displays the icon only. A configured area displays a tree of locations. If a Location is visible, then it is assigned to the selected Area.

Create Area

To create an Area, proceed as follows:

1. In the Navigator pane, click the button
2. In the Main pane, click the button
3. Enter an **Area Name** and **Area Description**

Delete Area

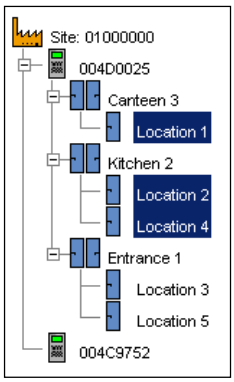
To delete an Area, proceed as follows:

1. In the Navigator pane, click the button
2. Select an Area from the **Area Name** drop-down list
3. Click the button. The Area **Edit** window is displayed.
4. Click the button. A confirmation dialog is displayed
5. Click **Yes**

Assign Locations to Areas

To assign Locations to an Area, proceed as follows:

1. In the Navigator pane, click the button
2. Select an Area from the **Area Name** drop-down list
3. Click the button. The Area **Edit** window is displayed.
4. In the **Edit** window, select a Location by clicking it—Select multiple Locations by holding down the **Ctrl** key while you click. Selected Locations are highlighted.



5. Click the button to save. The selected Locations are assigned to the Area

Access Groups

Each Tag Holder in a Site is assigned to at least one Tag Holder Access Group. The purpose of Access Groups is to allocate Tag Holder access permissions in bulk. This saves you the trouble of configuring Tag Holders one-at-a-time. A Tag can be assigned to up to three Tag Holder Access Groups per Site. Each Tag Holder Access Group consists of *three* **Access Descriptions**.

Access Descriptions

An **Access Description** defines the Time and the Area where access is permitted.

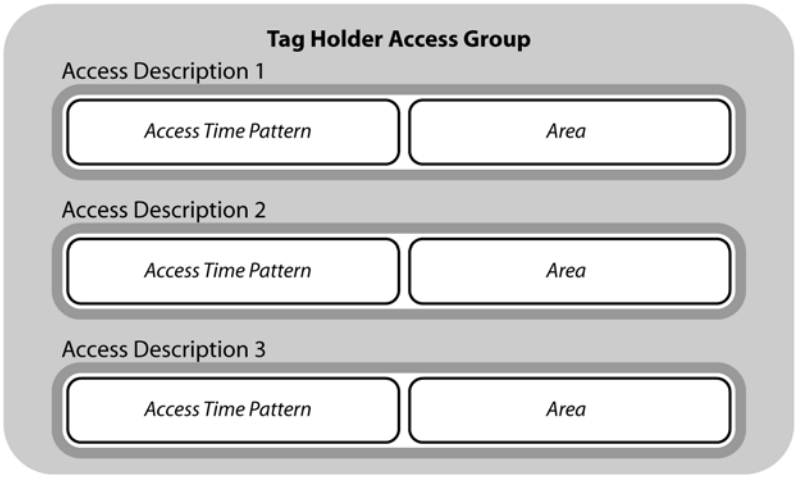


Figure 78 - Tag Holder Access Group Breakdown

There are two types of Tag Holder Access Groups:

- **General**—used for permanent staff
- **Visitor**—used for visitors

*The IXP300 System supports up to **255** Tag Holder Access Groups. The IXP400 System supports up to **1024** Tag Holder Access Groups.*

Configure Tag Holder Access Groups

The Tag Holder Access Group screen displays available Access Groups in the left-hand panel, and their Access Descriptions in the right-hand panel.

Select a Tag Holder Access Group

To select an existing Tag Holder Access Group, proceed as follows:

1. In the Navigator pane, click the button
2. Select a Tag Holder Access Group from the **General** tab in the left-hand panel. Alternatively, click the **Visitors** tab and select a Visitors Access Group.

The selected Access Group's **Access Descriptions** are displayed in the right-hand panel of the Tag Holder Access Group screen

Create a Tag Holder Access Group

To create a Tag Holder Access Group, proceed as follows:

1. In the Navigator pane, click the button
2. In the Main pane, click the button
3. Enter a name in the **Tagholder access group Name** textbox
4. Click the button to save

Delete a Tag Holder Access Group

To delete a Tag Holder Access Group, proceed as follows:

1. In the Navigator pane, click the button
2. Select a Tag Holder Access Group
3. Click the button. A confirmation dialog is displayed
4. Click **Yes**. The Tag Holder Access Group is removed

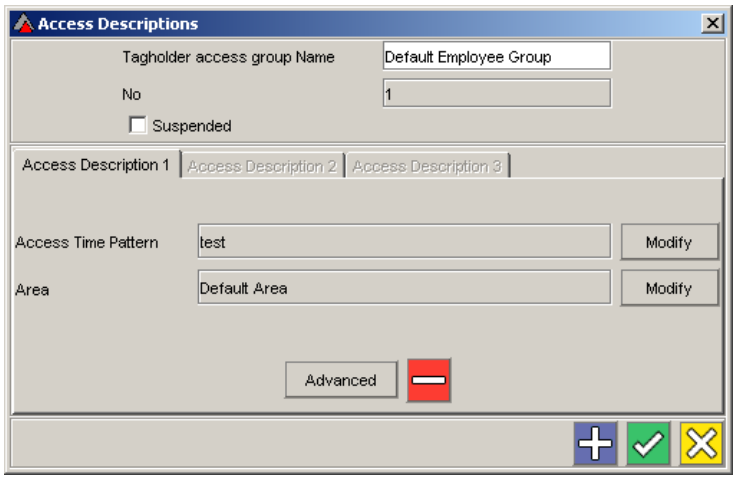
Edit a Tag Holder Access Group

To edit a Tag Holder Access Group, proceed as follows:

1. In the Navigator pane, click the button
2. Select a Tag Holder Access Group
3. Click the button. The **Access Descriptions** screen is displayed.

Configure Access Descriptions

The **Access Descriptions** screen has three tabs—one for each Access Description per Access Group. The **Access Description 1** tab is displayed by default.



Assign Access Time Patterns

1. Click the top Modify button to assign an Access Time Pattern to the Access Description. The **Access Time Patterns** screen is displayed.
2. Click a **Time Pattern Name** to select it
3. Click the button to accept

Assign Areas

1. Click the bottom Modify button to assign an Area to the Access Description. The **Select Area** screen is displayed.
2. Click a **Time Pattern Name** to select it
3. Click the button to accept

Three Access Descriptions are available per Access Group. However, you only need to configure one of them to save an Access Group.

Advanced Settings

Click the **Advanced Settings** button on the **Access Descriptions**. Additional settings are displayed on the following tabs:

- **Reporting**—click the checkbox to log all transactions for the selected Access Description
- **Start & Expiry Date**—click the edit buttons and enter dates to control when the Access Description is active
- **Supervisor Unlock**—select the Supervisor who is required to be inside the Area before other Tag Holders are permitted entry
- **Actions**—click the Select buttons to assign actions for when Tag Holders are entering (**Coming In**), or exiting (**Going Out**) the Area specified in the Access Description

*The **Supervisor Unlock** facility is only applicable to Areas comprising a single zone set to **Strict Anti-passback**.*

Visitor Access Group

Visitor Access Groups are displayed on the **Visitors** tab on the Tag Holder Access Groups screen. They operate the same as other Access Groups. Note that Visitor Tags can be assigned to Visitor Access Groups only.

Tag Holders – Assign Access to Tags

A Tag Holder is any person who uses a Tag to access a Site. Visitors are Tag Holders with restricted access rights. Before you can assign access to a Tag, you must first assign the Tag to a Tag Holder. The Tag Holder screen enables you to do the following:

- Add Tag Holders to a Site
- Edit existing Tag Holder information
- Search for Tag Holders
- Read Tags

Add or Edit a Tag Holder

To add or edit a Tag Holder, proceed as follows:

1. In the Navigator pane, click the button
2. In the Main pane, do one of the following:
   - Click the button to add a Tag Holder
   - Click the button to edit a Tag Holder

Quick Search for Tag Holder

To search for a Tag Holder, proceed as follows:

1. In the Navigator pane, click the button
2. Enter some text into the **Find** textbox

3. Select the search criteria from the **on Column** drop-down-list. The results are displayed in the Main pane.

Configure Tag Holder

The **Edit Tagholder** Screen enables you create or edit a Tag Holder's information and assign Tags. Only the **First Name** and **Last Name** fields are required. However, we recommend entering as much information as possible.

To create or edit a Tag Holder, proceed as follows:

1. Enter the Tag Holder's **First Name** and **Last Name**
2. Complete other personal information as necessary
3. Select the **Current** checkbox to enable the Tag Holder. If this **Current** checkbox is unchecked, the Tag Holder is inactive in the system.
4. Use the **Notes** text area to enter other information about the Tag Holder
5. Enter a PIN code of up to 5 digits if the Tag Holder is required to use keypad-type Readers

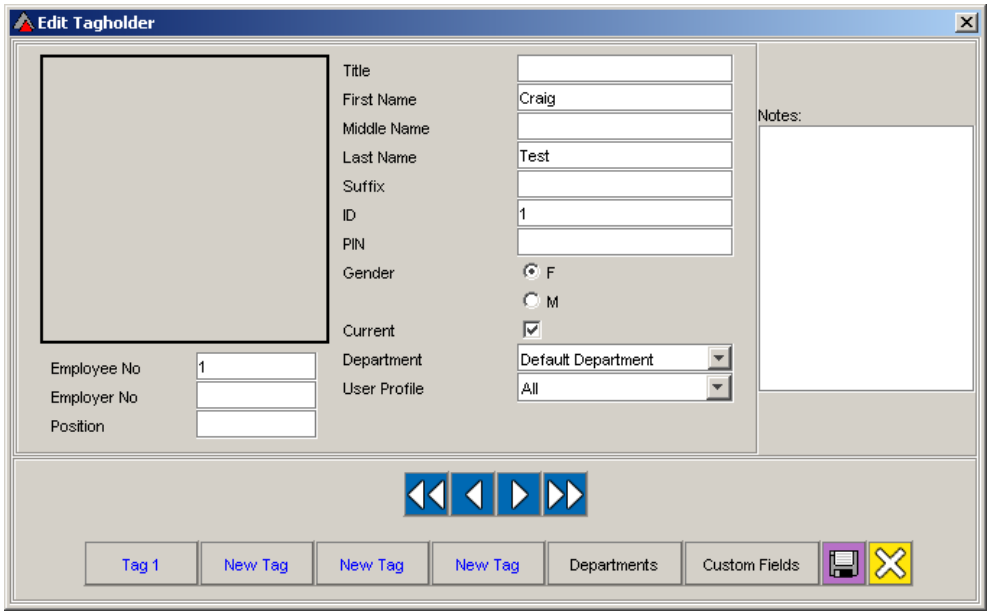
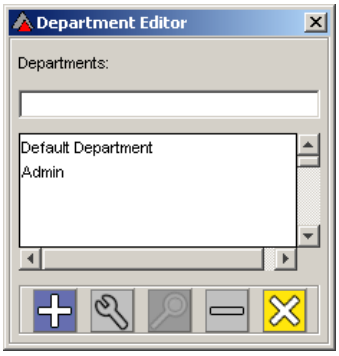


Figure 79 - Edit Tagholder Screen

Departments

Select the Tag Holder's Department from the **Department** drop-down list. To add new values or to edit the Department list, proceed as follows:

1. Click the **Departments** button. The **Department Editor** screen is displayed.



2. Do one of the following:
   - Click the button to add a new Department
   - Click the button to display Tag Holders belonging to the selected Department
   - Select a Department and click the button to edit it
   - Select a Department and click the button to delete it

User Profile

User Profiles are configured when Operator Security is required. Refer to the **Operator Security** section on page **286** for details

Configure Tag Details

A Tag Holder can have four Tags assigned to them. To assign Tags to a Tag Holder, proceed as follows:

1. On the **Edit Tagholder** screen, click any of the **New Tag** buttons. The **Tag Details** screen is displayed.
2. On the **Tag Details** screen, select one of the following Tag Options:
   - **Normal** – normal employee
   - **Suspend** – Tag is suspended form all access on the Site
   - **Blacklist** – Tag Holder is blacklisted and denied access to the Site
   - **Special Event 1** – Tag raises an Event when presented to the Reader – in this case Special Event 1. The Event can be linked to a specific Action
   - **Special Event 2** – Tag raises an Event when presented to the Reader – in this case Special Event 2. The Event can be linked to a specific Action
3. Configure the following:
   - **APB Override** – Tags are not subject to APB rules
   - **Report Always** – All Transactions for the Tag are written to the Database
4. Assign the Tag Holder to a Site by selecting a value form the **Site Assigned** drop-down list
5. Assign the Tag Holder to one or more Tag Holder Access Groups by selecting values form the **Group1**, **Group 2**, and **Group 3** drop-down lists.

   At least one Tag Holder Access Group must be assigned for the Tag to have any access rights.

6. Repeat procedure for additional Tags if necessary

Read the Tag

1. Present a Tag to an Enrollment Reader and click the **Read Tag** button. The Tag type is usually detected automatically.
2. If the Tag Type is not displayed when the card is read, or if you are entering a Tag code manually, select the **Tag Type** from the drop-down list.

When ImproNet detects a Tag, a Tag number is displayed in the **Tag Code** textbox.

*To create a Personal Access Code (PAC) only, select the **Personal Access Code** option from the **Tag Type** drop-down list and enter the PAC in the **Tag Code** text box.*

Multiple Tags do not work in an Anti-Passback Zone; if you enter a Zone with one Tag, and exit the Zone using a different Tag, APB is not enforced.

Specify Start and End Dates

If the Tag Holder is temporary, click the **Pick Start Date** and **Pick End Date** buttons to select a Start Date and Expiry Date. The **Select Date** window is displayed. To select dates, proceed as follows:

1. Select a month and a year using the and arrow buttons
2. Select a day by clicking it. Alternatively, click **Zero Date** to set no date.
3. Click the button to accept

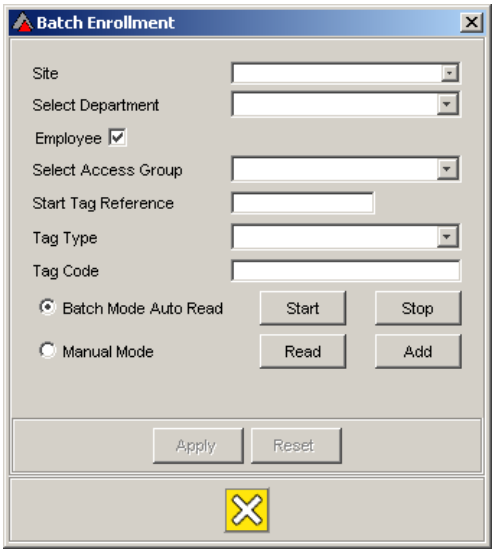
Batch Enrollment of Tags

The Batch Enrollment feature enables you to rapidly assign multiple Tags to a Site, without entering Tag Holder details.

