User Guide

IP Link® Pro xi Products

IPL EXP I/O Series

Control System Expansion Interfaces

Extron

68-3490-01 Rev. A
08 21

Safety Instructions

Safety Instructions • English

WARNING: This symbol, ⚠, when used on the product, is intended to alert the user of the presence of uninsulated dangerous voltage within the product's enclosure that may present a risk of electric shock.

ATTENTION: This symbol, ⚠, when used on the product, is intended to alert the user of important operating and maintenance (servicing) instructions in the literature provided with the equipment.

For information on safety guidelines, regulatory compliances, EMI/EMF compatibility, accessibility, and related topics, see the Extron Safety and Regulatory Compliance Guide, part number 68-290-01, on the Extron website, **www.extron.com**.

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ATTENTION : Ce pictogramme, ⚠, lorsqu'il est utilisé sur le produit, signale à l'utilisateur des instructions d'utilisation ou de maintenance importantes qui se trouvent dans la documentation fournie avec l'équipement.

Pour en savoir plus sur les règles de sécurité, la conformité à la réglementation, la compatibilité EMI/EMF, l'accessibilité, et autres sujets connexes, lisez les informations de sécurité et de conformité Extron, réf. 68-290-01, sur le site Extron, **www.extron.com**.

Istruzioni di sicurezza • Italiano

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ATTENTZIONE: Il simbolo, ⚠, se usato sul prodotto, serve ad avvertire l'utente della presenza di importanti istruzioni di funzionamento e manutenzione nella documentazione fornita con l'apparecchio.

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Instrukcje bezpieczeństwa • Polska

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UWAGI: Ten symbol, ⚠, gdy używany na produkt, jest przeznaczony do ostrzegania użytkownika ważne operacyjne oraz instrukcje konserwacji (obsługi) w literaturze, wyposażone w sprzęt.

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Для получения информации о правилах техники безопасности, соблюдении нормативных требований, электромагнитной совместимости (ЭМП/ЭДС), возможности доступа и других вопросах см. руководство по безопасности и соблюдению нормативных требований Extron на сайте Extron: , **www.extron.com**, номер по каталогу - 68-290-01.

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注意: 产品上的这个标志意在提示用户，设备随附的用户手册中有重要的操作和维护(维修)说明。

关于我们产品的安全指南、遵循的规范、EMI/EMF 的兼容性、无障碍使用的特性等相关内容，
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警告: 若產品上使用此符號，是為了提醒使用者，產品機殼內存在未隔離的危險電壓，可能會導致觸電之風險。

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안전 지침 • 한국어

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FCC Class A Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. The Class A limits provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause interference. This interference must be corrected at the expense of the user.

NOTE: For more information on safety guidelines, regulatory compliances, EMI/EMF compatibility, accessibility, and related topics, see the **Extron Safety and Regulatory Compliance Guide** on the Extron website.

Battery Notice

This product contains a battery. **Do not open the unit to replace the battery**. If the battery needs replacing, return the entire unit to Extron (for the correct address, see the Extron Warranty section on the last page of this guide).

CAUTION: Risk of explosion. Do not replace the battery with an incorrect type. Dispose of used batteries according to the instructions.

ATTENTION : Risque d'explosion. Ne pas remplacer la pile par le mauvais type de pile. Débarrassez-vous des piles usagées selon le mode d'emploi.

Conventions Used in this Guide

Notifications

The following notifications are used in this guide:

CAUTION: Risk of minor personal injury.

ATTENTION : Risque de blessure mineure.

ATTENTION:

- Risk of property damage.
- Risque de dommages matériels.

NOTE: A note draws attention to important information.

TIP: A tip provides a suggestion to make working with the application easier.

Software Commands

Commands are written in the fonts shown here:

```
^AR Merge Scene,,Op1 scene 1,1 ^B 51 ^W^C
[01] R 0004 00300 00400 00800 00600 [02] 35 [17] [03]
Esc X1 *X17* X20* X23* X21 CE←
```

NOTE: For commands and examples of computer or device responses mentioned in this guide, the character "0" is used for the number zero and "O" is the capital letter "o."

Computer responses and directory paths that do not have variables are written in the font shown here:

```
Reply from 208.132.180.48: bytes=32 times=2ms TTL=32
C:\Program Files\Extron
```

Variables are written in slanted form as shown here:

```
ping xxx.xxx.xxx.xxx –t
SOH R Data STX Command ETB ETX
```

Selectable items, such as menu names, menu options, buttons, tabs, and field names are written in the font shown here:

From the **File** menu, select **New**.

Click the **OK** button.

Specifications Availability

Product specifications are available on the Extron website, **www.extron.com**.

Extron Glossary of Terms

A glossary of terms is available at **http://www.extron.com/technology/glossary.aspx**.

Contents

Introduction

This section covers the following basic information you should know about this guide and the product before installation:

Before You Begin

What This Guide Covers

This user guide provides instructions for an experienced installer to install an Extron IPL EXP I/O Series Control System Expansion Interface. This guide provides detailed information and recommends best practices for cabling the expansion interface. It provides a brief overview of the configuration process, and reference information.

Configure the expansion interface using Extron Global Configurator software running in Global Configurator Professional (GC Professional) or Global Configurator Plus (GC Plus) mode, or program it using Global Scripter. This guide does not contain instructions on detailed software-related setup steps or details of configuration within the software: those are covered in the *Global Configurator Help File*, the *Global Scripter Help File*, and help files for related programs. The software help files describe how to use each program to download drivers, add AV devices to a configuration, configure basic functions, and set up schedules, macros, e-mail alerts, touchpanel button configurations, and the like.

Conventions Used in This Guide

- Throughout this guide the IPL EXP I/O Series products are also referred to as the "IPL EXP," "EXP," or "expansion interface."
- IPCP Pro Q xi and xi Series control processors are also referred to as the "IPCP," "IPCP Pro Q xi," "IPCP Pro xi," or "control processor." The xi models feature LAN ports, Q xi models feature both LAN and AV LAN ports.
- Global Configurator software is referred to as "GC," which can be run in Global Configurator Professional mode ("GC Professional") or Global Configurator Plus mode ("GC Plus").
- Global Scripter is sometimes referred to as "GS."
- The GlobalViewer Enterprise application is sometimes referred to as "GVE."
- Unless otherwise noted, in images of software or web pages, circled numbers correspond to the like-numbered procedural steps.

Important Information You Need Before Installation

The order and types of setup tasks for the IPL EXP I/O expansion interfaces, and for the IPCP Pro xi Series control processors and TouchLink Pro touchpanels and NBP button panels they work with, are important. Pay close attention to them. Follow the setup checklist in the **Hardware Features and Installation** section starting on page 6.

About the IPL EXP I/O Series

The Extron IPL EXP I/O Series control system expansion interfaces make it possible to easily expand the number and variety of ports available in an Extron IP Link Pro xi control system. These expansion interfaces work in conjunction with IPCP Pro xi Series control processors.

Once configured, these systems allow users to remotely control, monitor, and troubleshoot AV equipment, including display devices and switchers to integrate Ethernet connection into AV systems. These control systems allow users to remotely control, monitor, and troubleshoot AV equipment, including display devices, switchers, source devices, and various other items such as lights, a projector lift, or a screen motor. They can be used in a distributed control system environment or as part of a stand-alone system.

All models include an embedded web server. Depending on the model, an expansion interface can include multiple bidirectional serial ports, an IR/serial port, digital I/O, digital I/O with VDC power output, an Extron eBUS port, or relay ports. The IPL EXP RIO8 has the ability to power small devices that accept 12 VDC or 24 VDC.

Figure 1. Left to Right: IPL EXP S2, IPL EXP S5, IPL EXP 200, IPL EXP RIO8

An IPCP Pro xi Series control processor is the centerpiece of a control system that features Extron TouchLink Pro Touchpanels, Extron NBP Network Button Panels, and IPL EXP expansion interfaces.

- Most IPCP Pro xi Series control processor models (except the IPCP Pro S1 xi) and the IPL EXP 200 also support Extron eBUS button panels connected to the eBUS port on the control processor or the expansion interface.
- The system supports multiple TouchLink Pro touchpanels and NBP button panels over a standard Ethernet network. The touchpanels and button panels provide a convenient interface for controlling the IPCP, which, in turn, controls the other system components. Another option is to use a third-party device such as a touchpanel or tablet in conjunction with Extron LinkLicense.

NOTE: GUI Designer software is used to design the user interface layout of any Extron TouchLink Pro touchpanel or third-party touch interface that is used with the IPCP.

Use the Extron Toolbelt software to discover and manage the IPL EXP expansion interfaces, the IPCP Pro xi control processor, and other Extron control products. Configure the expansion interfaces and control processor using GC Professional or GC Plus, or program it using Global Scripter (GS). Once you have set up how you want it to work (set up IP addresses and functions, assigned drivers to ports, configured relays and digital input or output), that information is saved to a project configuration file that is built and uploaded into the IPCP and to any optional TouchLink Pro touchpanels.

The system integrates seamlessly with Extron GlobalViewer Enterprise software and Extron Control for Web, iOS, and Android for remote control applications.

Features

General features

Flexible options for device control — Depending on the model, each IPL EXP offers a variety of control ports for RS-232, infrared/serial (IR/S) control, TCP/Ethernet control and monitoring, relays, and either digital I/O (digital input or digital output) or digital I/O with DC power output.

The IPL EXP 200 includes an Extron eBUS port, which allows a variety of eBUS devices (such as button panels) and accessories (including power and signal hubs) to be connected to a single control processor or expansion interface. eBUS button panels are automatically recognized by the control processor or the expansion interface and can be added or removed at any time.

Mounting options

- All IPL EXP models are housed in a 1U high, quarter rack width enclosure which is easily rack mounted or can be installed in or under furniture with an optional mounting kit.
- All models other than the IPL EXP RIO8 mount to the included ZipClip 200 mounting bracket, which makes it easy to mount the units to rack rails and furniture.

Universal power system compatibility

- The IPL EXP RIO8 requires a PoE+ power source, as it provides 12 VDC and 24 VDC output ports that are used in conjunction with the digital I/O ports.
- All other models accept PoE or PoE+ input on the LAN/PoE port.

Network and configuration features

- **Global compatibility** — The expansion interface uses industry standard Ethernet communication protocols, including DHCP, DNS, HTTP (redirect), HTTPS, ICMP, IEEE 802.1X, NTP, SFTP, SMTP, SNMP, SSH, TCP/IP, and UDP/IP.
- **Multi-level password protection** — This allows security to be set based on user roles.
- **Embedded web pages** — The IPL EXP embedded web pages include online diagnostics and monitoring of basic features.

  If the unit is configured to work with Extron Control, you can access the virtual user interfaces from a link in the embedded web page.
- **System asset management** — The configured system and expansion interface allow you to control, monitor, and schedule various functions of devices in the system.
- **Additional security features** — Each expansion interface and control processor can use the included Secure Sockets Layer (SSL) certificate or a user-supplied, customized security certificate (see **Secure Sockets Layer (SSL) Certificates** on page 39). IEEE 802.1X Authentication is also supported in our devices once enabled. For details see **IEEE 802.1X Certificates** on page 40. These devices also comply with NIAP security standards.
- Support for the Extron ControlScript sandbox environment.

Feature Summary Table

The following table provides a summary of models and major features.

Model	Features								
		Ports							
	Enclosure	12 VDC Out	24 VDC Out	3-pole COM	IR/Serial	Relay	Digital I/O	eBUS	LAN/PoE
IPL EXP S2	Plastic	—	—	2	—	—	—	—	1
IPL EXP S5	Plastic	—	—	5	—	—	—	—	1
IPL EXP 200	Plastic	—	—	2	1	2	4	1	1
IPL EXP RIO8	Metal	4	4	—	—	8	8	—	1

Application Diagram

The following figure shows an example of types of devices that can be connected to some of the ports on the IPL EXP expansion interfaces and IPCP Pro xi Series control processors.

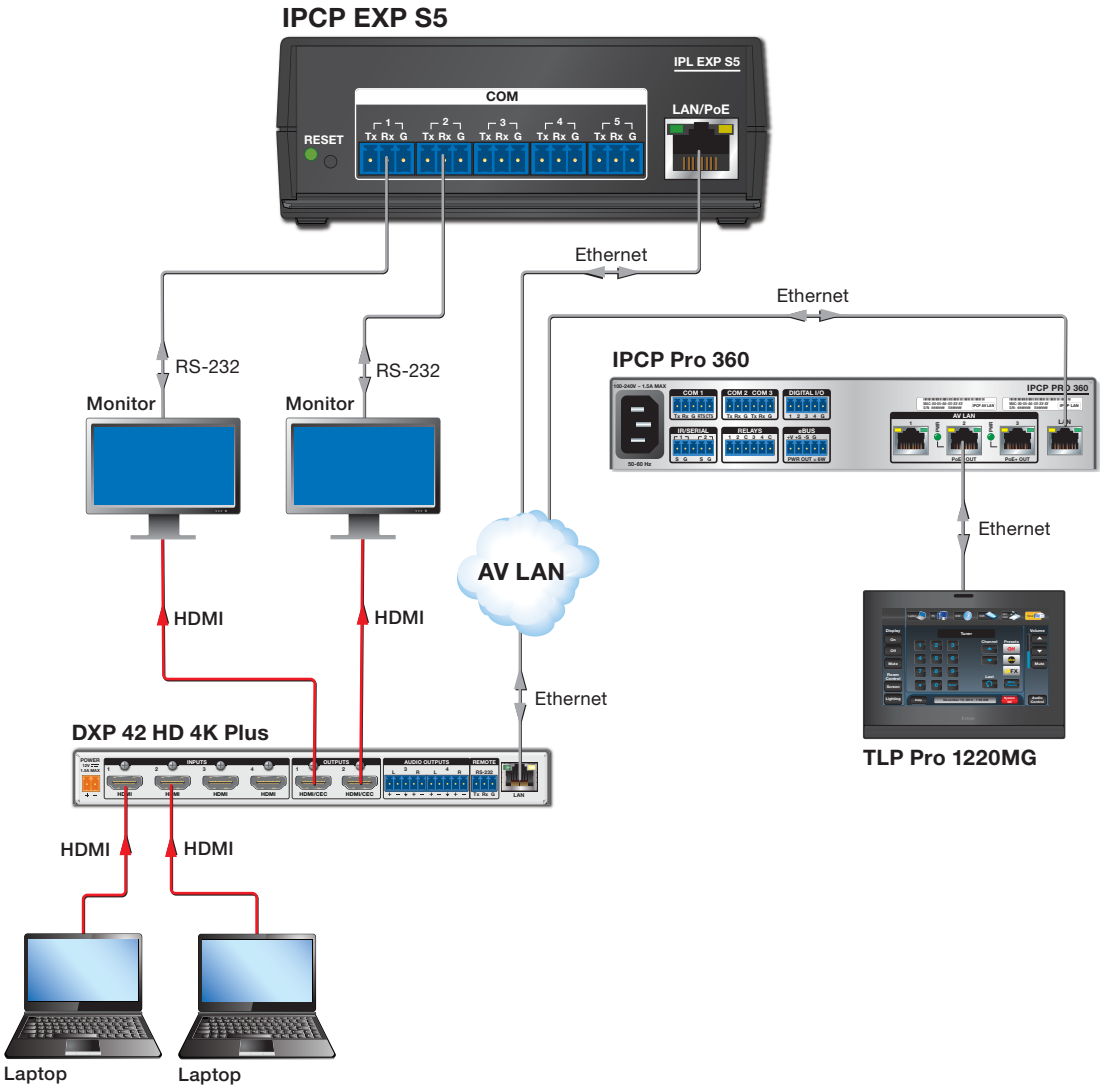


Figure 2. An IPL EXP S5 and IPCP Pro 360Q xi Application

Device Control

The system, including the IPCP and the IPL EXP, must be configured in one of the following ways before it will send commands to a projector, display, or other device:

- An IR, RS-232, or Ethernet driver file can be downloaded from the Extron website (**www.extron.com/download/index.aspx**). The driver is saved to a folder and commands from the driver are incorporated into the GC configuration file for the control processor and any expansion interfaces, button panels, and touchpanels that will work with it. The configuration file is built and uploaded to the IPCP via GC.
- If a driver is not already available, RS-232 or Ethernet command strings can be entered directly from a host computer using Global Configurator. These can then be incorporated into controls within the GC project.

