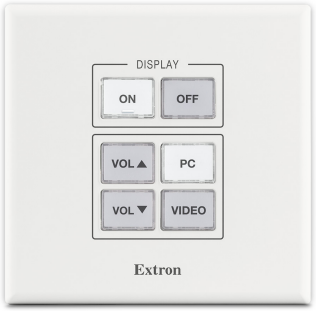
User Guide

MediaLink® Products

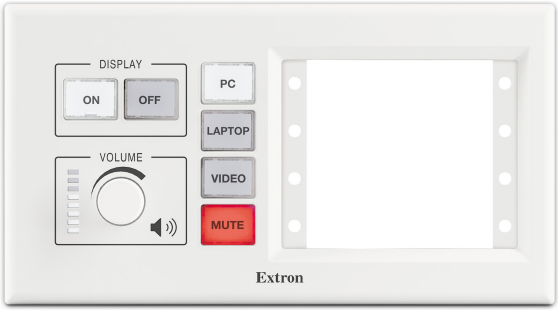
MLC Plus 50/100/200 Series

MediaLink Plus Controllers



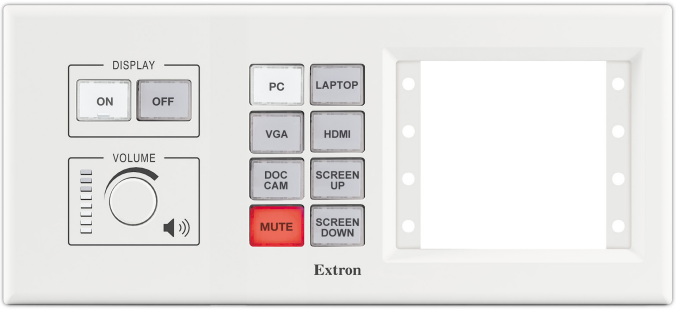
MLC Plus 50

MLC Plus 100



MLC Plus 100 AAP

MLC Plus 200



MLC Plus 200 AAP

Extron

68-2806-01 Rev. E
08 19

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.**

Sicherheitsanweisungen • Deutsch

WARNUNG: Dieses Symbol ⚠ auf dem Produkt soll den Benutzer darauf aufmerksam machen, dass im Inneren des Gehäuses dieses Produktes gefährliche Spannungen herrschen, die nicht isoliert sind und die einen elektrischen Schlag verursachen können.

VORSICHT: Dieses Symbol ⚠ auf dem Produkt soll dem Benutzer in der im Lieferumfang enthaltenen Dokumentation besonders wichtige Hinweise zur Bedienung und Wartung (Instandhaltung) geben.

Weitere Informationen über die Sicherheitsrichtlinien, Produkthandhabung, EMI/EMF-Kompatibilität, Zugänglichkeit und verwandte Themen finden Sie in den Extron-Richtlinien für Sicherheit und Handhabung (Artikelnummer 68-290-01) auf der Extron-Website, **www.extron.com**.

Instrucciones de seguridad • Español

ADVERTENCIA: Este símbolo, ⚠, cuando se utiliza en el producto, avisa al usuario de la presencia de voltaje peligroso sin aislar dentro del producto, lo que puede representar un riesgo de descarga eléctrica.

ATENCIÓN: Este símbolo, ⚠, cuando se utiliza en el producto, avisa al usuario de la presencia de importantes instrucciones de uso y mantenimiento recogidas en la documentación proporcionada con el equipo.

Para obtener información sobre directrices de seguridad, cumplimiento de normativas, compatibilidad electromagnética, accesibilidad y temas relacionados, consulte la Guía de cumplimiento de normativas y seguridad de Extron, referencia 68-290-01, en el sitio Web de Extron, **www.extron.com**.

Instructions de sécurité • Français

AVERTISSEMENT : Ce pictogramme, ⚠, lorsqu'il est utilisé sur le produit, signale à l'utilisateur la présence à l'intérieur du boîtier du produit d'une tension électrique dangereuse susceptible de provoquer un choc électrique.

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 le matériel.

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

AVVERTENZA: Il simbolo, ⚠, se usato sul prodotto, serve ad avvertire l'utente della presenza di tensione non isolata pericolosa all'interno del contenitore del prodotto che può costituire un rischio di scosse elettriche.

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.

Per informazioni su parametri di sicurezza, conformità alle normative, compatibilità EMI/EMF, accessibilità e argomenti simili, fare riferimento alla Guida alla conformità normativa e di sicurezza di Extron, cod. articolo 68-290-01, sul sito web di Extron, **www.extron.com**.

Instrukcje bezpieczeństwa • Polska

OSTRZEŻENIE: Ten symbol, ⚠, gdy używany na produkt, ma na celu poinformować użytkownika o obecności izolowanego i niebezpiecznego napięcia wewnątrz obudowy produktu, który może stanowić zagrożenie porażenia prądem elektrycznym.

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

Informacji na temat wytycznych w sprawie bezpieczeństwa, regulacji wzajemnej zgodności, zgodność EMI/EMF, dostępności i Tematy pokrewne, zobacz Extron bezpieczeństwa i regulacyjnego zgodności przewodnik, część numer 68-290-01, na stronie internetowej Extron, **www.extron.com**.

Инструкция по технике безопасности · Русский

ПРЕДУПРЕЖДЕНИЕ: Данный символ, ⚠, если указан на продукте, предупреждает пользователя о наличии неизолированного опасного напряжения внутри корпуса продукта, которое может привести к поражению электрическим током.

ВНИМАНИЕ: Данный символ, ⚠, если указан на продукте, предупреждает пользователя о наличии важных инструкций по эксплуатации и обслуживанию в руководстве, прилагаемом к данному оборудованию.

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.

安全说明 • 简体中文

警告: ⚠产品上的这个标志意在警告用户该产品机壳内有暴露的危险 电压，有触电危险。

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，敬请访问 Extron 网站 , **www.extron.com**，参见 Extron 安全规范指南，产品编号 68-290-01。

安全記事 • 繁體中文

警告: ⚠若產品上使用此符號，是為了提醒使用者，產品機殼內存在著可能會導致觸電之風險的未絕緣危險電壓。

注意 ⚠ 若產品上使用此符號，是為了提醒使用者，設備隨附的用戶手冊中有重要的操作和維護（維修）說明。

有關安全性指導方針、法規遵守、EMI/EMF 相容性、存取範圍和相關主題的詳細資訊，請瀏覽 Extron 網站：**www.extron.com**，然後參閱《Extron 安全性與法規遵守手冊》，準則編號 68-290-01。

安全上のご注意 • 日本語

警告: この記号⚠が製品上に表示されている場合は、筐体内に絶縁されていない高電圧が流れ、感電の危険があることを示しています。

注意: この記号⚠が製品上に表示されている場合は、本機の取扱説明書に記載されている重要な操作と保守(整備)の指示についてユーザーの注意を喚起するものです。

安全上のご注意、法規厳守、EMI/EMF適合性、その他の関連項目については、エクストロンのウェブサイト **www.extron.com** より『Extron Safety and Regulatory Compliance Guide』(P/N 68-290-01) をご覧ください。

안전 지침 • 한국어

경고: 이 기호 ⚠가 제품에 사용될 경우, 제품의 인클로저 내에 있는 접지되지 않은 위험한 전류로 인해 사용자가 감전될 위험이 있음을 경고합니다.

주의: 이 기호 ⚠가 제품에 사용될 경우, 장비와 함께 제공된 책자에 나와 있는 주요 운영 및 유지보수(정비) 지침을 경고합니다.

안전 가이드라인, 규제 준수, EMI/EMF 호환성, 접근성, 그리고 관련 항목에 대한 자세한 내용은 Extron 웹 사이트(**www.extron.com**)의 Extron 안전 및 규제 준수 안내서, 68-290-01 조항을 참조하십시오.