Start Batch Enrollment

Proceed as follows to open Batch Enrollment and start adding Tags:

1. On the ImproNet Access Menu, select **Configuration** > **Batch Enrollment**. The Batch Enrollment screen is displayed.



2. Select a **Site** to assign the Tags to
3. Select a **Department** if necessary
4. Select the **Employee** checkbox if the Tags are for employees. Deselect the **Employee** checkbox if the Tags are for Visitors.
5. Select an **Access Group**
6. Enter a **Start Tag Reference** number if required. The Start Tag Reference number is any number or identification that you can use to temporarily identify the Tags.
7. Select one of the following to start the Batch Enrollment process:
   - **Batch Mode Auto Read**
   - **Manual Mode**

Batch Mode Auto Read

This mode enables you to scan a batch of Tags in quick succession:

1. Ensure the **Batch Mode Auto Read** option is selected
2. Click the **Start** button
3. Present Tags to the Enrollment Reader one at a time
4. Click the **Stop** button
5. Click the **Add** button. Newly scanned Tags are added to the ImproNet Database
6. Click **Apply**

Manual Mode

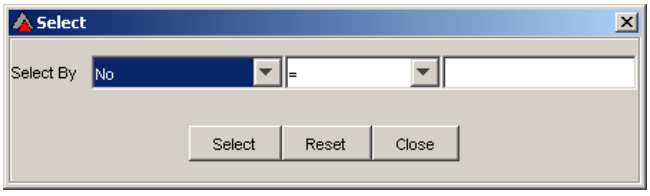
This mode enables you to scan a batch of Tags one at a time. It is useful if an Enrollment Reader is not within reach of the Host PC.

1. Ensure the **Manual Mode** option is selected
2. Present a Tag to the Enrollment Reader
3. Click the Read button. The Tag is read when its number is displayed in the **Tag Code** textbox.
4. Repeat steps 1 to 3 for additional Tags
5. Click the **Add** button when all Tags are scanned
6. Click **Apply**

Advanced Search

To search for a Tag Holder, proceed as follows:

1. In the Navigator pane, click the  button
2. In the Main pane, click the  button. The Select search window is displayed.



3. In the first drop-down list, select a field to search
4. In the second drop-down list, select an *operator*—see the next section for details
5. Enter keywords in the textbox on the right
6. Click the **Select** button to start the search. The results are displayed in the Main pane.
   - Click **Reset** to display the original Tag Holder list in the Main pane
   - Click Close to exit the search window

Search Operators

- **=** means the **same as**—use **=** to search for exact matches to your keyword
- **!=** means **not equal to**—use **!=** to search for Tag Holders that do *not* match your keyword. For example, use **!=** to search for Tag Holders that are *not* in a particular Department
- **LIKE** means **same first character**—use **LIKE** to search for Tag Holders if you are unsure of a spelling. For example, if you know that a Tag Holders Last Name is Johnson, but you are unsure how to spell it, enter the character **J** into the keyword textbox. All Tag Holder records that have Last Names beginning with a J are returned.

Available Search Fields

The first drop-down list in the Select search window contains the following fields:

Field Name	Description	Search Criteria
No	Tag Holder's *unique ID* assigned by ImproNet	Number
Title	Tag Holder's Title. For example, Mr, Mrs, or Prof.	Text
First Name	Tag Holder's first name	Text
Second Name	Tag Holder's second or middle name	Text
Last Name	Tag Holder's last name	Text
Suffix	Tag Holder's name suffix. For example, John Doe *Jr*	Text
ID	Number of Tag Holder's ID Document or Passport	Number
Gender	Male or Female	M or F
Pin	Pin code for use with Keypad Terminals	Number
Type		Text
Current Employee	The Tag Holder is currently employed	Checkbox
Position	Tag Holder's status in the company	Text
Department	Tag Holder's department	Text
Employee Number	Tag Holder's number assigned by their company	Number

Table 19 – Available Search Fields

Device Time Patterns

A Device Time Pattern (DTP) determines *when* a device is physically operational. You create Device Time Patterns on the **Device Time Pattern** screen, and assign them when you set up Terminals. You can also link Device Time Patterns to other functions including the following:

- Time Triggered Actions
- Inputs
- Random Search

A Device Time Pattern has the following settings:

- **DTP Name**—unique name
- **Start Date**—date when DTP starts operating
- **End Date**— date when DTP stops operating
- **Start Time**—time of day when DTP starts operating, configurable on a per day basis
- **Duration**—the length of time when the DTP is active
- **Day of the Week**—the days of the week when the DTP is active

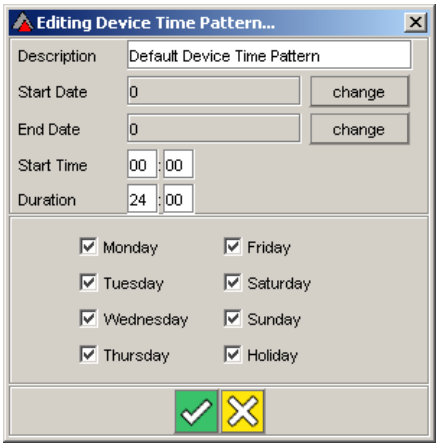


Figure 80 - Device Time Pattern Edit Screen

Create a Device Time Pattern

To create a new Device Time Pattern, proceed as follows:

1. In the Navigator pane, click the button
2. In the Main pane, click the button. The Adding **Device Pattern Time** screen is displayed.
3. Configure the new Device Time Pattern as specified in the **Configure Device Time Patterns** section

Open a Device Time Pattern

To configure a Device Time Pattern, proceed as follows:

1. In the Navigator pane, click the button
2. In the Main pane, select a **Time Pattern Name**
3. Click the button. The **Edit Device Pattern Time** screen is displayed.
4. Configure the new Device Time Pattern as specified in the next section: **Configure Device Time Patterns**

Configure Device Time Patterns

To configure the Device Time Patterns, proceed as follows:

1. Create a new Device Time Pattern, or open an existing one
2. Enter a **Description** that describes the Device Time Pattern

Configure Dates

If the Device Time Pattern is not required permanently, you can specify a start date and an end date. The default value for Start Date and End Date is **Zero Date**—this means that the Device Time Pattern begins immediately and does not expire. Specify a Start Date as follows:

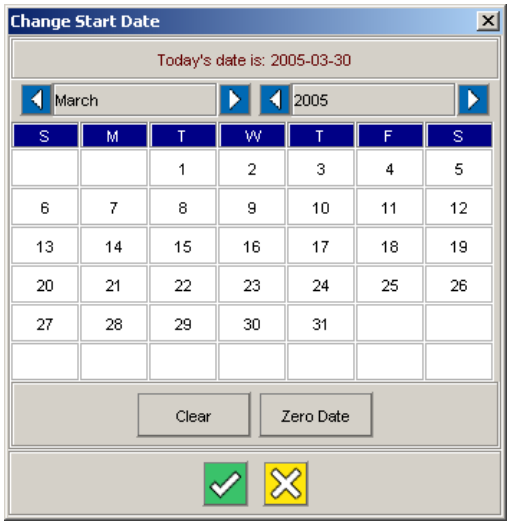


Figure 81 - Change Date Screen

1. Click the **change** button for the **Start Date**. The **Change Start Date** screen is displayed.
2. Select a month and a year using the and arrow buttons
3. Select a day by clicking it
4. Alternatively, click the **Zero Date** button to enable the default value
5. Click the button to accept

Now, Specify an End Date as follows:

1. Click the **change** button for the **End Date**. The **Change Start Date** screen is displayed.
2. Select a month and a year with the blue and white arrow buttons
3. Select a day by clicking it
4. Alternatively, click the **Zero Date** button to enable the default value
5. Click the  button to accept

Configure Times

Configure operating times as follows:

1. Enter a **Start Time**—this is the time of day when the Device Time Pattern becomes active
2. Enter a **Duration** in hours and minutes—this is how long after the start time, the Access Time Pattern is active

Configure Days

Configure days as follows:

1. Select the days of the week when the Device Time Pattern is enabled
2. Click the  button to accept the Device Time Pattern

Multiple Device Time Patterns

You can create up to 128 Device Time Patterns per Site. Additionally, multiple Terminals can share a single Device Time Pattern.

Holidays

Holidays are days or periods when access to a Site is restricted to Administrators. If the **Holiday** checkbox in an Access Time Pattern is selected, then Tag Holders assigned to that Access Time Pattern have access to a Site on or during Holidays.

Add, Edit, or Delete a Holiday

To add, edit, or delete a Holiday, proceed as follows:

1. In the Navigator pane, click the button
2. In the Main pane, do one of the following:
   - Click the button to add a Holiday
   - Click the button to delete a Holiday
   - Click the button to edit a Holiday

The **Add Holiday** screen is displayed.

Configure Holidays

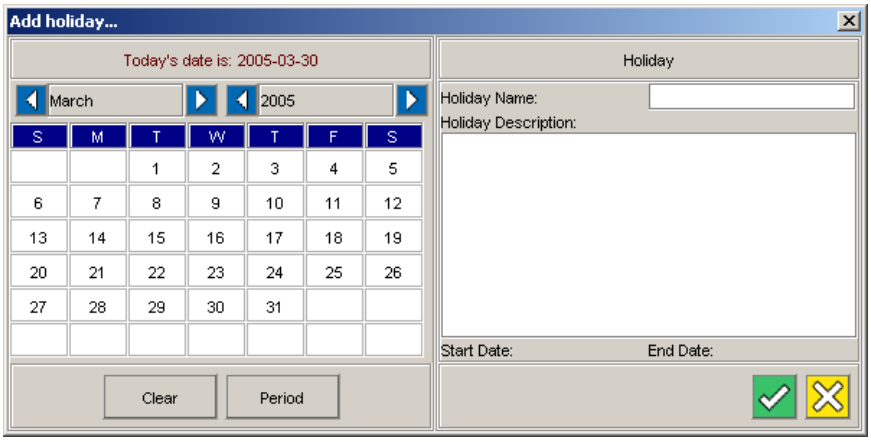


Figure 82 - Add Holiday Screen

To Add Holidays screen enables you to select the day or days to specify as a Holiday. To do this, proceed as follows:

1. Enter a **Holiday Name**
2. Enter a **Holiday Description**
3. Select a month and a year using the and arrow buttons
4. Select a day by clicking it. Click the **Period** button to select a period of more than one day
5. Click the button to accept

Time Triggered Actions

Time Triggered Actions are actions triggered by a Controller at the Start Time of a specified Device Time Pattern. They continue for the duration of the Device Time Pattern. To specify a Time Triggered Action you must assign a **Device Time Pattern** and an **Action**.

Add a Time Triggered Action

To add a Time Triggered Action, proceed as follows:

1. In the Navigator pane, click the button
2. In the Main pane, click the button

Delete a Time Triggered Action

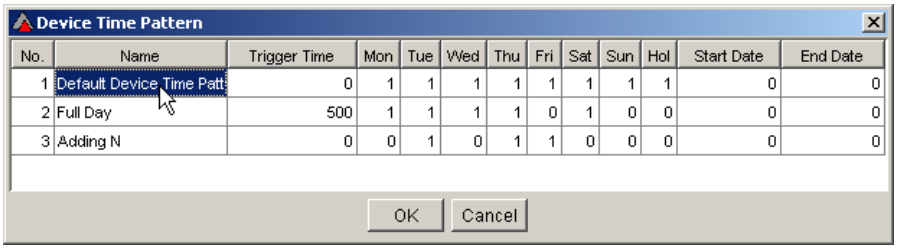
To delete a Time Triggered Action, proceed as follows:

1. In the Navigator pane, click the button
2. In the Main pane, select a Time Triggered Action and click the button

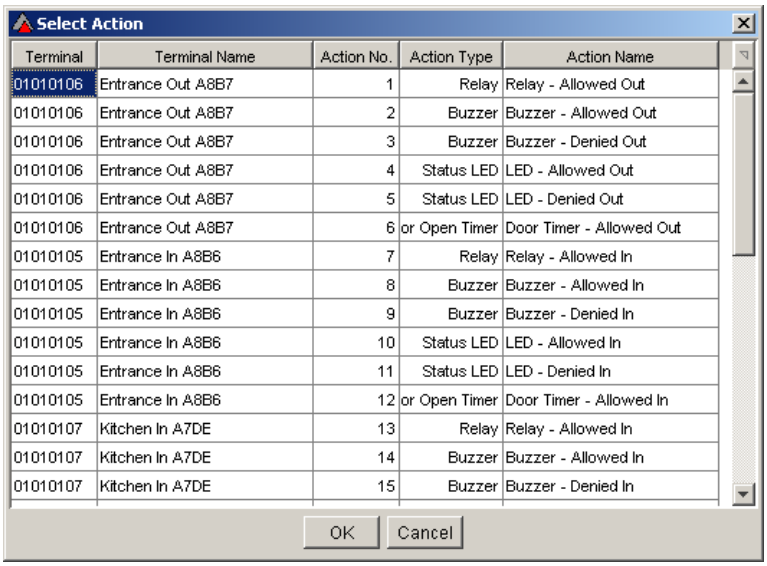
Configure Time Triggered Actions

To Configure a Time Triggered Action, proceed as follows:

1. In the Navigator pane, click the button
2. In the Main pane, double-click the **Device Time Pattern** field of a Time Triggered Action. The **Device Time Pattern** screen is displayed.



3. Select a **Device Time Pattern** by clicking it, then click **OK**
4. Double-click the **Action** field of the same Time Triggered Action. The **Select Action** screen is displayed.



5. Select an Action by clicking it, then click **OK**
6. Double-click the **Time Triggered Action Name** field and enter a name

Actions

When a Terminal is assigned to a Location, default Actions are created and linked to default Events. For example, the **Normal Allowed In** Event is automatically linked to the Action **Relay Allowed In**.

ImproNet Access enables you to create additional Actions and link them to Events.

*Most Actions are created and configured on the Action tab of the Terminals screen. Refer to the **Actions** section on page **239** for details.*

It is possible for Events on one Terminal to activate Actions on other Terminals.