See the *Global Configurator Help File* (which comes with the software) for details on setting up the IPL EXP and the IPCP and for downloading, programming, or configuring device control commands.

About Global Configurator

Global Configurator (with GC Professional and GC Plus Modes):

- Loads device drivers for monitoring the status of and controlling devices within the AV system.
- Uploads GUI Designer interface layouts to touchpanels and third-party touch interfaces.
- Creates the configuration containing all the settings for the control processor, the expansion interface, and the products with which they interact in the AV system.
- Uploads the configuration to the control processor.

To obtain Extron control product software, you must have an Extron Insider account and contact an Extron support representative. Extron provides training to our customers on how to use the software. Access to the features of Global Configurator Professional is available to users who successfully complete Extron Control Professional Certification.

About Global Scripter

For those who prefer to program control systems rather than configure them, Extron offers Global Scripter as an alternative to Global Configurator. Global Scripter is an integrated programming development environment for Extron IP Link Pro, TouchLink Pro, and eBUS products. It uses the object-oriented Python programming language and a custom Python library called ControlScript. Global Scripter includes the ControlScript API as well as all of the tools for developing control system programs, such as file management, code editing, debugging and diagnostic tools. More information is available at **https://www.extron.com/featured/Control-System-Programming/programming**.

PC System Requirements

To find the minimum hardware and software requirements for the PC you use to configure the control system:

- Visit the `Download` page (**www.extron.com/download/index.aspx**) on the Extron website and navigate to the web page for the specific software package (such as Global Configurator and GUI Designer). Minimum PC hardware and software system requirements are listed in the description section. In some cases, minimum device firmware version requirements are also listed there.
- If system requirements are not listed on the software package web page, contact an Extron support representative.

Hardware Features and Installation

This section covers the following material:

- **Setup Checklist** — A checklist of tasks to guide you through installation
- **Network Communication Setup** — A flowchart guide to network settings configuration
- **Features** — Locations and some descriptions of items on the front panel
- **Mounting** — Guidelines for mounting
- **Ports, Addressing, and Connections** — Locations, descriptions, and cabling notes for rear panel features and corresponding front panel indications
- **Resetting the Unit** — Information about the available reset modes and how to reset the IPL EXP

Pay careful attention to the order and types of setup tasks. Follow the setup checklist in this guide or in the setup guide and keep it with you for reference throughout the installation and configuration process.

Setup Checklist

Get Ready

- ☐ Familiarize yourself with the features of the IPL EXP Expansion Iinterface (see **Front Panel Features** on page 10 and **Ports, Addressing, and Connections** on page 13) and of any IPCP Pro xi Series control processors, TouchLink Pro touchpanels, or button panels that will be part of the system.
- ☐ Download and install the latest version of the following:
  - ☐ **Toolbelt software** — for discovering the control processor, expansion interface, and other control products on the network, for managing core settings, and for upgrading firmware when needed.
  - ☐ **Global Configurator (GC) software** — for configuring the control system.
  - ☐ **Global Scripter software** — for programming the control processor and expansion interfaces (as an alternative to GC)
  - ☐ **GUI Designer software** — for designing layouts for Extron TouchLink Pro touchpanels and third-party touch interfaces
  - ☐ **IP Link Pro device drivers** — for use with GC, to make control of other devices possible

  All are available from **www.extron.com** (see **Locating Software, Firmware, and Driver Files on the Extron Website** on page 33).

- ☐ Obtain network information for the unit from the network administrator. You also need the following details for each Extron Pro series Ethernet-enabled device:
  - ☐ DHCP setting (on or off)
  - ☐ Device (IPL EXP, IPCP Pro, TouchLink Pro, NBP) LAN IP address
  - ☐ AV LAN IP address (for IPCP Pro Q xi models)
  - ☐ Subnet mask
  - ☐ Gateway IP address
  - ☐ Username
  - ☐ Passwords

  NOTE: If DHCP is on, you do not need the IP addresses and subnet mask.
- ☐ Write down the MAC address of each network interface on each IP Link Pro device to be used.
- ☐ Obtain model names and setup information for devices the system will control.
- ☐ Each expansion interface and each control processor comes with a factory-installed Secure Sockets Layer (SSL) security certificate. If you intend to install a different SSL certificate, contact your IT department to obtain the certificate or for instructions on how to obtain one (see **Secure Sockets Layer (SSL) Certificates** on page 39 for requirements and guidelines regarding SSL certificates).
- ☐ For systems that will use IEEE 802.1X security, obtain a PEM-encoded security certificate and private key (see **IEEE 802.1X Certificates** on page 40) from your IT department.

Mount and Cable All Devices

- ☐ Mount the unit to a rack or furniture (see **Mounting** on page 11).
- ☐ Cable devices to the expansion interface (see **Ports, Addressing, and Connections** starting on page 13).
- ☐ Connect power cords and power on all the devices.

Set Up the Control Processor, Expansion Interfaces, Touchpanels, and Network Button Panels for Network Communication

- ☐ Connect the PC that you will use for setup, the LAN/PoE port, of the expansion interfaces, the LAN (or AV LAN) port of the control processor, the LAN/PoE port of the expansion interfaces, and the touchpanels or network button panels to the same Ethernet network. For expansion interface LAN connections, see **LAN/PoE and LAN/PoE+ (Ethernet) connectors and LEDs** on page 18.
- ☐ Start Toolbelt and use it to set the IP address or addresses, subnet, gateway IP address, DHCP status, and related settings (see the flowchart in **Network Communication Setup** on page 9).

  NOTE: When setting up DHCP during network configuration or if using a host name instead of an IP address, the user must enter a qualified host name (*`Username.HostName.Domain`*). For example: `somename.extron.com`.

Configure or Program the Control Processor, Expansion Interfaces, Touchpanels, and Network Button Panels

☐ If TouchLink Pro touchpanels are part of the system, start and use GUI Designer to **design, save, and build the graphical user interface (GUI) layout** for the touchpanels (see the *GUI Designer Help File* for instructions).

> **NOTE:** To redeem (activate) a LinkLicense, go to **www.extron.com/llredeem** and follow the online instructions.
>
> A LinkLicense unlocks features that add convenience, expand system options, and enhance the capabilities of your Extron products. For IPCP Pro Q xi and xi systems, a LinkLicense allows you to use a mobile device or computer as the primary control interface in an Extron control system where a TouchLink Pro touchpanel may not be present.

☐ If using GC, **create a new GC Professional or GC Plus project and configure the control processor, expansion interface,s and other IP Link Pro devices**. The configuration tells each control processor and expansion interface:

- How its ports function
- How to control other products
- Which touchpanels to interact with
- What to monitor
- When to do things
- Whom to notify, how, and under what circumstances

☐ Configure ports on the control processor:

- ☐ Select device drivers and link them to each serial, IR/serial, or Ethernet port.
- ☐ Select settings (serial protocol, relay behavior, digital I/O or flex I/O settings, AC output settings) as needed.

☐ Add eBUS devices and set them up:

- ☐ Ensure that the hardware address (eBUS ID) set on each device is distinct and matches the address used in the configuration.
- ☐ Assign button functions as desired.

☐ Add Network Button Panels (NBPs) and set them up. Assign button functions as desired.

☐ Add the IPL EXP expansion interfaces and configure their ports.

☐ Set up monitors, schedules, macros, and local variables.

☐ Add touchpanels and set them up:

- ☐ Upload the GUI configuration to the Global Configurator project.
- ☐ Assign any appropriate functions, monitors, or schedules to the touchpanels and their buttons.

☐ **If not using GC Professional or GC Plus, use Global Scripter** to program the control system as desired.

☐ Program ports on the control processor:

- ☐ Program each serial, IR/serial, or Ethernet port as needed.
- ☐ Program relay behavior, digital I/O, flex I/O, and AC output settings as needed.

☐ Add eBUS devices and set them up:

- ☐ Ensure that the hardware address set on each device is distinct and matches the addresses programmed for them in the IPCP.
- ☐ Program button functions as desired.

☐ Add Network Button Panels and set them up. Assign button functions as desired.

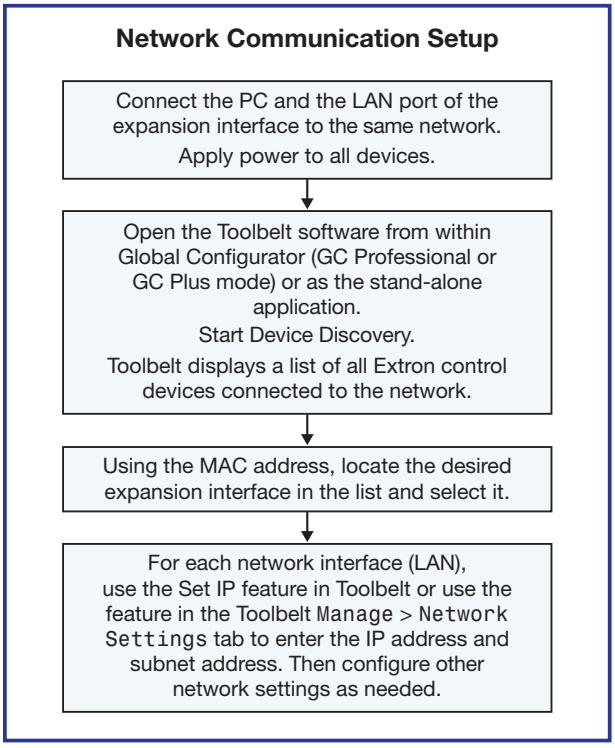
- ☐ Add the PL EXP expansion interfaces and program their ports.
- ☐ Add touchpanels and set them up:
  - ☐ Upload the GUI configuration to the Global Scripter project.
  - ☐ Program functions, monitors, or schedules to the touchpanels and their buttons.
- ☐ Save the project.
- ☐ Build and upload the system configuration to the control processor, expansion interfaces, and other system devices.

Test and Troubleshoot

- ☐ Test the system (see the **Troubleshooting** section starting on page 36 for an outline of items to check during system troubleshooting).
- ☐ Make adjustments to wiring or configuration as needed.

Network Communication Setup

Network setup is essential prior to configuration. Use the flowchart as a general guide to setting up the expansion interface for network use.



NOTE: If using 802.1X security, see the *Extron 802.1X Technology Reference Guide* (available at **www.extron.com**) and the *Toolbelt Help* file for additional details on system setup.

Figure 3. Network Setup

Features

This section shows panel features and their locations. Most of the features and LED indications are described and shown in the **Ports, Addressing, and Connections** section starting on page 13 paired with the descriptions of the corresponding ports.

Front Panel Features

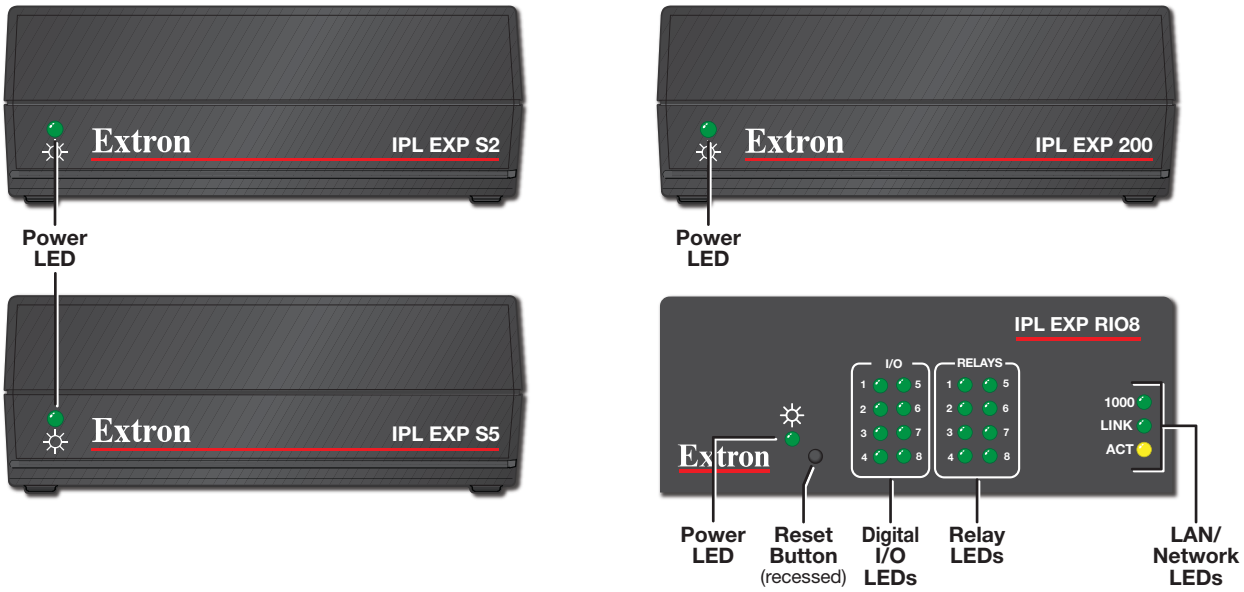


Figure 4. Front Panels — Left: IPL EXP S2, IPL EXP S5 Right: IPL EXP 200, IPL EXP RIO8

