MM-4XP Miniature Loudspeaker
MPS-488 Power Supply

Keep these important operating instructions.
Check www.meyersound.com for updates.

DECLARATION OF CONFORMITY ACCORDING TO ISO/IEC GUIDE 22 AND EN 45014

Manufacturer's Name:
Meyer Sound Laboratories Inc.

Manufacturer's Address:
2832 San Pablo Avenue
Berkeley, CA 94702-2204, USA

Declares that the products
Product Name: MM-4XP
MPS-488P
MPS-488E
Product Options: All

Conforms to the following Product Specifications
Safety: EN 60065: 2002
IEC 60065: 2005
UL 60065: 2006
EMC: EN 55103-1: 1997 emission (1)
EN 55103-2: 1997 immunity (2)

This device complies with EN 55103-1 & -2. Operation is subject to the following two conditions:
(1) this device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.

Supplementary Information
The product herewith complies with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC.

Office of Quality Manager
Berkeley, California USA
May 1, 2007

European Contact: Your local Meyer Sound dealer or Meyer Sound Germany, GmbH. Carl Zeiss Strasse 13, 56751 Polch, Germany.
Telephone: 49.2654.9600.58 Fax: 49.2654.9600.59

Environmental specifications for Meyer Sound Electronics products

Operating Temperature	0° C to +45° C
Non operating Temperature	<–40° C or >+75° C
Humidity	to 95% at 35° C
Operating Altitude	to 4600 m (15,000 ft)
Non operating Altitude	to 6300 m (25,000 ft)
Shock	30 g 11 msec half-sine on each of 6 sides
Vibration	10 Hz to 55 Hz (0.010 m peak-to-peak excursion)

Made by Meyer Sound Laboratories
Berkeley, California USA
European Office:
Meyer Sound Lab. GmbH
Carl Zeiss Strasse 13
56751 Polch, Germany
CE
Pending

TÜV Rheinland of North America, Inc.
C US
Pending

N775
Pending

MM-4XP Miniature Loudspeaker Operating Instructions

Printed in the U.S.A.

Part Number: 05.163.005.01 A

SYMBOLS USED

These symbols indicate important safety or operating features in this booklet and on the chassis:

			
Dangerous voltages: risk of electric shock	Important operating instructions	Frame or chassis	Protective earth ground
Pour indiquer les risques résultant de tensions dangereuses	Pour indequer important instructions	Masse, châssis	Terre de protection
Warnung vor gefährlicher elektrischer Spannung	Wichtige Betriebsanweisung oder Gebrauchsanleitung	Rahmen oder Gehäuse	Masse Schutzleiter
Para indicar voltajes peligrosos	Instrucciones importantes de funcionamiento y/o manteniento	Armadura o chassis	Tierra proteccionista

IMPORTANT SAFETY INSTRUCTIONS

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this loudspeaker near water.
6. Clean only with dry cloth.
7. Do not block any ventilation openings. Install in accordance with Meyer Sound's installation instructions.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus that produce heat.
9. Do not defeat the safety purpose of the grounding-type plug. A grounding type plug has two blades and a third grounding prong. The third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10. Protect the power cord from being walked on or pinched, particularly at plugs, convenience receptacles, and the point where they exit from the loudspeaker. The AC mains plug or appliance coupler shall remain readily accessible for operation.
11. Only use attachments/accessories specified by Meyer Sound.
12. Use only with the caster rails or rigging specified by Meyer Sound, or sold with the loudspeaker. Handles are for carrying only.

    ⚠ **CAUTION:** Rigging should only be done by experienced professionals.

13. Unplug this loudspeaker during lightning storms or when unused for long periods of time.
14. Refer all servicing to qualified service personnel. Servicing is required when the loudspeaker has been damaged in any way, such as when the power-supply cord or plug has been damaged; liquid has been spilled or objects have fallen into the loudspeaker; rain or moisture has entered the loudspeaker; the loudspeaker has been dropped; or when for undetermined reasons the loudspeaker does not operate normally.

SAFETY SUMMARY

English

- To reduce the risk of electric shock, disconnect the loudspeaker from the AC mains before installing audio cable. Reconnect the power cord only after making all signal connections.
- Connect the loudspeaker to a two-pole, three-wire grounding mains receptacle. The receptacle must be connected to a fuse or circuit breaker. Connection to any other type of receptacle poses a shock hazard and may violate local electrical codes.
- Do not install the loudspeaker in wet or humid locations without using weather protection equipment from Meyer Sound.
- Do not allow water or any foreign object to get inside the loudspeaker. Do not put objects containing liquid on or near the unit.
- To reduce the risk of overheating the loudspeaker, avoid exposing it to direct sunlight. Do not install the unit near heat-emitting appliances, such as a room heater or stove.
- This loudspeaker contains potentially hazardous voltages. Do not attempt to disassemble the unit. The unit contains no user-serviceable parts. Repairs should be performed only by factory-trained service personnel.

Français

- Pour réduire le risque d'électrocution, débrancher la prise principale de l'haut-parleur, avant d'installer le câble d'interface allant à l'audio. Ne rebrancher le bloc d'alimentation qu'après avoir effectué toutes les connections.
- Branchez l'haut-parleur dans une prise de courant à 3 dérivations (deux pôles et la terre). Cette prise doit être munie d'une protection adéquate (fusible ou coupe-circuit). Le branchement dans tout autre genre de prise pourrait entraîner un risque d'électrocution et peut constituer une infraction à la réglementation locale concernant les installations électriques.
- Ne pas installer l'haut-parleur dans un endroit où il y a de l'eau ou une humidité excessive.
- Ne pas laisser de l'eau ou tout objet pénétrer dans l'haut-parleur. Ne pas placer de r´cipients contenant un liquide sur cet appareil, ni à proximité de celui-ci.
- Pour éviter une surchauffe de l'haut-parleur, conserver-la à l'abri du soleil. Ne pas installer à proximité d'appareils dégageant de la chaleur tels que radiateurs ou appareils de chauffage.
- Ce haut-parleur contient des circuits haute tension présentant un danger. Ne jamais essayer de le démonter. Il n'y a aucun composant qui puisse être réparé par l'utilisateur. Toutes les réparations doivent être effectuées par du personnel qualifié et agréé par le constructeur.

Deutsch

- Um die Gefahr eines elektrischen Schlages auf ein Minimum zu reduzieren, den Lautsprecher vom Stromnetz trennen, bevor ggf. ein Audio-Schnittstellensignalkabel angeschlossen wird. Das Netzkabel erst nach Herstellung aller Signalverbindungen wieder einstecken.
- Der Lautsprecher an eine geerdete zweipolige Dreiphasen-Netzsteckdose anschließen. Die Steckdose muß mit einem geeigneten Abzweigschutz (Sicherung oder Leistungsschalter) verbunden sein. Der Anschluß der unterbrechungsfreien Stromversorgung an einen anderen Steckdosentyp kann zu Stromschlägen führen und gegen die örtlichen Vorschriften verstoßen.
- Der Lautsprecher nicht an einem Ort aufstellen, an dem sie mit Wasser oder übermäßig hoher Luftfeuchtigkeit in Berührung kommen könnte.
- Darauf achten, daß weder Wasser noch Fremdkörper in das Innere den Lautsprecher eindringen. Keine Objekte, die Flüssigkeit enthalten, auf oder neben die unterbrechungsfreie Stromversorgung stellen.
- Um ein Überhitzen dem Lautsprecher zu verhindern, das Gerät vor direkter Sonneneinstrahlung fernhalten und nicht in der Nähe von wärmeabstrahlenden
- Haushaltsgeräten (z.B. Heizgerät oder Herd) aufstellen.
- Im Inneren diesem Lautsprecher herrschen potentiell gefährliche Spannungen. Nicht versuchen, das Gerät zu öffnen. Es enthält keine vom Benutzer reparierbaren Teile. Reparaturen dürfen nur von ausgebildetem Kundenienstpersonal durchgeführt werden.

Español

- Para reducir el riesgo de descarga eléctrica, desconecte de la red de voltaje el altoparlante antes de instalar el cable de señal de audio. Vuelva a conectar la alimentacion de voltaje una vez efectuadas todas las interconexiones de señalizacion de audio.
- Conecte el altoparlante a un tomacorriente bipolar y trifilar con neutro de puesta a tierra. El tomacorriente debe estar conectado a la protección de derivación apropiada (ya sea un fusible o un disyuntor). La conexión a cualquier otro tipo de tomacorriente puede constituir peligro de descarga eléctrica y violar los códigos eléctricos locales.
- No instale el altoparlante en lugares donde haya agua o humedad excesiva.
- No deje que en el altoparlante entre agua ni ningún objeto extraño. No ponga objetos con líquidos encima de la unidad ni cerca de ella.
- Para reducir el riesgo de sobrecalentamiento, no exponga la unidad a los rayos directos del sol ni la instale cerca de artefactos que emiten calor, como estufas o cocinas.
- Este altoparlante contiene niveles de voltaje peligrosos en potencia. No intente desarmar la unidad, pues no contiene piezas que puedan ser reparadas por el usuario. Las reparaciones deben efectuarse únicamente por parte del personal de mantenimiento capacitado en la fábrica.