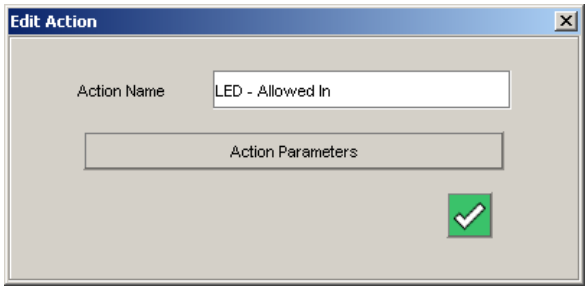
Edit and Delete Actions

Actions are create when Terminals are assigned to Locations. Therefore, the Actions screen only enables you to edit or delete Actions. To open the **Actions** screen, click the button in the Navigator pane,

Edit an Action

To edit an Action, proceed as follows:

1. In the Main pane, select an **Action** row
2. Click the button. The **Edit Action** window is displayed.



3. Edit the **Action Name** if necessary
4. Click the **Action Parameters** button. An **Action Parameters** window corresponding to the Action type is displayed.
5. Edit the parameters as required.
6. Click the button to accept

Delete Action

To delete an Action, proceed as follows:

1. In the Main pane, select an **Action** row
2. Click the  button. A delete confirmation dialogue box is displayed.
3. Click **Yes**

There is no undo for this procedure. Deleting an Action can result in a Terminal or Location functioning incorrectly.

Inputs

When a Terminal is assigned to a Location, default Inputs Functions are created. For example, If a Terminal has a Request to Exit (RTE) facility, a **General Input** for the Terminal is created.

The Inputs screen enables you to configure existing Inputs created during Terminal assignment.

*We recommend using the **Inputs** tab on the **Terminal** screen to configure Inputs. Refer to the **Inputs** section on page **234** for details.*

Outputs

When a Terminal is assigned to a Location, default Output Functions are created. For example, an Output function that controls the Terminal's LED status is created.

The Outputs screen enables you to configure existing Outputs created during Terminal assignment.

*We recommend using the **Outputs** tab on the **Terminal** screen to configure Outputs. Refer to the **Outputs** section on page **238** for details.*

Common Zones

Terminals on different Controllers can be assigned to Common Zones. However, you must first create a Common Zone in the **Common Zones** screen before it is available in the Terminal screen.

For more information, refer to the **Common Zones** section on page **270**.

Messages

Devices fitted with an LCD, such as a Time and Attendance Reader, can display a messages. Messages can be activated by Events and Time Triggered Events. The Message screen in ImproNet Access enables you to create up to **63** messages to assign to suitable hardware.

Create a Message

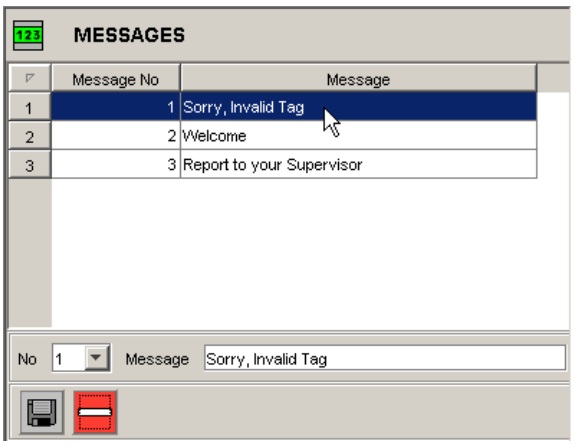
To create a new Message, proceed as follows:

1. In the Navigator pane, click the button. The **Messages** screen is displayed
2. In the Main pane, select a Message number from the **No** drop-down list. The default value is **1**
3. Enter the Message content in the **Message** textbox
4. Click the button to save
5. Repeat steps **1** – **4** to create additional messages. However, remember to select an unused Message Number each time, otherwise the original Message will be overwritten.

Delete a Message

To Delete a Message, proceed as follows:

1. In the Navigator pane, click the button. The **Messages** screen is displayed
2. In the Main pane, click a Message to select it



3. Click the button. The selected Message is deleted.

PART IV – Advanced Configuration

Common Zones

Common Zones enable you to group Zones on *different Controllers* together *and* maintain full APB control. This enables Tag Holders to enter an Area via one Zone, and exit the Area via another Zone.

Figure 83 illustrates a basic Common Zone set-up. In this scenario, there are two Controllers with one Zone each. **Zone A** and **Zone B** are grouped into a Common Zone, **Zone C**. This enables a Tag Holder to enter and Exit at any Location.

Why Common Zones?

Remember that a Zone can belong to one Controller only. In some cases, it is not possible to connect all Doors entering a building to the same Controller—this could be a distance constraint, or a result of bad initial planning. Common Zones enable you to treat two or more Zones as a single zone. Therefore, APB is enforced across multiple Zones.

*Zones must be set up in **relaxed** or **strict** APB mode if they are part of a common Zone*

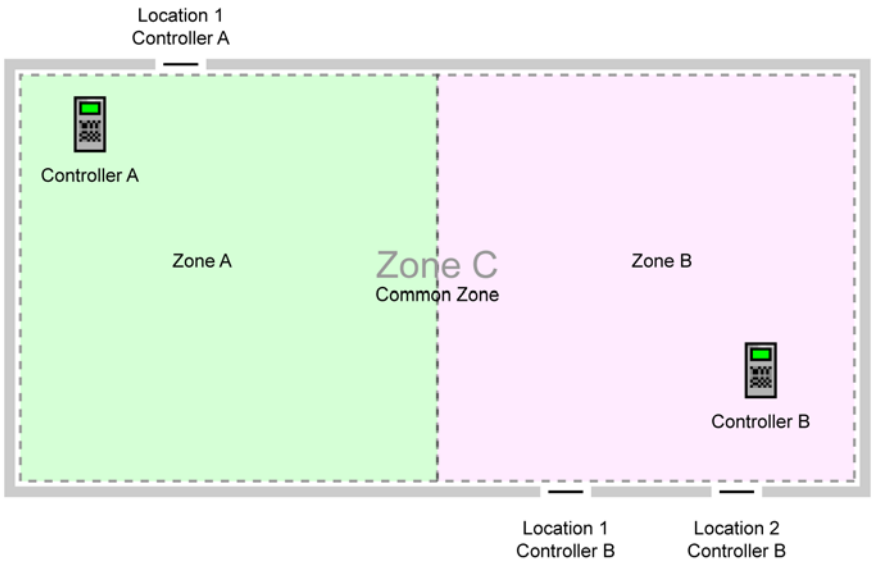


Figure 83 - Common Zone Diagram

Configure Common Zones

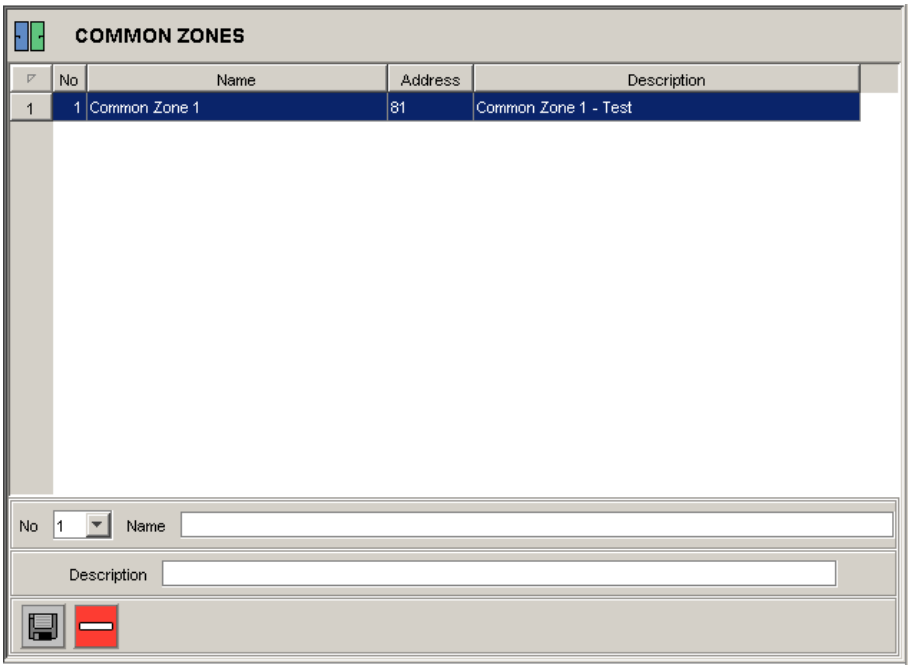
Perform the following steps to set up a Common Zone:

1. Create a new Common Zone
2. **Assign** existing Zones to a Common Zone

Create Common Zone

To create a Common Zone, proceed as follows:

1. In the Navigator pane, click the button. The **Common Zone** screen is displayed



2. In the Main pane, select a Common Zone number from the **No** drop-down list. The default value is **1**
3. Enter the Common Zone **Name** and **Description**
4. Click the button to save
5. Repeat steps **1** – **4** to create additional Common Zones. However, remember to select an unused Common Zone number each time, otherwise the original Common Zone will be overwritten.

Delete Common Zone

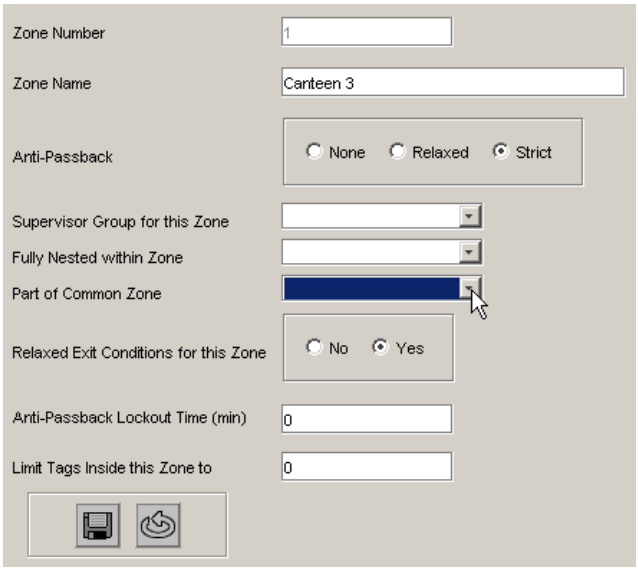
To Delete a Common Zone, proceed as follows:

1. In the Navigator pane, click the button. The **Common Zone** screen is displayed
2. In the Main pane, click a Common Zone to select it
3. Click the button. The selected Common Zone is deleted.

Assign Zones to Common Zone

Perform the following procedure for each Zone you are assigning to a Common Zone:

1. In the Navigator pane, click a Terminal to select it. The **Terminal** tab is displayed
2. Select a Common Zone from the **Part of Common Zone** drop-down list



3. Click the button to save the settings

*Ensure that **APB** is set to **Strict**.*

Emergency Unlock

Items not approved by UL are marked with a ★ character.

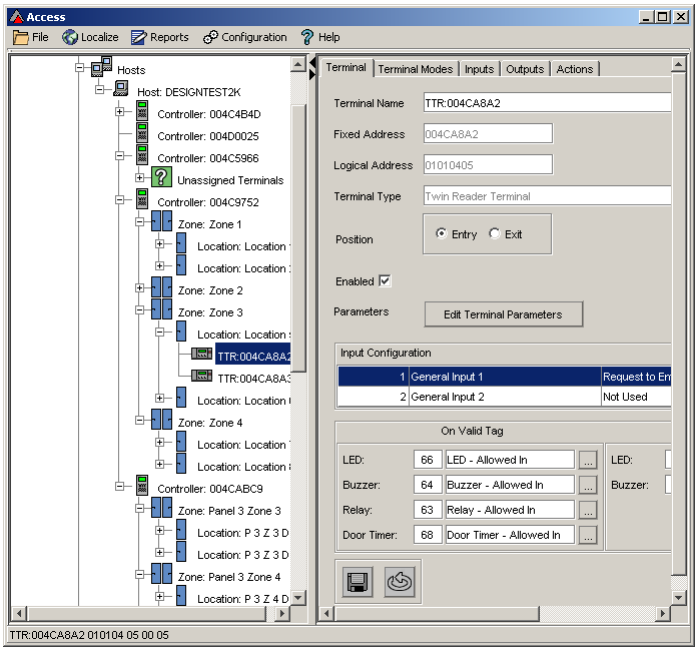
Emergency Unlock is used during an emergency to unlock selected doors in a Site. It can be activated directly via the ImproNet Software or by a Controller Event. For example, in the event of a fire, a third-party fire detector★ can trigger an input on a selected Terminal. The input triggers an Event that activates Emergency Unlock Mode at selected Terminals.

You need to configure each Terminal separately for Emergency Unlock Mode.

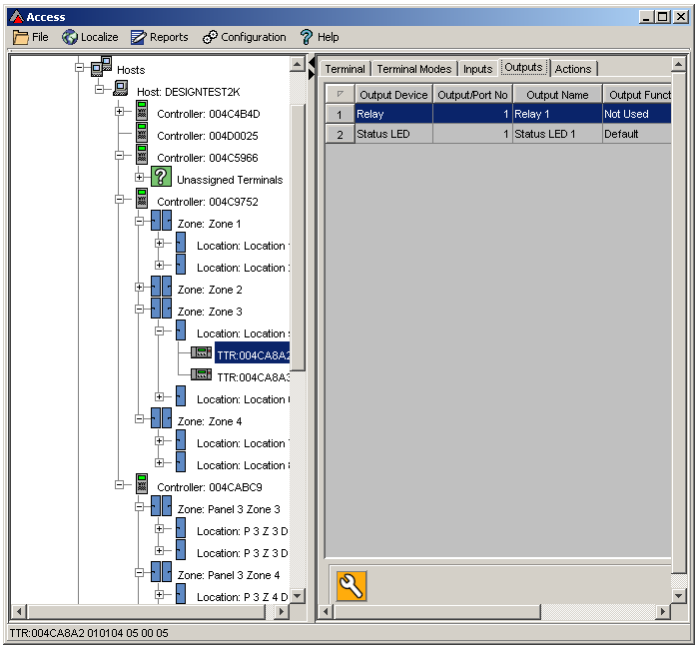
Set Up Emergency Unlock Mode

To set up Emergency Unlock, proceed as follows:

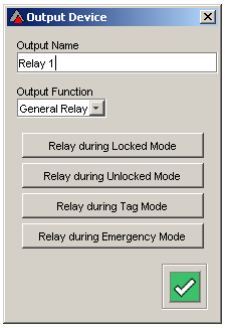
1. In Access, select a Terminal for a location where you want to enable Emergency Unlock. The **Terminal** tab is displayed.



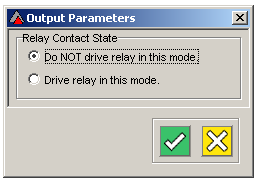
2. Select the **Outputs** tab



3. Select the **Relay** row. The **Output Device** screen is displayed.



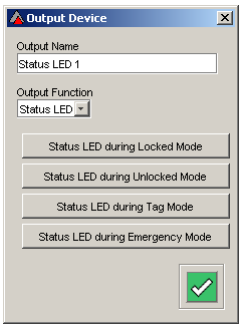
4. Click the **Relay during Emergency Mode** button. The **Output Parameters** screen is displayed. It contains settings for **Relay Contact State**.