Rear Panel Features

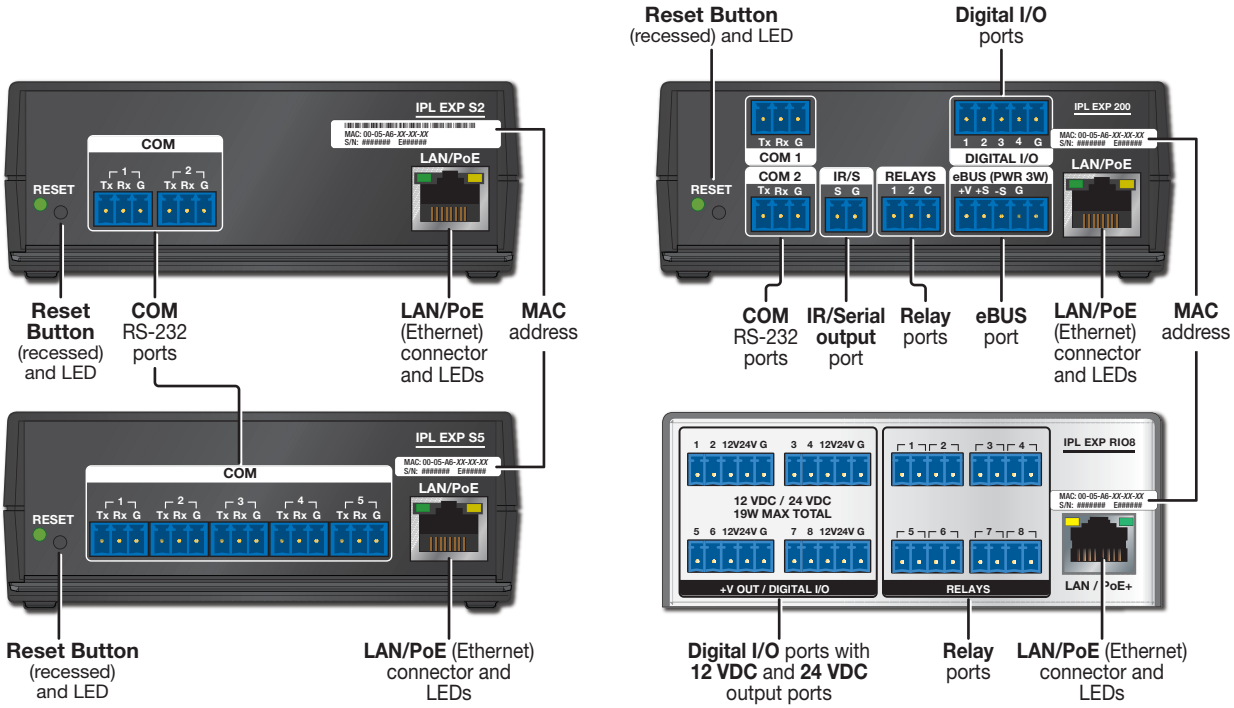


Figure 5. Rear Panels — Left: IPL EXP S2, IPL EXP S5 Right: IPL EXP 200, IPL EXP RIO8

Reset Features

Reset button and LED — Pressing this recessed button causes various product settings to be reset to the factory defaults. The green Reset LED (rear panel of the IPL EXP S2, IPL EXP S5, IPL EXP 200) or Power LED (front panel of the IPL EXP RIO8) blinks depending on the selected reset mode (see **Resetting the Unit** on page 29 and the **reset modes table** starting on page 29 for details).

Mounting

Mounting Options

Optional 1U rack shelves are available for use with all IPL EXP models. A variety of rack mounting bracket kits and furniture mounting kits are available for use with the IPL EXP RIO8.

- Optional furniture mounting bracket kits are available for use with the IPL EXP RIO8 .
- All other models come with a ZipClip 200 mounting bracket, which can be mounted to to the following items:
  - tabletop
  - optional equipment rack shelf
  - equipment rack rails
  - furniture

See the product-specific page at **www.extron.com** for a list of compatible accessories for mounting your expansion interface. Visit the product-specific page on the Extron website (**www.extron.com**) for a list of compatible accessories for mounting your control processor or call a support representative to find out which kit to order for your installation.

Read the instructions that are included with the rack shelf or mounting kit for installation procedures and see the UL rack mounting guidelines below for safe installation. Then securely mount the control system expansion interface and other devices and attach cables using the wiring section (see **Ports, Addressing, and Connections** on page 13) as a wiring guide.

UL Rack Mounting Guidelines

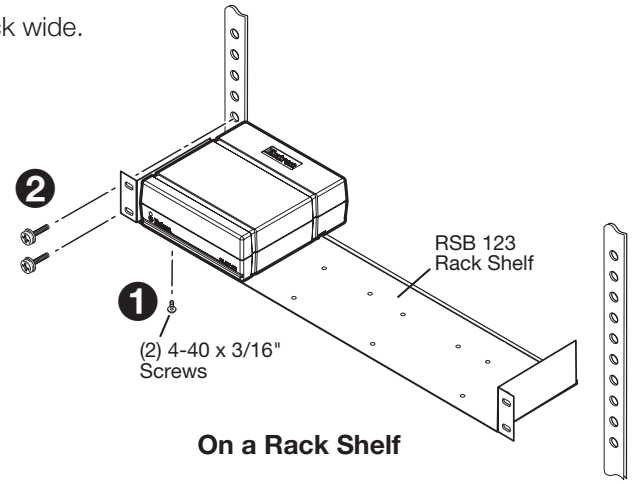
The following **Underwriters Laboratories (UL)** guidelines pertain to the safe installation of IPL EXP I/O Series expansion interfaces in a rack.

1. **Elevated operating ambient temperature** — If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient temperature. Therefore, install the EXP in an environment compatible with the maximum ambient temperature (Tma = +122 °F, +50 °C) specified by Extron.
2. **Reduced air flow** — Install the equipment in a rack so that the amount of air flow required for safe operation of the equipment is not compromised.
3. **Mechanical loading** — Mount the equipment in the rack so that a hazardous condition is not achieved due to uneven mechanical loading.
4. **Circuit overloading** — Connect the equipment to the supply circuit and consider the effect that circuit overloading might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.
5. **Reliable earthing (grounding)** — Maintain reliable grounding of rack-mounted equipment. Pay particular attention to supply connections other than direct connections to the branch circuit (such as use of power strips).

Rack Mounting

The IPL EXP units are one quarter rack wide. Up to four IPL units can be mounted side by side directly onto a rack shelf.

1. Align the threaded holes in the bottom of the IPL EXP with the holes in an Extron rack shelf and fasten the unit to the shelf with two 4-40 x 3/16"inch screws (see ❶ at right).
2. Bolt the rack shelf to the rack (see ❷).



On a Rack Shelf

Mounting an IPL EXP Expansion Interface With a ZipClip 200

These instructions apply to the IPL EXP 200, S5, and S2 models.

Using the ZipClip 200

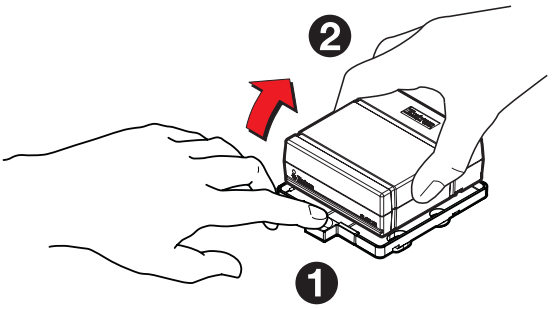
Attaching and removing the clip and IPL EXP

To attach the EXP to the ZipClip 200 mounting clip:

1. Insert the bottom of the EXP down into the clip, starting with one end.
2. Pivot the other end down and press until the clip snaps into place.

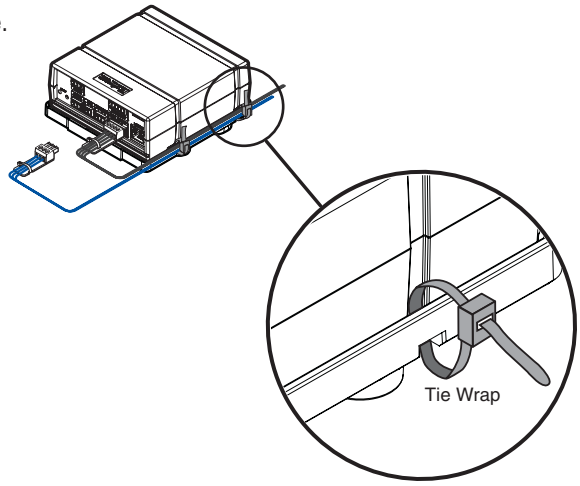
To remove the EXP from the ZipClip:

1. Press the tab on the ZipClip (see ❶ at right).
2. Pivot the EXP and lift it out of the ZipClip (see ❷).



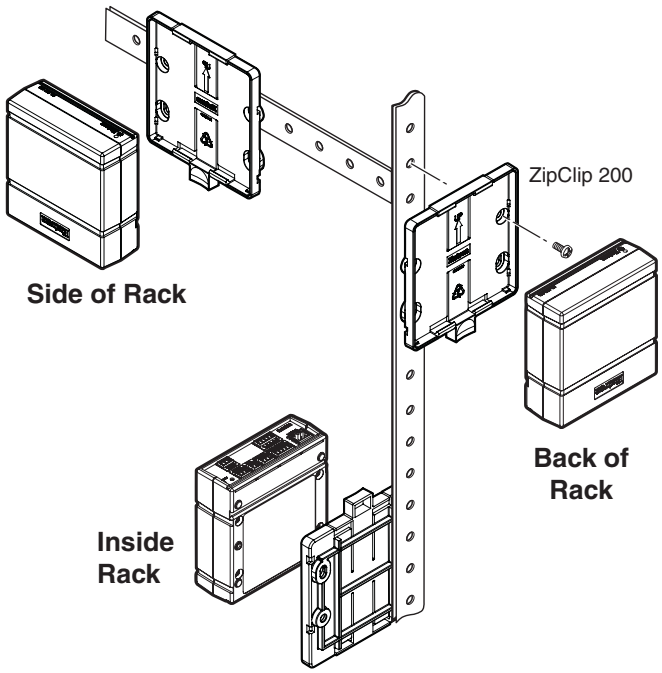
Using tie wraps for cable strain relief

1. Attach the EXP to the ZipClip 200 mounting clip as described previously.
2. Fasten the cables to the ZipClip base.
   a. Insert tie wraps (also called "zip ties") along the notches on the side of the EXP and through the tie wrap anchor points on the ZipClip, then around the cables.
   b. Connect and pull the tie wraps until they are secure. Do not over-tighten.



Mounting to rack rails using a ZipClip

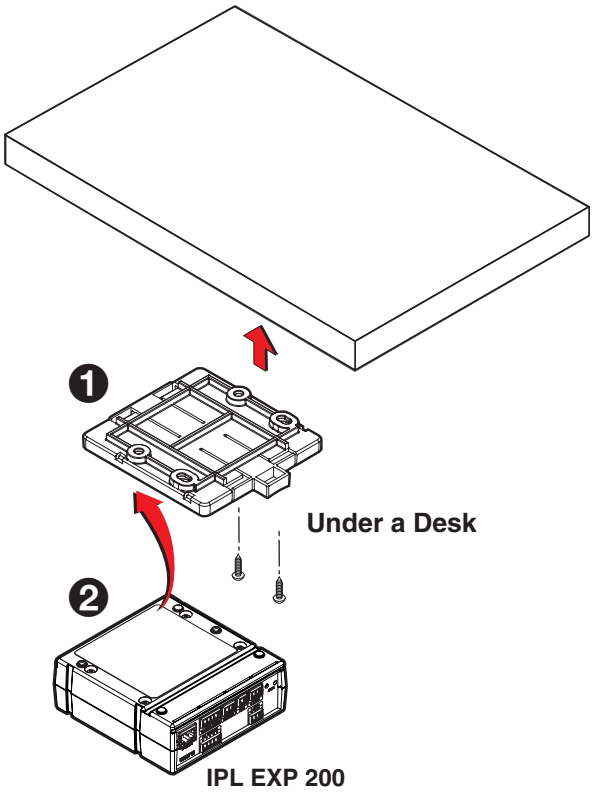
1. Fasten the ZipClip 200 mounting clip to a rack rail using two rack screws as shown in the diagram at right.
2. Insert the bottom of the EXP down into the clip, starting with one end.
3. Pivot the other end toward the clip and press until the clip snaps into place.



Furniture mounting

NOTE: The ZipClip is shipped with a set of four wood screws.

1. Attach the ZipClip to the mounting surface using two or more wood screws (see ❶ at right). Make sure the clip is oriented with the appropriate side facing the mounting surface of the furniture and with the tab accessible from the front of the furniture.
2. Insert the EXP into the ZipClip ❷ as described previously and press to snap it into place.



Ports, Addressing, and Connections

ATTENTION:
- Installation and service must be performed by experienced personnel.
- L'installation et l'entretien doivent être effectués par du personnel expérimenté.

Attach cables using the wiring diagrams in this section as a guide. See the **Software-based Configuration and Control** section starting on page 31 and the *Global Configurator Help File* and *Toolbelt Help File* for information about Global Configurator and Toolbelt, which you must use to set up the unit.

Power Connections

ATTENTION:

- Always use a power supply supplied or specified by Extron. Use of an unauthorized power supply voids all regulatory compliance certification and may cause damage to the supply and the unit.
- Utilisez toujours une source d'alimentation fournie par Extron ou recommandée. L'utilisation d'une source d'alimentation non autorisée annule toute certification de conformité réglementaire, et peut endommager la source d'alimentation et l'unité.

- If not provided with a power supply, this product is intended to be supplied by a UL Listed power source marked "Class 2" or "LPS" and rated output 48 VDC (PoE), minimum 0.35 A or 56 VDC (PoE), minimum 0.8 A.
- Si le produit n'est pas fourni avec une source d'alimentation, il doit être alimenté par une source d'alimentation certifiée UL de classe 2 ou LPS, avec une tension nominale 48 VDC (PoE) et 0,35 A minimum ou 56 VDC (PoE) et 0,8 A minimum.

- Unless otherwise stated, the AC/DC adapters are not suitable for use in air handling spaces or in wall cavities.
- Sauf mention contraire, les adaptateurs CA/CC ne conviennent pas à une utilisation dans les espaces d'aération ou dans les cavités murales.

- The installation must always be in accordance with the applicable provisions of National Electrical Code ANSI/NFPA 70, article 725 and the Canadian Electrical Code part 1, section 16. The power supply shall not be permanently fixed to building structure or similar structure.
- Cette installation doit toujours être conforme aux dispositions applicables du Code américain de l'électricité (National Electrical Code) ANSI/NFPA 70, article 725, et du Code canadien de l'électricité, partie 1, section 16. La source d'alimentation ne devra pas être fixée de façon permanente à la structure de bâtiment ou à d'autres structures similaires.

Power input

- The IPL EXP RIO8 requires PoE+ power over Ethernet input of at least 48 VDC. The Extron PI 140 Power Injector and the IPCP Pro 360Q xi can provide appropriate PoE+ output to power the IPL EXP RIO8.

  NOTE: The IPCP Pro 360Q xi offers Power over Ethernet+ (PoE+) output on AV LAN ports 2 and 3. These RJ-45 connectors, labeled "PoE+ Out," can output a maximum of 30 watts per port. It can be used to power the IPL EXP expansion interface.

- The rest of the IPL EXP I/O Series expansion interfaces (IPL EXP 200, IPL EXP S5, IPL EXP S2) accept power over Ethernet (PoE) or PoE+ through the LAN port in addition to network communication.