CONTENTS

CHAPTER 1: INTRODUCTION

HOW TO USE THIS MANUAL

Make sure to read these operating instructions in their entirety before configuring a loudspeaker system with MM-4XPs. In particular, pay close attention to material related to safety issues.

As you read these operating instructions, you will encounter the following icons for notes, tips, and cautions:

NOTE: A note identifies an important or useful piece of information relating to the topic under discussion.

TIP: A tip offers a helpful tip relevant to the topic at hand.

CAUTION: A caution gives notice that an action may have serious consequences and could cause harm to equipment or personnel, or could cause delays or other problems.

Information and specifications are subject to change. Updates and supplementary information are available on the Meyer Sound® website:

http://www.meyersound.com

Meyer Sound Technical Support is available at:

- **Tel:** +1 510 486.1166
- **Fax:** +1 510 486.8356
- **Email:** techsupport@meyersound.com

THE MM-4XP MINIATURE LOUDSPEAKER

The MM-4XP miniature loudspeaker is a self-powered loudspeaker designed for high-quality distributed systems. Housed in a compact aluminum enclosure, the MM-4XP is especially suitable for installations involving space limitations and visibility concerns. The loudspeaker's proprietary 4-inch cone transducer, manufactured at Meyer Sound's Berkeley factory, delivers an impressive maximum peak SPL of 113 dB (measured with music referred to 1 meter), and has a wide operating frequency range of 120 Hz to 18 kHz with very low distortion. The MM-4XP exhibits the same high intelligibility and flat frequency and phase responses for which Meyer Sound loudspeakers are known. Peak and rms limiters regulate loudspeaker temperatures and excursion, ensuring that the MM-4XP performs exceedingly well even when driven into overload.

MM-4XP Loudspeaker

The MM-4XP's amplifier and signal-processing circuits are designed to store DC power and tolerate voltage drops, thereby accommodating light-gauge cables and long cable runs. The MM-4XP receives balanced audio and DC power from a SwitchCraft® EN3™ 5-pin male connector on its rear panel. The sealed EN3 connector provides protection against harsh environmental conditions when the MM-4XP is installed outdoors.

MM-4XP loudspeaker systems require an MPS-488 external power supply. The single-space 19-inch rack unit receives eight channels of balanced audio from its XLR female inputs and routes the audio, along with 48 V of DC power, to its eight Channel Outputs. The outputs — equipped with either Phoenix 5-pin male connectors on the MPS-488P model, or EN3 5-pin female connectors on the MPS-488E model — can deliver DC power to the MM-4XP loudspeakers at cable lengths of up to 300 feet with just 1 dB of loss in peak SPL using 18 AWG wire. The use of composite multiconductor cables (such as Belden® 1502) allows a single cable to carry both audio and DC power to the MM-4XP. Longer cable lengths are possible for moderate applications that don't drive the loudspeakers to maximum output, or for installations with heavier wire gauges.

MPS-488P Power Supply

The MPS-488 front panel has two LEDs per output channel that provide useful feedback on the status of the system. The Voltage LEDs indicate when voltage is present for each output channel. The Load Current LEDs indicate when a loudspeaker is connected to an output and glow brighter as the signal level increases.

The MM-4XP's extruded aluminum enclosure acts as a heat sink to dissipate heat from the driver's voice coil. The enclosure is available in standard white or black anodized finishes with a perforated steel grille. It can also be custom painted to match specific color schemes. The MUB-MM4XP U-bracket mounts the loudspeaker on walls and ceilings at adjustable angles. The U-bracket is also available in standard white or black anodized finishes and custom colors.

MM-4XP Loudspeaker Mounted with MUB-MM4XP U-Bracket

CHAPTER 2: THE MPS-488 POWER SUPPLY

The MPS-488 power supply was designed to deliver DC power and balanced audio to up to eight MM-4XP loudspeakers. The MPS-488 is a switched-mode regulated power supply that occupies one space in a standard 19-inch rack. There are two MPS-488 models available: the MPS-488P, which has Phoenix 5-pin male output connectors, and the MPS-488E, which has EN3 5-pin female output connectors.

THE MPS-488 FRONT PANEL

The MPS-488 front panel includes a power switch, LEDs for monitoring each of the eight loudspeaker channels, and fuses for each channel.

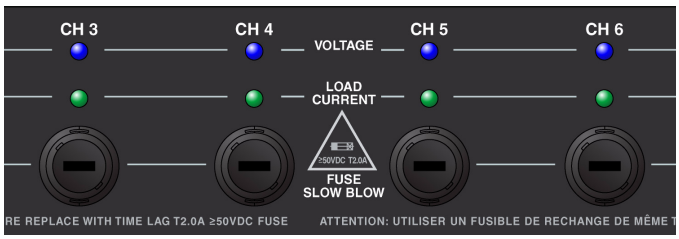
MPS-488P Power Supply Front Panel

AC Power

The MPS-488 is powered on and off with the AC Power switch.

Voltage and Load Current LEDs (1–8)

The Voltage and Load Current LEDs are useful for verifying whether each of the eight Channel Outputs have voltage and whether the connected MM-4XP loudspeakers are receiving DC power and audio.



MPS-488 Channel LEDs and Fuses

Voltage LEDs (1–8)

The blue Voltage LEDs indicate whether voltage is present for each of the eight Channel Outputs. These LEDs should be lit when the MPS-488 is powered on. If a channel is not lit, its fuse may need to be replaced. If a group of two Voltage LEDs is not lit (1–2, 3–4, 5–6 or 7–8), one of the four MPS-488 internal power supplies may have failed.

Load Current LEDs (1–8)

The green Load Current LEDs indicate whether a loudspeaker is connected to the channel and receiving power. As a channel's audio signal increases, its LED glows brighter. If an LED is not lit, check that the channel's Voltage LED is lit (the fuse is working) and verify the cable connection to the loudspeaker.

Fuse Slow Blow (1–8)

Each loudspeaker channel is protected with its own fuse. A maximum of one loudspeaker can be connected per channel; connecting more than that could cause the fuse to be tripped.

NOTE: When replacing fuses, make sure to use a 2-amp, 250-volt slow-blow fuse (T2A-250V). These fuses are available from Meyer Sound (PN 420.027).

THE MPS-488 REAR PANEL

The MPS-488 rear panel includes an AC connector, eight Channel Inputs for receiving source audio, and eight Channel Outputs for delivering DC power and balanced audio to the MM-4XP loudspeakers. The rear panel is different for the two MPS-488 models: the MPS-488P has Phoenix 5-pin male output connectors, and the MPS-488E has EN3 5-pin female output connectors.

MPS-488P Power Supply Rear Panel

MPS-488E Power Supply Rear Panel

AC Input

The MPS-488 has a PowerCon twist-lock AC connector (line, neutral/line, earth). The connector can accept different power cord types for outlets used throughout the world. Make sure to use the correct power cord for the AC power in your area. The MPS-488 operates at an AC voltage range of 100–240 V at 50–60 Hz.

Channel Inputs

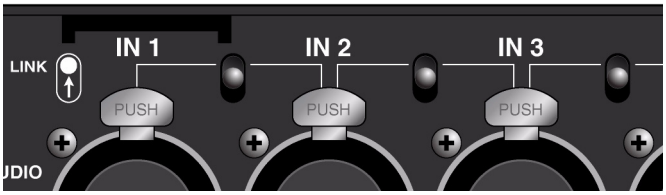
Up to eight channels of balanced audio are received via the MPS-488's eight Channel Inputs. The inputs are equipped with XLR female connectors (pin 1, ground; pin 2, signal positive; pin 3, signal negative) and have an input impedance of 10 kOhms. Make sure to use standard balanced XLR cables with all three pins connected on both ends.

MPS-488 Channel Inputs

Channel Inputs default to being routed to their corresponding Channel Outputs but can also be routed to adjacent outputs with the Link switches, though this affects their input impedance (see "Input Impedance for Linked Channel Inputs" on page 11).

Link Switches

Link switches determine how Channel Inputs are routed to Channel Outputs. When a Channel Input's Link switch is disabled (set to the down position), the input is only routed to its corresponding Channel Output (for example, Channel Input 1 routed to Channel Output 1). When a Link switch is enabled (set to the up position), the input is routed to its corresponding Channel Output and the next adjacent Channel Output. If multiple, adjacent Link switches are enabled, the input is routed to each adjacent Channel Output.



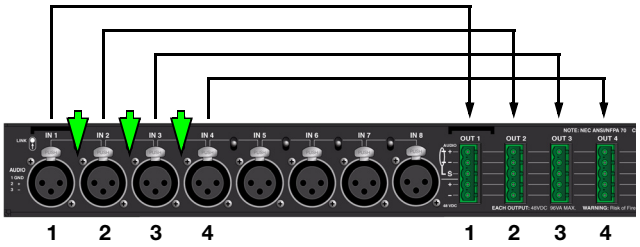
MPS-488 Audio Input

NOTE: Channel Inputs are inactive when the Link switch for their preceding Channel Input is enabled. Connections should not be made to inactive Channel Inputs.

