

PureLink

PM Series Matrix Router Owner's Manual



PM-8X

PM 8 x 8 Cross-Platform Modular Matrix Router

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Chapter 1. Introduction

1.1 Safety Precautions

When using and installing Dtrovision PureLink product, adhere to the following basic safety precautions.

- Read and understand all instructions before using and installing this product.
- The safety and operating instructions should be retained for future reference.
- Always use the correct external power supply (indicated on the product label) when operating this unit.
- Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.
- Mishandling of this product may lead to a fire or explosion hazard.
- Do not place any heavy objects or equipment on top of the product.
- Keep away from wet, magnetic, and flammable surfaces or substances.
- Air vents should be kept clean and unobstructed at all times.
- Any external impact may cause damage to the operation of this unit.
- Be sure this product is properly grounded (earthed) in order to prevent the risk of electrical shock.
- Turn off and unplug power before adding or removing Input/Output Boards.
- Input/Output Boards may be damaged when they are replaced with power turned on.
- Use surge protectors and/or AC line conditioners when powering this product.
- Only use a fuse(s) with the correct fuse rating in your enclosure.
- Make sure the product is on or attached to a stable surface.

If you experience any malfunctioning of product or have any question as to operation of the product, please contact our customer service center.

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1.2 Product Introduction

The PM series Matrix Router is a Cross-Platform Matrix Router that supports multiple different digital interface types in a single unit. PureLink's unique "Cross-Platform" feature makes the Matrix Router most flexible and simple solution for today's sophisticated digital AV environment.

The PM series Matrix Router supports seven types of digital interface:

- HDMI v1.4 (w/optional scaling)
- DVI 1.0 (w/optional scaling)
- 3G/HD-SDI (standard scaling)
- Analog VGA/Component
- CATx (HdbaseT) (w/optional scaling)
- Fiber Optic (w/optional scaling)
- Displayport

Each Matrix Router is assembled from field installable I/O (Input/Output) Boards. The PM-8X Matrix Router can support up to 2 I/O Boards of any of the above type.

The Matrix Router can switch any Input signal to any combination of Outputs. For example, HDMI Input signal can be Output to 3G/HD-SDI Output, Fiber Optic Output, and CATx Output. The Matrix Router can route multiple Input/Output configurations simultaneously.

Note) 3G/HD-SDI is not a licensed HDCP interface and if the content received from HDMI is protected by HDCP, there should be no Output from the 3G/HD-SDI Board.

PM series CATx I/O Boards are used in conjunction with PM CATx Transmitter and Receiver and PM series Fiber Optic I/O Boards are used in conjunction with PM Fiber Transmitter and Receiver.

Note) For I/O Boards and Extenders compatibility information, see page 32

1.3 Front View:

The PM Matrix Router frame is mountable on a 19" standard rack. Push button control panel and power switch are placed at the front panel as show in Figure 1-1

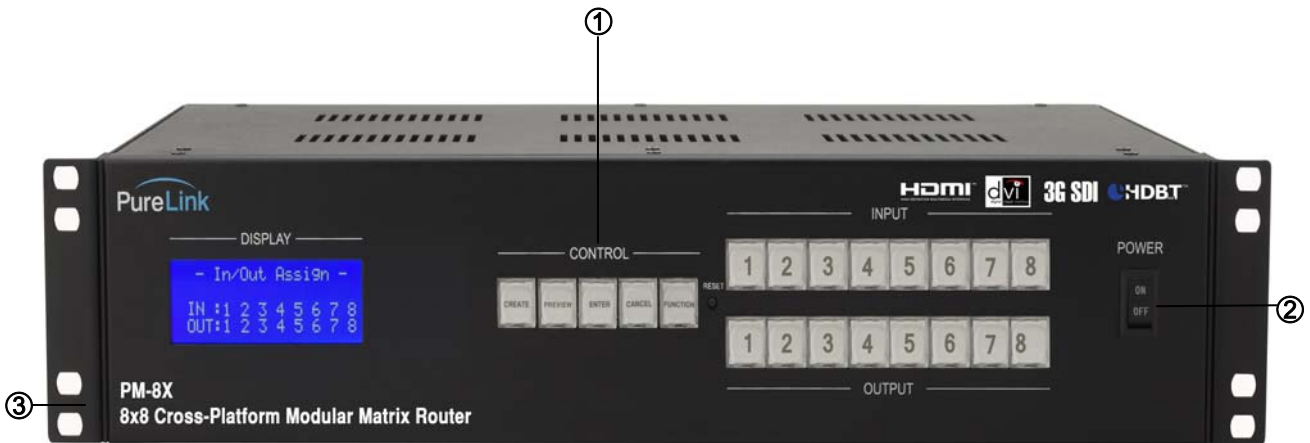


Figure 1-2 Front view of PM-8X enclosure

- ① Push button control panel
- ② Power On/Off switch
- ③ Rack ears

1.4 Rear View:

Input/Output Board section, Audio Matrix Router, communication ports, and power supplies are placed on the rear panel as show in Figure 1-2. Actual rear view will vary depending on the configuration of Input/Output Board type. The rear view of PM-8X in Figure 1-2 is fully populated each of 3G/HD-SDI, and CATx Input Board, and Fiber, and HDMI Output Board in PM-8X main frame.