For all models, see **LAN/PoE and LAN/PoE+ (Ethernet) connectors and LEDs** on page 18 for cabling details.

Power output (IPL EXP RIO8 only)

12 VDC and 24 VDC power output ports — The IPL EXP RIO8 includes both 12 VDC and 24 VDC output ports for use together with the digital I/O ports to provide power to small accessories. They remain on as long as there is no overload condition.

- The 12 VDC ports supply 12 VDC to devices such as an Extron ECM S10 partition sensor.
- The 24 VDC port supplies 24 VDC to devices such as the Extron OCS 100 occupancy sensor.

Output power capacity on these ports has an aggregate limit of 19 watts, maximum, total for all 12 VDC and 24 VDC ports. These ports are monitored continuously for total power draw.

- When the total power draw exceeds a threshold of 17 watts but is still below 19 watts, the IPL EXP RIO8 enters the **limit mode**. The Limit condition is indicated within Global Configurator, and the ports are operational. If you have configured the unit to do so, the IPL EXP RIO8 can issue a power overcurrent notice.
- If power draw exceeds a second, higher threshold (19 watts, by default), the unit enters **overcurrent mode**. Power is disabled on all 12 VDC and 24 VDC ports, and the Over condition is indicated within Global Configurator.

  Once ports are disabled, the user must disconnect or fix the attached devices to correct the problem. If the power draw is still excessive, the ports remain off.

NOTES:

- The IPL EXP RIO8 provides a maximum output of 19 watts, combined, for all the DC output ports together.
- The IPL EXP RIO8 requires a PoE+ source that provides at least 48 watts (see the **power input requirement** on the previous page).
- See the *Global Configurator Help File* for details on the Limit and Over conditions.

See the wiring diagrams (figure 6) on the next page.

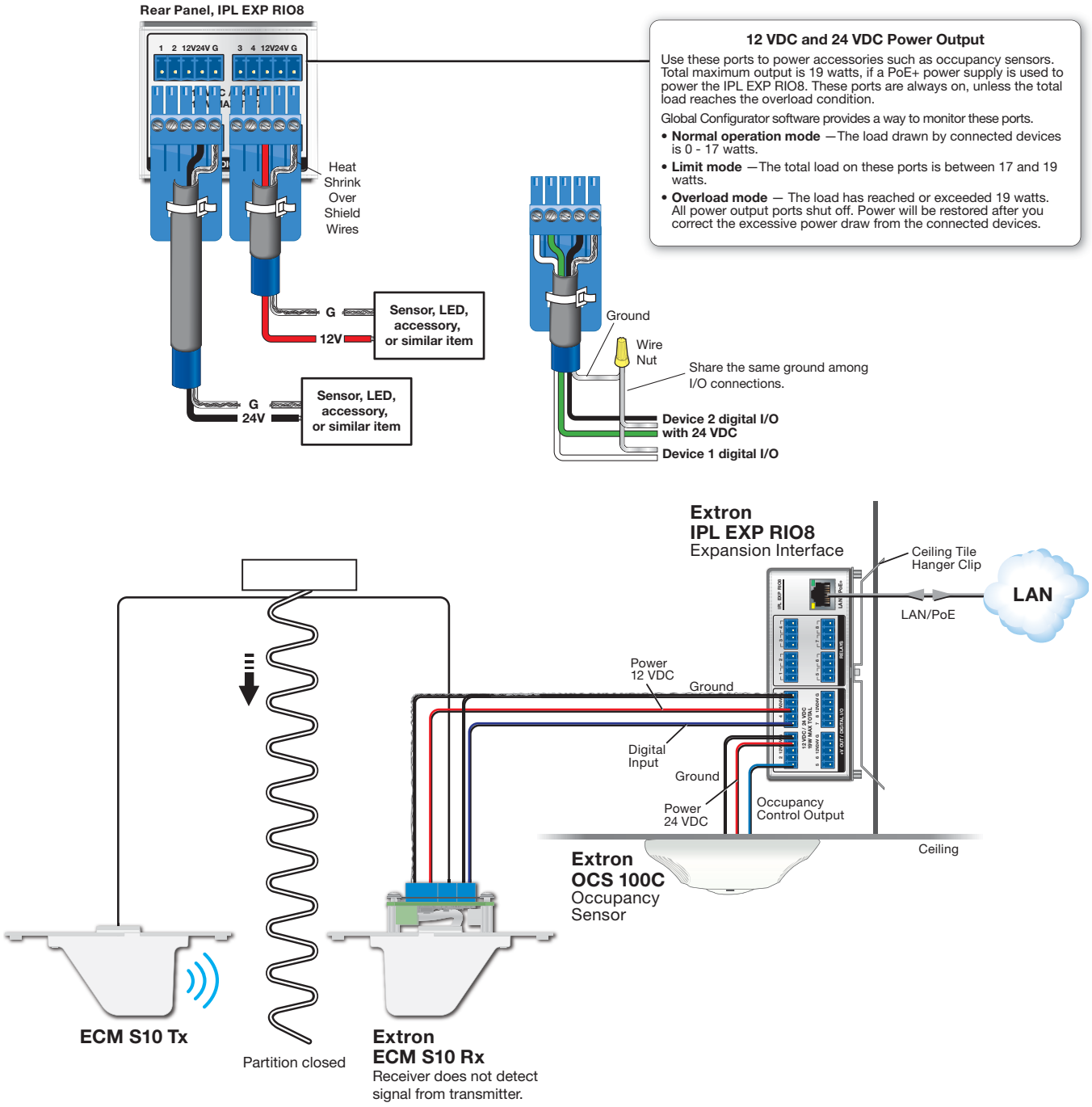


Figure 6. Wiring the DC Power Output Ports

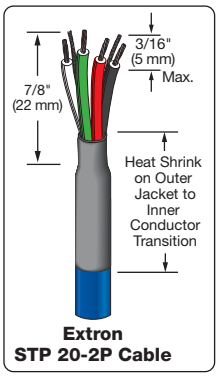
Bidirectional Control and Communication Connections and Features

3-pole COM ports, RS-232 only

All models except the IPL EXP RIO8 include COM ports, which can be used for serial control of a display or other device and to receive status messages from the connected devices. These ports can send commands from a driver file.

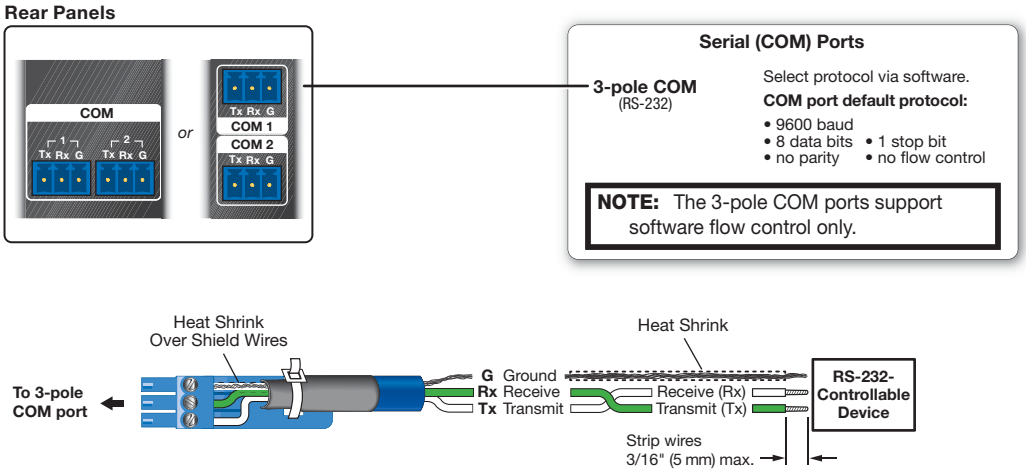
IPL EXP I/O Series serial protocol:

- 300 to 115200 baud (9600 baud = default)
- 8 (default) or 7 data bits
- 1 (default) or 2 stop bits
- No parity (default), even parity, or odd parity
- Flow control support (default = none), software-only (XON, XOFF)



TIP: STP 20-2P cable, shown at left, is recommended for these connections. For best results, insulate the common or drain wires using heat shrink.

Use the following diagram as a wiring guide to cable the EXP to other devices.



NOTE: If you use cable that has a drain wire, tie the drain wire to ground at both ends.

Figure 7. Wiring COM Ports for Serial Control

For bidirectional serial communication, the transmit, ground, and receive pins must be wired at both the IPL EXP and the other device. Each projector or other device may require different wiring. For details, see the manual for that equipment or read the Extron device driver communication sheet, which is included with the drivers.

NOTE: Maximum distances between the EXP and the device being controlled are generally up to 200 feet (61 m) but can vary based on factors such as cable gauge, baud rates, environment, and output levels from the EXP and the device being controlled.

LAN/PoE and LAN/PoE+ (Ethernet) connectors and LEDs

To connect the EXP to an Ethernet network (for configuration and control of the EXP and the devices connected to it), plug a cable into one of these RJ-45 sockets and connect the other end of the cable to a power inserter, network switch, hub, router, or PC connected to a local network or the Internet. DHCP is off by default.

- The IPL EXP RIO8 requires a PoE+ connection through its LAN/PoE+ port see the **power input requirement** on page 14).
- All other IPL EXP models accept power over Ethernet (PoE) and PoE+ through the LAN/PoE port

ATTENTION:

- Power over Ethernet (PoE) is intended for indoor use only. It is to be connected only to networks or circuits that are not routed to the outside plant or building.
- L'alimentation via Ethernet (PoE) est destinée à une utilisation en intérieur uniquement. Elle doit être connectée seulement à des réseaux ou des circuits qui ne sont pas routés au réseau ou au bâtiment extérieur.

Network Port Addressing:

If you use static IP addresses, configure the settings and IP addresses via Toolbelt. See the help file for Global Configurator or Toolbelt for basic information on configuration. See the diagram on the next page and see the following table for default addresses.

Network Port Addressing			
	IP Address	**Subnet Mask**	**DNS Address**
Static IP addresses (default, what the unit uses when DHCP is off)			
	192.168.254.250	255.255.255.0	127.0.0.1
DHCP on (alternative setting)			
	DHCP on (addresses are automatically assigned)		

For details of communication protocols, ports, and services used, see the *Pro Series Control Product Network Ports and Licenses Guide* at **www.extron.com**.

LED Indication:

Activity LED (connectors [all models] and front panel [rack mount models]) — This yellow LED blinks to indicate network activity.

Link LED (connectors [all models] and front panel [rack mount models]) — This green LED lights to indicate a good network connection.

100 LED (IPL EXP RIO8 front panel) — This green LED lights when the unit is connected to a 100 Mbps or faster network connection.

Passwords:

IMPORTANT NOTE:

The factory configured passwords for this device have been set to the device serial number. Passwords are case sensitive. Performing a Reset to Factory Defaults reset (see **Resetting the Unit** on page 29) sets the password to `extron`.

Cabling:

- For 10Base-T (10 Mbps) networks, use a CAT 3 or better cable.
- For 100Base-T (max. 155 Mbps) networks, use a CAT 5 or better cable.

Connect the PC that you will use for setup, the LAN port of the EXP, and the control processor and touchpanels to the same Ethernet network.

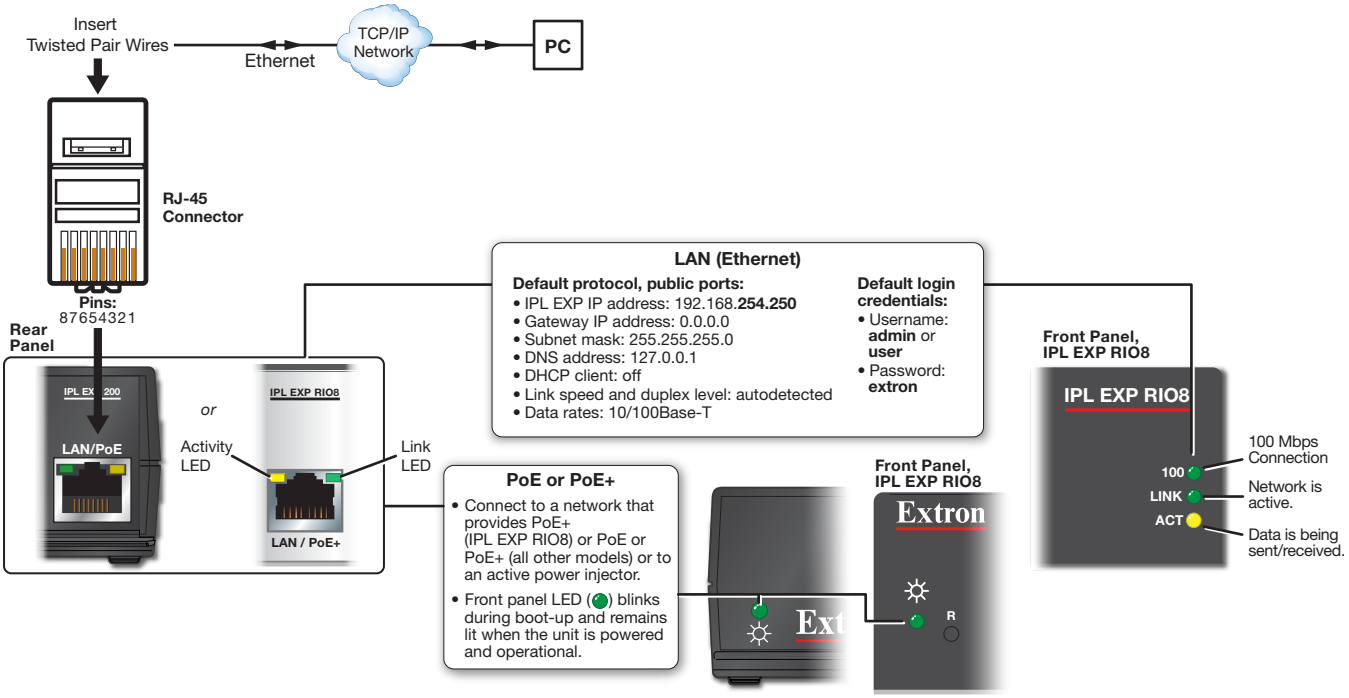


Figure 8. LAN Connector, LEDs, and Default Protocol

MAC address — Each IPL EXP unit is assigned a unique user hardware ID number (Media Access Control [MAC] address) (for example, 00-05-A6-05-1C-A0). You may need this address during control processor configuration.
A label that indicates the MAC address is located on the rear or side panel of each EXP unit.

Unidirectional Control and Communication Connections

IR/Serial output ports

An IPL EXP 200 can use infrared signals or unidirectional RS-232 serial signals to control various devices (up to four per port for IR) via these ports. Set output signal type (IR or serial) during configuration. The following figure shows wiring examples.