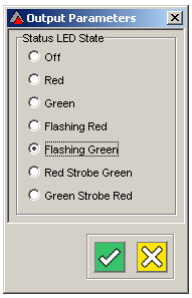
5. Select the **Relay Contact State** required during Emergency Mode

Now, configure the Terminal LED state as follows:

1. Select the **Status LED** option from the **Output Function** drop-down list
2. Click the **Status LED during Emergency Mode** button. The Output Parameters screen is displayed. It contains settings for **Status LED State**.



3. Select an option—we recommend **Flashing Green**
4. Click the button to Save



Activating Emergency Unlock Mode Manually

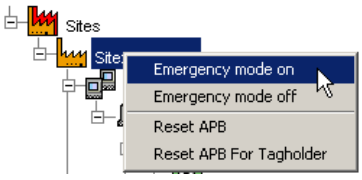
You can activate Emergency Unlock Mode at the following levels:

- Site
- Controller
- Terminal

Site Emergency Unlock

ImproNet Access enables you to manually activate Emergency Unlock Mode on a per Site basis. At this level, Emergency Unlock Mode triggers all Terminals that were set up for it. To do this, proceed as follows:

1. In the Navigator pane, click a Site to select it
2. Right-click the Site. A popup menu is displayed.



3. Select the **Emergency mode on** option. Emergency Unlock Mode is activated on all Terminals that were set-up for it.

Controller and Terminal Emergency Unlock

You can also activate Emergency Unlock mode for Terminals connected to a specific Controller or Terminal. The procedure is the same as the **Site Emergency Unlock** procedure, except you must select a Controller or Terminal in the Navigator pane.

Emergency Unlock is only activated on a Terminal if it has been configured for Emergency Unlock.

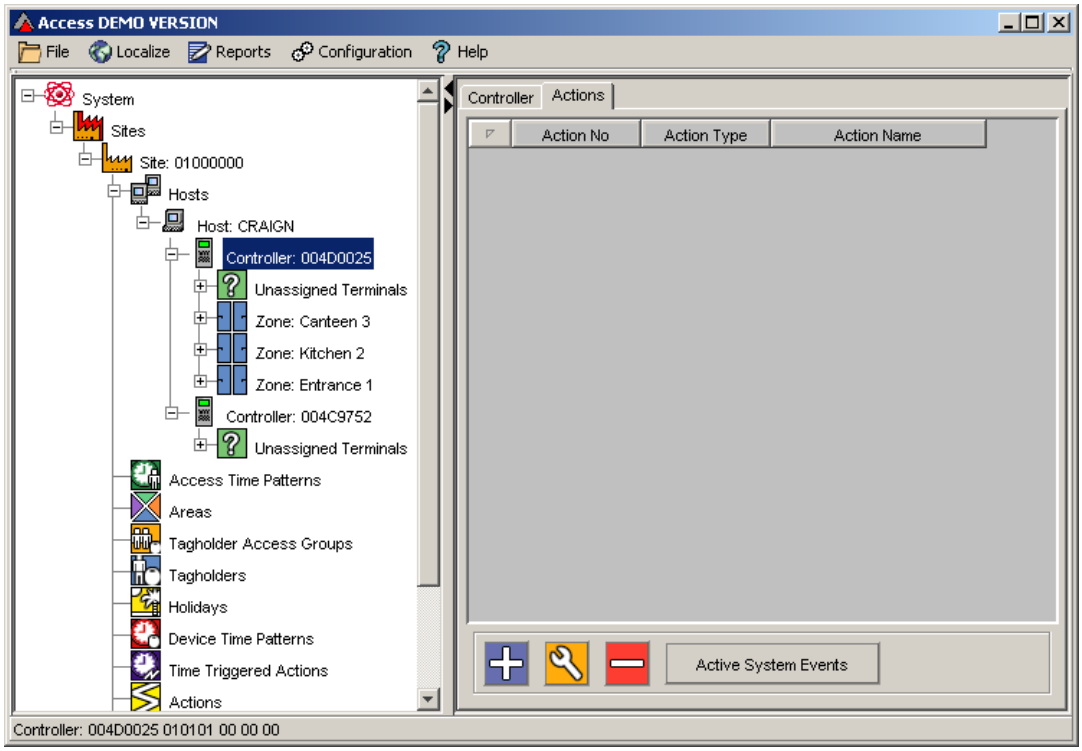
Activating Emergency Unlock via an Input

Emergency Unlock can also be triggered via selected Terminals. In this configuration, the Emergency Unlock Action is triggered when an Input receives a specific signal. For example, you can set-up a Controller to activate the Emergency Unlock Action when the Terminals Input receives a signal from a panic button.

Configure Controller Action

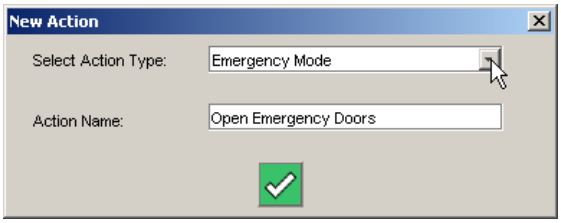
First, configure the Emergency Unlock Action on a Controller as follows:

1. In the Navigator pane, select a Controller
2. Click the **Action** tab

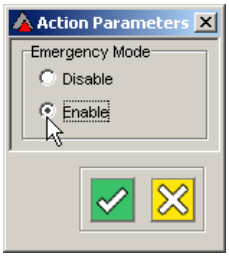


3. Click the  button to create a new action
4. Select **Emergency Mode** from the **Select Action Type** drop-down list

5. Name the Action **Open Emergency Doors**



6. Click the button to save. The **Action Parameters** window is displayed.

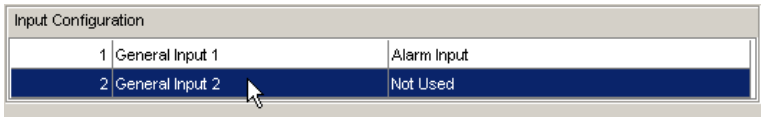


7. Select the **Enabled** option
8. Click the button to save

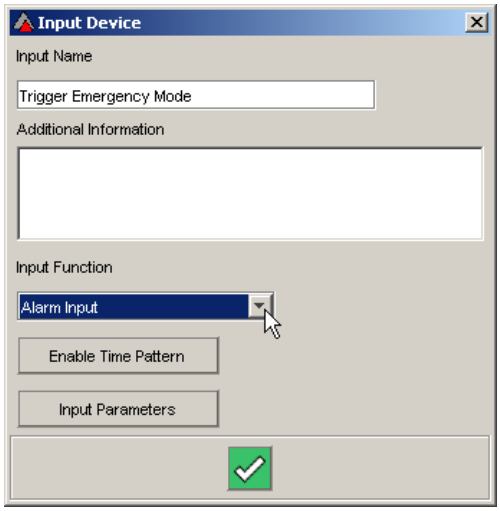
Configure Terminal Input

Second, configure an Input on a Terminal as follows:

1. In the Navigator pane, select a Terminal
2. In the **Input Configuration** field, double-click a General Input that is **Not Used**.

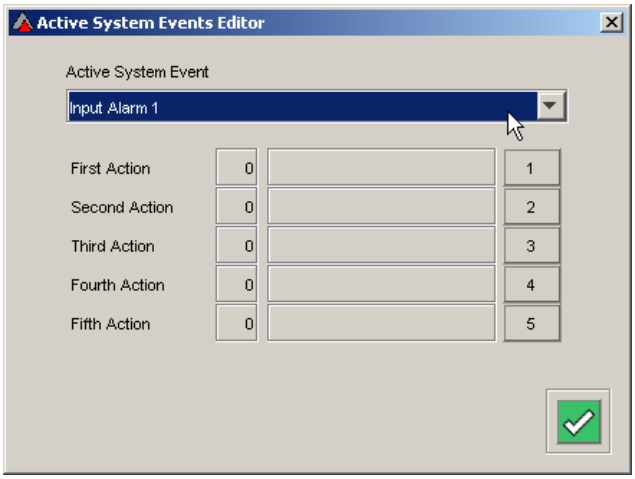


The **Input Device** window is displayed.



3. Enter **Trigger Emergency Mode** for the **Input Name**
4. Select **Alarm Input** from the **Input Function** drop-down list
5. Click the button to save

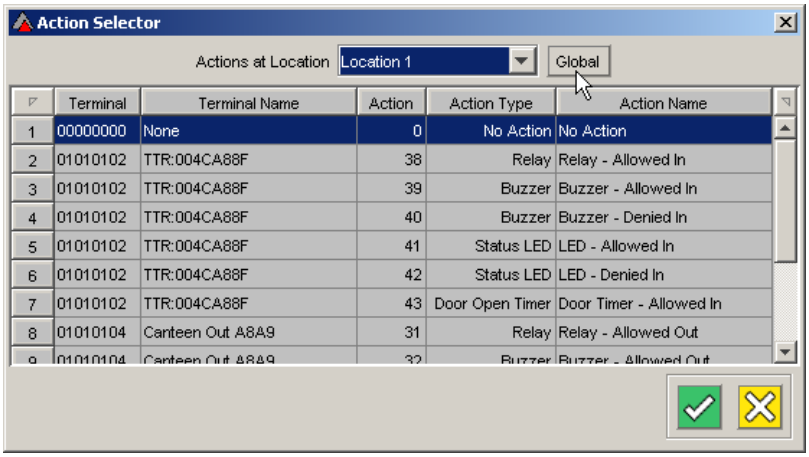
6. Click the **Action** tab
7. Click the **Active System Events** button
8. Click the **Advanced** button. The Advanced **Active System Events Editor** is displayed.



9. Select **Input Alarm** from the **Active System Event** drop-down list
10. Click the **1** button

The **Action Selector** window is displayed

11. Click the **Global** button to list all Actions on all Controllers



12. Select the **Open Emergency Doors** Action that you created on the Controller Action tab
13. Click the button to save

*We recommend configuring a second Input to revert a Site to normal operation after Emergency Unlock has been triggered. An additional Emergency Mode **disable** Action is also required.*

Supervisor Unlock

Supervisor Unlock is a security feature that allows Tag Holders to enter a Zone only after a Supervisor has entered the Zone.

Supervisor Unlock does not work if an Area has more than one Zone.

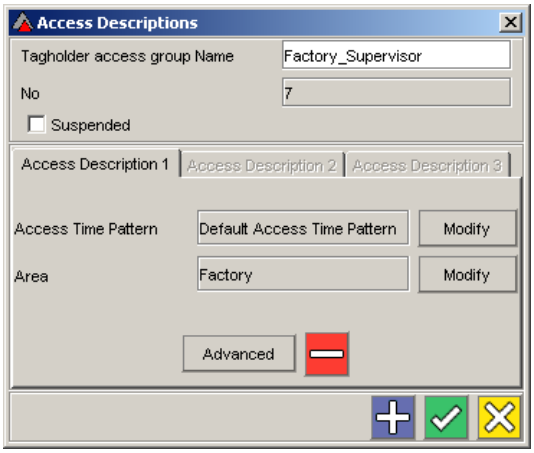
Configure Supervisor Unlock

The following steps enable you to configure a Zone for Supervisor Unlock:

Create Supervisor Tag Holder Access Group

To create a **Supervisor** Tag Holder Access Group, proceed as follows:

1. In the Navigator pane, click the button
2. In the Main pane, click the button
3. Enter a name in the **Tagholder access group Name** textbox



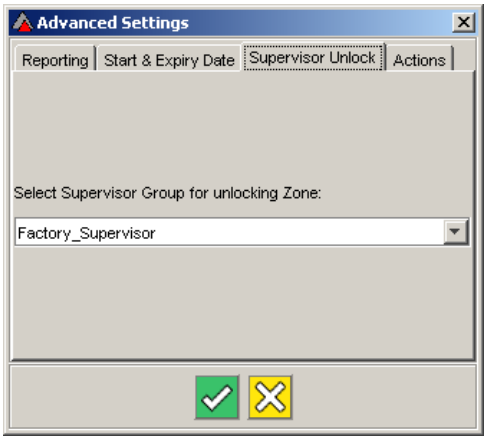
4. Click the button to save

*We recommend using the word **Supervisor** as part of the name for the Supervisor Tag Holder Access Group.*

Specify Supervisor

To create an Access Group and specify a Supervisor for the group, proceed as follows:

1. In the Navigator pane, click the icon
2. Select the Tag Holder Access Group that requires a Supervisor
3. Click the button. The Access Description screen is displayed.
4. Select the **Access Description** that contains the *Area* that requires a Supervisor
5. Click the **Advanced** button. The **Advanced Settings** window is displayed.
6. Click the **Supervisor Unlock** tab

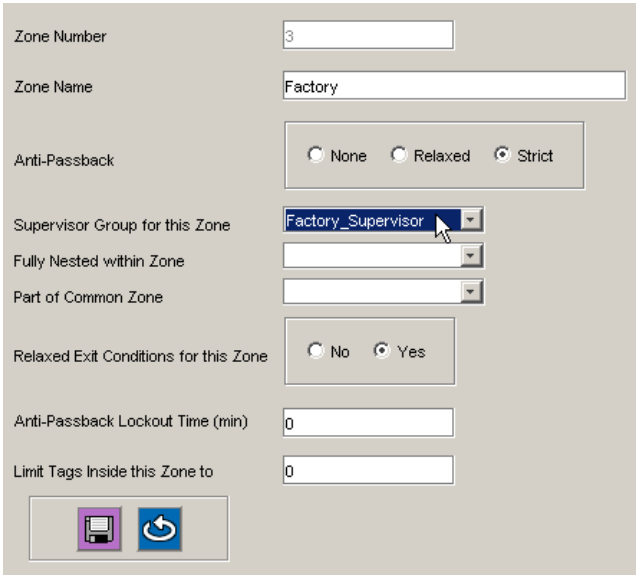


7. Select the name of the Supervisor group from the drop-down list
8. Click the button to save

Configure Zone for Supervisor Unlock

Open an existing Zone and configure Supervisor Unlock as follows:

1. In the Navigator pane, select a Zone



2. Select the name of the Supervisor Access Group from the **Supervisor Group for this Zone** drop-down list
3. Click the button to save

Random Search

Some establishments require their staff to be physically searched for security purposes. ImproNet provides a facility to randomly select Tag Holders for this purpose. Random Search can be enabled on a per Reader basis.

The Random Search Event

ImproNet enables you to assign the Random Search Event to any number of Terminals. Tag Holders using these Terminals are randomly selected and locked out. The Tag Holder is denied access to the location until a Security person has attended to them.