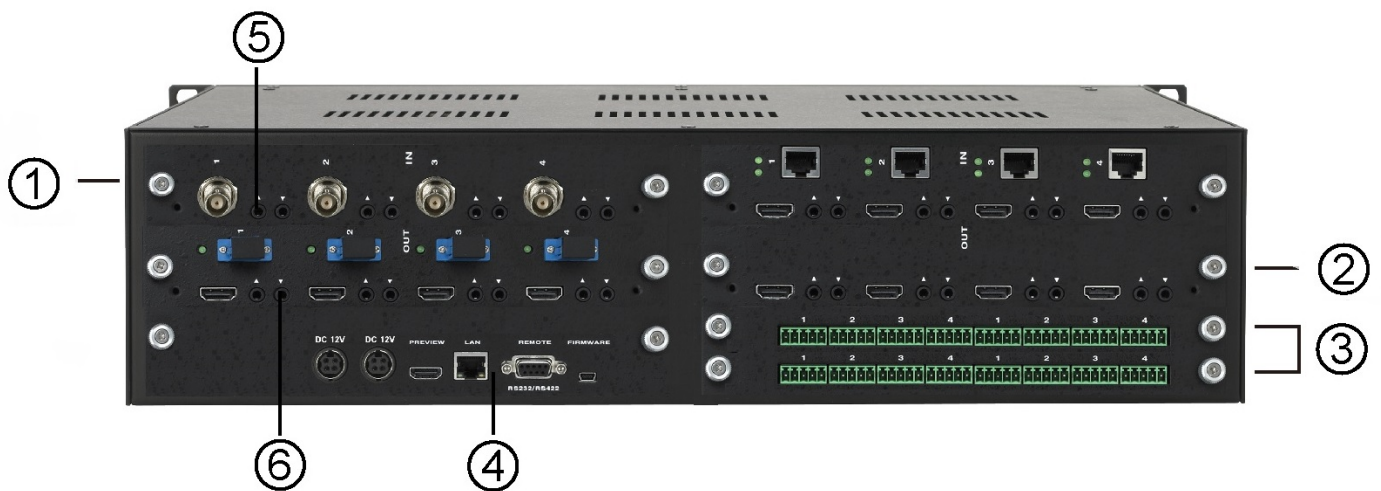


Figure 1-2 Rear view of PM-8X Enclosure

- ① Input Board Section (6 Board options are available)
- ② Output Board Section (7 Board options are available)
- ③ Independent Audio Matrix Router (Balanced or Unbalanced), 5-pin Phoenix Connector
- ④ Communication Board
- ⑤ Audio Insertion/Extraction on Input Board
- ⑥ Audio Insertion/Extraction on Output Board

Chapter 2. Features and Specifications

2.1 Features

▶ **Cross-Platform Switching Technology**

PureLink's advanced Cross-Platform Switching Technology allows interchangeable switching between any Input signal formats to any Output signal formats. PM Matrix Router supports HDMI v1.4, DVI, 3G/HD-SDI, VGA/Component, Fiber Optic & CATx (HDBaseT) signal formats with various Input and Output selection.

▶ **Available in various I/O sizes from 4x4 to 256x256**

PM series Matrix Router offers a wide range of Input/Output configuration to match various sized installations. Total eight size of main frames are available PM-8X (up to 8x8), PM-16X (up to 16x16), PM-32X (up to 32x32), PM-48X (up to 48x48), PM-64X (up to 64x64), PM-80X (up to 80x80), PM-128X (up to 128x128) and PM-256X (up to 256x256)

▶ **POE**

PM series Matrix Router provides power to the PM CATx Extenders (Transmitter or Receiver) at the remote location over the same CATx cable that transmits Audio, Video, and Control. It eliminates the need of having a power on PM CATx Extenders. Single CATx cable for Audio, Video, Control and Power makes installation simple.

Note) Scaling Receiver (PM-CR102) does not support POE

▶ **RS-232 +**

An industry first, the PM series' RS-232 + simplifies the control issues that have traditionally complicated system design, RS-232 + enables a single serial cable connecting the controller to a PM series Matrix Router to also control the system on three separate levels:

- 1) PM series Matrix Router
- 2) PM series CATx and Fiber Extenders (both Tx and Rx)
- 3) Devices attached to PM series Extenders (both Tx and Rx)

RS-232 + simplifies control within most systems, increasing reliability while also lowering costs by removing control design, hardware and cabling.

▶ **Auto-Scaling with Seamless Switching**

The PM series offers auto scaling on both the Router and Extender Receiver sides, virtually eliminating latency while increasing system design flexibility. The PM series' HDMI Output Board (PM-HOS4S), DVI Output Board (PM-DOS4S), and 3G/HD-SDI

Output Board (PM-SOS4) provides auto scaling for every PM series Matrix Router. The CATx (PM-CR102) and Fiber (PM-FR102) Extender Receivers provide auto scaling directly driven by the PM series' Matrix Router CATx and Fiber Output Boards.

▶ **Flexible Input/Output Switching with Auto Distribution**

Each main port on the PM series DVI, CATx, and Fiber I/O Boards also contains a parallel HDMI port, effectively doubling those Boards' I/O capacity.

On the Input Side, the user can select either the main CATx/DVI/Fiber port or the parallel HDMI port via the front panel or control command, providing a 2x1 switch within the Input and thereby double the amount of Inputs.

On the Output side, the main DVI, CATx, and Fiber port and the parallel HDMI are driven simultaneously, providing a 1x2 distribution amplifier with a mirrored Output for each main Output.

▶ **Audio Insertion/Extraction**

Every Video port on the PM series Matrix Router I/O Boards also provides a 3.5mm Stereo Audio Input and Output, enabling easy extraction of 2-channel PCM Audio from HDMI or Audio from PM Extender Transmitter, as well as insertion of a separate 2-channel Audio signal onto HDMI, CATx, and Fiber Outputs

▶ **Audio Matrix Router**

PM series Matrix Router frame offers independent built-in Balanced/Unbalanced Audio Matrix Router. Depending on the frame size, it comes as a standard feature and some of them are optional.

PM-8X-AD: Optional Internal 8x8 Audio Matrix Router for PM-8X

▶ **Audio Attenuation and Muting**

Every PM series Matrix Router allows volume attenuation and muting on the Audio Matrix Router's Output.

▶ **Test Pattern Generator**

Every PM series Matrix Router provides a built-in Test Pattern Generator, enabling easy testing from the Matrix Router to the display.

▶ **Signal Analyzer**

Every PM series Matrix Router provides built-in comprehensive signal analysis of both incoming and outgoing signals, via the front panel LCD touch screen or control

command. Signal information provided includes EDID, HDCP, transmission status, and resolution.

▶ **Preview Monitoring**

Every PM series Matrix Router provides an HDMI preview monitoring port, which further simplifies system testing by acting like an extra Video Output.

▶ **12.5 Gbps Data-Rate Frame**

Ensures lossless High Definition digital AV signal switching and distribution.

▶ **Input Boards directly compatible with PM Extender Transmitters**

PM CATx/Fiber Input Boards can receive signal directly from PM CATx/Fiber Extender Transmitter, eliminating the need of matching Receiver.

▶ **Output Boards directly compatible with PM Extenders Receivers**

PM CATx/Fiber Output Boards can send signal directly to PM CATx/Fiber Extender Receiver, eliminating the need of matching Transmitter.

▶ **HDMI v1.4, 3D Support**

Adopting latest HDMI version 1.4 enables to support 3D, 48-Bit Deep Color, UHD (4K x 2K) resolution (optional) and 7.1 Channel Dolby TruHD & DTS MasterHD

▶ **Standard Dual Redundant Power**

Every PM series Matrix Router is equipped dual redundant power supply as a standard

▶ **Genlock for 3G/HD-SDI**

PM series Matrix Router's 3G/HD-SDI Board is equipped with Genlock feature to provide steady Video signals for optimum picture quality.