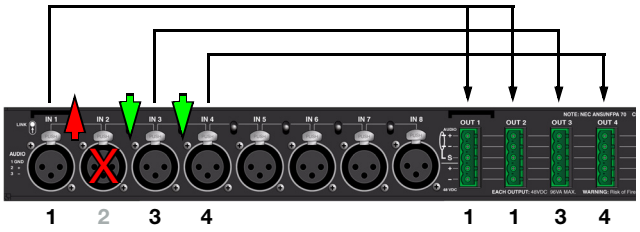
How Linked Input Channels Are Routed

The following examples illustrate how the Link switches for Input Channels 1–4 can be used to affect their routing to Channel Outputs.

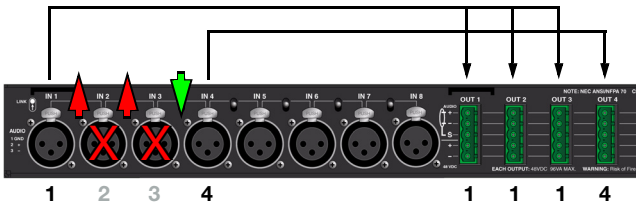
- When Link switches 1–3 are off, Channel Inputs 1–4 are routed to their corresponding Channel Outputs.



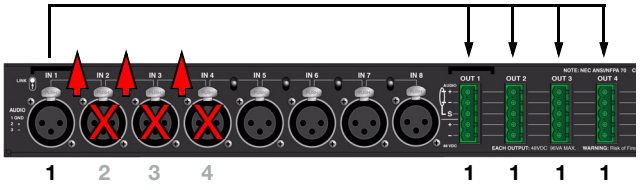
- When Link switch 1 is on and Link switches 2–3 are off, Channel Input 1 is routed to Channel Outputs 1–2, and Channel Inputs 3–4 are routed to their corresponding Channel Outputs. Channel Input 2 is inactive.



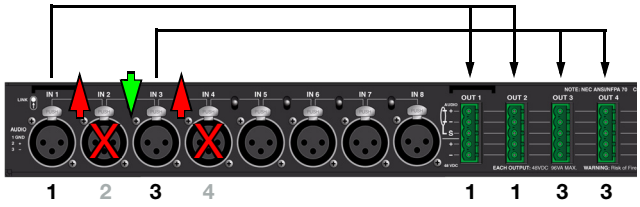
- When Link switches 1–2 are on and Link switch 3 is off, Channel Input 1 is routed to Channel Outputs 1–3, and Channel Input 4 is routed to Channel Output 4. Channel Inputs 2 and 3 are inactive.



- When Link switches 1–3 are on, Channel Input 1 is routed to Channel Outputs 1–4. Channel Inputs 2–4 are inactive.



- When Link switches 1 and 3 are on and Link switch 2 is off, Channel Input 1 is routed to Channel Outputs 1–2, and Channel Input 3 is routed to Channel Outputs 3–4. Channel Inputs 2 and 4 are inactive.



Common Routing Examples

Table 1 lists some of the more common routing applications for the MPS-488 Link switches.

Table 1: MPS-488 Routing Examples

Routing Application	Link 1	Link 2	Link 3	Link 4	Link 5	Link 6	Link 7
INs 1–8 to OUTs 1–8	Off	Off	Off	Off	Off	Off	Off
IN 1 to OUTs 1–4, IN 5 to OUTs 5–8	On	On	On	Off	On	On	On
IN 1 to OUTs 1–2, IN 3 to OUTs 3–4, IN 5 to OUTs 5–6, IN 7 to OUTs 7–8	On	Off	On	Off	On	Off	On
IN 1 to OUTs 1–8	On	On	On	On	On	On	On

Input Impedance for Linked Channel Inputs

When a Link switch is enabled, the Channel Input's unbuffered source signal is transmitted in parallel to each linked Channel Output. This causes the Channel Input's impedance (normally 10 kOhms for one MM-4XP) to be reduced for each linked Channel Output. For example:

- 1 Channel Output, 10 kOhm input impedance
- 2 Channel Outputs, 5 kOhm input impedance
- 4 Channel Outputs, 2500 ohms input impedance
- 8 Channel Outputs, 1250 ohms input impedance

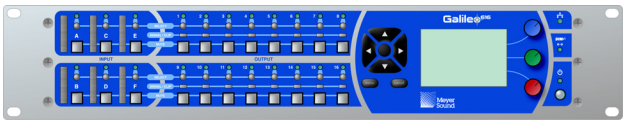
To avoid distortion when linking Channel Inputs, make sure the source device can drive the total load impedance of the linked MM-4XP loudspeakers. The source device must be capable of delivering a minimum of 16 dBV (6.3 V rms into 600 ohms) to yield the maximum peak SPL over the operating bandwidth of the loudspeaker.

NOTE: Most source devices are capable of driving loads no smaller than 10 times their output impedance. To drive eight MM-4XPs linked from a single Channel Input, the source device should have an output impedance of approximately 100 ohms or less.

For large loudspeaker systems with many loudspeakers, a loudspeaker management system like Meyer Sound's Galileo® is recommended. Galileo audio outputs can drive two MPS-488 power supplies with all Channel Outputs linked (a total of 16 MM-4XP loudspeakers). Therefore, a single Galileo with 16 audio outputs can drive 32 MPS-488 power supplies and 256 MM-4XP loudspeakers.

Galileo Loudspeaker Management System

Meyer Sound's Galileo loudspeaker management system is a comprehensive solution for driving and aligning loudspeaker systems, especially those comprised of Meyer Sound self-powered loudspeakers. The Galileo 616 is a two-space rack unit with six inputs and 16 low-latency outputs. Processing for the outputs includes gain, polarity, delay, high- and low-pass filters, equalization (parametric and TruShaping), and atmospheric correction.



Galileo 616

The Galileo 616 can be controlled from its intuitive front panel or from the extensive Compass™ software running on a Windows or Mac® computer. The Galileo system also interfaces seamlessly with Meyer Sound's SIM® 3 audio analyzer.

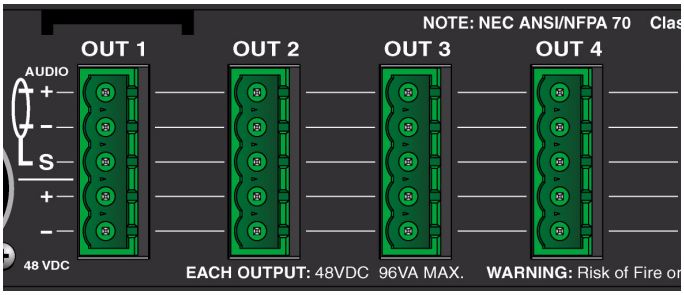
Channel Outputs

The eight Channel Outputs deliver DC power (48 V DC) and balanced audio to up to eight loudspeakers. Each Channel Output can drive one MM-4XP loudspeaker and is equipped with either Phoenix 5-pin male connectors (on the MPS-488P model) or EN3 5-pin male connectors (on the MPS-488E model).

⚠ **CAUTION:** When wiring cable connections for the MPS-488 Channel Outputs, it is extremely important that each pin in the connector is wired correctly. Make sure the 48 V DC from the MPS-488 is wired directly (and only) to the 48 V DC pins on the MM-4XP connector, and that the polarity is observed (negative to negative, positive to positive) to avoid damage to the loudspeaker. In addition, make sure the audio pins are wired correctly; polarity reversals for audio signals can affect system performance.

MPS-488P Channel Outputs

The MPS-488P Channel Outputs use Phoenix 5-pin male connectors with three pins for balanced audio (positive, negative, and shield) and two for DC Power (positive and negative). These pins are clearly labeled on the MPS-488P rear panel. A single composite cable (such as Belden 1502) wired for both DC power and balanced audio can be used to connect to each MM-4XP.

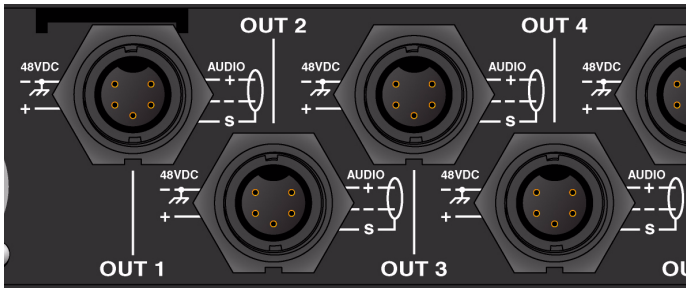


MPS-488P Channel Outputs

Each MPS-488P comes with eight Phoenix 5-pin female cable connectors for assembling MM-4XP loudspeaker cables. For information on MM-4XP cable requirements, see “MM-4XP Current Draw and Cable Requirements” on page 16. For information on cables and cable accessories available from Meyer Sound, see Appendix B, “MM-4XP Accessories.” For information on cable assembly, see Appendix C, “MM-4XP Cable Assembly.”