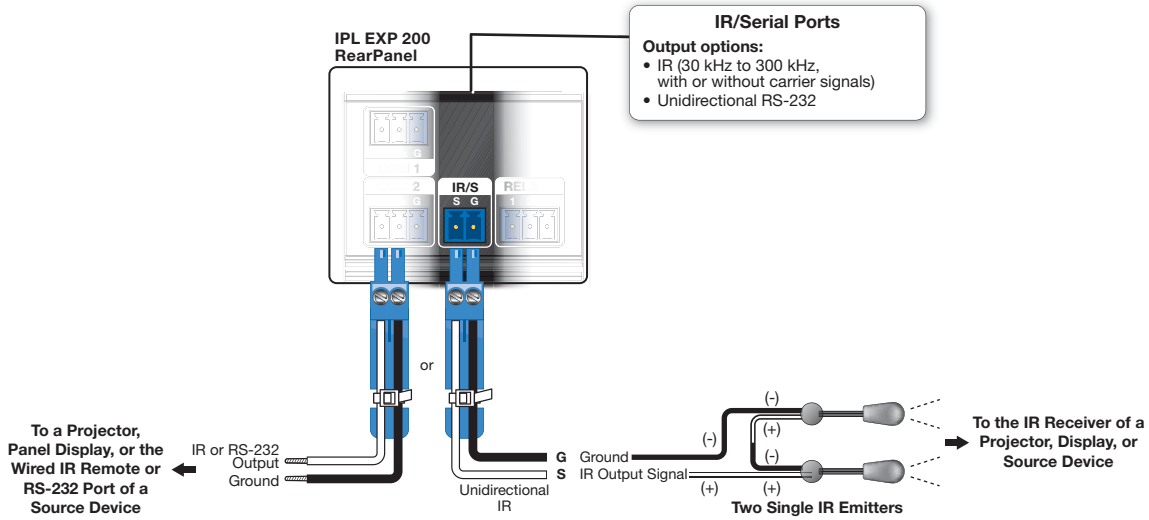


Figure 9. Wiring the IR/Serial Port

Serial control — Connect the IR/S port to the serial control receive (Rx) and ground pins of the device to be controlled. These ports have the same **serial protocol** options (see page 17) as the COM ports.

IR control — Connect the IR/S port directly to the wired IR port of another device. Alternatively, insert the wires from up to four IR Emitters into an IR port and place the heads of the emitters over or next to the IR signal pickup windows of the devices. For wiring, see the following diagrams or the *IR Emitter Installation Guide* (available on **www.extron.com**).

NOTE: Each emitter must be within 100 feet (30.4 meters) of the EXP for best IR control results.

Installing One Single Emitter

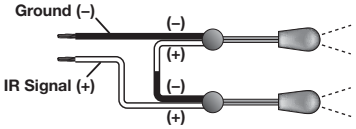
One Single IR Emitter

Installing One Dual Emitter

Dual IR Emitter

Installing Two Single Emitters

When installing only single emitters, tie them **in series** as shown below.



Two Single IR Emitters

Relay ports

The IPL EXP 200 and IPL EXP RIO8 have relay ports, which also provide control for power, screen or projector lifts, window coverings, and similar items, when trigger events occur.

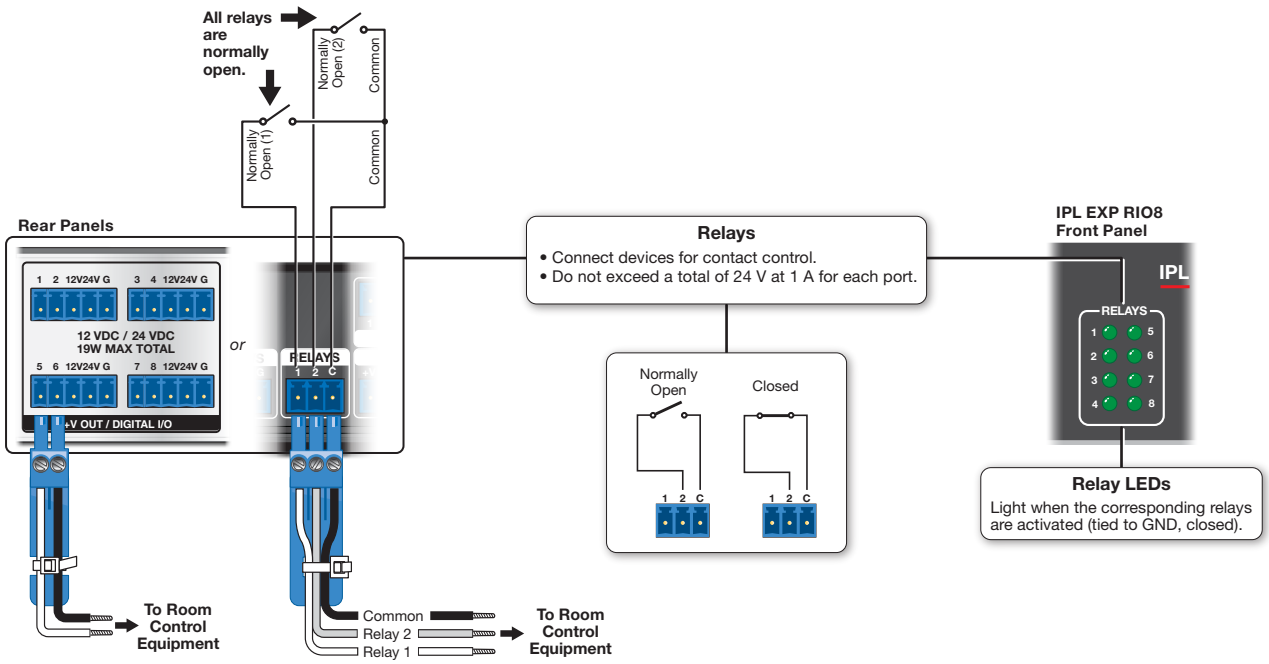


Figure 10. Cabling Relay Ports

These relay contacts may be used to control any equipment as long as the contact specifications of a total of 24 V at 1 A are not exceeded for each port. These relays are normally open by default.

When activated, the open contacts close. They can be set up to operate in one of two ways:

- **Latching** (brief or indefinite period contact) (press to close, press to open), or
- **Pulsed** (timed cycle) (press to close, timeout to open, with automatic repeat).

In pulse mode the default timeout period (hold time) is ½ second (500 ms). Use Global Configurator to change the length of the timeout period.

NOTE: The pulse function is absolute: it always sets the relay state to closed, times out (briefly), then opens the contact. It overrides the previously selected setting (on state, off state, or toggle).

Additional Control Ports

Digital I/O (digital input/output) ports (IPL EXP 200, IPL EXP RIO8)

To allow the IPL EXP to monitor devices to trigger events, connect switches, sensors, LEDs, relays, or similar items to these ports. Connect physical switches, sensors, LEDs, relays, or similar items to these ports, which can be configured as digital inputs or outputs, with or without +5 VDC pull-up. These ports can trigger events or functions (such as triggering relays, issuing commands, or sending an e-mail) that have been set up using Global Configurator. By default these ports are set as digital inputs with pull-up disabled.

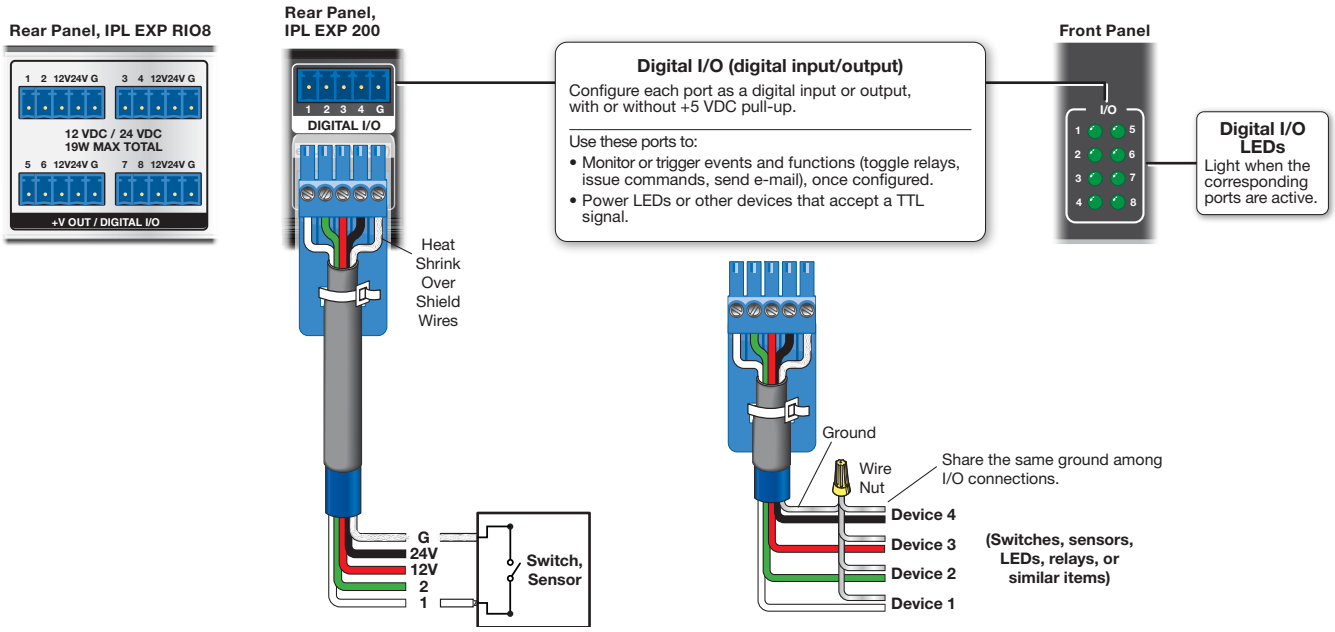


Figure 11. Digital I/O Port Wiring Examples

Digital input — To allow the EXP to monitor external devices that do not use RS-232 communication, connect a switch, motion sensor, moisture sensor, tally feedback output, button pad, or a similar item to a digital I/O port and configure it for digital input. When configured as a digital input, the port is set to measure two states: high and low. The port accepts 0 to 25.3 VDC input.

Threshold voltages are **not** adjustable. The thresholds are:

- **2.0** VDC — port on, logic low
- **2.8** VDC — port off, logic high

There is also an internal, selectable, pull-up resistor connected to +5 VDC, which you can use if the connected device does not provide its own power.

- Digital I/O digital input with pull-up disabled:
  - Digital input is triggered by an external switch or voltage between the digital input pin and ground.
  - **Example application, digital input without pull-up:** occupancy sensor connection:

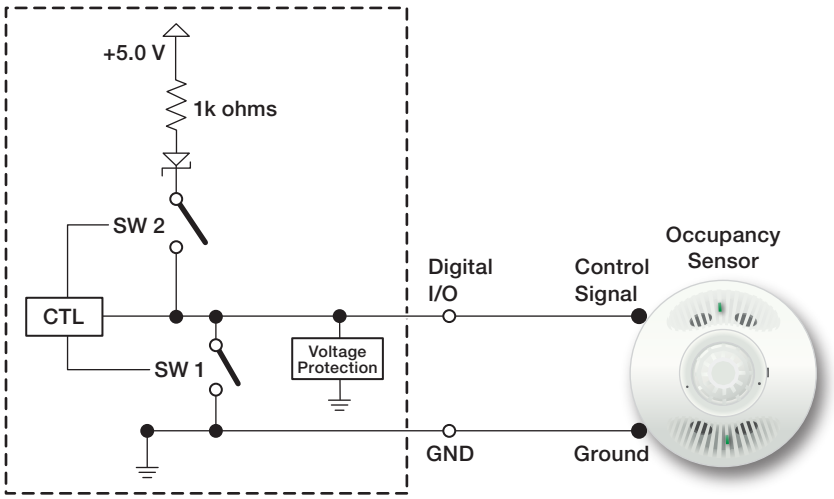


Figure 12. Digital I/O Digital Input Application: Occupancy Sensor, Without Pull-up

Room occupied: logic high, front panel LED (IPL EXP RIO8 only) is off.
Room unoccupied: logic low, front panel LED (IPL EXP RIO8 only) is lit.

NOTE: Occupancy sensors typically supply +24 VDC when occupancy is detected. After a set time with no occupancy, the sensor supplies 0 VDC.

- Digital I/O digital input with pull-up enabled:
  - When the port is configured for pull-up, switch 2 is closed, activating the +5.0 VDC pull-up resistor.
  - When an external switch closes (shorts to ground, logic low), the port is on and (for the IPL EXP RIO8 front panel only) LED is on.
  - When the external switch opens (logic high), the port is off. The IPL EXP RIO8 front panel LED is off.
  - **Example application, digital input with pull-up:** connecting a two-position switch

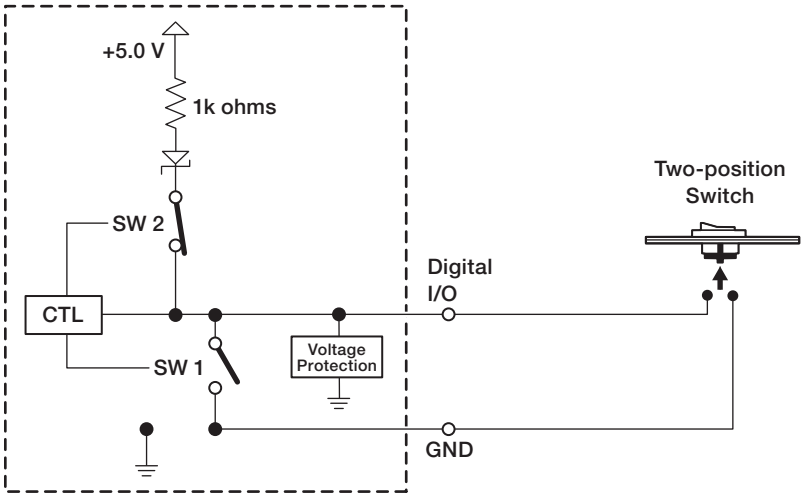


Figure 13. Digital I/O Digital Input Application: Two-position Switch With Pull-up

Two-position switch is open: logic high, front panel LED (IPL EXP RIO8 only) is off.
Two-position switch is closed: logic low, front panel LED (IPL EXP RIO8 only) is lit.

Digital output — To activate LEDs, incandescent lights, or other devices that accept a TTL signal, or to provide contact closure control for projector lifts, motorized screens, room or light switches via an Extron IPA T RLY4 or similar device, you can use one or more of these ports as a digital output. When a port is configured for digital output, it offers two output states: on and off.

- When the port is set to an "on" state, (the switch 1 circuit is closed), the I/O pin is connected to ground. Output voltage is less than 0.5 volts.
- When the port is set to the "off" state (the switch 1 circuit is open), the output pin floats (is not connected).
- If the application calls for TTL compatibility, the digital output circuit can be set up to provide a 2k ohm pull-up resistor to +5 VDC, which you can use if the connected device does not provide its own power.
  - If the pull-up resistor is **disabled**, voltage output is determined by an external source device.
  - If the pull-up resistor is **enabled**, switch 2 is closed, voltage output is 4.3 VDC.

Each I/O port is capable of accepting 250 mA, maximum.