▶ **LCD Touch-Screen Display w/ Security Lock-Out**

Every PM series Matrix Router has front panel LCD Touch Screen for intuitive operation. Security Lock-Out feature prevents unauthorized user to access to the Matrix Router. In lock-out mode, a password entered from the touch screen or special command sent from controller can disable the lock-out mode.

▶ **Auto-EDID (EDID Library, Emulation)**

PureLink's EDID library and emulation features failsafe EDID capture & storage to provide constant and continuous EDID for source devices.

▶ **Various Input/Output Choices**

There are five Input Board types and six Output Board types to support every conceivable digital Video format.

▶ **HDCP Compliant**

▶ **Modular, Field-upgradeable**

PM Matrix Router is designed to expand, upgrade, and reconfigure the Matrix Router in the field by simply installing or replacing Input/Output Board .

▶ **Preset**

Multiple preset switching commands can be pre-programmed and saved in the memory. It can be recalled in the future for easy and time-saving switching use.

▶ **Analog Support (VGA and Component)**

PM Matrix Router supports analog VGA and component signal via PM Extender Transmitters

▶ **Fan, Power Supply Monitoring**

PM Matrix Router provides real-time fan, power supply units status on the front panel LCD touch screen

▶ **PM-Universal Input/Output Boards**

PM Input/Output Boards can be used in any size of PM Matrix Router frame.

▶ **USB Firmware Update**

Easy Firmware Update using USB port in the rear panel (no software program required)

▶ **Three Convenient Control Methods:**

Control via front panel touch screen

Control via RS-232/422C

Control via LAN (TCP/IP)

▶ **Maximum Distance up to 6,600ft**

As part of a complete switching system, send Audio, Video, control signal and power up to 330ft over single CATx cable to and from the PM Matrix Router using PM series CATx Extenders and send Audio, Video, and control signal up to 6,600ft over Fiber Optic cable to and from the PM Matrix Router using PM series Fiber Extenders.

- ▶ **Plug-N-Play**
- ▶ **Standard 19" Rack-mountable**
 - PM-8X (3 RU)
- ▶ **Resolutions up to WUXGA 1920x1200, HD 1080p @ 60Hz, and 4K2K (Optional)**
- ▶ **Integrated Noise-cancellation and Error-correct Logic for both Input and Output Ports to prevent any damage caused by Electrical Noise.**

2.2 Router Frame Specification

PM-8X

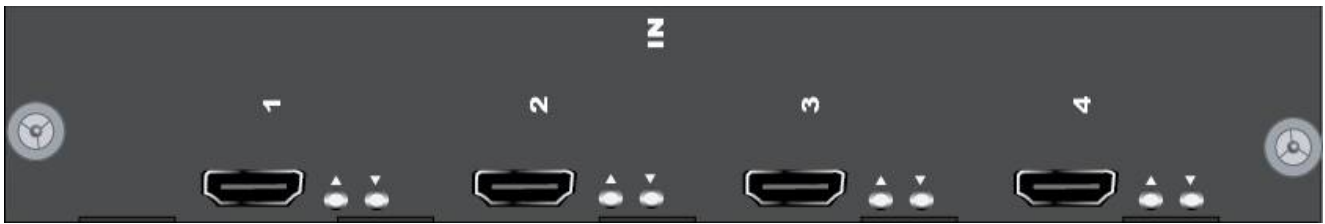


PM-8X Frame General Specifications	
Maximum # of Input Board load	2 of any kind of Input Board
Available Input Board	HDMI, DVI, 3G/HD-SDI, VGA/Component, CATx (HDBaseT), Fiber Optic
Maximum # of Output Board load	2 of any kind of Output Board
Available Output Board	HDMI, HDMI w/scaling, DVI, DVI w/scaling,

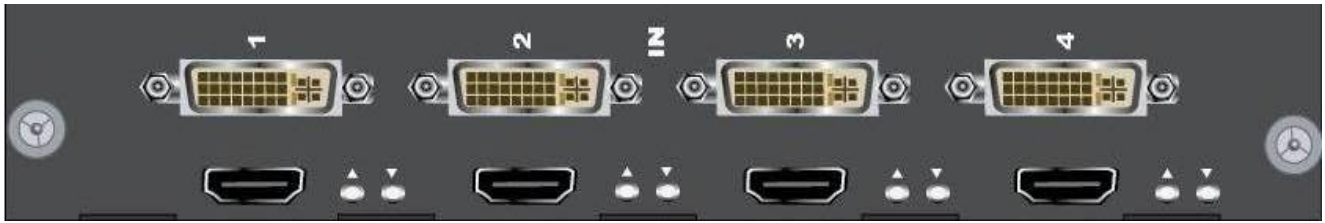
	3G/HD-SDI, CATx (HDBaseT), Fiber Optic
Power	External Power Supply DC12V, 6.6A
Power Consumption (max)	120W + 120W (Dual) = 240W
Operational Temperature	32° ~ 117° F (0° to 47° C)
Storage Temperature	- 40° ~ 158° F (-40° to 70° C)
Humidity	0 ~ 90% non-condensing
MTBF	50,000 hours
Dimensions (W x D x H)	17.1" x 14.5" x 5.25" (435 x 368 x 133mm)
Shipping Dimensions (with cover box)	TBD
Rack mounting	Yes, 19" standard rack, 3RU
Weight (w/o Boards installed)	TBD
Weight (with HDMI Boards fully installed)	TBD
Shipping Weight (with Boards fully installed, accessories, hard metal case, and cover box)	TBD
Shipping Weight of Individual Boards	2 lbs (0.9 kg)

2.3 Input Boards Specification

HDMI Input Board (PM-HIS4)



HDMI Input Board (PM-HIS4) Specifications	
Number of Port	4 HDMI ports, 4 Stereo In/out ports
Connector Type	Female HDMI connector, Female 3.5mm stereo jack
Signal Type	RGB digital Video (DVI and HDMI standards) or YCrCb digital component Video (HDMI)
Digital Audio	Dolby Digital® Plus, Dolby® TrueHD, DTS-HD High Res, DTS-HD Master Audio™, up to 8ch PCM
Audio Extraction	Via 3.5mm stereo Audio out ports
Audio Insertion	Via 3.5mm stereo Audio in ports
Maximum Data Rate	3.4 Gbps per color (R,G,B)
Maximum Pixel Clock	165 MHz
Standard	DVI 1.0 , HDMI 1.4
Switching Speed	Max 200ns
Output DVI Re-clocking	Automatic
Output Peripheral Device Power	600 mA per Output
Input Equalization	Automatic, Max 30m 1920 x1200 @50/60Hz or 1080p; 8 bit color
HDCP Compatible	HDCP version 2.0
Support Hot Plug Detection	Yes
Single Board Weight	0.5 lbs (0.23 kg)