MPS-488E Channel Outputs

The MPS-488E Channel Outputs use EN3 5-pin female connectors with three pins for balanced audio (positive, negative, and shield) and two for DC Power (positive and negative). These pins are clearly labeled on the MPS-488E rear panel. A single composite cable (such as Belden 1502) wired for both DC power and balanced audio can be used to connect to each MM-4XP.



MPS-488E Channel Outputs

Each MPS-488E comes with eight EN3 5-pin male cable connectors for assembling MM-4XP loudspeaker cables. For information on MM-4XP cable requirements, see “MM-4XP Current Draw and Cable Requirements” on page 16. For information on cables and cable accessories available from Meyer Sound, see Appendix B, “MM-4XP Accessories.” For information on cable assembly, see Appendix C, “MM-4XP Cable Assembly.”

MPS-488 CURRENT DRAW

The current that the MPS-488 and its connected loudspeakers draw from its AC source (wall outlet or power distribution system) is dynamic and fluctuates as operating levels change. Since different cables and circuit breakers heat up at varying rates, it is important to understand the following types of current ratings and how they affect circuit breaker and cable specifications.

- **Idle Current** — The maximum rms current during idle periods.
- **Maximum Long-Term Continuous Current** — The maximum rms current during a period of at least 10 seconds. The Maximum Long-Term Continuous Current is used to calculate temperature increases for cables, to ensure that cable sizes and gauges conform to electrical code standards. This current rating is also used as a rating for slow-reacting thermal breakers.

- **Burst Current** — The maximum rms current during a period of around one second. The Burst Current is used as a rating for magnetic breakers. It is also used for calculating the peak voltage drop in long AC cable runs according to the following formula:

  V pk (drop) = I pk x R (cable total)

- **Ultimate Short-Term Peak Current** — A rating for fast-reacting magnetic connectors.

You can use the following table as a guide for selecting cable gauges and circuit breaker ratings for the system's operating voltage.

Current Draw for MPS-488 with Eight MM-4XPs

Current Draw (Eight MM-4XPs)	115 V AC	230 V AC	100 V AC
Idle Current	1.16 A rms	1.00 A rms	1.26 A rms
Maximum Long-Term Continuous Current	2.20 A rms	1.38 A rms	2.60 A rms
Burst Current	3.6 A rms	2.2 A rms	4.3 A rms
Ultimate Short-Term Peak Current	8.8 A peak	4.6 A peak	9.6 A peak

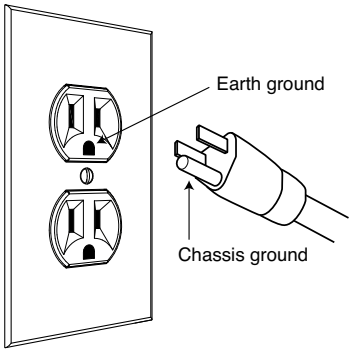
The minimum electrical service amperage required by an MPS-488 is the sum of the Maximum Long-Term Continuous Current for all MM-4XPs connected to the MPS-488. An additional 30 percent above the minimum amperage is recommended to prevent peak voltage drops at the service entry.

NOTE: For best performance, the AC cable voltage drop should not exceed 10 V, or 10 percent at 115 V and 5 percent at 230 V. Make sure that even with AC voltage drops that the AC voltage always remains within the operating window.

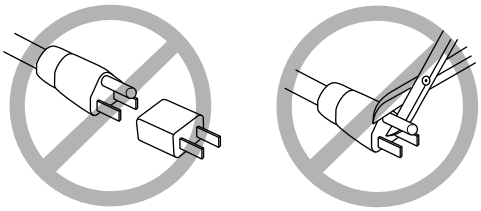
SAFETY ISSUES

Pay close attention to these important electrical and safety issues.

- The MPS-488 requires a grounded outlet.



- Do not use a ground-lifting adapter or cut the AC cable ground pin.



- Keep all liquids away from the MPS-488 to avoid hazards from electrical shock.
- Do not operate the unit if the power cables are frayed or broken.

CHAPTER 3: THE MM-4XP LOUDSPEAKER

THE MM-4XP CONNECTOR

The MM-4XP receives DC power and balanced audio from a EN3 5-pin male connector on its rear panel. The connector's five pins include two for DC power (negative and positive) and three for balanced audio (shield, negative, and positive). To function properly, the MM-4XP requires 48 V of DC power.

MM-4XP Connector

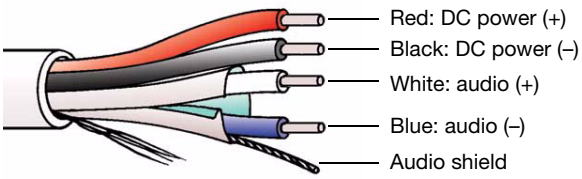
A single composite cable (such as Belden 1502) wired for both DC power and balanced audio can be used to connect the MM-4XP to one of the MPS-488's eight Channel Outputs.

Wiring the EN3-to-Pigtail Cables

Each MM-4XP loudspeaker comes with one EN3 5-pin female to pigtail cable. The EN3 end of the cable connects directly to the MM-4XP connector. The pigtail end of the cable can be equipped with either an EN3 5-pin male connector for connecting to the MPS-488E power supply, or a Phoenix 5-pin female connector for connecting to the MPS-488E power supply. The pigtail can also be spliced to a longer loudspeaker cable or to a junction box. The included EN3-to-pigtail cable uses Belden 1502 cable, which can be wired for both DC power and balanced audio. The EN3-to-pigtail cable is available in plenum or regular (non-plenum) versions.

NOTE: For a complete list of cables and cable connectors available from Meyer Sound that can be used with the MM-4XP loudspeaker and MPS-488 power supply, see Appendix B, "MM-4XP Accessories."

When assembling MM-4XP loudspeaker cables with the included EN3-to-pigtail cables, make sure to use the wiring scheme in Table 2. The red and black wires in Belden 1502 cable have a thicker gauge than the other three wires and should be used for DC power. The blue, white, and shield wires should be used for audio.



Belden 1502 Composite Cable

NOTE: For details on assembling MM-4XP loudspeaker cables, see Appendix C, "MM-4XP Cable Assembly."

Table 2: MM-4XP Cable Wiring for Belden 1502

Wire	Gauge	Signal
Red	18 AWG	DC power, positive (+)
Black	18 AWG	DC power, negative (–)
White	22 AWG	Balanced audio, positive (+)
Blue	22 AWG	Balanced audio, negative (–)
Shield	24 AWG	Balanced audio, shield

When wiring MM-4XP cables, it is extremely important that each pin in the cable be wired so that the pins in the MM-4XP connector align with those in the MPS-488 Channel Output connector (see "Channel Outputs" on page 12). Make sure the 48 V DC from the MPS-488 is wired directly (and only) to the 48 V DC pins on the MM-4XP connector, and that the polarity is observed (negative to negative, positive to positive) to avoid damage to the loudspeaker. In addition, make sure the audio pins are wired correctly; polarity reversals for audio signals can affect system performance.

NOTE: For information on MM-4XP cable requirements, see "MM-4XP Current Draw and Cable Requirements" on page 16.

MM-4XP Current Draw and Cable Requirements

Each MM-4XP loudspeaker draws a maximum current of 0.7 A rms and 2.2 A peak from the 48 V DC output of the MPS-488. The current draw for the MM-4XP is dynamic and fluctuates as operating levels change. The cabling between the MM-4XP and the MPS-488 adds resistance and hence causes a voltage drop at the loudspeaker. Because lower voltages compromise peak SPL, and in some cases frequency response, cable resistance should be minimized.

NOTE: When connecting an MM-4XP to an MPS-488 Channel Output, the total cable resistance should not exceed 4 ohms.

Cable Lengths and Cable Gauges for MM-4XPs

When connecting an MM-4XP to an MPS-488 Channel Output, you can use cable lengths of up to 300 feet with only 1 dB of peak SPL loss using 18 AWG wire. Longer cable lengths are possible with heavier wire gauges (see Table 3 and Table 4).

NOTE: For music playback at moderate levels (when the MM-4XP is not driven to maximum output), cable lengths of up to 500 feet with 18 AWG wire are acceptable.

Table 3: MM-4XP Loudspeaker Cable Lengths (AWG)

Cable Gauge	Resistance (Ω/ft)	Approximate Max. Length
12 AWG	0.0016	1200 ft
14 AWG	0.00253	750 ft
16 AWG	0.00402	475 ft
18 AWG	0.00636	300 ft
20 AWG	0.01008	175 ft

Table 4: MM-4XP Loudspeaker Cable Lengths (European)

Cable Gauge	Resistance (Ω/m)	Approximate Max. Length
2.50 mm^2	0.0052	365 m
1.50 mm^2	0.01076	175 m
1.00 mm^2	0.02087	90 m
0.75 mm^2	0.03307	55 m

The maximum cable length for an MM-4XP can be calculated with the following formula:

maximum length = 4 ohms / 2 * cable resistance

For example, the maximum length of an 18 AWG cable with a resistance of 0.00636 is 314.4 feet (4 / 2 * 0.00636).