Parameters

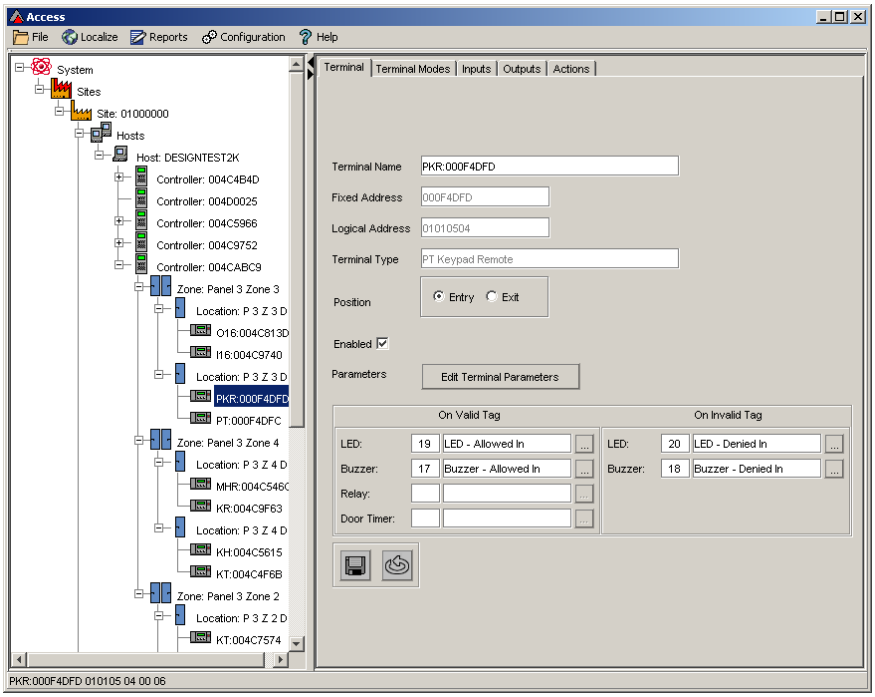
You can specify the following key parameters for the Random Search Event:

- **Same Tag Timeout**—the time that the effected Tag Holder is denied access
- **Random Search Frequency**—the frequency that Random Search Event operates. You can set it to operate from every Tag Holder to one in every 255 Tag Holders on a Random basis.

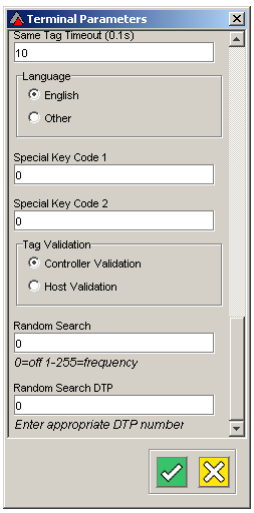
Set Up Random Search

Configure Random Search for each Reader as follows:

1. Navigate to the **Location** where you want to enable Random Search
2. Click the **Edit Terminal Parameter** button. The **Terminal Parameters** screen is displayed.



3. Scroll to the bottom of the **Terminal Parameters** screen until you reach the **Random Search** textbox



4. Enter a number from **1** to **255** to enable random Search. **0** is the default value—Random Search is disabled.

About the Frequency 1 to 255

Entering **1** means that one out of every Tag Holder is selected—in other words, all Tag Holders are selected. Similarly, entering **2** means that one out of two Tag Holders is selected, a fifty percent selection rate. You can enter any number up to **255**. The higher the number, the less the function is activated.

*Random Search is a **random** function. Setting the frequency to a particular number only guarantees the probability of the function occurring at that rate.*

Enable Search at Specific Times Only

The Random Search event can be set up to function only during a Reader's specific Device Time Patterns (DTP). To set up this feature, enter a number into the **Random Search DTP** textbox.

*A **Device Time Pattern** is a period of time when a hardware device is set to operate*

The **Random Search DTP** value must correspond with the number of the Device Time Pattern for the designated Reader. **0** is the default value and enables Random Search for 24 hours each day of the week.

To set a Device Time Pattern for Random Search, proceed as follows:

1. On the **Terminal Mode** tab, click the button. A new Terminal Mode is created.
2. Double-click the **Device Time Pattern** field and select a Device Time Pattern
3. Double-click the **Terminal Mode** field and select **Tag Mode**
4. Click the button to save

When a **Denied Random Search Event** is generated, the Tag Holder is denied access. Additional options are available to prevent the Tag Holder entering the Site in the case that the further measures are required. An example is to enable the **Inhibit Scanner** option—this prevents the Tag Holder re-gaining access by re-presenting their tag *after* it is denied for Random Search purposes.

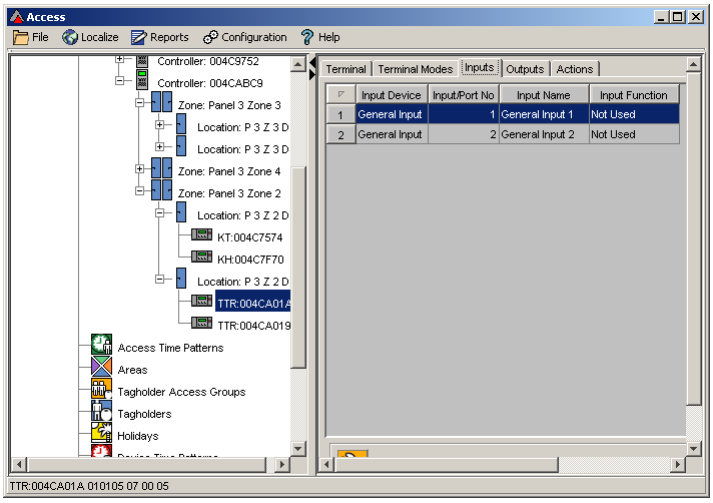
The following example, an additional Terminal relay and Input are used to inhibit a Reader when a Denied Random Search Event is raised. In this example, the relay is connected to the Input. When activated, the Relay creates a contact closed signal at the Input. When the contact closed signal is registered, the **Inhibit Scanner** function is enabled.

Example

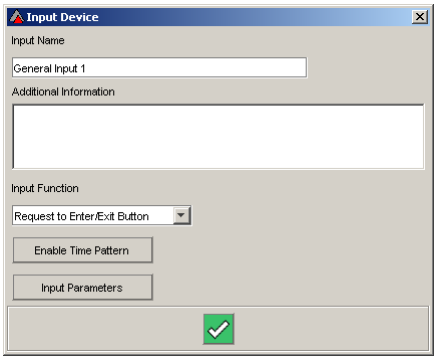
Configure Input

Select the **Input** tab. Configure the inputs as follows:

1. Select an unused Input



2. Click the button. The **Input Device** screen is displayed.

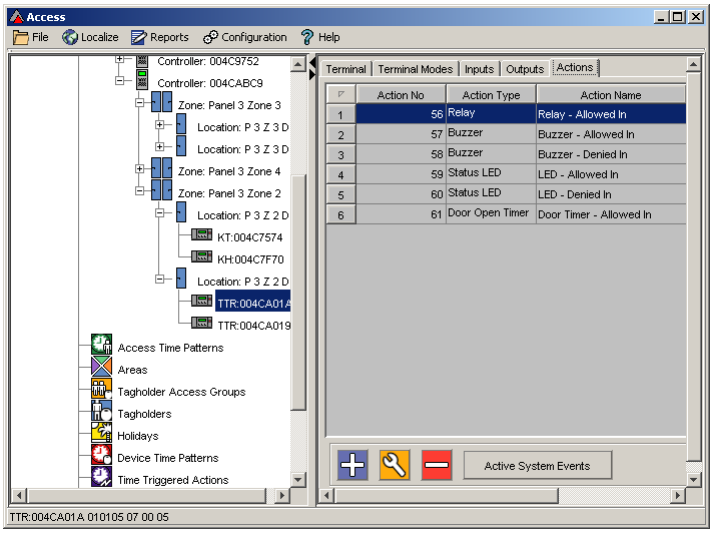


3. On the **Input Function** drop-down menu, select **Inhibit Scanner**

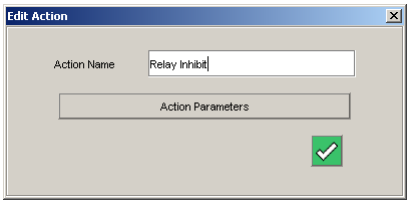
Create Action

Create a Relay Action that connects to the Input that enables the Inhibit Scanner function:

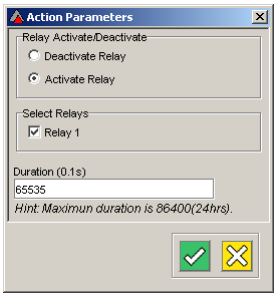
1. Select the **Action** tab. Proceed as follows:



2. Create a new relay action and name it **Relay Inhibit**



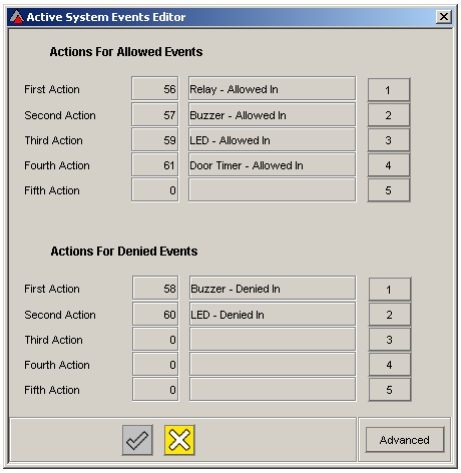
3. Click the **Action Parameters** button. The **Action Parameters** screen is displayed
4. Set the **Duration** to **65535**. This value enables indefinite duration.



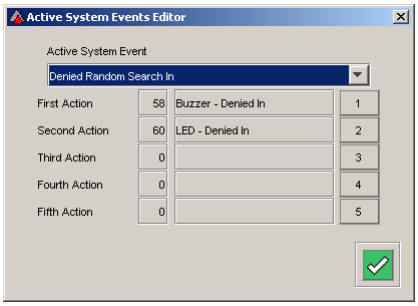
We recommend that you create a second relay Action to deactivate the first one. The second Action will deactivate the Relay and disable the Inhibit Scanner function.

5. Click the button on the **Action Parameters** screen
6. Click the button on the **Edit Action** screen

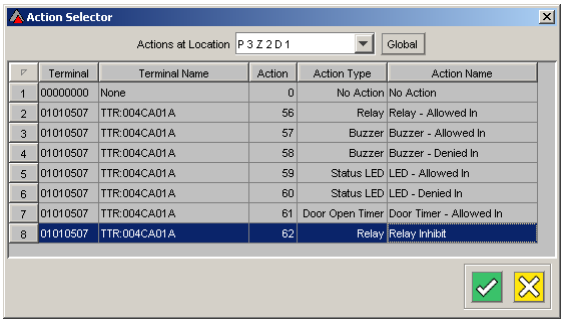
7. On the Action tab, click the **Active System Events** button. The **Active System Events Editor** is displayed.



8. Click on the **Advanced** button
9. Select the **Denied by Random Search In** option from the **Active System Event** drop-down menu



10. Select the new **Relay Inhibit** Action you created for the **Third Action**



Do not change the values for the First Action and Second Action.

11. Click the button to save

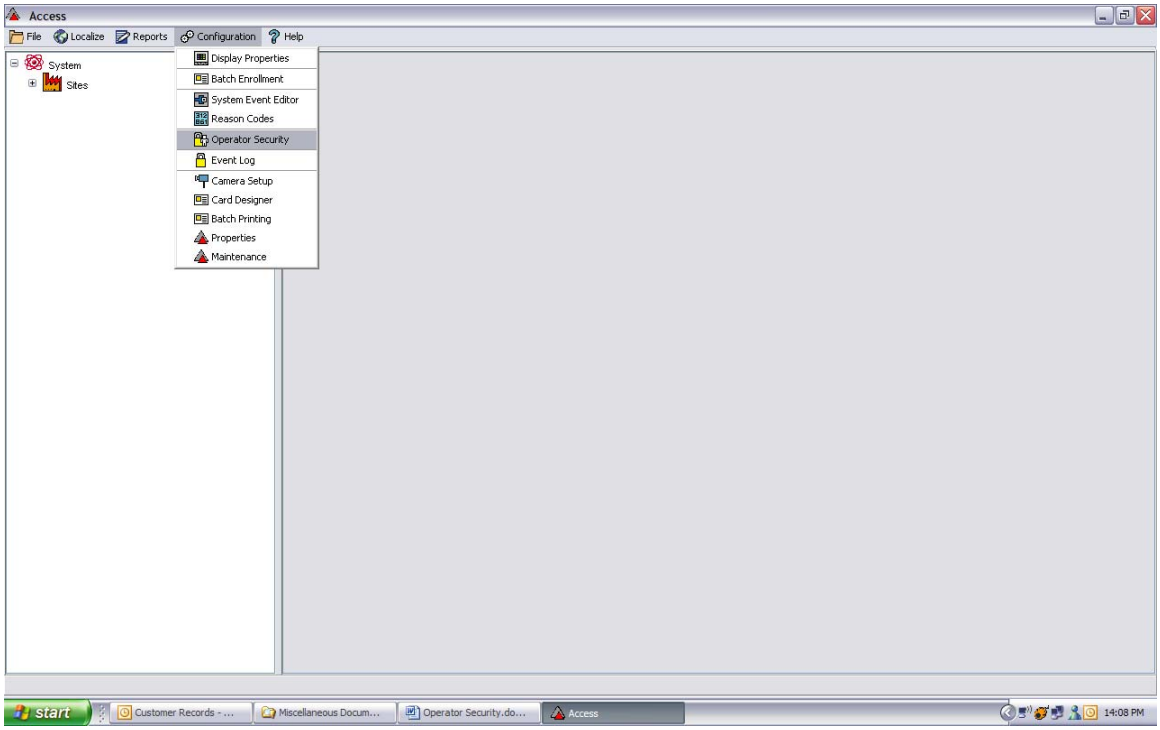
The Relay must be physically connected to the Input for this configuration to work.

Operator Security

The ImproNet Software Suite offers full User and Operator Security. Previously, the third-party database utility, **IBConsole**, was required to administer usernames and passwords. Now, ImproNet facilitates administration of usernames and passwords. Any User or Operator can be configured to have access to any part of the ImproNet software. It is possible to restrict operator access to specific Tag Holders and ImproNet applications.