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
[Ø1] R ØØØ4 ØØ3ØØ ØØ4ØØ ØØ8ØØ ØØ6ØØ [Ø2] 35 [17] [Ø3]
```

NOTE: For commands and examples of computer or device responses mentioned in this guide, the character "Ø" 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 2Ø8.132.18Ø.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 information you should know about this guide and the products before installation:

- **Before You Begin** — What this guide covers and does not cover, and what terms are used to refer to this product
- **About the MLC Plus 50/100/200 Series** — An overview of the products and their features
- **Application Diagrams** — Example application diagrams
- **Device Control** — General information about IR, RS-232, and Ethernet control of other products
- **About Global Configurator (with GC Professional and GC Plus Modes)** — A brief description of the software needed to set up the controllers
- **PC System Requirements** — Where to find computer and network system requirements

Before You Begin

What This Guide Covers

This user guide provides instructions for an experienced installer to install an Extron MLC Plus 50/100/200 Series IP Link Pro Controller. This guide includes detailed information and best practices recommendations about cabling the controller, a brief overview of the configuration process, and reference information.

You configure the controller using Extron Global Configurator software running in Global Configurator Professional (GC Professional) or Global Configurator Plus (GC Plus) mode. 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 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, controller button configurations, and the like.

Conventions Used in This Guide

Throughout this guide the MLC Plus 50/100/200 Series products are also referred to as the "MLC Plus," "MLC Plus 50/100/200," or "controller." 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"). The GlobalViewer Enterprise application is referred to as "GVE." Unless otherwise noted, in images of software or web pages, circled numbers correspond to procedural steps.

Important Information You Need Before Installation

The MLC Plus 50/100/200 Series controllers **work differently** from the previous generation of IP Link products. The order and types of setup tasks are important. Pay close attention to them. Follow the setup checklist in the **Hardware Features and Installation** section starting on page 9.

About the MLC Plus 50/100/200 Series

The MLC Plus 50/100/200 Series Controllers integrate Ethernet connection into AV systems to allow users to remotely control, monitor, and troubleshoot AV equipment. This equipment includes, but is not limited to, display devices and 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 stand-alone controllers.

All models fit standard US junction boxes or mud rings, and all include magnetic faceplates. The models offer different mounting options and they differ in button or button and knob arrangements. The buttons and knob can be configured for a variety of functions.

- The **MLC Plus 50** features six buttons and fits a standard US two-gang junction box or mud ring.

Figure 1. MLC Plus 50 Front (Left), Rear (Middle), and Side (Right) Views

- The **MLC Plus 100** and **MLC Plus 100 AAP** models feature six buttons and a knob.
  - The MLC Plus 100 fits a standard US two-gang junction box or mud ring.

Figure 2. MLC Plus 100 Front, Rear, and Side Views

  - The MLC Plus 100 AAP fits a standard US four-gang junction box or mud ring and includes space to mount from one to four Extron AAP plates.

Figure 3. MLC Plus 100 AAP Front and Rear Views

- The **MLC Plus 200** and **MLC Plus 200 AAP** models feature ten buttons and a knob.
  - The MLC Plus 200 fits a standard US three-gang junction box or mud ring.

Figure 4. MLC Plus 200 Front, Rear, and Side Views

  - The MLC Plus 200 AAP fits a standard US five-gang junction box or mud ring and includes space to mount from one to four Extron AAP plates.

Figure 5. MLC Plus 200 AAP Front and Rear Views

The MLC Plus is configured completely via Global Configurator software. 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), that information is saved to a project configuration file that is built and uploaded into the MLC Plus.

The MLC Plus 50/100/200 Series integrates seamlessly with Extron GlobalViewer Enterprise (GVE) software and the GlobalViewer web-based AV resource management tool for remote control applications.

Features

General features

- **Flexible options for device control**
  - **Controlling the MLC** — All models offer front panel controls. The MLC can also be controlled using Extron Control apps, or digital input signals.
  - **Controlling other devices** — The MLC Plus 50/100/200 Series models offer RS-232 and IR-based control, digital input, and relay controls. Except for the MLC Plus 50, they also include a port for volume control of an Extron audio amplifier.

Available Ports						
Model	**LAN (Ethernet)**	**Serial (RS-232)**	**IR**	**Volume control**	**Digital input**	**Relays**
MLC Plus 50	1	1	1	0	1	2
MLC Plus 100	1	2	1	1	1	2
MLC Plus 100 AAP	1	2	1	1	1	2
MLC Plus 200	1	2	1	1	1	2
MLC Plus 200 AAP	1	2	1	1	1	2

- **A variety of mounting options** — The MLC can be mounted in furniture or a wall, in a lectern, or in a surface mount box, depending on the model and its faceplate.

US Gang Size and AAP Options		
Model	**US gang size**	**AAP opening?**
MLC Plus 50	2	No
MLC Plus 100	2	No
MLC Plus 100 AAP	4	Yes
MLC Plus 200	3	No
MLC Plus 200 AAP	5	Yes

NOTE: Optional kits (alternative mounting hardware and faceplates) are available for the MLC Plus 100 and MLC Plus 200 to add an opening for a 1-gang product that fits within a decorator-style opening.

- **Support for Power over Ethernet (PoE)** — The MLC supports power over Ethernet, which allows the controller to receive both power and an Ethernet connection over a single connector.
- **Support for an optional external power supply** — The MLC also supports connection to an optional external 12 VDC, 0.5 A power supply that accepts 100-240 VAC, 50-60 Hz input. The power supply is not included with the MLC Plus 50/100/200.

Network and configuration features

- **Global compatibility** — The MLC uses industry standard Ethernet communication protocols, including DHCP, DNS, HTTP, HTTPS, ICMP, NTP, SFTP, SMTP, SNMP, SSH, TCP/IP, and UDP/IP.
- **Embedded web pages** — The MLC Plus 50/100/200 embedded web pages include basic information about the device, time, network settings, firmware version, system project configuration information (project name, version, created date, GC version used), and a firmware upload option.

- **Network connection** — The MLC Plus 50/100/200 models support 10Base-T up to gigabit (1000Base-T) Ethernet communication.
- **Remote equipment management** — The IP Link Pro connection via the LAN port on the MLC Plus allows you to remotely manage, monitor, and control several Ethernet-enabled products such as projectors, cameras, video conferencing equipment, switchers, and other AV equipment. The MLC provides support for the following:
  - TCP, UDP, and HTTP connections
  - Password protection using secure communication
  - Up to eight or four Ethernet devices at a time depending on the configuration mode (GC Professional or GC Plus)
  - Connection via IP address or host name
- **Multi-level password protection** — Allows security to be set based on user roles.
- **System asset management** — The configured system and controller allow you to control, monitor, and schedule various functions of devices in the system.
- **E-mail notification** — The MLC can be set up to send e-mail notifications, such as a notice that a projector has been disconnected or the projector lamp has been used for a designated number of hours.
- **Additional security features** — Each controller can use the included Secure Sockets Layer (SSL) certificate or a user-supplied, customized security certificate (see **Secure Sockets Layer (SSL) Certificates** on page 43).

Application Diagrams

The following figures show examples of types of devices that can be connected to ports on the MLC Plus 50/100/200 Series controllers.

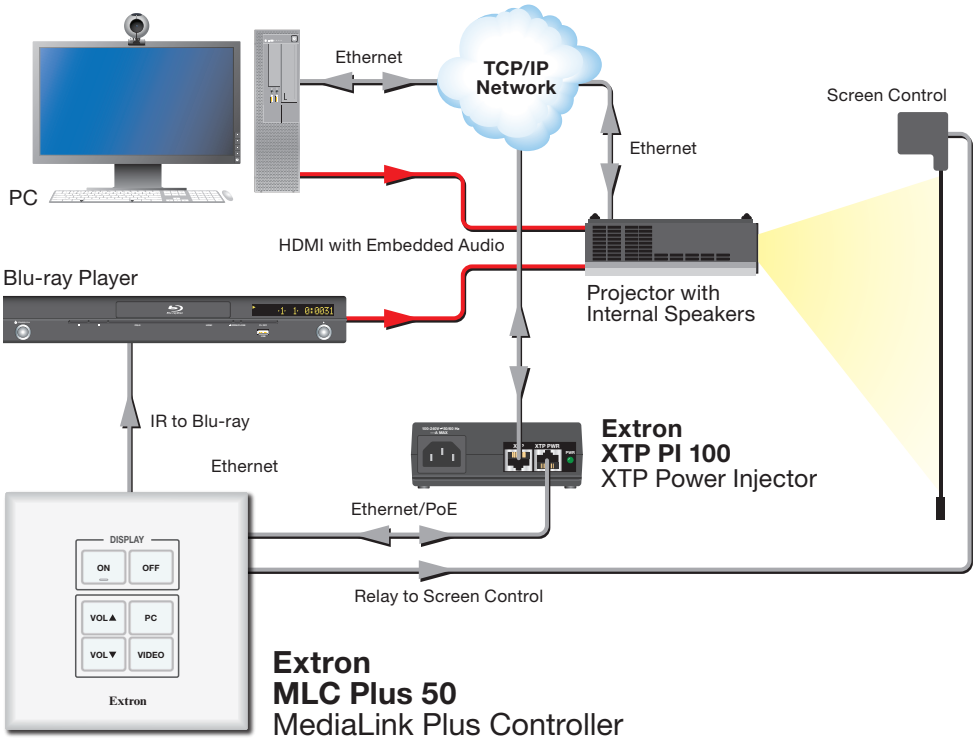


Figure 6. An MLC Plus 50 Application

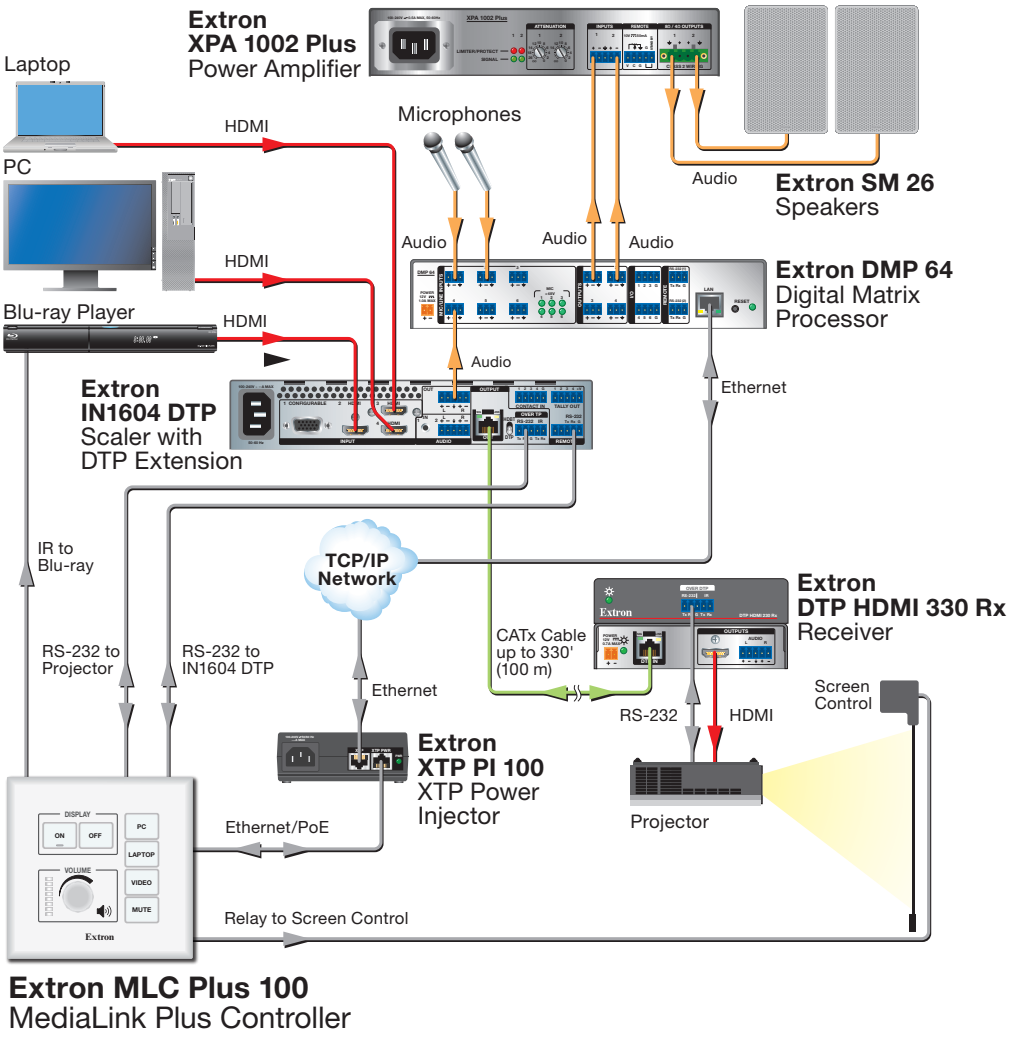


Figure 7. An MLC Plus 100 Application

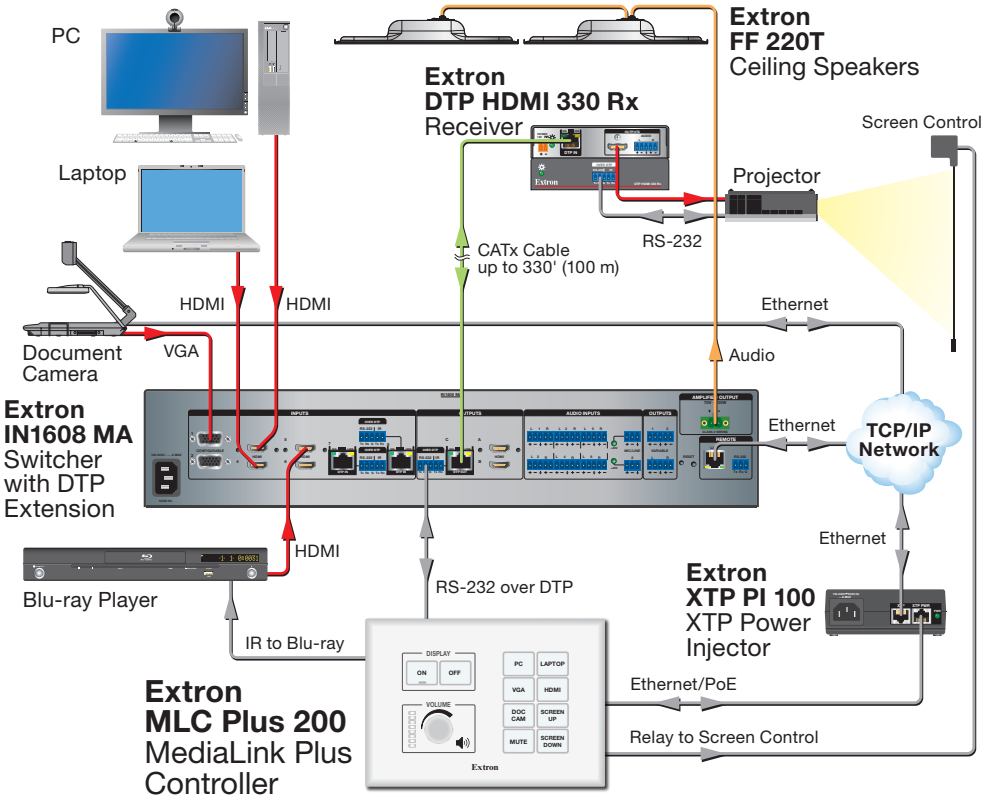


Figure 8. An MLC Plus 200 Application

Device Control

The MLC Plus must be configured in one of the following ways before it can send commands to a projector, display, or other device:

- An IR, RS-232, or Ethernet driver file can be downloaded from the extensive Extron driver selection 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 controller. The configuration file is built and uploaded to the MLC Plus 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 MLC Plus and for downloading device control commands.

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

Global Configurator is the software tool for network setup and configuration of an MLC Plus 50/100/200 Series controller. Global Configurator:

- Loads device drivers for monitoring the status of and controlling devices within the AV system.
- Creates the configuration containing all the settings for the controller and the products with which it interacts in the AV system.
- Creates a graphical user interface for use with Extron Control that looks just like the front panel controls. Using Extron Control you can operate the MLC Plus remotely as if you were touching the controls on the actual front panel.
- Uploads the configuration to the unit.

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.

PC System Requirements

To find the minimum hardware and software requirements for the PC used to configure the MLC Plus 50/100/200 Series:

- 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). Minimum 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:

- **Overall Configuration Procedure for the Controller** — A flowchart showing the main steps needed to install and set up the controller
- **Installation Step 1: Get Ready** — A checklist of tasks to guide you through installation
- **Installation Step 2: Prepare the Installation Site** — Notes on accessibility and Americans with Disabilities Act (ADA) compliance, as well as instructions for preparing the site and installing mounting hardware prior to connecting the controller
- **Installation Step 3: Change a Faceplate or Button Labels (optional)** — Step by step instructions for replacing buttons or faceplates