- Digital I/O digital output with pull-up disabled:
  - When switch 1 closes, the port is on and the front panel LED (IPL EXP RIO8 only) is on.
  - When switch 1 opens, the port is off and the front panel LED (IPL EXP RIO8 only) is off.
  - **Example application, digital output without pull-up:** connecting an LED and an external +5 VDC power source

    This application often requires a current-limiting resistor, as shown in the diagram below. Many button switches that contain LEDs have a resistor built in. See the guide for the lighted switch or stand-alone LED for details.

    NOTE: Each I/O pin is capable of sinking a maximum of 250 mA.

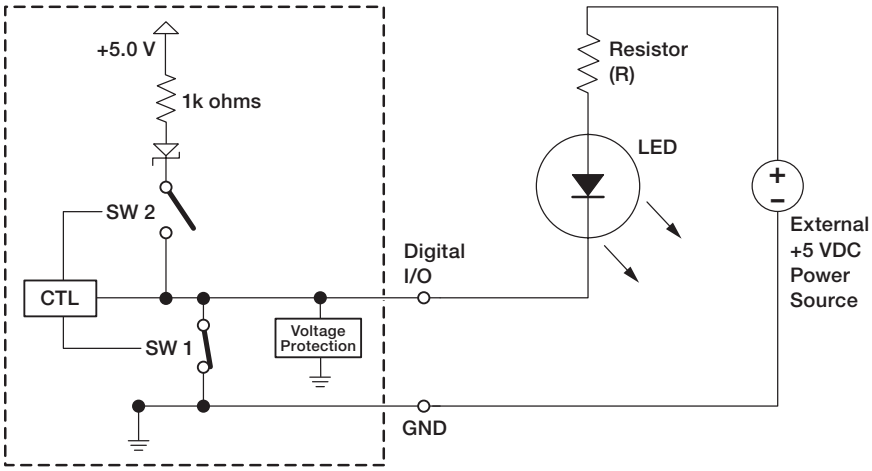


Figure 14. Digital I/O Digital Output Application: LED and External +5 VDC Power Source Without Pull-up

To determine the value of the current limiting resistor in the circuit shown above, you need to know the values of three variables:

i = LED forward current in amps (found in the data sheet for the LED)

V_f = LED forward voltage drop in volts (found in the data sheet for the LED)

V_s = supply voltage of the external voltage source

Insert those values into the following equation to determine the resistor value:

$$R = \frac{V_s - V_f}{i}$$

Example calculation:

i = 5 mA (0.005 A)
V_f = 2 V
V_s = 5 V

$$R = \frac{V_s - V_f}{i} = \frac{5\text{ V} - 2\text{ V}}{0.005\text{ A}} = 600\text{ ohms}$$

NOTE: If the value calculated for the current limiting resistor is not a standard resistor value, you can round up the number to the next highest common resistance value.

The connected LED is off when the port and switch 1 are open.

The connected LED is on when the port and switch 1 are closed.

- Digital I/O digital output with pull-up enabled:
  - When the port is configured for pull-up, switch 2 is closed, activating the +5.0 VDC pull-up resistor.
  - When switch 1 closes, the port is on and the front panel LED (IPL EXP RIO8 only) is on.
  - When switch 1 opens, the port is off, and the front panel LED (IPL EXP RIO8 only) is off.
  - **Example application, digital output with pull-up:** controlling another device via its contact closure input port

    Connect the digital I/O port to the contact input port of another device, such as an Extron DTP transmitter. When activated, the digital I/O digital output port momentarily shorts pin 1 to ground (pulsed contact for 0.5 seconds), closes switch 1, which selects the input on the connected device.

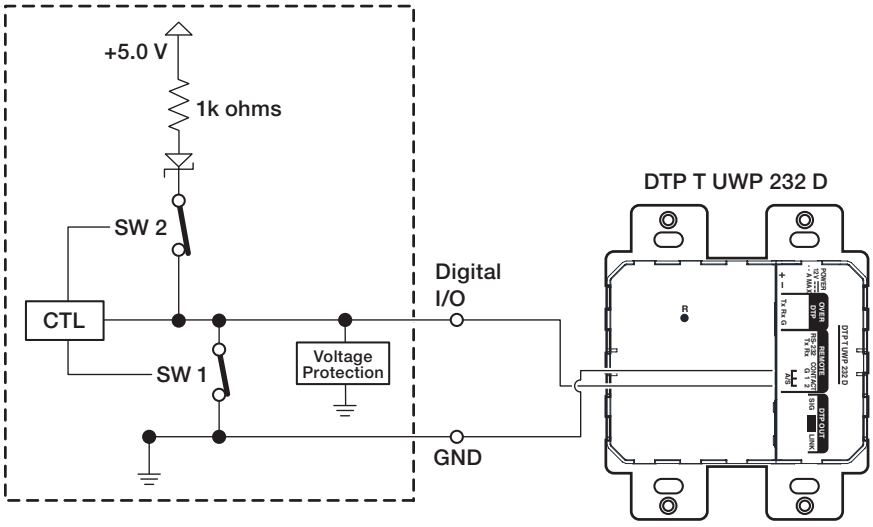


Figure 15. Digital I/O Digital Output Application With Pull-up: Contact Closure Input Selection on a Connected Device

eBUS port (IPL EXP 200)

eBUS is a technology (proprietary bus architecture and serial communication protocol) developed by Extron. It allows many eBUS devices (such as button panels) and accessories (including power and signal hubs) to be connected to a single control processor or expansion interface to expand the capabilities of a control system. Button panels are automatically recognized by the host control processor and can be added or removed at any time.

See the *eBUS Technology Reference Guide* (available at **www.extron.com/ebus_tech_ref**) before you install eBUS devices and accessories. It explains how to determine how many devices are supported when directly connected to the expansion interface and where (at what distances and what points in a system) and when it is advisable to add external power supplies. Also see the guide for each eBUS device for detailed installation information specific to each product, such as how to set the eBUS address and mount the devices. Each device in a system must have a distinct eBUS address that is not shared with any other device in the same system.

Wire both ends the same on each cable that connects eBUS devices. Extron STP 20 Series cable is recommended for these connections (see the **cable preparation tip** on page 17).

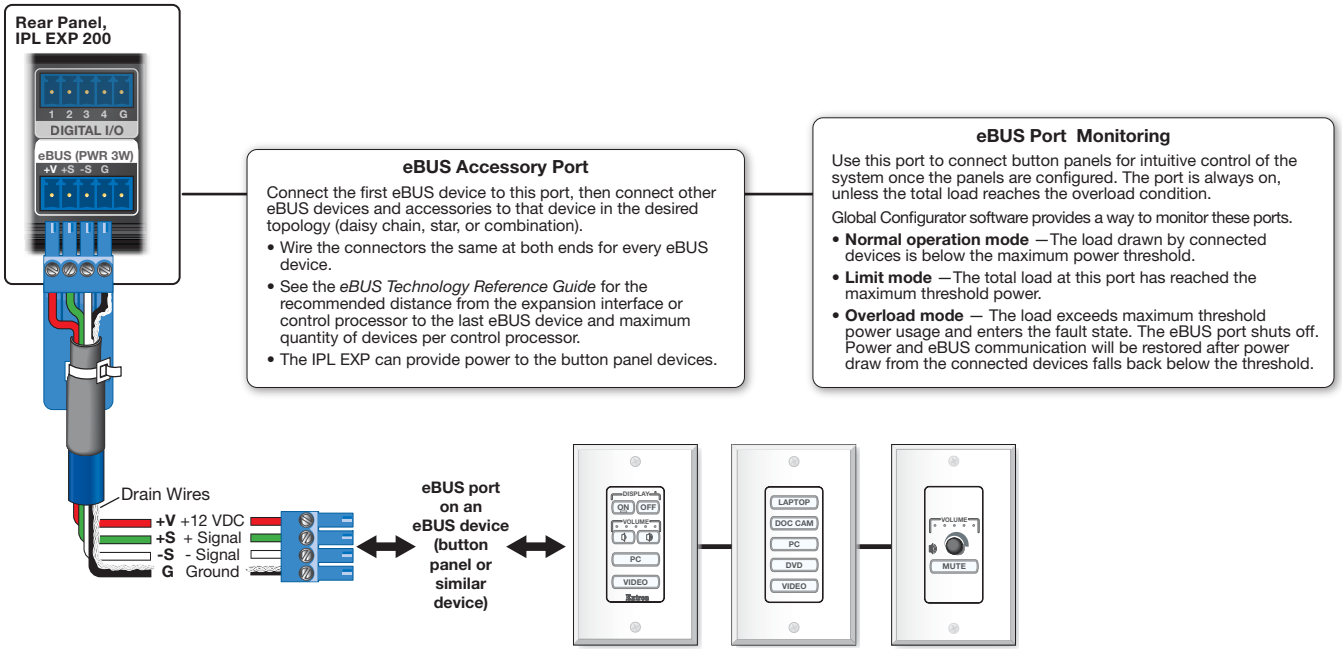


Figure 16. eBUS Port Cabling

This port provides power to eBUS devices. The EXP can be configured to provide indication to the user If the power draw by the connected devices reaches the maximum level allowed (the Limit state). If the power consumption exceeds the allowed threshold, the EXP shuts off the eBUS port and the port enters the overload (Over) state. If that occurs, you must resolve the hardware cause of the power overload before the EXP can successfully restore function to this port. Once the power consumption of the port is reduced to below the maximum overload condition threshold, the eBUS port automatically re-enables and resumes function.

If additional power supplies are required for an eBUS system, consider the following:

- Do **not** connect power from **both** the EXP and the supplemental power supply to any eBUS device.
- Do not allow power from the supplemental power supply to flow to the EXP.

See the following diagram as an example of a system where both an EXP and a supplemental power supply are included in the eBUS topology.

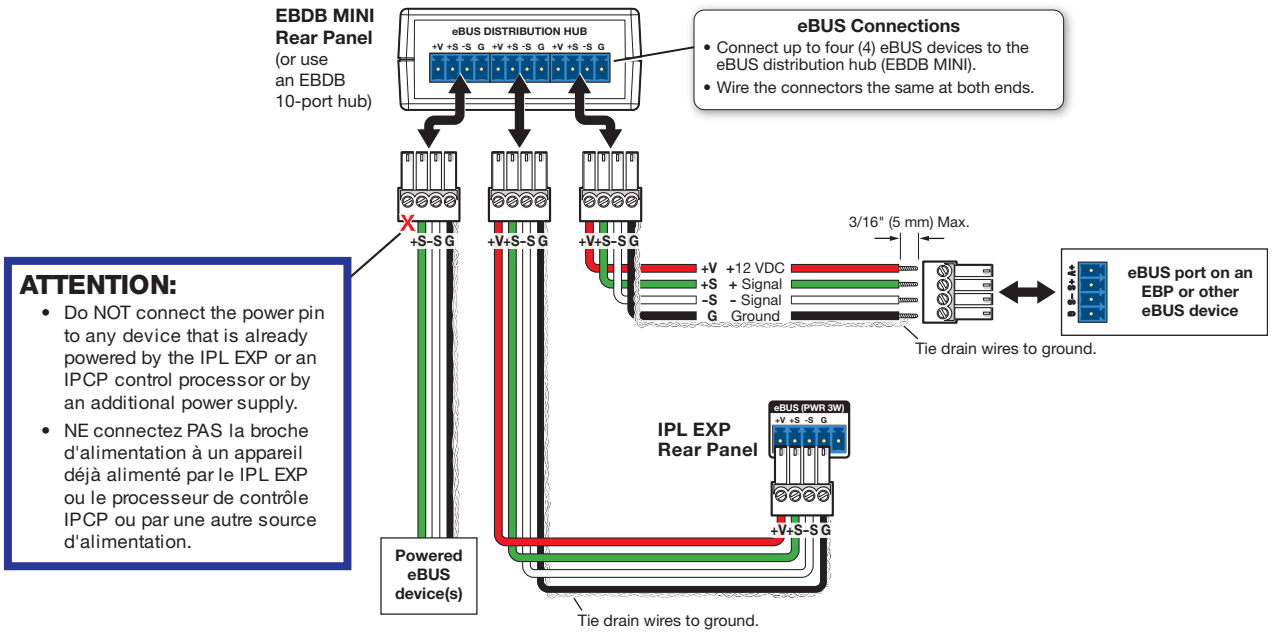
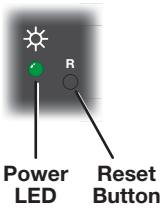


Figure 17. Connecting eBUS Devices in a System With Both an EXP and Another Powered eBUS Device

Resetting the Unit

There are six reset modes that are available by pressing the **Reset** button on the front panel (IPL EXP RIO8) or rear panel (all other models). The **Reset** button is recessed, so use a pointed stylus, ballpoint pen, or Extron Tweeker to access it. See the reset modes table below and on the next pages for a summary of the modes.



ATTENTION:

- Review the reset modes carefully. Using the wrong reset mode may result in unintended loss of flash memory programming, port reassignment, or a unit reboot.
- Analysez minutieusement les différents modes de réinitialisation. Appliquer le mauvais mode de réinitialisation peut causer une perte inattendue de la programmation de la mémoire flash, une reconfiguration des ports ou une réinitialisation de l'unité.

NOTE: If you press and hold the **Reset** button continuously, the LED blinks every 3 seconds, and the unit enters a different mode, from the Reset All IP Settings mode through the Reset to Factory Defaults mode. For Reset to Factory Defaults mode the LED blinks once at 3 seconds, twice at 6 seconds, and three times at 9 seconds; the third set of blinks indicating the last mode. The modes are separate functions, not a continuation from one mode to the next.

IPL EXP I/O Series Expansion Interface Reset Mode Summary

Mode	Use This Mode to...	Activation	Result
Run Factory Boot Code	Temporarily boot up the unit running only the universal boot code, then install the desired firmware. Use this in the event that a firmware update has failed or if incompatibility issues arise with user-loaded firmware	To start the Run Universal Boot Code reset mode and replace firmware: 1. On the IPL EXP expansion interface hold down the recessed **Reset** button while applying power to the unit. Keep holding the button down until the Reset or Power LED blinks twice or for 6 seconds, then release the button. The LED blinks slowly during bootup. The expansion interface runs the factory boot code (rather than full firmware). 2. Upload new firmware to the unit as desired (see **Updating the Firmware** on page 43 for details). **NOTE: Do not** continue to operate the expansion interface using only the boot code. The unit requires a full firmware package in order to be fully operational. If you want to use the firmware version with which the unit shipped, you must upload that version again (see the *Global Configurator Help File* or *Toolbelt Help File* for firmware upload instructions).	**The expansion interface firmware is replaced.** If the unit is powered on in Run Factory Boot Code mode, event scripts and systems do not start. All user files and settings such as drivers, adjustments, and IP settings are maintained. **NOTE:** To return the unit to the firmware version that was running prior to the reset, cycle power to the unit instead of installing new firmware.
Toggle DHCP Client	Enable or disable the DHCP client	To enable or disable the DHCP client for the LAN port: 1. Press the **Reset** button five times (consecutively). 2. Release the button. Do not press the button within 3 seconds following the fifth press. **NOTE:** By default DHCP is off for the LAN port and the unit uses a static IP address.	• The Reset or Power LED blinks 6 times if the DHCP client is enabled. • The Reset or Power LED blinks 3 times if the DHCP client is disabled. **NOTE:** If DHCP has been enabled, when you disable DHCP, the unit reverts to using the previously-set static IP address.