To open the Operator Security screen, proceed as follows:

- On the Access menu, select **Configuration** > **Operator Security**



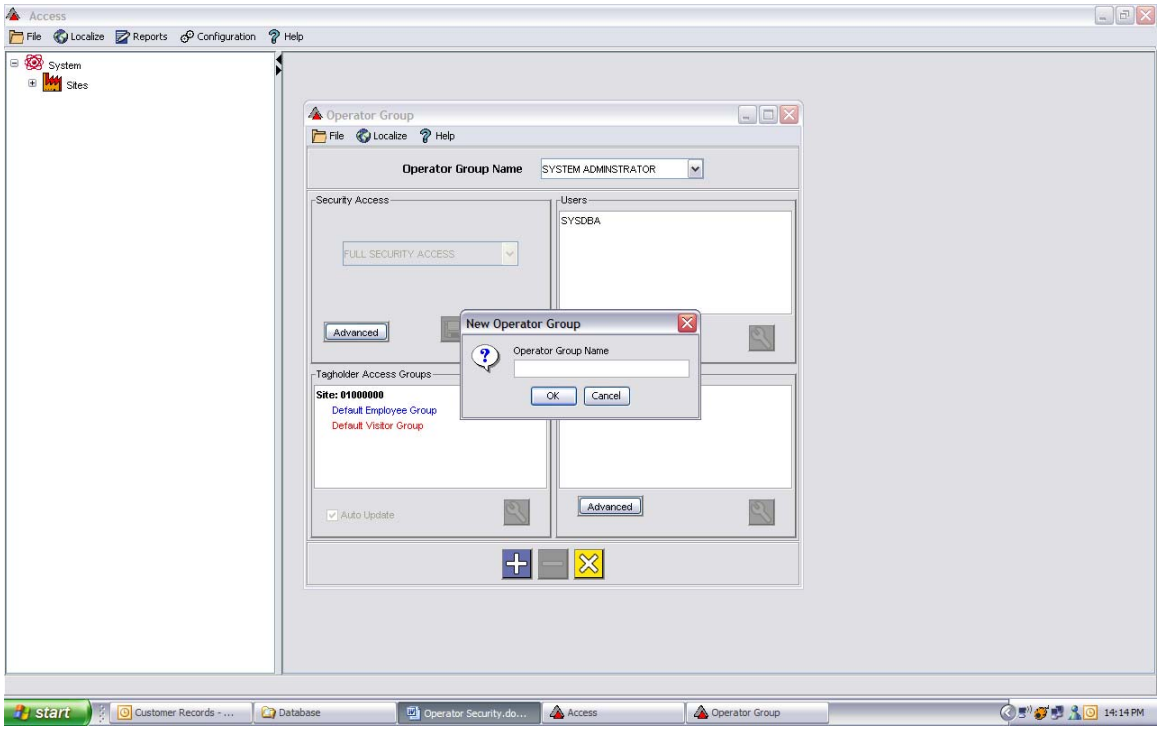
System Administrator Group

The Operator Security screen displays the System Administrator group by default. This group has *full access* to all ImproNet Software applications and all Tag Holders. The System Administrator group *cannot be edited or deleted*. **SYSDBA** is the *only* user that is a member of the System Administrator operator group.

Create Group

To create a new Operator Group, proceed as follows:

1. Click the  button
2. Enter an **Operator Group Name**
3. Click **OK**



The Operator Security screen consists of the following sections:

- Security Access
- Users
- Tag Holder Access Groups
- User Profiles.

Configure each section for each Operator Group that you create.

Security Access

The Security Access screen defines the Software interfaces that different Users have access to. The **Full Security** access profile is enabled by default. To change this, choose from a list of preset access profiles, or click the **Advanced** button to configure a new access profile in the **Security Control Panel**.

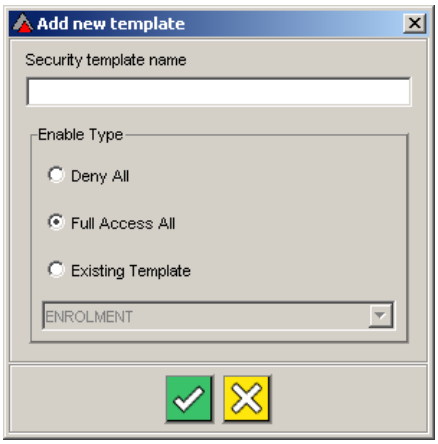
Change Profile

To change to a different profile, click the button, and select another profile from the drop-down list.

Templates

You can select default, pre-configured templates from the **Security template name** drop-down-list. These templates are not editable but are useful for standard Users. Alternatively, create a new template as follows:

1. Click the button. The **Add New Template** window is displayed.



2. Enter a **Security template name**
3. Select on of the following options as a starting point:
   - **Deny All**—all parts of ImproNet Access are restricted. Use this option if you are only enabling a few items.
   - **Full Access All**—all parts of ImproNet Access are accessible. Use this option if you are only restricting a few items.
   - **Existing Template**—the new template settings are the same as an existing template. Use this option if you are designing a template that is similar to an existing template and has only a few differences.
4. Click the button to save

Using Security Control Panel

The Security Control Panel enables you to restrict access to almost every screen, section, or object in ImproNet Access. **Figure 84** shows the **Security Control Panel**. ImproNet applications are listed in the left-hand pane. When an application is selected, its features are displayed on tabs in the main Security Control Panel pane.

To customize a template proceed as follows:

1. Select each application one at a time
2. In the main pain, select a tab, and do one of the following:
   - Click the **Full Access** option to enable access to *all* items on the tab
   - Click the **Denied Access** option to deny access to *all* items on the tab
   - Click an item to toggle its accessibility—the **Customised Access** option is selected
3. Click the button to save

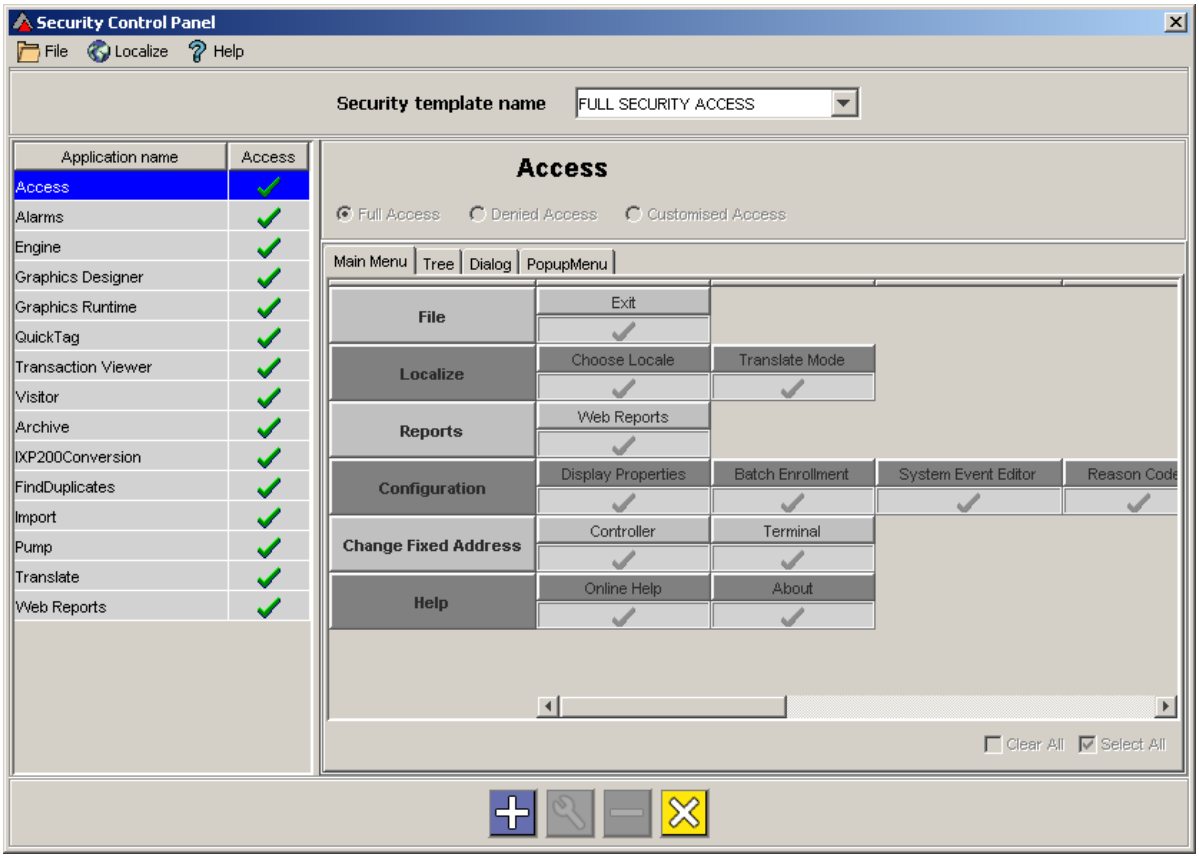
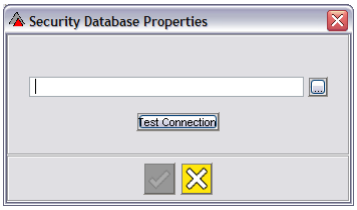


Figure 84 - Security Control Panel

Users

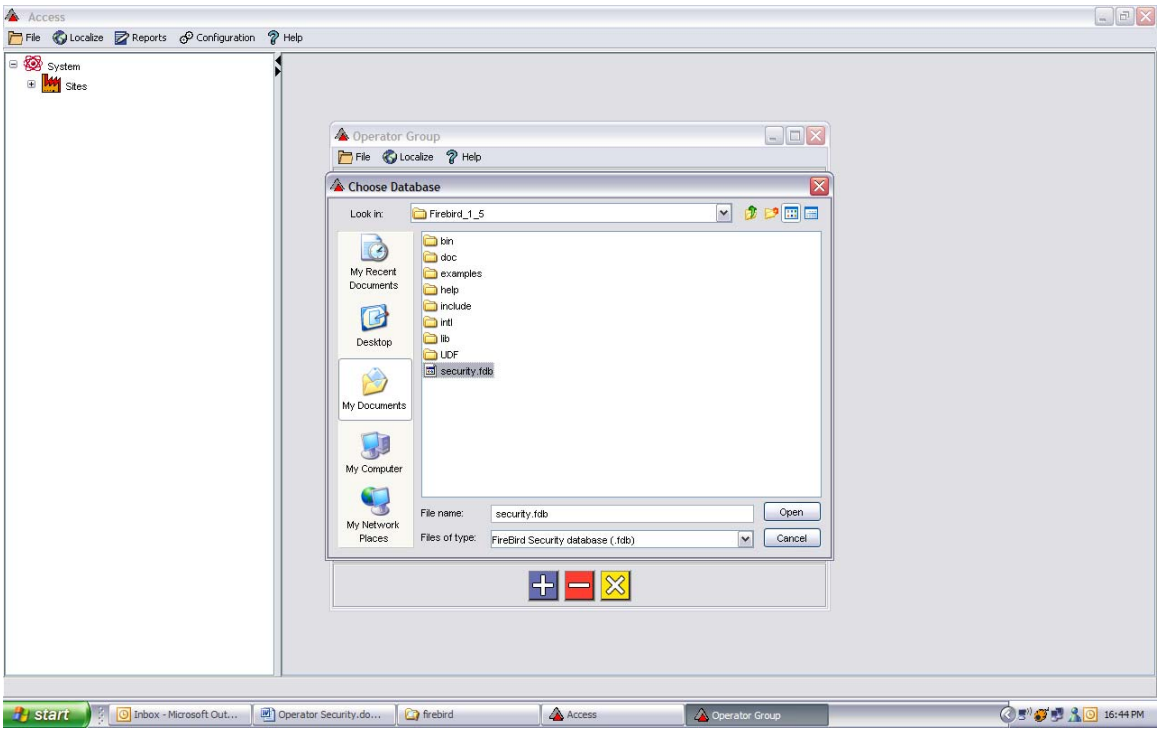
Users must be added to the database before they can be assigned to an Operator Group. To add users to the database, proceed as follows:

1. In the **Users** panel, click the **Advanced** button. The first time the **Advanced** button is clicked, the following dialog box is displayed:



Use this window to specify or confirm the location of the Security Database that you are connecting to. A default path is if a Database exists.

2. If there is no Database file path displayed in the textbox, click the ... button
3. Browse to the location of the Security Database



4. Select the **security.fdb** file
5. Click **Open**

*The Security Database is installed to **c:\program files\firebird\firebird_1_5** by default. However, if the default directory does not exist, consult the person who installed the Firebird Database Server.*

6. Click **Test Connection**

If Access connects to the Security Database successfully, the button turns green and enables you to save the setting.

The location of the Security Database is saved in the access.properties file. Therefore, if the location of the Security Database changes, you must edit the last line of the access.properties file to reflect the change.

Add and Delete Users

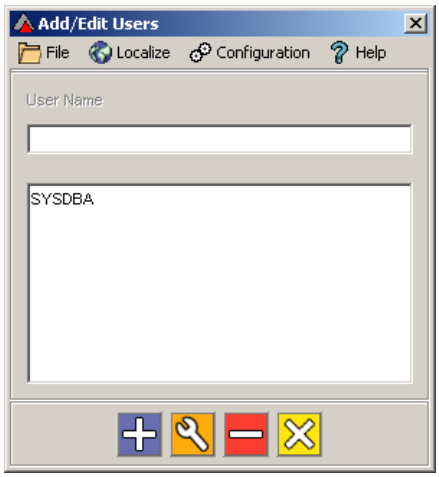


Figure 85 - Add/Edit User Window

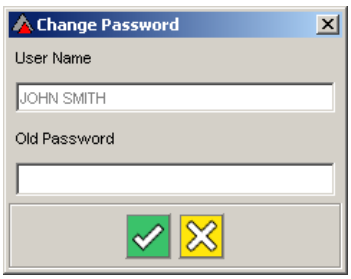
In the **Add/Edit Users** window, do one of the following:

1. Click the button to add a User
2. Select a User and click the button to delete them

Change Password

In the Add/Edit Users window, proceed as follows to change a User's password:

1. Select a User
2. Click the button



3. Enter the **Old Password**
4. Click the button
5. Enter a **New Password**
6. **Re-enter Password** to Confirm
7. Click the button

Assign Users

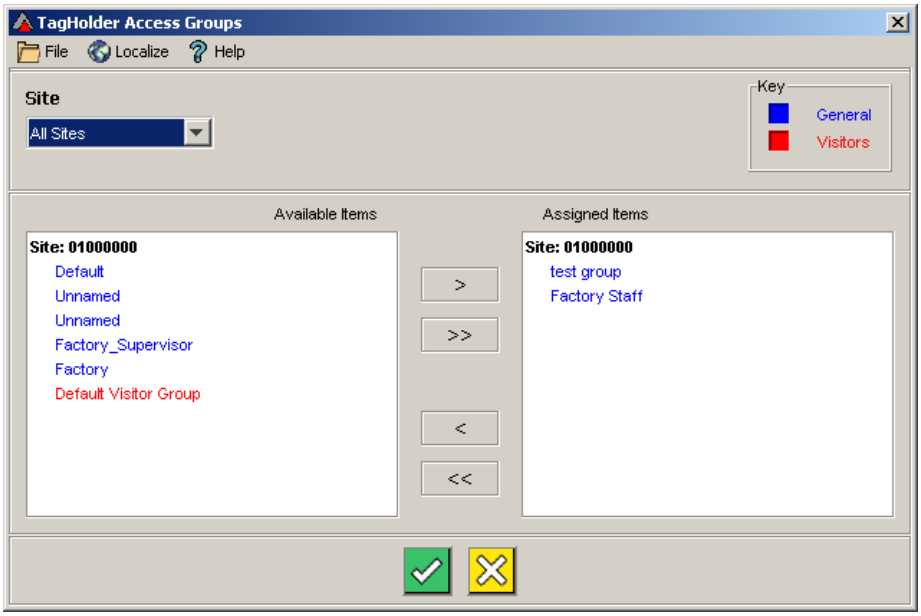
1. Click the button. The **Select Group's Users** window is displayed
2. Select users in the **Available Users** section and click the > button to move them to the **Assigned Users** section
3. Click the button

Use the >> button to move all users at once

Tag Holder Access Groups

The **Tag Holder Access Groups** section specifies the Access Groups that the selected Operator has access to. To edit the available Tag Holder Access Groups, proceed as follows:

1. Click the button. The **TagHolder Access Groups** window is displayed



2. Select Access Groups in the **Available Items** section and click the > button to move them to the **Assigned Items** section
3. Click the button

Use the >> button to move all Access Groups at once

User Profiles

When Tag Holders are added to the database, they can be assigned to a User Profile. However, you must create User Profiles in the Operator Group screen before you can assign a Tag Holders to them.