- **Installation Step 4: Cable All Devices** — Locations, descriptions, and cabling notes for rear and side panel features including wiring diagrams and details about each port
- **Installation Step 5: Set up the MLC for Network Communication** — A flowchart guide to network settings configuration
- **Installation Step 6: Configure the MLC Plus** — An outline of the configuration steps to be performed using software
- **Installation Step 7: Test and Troubleshoot** — Basic steps to test and troubleshoot the installation
- **Installation Step 8: Complete the Physical Installation** — How to wrap up AAP connections, cabling, and mounting
- **Mounting** — Brief guidelines for mounting each model

The MLC Plus 50/100/200 Series controllers **work differently** from the previous generation of MediaLink and IP Link products. Pay careful attention to the order and types of setup tasks. Follow the installation steps in this guide or in the setup guide and keep it with you for reference throughout the installation and configuration process.

Overall Configuration Procedure for the Controller

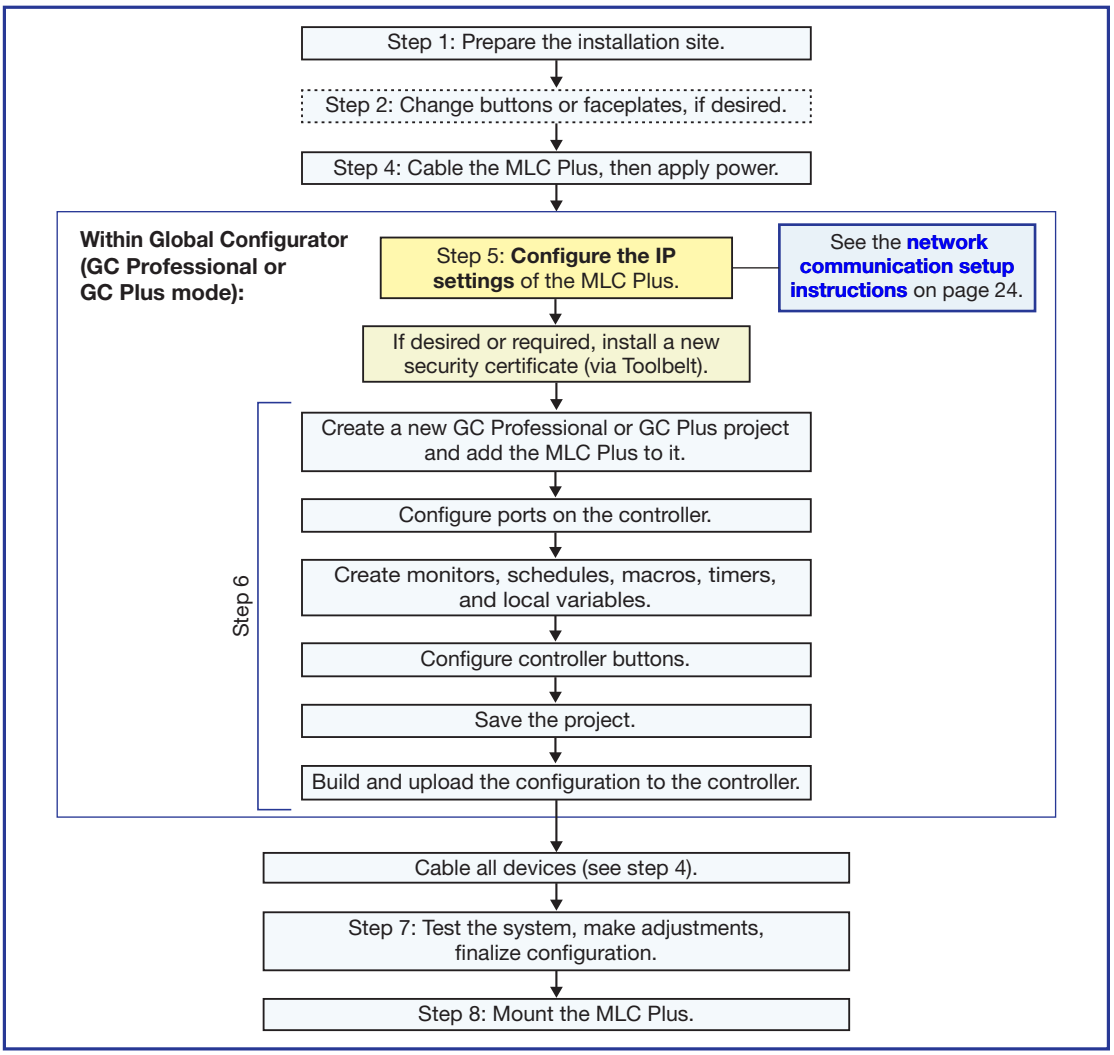


Figure 9. Overall Configuration Steps

Installation Step 1: Get Ready

Use the following checklist to prepare for the installation.

- ☐ Download and install the latest version of the following:
  - ☐ **Toolbelt software** — for discovering the controller and other control products on the network, for managing core settings, and for upgrading firmware when needed
  - ☐ **Global Configurator software** — for configuring the control system
  - ☐ **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**).
- ☐ Obtain network information for the unit from the network administrator. You need the following details for each IP Link Pro device such as the MLC Plus:
  - ☐ DHCP setting (on or off)
  - ☐ Device (MLC Plus) IP address
  - ☐ Subnet mask
  - ☐ Gateway IP address
  - ☐ User name
  - ☐ Passwords
- ☐ Write down the MAC address of each IP Link Pro device (such as the MLC Plus 50/100/200) to be used.
- ☐ Obtain model names and setup information for devices the MLC Plus 50/100/200 will control.

☐ Each controller 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 43 for requirements and guidelines regarding SSL certificates.

Installation Step 2: Prepare the Installation Site

Steps and hardware required depend on the model being installed (see **Site Preparation** on page 12 for details)

ATTENTION:

- Installation and service must be performed by authorized personnel only.
- L'installation et l'entretien doivent être effectués uniquement par un technicien qualifié.

- Extron recommends installing the MLC Plus 50/100/200 into a grounded, UL Listed electrical junction box.
- Extron recommande d'installer le MLC Plus 50/100/200 dans uune boîte de dérivation électrique mis à la terre, certifiée UL.

- If the controller will be installed into fine furniture, it is best to hire a licenced, bonded craftsperson to cut the access hole and perform the physical installation so the surface will not be damaged.
- S'il est prévu d'installer le contrôleur dans du beau mobilier, il est préférable de faire appel à un artisan autorisé et qualifié pour couper le trou d'accès et réaliser l'installation de telle façon que la surface ne soit pas endommagée.

- Follow all national and local building and electrical codes that apply to the installation site.
- Respectez tous les codes électriques et du bâtiment, nationaux et locaux, qui s'appliquent au site de l'installation.

- For the installation to meet UL requirements and to comply with National Electrical Code (NEC), the MLC must be installed in a UL Listed junction box. The end user or installer must furnish the junction box. It is not included with the unit.
- Pour que l'installation respecte les exigences UL et soit conforme au National Electrical Code (NEC) américain, le MLC doit être installé dans une boîte de dérivation certifiée UL. Il incombe à l'utilisateur final ou à l'installateur de fournir la boîte de dérivation. Cet équipement n'est pas inclus avec l'unité.

NOTES:

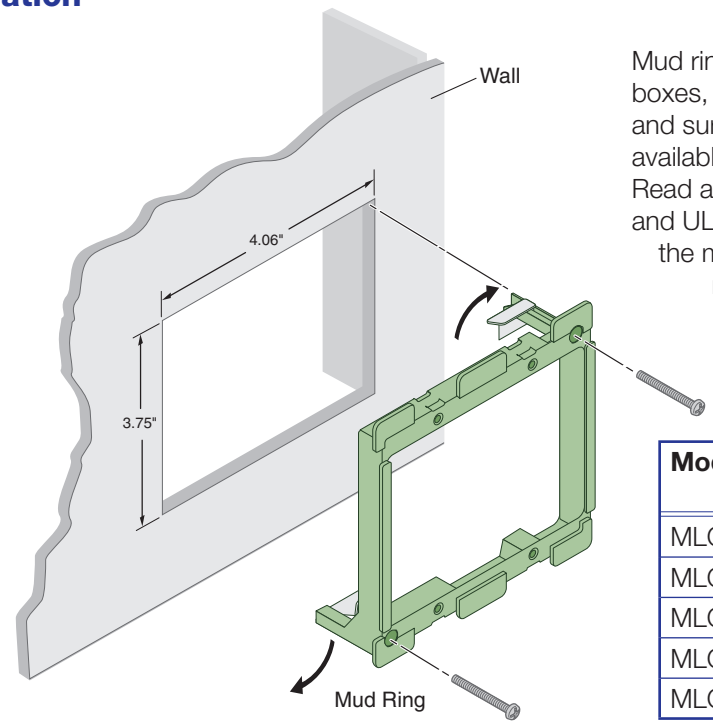
- If the MLC Plus is not mounted to a grounded metal junction box or a grounded metal equipment rack, Extron recommends connecting the unit to an earth ground to protect the unit from electrostatic discharge. For details, see the **grounding instructions** on page 15.
- If not provided with a power supply, this product is intended to be supplied by a power source marked "Class 2" or "LPS" and rated at 12 VDC, minimum 0.5 A, or 48 V PoE, 0.35 A minimum, or 56 V PoE, 0.8 A minimum.

Select and prepare the site before cabling the controller. This may include cutting a hole in the installation surface or installing a cabling raceway, running the cables to that site, installing the wall box, and pulling cables through it.

Accessibility and Americans with Disabilities Act (ADA) Compliance

When planning where to install the MLC Plus 50/100/200, consider factors affecting accessibility of the controller such as height from the floor, distance from obstructions, and how far a user must reach to press the buttons. For guidelines, see sections 307 ("Protruding Objects") and 308 ("Reach Ranges") of the *2010 ADA Standards for Accessible Design* available at **http://www.ada.gov/regs2010/2010ADAStandards/2010ADAStandards.pdf**.

Site Preparation



Mud rings, optional UL Listed junction boxes, external junction boxes, and surface mounting boxes are available for use with the MLC Plus. Read any installation instructions and UL guidelines that come with the mounting devices, protect the mounting surface to prevent damage, then install the box or mud ring in the opening at the installation site.

Model	US Gang Size
MLC Plus 50	2
MLC Plus 100	2
MLC Plus 100 AAP	4
MLC Plus 200	3
MLC Plus 200 AAP	5

Figure 10. Installing a Mud Ring

The following table provides the approximate sizes of holes to cut in the installation surface depending on the gang size of the device and whether you are using the provided mud ring or attaching the MLC Plus directly to the mounting surface.

	Mud Ring Installation	Direct Mounting
US Gang Size	**Cutout Dimensions**	**Cutout Dimensions**
2	4.1" W x 3.75" H 104 mm W x 95 mm H	3.6" W x 2.9" H 91 mm W x 74 mm H
3	5.9" W x 3.75" H 150 mm W x 95 mm H	5.4" W x 2.9" H 137 mm W x 74 mm H
4	7.6" W x 3.75" H 193 mm W x 95 mm H	7.3" W x 2.9" H 18.5 cm W x 74 mm H
5	9.5" W x 3.95" H 241 mm W x 100 mm H	9.1" W x 2.9" H 231 mm W x 74 mm H

When you run cables to the mounting location, leave enough slack for device installation. Secure the cables with a clamp for strain relief so they do not slip back down into the wall or furniture.

Installation Step 3: Change a Faceplate or Button Labels (Optional)

Faceplates can easily be changed, if desired. Or you can replace one or more of the labels within the buttons. Some button labels ship with the unit. You can create and print your own customized labels using Extron Button Label Generator software, available free from **www.extron.com**.

Replacing a Faceplate

To replace a faceplate **prior to installation**:

1. Remove the faceplate by holding the body of the unit with one hand, gripping the sides of the faceplate with the other hand, and pulling the faceplate away from the unit.

2. For models with knobs, if you are changing faceplate colors, remove the knob by holding the body of the unit with one hand, gripping the knob firmly with the other hand, and pulling it away from the unit.
3. For models with knobs, install the new knob as follows:
   a. Align the ridge inside the knob with the channel on the metal knob assembly.
   b. Press the knob toward the unit, allowing the magnet in the knob to fasten it to the unit.
4. Align the openings of the new faceplate with the buttons, knob, and Volume LEDs and place the faceplate against the unit. The magnetic catches fasten the faceplate onto the unit.

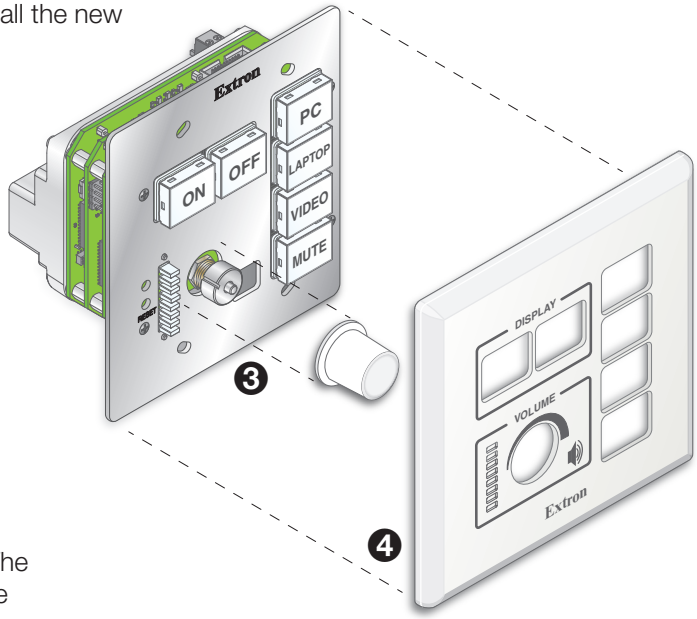


Figure 11. Replacing the Knob and Faceplate

To replace a faceplate **after installation**:

1. Remove the faceplate as follows:
   a. Insert the provided Extron removal tool (shown at right) into the notch at the bottom left of the faceplate and press the removal tool toward the wall. The bottom of the faceplate pivots out toward you.

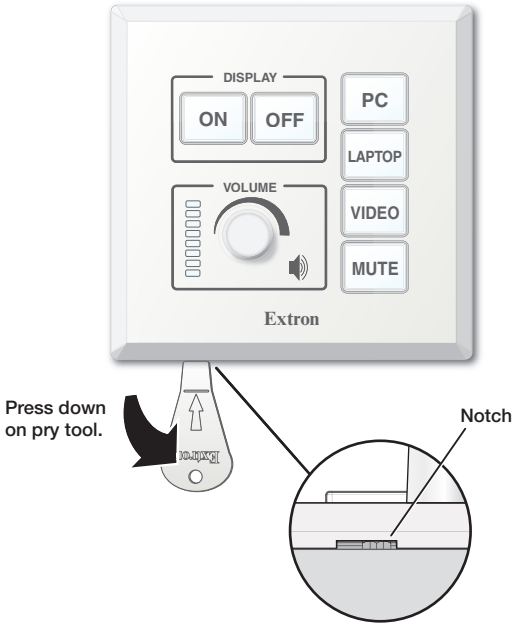


Figure 12. Removing the Faceplate

   b. Gently grip the sides of the faceplate and pull it away from the wall.
2. For models with knobs, if you are changing faceplate colors, remove the knob by gripping the knob firmly and pulling it away from the unit.

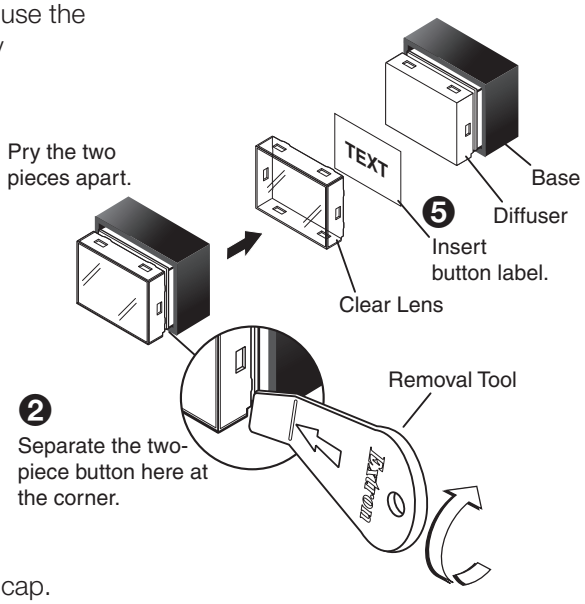
3. For models with knobs, install the new knob as follows (see **figure 11**):
   a. Align the ridge inside the knob with the channel on the metal knob assembly.
   b. Press the knob toward the unit, allowing the magnet in the knob to fasten it to the unit.
4. Align the openings of the new faceplate with the buttons, knob, and Volume LEDs and place the faceplate against the unit. The magnetic catches fasten the faceplate onto the unit.

   TIP: You can wait until the unit is mounted to the junction box or mud ring before placing the new faceplate on the unit.

Replacing Button Labels

You may wish to customize the button labels. The labels can be changed at any time. Follow these steps to change the translucent button labels:

1. Remove the faceplate as mentioned in step 1 of **Replacing a Faceplate** on page 12.
2. For each button label to be replaced, use the provided Extron removal tool to gently separate the clear button cap (lens) from its white diffuser backing as follows: insert the end of the removal tool into the corner notch and gently twist the tool.
3. Remove the label insert from the transparent button cap.
4. Select one of the button labels from the printed label sheets included with the MLC Plus. Remove the label from its backing and remove the clear, protective film from the front of the label.



5. Insert the button label into the button cap. Check for correct label orientation.
6. Align the cap with the white diffuser and press the clear cap into place on the button.
7. Reattach the faceplate to the controller (see **step 2** in "Replacing a Faceplate" on page 13).

Installation Step 4: Cable All Devices

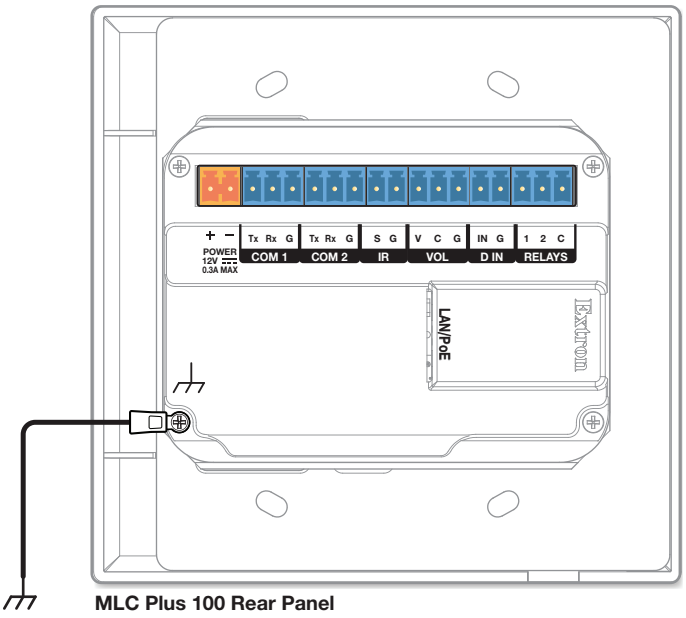
NOTE: Most examples on the following pages show the MLC Plus 100. However, connector wiring and port functions are identical for all models.

1. If the MLC Plus is not mounted to a grounded metal junction box or a grounded metal equipment rack, Extron recommends connecting the unit to an earth ground to protect the unit from electrostatic discharge.