DVI Input Board (PM-DIS4)

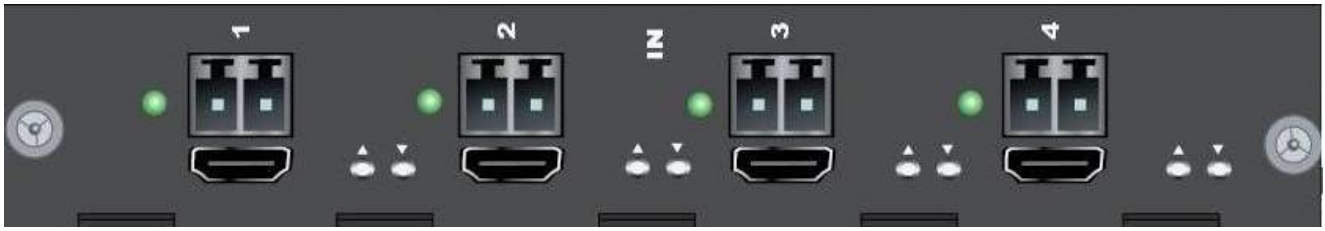
DVI Input Board (PM-DIS4) Specifications	
Number of Port	4 DVI ports, 4 HDMI ports, 4 Stereo In/out ports
Connector Type	Female DVI connector, Female HDMI connector, Female 3.5mm stereo jack
Signal Type	RGB digital Video (DVI and HDMI standards) or YCrCb digital component Video (HDMI)
Digital Audio	Supported when HDMI signal source used
Audio Extraction	Via 3.5mm stereo Audio out ports
Audio Insertion	Via 3.5mm stereo Audio in ports
Maximum Data Rrate	3.4 Gbps per color (R,G,B)
Maximum Pixel Clock	165 MHz
Standard	DVI 1.0 , HDMI 1.4
Switching Speed	Max 200ns
Output DVI Re-clocking	Automatic
Output Peripheral Device Power	600 mA per Output
Input Equalization	Automatic, Max 30m 1920 x1200 @50/60Hz or 1080p; 8 bit color
HDCP Compatible	HDCP version 2.0
Support Hot Plug Detection	Yes
Single Board Weight	1 lbs (0.45 kg)

CATx (HDBaseT) Input Board (PM-CIS4)



CATx (HDBaseT) Input Board (PM-CIS4) Specifications	
Number of Port	4 CATx ports, 4 HDMI ports, 4 Stereo In/out ports
Connector Type	Female RJ45 connector, Female HDMI connector, Female 3.5mm stereo jack
Supported Twisted Cable Type	CAT5/5e, CAT6/6e, CAT6a, CAT7
Digital Audio	Supported when HDMI signal source used
Audio Extraction	Via 3.5mm stereo Audio out ports
Audio Insertion	Via 3.5mm stereo Audio in ports
Supported Twisted Pair Cable Length	330 ft (100m) ; 1080p, 1920x1200 @50/60Hz
P.O.E Maximum Output Watt	Max 9.6Watt per channel
Resolution Range	1080p, 1920x 1200 @50/60Hz
Maximum Data Rate	3.4 Gbps per color (R,G,B)
Switching Speed	Max 200ns
HDCP Compatible	HDCP version 2.0
Compatible Extenders	PM-CT101, PM-CT102, PM-CT103 PM-CT101-D, PM-CT102-D, PM-CT103-D, PM-CT101-RF6, PM-CT102-RF6, PM-CT101-RF6-D, PM-CT102-RF6-D
Single Board Weight	1 lbs (0.45 kg)

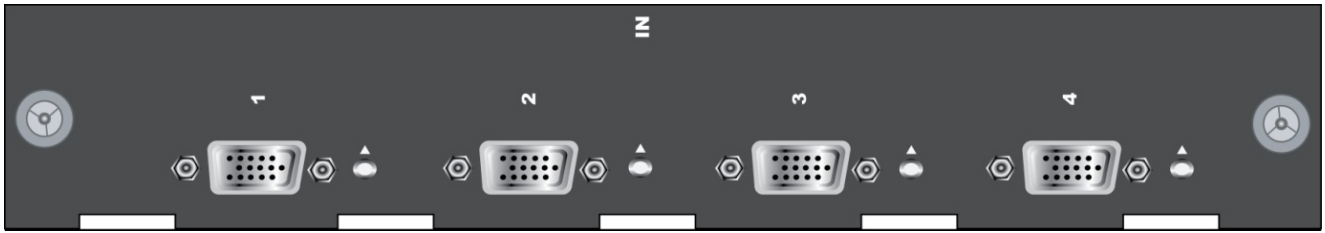
Fiber Optical Input Board (PM-FIS4)



Fiber Optical Input Board (PM-FIS4) Specifications	
Number of Port	4 Optical ports, 4 HDMI ports, 4 Stereo In/out ports
Connector Type	Female 2 LC connector, Female HDMI connector, Female 3.5mm stereo jack
Mode Type	Supports both single mode & multi mode
Digital Audio	Supported when HDMI signal source used
Audio Extraction	Via 3.5mm stereo Audio out ports
Audio Insertion	Via 3.5mm stereo Audio in ports
Operating Distance	Up to 6,600 ft when used single mode, Up to 1,650 ft when used multi mode
Nominal Peak Wavelength	1310 and 1490, 1550 nm
Transmission Power	> -5 dBm, typical
Maximum Receiver Sensitivity	< -20 dBm, typical
Optical Loss Budget	10 dB, Maximum
Maximum Channel Data Rate	3.4 Gbps each channel
Pixel Data Bit Depth	12 bits per channel, 3 channel (R, G, B)
Rise and Fall Times (20%-80%)	75psec ≤ Rise time / fall time
Resolution Range	1080p, 1920x 1200 @50/60Hz
Switching Speed	Max 200ns
HDCP Compatible	HDCP version 2.0
Compatible Extenders	PM-FT101, PM-FT102, PM-FT103 PM-FT101-D, PM-FT102-D, PM-FT101-RF6, PM-FT102-RF6, PM-FT101-RF6-D, PM-FT102-RF6-D
Single Board Weight	1.5 lbs (0.68 kg)