A Tag Holder assigned to a User Profile is visible and editable only to Security Users who are configured for the particular User Profile. For example, John Smith is an Operator Security

User. He belongs to an Operator Group called **Test2**—refer to **Figure 86**. John is assigned the **Junior Staff** and **Casuals** User Profiles. This means that when he uses Access, he can only see and edit Tag Holders who are assigned to one of these groups. John will not see Tag Holders who belong to other User Profiles.

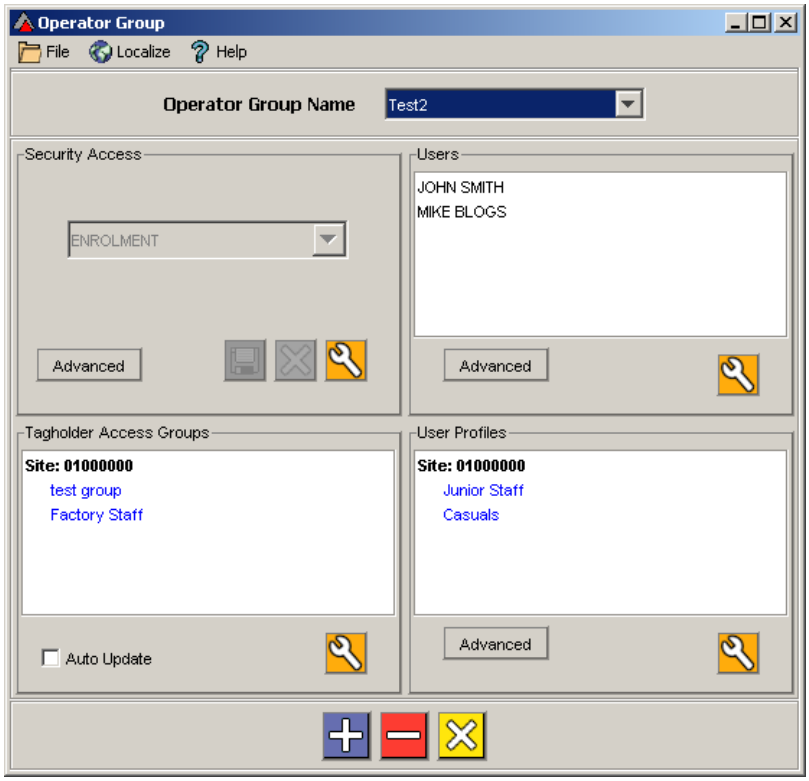


Figure 86 - User Profile Example

Create User Profile

To create a User Profile, proceed as follows:

1. Click the button. The User Profile window is displayed

2. Click the button
3. Enter a **User Profile Name**
4. Click the button to save

Assign User Profiles to Users

Ensure the correct **Operator Group Name** is selected then proceed as follows:

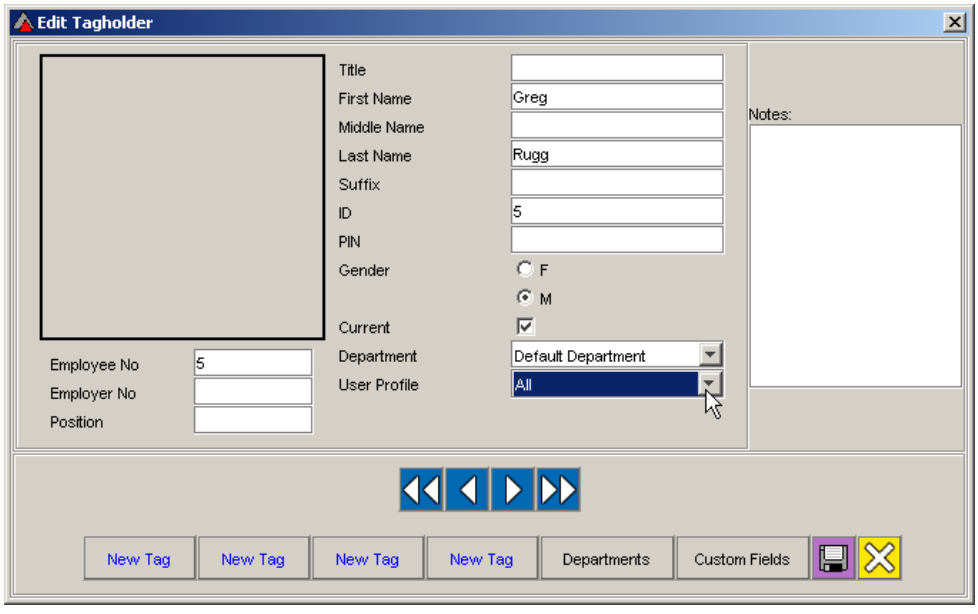
1. In the **User Profiles** section, click the button. The **User Profiles** window is displayed
2. Select User profiles in the **Available Items** section and click the > button to move them to the **Assigned Items** section
3. Click the button

Use the >> button to move all User Profiles at once

Assign Tag Holders

User Profiles can be assigned to Tag Holders on the **Edit Tagholder** screen. To do this, proceed as follows:

1. In the Navigator pane, click the button
2. In the Main pane, select a Tag Holder and click the button. The **Edit Tagholder** screen is displayed.
3. Select a User Profile from the **User Profile** drop-down list



4. Click the button to save

If the All value is selected, the Tag Holder is visible to Operator Security Users who are assigned any User Profile

PART V – Utilities

CSV Import

The format of a CSV file must match the format of the Database that is receiving the data.

If you have no experience with databases or CSV files, we recommend that you consult someone with the necessary skills.

CSV Overview

The **CSV Import Utility** enables you to import a **Comma Separated Value** (**CSV**) file into the ImproNet Database.

Use the CSV Import Utility to import data from other database systems to the ImproNet Database.

Why Import a CSV File?

CSV files are commonly used to transfer data between different databases. For example, you may already have a database containing thousands of records – CSV Import enables you transfer this existing data to the ImproNet Database without re-entering it one record at a time. Specific examples of CSV Import use include the following:

- Transferring a company's existing employee details to the ImproNet Database
- Transferring a list of department names to the ImproNet Database
- Transferring details from another access control system to the ImproNet Database

How to Create a CSV File

There are two methods to create a CSV file:

- **Export data as a CSV file from another Database**—Almost all Databases have a CSV export facility. Consult the documentation of the database containing the data to export. Export the relevant data to a CSV file using the database's CSV export facility.

- **Manually create it**—You can create a CSV file with a text editor. Refer to page **298** for details

Importing a CSV File

Close all ImproNet software before opening the CSV Import Utility.

Guidelines for CSV Import Utility

- **Parent Tables** must be added before **Child Tables**; Tables containing the **Primary Keys** must be added before tables containing **Foreign Keys**
- **Not null** fields must contain data, even if it is space characters
- **Char** and **VarChar** fields can have spaces
- **Int** fields must be separated by commas

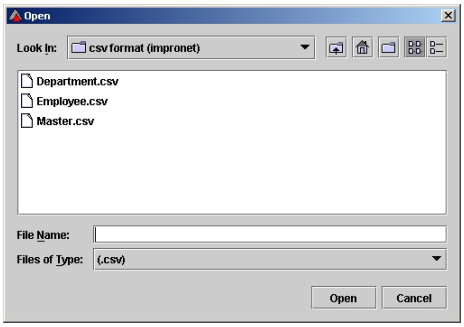
To open the CSV Import Utility, proceed as follows:

1. In Windows, click Start > Programs > ImproNet > Utils > Import
2. Enter your Username and Password

Open CSV File

1. Click on the button

2. Browse and select the relevant CSV file



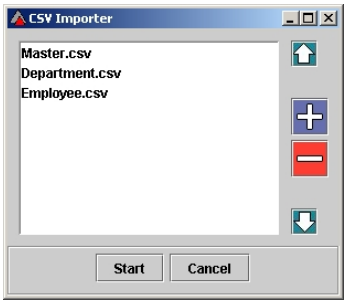
3. Click **Open**
4. Repeat steps **1** to **3** for each CSV file to be imported

Ensure Correct Sequence

If you are importing any of the following files, ensure that they are in the same sequence as displayed:

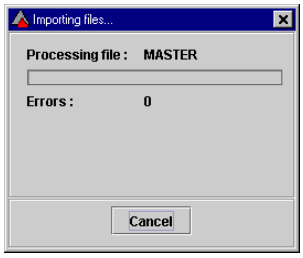
1. Master.csv
2. Department.csv
3. Employee.csv

To change the order of the files, select a file and use the arrow buttons.



Import CSV File

1. Click **Start** to begin the import process



2. A confirmation message is displayed after a successful import

Creating a CSV File

You can create a CSV file manually with a plain text editor such as Notepad. Microsoft Excel is useful for creating spreadsheets to export as CSV files.

Do not use rich text editors such as WordPad or Microsoft Word as these programs contain hidden characters.

CSV files can add data to one table at a time only. Therefore, you need to have a CSV file for each table you are updating.

To create a CSV file manually, proceed as follows:

1. Ensure you know the correct field names of the table you are importing into
2. Open your text editor
3. Enter the **field names** separated by **commas**

4. Press **Enter**
5. Enter the data **value** of each record separating the values with **commas**. Press **Enter** after each record.
6. **Save** the file with a suitable name and a **csv** file extension

Example

Figure 87 shows an example of a CSV file containing two records. The first row contains the field names separated by commas. The second line is blank. The third and forth lines contain record data; each value separated by a comma. In this example, the value for EMP_Employer is *null* in both records.

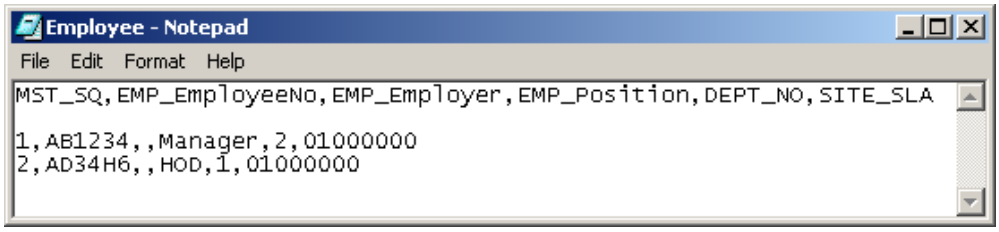


Figure 87 - Example of CSV file

Correct field types are vital for a successful import. Be sure to read the next section.

Ensuring Correct CSV File Format

If you create or modify a CSV file, ensure that its data conforms to the specified field requirements.

Null and Not Null Values

A **Null** field in a database table means that a value is not required for that field. Do not confuse Null with zero. Zero is a value (0); Null has no value. For example, the Gender field in the ImproNet Database has a Null option. This means that you do not have to enter a value in this field—you can leave it empty.

A **Not Null** field in a database table means that a field *must* contain a value. The value can be any value that conforms to the field Type. In this case, a zero (0) is accepted as a number value, provided the field permits a number Type.

Field Types

Each field in a database table has a specified **Type**. The Type determines the data that is permitted in that field. For example, a *Varchar* type is a text field that accepts text and number characters. An *Int* type is a number field only—it cannot accept text characters. **Table 20** describes some common Field Types in the ImproNet Database.

Field Type	Description
Varchar(40)	A text field permitting up to 40 alphanumeric characters
Varchar(16)	A text field permitting up to 16 alphanumeric characters
Char(1)	A text only field permitting 1 text character
Char(8)	A text only field permitting up to 8 text
Int	A number field permitting up to 65536 characters (16 bit)
SmallInt	A number field permitting up to 256 characters (8 bit)

Table 20 - Database Field Types

You can use **Import** to add data to any of the tables in the ImproNet database. However, you must ensure that the data conforms to the receiving table's structure.

Import Data to Other Tables

To ensure correct CSV file format for other ImproNet Database tables, you need to view the tables' structures. We recommend using the **IBConsole** utility to do this.

Structure of Master, Department, and Employee Tables

The following tables are the most likely tables to receive data via the Import utility:

- Master
- Department
- Employee

Master Table Requirements

Table 21 displays the field requirements for the Master Table.

Field Name	Type	Null Value
MST_SQ(PK)	Int	Not Null
MST_Title	Varchar(40)	Not Null
MST_FirstName	Varchar(40)	Not Null
MST_MiddleName	Varchar(40)	Not Null
MST_LastName	Varchar(40)	Not Null
MST_Suffix	Varchar(40)	Not Null
MST_ID	Varchar (16)	Not Null
MST_Gender	Char (1)	Null
MST_Pin	Int	Null
MST_Type	SmallInt	Not Null
MST_Current	SmallInt	Not Null
SILE_SLA(FK)	Char(8)	Not Null

Table 21 – Master Table Requirements

Department Table Requirements

Table 22 displays the field requirements for the Department Table.

Field Name	Type	Null Value
DEPT_No (PFK)	SmallInt	Not Null
Site_SLA(FK)	Varchar(8)	Not Null
DEPT_NAME	Varchar(40)	Not Null

Table 22 – Department Table Requirements

Employee Table Requirements

Table 23 displays the field requirements for the Employee Table.