   To ground the unit:

   a. Securely terminate a grounding cable with a ring terminal.

   b. Remove the grounding screw in the lower left corner of the rear panel, insert the grounding cable, replace and securely fasten the screw (hand-tighten only). Do not over-tighten the screw. Maximum torque is 2 inch-pounds (0.2 Newton-meter).



MLC Plus 100 Rear Panel

Figure 13. Connecting a Grounding Wire to the MLC Plus

   c. Connect the other end of the grounding cable to an earth ground.

2. Cable devices to the controller (see **Rear and Side Panel Features and Cabling** on page 16). Use the wiring diagrams in this section as a guide.

3. Connect power cords and power on all the devices.

Rear and Side Panel Features and Cabling

NOTE: For rear panel features and cabling, the MLC Plus 100, MLC Plus 100 AAP, MLC Plus 200, and MLC Plus 200 AAP are identical, so in this section the MLC Plus 100 represents all of those models. The rear panel of the MLC Plus 50 has one COM port instead of two, and does not have a volume control port, but it is otherwise the same as the other models.

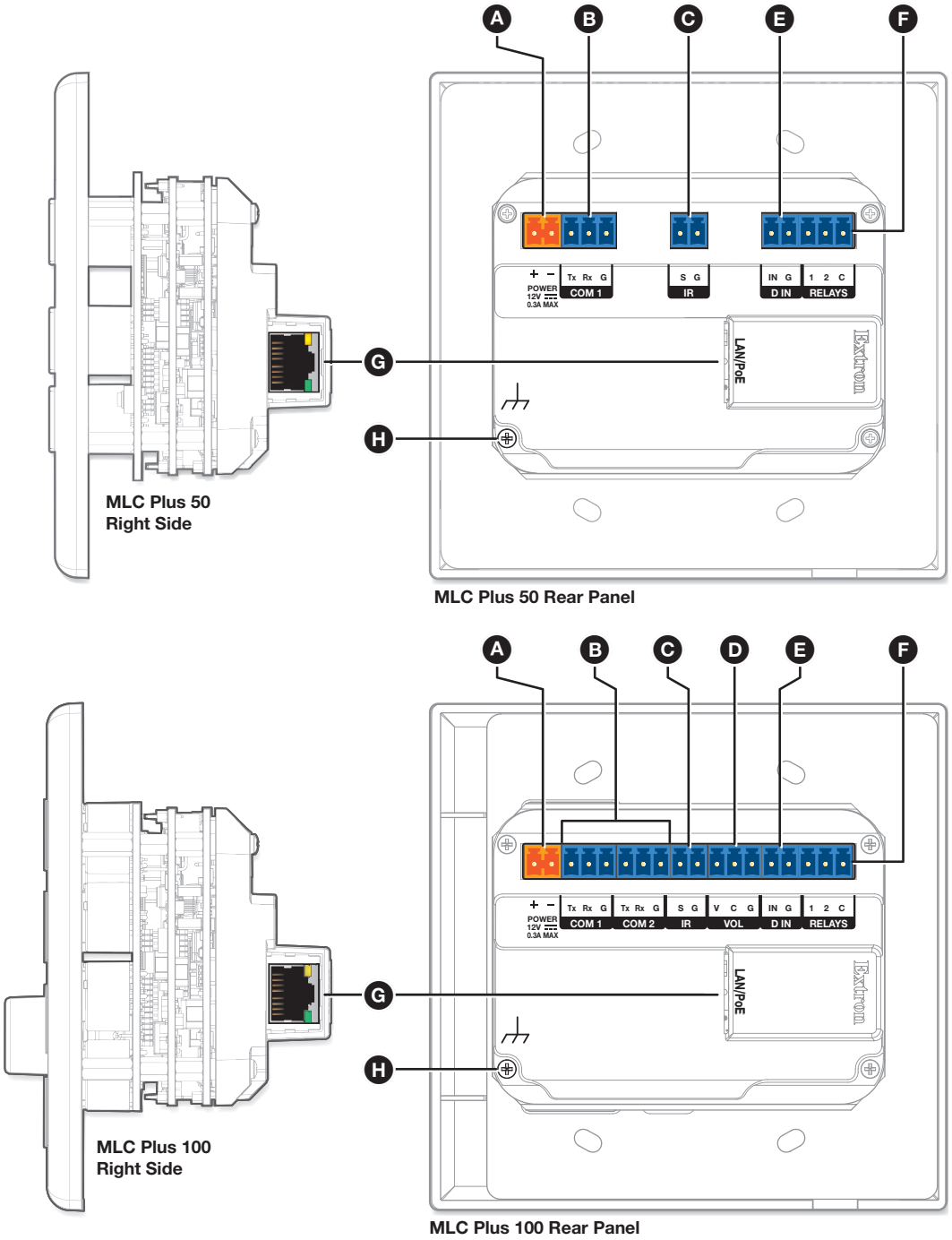


Figure 14. MLC Plus 50/100/200 Series Side (Left) and Rear Panel (Right) Features

- A **Power input connector**, page 17
- B **COM (RS-232) ports**, page 19
- C **IR output port**, page 20
- D **Volume control port**, page 21
- E **Digital input port**, page 22
- F **Relay ports**, page 23
- G **LAN (Ethernet) and PoE port and LEDs**, page 18
- H Grounding screw, see the **grounding instructions** on page 15

Power connection

A **Power input connector for optional external power supply** (see **figure 14** on page 16) — If Power over Ethernet is not available, or if desired, connect the MLC Plus to an optional (not included) Extron 12 VDC, 0.5 A desktop power supply, (part number 28-331-57LF) here; then connect the external power supply to a 100 to 240 VAC power source. If using this port, connect the power after connecting the other cables.

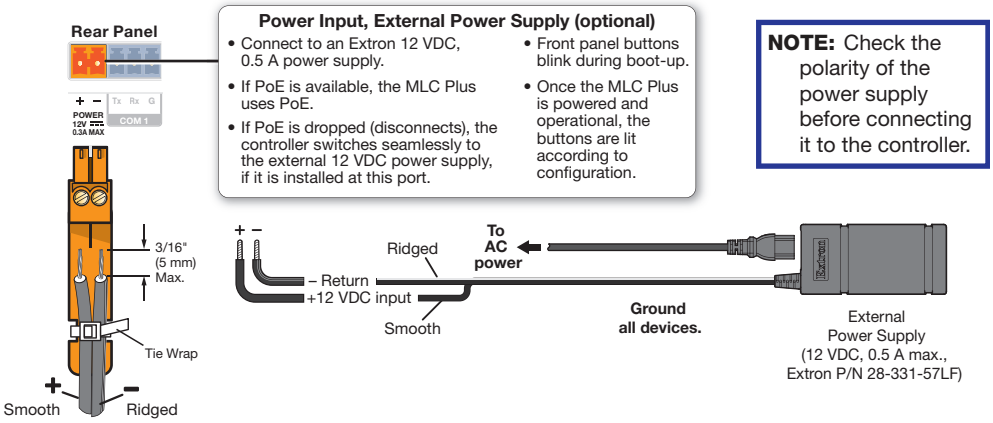


Figure 15. Connecting an External Power Supply

ATTENTION:

- Always use a power supply provided by or specified by Extron. Use of an unauthorized power supply voids all regulatory compliance certification and may cause damage to the supply and the end product.
- Utilisez toujours une source d'alimentation fournie ou recommandée par Extron. L'utilisation d'une source d'alimentation non autorisée annule toute conformité réglementaire et peut endommager la source d'alimentation ainsi que le produit final.
- 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 12 VDC, minimum 0.5 A, or 48 VDC (PoE), minimum 0.35 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 12 VDC et 0,5 A minimum, ou 48 VDC (PoE) et 0,35 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 sconviennent 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.

NOTE: The MLC Plus 50/100/200 Series controllers accept power over Ethernet (PoE) through the LAN port (**figure 13**, **G**, on page 15) in addition to network communication. Both an external power supply and PoE can be connected to the controller simultaneously. The MLC Plus uses PoE when it is available but can switch seamlessly to the external 12 VDC power supply if the PoE connection is dropped.

Control and power — LAN (Ethernet) and PoE

G **LAN (Ethernet) and PoE port and LEDs** (see **figure 14** on page 16) — To connect the MLC Plus to an Ethernet network, plug a cable into the LAN RJ-45 socket and connect the other end of the cable to a network switch, hub, router, or PC connected to a LAN or the Internet. Network connection lets you configure the MLC Plus and the devices connected to it and to have the option to control the unit via Extron Control app. For details of communication protocols, ports, and services used, see **Network Port Requirements** on page 42.

The MLC Plus 50/100/200 controllers accept Power over Ethernet (PoE) through the LAN port. Both an external power supply and PoE can be connected to the controller simultaneously. The MLC Plus uses PoE when it is available but can switch seamlessly to the external power supply if the PoE connection is dropped.

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.

Cabling:

- For 10Base-T (10 Mbps) networks, use a CAT 3 or better cable.
- For 100Base-T (max. 155 Mbps, all models) or 1000Base-T networks, use a CAT 5 cable.

Activity LED (on connector) — This yellow LED blinks to indicate network activity.
Link LED (on connector) — This green LED lights to indicate a good network connection.

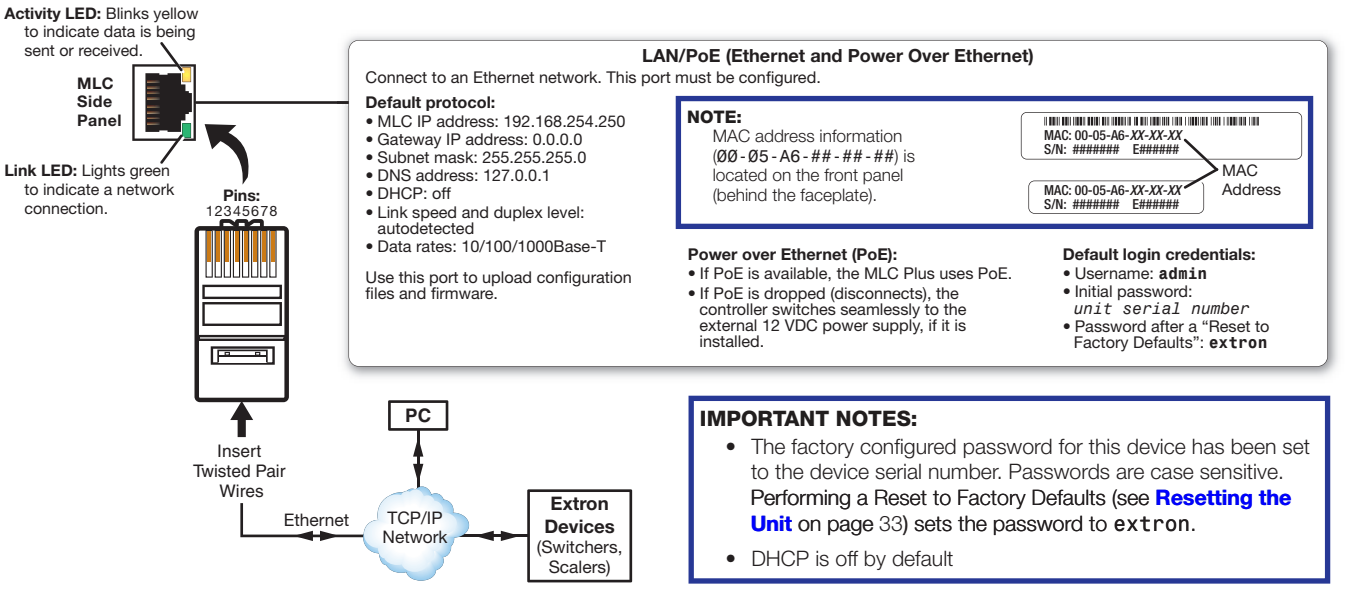


Figure 16. LAN Connector and LEDs

MAC address — This is the unique user hardware ID number (MAC address) of the unit (for example, 00-05-A6-05-1C-A0). You may need this address during configuration. The label is on the front panel (behind the faceplate).

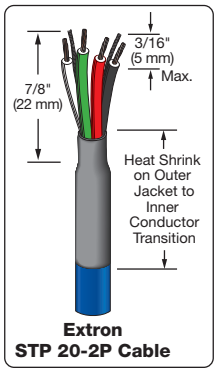
Control

B **COM ports, RS-232 only** (see **figure 14** on page 16) — Use COM ports 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. These ports support only RS-232 communication.

MLC Plus 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, or odd parity
- Flow control support (default = none): software-only (XON, XOFF)

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



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.

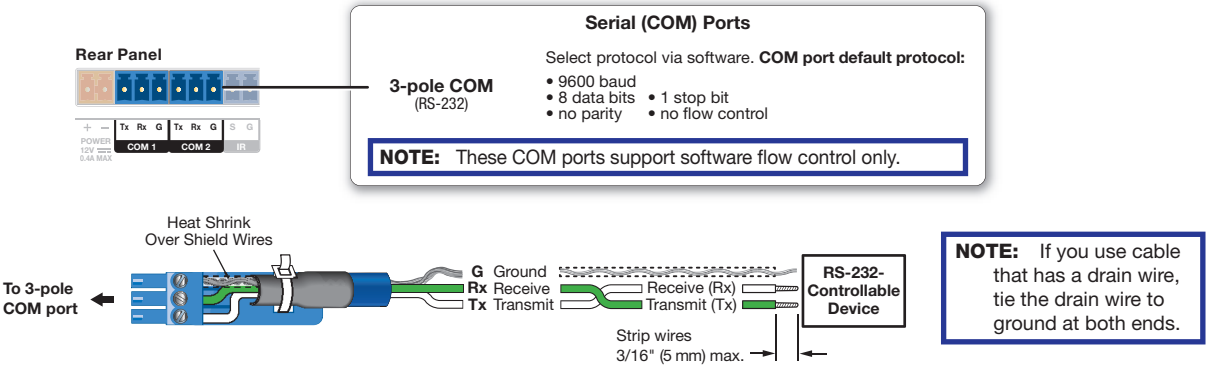


Figure 17. Wiring COM Ports for Serial Control

For bidirectional serial communication, the transmit, ground, and receive pins must be wired at both the controller 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 MLC Plus and the device being controlled may vary up to 200 feet (61 m). Factors such as cable gauge, baud rates, environment, and output levels (from the MLC Plus and the device being controlled) all affect transmission distance.

C **IR output port** (see **figure 14** on page 16) — An MLC Plus 50/100/200 Series controller can use infrared signals to control up to two devices via this port.

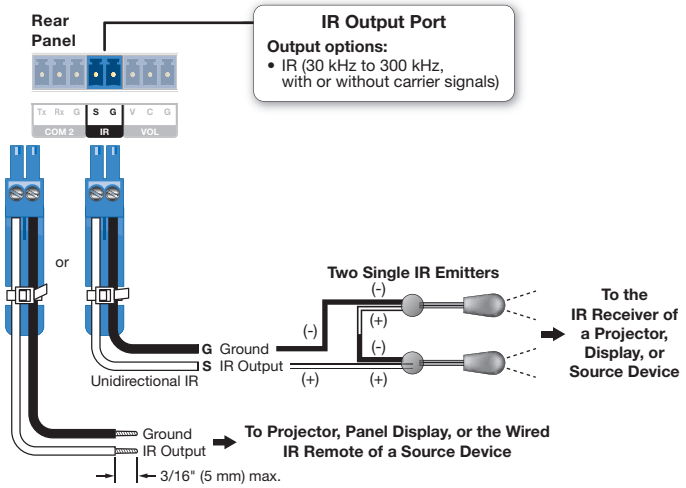
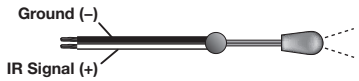


Figure 18. Wiring the IR Port

Connect the port directly to the wired IR port of another device. Or insert the wires from up to two IR Emitters into this 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**).

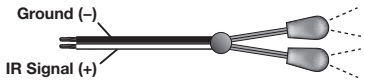
NOTE: Each emitter must be within 100 feet (30 m) of the controller for best results.

Installing One Single Emitter



One Single IR Emitter

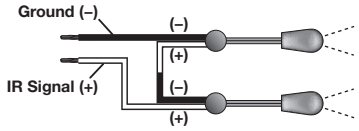
Installing One Dual Emitter



Dual IR Emitter

Installing Two Single Emitters

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



Two Single IR Emitters

D **Volume control port** (see **figure 14** on page 16) — To provide volume control for some Extron audio amplifiers, connect this port to the volume remote control port on the amplifier as shown below. Configure the maximum and minimum voltage limits. Set Soft Start mode off or on (default). Soft Start mode allows volume to gradually increase from mute to the previous level after muting or power-on to prevent loud audio bursts.

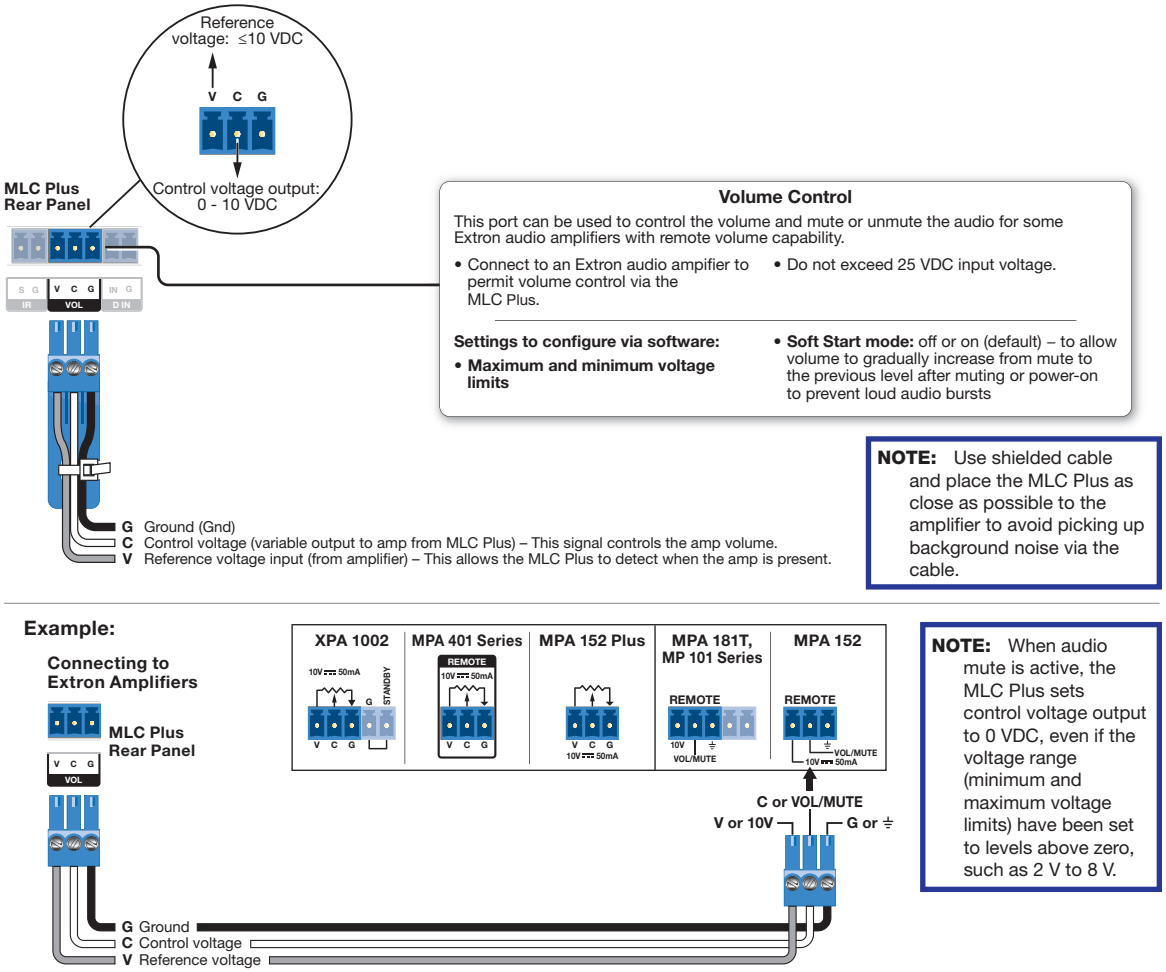


Figure 19. Volume Control Port Wiring Examples

Ⓔ **Digital input port** (see **figure 14** on page 16) — Connect a switch, sensor, LED, relay contact, or similar item to this port, which can be configured with or without +5 VDC pull-up. The port can trigger events or functions (such as triggering relays, issuing commands, or sending an e-mail) that have been configured using Global Configurator.

To allow the controller to monitor external devices, connect a switch, motion sensor, moisture sensor, tally feedback output, button pad, or a similar item to a digital input port and configure the port. The port is set to measure two states: high and low. The port accepts 0 to 24 VDC input.

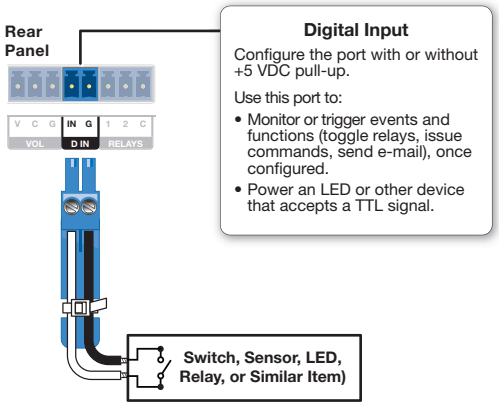


Figure 20. Digital Input Port Wiring

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

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

There is also an internal, +5 VDC, selectable, pull-up resistor for this circuit, which you can use if the connected device does not provide its own power. The port is capable of accepting 250 mA, maximum.

- 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

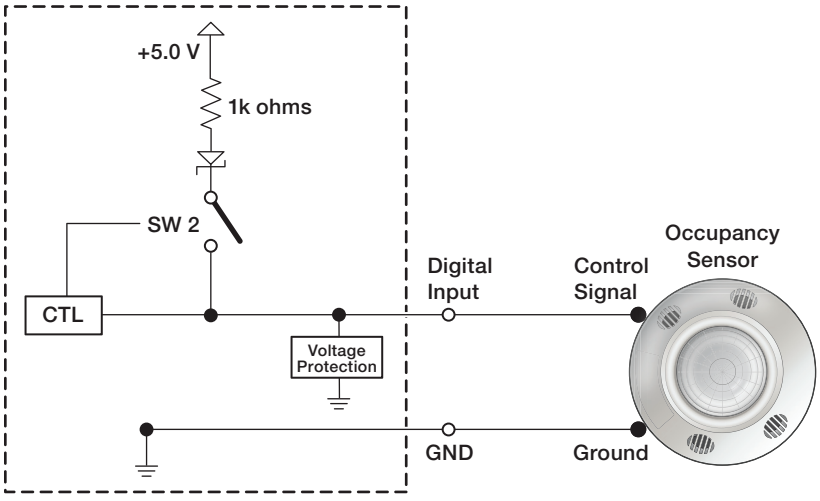


Figure 21. Digital Input Application: Occupancy Sensor, Without Pull-up

Room occupied: digital input is +2.8 to 24 VDC, logic high.

Room unoccupied: digital input is 0 VDC, logic low

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

- Digital input with pull-up enabled
  - The +5.0 VDC pull-up resistor is enabled (switch 2 is closed when configured for pull-up).
  - An external short to ground creates a logic low.
  - An open circuit acts a logic high
  - Example application, digital input with pull-up: connecting a two-position switch

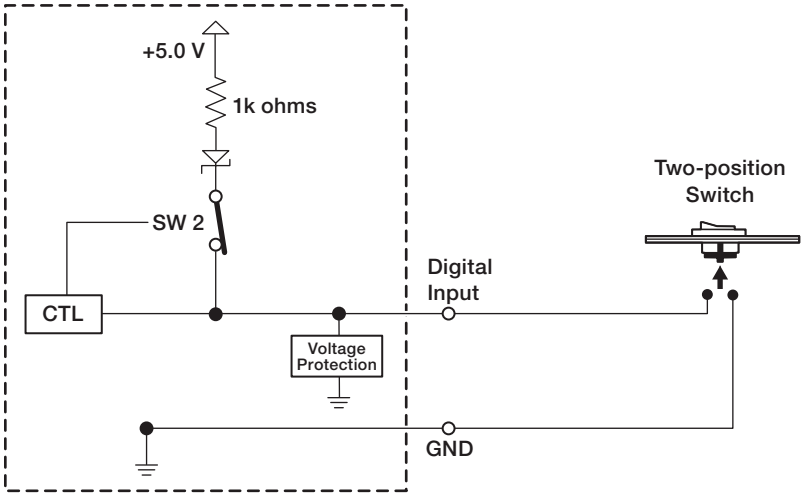


Figure 22. Digital I/O Digital Input Application: Two-position Switch With Pull-up

Two-position switch is open: digital input is +5 VDC, logic high.
Two-position switch is closed: digital input is 0 VDC, logic low.

F **Relay ports** (see **figure 14** on page 16) — Relay ports provide control for power, screen or projector lifts, window coverings, and similar items, when trigger events occur.

These relay contacts may be used to control any equipment as long as the contact specifications of a total of 24 volts at 1 ampere 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).

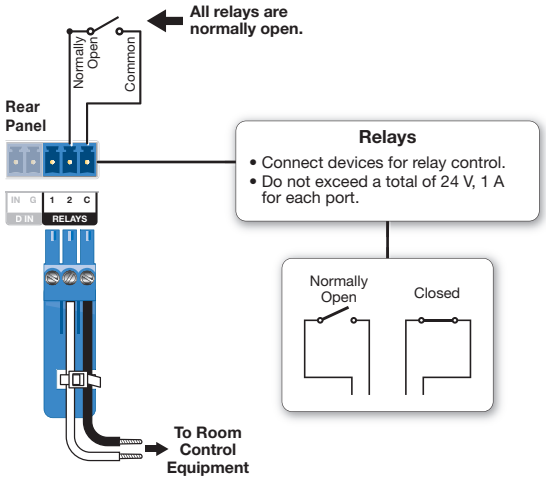


Figure 23. Cabling Relay Ports

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).

Installation Step 5: Set up the MLC Plus for Network Communication

1. Connect the PC to be used for setup and the MLC Plus to the same Ethernet subnetwork. For LAN connections for the MLC Plus, see **Control and power — LAN (Ethernet) and PoE** on page 18.

2. Start Global Configurator and use the Toolbelt feature of the software (or use the stand-alone Toolbelt program) to set the DHCP status or set the IP address, subnet, gateway IP address, and related settings. Network setup is essential prior to configuration. Use the flowchart at right as a guide to setting up the controller for network use.

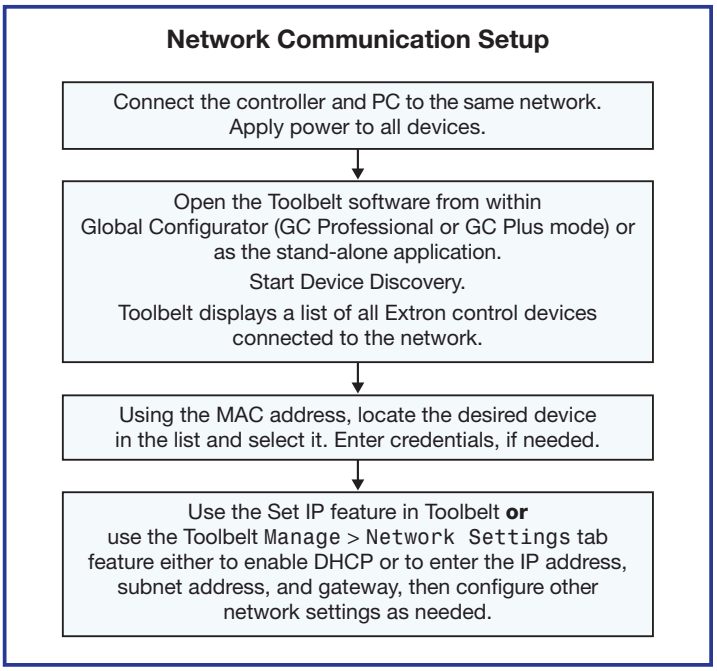


Figure 24. Network Setup, Online Method

NOTE: If using a host name instead of an IP address, the user must enter a qualified host name (*HostName.Domain*). For example: `somename.somedomain.com`.