3G/HD-SDI Input Board (PM-SIS4)

3G/HD-SDI Input Board (PM-SIS4) Specifications	
Number of Port	4 3G/HD-SDI ports, 4 Stereo In/out ports
Connector Type	Female BNC connector, Female 3.5mm stereo jack
Audio Extraction	Via 3.5mm stereo Audio out ports
Audio Insertion	Via 3.5mm stereo Audio in ports
Nominal Level	0.8 Vp-p \pm 10 %
Impedance	75 ohm
Return Loss	< -15 dB @ 1 MHz to 1.5 GHz
Equalization	Automatic or manual
Input Cable Equalization Distance	SDI: 150m / HD-SDI: 100m / 3G-HD-SDI: 50m
DC Offset	\pm 0.5 mV with Input at 0 offset
Re-clocking	Automatic
Jitter	<0.3 UI
Rise and Fall Times(20%-80)	135psec \leq Rise time / fall time @2970Mbps
Maximum Data Rate	2.97 Gbps
Auto Data Rate Lock	Yes
Data Types	8 bits or 10 bits
Operation Standard	SMPTE 292M, SMPTE 259M, SMPTE 424M, ITU-RBT.601, ITU-RBT.1120
Single Board Weight	1.5 lbs (0.68 kg)

VGA/Component Input Board (PM-AIS4)

VGA Input Board (PM-AIS4) Specifications	
Number of Port	4 VGA ports, 4 Stereo Input ports
Connector Type	Female 15-pin D-Sub connector, Female 3.5mm stereo jack
Signal Type	RGBHV or YPbPr component Video
Bandwidth	170MHz(-3dB)
Impedance	75 ohm
Norminal level	0.7Vp-p for RGB 1.0Vp-p for YPbPr
Maximum level	1.5Vp-p
Horizontal frequency	15KHz ~ 100KHz
Vertical frequency	30Hz ~ 100Hz
Sync Input level	3 ~ 5.5Vp-p
Audio Insertion	Via 3.5mm stereo Audio in ports
Single Board Weight	0.5 lbs (0.23 kg)

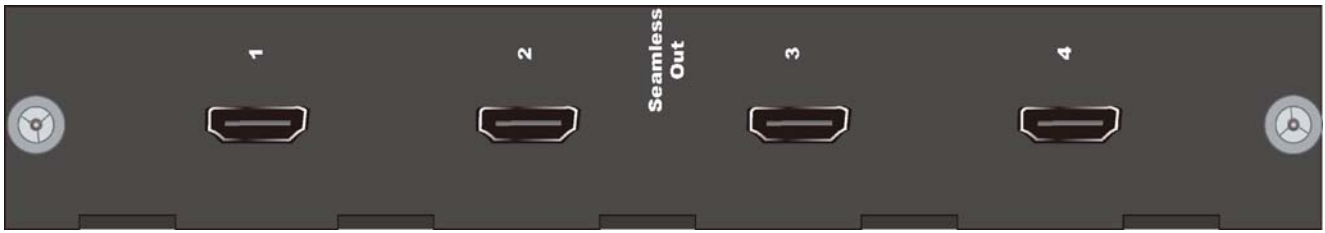
2.4 Output Boards Specification

HDMI Output Board (PM-HOS4)

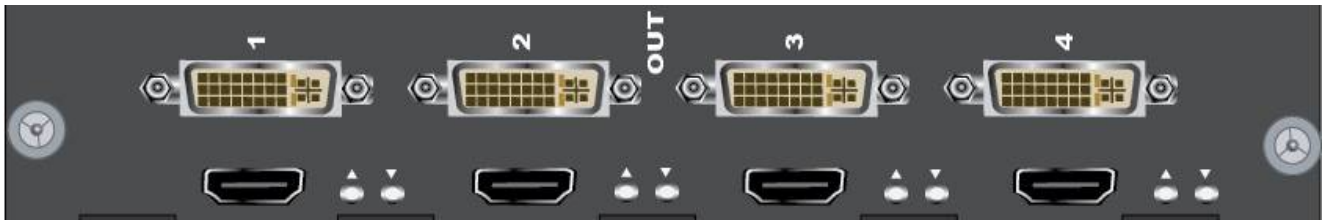


HDMI Output Board (PM-HOS4) Specifications	
Number of Port	4 HDMI ports, 4 Stereo In/out ports
Connector Type	Female HDMI connector, Female 3.5mm stereo jack
Signal Type	RGB digital Video (DVI and HDMI standards) or YCrCb digital component Video (HDMI)
Digital Audio	Dolby Digital® Plus, Dolby® TrueHD, DTS-HD High Res, DTS-HD Master Audio™, up to 8ch PCM
Audio Extraction	Via 3.5mm stereo Audio out ports
Audio Insertion	Via 3.5mm stereo Audio in ports
Maximum Data Rate	3.4 Gbps per color (R,G,B)
Maximum Pixel Clock	165 MHz
Standard	DVI 1.0 , HDMI 1.4
Switching Speed	Max 200ns
Output DVI Re-clocking	Automatic
Output Peripheral Device Power	600 mA per Output
Output Equalization	Automatic, Max 30m 1920 x1200 @50/60Hz or 1080p; 8 bit color
HDCP Compatible	HDCP version 2.0
Support Hot Plug Detection	Yes
Single Board Weight	0.5 lbs (0.23 kg)

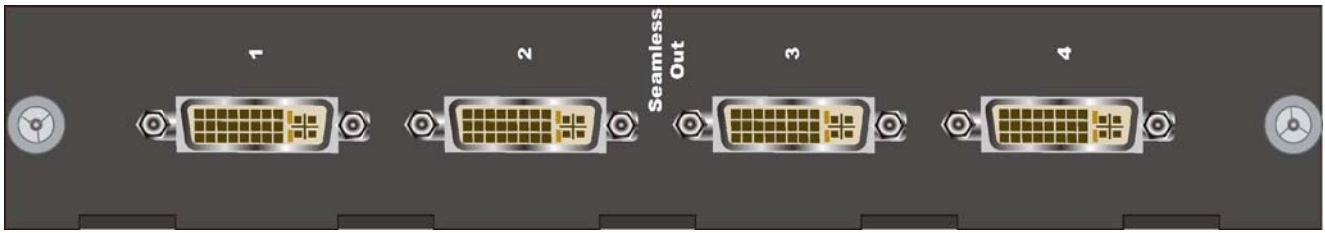
HDMI Output Board with Scaling (PM-HOS4S)