Field Name	Type	Null Value
MST_SQ(PK)(FK)	Int	Not Null
EMP_EmployeeNo	Varchar(16)	Not Null
EMP_Employer	Varchar(16)	Not Null
EMP_Position	Varchar(40)	Not Null
DEPT_No (FK)	SmallInt	Not Null
Site_SLA(FK)	Char(8)	Not Null

Table 23 – Employee Table Requirements

Notes

- **PK** means **Primary Key**—This is sequential number unique to every record.
- **FK** means **Foreign Key**—This is a number that corresponds with the Primary Key. It is used to link recodes in one table with records in another table. For example, **MST_SQ** is the Primary Key in the **Master** Table. It is also used in the **Employee** Table as a Foreign Key to identify a particular Tag Holder.

DBUpgrade

Database Upgrade Procedures

The **Database Upgrade** utility enables automatic updating of the ImproNet database. The Utility checks the database for available Scripts in the directory. Update Scripts are processed automatically and a status message is displayed. A status message is also displayed if no scripts are found.

To open the **Database Upgrade** utility, proceed as follows:

- In Windows, click **Start** > **Programs** > **ImproNet** > **Utils** > **DBUpgrade**

The **Logon to database updater** screen is displayed. Enter the password.

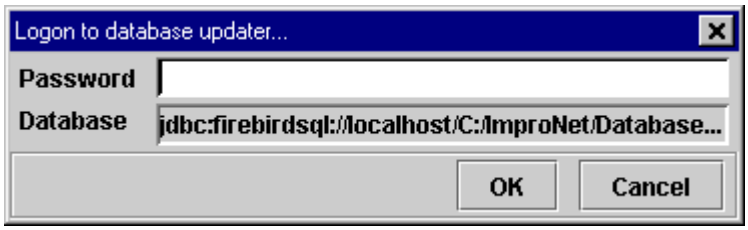


Figure 88 - Database Update Logon

If no new database scripts are found, the following message is displayed:

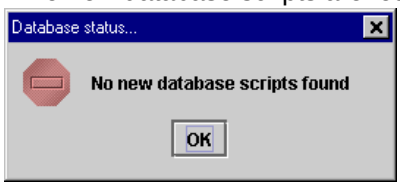


Figure 89 - Database Status screen – no scripts found

If new database scripts are found, the following screen is displayed:

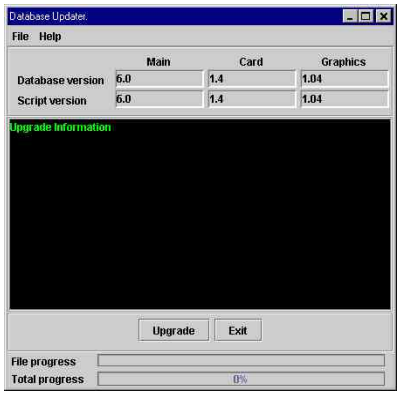
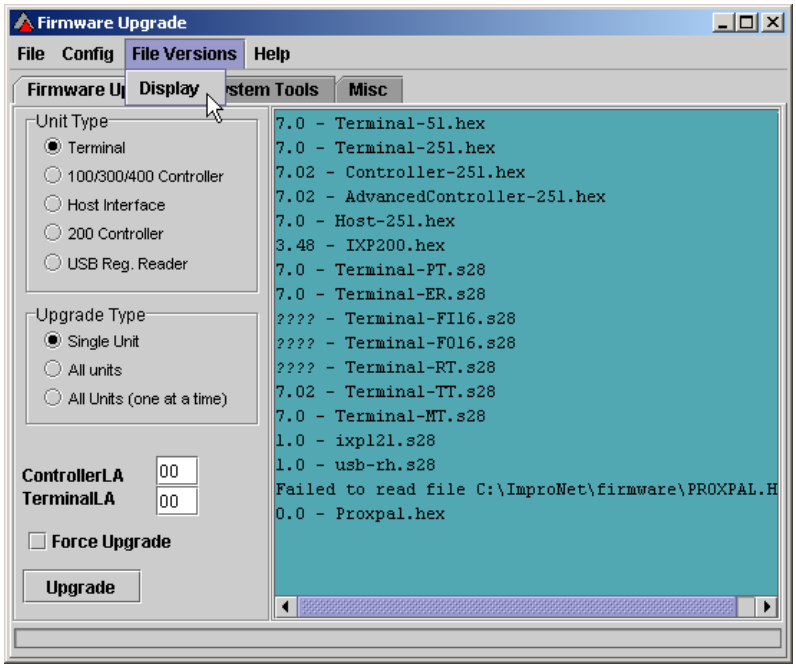


Figure 90 - Database Status screen – scripts found

Firmware Upgrade

Identify Firmware Versions

Select **Display** on the **File Versions** menu to view Firmware **File Versions** of installed hardware units.



Upgrade Unit

To upgrade a unit, proceed as follows:

1. On the firmware **Upgrade Tab**, select the **Unit Type**
2. Select one of the following **Upgrade Type** options:
   - **Single Unit**—upgrades one unit only
   - **All Units**—
   - **All Units (one at a time)**—upgrades all units of the specified type, one at a time
3. Enter the **Controller LA**—the logical address of the Controller. If **300/400 Controller** is selected as Unit Type, the **Controller LA** specifies the Controller that will be upgraded. If another Unit Type is selected, the **Controller LA** specifies the Controller that the selected unit is connected to.
4. Enter the **Terminal LA**—the Logical Address of the Terminal. This field is only available when upgrading Terminals
5. Click the **Upgrade** button

The Force upgrade button is used to force an upgrade on a unit that has a newer firmware version than is available with your current ImproNet Software Suite. We recommend that you do not use this feature.

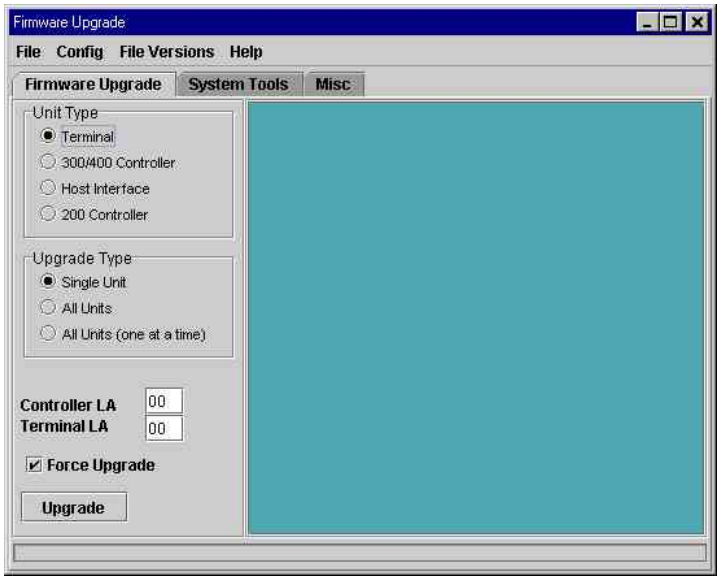


Figure 91 – Firmware Upgrade Utility Display

Ping Function

Use the ping function on the **System Tools** tab to ensure that all hardware is connected and working as specified.

1. Enter the logical address of the Controller to ping in the first **Unit CLA** textbox
2. Enter the logical address of the Terminal to ping in the second **Unit CLA** textbox. A value of **FF** in this textbox will ping *all* Terminals.
3. Click the **Ping** button. The results of the ping test are displayed

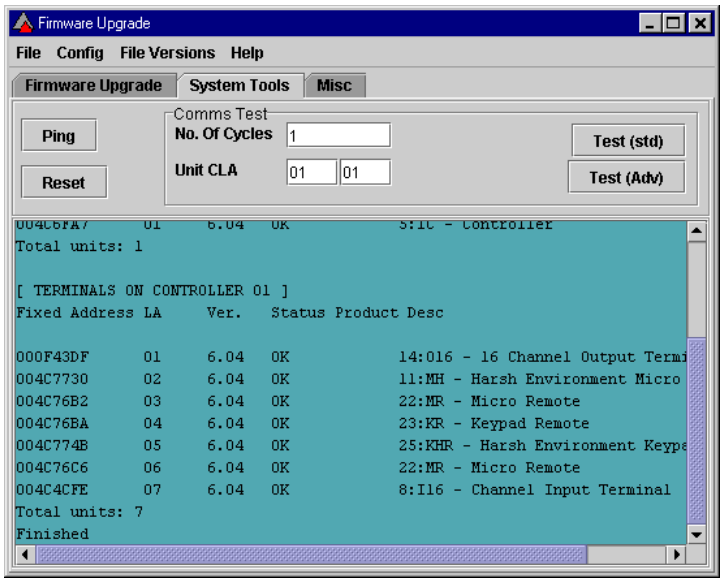


Figure 92 – Results of Ping Check

Select Com Port

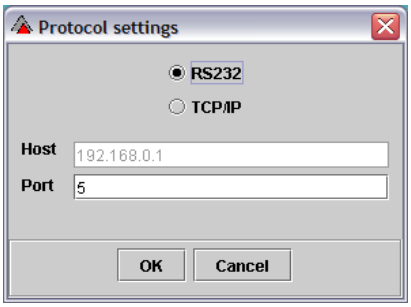
Select **Protocol** on the **Config** menu to specify an **RS232** or **TCP/IP** communication protocol.

*Select the **RS232** option if you are using a **USB** connection.*

*Further information on the **Firmware Upgrade utility** is available in the ImproNet Software Manual.*

Configuring Comm Port for Ping Untility

1. Open the Firmware Upgrade utility,
2. On the menu, select **Config** > **Protocol**
3. If an ImproX HI or ImproX RH comms interface device is used, select the **RS232** option and enter the relevant com **Port** number



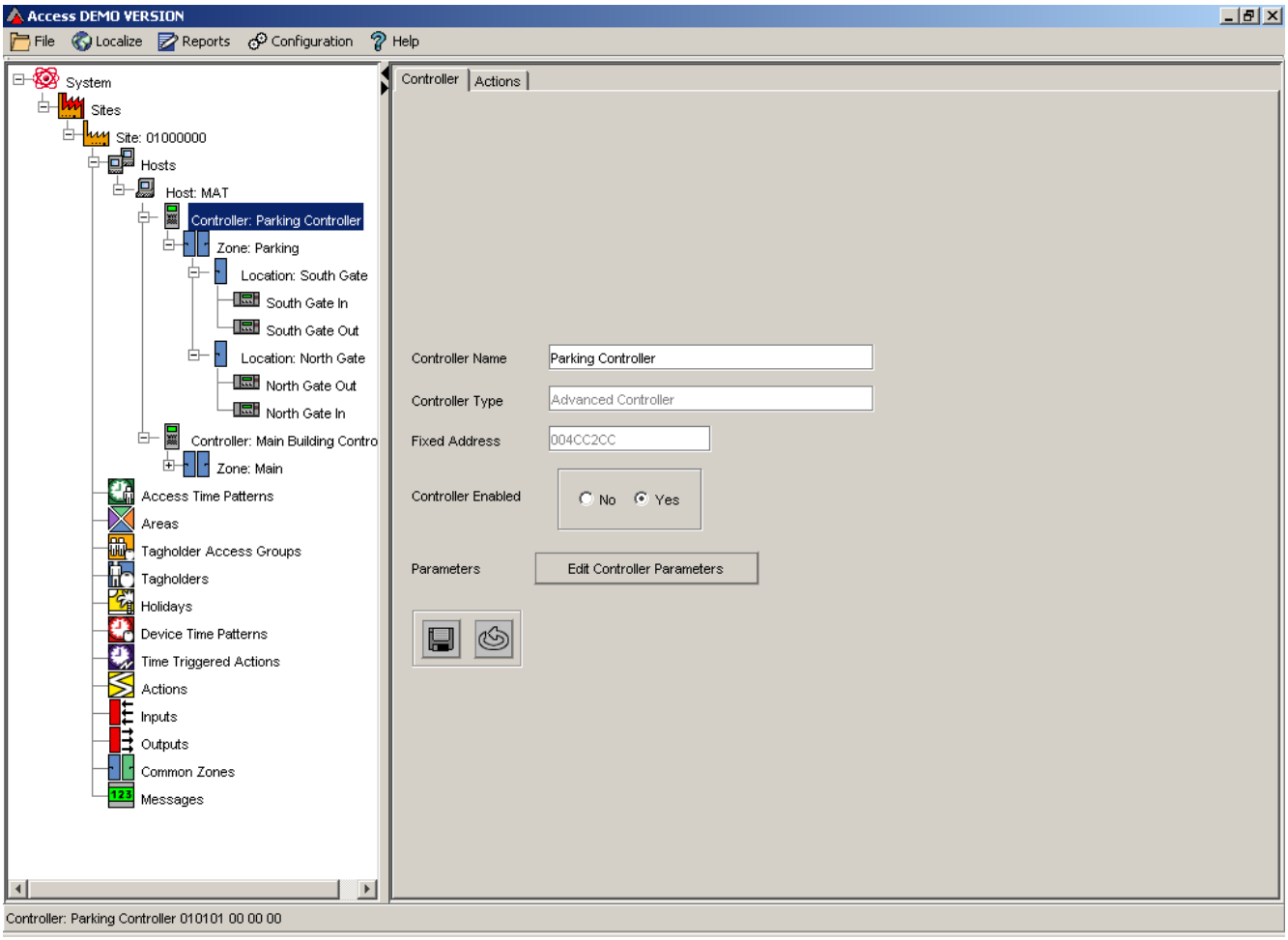
Replacing Controllers and Terminals

To remove Controllers or Terminals from their bus, perform the following procedure:

1. Physically disconnect and remove the old hardware
2. Physically connect and mount the new hardware
3. Configure the new hardware configuration in ImproNet Access

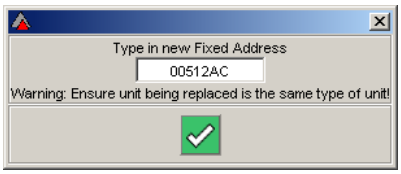
Replace Controller

1. Remove the old Controller from the Controller bus
2. Connect the new Controller to the Controller bus
3. Open ImproNet Access



4. In the Navigation pane, click the old Controller to select it
5. Right-click the Controller and select the **Replace Unit** option. A dialog box is displayed

6. Enter fixed address of the new Controller and click on the button

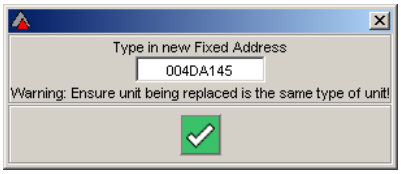


When you replace an old unit with a new one, ensure both units are the same type.

You can keep ImproNet Engine running when you replace a unit.

Replace Terminal

1. Remove the old Terminal from the Terminal bus
2. Connect the new Terminal to the Terminal bus
3. Open ImproNet Access
4. In the Navigation pane, click the old Terminal to select it
5. Right-click the Terminal and select the **Replace Unit** option. A dialog box is displayed
6. Enter fixed address of the new Controller and click on the button



When you replace an old unit with a new one, ensure both units are the same type.

You can keep ImproNet Engine running when you replace a unit.