NOTE: For long cable runs, you can use large cable gauges for most of the run and then terminate with the included EN3-to-pigtail cable.

THE MM-4XP LED

The MM-4XP has a three-color LED on its rear panel that changes color to indicate the loudspeaker's status.

Powering On (Green)

When powering up the MM-4XP loudspeaker, the following startup events occur and are indicated by the LED:

1. The LED flashes green and then yellow during power up.
2. The LED turns solid green indicating the loudspeaker is ready to reproduce audio.

CAUTION: If the MM-4XP LED turns red and stays solid red after powering up and the audio is muted, the loudspeaker has encountered a failure and may need to be serviced. Contact Meyer Sound Technical Support.

CAUTION: If the MM-4XP LED turns solid red and the loudspeaker continues to output audio, though at reduced levels, the loudspeaker's voltage may have dropped below 25 V DC. Operation of the loudspeaker under these conditions is not recommended and the loudspeaker's power supply and cabling should be verified.

Limiting (Yellow)

Limiting activity is indicated when the MM-4XP LED turns yellow. When engaged, the limiter protects the loudspeaker's driver and prevents signal peaks from causing excessive distortion in the loudspeaker's amplifier, thereby preserving headroom and maintaining smooth frequency response at high levels. When the level returns to normal, below the limiter's threshold, the LED turns green and limiting ceases.

The MM-4XP performs within its acoustical specifications at normal temperatures when the MM-4XP LED is green, or if the LED turns yellow for two seconds or less and then turns green for at least one second. If the LED remains yellow for longer than three seconds, that loudspeaker enters hard limiting where:

- Increases to the input level have no effect.
- Distortion increases due to clipping and nonlinear driver operation.
- The driver is subjected to excessive heat and excursion, which will compromise its life span and may eventually lead to damage over time.

⚠ **CAUTION:** The MM-4XP LED turns yellow when the loudspeaker's signal goes 2 dB beyond the actual onset of limiting, and indicates a safe, optimum level has been exceeded. If the MM-4XP loudspeakers in a system begin to limit before reaching the required SPL, consider adding more loudspeakers to the system to achieve the desired SPL without exposing the loudspeakers to excessive levels and possible overheating.

Loudspeaker Temperature and Limiting

The MM-4XP LED turns solid yellow when the temperature of the MM-4XP heatsink reaches 65° C (145° F), indicating the unit is reaching its maximum heat dissipation and a reduction in SPL is recommended. While the MM-4XP will continue to operate while the LED is yellow, the limiter threshold is lowered to a safe level (causing the output level to be lowered by 6 dB) to prevent the loudspeaker from overheating. When the temperature of the MM-4XP heatsink cools to 50°C (122°F), the LED changes from yellow to green and the limiter threshold returns to normal.

Clipping (Red)

The MM-4XP LED flashes red when its input signal causes the amplifier to overload. If the LED flashes red continuously, the loudspeaker is severely overloaded and a reduction in the input level is recommended.

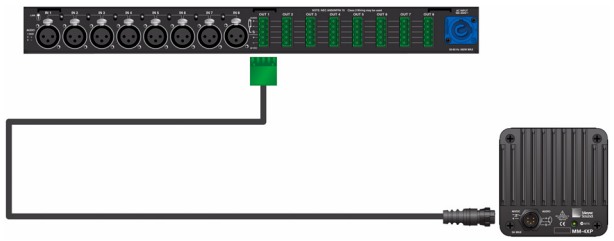
⚠ **CAUTION:** If the MM-4XP LED turns solid red and the loudspeaker continues to output audio, though at reduced levels, the loudspeaker's voltage may have dropped below 25 V DC. Operation of the loudspeaker under these conditions is not recommended and the loudspeaker's power supply and cabling should be verified.

CONNECTING MM-4XP LOUDSPEAKERS TO THE MPS-488

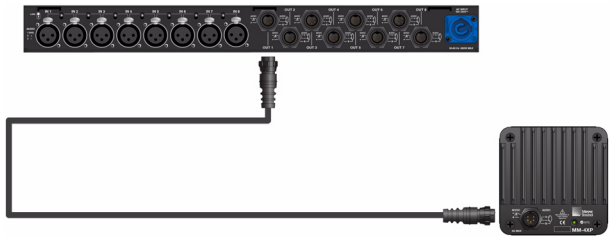
To connect MM-4XP loudspeakers to the MPS-488:

1. Power off the MPS-488.
2. Connect audio sources (from a mixer or processor) to the MPS-488 Channel Inputs. Use balanced XLR cables.
3. Use the MPS-488 Link switches to route Channel Inputs to the desired Channel Outputs.
4. Connect the MM-4XP loudspeakers to the MPS-488 Channel Outputs. Use a composite cable (such as Belden 1502) wired for both DC power and balanced audio and outfitted with the appropriate connector:

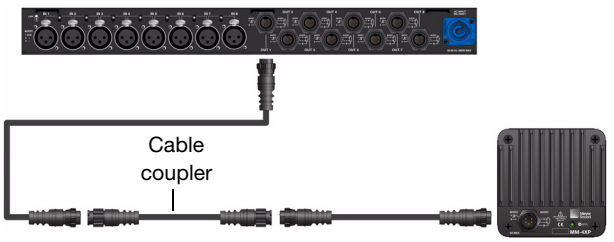
- For an MPS-488P power supply, use an EN3 5-pin female to Phoenix 5-pin female cable.



- For an MPS-488E power supply, use an EN3 5-pin female to EN3 5-pin male cable.



- To join two cables, one with an EN3 5-pin male cable mount connector to one with an EN3 5-pin female cable mount connector, use an EN3 5-pin female-to-male cable coupler (PN 28.163.033.01).



⚠ **CAUTION:** Make sure the MM-4XP loudspeaker cables are wired correctly. For details on assembling loudspeaker cables, see Appendix C, “MM-4XP Cable Assembly.”

5. Power on the MPS-488 and monitor the LEDs on the front panel to verify connections (for more information, see “Voltage and Load Current LEDs (1–8)” on page 9).
6. Check the MM-4XP LEDs on the rear panel and verify they are green (ready to reproduce audio).
7. Enable output from the audio sources (from the mixer or processor) connected to the MPS-488.

CHAPTER 4: MOUNTING THE MM-4XP

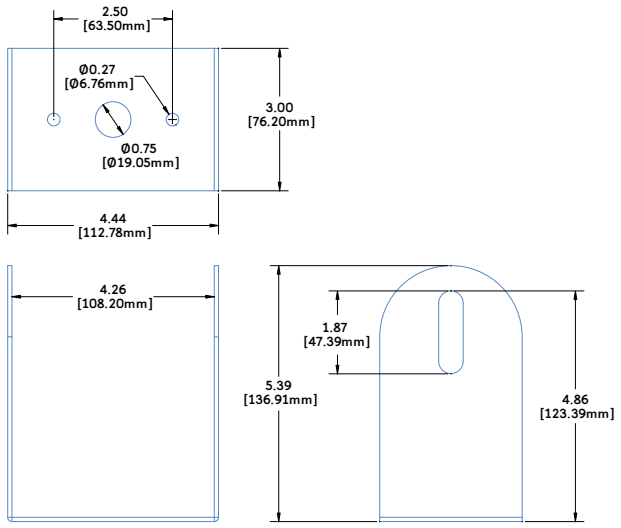
IMPORTANT SAFETY CONSIDERATIONS

When installing Meyer Sound loudspeakers, the following precautions should always be observed:

- All Meyer Sound products must be used in accordance with local, state, federal, and industry regulations. It is the owner's and user's responsibility to evaluate the reliability of any rigging method for their application. Rigging should only be carried out by experienced professionals.
- Use mounting and rigging hardware that has been rated to meet or exceed the weight being hung.
- Make sure to attach mounting hardware to the building's structural components (studs or joists), and not just to the wall surface. Verify that the building's structure and the anchors used for the installation will safely support the total weight of the mounted loudspeakers.
- Use mounting hardware appropriate for the surface where the loudspeaker will be installed.
- Make sure bolts and eyebolts are tightened securely. Meyer Sound recommends using Loctite® on eyebolt threads and safety cables.
- Inspect mounting and rigging hardware regularly. Immediately replace any worn or damaged components.