Installation Step 6: Configure the MLC Plus

The most basic steps are outlined below in the recommended order.

NOTE: See the *Global Configurator Help File* as needed for step-by-step instructions and detailed information. The help file for GC includes an introduction to the software, and how to start a project and configuration.

1. Using GC, create a new GC Plus or GC Professional project and configure the controller and any installed IP Link Pro devices. The configuration tells the controller:
   - How its ports function
   - How to control other products
   - What to monitor
   - When to do things
   - Whom to notify, how, and under what circumstances

   a. Configure ports on the controller.
      - Select device drivers and link them to each assigned serial, IR, or Ethernet port.
      - Configure settings (serial protocol, relay behavior, digital input, volume control settings) as needed.

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

   c. Set up the front panel buttons: assign appropriate commands and actions, macros, timers, local variables, monitors, or schedules to the buttons.

2. Save the project.
3. Build and upload the system configuration to the controller.

Installation Step 7: Test and Troubleshoot

1. Test the system.
   - Press buttons and ensure the buttons light as desired and that the appropriate control commands or functions are triggered.
   - Ensure that the audio output responds correctly to the **`Volume`** knob or button. Also ensure that the volume LEDs light correctly as you increase or decrease the audio gain.
   - If the controller is connected to a network, ensure that the yellow Activity LED and green Link LED on the LAN/PoE port light.
2. Make adjustments to wiring or configuration as needed. Remember that the rear and side panel ports are not accessible after the controller is mounted.

Installation Step 8: Complete the Physical Installation

1. **For AAP models**, attach any optional AAP devices or blank AAP plates to the metal AAP bracket as shown in the figure at right. Fasten the built-in screws to the bracket with the provided nuts (hand tighten).

   NOTE: You must purchase AAP devices and plates separately. They are not provided with the MLC.

   - Place the AAP devices as close together as possible. Do not leave gaps between devices.
   - Place the AAP opening of the MLC Plus faceplate over the cluster of AAPs to check for correct fit. Make sure that the edges of the AAPs all fit within the faceplate AAP opening so that no edges or corners catch or prevent the faceplate from laying flat against the AAP mounting bracket. If needed, loosen the nuts, adjust the position of one or more AAPs, and retighten the nuts.

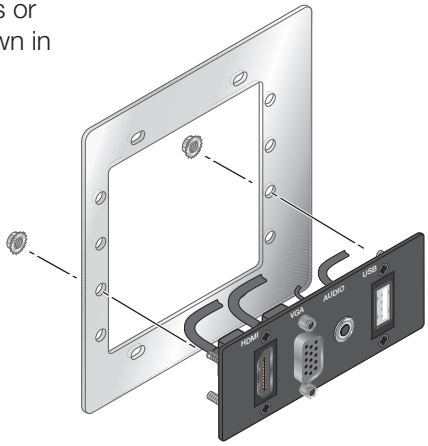


Figure 25. Attaching AAP Devices or Blank AAP Plates to the AAP Bracket

2. For all models, follow the instructions in **Mounting**.

Mounting

Prior to mounting:

1. If it has not already been done, feed all device cables through the wall or furniture and, if applicable, through the plastic spacer.

   NOTE: If the unit is not installed in a mud ring, you must install the plastic spacer. The spacer positions the unit to allow the magnetic faceplate to attach properly and securely.

2. Ensure that cables are connected to the MLC Plus rear panel and to any AAP devices or plates. For best results, Extron recommends grounding the MLC if the junction box or mud rings are not already grounded (see **grounding instructions** on page 15).
3. Disconnect power at the source from all devices in the system.

Mount the MLC Plus as follows:

1. **For AAP models**, first attach AAP devices or blank AAP plates to the metal AAP bracket (see **Installation Step 8: Complete the Physical Installation** on the previous page).
2. For all models, insert the cabled MLC Plus into the mud ring or junction box within the wall or furniture, aligning the mounting holes in the MLC Plus with those in box or mud ring.
3. **For AAP models**, fasten the MLC to the junction box, wall or surface mounting box, or mud ring as follows (see figure 26, ❸) :

   a. Insert screws through the mounting holes in the unit or AAP bracket, then into the mud ring, or insert them through the plastic spacer and into the wall box, and loosely tighten the screws.

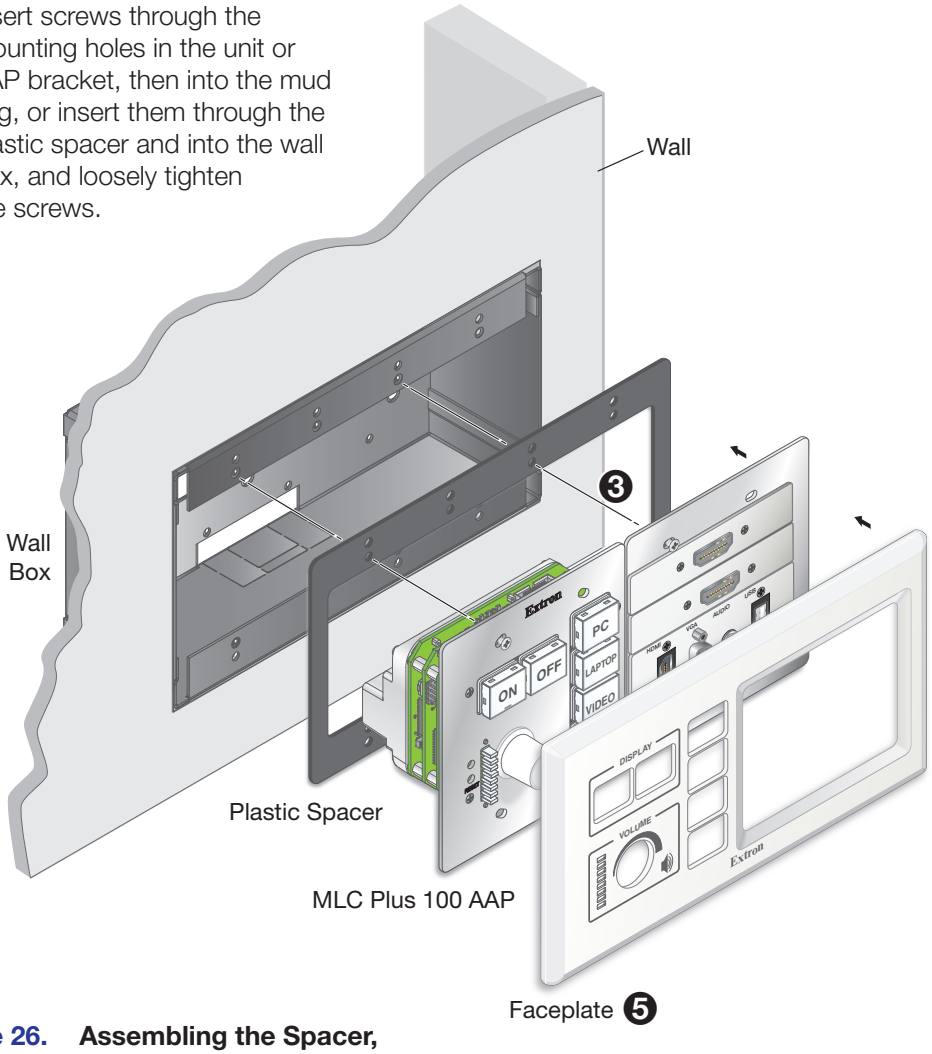


Figure 26. Assembling the Spacer, Unit, AAP Bracket, and Faceplate for an AAP Model

   b. Align the faceplate with the MLC Plus and place it against the front of the unit, allowing the magnetic catches to fasten the faceplate onto the unit. Check the alignment and fit. The faceplate must sit flush against the front of the MLC Plus and against the AAP bracket without catching on any LEDs, buttons, or AAP edges, or on the edges of the MLC Plus metal plate. **If the faceplate seats in place correctly**, remove the faceplate, tighten the screws, and reattach the faceplate. The installation is complete. **If not**, proceed to step 3c.

   c. If necessary, remove the faceplate, loosen the mounting screws, and adjust the position of the MLC Plus, AAP mounting bracket, or individual AAP devices. Place the faceplate over the unit to check the fit, remove the faceplate, and tighten the mounting screws once all the elements are positioned to allow correct alignment with the faceplate.

4. **For non-AAP models**, secure the MLC Plus to the junction box, wall or surface mounting box, or mud ring as follows (see figures 27 and 28, ❹):

   a. Insert the included screws through the oval slots at the top and bottom of the MLC Plus, through the plastic spacer (if not using a mud ring), and into the corresponding threaded holes in the box or mud ring.

   b. Using a Phillips screwdriver, lightly tighten the screws until snug.

NOTE: If the unit is not installed in a mud ring, you must install the plastic spacer. The spacer positions the unit to allow the magnetic faceplate to attach properly and securely.

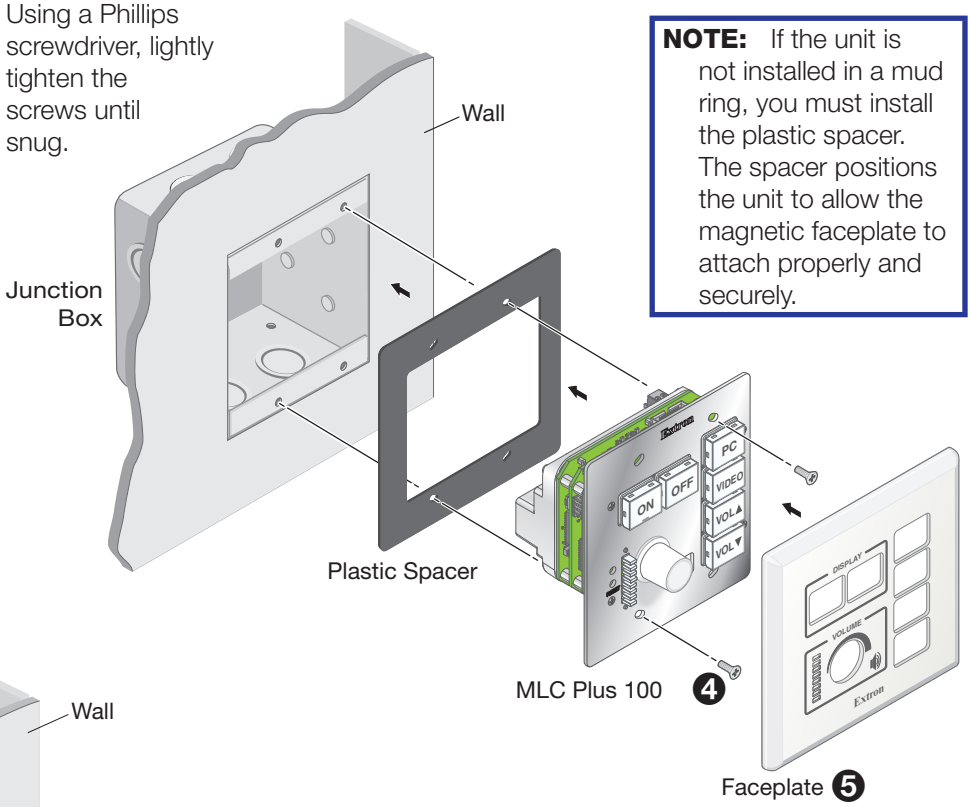


Figure 27. Installing the MLC Plus in a Junction Box

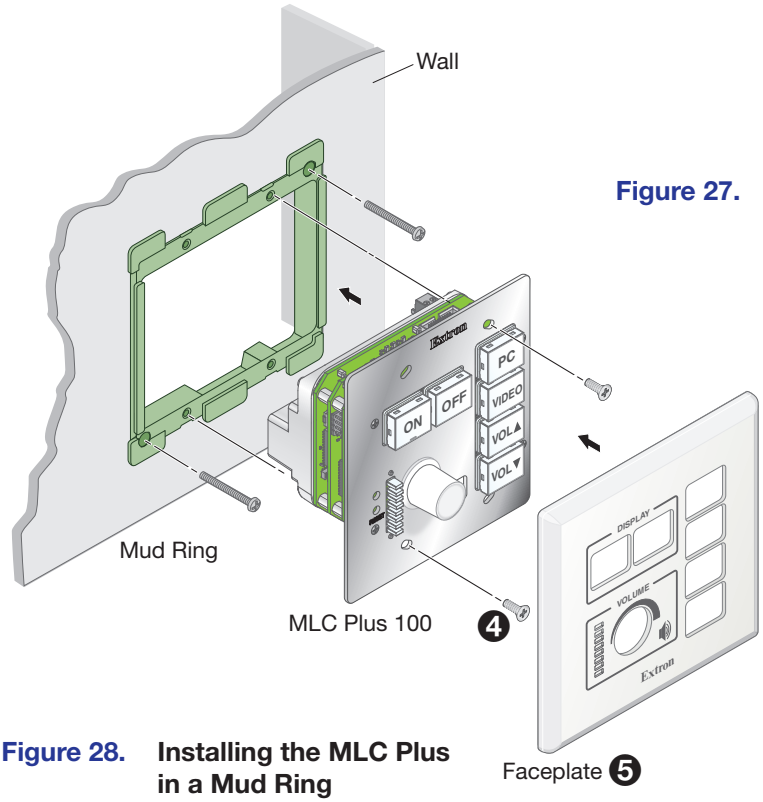


Figure 28. Installing the MLC Plus in a Mud Ring

5. Attach the faceplate to the MLC Plus: align the faceplate openings with the buttons, knob, and LEDs, and place the faceplate against the unit (see figures 26, 27, and 28, ❺). The magnetic catches fasten the faceplate onto the front of the unit.

Operation

This section of the guide covers the following topics:

- **Front Panel Features** — Locations and descriptions of items on the front panel
- **Reset Features and Resetting the Unit** — Locations of the `Reset` button and LED and information about the available reset modes and how to reset the MLC Plus 50/100/200

Front Panel Features

Some features and indications are described in **Rear and Side Panel Features and Cabling** on page 16 paired with descriptions of rear panel ports. The rest are detailed in this section.

NOTE: You can control the unit and adjust volume via the front panel controls, remote, or Extron Control apps. However, the controller must be configured in order to function. See **Software-based Configuration and Control** starting on page 36, and see the GC help file for information about the software, and step by step instructions for basic setup.

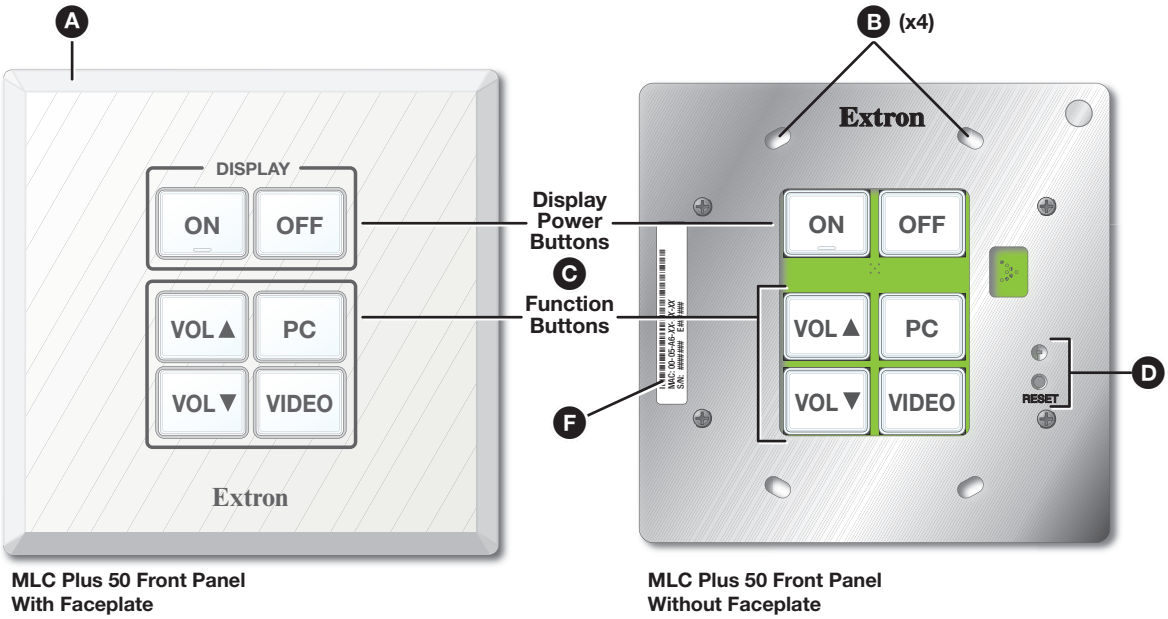


Figure 29. MLC Plus 50 Front Panel With Faceplate (Left) and Without Faceplate (Right)

- A **Faceplate**, page 30
- B **Mounting holes**, page 30
- C **Buttons**, page 31
- D **Reset button and LED**, page 33
- F **MAC address**, page 18

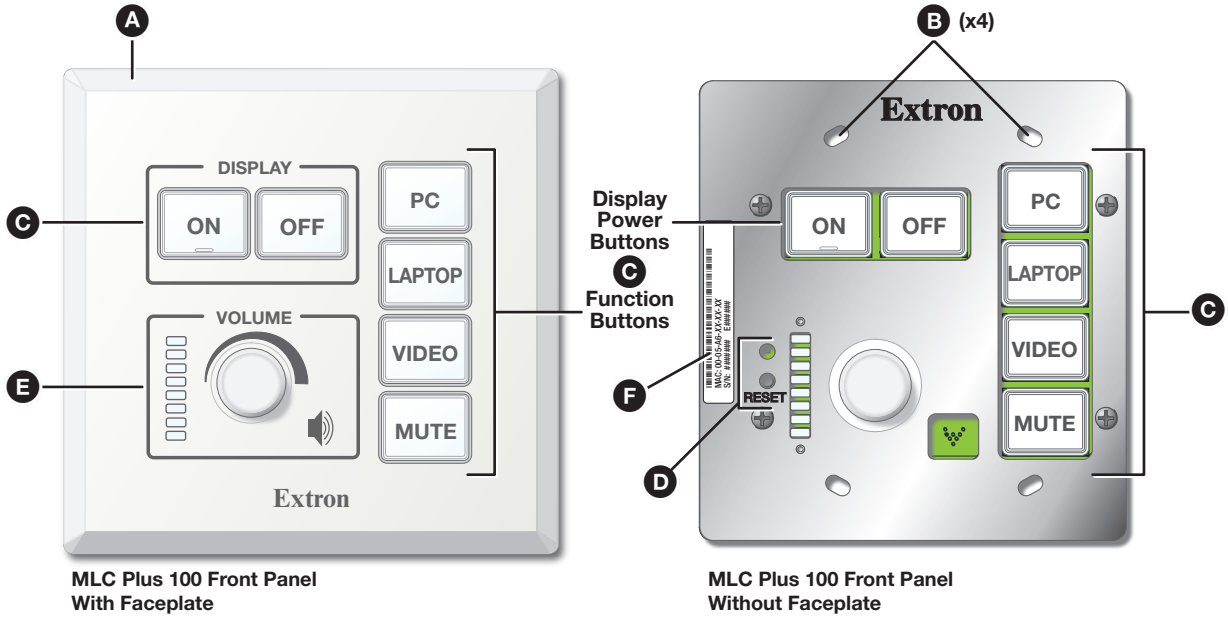


Figure 30. MLC Plus 100 Front Panel With Faceplate (Left) and Without Faceplate (Right)

- A **Faceplate**, page 30
- B **Mounting holes**, page 30
- C **Buttons**, page 31
- D **Reset button and LED**, page 33
- E **Volume control knob and LEDs**, page 31
- F **MAC address**, page 18

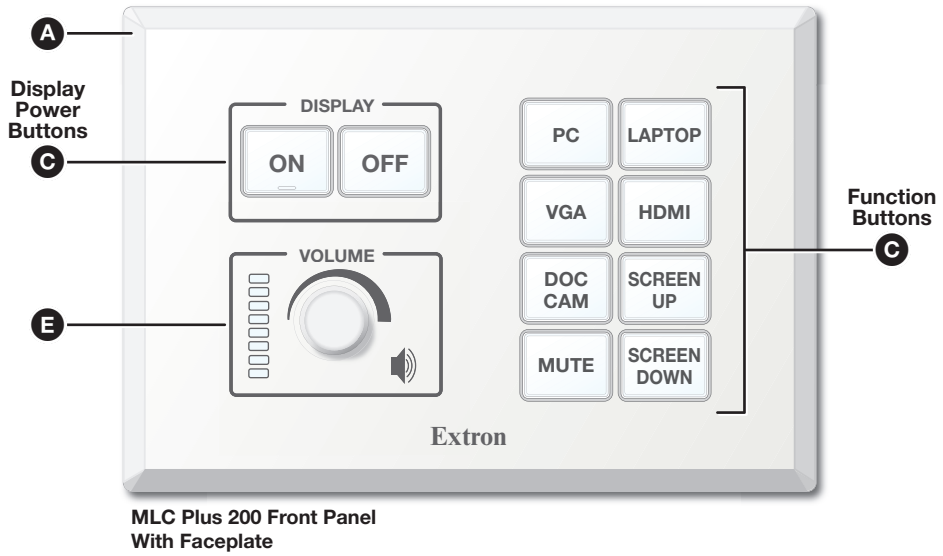


Figure 31. MLC Plus 200 Front Panel With Faceplate

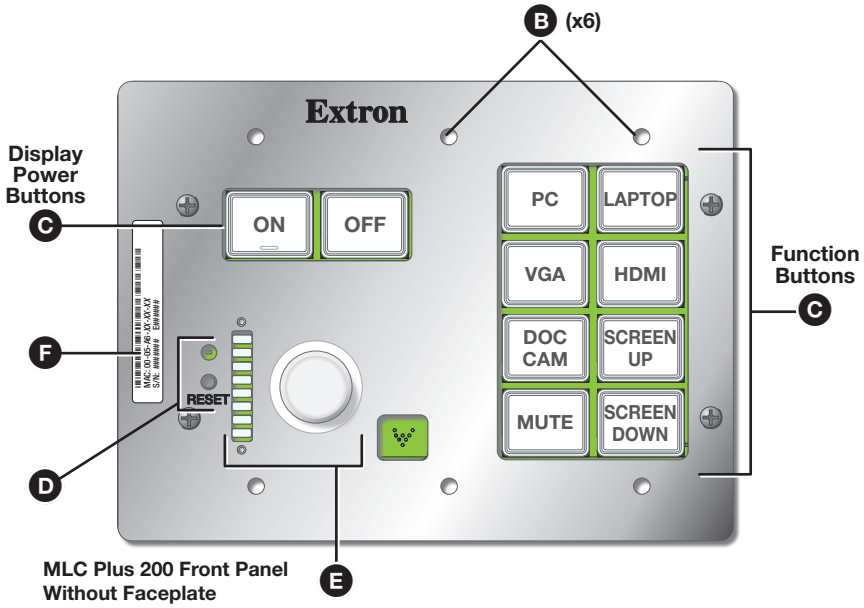


Figure 32. MLC Plus 200 Front Panel Without Faceplate

- A Faceplate, see below
- B Mounting holes, see below
- C **Buttons**, page 31
- D **Reset button and LED**, page 33
- E **Volume control knob and LEDs**, page 31
- F **MAC address**, page 18

Faceplates

A **Faceplates** — The MLC is shipped with white and black faceplates. See **Installation Step 3: Change a Faceplate or Button Labels (optional)** on page 12 for instructions on how to change faceplates and button labels.

Mounting Holes

B **Mounting holes** — During final mounting, insert the mounting screws through these holes and gently tighten the screws to fasten the MLC Plus to the wall box, mud ring, or surface mount box.

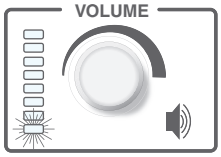
Buttons

C **Buttons** (see **figure 29** on page 29, **figure 30** on page 29, and **figure 32** on page 30) — All buttons are backlit so they are visible in low light conditions. By default, the active (selected) buttons light brighter than inactive buttons. The light intensity and blink rate can be set during configuration. Each button can be configured with a variety of commands and functions, as desired.

Volume Controls and LEDs

E **Volume control knob and LEDs** (see **figure 30** on page 29, **figure 31** on page 30. and **figure 32** on page 30) — You must configure the knob. It can be used for any function and behavior and to control any device. However, the most common configuration is to rotate the **Volume** knob clockwise to increase the audio volume, counterclockwise to decrease volume. The LEDs (on all models except the MLC Plus 50) to the left of the knob can be set to light in patterns such as upward or downward sweeps to indicate increases or decreases for increment/decrement adjustments, or to indicate a volume level range for range-based adjustments (see "Volume control options" below for additional details).

For all models, when audio mute is active, mute would typically be indicated by a slowly blinking LED (shown in the diagram at right), no matter which port is used for audio control or what mode (range-based) is being used. When the audio is unmuted, the volume returns to the previously used level.



Volume control options

Global Configurator software lets you select whether the MLC Plus knob controls the audio levels of the **projector** (or another AV device) or of an optional **Extron amplifier**. Once configured, the **Volume** knob can:

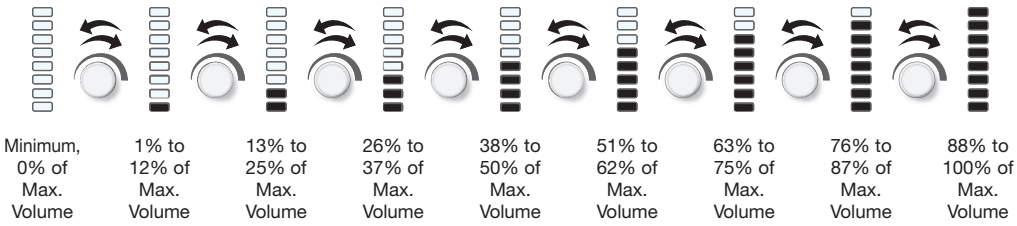