HDMI Output Board with Scaling (PM-HOS4S) Specifications	
Number of Port	4 HDMI ports
Connector Type	Female HDMI connector,
Signal Type	RGB digital Video (DVI and HDMI standards) or YCrCb digital component Video (HDMI)
Digital Audio	Supported when HDMI signal source used
Maximum Data Rate	3.4 Gbps per color (R,G,B)
Maximum Pixel Clock	165 MHz
Standard	DVI 1.0 , HDMI 1.3
Switching Speed	Max 200ns
Output DVI Re-clocking	Automatic
Output Peripheral Device Power	600 mA per Output
Output Equalization	Automatic, Max 30m 1920 x1200 @50/60Hz or 1080p; 8 bit color
HDCP Compatible	HDCP version 2.0
Support Hot Plug Detection	Yes
Single Board Weight	1 lbs (0.45 kg)

DVI Output Board (PM-DOS4)

DVI Output Board (PM-DOS4) Specifications	
Number of Port	4 DVI ports, 4 HDMI ports, 4 Stereo In/out ports
Connector Type	Female DVI connector, Female HDMI connector, Female 3.5mm stereo jack
Signal Type	RGB digital Video (DVI and HDMI standards) or YCrCb digital component Video (HDMI)
Digital Audio	Supported when HDMI signal source used
Audio Extraction	Via 3.5mm stereo Audio out ports
Audio Insertion	Via 3.5mm stereo Audio in ports
Maximum Data Rate	3.4 Gbps per color (R,G,B)
Maximum Pixel Clock	165 MHz
Standard	DVI 1.0 , HDMI 1.4
Switching Speed	Max 200ns
Output DVI Re-clocking	Automatic
Output Peripheral Device Power	600 mA per Output
Output Equalization	Automatic, Max 30m 1920 x1200 @50/60Hz or 1080p; 8 bit color
HDCP Compatible	HDCP version 2.0
Support Hot Plug Detection	Yes
Single Board Weight	1 lbs (0.45 kg)

DVI Output Board with Scaling (PM-DOS4S)

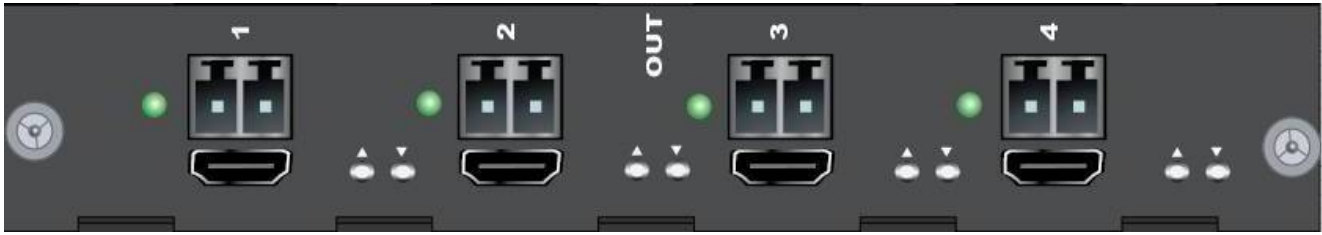
DVI Output Board with Scaling (PM-DOS4S) Specifications	
Number of Port	4 DVI ports
Connector Type	Female DVI connector,
Signal Type	RGB digital Video (DVI and HDMI standards) or YCrCb digital component Video (HDMI)
Digital Audio	Supported when HDMI signal source used
Maximum Data Rate	3.4 Gbps per color (R,G,B)
Maximum Pixel Clock	165 MHz
Standard	DVI 1.0 , HDMI 1.3
Switching Speed	Max 200ns
Output DVI Re-clocking	Automatic
Output Peripheral Device Power	600 mA per Output
Output Equalization	Automatic, Max 30m 1920 x1200 @50/60Hz or 1080p; 8 bit color
HDCP Compatible	HDCP version 2.0
Support Hot Plug Detection	Yes
Single Board Weight	1 lbs (0.45 kg)

CATx (HDBaseT) Output Board (PM-COS4)

CATx (HDBaseT) Output Board (PM-COS4) Specifications	
Number of Port	4 CATx ports, 4 HDMI ports, 4 Stereo In/out ports
Connector Type	Female RJ45 connector, Female HDMI connector, Female 3.5mm stereo jack
Supported Twisted Cable Type	CAT5/5e, CAT6/6e, CAT6a, CAT7
Digital Audio	Supported when HDMI signal source used
Audio Extraction	Via 3.5mm stereo Audio out ports
Audio Insertion	Via 3.5mm stereo Audio in ports
Supported Twisted Pair Cable Length	330 ft (100m) ; 1080p, 1920x1200 @50/60Hz
P.O.E Maximum Output Watt	Max 9.6Watt per channel
Resolution Range	1080p, 1920x 1200 @50/60Hz
Maximum Data Rate	3.4 Gbps per color (R,G,B)
Switching Speed	Max 200ns
HDCP Compatible	HDCP version 2.0
Compatible Extenders	PM-CR101, PM-CR102, PM-CR103, PM-CR101-D, PM-CR102-D, PM-CR101-RF6, PM-CR102-RF6, PM-CR101-RF6-D, PM-CR102-RF6-D
Single Board Weight	1 lbs (0.45 kg)

Note) Scaling Receiver (PM-CR102) does not support POE

Fiber Optical Output Board (PM-FOS4)



Fiber Optical Output Board (PM-FOS4) Specifications	
Number of Port	4 Optical ports, 4 HDMI ports, 4 Stereo In/out ports
Connector Type	Female 2 LC connector, Female HDMI connector, Female 3.5mm stereo jack
Mode Type	Supports both single mode & multi mode
Digital Audio	Supported when HDMI signal source used
Audio Extraction	Via 3.5mm stereo Audio out ports
Audio Insertion	Via 3.5mm stereo Audio in ports
Operating Distance	Up to 6,600 ft when used single mode, Up to 1,650 ft when used multi mode
Nominal Peak Wavelength	1310 and 1490, 1550 nm
Transmission Power	> -5 dBm, typical
Maximum Receiver Sensitivity	< -20 dBm, typical
Optical Loss Budget	10 dB, Maximum
Maximum Channel Data Rate	3.4 Gbps each channel
Pixel Data Bit Depth	12 bits per channel, 3 channel (R, G, B)
Rise and Fall Times (20%-80%)	75psec ≤ Rise time / fall time
Resolution Range	1080p, 1920x 1200 @50/60Hz
Switching Speed	Max 200ns
HDCP Compatible	HDCP version 2.0
Compatible Extenders	PM-FR101, PM-FR102, PM-FR103, PM-FR101-D, PM-FR102-D, PM-FR101-RF6, PM-FR102-RF6, PM-FR101-RF6-D, PM-FR102-RF6-D
Single Board Weight	1.5 lbs (0.68 kg)