IPL EXP I/O Series Expansion Interface Reset Mode Summary			
Mode	**Use This Mode to...**	**Activation**	**Result**
Reset All IP Settings	Reset IP settings and port maps to factory defaults without affecting user-loaded files	To reset all IP settings: **1.** Press and hold the **Reset** button until the Reset or Power LED blinks once at 3 seconds and twice at 6 seconds. **2.** Release and press the **Reset** button momentarily (for <1 second) within 1 second*. The LED blinks 3 times in quick succession upon successful reset. *Nothing happens if the momentary press does not occur within 1 second.	**Reset All IP Settings mode:** • Turns DHCP off. • Sets the IP address back to factory default: • LAN port: 192.168.254.250 • Sets the subnet back to factory default (255.255.255.0). • Sets the default gateway address to the factory default (0.0.0.0). • Sets domain and host names to factory default. • Sets port mapping back to factory default. • Turns events (user-created schedules, macros) off. • Stops any running program. • Disables 802.1X authentication.

Reset to Factory Defaults	Start over with configuration and uploading	To reset the unit to all factory default settings:
		1. Hold down the **Reset** button until the Reset or Power LED blinks once at 3 seconds, twice at 6 seconds, and three times at 9 seconds.
		2. Release and press the **Reset** button momentarily (for <1 second) within 1 second*. The Reset or Power LED blinks 4 times in quick succession upon successful reset.
		*Nothing happens if the momentary press does not occur within 1 second.
			Reset to Factory Defaults mode performs a complete reset to factory defaults (except the firmware).
			• Does everything Reset All IP Settings mode does.
			• Removes (clears) all user-loaded files (except LinkLicense files) and configurations from the control processor:
			  • Clears driver-port associations (IR, serial, Ethernet) and port configurations.
			  • Removes button/touchpanel configurations.
			  • Removes user-loaded digital certificates.
			  • Removes schedules, settings, macros.
			  • Clears messages in the event logs table.
			• The unit continues to run the user-loaded firmware.

NOTES:

- After performing a Reset All IP Settings or Reset to Factory Defaults reset, either set the IP address again (by using Toolbelt) for use on your network, or turn DHCP on.
- The factory configured passwords for this device have been set to the device serial number. Passwords are case sensitive. Performing a Reset to Factory Defaults reset sets the password to `extron`.

Software-Based Configuration and Control

This section of the guide is divided into the following topics:

Configuration and Control: An Overview

An IPL EXP unit must be configured before use in order to recognize and accept commands and pass them on to the controlled devices. It can be configured and controlled via a host computer connected to the same network as the control processor (see **LAN/ PoE and LAN/PoE+ (Ethernet) connectors and LEDs** starting on page 18 for details about LAN port and cabling to connect the expansion interface to the network).

- Configure the expansion interface by using the Global Configurator software (GC Professional or GC Plus) (see the Extron **website** for full system hardware and software requirements for GC), or program it using Global Scripter.
- The default web pages embedded within the expansion interface provide a means to view general hardware information, network settings, and, if configured, project information. You cannot configure the expansion interface via the embedded web pages.

Basic Setup Steps: a Guide to this Section and Other Resources

NOTE: GC projects can be created offline and uploaded to the hardware at a later date.

Follow the steps in **Setup Checklist** starting on page 6. The overall process for setting up a control processor using GC is as follows:

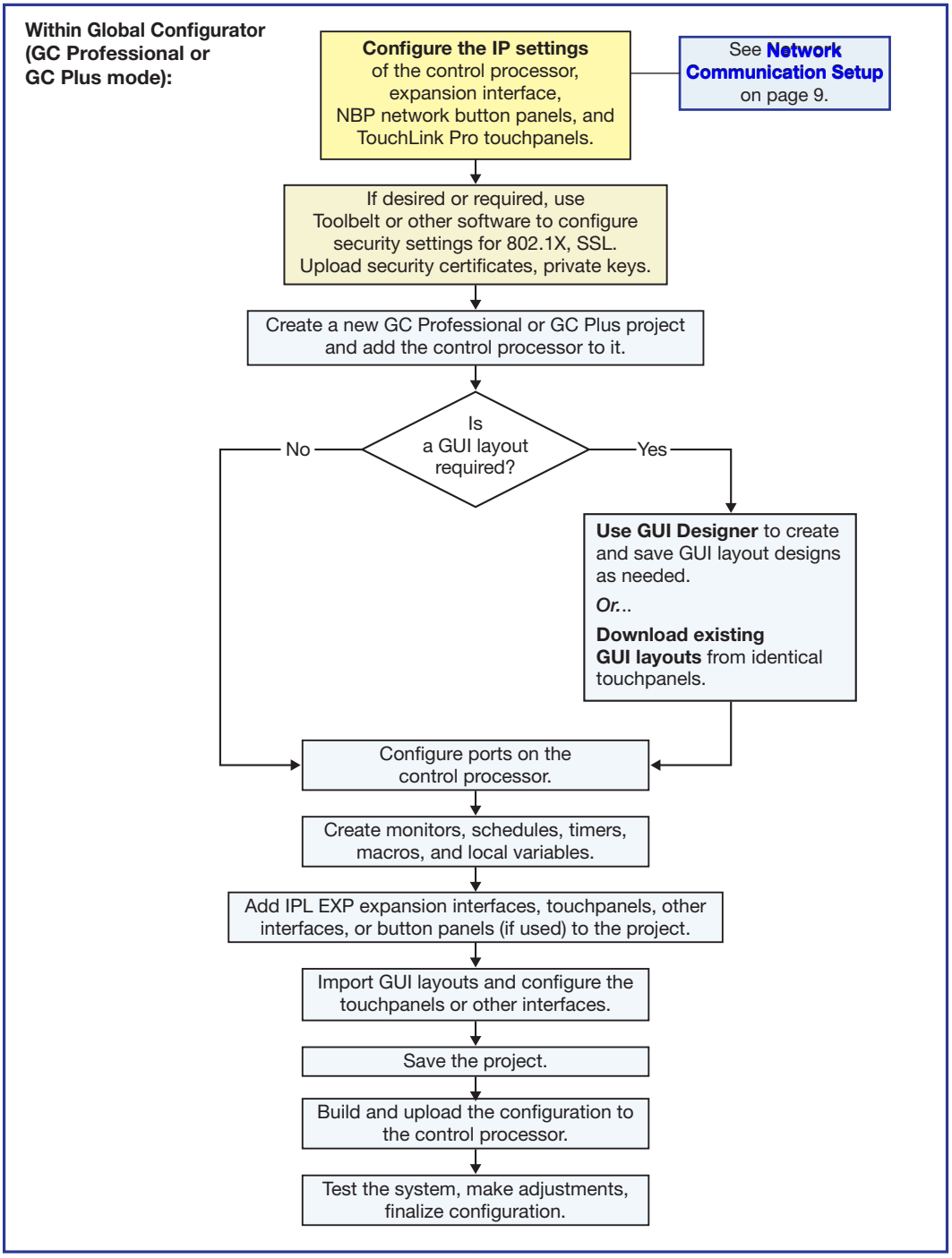


Figure 18. Overall Configuration Steps

Downloading the Software and Getting Started

GC software updates and a large variety of device drivers can be downloaded from the **Download** page on the Extron website (**www.extron.com/download/index.aspx**). When you locate the desired software or driver package, follow the on-screen directions to download and install it.

NOTE: New RS-232 and Ethernet drivers are required. Use serial and Ethernet drivers developed specifically for the IP Link Pro platform. With the exception of IR device drivers, drivers used for the previous generation IP Link (non-Pro) control processors are not compatible.

Locating Software, Firmware, and Driver Files on the Extron Website

There are three main ways to find software, firmware, and device drivers within **www.extron.com**:

- Via links from the web page for the specific product
- Via the **Download Center** page (Click on the **Download** tab at the top of any page within the Extron website.)
- Via links from search results

NOTE: For some software you have the option to click the **Download** button to begin downloading the software file. For other software there is a link for contacting an Extron support representative who can provide you access to the latest version.

To obtain Extron control product software, you must have an Extron Insider account and contact an Extron support representative. Extron provides training to our customers on how to use the software. For Global Configurator Professional, you must first attend Extron training, pass a proficiency test, and achieve Extron Control Professional Certification before being able to access all the features of that program.

Via links from the web page for the specific product

1. Navigate to the web page for the specific product model by performing one of the following:
   - Enter the model name into the search field in the upper right of any Extron web page and click the **magnifying glass** icon.
     Or...
   - Select the model name from the **Product Shortcuts** drop-down list in the upper left of the Extron home page or **Products** page.
2. Click the **Downloads** tab in the middle of the product page. A list of available software, firmware, and documents for that model appears on screen.
3. Click on the name of the desired software or firmware to start downloading the file, or click on the link for device drivers to navigate to a page from which you can select either a driver package or specific drivers for individual devices.

Via the Download Center page

1. Click on the **Download** tab at the top of any page within the Extron website to access the **Download** page.
2. Click on the link for the desired software product category (such as Global Configurator Professional, firmware, or control system device drivers) in the center of the screen. A page opens that allows you to make more specific selections from within that category.

3. For **software**, click on the link for the specific software that you need. A software product page opens that provides a description of the software package, a list of system requirements, a list of features, and access to the release notes, in addition to a download link.

   For **drivers**:

   a. Click on the **`Control System Drivers`** button.

   b. Select the name of the control processor from the drop-down list.

   c. Click the link directly below the search fields to download the current "Pro Series driver package" of all available drivers supported by the control processor. Alternatively, search for, locate, and select the device or devices for which you need a driver file.

   d. To download a single driver rather than the package, click on the appropriate link in the row for the product you want to control to download the driver or to download the "communication sheet." The communication sheet provides details that may be helpful for working with the product and its control driver.

4. For some software you can click the **`Download`** or **`Download Now`** button to begin downloading the software file. For other software there is a link for contacting an Extron support representative who can provide you access to the latest version.

   For **drivers**, navigate through the alphabetically arranged list to select and download a driver for a specific device.

Via links from search results

1. Type the specific name of the software package (such as Global Configurator or GUI Designer) into the **`Search`** field in the upper right of the Extron web page and click the **`magnifying glass`** icon. A search results page appears.
2. Click on the name of the software package. A software product page opens that provides a description of the software package, a list of system requirements, a list of features, and access to the release notes, in addition to a download link.
3. For some software you can click the **`Download`** or **`Download Now`** button to begin downloading the software file. For other software there may be a link for contacting an Extron support representative who can provide you access to the latest version.

Obtaining Control Drivers

Extron provides an extensive selection of device drivers available on the Extron website. Ethernet, serial, and infrared (IR) device drivers (for controlling projectors, displays, DVD players, document cameras, and so forth) are available as individual device driver files. Prior to configuration, download driver files for products to be used in the installation.

NOTE: For serial devices, IPCP Pro xi Series control processors and IPL EXP expansion interfaces require IP Link **Pro** drivers. They do not support serial that were created for IP Link (non-Pro) products. However, existing Extron IR driver files are supported.

If the system requires a driver that is not already available, you can request a new serial (RS-232) or Ethernet driver from Extron.

Things to Do After Installing GC and Before Starting a Project

- Read the *Global Configurator Help File*, included with the software, for details and step-by-step procedures on how to start a GC Professional or GC Plus project and perform basic setup tasks for a control processor. The help file provides a wealth of information on settings and how to use the software. It includes examples of how to use the features of GC and step by step instructions for typical configuration tasks.
- Obtain network addresses and related information from your network administrator.
- Set up the IP address for the IPL EXP. See **Network Communication Setup** on page 9 for an overview of how to set up the network properties of the unit. For details, see the GC help file or Toolbelt help file. The help files contain instructions on how to set the IP address, gateway IP address, subnet mask, mail server IP address, domain name, web port, SMTP username, and SMTP password so that the EXP is able to communicate with the network.

Using GC: Helpful Tips

Resources and notes

- The *IPL EXP I/O Series Setup Guide* is shipped with the unit. It includes a quick reference to the front and rear panel features, and covers basic hardware installation.
- See **Front Panel Features** on page 10 and **Ports, Addressing, and Connections** on page 13 in this guide for features and settings for the ports you are configuring.
- If you plan to configure the EXP at the installation site, Extron recommends downloading drivers for all the devices in the installation **before** you go out to the site.
- The Global Configurator project file (*.gcpro or *.gcplus) contains configuration settings and it can be saved to a directory or folder for backup or for installation on another expansion interface. Saving a configuration is recommended before you perform a firmware upgrade.
- IP address, subnet mask, and gateway address are required during network setup of the control processor.
- The unit name is any name (for example, Room730-IPLEXP200 or ConfRmSystem) that you want to use to label a specific EXP unit. The default is a combination of the product name and part of the hardware (MAC) address. This can be changed to your choice of alphanumeric characters and hyphens (-). The following rules apply:
  - Spaces are not permitted within the name of a unit or at the start or the end of a name.
  - Underscores (_) are not permitted.
  - Valid characters are A-Z, a-z, 0-9, and - (hyphen).
  - The unit does not distinguish between upper and lower case letters.
  - The name cannot start with a number or a hyphen, and it cannot end with a hyphen.
  - Maximum name length is 63 characters.

Troubleshooting

Turn on the input devices (DVD players, Blu-ray players, PCs, and other sources), output devices (display screens, projectors), the control processor, and the PC and touchpanel or eBUS button panels. Touch a configured button on the touchpanel or eBUS button panel.

If an input or output AV device cannot be remotely controlled (does not respond as expected), check the following:

- **Power Connections**
- **Data Connections**
- **Device Control Connections and Configuration** (see the next page)
- **eBUS Connections and Configuration** (see the next page)

Power Connections

- Ensure that all devices are plugged in.
- Make sure that each device is receiving power. The EXP front panel power LED lights if the EXP is receiving power.
- For the IPL EXP RIO8 power output ports, verify that the unit is **not** in the overload state. If the system has been configured to monitor the ports monitoring indicates that the 12 VDC and 24 VDC power output is in an overload (Over) state, the power draw at the power ports has been exceeded. To restore these ports to normal function, do the following:

  1. Correct the hardware cause of the overload. Disconnect one or more devices from the 12 VDC or 24 VDC power output ports on the EXP. The unit waits a moment and rechecks the power load.
     - If the total load (power draw) is now within safe limits, the unit automatically re-enables the ports. Within Global Configurator, the port status returns to normal (it is no longer in the overload state), and power is restored to the output ports.
     - If the total load still exceeds the maximum threshold, the overload state persists, and the ports remain off until the overload is corrected (see step 2).
  2. Repeat step 1 (disconnect another device from the switched power output ports) as needed until the unit exits the overload state and the switched power status returns to normal in Global Configurator.