- Work in conjunction with the MLC Plus rear panel volume control port to control the volume of an Extron audio power amplifier. See the information on the **volume control port** on page 21 for connector pinouts, wiring, and useful installation notes.
- Control audio volume via a projector or other device using serial or IR control commands together with a COM or IR port on the MLC Plus.

If the knob controls the audio levels of the projector, you can specify incremental adjustments or range-based adjustments (via device driver only). See the *Global Configurator Plus and Global Configurator Professional Help File* for details on these types of volume adjustments and on how to configure the **Volume** LEDs for the desired lighting behavior.

Range-based volume adjustment

If the MLC Plus is configured for use with some projectors, the most common way to configure the LEDs on the MLC Plus is to indicate **volume ranges** (with steadily lit LEDs), as shown in the following diagram.

Range-based Volume Adjustment

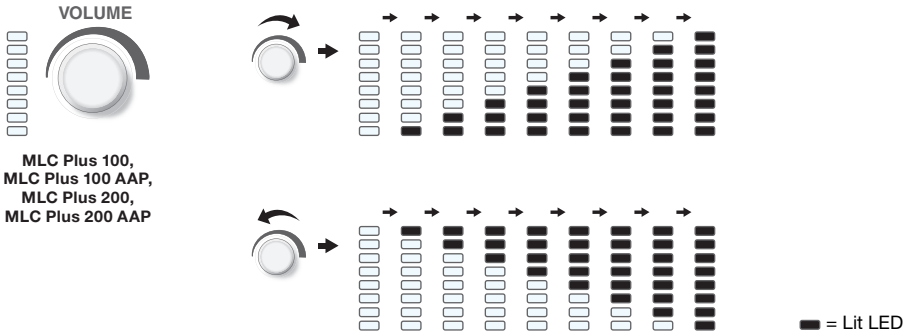


NOTE: **Volume** LEDs light based on the percentage of the user-set minimum/maximum range rather than on the full range that the MLC Plus can support.

Increment/decrement volume adjustment

If the MLC Plus is configured for **increment/decrement** volume adjustment, typically you would configure the **Volume** LEDs to be off except during adjustment. In the most common configuration, when the volume is adjusted, the LEDs light briefly in a scrolling pattern to the top (increment) or bottom (decrement), as shown in the following examples.

Increment/Decrement-based Volume Adjustment



Control voltage range and mute

The maximum output voltage range of pin C of the volume control port is Ø to +10 VDC. During configuration you can set the minimum and maximum output voltage to limit the minimum and maximum volume level for a specific Extron amplifier model and connected audio equipment. For example, a range of 2.5 V to 8 V may be optimal for making soft audio audible and for preventing audio distortion for a particular combination of amplifier and speakers. However, note that these MLC Plus models set the control voltage to Ø V when audio mute is active. Exiting mute mode returns the control voltage to the last selected level, within the user-configured voltage range.

Soft Start mode

Soft Start mode allows volume to gradually increase from mute to the previously selected level after muting or power-on to prevent sudden, loud audio bursts. By default Soft Start mode is on, but it can be turned off using the configuration software.

Reset Features and Resetting the Unit

Locating the Reset Button and LED

Ⓓ **Reset button and LED** — Pressing this button causes various IP functions and Ethernet connection settings to be reset to the factory defaults. The adjacent green LED flashes depending on the selected reset mode (see "Resetting the Unit" below and see the reset modes table for details).

Resetting the Unit

There are several reset modes that are available by pressing the **Reset** button. The **Reset** button is recessed, so use an Extron Tweeker, a pointed stylus, or a ballpoint pen to access it. See the **reset modes table** below and on the next page 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 hold down 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 three times, the third blink indicating the last mode. The modes are separate functions, not a continuation from one mode to the next.

MLC Plus 50/100/200 Series Controller Reset Mode Summary

Mode	Use This Mode to...	Activation	Result
Use Factory Firmware	Temporarily boot up the unit with factory-installed firmware for a single power cycle in the event that a firmware update has failed or if incompatibility issues arise with user-loaded firmware	To start the Use Factory Firmware reset mode and replace firmware: 1. On the controller, hold down the recessed **Reset** button while applying power to the unit. Keep holding the button down until the Reset LED blinks twice, then release the button. The controller enters factory firmware mode, and the LED blinks quickly. 2. Upload new firmware to the unit as desired (see **Updating the Firmware** on page 45 for details). **NOTE:** **Do not** continue to operate the MLC Plus controller using the factory firmware version. If you want to use the factory default firmware version, you must upload that version again. See the *Global Configurator Help File* or *Toolbelt Help File* for firmware upload instructions.	**The controller reverts to the factory default firmware.** Event scripting does not start if the unit is powered on in this mode. 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.

MLC Plus 50/100/200 Series Controller Reset Mode Summary

Mode	Use This Mode to...	Activation	Result

Project Recovery	Recover project configuration and program files if passwords have been lost	**For devices with a firmware version below 2.00.0001**
		To start the Project Recovery reset mode and recover a project:
		1. On the PC, open Global Configurator.
		2. Click the **Tools** menu and select **Project Recovery**. The Recovery Mode dialog box opens.
		3. Enter the IP address or host name of the target device for which you want to perform project recovery.
		4. Click **Recover**. The software allows indefinite time to establish a connection (until a connection is made or the user clicks **Cancel**).
		5. On the controller, hold down the recessed **Reset** button while applying power to the unit. Keep holding the button down until the Power LED blinks twice, then release the button. The control processor enters Project Recovery mode for 20 seconds, during which time the Power LED blinks quickly. When the unit finishes booting up, release the button. The controller enters project recovery mode for 30 seconds, during which time the LED blinks quickly.
		GC automatically connects to the controller, then opens and retrieves the project from the unit.
		6. Cycle power to the controller to exit project recovery mode.
		7. Perform the **Reset to Factory Defaults** reset on the controller.
		8. Open Toolbelt, start device discovery, select the desired controller from the list, and click **Manage**.
		9. Click the **Network Settings** tab and set the IP address of the controller.
		10. Click the **User Management** tab and change the password of the controller.
		11. Close Toolbelt.
		12. In GC, add the new password to the recovered project.
		13. Save the project.
		14. Upload the project from GC to the MLC Plus.
			Project Recovery mode stops regular operation and allows a connection to be made to the unit via GC software without requiring password entry so that project files can be retrieved and saved.
			• During project recovery mode, events are stopped, and so is communication with AV devices.
			• While the controller is in this mode, use the GC software to recover project files.
			• If the software does not initiate project recovery within 30 seconds after the controller enters this mode, the controller exits recovery mode.
			• Upon exiting project recovery mode:
			  • The unit returns to its pre-recovery mode state and settings.
			  • The Reset LED returns to being steadily lit.
			  • To return the unit to normal operation, cycle power to the unit (disconnect power, then let the unit power on again).

		For devices with firmware version 2.00.0001 or higher
		To start the Project Recovery reset mode and recover a project:
		1. On the PC, open Global Configurator.
		2. Click the **Tools** menu and select **Project Recovery**. The Recovery Mode dialog box opens.
		3. Enter the IP address or host name of the target device for which you want to perform project recovery.
		4. Click **Recover**. The software allows indefinite time to establish a connection (until a connection is made or the user clicks **Cancel**).
		5. On the controller, press the recessed **Reset** button three times within one second. The controller enters Project Recovery mode for 30 seconds, during which time the Reset LED blinks quickly.
		GC automatically connects to the controller, then opens and retrieves the project from the unit.
		6. Perform the **Reset to Factory Defaults** reset on the controller.
		7. Open Toolbelt, start device discovery, select the desired controller from the list, and click **Manage**.
		8. Click the **Network Settings** tab and set the IP address of the controller.
		9. Click the **User Management** tab and change the password of the controller.
		10. Close Toolbelt.
		11. In GC, add the new password to the recovered project.
		12. Save the project.
		13. Upload the project from GC to the MLC Plus.
			Project Recovery mode stops regular operation and allows a connection to be made to the unit via GC software without requiring password entry so that project files can be retrieved and saved.
			• During project recovery mode, events are stopped, and so is communication with AV devices.
			• While the controller is in this mode, use the GC software to recover project files.
			• If the software does not initiate project recovery within 30 seconds after the controller enters this mode, the controller exits recovery mode.
			• Upon exiting project recovery mode:
			  • The unit returns to its pre-recovery mode state and settings.
			  • The Reset LED turns off.

MLC Plus 50/100/200 Series Controller Reset Mode Summary			
Mode	**Use This Mode to...**	**Activation**	**Result**
Run/Stop Program	Toggle stop/ start program	To stop or start a program: **1.** Hold down the **Reset** button for about 3 seconds, until the Reset LED blinks once. **2.** Release and press the **Reset** button momentarily (for <1 second) within 1 second*. *Nothing happens if the momentary press does not occur within 1 second. **NOTE:** This reset mode is supported on firmware version 2.00.0001 or higher.	• The LED blinks 2 times if the program is starting. • The LED blinks 3 times if the program is stopping.
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. **NOTES:** • DHCP toggle mode is supported on firmware version 3.00.0000 or higher. • By default DHCP is off and the unit uses a static IP address. • When you disable DHCP, the unit reverts to using the previous static IP address.	• The Reset LED blinks 6 times if the DHCP client is enabled. • The Reset LED blinks 3 times if the DHCP client is disabled.