MOUNTING THE MM-4XP WITH THE MUB-MM4XP U-BRACKET

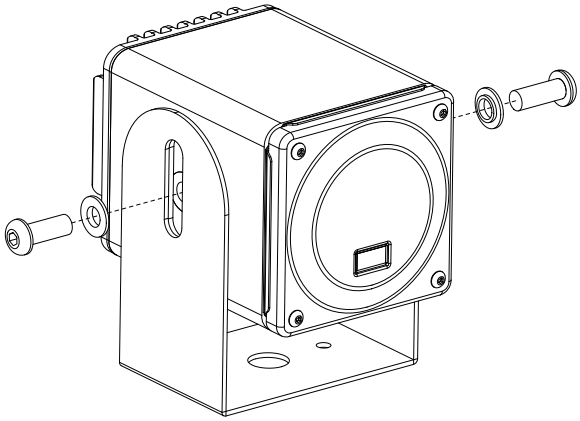
The MUB-MM4XP U-bracket allows the MM-4XP to be mounted on virtually any flat surface at adjustable angles.



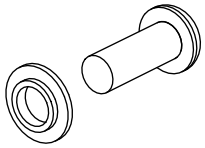
MUB-MM4XP U-Bracket Dimensions

To mount the MM-4XP with the MUB-MM4XP U-bracket:

1. Mount the MUB-MM4XP U-bracket to the mounting surface using screws in the two holes in the back of the U-bracket. Use fastening hardware appropriate for the mounting surface.
2. Insert the MM-4XP into the U-bracket, seating its sides against the bracket's attached neoprene strips. Align the loudspeaker's screw inserts near the top of the U-bracket's slots to allow for maximum tilting.



3. Secure the loudspeaker to the U-bracket using the two 3/8-16 screws and two shoulder washers included with the MUB-MM4XP. The shoulder washers should be placed between the screws and the outside of the U-bracket, with the shoulder oriented toward the loudspeaker. Do not yet tighten the U-bracket screws.



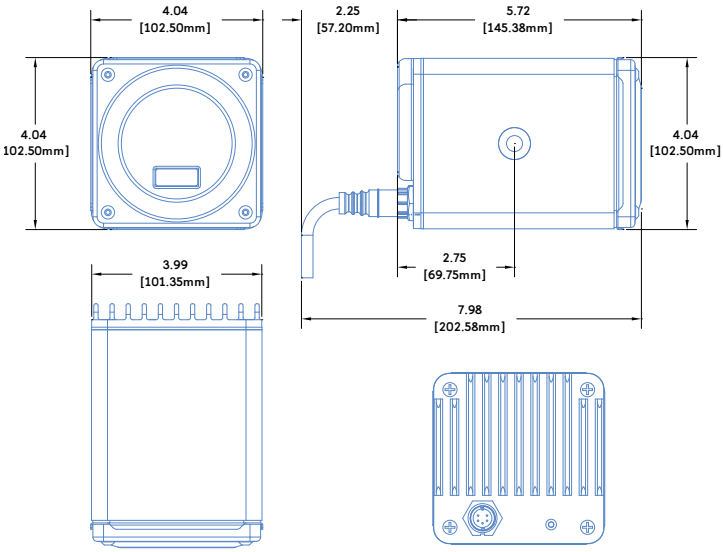
⚠ **CAUTION:** Make sure to use the shoulder washers. They insulate the MM-4XP from the U-bracket and mounting surface, eliminating grounding and differential problems.

4. Adjust the angle of the loudspeaker as desired.
5. Tighten the U-bracket screws to secure the MM-4XP.

APPENDIX A: SPECIFICATIONS

MM-4XP SPECIFICATIONS

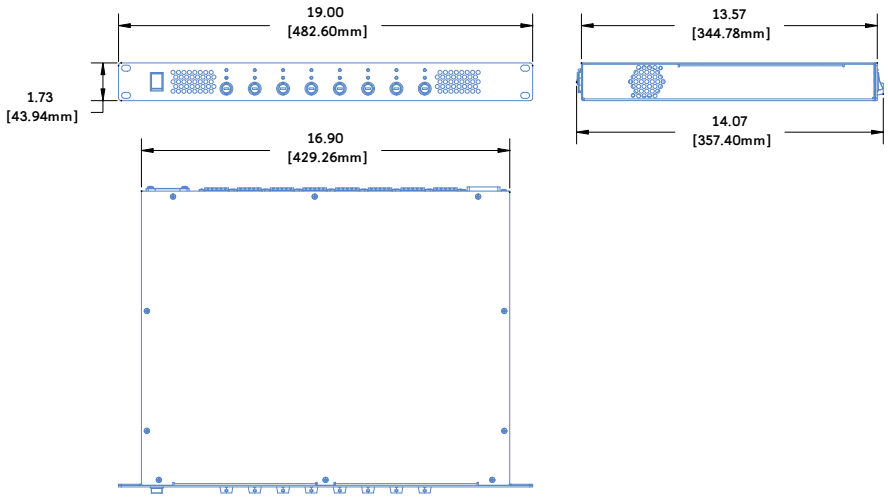
Operating Frequency Range	120 Hz – 18 kHz **Note:** Recommended maximum operating frequency range. Response depends on loading conditions and room acoustics.
Frequency Response	160 Hz – 16 kHz ±4 dB **Note:** Measured free-field with pink noise at 1 meter, 1/3rd octave resolution.
Maximum Peak SPL	113 dB **Note:** Measured free-field with music and referred to 1 meter.
Dynamic Range	100 dB **Note:** Taken from peak SPL referred to A-wtd noise floor.
Phase Response	700 Hz – 17 kHz ±45°
Coverage	80° (3 kHz – 14 kHz ±10°); 120° (below 2 kHz)
Transducer	One 4” cone driver
Voltage Requirement	48 V DC
Audio/Power Connector	Single EN3 5-pin male (3 pins for balanced audio, 2 pins for DC power)
Input Impedance	10 kΩ electronically balanced
Nominal Input Sensitivity	–2.5 dBV (0.75 V rms, 1.0 V peak) continuous average is typically the onset of limiting for noise and music
Input Level	Audio source must be capable of producing +16 dBV (6.3 V rms, 9.0 V peak) into 600 Ω to produce maximum peak SPL over the operating bandwidth of the loudspeaker
Current Draw	0.7 A average; 2.2 A peak
LED	To indicate loudspeaker status
MM-4XP Dimensions	4.04” W x 4.04” H x 5.72” D (102.50 mm x 102.50 mm x 145.38 mm)
MM-4XP Weight	4.2 lbs (1.91 kg)



MM-4XP Dimensions

MPS-488 SPECIFICATIONS

Audio Inputs	8 channels of XLR female connectors with Link switches to route to outputs
Outputs	8 channels of Phoenix 5-pin male connectors or EN3 5-pin female connectors (3 pins for balanced audio, 2 pins for DC power)
Output Voltage	8 channels of 48 V DC (2.0 A, fuse protected)
Front Panel	On-off switch 8 LEDs to indicate output voltage 8 LEDs to indicate current
AC Connector	PowerCon
Voltage Selection	Automatic
Safety Agency Rated Operating Voltage	100–240 V AC; 50/60 Hz
Turn On/Turn Off Points	90–264 V AC; 50/60 Hz **Note:** No automatic turn-off voltages. Voltages above 265 V AC are fuse protected but may cause permanent damage to the power supply. Voltages below 90 V AC may result in intermittent operation.
Current Draw	**Note:** For 8 MM-4XP loudspeakers (1 per channel).
Idle Current	1.16 A rms (115 V AC); 1.00 A rms (230 V AC); 1.26 A rms (100 V AC)
Maximum Long-Term Continuous Current	2.20 A rms (115 V AC); 1.38 A rms (230 V AC); 2.60 A rms (100 V AC)
Burst Current	3.6 A rms (115 V AC); 2.2 A rms (230 V AC); 4.3 A rms (100 V AC)
Ultimate Short-Term Peak Current	8.8 A peak (115 V AC); 4.6 A peak (230 V AC); 9.6 A peak (100 V AC)
Inrush Current	30.8 A peak (115 V AC); 15.2 A peak (230 V AC); 33.0 A peak (100 V AC)
Dimensions	1RU high 19.00” W x 1.73” H x 13.57” D (482.60 mm x 43.94 mm x 348.78 mm)
Weight	15.5 lbs (6.6 kg)



MPS-488 Dimensions

APPENDIX B: MM-4XP ACCESSORIES

MM-4XP ACCESSORIES

The following MM-4XP accessories are available from Meyer Sound.

MM-4XP Accessories

Part Number	Accessory	Notes
09.183.001.01	MPS-488P external power supply (with US power cord)	Channel Outputs equipped with Phoenix 5-pin male connectors
09.183.001.02	MPS-488P external power supply (with CE power cord)	
09.183.001.03	MPS-488E external power supply (with US power cord)	Channel Outputs equipped with EN3 5-pin female connectors
09.183.001.04	MPS-488E external power supply (with CE power cord)	
420.027	MPS-488 Fuse Replacement	2-amp, 250-volt slow-blow fuse (T2A-250V)
40.163.003.02	MUB-MM4XP Mounting Bracket (black)	Includes black mounting hardware
40.163.003.04	MUB-MM4XP Mounting Bracket (white)	Includes clear mounting hardware

MM-4XP CABLE CONNECTORS AND ADAPTERS

The following MM-4XP cable connectors and adapters are available from Meyer Sound.