Data Connections

1. Check the cabling connections and make adjustments as needed. The Link LEDs on the IPL EXP, the IPCP Pro, and on the touchpanel, network button panel, or PC should be lit green steadily if a network connection is detected. If these LEDs are not lit, either the cable is faulty or not plugged in, or the wrong type of cable is being used (see **LAN/ PoE and LAN/PoE+ (Ethernet) connectors and LEDs** on page 18).
2. Try to “ping” the unit by entering the following at the command prompt on the PC when the DHCP server is disabled (default):

   ```
   ping 192.168.254.250
   ```

   Or ping the IP or web address provided to you by your system administrator.

   If you get no response:

   - Make sure your unit is using the appropriate subnet mask (check with your system administrator).
   - Make sure your PC and network do not have a software firewall program that might block the IP address of the EXP unit.

3. If contact is established with the unit, but the IPL EXP web pages cannot be accessed by your browser program, verify (via an Internet network options or preferences menu) that your browser is configured for direct network connection and is not set up to use a proxy server.

Device Control Connections and Configuration

- Verify that ports are wired correctly and that ground (earthing) wires are connected to the proper pins on the control processor and, if applicable, on the controlled device.
- Ensure that each IR emitter head is placed adjacent to or directly over the IR pickup window on the controlled device.
- Verify that the appropriate drivers were used while creating the configuration file and that the correct commands and signal types (IR, RS-232, Ethernet) are associated with the appropriate ports on the control processor and on the other devices.
- For digital input and output connections, verify whether the application requires the +5 VDC pull-up resistor within the IPL EXP for TTL circuits, and use the software to check whether it is selected within the configuration.
- Verify that input current at any digital input or output port does not exceed 250 mA.

eBUS Connections and Configuration

- Verify that the eBUS ports are wired correctly and that ground (earthing) wires are connected to the ground pins on every device in the system. Connectors should be wired the same at each port.
- Check for eBUS address conflicts (see the *Toolbelt Help File*). Ensure that each device in the system has a distinct, individual bus ID address and that no device is set to address zero. When an eBUS address conflict exists:
  - The devices that share an address do not function.
  - The other devices work correctly.

  NOTE: If a device bus address is set to zero, it is not recognized by the EXP.
- If the IPL EXP 200 does not recognize any connected devices and if the eBUS port is in an overload state (the EXP can be configured to monitor the state of the port), power consumption at the eBUS port is too high.

  Use one of these methods to restore the eBUS port to normal mode:
  - Remove eBUS devices one at a time from the system until the overload no longer occurs.
  - Add supplemental power supplies to the system.

  See the *eBUS Technology Reference Guide* (available at **www.extron.com/ebus_tech_ref**) for details.
- Once overload conditions are resolved, the eBUS devices resume functioning and are again recognized by the EXP.

If you are still experiencing problems, call the **Extron Sales & Technical Support Hotline** or the Extron S3 Control Systems Support Hotline (1.800.633.9877).

Reference Information

This section of the guide includes the following reference items:

- **Network Port Requirements and Licensed Third-Party Software**
- **File Types: a Key to Extron-specific File Names**
- **Secure Sockets Layer (SSL) Certificates**
- **IEEE 802.1X Certificates**
- **SNMP**

To read product specifications, visit the IPL EXP product pages at **www.extron.com**.

Network Port Requirements and Licensed Third-Party Software

Network administrators may find it useful to know which ports, protocols, and services are used by the IP Link Pro control processors, IPL EXP expansion interface, TouchLink Pro Touchpanels, Global Configurator Plus and Professional software, Toolbelt, and Extron Control (for IP Link Pro control systems). A list of protocols used for inbound and outbound communication for each type of device or software is available in the *Pro Series Control Product Network Ports and Licenses Guide*, part 68-2961-01, available at **www.extron.com**.

The control processors use various licensed third-party software packages during operation. To view details about third-party packages and associated licensing, click the **`License Information`** button in the internal web pages of the expansion interface, control processor. A `License Information` window opens. To view a copy of a listed package license, in the `License Information` window, click the link in the License column for the relevant package. This opens a copy of the package license in a separate window. A list of licenses is also available in the *Pro Series Control Product Network Ports and Licenses Guide* at **www.extron.com**.

File Types: a Key to Extron-specific File Names

A basic understanding of the types of files used by the expansion interfaces helpful in order to decide what (if anything) to do with them.

- **.eff** — This is an Extron firmware update file (see the **Firmware Updates** section starting on page 42 for details on firmware updates).
- **.eir** — These are IR driver files containing infrared commands. There is a separate `.eir` file for each device the IPCP and IPL EXP controls via infrared communication. This is also the type of file created during IR learning. Via Global Configurator, these files can be imported and associated with one of the IR ports on a control processor.
- **.ell** — This is a LinkLicense file. It appears in systems that use a LinkLicense for using a third-party device as a control interface instead of an Extron TouchLink Pro touchpanel.
- **.gcplus** — This is a Global Configurator Plus configuration file.
- **.gcpro** — This is a Global Configurator Professional configuration file.
- **.gdl** — This is a GUI Designer layout created for TouchLink Pro a touchpanel or third-party touch interface.

- **.glta** — This is a GUI layout template.
- **.gs** – This is a Global Scripter project file.

Secure Sockets Layer (SSL) Certificates

Extron control processors and expansion interfaces ship with factory-installed SSL certificates created by Extron. If you want or are required to use a different SSL certificate at your installation site, then you can use system utilities in the Toolbelt software to change the SSL certificate at any time. The *Toolbelt Help File* provides instructions on how to apply an SSL certificate to a control processor.

NOTES:

- You must run Toolbelt as an administrator.
- Some certificates require a passphrase that is created when the certificate is created. If a passphrase is required, you must enter that passphrase before uploading and applying the certificate.

Control system expansion interfaces and controllers support standard OpenSSL certificate encodings such as .pem (Privacy-enhanced Electronic Mail) and .der (Distinguished Encoding Rules) file types. PEM file types are ASCII encoded and are the required format for uploading to the control processor. DER file types are binary encoded and can typically have several file extension variations, such as .crt and .cer. There are many standard tools that can convert from DER to PEM file encodings if needed.

NOTE: A DER format file must be converted to PEM encoding before uploading it to the control processor.

To properly create the certificate for uploading to Extron expansion interfaces and control processors, ensure that the certificate file meets the following requirements:

- Contains X.509 certificate information
- Contains public and private keys
- Uses PEM encoding

NOTE: ITU-T standard X.509 covers aspects of public key encryption, digital cryptography, certificates, and validation.

Contact your IT administrator for more information on what tools and policies are required to obtain or create the SSL certificate and, if necessary, the corresponding passphrase.

IEEE 802.1X Certificates

IEEE 802.1X is a standard that enables port-based network access control via an authentication server. The protocol requires that all devices must be authenticated before gaining privileges to access the secure part of the network.

The Extron implementation of 802.1X supports PEAP - MSCHAPV2 and EAP - TLS methods of authentication. This section of the guide details the requirements for any **certificate file** (machine or CA) and the **private key file** (for the machine certificate) to be used in the system.

Extron provides resources for learning about 802.1X implementation:

- The *Extron 802.1X Technology Reference Guide*, available from **www.extron.com**, is the primary resource for background information, system planning, topology, and how to set up these systems.
- The *Toolbelt Help* file provides detailed step-by-step information on using the software to set up 802.1X for IP Link Pro control systems and on troubleshooting.
- The *802.1X Primer* white paper, also available from **www.extron.com**, provides a general overview of the protocol and its use within a control system.

NOTES:

- You must run Toolbelt as an administrator.
- Machine certificates require a private key file, which can be encrypted.

Certificate File Requirements

PEM (Privacy-enhanced Electronic Mail) file types are ASCII encoded, and they are the required format for 802.1X authentication for the control processors. DER (Distinguished Encoding Rules) file types are binary encoded and can typically have several file extension variations, such as .crt and .cer.

NOTE: DER encoded files (files with .der, .crt, or .cer extensions that are encoded in DER binary format) must be converted to a PEM encoded file type (.pem) before being used for authentication.

DER encoded certificates must be converted to PEM encoding using a third-party tool. Contact your IT administrator for more information on required tools.

To create the 802.1X security certificate for uploading to Extron control processors, ensure that the certificate file meets the following requirements:

- It contains X.509 certificate information.
- It contains a private key (for machine certificates only).
- It is PEM encoded.
- It has a file extension that is .crt or .pem
- Its file name consists of the following types of valid characters:
  - Alphanumerical (A-Z, a-z, 0-9) characters
  - Some special characters (colon [:], underscore [_], and hyphen [-])

NOTE: Spaces are not permitted anywhere in the name.

Private Key File Requirements

Private key files are required only when employing machine certificates. Follow these requirements for creating a private key:

- Its file name consists of the following types of valid characters:
  - Alphanumerical (A-Z, a-z, 0-9) characters
  - Some special characters (colon [:], underscore [_], and hyphen [-])
- It has a file extension that is .key or .pem.
- It can have optional encryption (via password or passphrase).

SNMP

Extron control products support Simple Network Management Protocol (SNMP). SNMP facilitates the exchange of basic network management information between network devices. It helps in monitoring of operations and factors such as packet usage, memory usage, remote password resets, and collection of error information. An information technology administrator can use common IT tools to monitor those factors, as well as look up device location and the name of the contact person for the device.

The SNMP controls within Toolbelt provide a way to enable or disable SNMP. It also allows you to specify related information such as the name of a contact person, the physical location of the unit, and a community name. The text that is specified in these fields is seen by the network community when the unit is queried.

Extron control products support the following security levels:

- Management Information Base 2 (MIB-II)
- SNMPv2c

Firmware Updates

If the need arises, you can replace the IPL EXP firmware. This section covers the following firmware-related topics:

- **Determining the Firmware Version**
- **Updating the Firmware**

Determining the Firmware Version

There are several ways to check which firmware version the control processor is using:

- View the device information in Toolbelt.
- View the general status information section of the IPL EXP embedded web page.

Before using either method, connect the expansion interface and the PC to the same network. For details see the **Hardware Features and Installation** section starting on page 6, the **Software-Based Configuration and Control** section starting on page 31, and the *IPL EXP I/O Series Setup Guide*.

Using Toolbelt Software

1. Open the Toolbelt software.
2. Either add the desired expansion interface manually or start device discovery and select the desired IPL EXP from the list of discovered devices.
3. Click **`Manage`** in the row for the desired IPL EXP and view the device information that appears in that section.

Using a Browser

The IPL EXP comes with a factory default embedded web page.

1. Start a browser program.
2. Enter the IP address of the IPL EXP into the address field of the browser and log on to the internal web page.
3. Look for the version within one of the information panes.

Updating the Firmware

Firmware upgrade tools require the PC and the control processor to both be connected to an Ethernet network. The instructions for updating the IPL EXP firmware assume you have installed the appropriate software on your PC first.

NOTES:

- You should save the existing system configuration to a file (see the *Global Configurator Help File* for instructions) before replacing the firmware. If the file is saved, the configuration can be restored to the control system later using GC.
- Check the Extron website for firmware-related documents, instructions, patch files, and new firmware files before loading new firmware into the control processor. We recommend that you read the firmware release notes (available from **www.extron.com**) before beginning the firmware update.

Locating and Downloading the Firmware

1. Visit the Extron website to find the latest firmware file for the IPL EXP. The easiest way to locate files is through the **Downloads** tab on the web page for the specific model.
2. Download the executable installer file (*`.exe`) from the website and run the installer program. The program stores the firmware file on the PC in `C:\Program Files (x86)\Extron\Firmware` or `C:\Program Files\Extron\Firmware` within a folder specific to that version.
3. Write down the firmware filename and location for later use. The filename ends in *.eff* such as `49-###-5Ø-`*`x.xx.xxxx`*`-yyyy.eff`, where *`x.xx.xxxx`* is the version number.

   NOTE: The firmware update file must have a filename extension of `.eff`. If the file does not have that extension, it does not work properly.

Installing Firmware

Firmware can be replaced by using one of the following:

- Global Configurator (using the `Update Firmware` link to Toolbelt)
- Toolbelt

These methods allow you to browse to find and select the appropriate `.eff` file on your PC and then click an **Upload** button to initiate the firmware upload to the IPL EXP.

NOTE: Toolbelt allows you to update multiple devices with the same firmware version simultaneously.

Allow at least a couple minutes for the firmware to finish uploading. At the end of the upload process, the unit partially reboots and loses its connection to the PC. Therefore, to continue using the web page or Toolbelt you need to refresh the web page or reconnect via Toolbelt after the firmware update.

Extron Warranty

Extron warrants this product against defects in materials and workmanship for a period of three years from the date of purchase. In the event of malfunction during the warranty period attributable directly to faulty workmanship and/or materials, Extron will, at its option, repair or replace said products or components, to whatever extent it shall deem necessary to restore said product to proper operating condition, provided that it is returned within the warranty period, with proof of purchase and description of malfunction to:

USA, Canada, South America, and Central America:
Extron
1230 South Lewis Street
Anaheim, CA 92805
U.S.A.

Asia:
Extron Asia Pte Ltd
135 Joo Seng Road, #04-01
PM Industrial Bldg.
Singapore 368363
Singapore

Japan:
Extron, Japan
Kyodo Building, 16 Ichibancho
Chiyoda-ku, Tokyo 102-0082
Japan

Europe:
Extron Europe
Hanzeboulevard 10
3825 PH Amersfoort
The Netherlands

China:
Extron China
686 Ronghua Road
Songjiang District
Shanghai 201611
China

Middle East:
Extron Middle East
Dubai Airport Free Zone
F13, PO Box 293666
United Arab Emirates, Dubai

Africa:
Extron South Africa
3rd Floor, South Tower
160 Jan Smuts Avenue
Rosebank 2196, South Africa

This Limited Warranty does not apply if the fault has been caused by misuse, improper handling care, electrical or mechanical abuse, abnormal operating conditions, or if modifications were made to the product that were not authorized by Extron.

NOTE: If a product is defective, please call Extron and ask for an Application Engineer to receive an RA (Return Authorization) number. This will begin the repair process.

USA:	714.491.1500 or 800.633.9876	**Asia**:	65.6383.4400
Europe:	31.33.453.4040 or 800.3987.6673	**Japan**:	81.3.3511.7655
Africa:	27.11.447.6162	**Middle East**:	971.4.299.1800

Units must be returned insured, with shipping charges prepaid. If not insured, you assume the risk of loss or damage during shipment. Returned units must include the serial number and a description of the problem, as well as the name of the person to contact in case there are any questions.

Extron makes no further warranties either expressed or implied with respect to the product and its quality, performance, merchantability, or fitness for any particular use. In no event will Extron be liable for direct, indirect, or consequential damages resulting from any defect in this product even if Extron has been advised of such damage.

Please note that laws vary from state to state and country to country, and that some provisions of this warranty may not apply to you.