Reset All IP Settings	Reset IP settings and port maps to factory defaults without affecting user-loaded files	To reset all IP settings: **1.** Hold down the **Reset** button for about 6 seconds until the Reset LED blinks twice (once at 3 seconds, again at 6 seconds). **2.** Release and momentarily press and release the **Reset** button (for <1 second) within 1 second*. *Nothing happens if the momentary press does not occur within 1 second.	**Reset All IP Settings mode:** • Sets the IP address back to factory default (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 DHCP off • Turns events (user-created schedules, macros) off. • Stops any running program.

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 for about 9 seconds until the Reset LED blinks three times (once at 3 seconds, again at 6 seconds, again at 9 seconds).
		2. Release and momentarily press and release the **Reset** button (for <1 second) within 1 second*.
		*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 and configurations from the controller:
			  • Clears driver-port associations (IR, serial, Ethernet) and port configurations
			  • Removes button configurations
			  • Removes schedules, settings, macros

NOTES:

- After performing a Reset All IP Settings or Reset to Factory Defaults reset, set the IP address again (by using Toolbelt) for use on your network.
- The factory configured password for this device has been set to the device serial number. Passwords are case sensitive. Performing a Reset to Factory Defaults 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**
- **Basic Setup Steps: a Guide to this Section and Other Resources**
- **Downloading the Software and Getting Started**
- **Troubleshooting**

Configuration and Control: an Overview

An MLC 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 attached to the same network as the controller. See **LAN (Ethernet) and PoE port and LEDs** on page 18 for details about the LAN port and cabling to connect the controller to the network.

- Configure the controller by using the Global Configurator software (GC Professional or GC Plus). See the Extron **website** for full system hardware and software requirements for GC.
- The default web pages embedded within the controller provide a means to view general hardware information, network settings, and, if configured, project information. The embedded web pages can also be used to update the firmware. You cannot configure the controller via the embedded web pages.

  NOTE: See the diagram within **LAN (Ethernet) and PoE port and LEDs** on page 18 for the default login credentials for the MLC Plus internal 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 **Hardware Features and Installation** starting on page 9. The overall process for setting up a controller using GC is as follows:

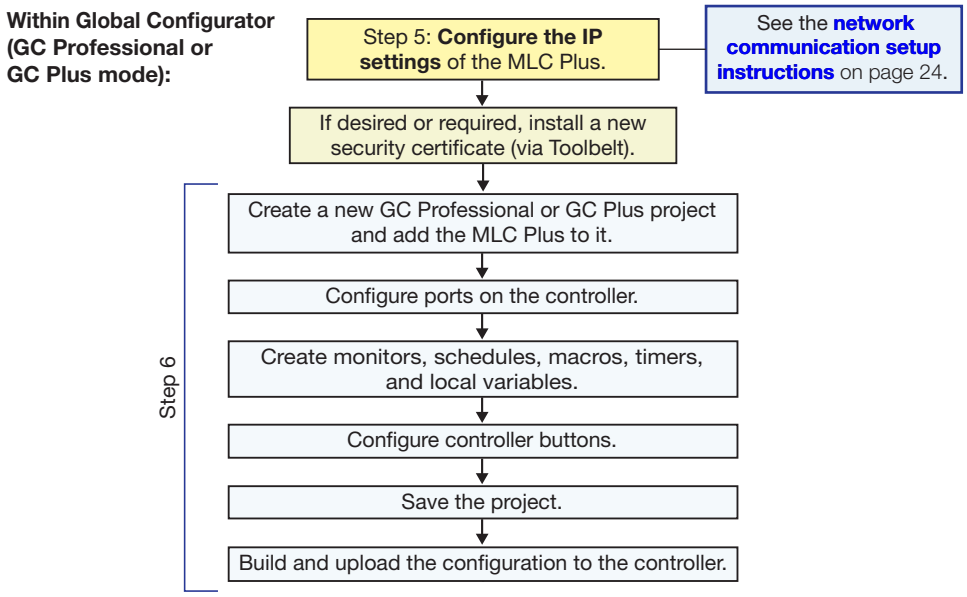


Figure 33. Overall Configuration Steps

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. You must 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) controllers 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 Global Configurator (GC Professional, GC Plus) 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:
   - Typing the model name into the **Search** field in the upper right of any Extron web page and clicking the **magnifying glass** icon
     or
   - Selecting 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 software 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 controller 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, 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 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 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 or Ethernet devices, MLC Plus 50/100/200 Series controllers require IP Link **Pro** drivers. They do not support serial or Ethernet drivers 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 have an additional option: request a new serial (RS-232), IR, or Ethernet driver from Extron.

Things to Do After Installing GC and Before Starting a Project

- Read the *Global Configurator Help File* 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 controller. The help file provides a wealth of information on settings and how to use the software. The help file covers setup steps and 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 controller. See **Installation Step 5: Set up the MLC for Network Communication** on page 24 for an overview of how to set up the network properties of the unit. For details, see the *Global Configurator 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 controller is able to communicate with the network.

Using GC: Helpful Tips

Resources and Notes

- The *MLC Plus 50/100/200 Series Setup Guide* ships with the units. It includes a quick reference to the front and rear panel features, and covers basic hardware installation.
- See **Front Panel Features** on page 28 and **Rear and Side Panel Features and Cabling** on page 16 in the "Hardware Features and Installation" section of this guide for features and settings for the ports you are configuring.
- If you plan to configure the controller 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 MLC Plus 50/100/200 controller. 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 controller.
- The unit name can be any name (for example, Room250-MLCPlus or LectureHallCtrlMLC) that you want to use to label a specific MLC Plus 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 (-).
  - 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

Hardware and Mounting

If the faceplate does not seat properly and is easy to dislodge from the unit, or if the buttons seem to be too far recessed in the faceplate, the plastic spacer may have been omitted when the unit was mounted. Check to make sure the spacer was installed if no mud ring is present. The spacer is required for the faceplate to stay attached to the unit and have the proper alignment.

Connections and Configuration

Turn on the input devices (DVD players, VCRs, PCs, and other sources), output devices (display screens, projectors), the controller, and the PC. Push a front panel button or rotate the **Volume** knob. If an input or output AV device cannot be remotely controlled (does not respond as expected), check the following:

Power connections

- Ensure that all devices are plugged in.
- Make sure that each device is receiving power. The MLC Plus front panel buttons light if the controller is receiving power.

Data connections

1. Check the cabling connections (see **Rear and Side Panel Features and Cabling** starting on page 16) and make adjustments as needed. The Link LEDs on the MLC Plus and on the PC should be lit solid green if a network connection is detected. If these LEDs are not lit, the cable is faulty or not plugged in, or the wrong type of cable is being used (see **LAN (Ethernet) and PoE port and LEDs** on page 18), or the network is "down".
2. Try to "ping" the unit by entering `ping 192.168.254.250` at the command prompt on a PC, or use 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 MLC Plus unit.
   - Ensure that the network is functioning. Try to ping another device, for example.
3. If contact is established with the unit, but the MLC Plus 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 MLC Plus 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 GC configuration file and that the correct commands and signal types (IR, RS-232, Ethernet) are associated with the appropriate ports on the MLC Plus and on the other devices.
- For digital input connections, verify whether the application requires the +5 VDC pull-up resistor within the MLC Plus for TTL circuits and use the software to check whether it is selected within the configuration.
- Verify that input voltage at the digital input port does not exceed 24 VDC.
- For a volume control port, ensure that all three pins of the port are connected to the remote port on the Extron amplifier. The port cannot output the proper control signals unless all three pins are connected.
- Verify that input at the volume control port does not exceed 10 VDC and that the amplifier is cabled correctly, as well.

If you are still experiencing problems, call the **Extron S3 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**
- **File Types: a Key to Extron-specific File Names**
- **Secure Sockets Layer (SSL) Certificates**
- **SNMP**

Full product specifications are available via the MLC Plus 50/100/200 product pages at **www.extron.com**.

Network Port Requirements

Network administrators may find it useful to know which ports, protocols, and services are used by the IP Link Pro control processors, 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 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

The controller uses files with the following extensions:

- **.eff** — This is an Extron firmware update file (see the **Firmware Updates** section starting on page 44 for details on firmware updates).
- **.eir** — These are IR driver files containing infrared commands. There is a separate .eir file for each device the MLC Plus controls via infrared communication. Via Global Configurator, these files can be imported and associated with an IR port on a controller.
- **.gcplus** — This is a Global Configurator Plus configuration file.
- **.gcpro** — This is a Global Configurator Professional configuration file.
- **.pkp** — This is a driver package file.

Secure Sockets Layer (SSL) Certificates

Extron controllers 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 controller.

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.

IP Link Pro controllers support standard OpenSSL certificate encodings such as .pem (Privacy-enhanced Electronic Mail) and .der file types. PEM file types are ASCII encoded and are the required format for uploading to the controller. DER (Distinguished Encoding Rules) 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 controller.

To properly create the certificate for uploading to Extron controllers, 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.

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)
- SNMPv2a.

Firmware Updates

If the need arises, you can replace the MLC Plus 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 controller is using:

- View the device information in Toolbelt.
- View the general status information section of the MLC Plus embedded web pages.
- View the GlobalViewer (GV) web pages (if the controller has already been configured and the GV web pages have been generated, built, and uploaded to the controller).

Before using any of those methods, connect the controller and the PC to the same network. For details see the **Hardware Features and Installation** section starting on page 9, the **Software-based Configuration and Control** section starting on page 36.

Using Global Configurator and Toolbelt