3G/HD-SDI Output Board (PM-SOS4)

3G/HD-SDI Output Board (PM-SOS4) Specifications	
Number of Port	4 3G/HD-SDI ports, 4 Stereo In/out ports
Connector Type	Female BNC connector, Female 3.5mm stereo jack
Audio Insertion	Via 3.5mm stereo Audio in ports
Nominal Level	0.8 Vp-p \pm 10 %
Impedance	75 ohm
Return Loss	< -15 dB @ 1 MHz to 1.5 GHz
Equalization	Automatic or manual
Output Cable Equalization Distance	SDI: 150m / HD-SDI: 100m / 3G-HD-SDI: 50m
DC Offset	\pm 0.5 mV with Input at 0 offset
Re-clocking	Automatic
Jitter	<0.3 UI
Rise and fall times(20%-80)	135psec \leq Rise time / fall time @2970Mbps
Maximum data rate	2.97 Gbps
Auto Data Rate Lock	Yes
Data Types	8 bits or 10 bits
Operation Standard	SMPTE 292M, SMPTE 259M, SMPTE 424M, ITU-RBT.601, ITU-RBT.1120
Single Board Weight	1.5 lbs (0.68 kg)

2.5 PM Matrix Boards and PM Extenders Compatibility Chart

Boards Extenders	PM-CIS4	PM-FIS4	PM-COS4	PM-FOS4
PM-CT101	•			
PM-CT102	•			
PM-CT103	•			
PM-CT101-D	•			
PM-CT102-D	•			
PM-CT101-RF6	•			
PM-CT102-RF6	•			
PM-CT101-RF6-D	•			
PM-CT102-RF6-D	•			
PM-FT101		•		
PM-FT102		•		
PM-FT103		•		
PM-FT101-D		•		
PM-FT102-D		•		
PM-FT101-RF6		•		
PM-FT102-RF6		•		
PM-FT101-RF6-D		•		
PM-FT102-RF6-D		•		
PM-CR101			•	
PM-CR102			•	
PM-CR103			•	
PM-CR101-D			•	
PM-CR102-D			•	
PM-CR101-RF6			•	
PM-CR102-RF6			•	
PM-CR101-RF6-D			•	
PM-CR102-RF6-D			•	
PM-FR101				•
PM-FR102				•
PM-FR103				•
PM-FR101-D				•
PM-FR102-D				•
PM-FR101-RF6				•
PM-FR102-RF6				•

PM-FR101-RF6-D				•
PM-FR102-RF6-D				•

- PM-CT101 : PM series HDMI over CATx (HDBaseT) Extender Transmitter, Stand alone type, HDMI Loop-Through, single 3.5mm Audio in, POE+, RS-232+, 330 ft
- PM-CT102 : PM series HDMI over CATx (HDBaseT) Extender Transmitter, Stand alone type, HDMI and VGA selectable Input, dual 3.5mm Audio in, POE+, RS-232+, 330 ft
- PM-CT103 : PM series HDMI over CATx (HDBaseT) Extender Transmitter, Wall Plate type, HDMI and VGA selectable Input, dual 3.5mm Audio in, POE+, RS-232+, 330 ft
- PM-CT101-D : PM series DVI over CATx (HDBaseT) Extender Transmitter, Stand alone type, DVI Loop-Through, single 3.5mm Audio in, POE+, RS-232+, 330 ft
- PM-CT102-D : PM series DVI over CATx (HDBaseT) Extender Transmitter, Stand alone type, DVI and VGA selectable Input, dual 3.5mm Audio in, POE+, RS-232+, 330 ft
- PM-CT101-RF6 : PM series HDMI over CATx (HDBaseT) Extender Transmitter, RF6 Rack mountable type, HDMI Loop-Through, single 3.5mm Audio in, POE+, RS-232+, 330 ft
- PM-CT102-RF6 : PM series HDMI over CATx (HDBaseT) Extender Transmitter, RF6 Rack mountable type, HDMI and VGA selectable Input, dual 3.5mm Audio in, POE+, RS-232+, 330 ft
- PM-CT101-RF6-D : PM series DVI over CATx (HDBaseT) Extender Transmitter, RF6 Rack mountable type, DVI Loop-Through, single 3.5mm Audio in, POE+, RS-232+, 330 ft
- PM-CT102-RF6-D : PM series DVI over CATx (HDBaseT) Extender Transmitter, RF6 Rack mountable type, DVI and VGA selectable Input, dual 3.5mm Audio in, POE+, RS-232+, 330 ft
- PM-FT101 : PM series HDMI over Fiber Optic Extender Transmitter, Stand alone type, HDMI Loop-Through, single 3.5mm Audio in, RS-232+, 6,600 ft
- PM-FT102 : PM series HDMI over Fiber Optic Extender Transmitter, Stand alone type, HDMI and VGA selectable Input, dual 3.5mm Audio in, RS-232+, 6,600 ft
- PM-FT103 : PM series HDMI over Fiber Optic Extender Transmitter, Wall Plate type, HDMI and VGA selectable Input, dual 3.5mm Audio in, RS-232+, 6,600 ft