MM-4XP Cable Connectors and Adapters

Part Number	Connector/Adapter	Use
484.065	Phoenix 5-pin female cable mount connector	Connects to the MPS-488P Channel Output connector (a Phoenix 5-pin male connector).
468.069	EN3 5-pin female cable mount connector	Connects to the MM-4XP loudspeaker connector (an EN3 5-pin male panel mount connector).
468.071	EN3 5-pin male cable mount connector	Connects to the MPS-488E Channel Output connector (an EN3 5-pin female panel mount connector).
468.072	EN3 5-pin female inline cable adapter	Connects to an EN3 5-pin male cable mount connector.
468.073	EN3 5-pin male inline cable adapter	Connects to an EN3 5-pin female cable mount connector.
28.163.033.01	Cable coupler EN3 5-pin female-to-male	Joins two cables: one with an EN3 5-pin male cable mount connector to one with an EN3 5-pin female cable mount connector.

MM-4XP CABLES

The following MM-4XP cables are available from Meyer Sound.

NOTE: All MM-4XP loudspeaker cables and bulk cable use Belden 1502R (regular) or Belden 1502P (plenum) cable. Belden 1502 is a composite cable comprised of two 18 AWG wires for DC power, two 22 AWG wires for balanced audio, and one 24 AWG wire for audio shield.

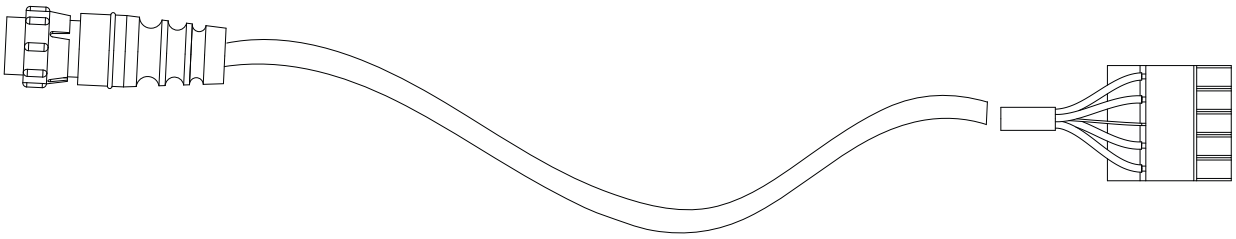
MM-4XP Loudspeaker Cables

Part Number	Cable	Color	Coating	Length
524.014	Bulk (no connectors)	Black	Regular	500 ft spool
524.015	Bulk (no connectors)	White	Plenum	500 ft spool
28.163.009.01	EN3 5-pin female to pigtail	Black	Regular	10 ft
28.163.009.11	EN3 5-pin female to pigtail	White	Plenum	10 ft
28.163.009.21	EN3 5-pin female to EN3 5-pin male	Black	Regular	10 ft
28.163.009.22				20 ft
28.163.009.23				30 ft
28.163.009.24				50 ft
28.163.009.25				100 ft
28.163.009.26				150 ft
28.163.009.31	EN3 5-pin female to EN3 5-pin male	White	Plenum	10 ft
28.163.009.32				20 ft
28.163.009.33				30 ft
28.163.009.34				50 ft
28.163.009.35				100 ft
28.163.009.36				150 ft
28.163.033.01	Cable coupler EN3 5-pin female-to-male (joins two cables: one with an EN3 5-pin male cable mount connector to one with an EN3 5-pin female cable mount connector)			
28.163.009.41	EN3 5-pin female to Phoenix 5-pin female	Black	Regular	10 ft
28.163.009.42				20 ft
28.163.009.43				30 ft
28.163.009.44				50 ft
28.163.009.45				100 ft
28.163.009.46				150 ft
28.163.009.51	EN3 5-pin female to Phoenix 5-pin female	White	Plenum	10 ft
28.163.009.52				20 ft
28.163.009.53				30 ft
28.163.009.54				50 ft
28.163.009.55				100 ft
28.163.033.01				150 ft

APPENDIX C: MM-4XP CABLE ASSEMBLY

ASSEMBLING EN3-TO-PHOENIX LOUDSPEAKER CABLES

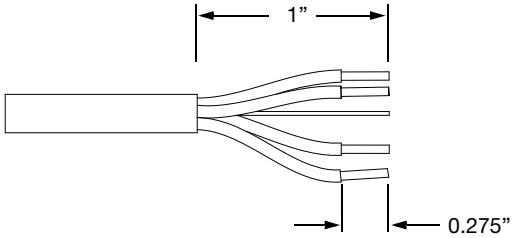
To connect the MM-4XP loudspeaker directly to the MPS-488P power supply, you need an EN3 5-pin female to Phoenix 5-pin female cable. The following procedure documents how to assemble this cable. If you are starting with an EN3-to-pig-tail cable (included with the MM-4XP), you can disregard steps 4–7 in the procedure



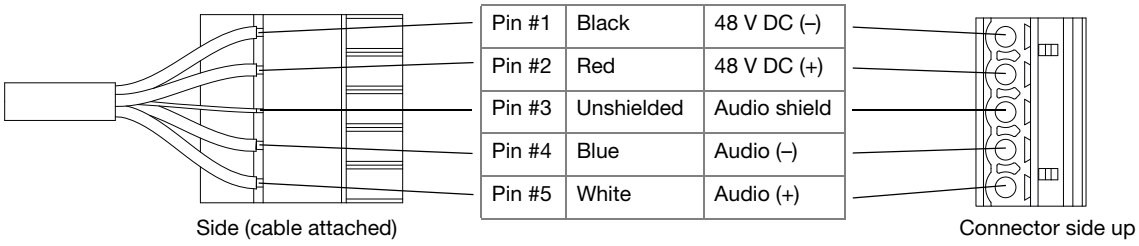
Assembled EN3-to-Phoenix Cable

To assemble an EN3-to-Phoenix cable:

1. If cable has not been stripped, strip the outer shielding 1” and then strip the black, red, blue, and white wires .275”.



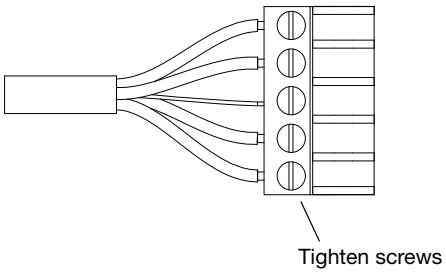
2. Insert the five exposed conductors into the five cable holes in the Phoenix connector using the following wiring scheme.



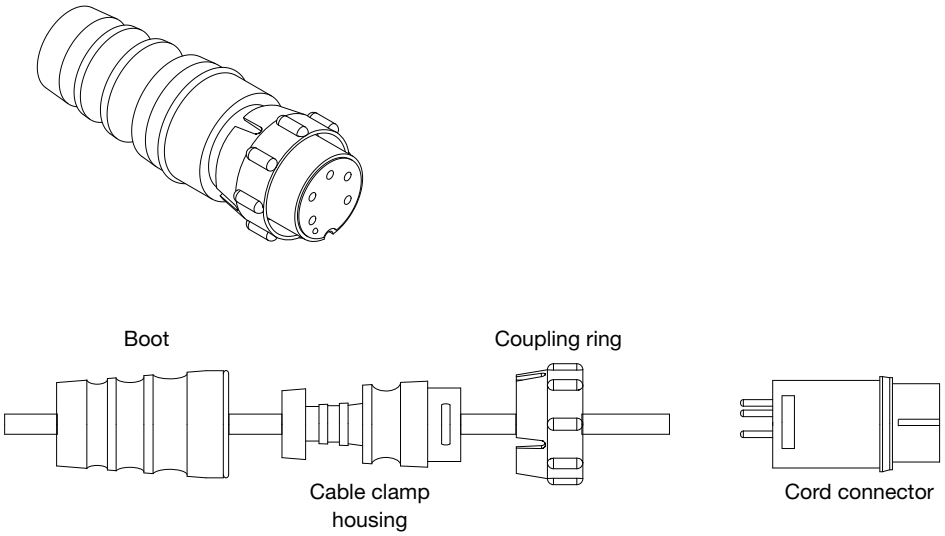
Pin #1	Black	48 V DC (–)
Pin #2	Red	48 V DC (+)
Pin #3	Unshielded	Audio shield
Pin #4	Blue	Audio (–)
Pin #5	White	Audio (+)

Phoenix 5-Pin Female Cable Mount Connector

3. Secure the conductors by tightening the five screws in the Phoenix conductor.

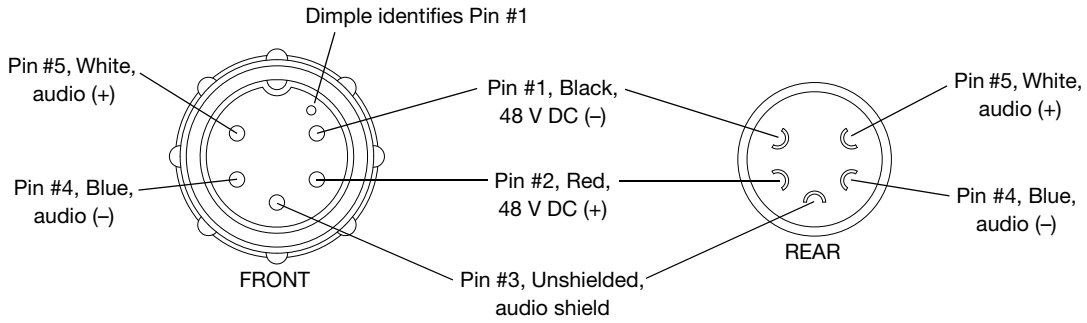


4. Disassemble the EN3 5-pin female connector and feed one end of the cable through the boot, cable clamp housing, and coupling ring.