1. Start Global Configurator in either GC Professional or GC Plus mode and open the Toolbelt link, or open the Toolbelt software directly.
2. Either add the desired MLC Plus manually or start device discovery and select the desired controller from the list of discovered devices.
3. Click on the IP address link or on the **`Manage`** icon (cog) in the row for the desired controller, select the applicable device management tabs, and view the device information.

Using a Browser

The controller comes with a set of factory default embedded web pages. Also, after configuration, the GlobalViewer (GV) application could be installed in the unit, providing a different set of web pages. See the *Global Configurator Help File* for information on how to use that software and the resulting web pages. Either type of web page (factory default or GV) can be used to find the firmware version and part number of the unit.

1. Start a browser program.
2. Type the IP address of the MLC Plus into the address field of the browser and log on to the internal web page or to the optional GlobalViewer web page stored in the MLC Plus (see the *Global Configurator Help File* for details).
3. Look for the general device or status information section.

Updating the Firmware

Firmware upgrade tools require the PC and the controller to both be connected to an Ethernet network. The instructions for each method of updating the MLC Plus firmware assume you have installed the appropriate software on your PC first.

NOTES:

- You should save the existing 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 MLC Plus later using GC, if needed.
- Check the Extron website for firmware-related documents, instructions, patch files, and new firmware files before loading new firmware into the controller. 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 MLC Plus. 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 automatically stores the firmware file on the PC in `C:\Program Files (x86)\Extron\Firmware\MLC Plus Series` 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 `49-247-5Ø-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 link to Toolbelt)
- Toolbelt
- The firmware uploader feature in the default embedded web page

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 controller.

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.

Glossary

10/100Base-T Ethernet which uses unshielded twisted pair (UTP - CAT 5, CAT 5e, CAT 6) cable, where the amount of data transmitted between two points in a given amount of time is equal to either 10 Mbps or 100 Mbps.

1000Base-T, gigabit Ethernet
An Ethernet standard that transmits at 1 Gbps over twisted pair wire.

DHCP (Dynamic Host Configuration Protocol)
A standardized client-server communications protocol that enables a server to automatically assign unique network addresses (IP address, subnet mask, gateway) to a device using a defined range of numbers configured for the network.

DNS (Domain Name System)
DNS is the application layer protocol that locates and translates an Internet domain name (such as www.extron.com) into a numerical Internet Protocol (IP) address. A domain name is an easy-to-remember “handle” for an Internet address.

Driver A software package that controls the interface between the controller and peripheral devices.

Ethernet A network protocol that uses MAC addresses instead of IP addresses to exchange data between computers. Using ARP with TCP/IP support, Ethernet devices can be connected to the Internet. An Ethernet LAN typically uses unshielded twisted pair (UTP) wires. Ethernet systems currently provide transmission speeds of 10 Mbps, 100 Mbps (fast Ethernet), or 1000 Mbps (gigabit Ethernet).

FTP (File Transfer Protocol)
A protocol that is used to transfer files from one host to another host over a TCP-based network (such as the Internet). Also see Secure File Transfer Protocol (**SFTP**) for the version that incorporates security features.

HTTP (Hypertext Transfer Protocol)
A network protocol based on TCP/IP that is used to retrieve hypertext objects from remote web pages and allows servers to transfer and display web content to users.

HTTPS (Hypertext Transfer Protocol Secure)
A communications protocol for secure communication over a computer network. It allows web servers to transfer and display web content to users securely. All transferred data is encrypted so that only the recipient is able to access and read the content. It is not a protocol, itself, but rather a combination of Hypertext Transfer Protocol (HTTP) on top of the SSL/TLS protocol, which adds the security capabilities of SSL/TLS to standard HTTP communications.

ICMP (Internet Control Message Protocol)
ICMP is an Internet protocol used by network devices (routers, switches, and the like) to send error messages or relay query messages. Typically ICMP messages are used for diagnostic or control purposes or are sent to the source IP address in response to IP operations errors. Error messages include notices that a device is not available or that a host or router could not be reached.

IP (Internet Protocol) The protocol or standard used to send information from one computer to another on the Internet.

IP address — A unique, 32-bit, binary number (12 digit decimal number, xxx.xxx.xxx.xxx) that identifies each device or device port (an information sender and/or receiver) that is connected to a LAN, WAN, or the Internet. IP addresses can be static (see **static IP**) or dynamic (see **DHCP**).

IP net mask/subnet mask — See subnet mask.

MAC (Media Access Control) Address
A unique hardware number given to devices that connect to a network such as the Internet. When a computer or networking device (router, hub, interface, and the like) is connected to a LAN or the Internet, a table (which is used in ARP) relates the IP address of the device to its corresponding physical (MAC) address on the LAN. This protocol allows for several terminals or network nodes to communicate within a multi-point network, typically a local area network (LAN).

NTP (Network Time Protocol)
NTP is an Application layer networking protocol that synchronizes clocks among computers and other devices over networks.

Ping — A utility/diagnostic tool that tests network connections. It is used to determine if the host has an operating connection and is able to exchange information with another host.

Port number — A preassigned address within a server (such as the controller) that provides a direct route from the Application to the Transport layer or from the Transport layer to the Application of a TCP/IP system.

SFTP (Secure File Transfer Protocol)
Similar to FTP, this protocol adds encryption and requires credentials for file transfers.

SMTP (Simple Mail Transfer Protocol)
SMTP is an Internet standard for e-mail transmission. By default, SMTP uses TCP port 25. SMTP connections secured by SSL, known as SMTPS, default to port 465.

SNMP (Simple Network Management Protocol)
SNMP is an Application layer protocol that facilitates the exchange of basic network management information between network devices. It helps in monitoring of operations and factors such as bandwidth, memory usage, remote password resets, and collection of error information. This protocol collects (and configures) information from network devices (such as servers, hubs, switches, and routers) on an Internet Protocol (IP) network.

SSH (Secure Shell) — SSH is a network protocol for secure data communication and for providing various secure network services between two networked computers. SSH creates a secure channel over an insecure network to connect client and server devices. It allows confidential communications of passwords and similar data over public or otherwise insecure networks.

Static IP — An IP address that has been specifically (instead of dynamically—see **DHCP**) assigned to a device or system in a network configuration. This type of address requires manual configuration of the actual network device or system and can only be changed manually or by enabling DHCP.

Subnet — See subnetwork.

Subnet address — The portion of an IP address that is specifically identified by the subnet mask as the subnetwork.

Subnet mask — A 32-bit binary number (12 digit decimal number, xxx.xxx.xxx.xxx) used on subnets (smaller, local networks) to help routers determine which network traffic gets routed internally (within the subnetwork) to local computers and which network traffic goes out to the rest of the network or the Internet. It is an address mask used to identify the bits of an IP address that are used for the subnet address. Using a mask, the router does not need to examine all 32 bits, only those selected by the mask.

Subnetwork — A network that is part of a larger IP network and is identified by a subnet address. Networks can be segmented into subnetworks to provide a hierarchical, multilevel routing structure.

TCP (Transmission Control Protocol)

A connection-oriented protocol at the Transport layer of the Open Systems Interconnection (OSI, ISO/IEC 7498-1) reference model. It provides reliable end-to-end data delivery from one network device to another.

TCP/IP (Transmission Control Protocol/Internet Protocol)

The communication protocol of the Internet. Computers and devices with direct access to the Internet are provided with a copy of the TCP/IP program to allow them to send and receive information in an understandable form.

UDP (User Datagram Protocol)

A connectionless, Internet transport layer protocol that sends packets (datagrams) of information across networks using "best-effort" delivery. It is a relatively simple protocol that does not include handshaking. It is faster than TCP and is often used for broadcast and multicast communication, but it does not include data verification to ensure that all packets arrived at their destination.

URL (Uniform Resource Locator)

The address (such as www.extron.com) that lets a resource on the internet be identified, located, and accessed.

Extron Warranty

Extron Electronics 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 Electronics 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 Electronics
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 Electronics, 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
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 Electronics 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 Electronics be liable for direct, indirect, or consequential damages resulting from any defect in this product even if Extron Electronics 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.