Disassembled EN3 5-Pin Female Cable Mount Connector

5. If the EN3 end of the cable has not been stripped, strip the outer shielding 1” and then strip the black, red, blue, and white wires .275”.
6. Solder the five exposed conductors to the five pins on the EN3 cord connector using the following wiring scheme.



Pin Destinations for EN3 5-Pin Female Cable Mount Connector

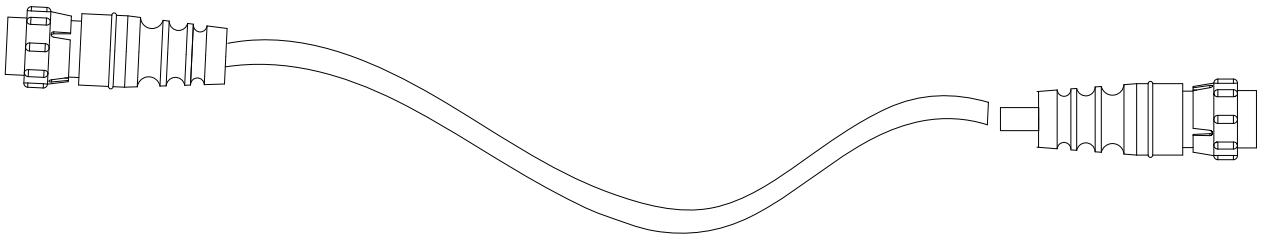
7. Reassemble the EN3 5-pin female connector:

- Align the coupling ring’s side notches with the cord connector’s side notches and slide the couple ring onto the cord connector.
- Carefully insert the end of the cable clamp housing into the cord connector until it locks into place. Snap the cable clamps in the cable clamp housing into their compartments.
- Slide the boot forward so it covers the cable clamp housing completely.

ASSEMBLING EN3-TO-EN3 LOUDSPEAKER CABLES

To connect the MM-4XP loudspeaker directly to the MPS-488E power supply, you need an EN3 5-pin female to EN3 5-pin male cable. The following procedure documents how to assemble this cable. If you are starting with an EN3-to-pigtail cable (included with the MM-4XP), you can disregard step 5 in the procedure.

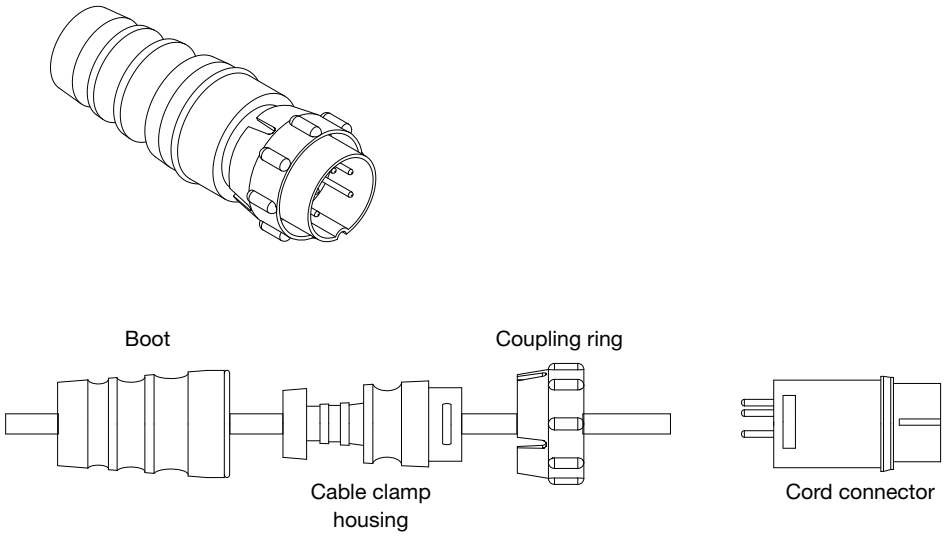
NOTE: Cable mount connectors cannot connect to other cable mount connectors. Cable mount connectors can only connect to panel mount connectors (like those on the MM-4XP and MPS-488E) or inline connectors. To extend cables with EN3 connectors on both ends you can use an EN3 5-pin female-to-male cable coupler.



Assembled EN3-to-EN3 Cable

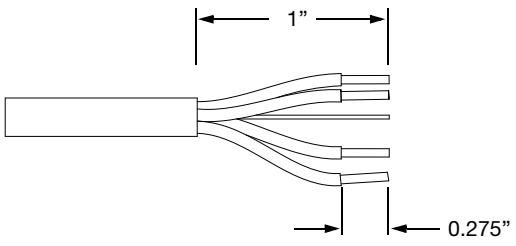
To assemble an EN3-to-EN3 loudspeaker cable:

1. Disassemble the EN3 5-pin male connector and feed one end of the cable through the boot, cable clamp housing, and coupling ring.

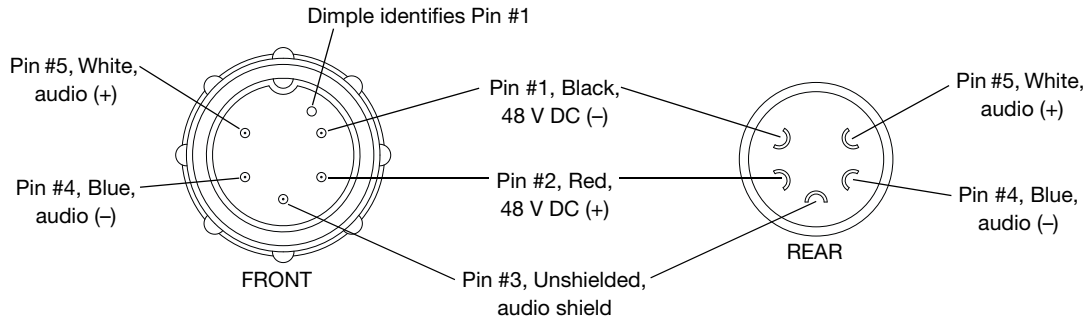


Disassembled EN3 5-Pin Male Cable Mount Connector

2. If the cable has not been stripped, strip the outer shielding 1” and then strip the black, red, blue, and white wires .275”.



3. Solder the five exposed conductors to the five pins on the EN3 cord connector using the following wiring scheme.

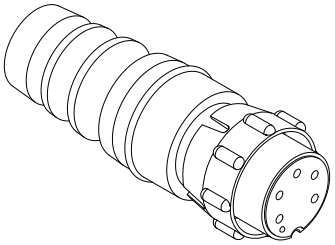


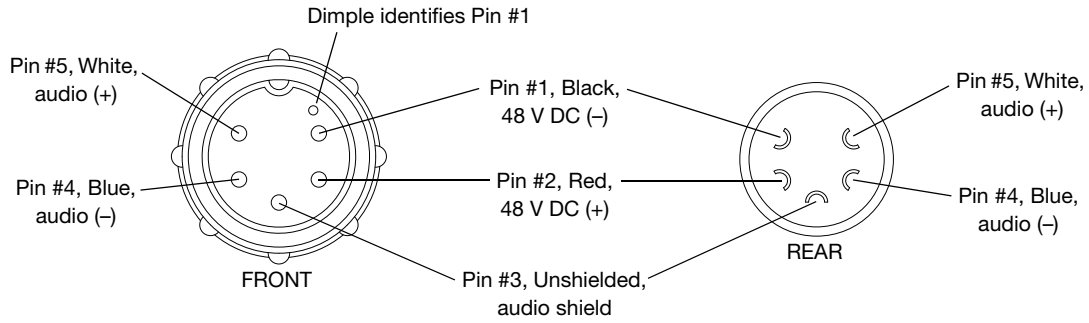
Pin Destinations for EN3 5-Pin Male Cable Mount Connector

4. Reassemble the EN3 5-pin male connector:

- Align the coupling ring's side notches with the cord connector's side notches and slide the couple ring onto the cord connector.
- Carefully insert the end of the cable clamp housing into the cord connector until it locks into place. Snap the cable clamps in the cable clamp housing into their compartments.
- Slide the boot forward so it covers the cable clamp housing completely.

5. Repeat the previous steps to attach the EN3 5-pin female connector to the other end of the cable.





Pin Destinations for EN3 5-Pin Female Cable Mount Connector

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