PM-FT101-D	:	PM series DVI over Fiber Optic Extender Transmitter, Stand alone type, HDMI Loop-Through, single 3.5mm Audio in, RS-232+, 6,600 ft
PM-FT102-D	:	PM series DVI over Fiber Optic Extender Transmitter, Stand alone type, HDMI and VGA selectable Input, dual 3.5mm Audio in, RS-232+, 6,600 ft
PM-FT101-RF6	:	PM series HDMI over Fiber Optic Extender Transmitter, RF6 Rack mountable type, HDMI Loop-Through, single 3.5mm Audio in, RS-232+, 6,600 ft
PM-FT102-RF6	:	PM series HDMI over Fiber Optic Extender Transmitter, RF6 Rack mountable type, HDMI and VGA selectable Input, dual 3.5mm Audio in, RS-232+, 6,600 ft
PM-FT101-RF6-D	:	PM series DVI over Fiber Optic Extender Transmitter, RF6 Rack mountable type, DVI Loop-Through, single 3.5mm Audio in, RS-232+, 6,600 ft
PM-FT102-RF6-D	:	PM series DVI over Fiber Optic Extender Transmitter, RF6 Rack mountable type, DVI and VGA selectable Input, dual 3.5mm Audio in, RS-232+, 6,600 ft
PM-CR101	:	PM series HDMI over CATx (HDBaseT) Extender Receiver, Stand alone type, Single 3.5mm Audio out, POE+, RS-232+, 330 ft
PM-CR102	:	PM series HDMI over CATx (HDBaseT) Extender Receiver, Stand alone type, Built-in Scaler, single 3.5mm Audio out, POE+, RS-232+, 330ft
		Note) Scaling Receiver (PM-CR102) does not support POE
PM-CR103	:	PM series HDMI over CATx (HDBaseT) Extender Receiver, Wall Plate type, Single 3.5mm Audio out, POE+, RS-232+, 330 ft
PM-CR101-D	:	PM series DVI over CATx (HDBaseT) Extender Receiver, Stand alone type, Single 3.5mm Audio out, POE+, RS-232+, 330 ft
PM-CR102-D	:	PM series DVI over CATx (HDBaseT) Extender Receiver, Stand alone type, Built-in Scaler, single 3.5mm Audio out, POE+, RS-232+, 330ft
		Note) Scaling Receiver (PM-CR102-D) does not support POE
PM-CR101-RF6	:	PM series HDMI over CATx (HDBaseT) Extender Receiver, RF6 Rack mountable type, Single 3.5mm Audio out, POE+, RS-232+, 330 ft
PM-CR102-RF6	:	PM series HDMI over CATx (HDBaseT) Extender Receiver, RF6 Rack mountable type, Built-in Scaler, single 3.5mm Audio out, POE+, RS-232+, 330ft
		Note) Scaling Receiver (PM-CR102-RF6) does not support POE
PM-CR101-RF6-D	:	PM series DVI over CATx (HDBaseT) Extender Receiver, RF6 Rack mountable type, Single 3.5mm Audio out, POE+, RS-232+, 330 ft

PM-CR102-RF6-D: PM series DVI over CATx (HDBaseT) Extender Receiver, RF6 Rack mountable type, Built-in Scaler, single 3.5mm Audio out, POE+, RS-232+, 330ft

Note) Scaling Receiver (PM-CR102-RF6-D) does not support POE

PM-FR101 : PM series HDMI over Fiber Optic Extender Receiver, Stand alone type, Single 3.5mm Audio out, RS-232+, 6,600 ft

PM-FR102 : PM series HDMI over Fiber Optic Extender Receiver, Stand alone type, Built-in Scaler, single 3.5mm Audio out, RS-232+, 6,600ft

PM-FR103 : PM series HDMI over Fiber Optic Extender Receiver, Wall Plate type, Single 3.5mm Audio out, RS-232+, 6,600ft

PM-FR101-D : PM series DVI over Fiber Optic Extender Receiver, Stand alone type, Single 3.5mm Audio out, RS-232+, 6,600 ft

PM-FR102-D : PM series DVI over Fiber Optic Extender Receiver, Stand alone type Built-in Scaler, single 3.5mm Audio out, RS-232+, 6,600ft

PM-FR101-RF6 : PM series HDMI over Fiber Optic Extender Receiver, RF6 Rack mountable type, Single 3.5mm Audio out, RS-232+, 6,600 ft

PM-FR102-RF6 : PM series HDMI over Fiber Optic Extender Receiver, RF6 Rack mountable type, Built-in Scaler, single 3.5mm Audio out, RS-232+, 6,600ft

PM-FR101-RF6-D : PM series DVI over Fiber Optic Extender Receiver, RF6 Rack mountable type, Single 3.5mm Audio out, RS-232+, 6,600 ft

PM-FR102-RF6-D : PM series DVI over Fiber Optic Extender Receiver, RF6 Rack mountable type, Built-in Scaler, single 3.5mm Audio out, RS-232+, 6,600ft

Chapter 3. Installation

3.1 Package Contents

The shipping group consists of the followings:



- ▶ 1 x PM series Matrix Router Main Frame
- ▶ Input / Output Boards (purchased separately)
- ▶ AC Power Cords
- ▶ 1 x RS-232C Cable (crossed type)
- ▶ 1 x RJ-45 UTP Cable (crossed type)
- ▶ 1 x USB Cable for Firmware Update
- ▶ User's Manual

3.2 Installation Environments

For installation environments, we recommend the following environments;

- ▶ Below 30°C of ambient temperature
- ▶ Install and operate in the environment below 60% of ambient humidity (Best condition)
- ▶ Use it in the environment of free of vibrations and dusts and in good ventilation condition
- ▶ Avoid areas with direct sunlight, heat sources, or high levels of EMI
 - * EMI: Electro-Magnetic Interference
- ▶ Recommend stabilized AC Input power (Recommend to use AVR)
 - * AVR: Automatic Voltage Regulator
- ▶ All physical connections to the product use industry-standard connectors.
- ▶ Be careful when you contact the product because some parts can be somewhat hot

3.3 Installation

Note) Before installing PM Matrix Router, inspect the physical condition of the unit if there is any signs of damage. If you find damage, stop installing and contact your PureLink representative immediately. When the unit has been inspected and found to be in good condition, the installation process can begin.

Installing and Removing Input and Output Board



PM-8X has total 4 horizontal Board slots; 2 Input Board slots section on the top side and 2 Output Board slots section on the middle side, to configure maximum of 8 Inputs and 8 Outputs.

- | | |
|-----------------|------------------|
| ① Input 1,2,3,4 | ③ Output 1,2,3,4 |
| ② Input 5,6,7,8 | ④ Output 5,6,7,8 |

Install Board as follows;

1. Align the Board with metal guide rail
2. Gently slide the Board into the frame until it connects to the main frame
3. Tighten the left and right screw knobs (clockwise) to lock the Board to the main frame

Removing Board as follows;

1. Disconnect any connected cables
2. Loosen and pull the left and right screw knobs (counterclockwise) to unlock the Board from the main frame
3. Gently slide Board out of the main frame

Installing the Matrix Router in a Rack

Note) When mount the Matrix Router in a rack, ensure that none of the fans have restricted air flow

PM-8X is designed to be mounted in a standard 19" (48.26 cm) AV rack. It takes 3 RU rack space and it is recommended to have at least one empty rack unit space above and below of the Matrix Router to prevent overheating.

Rack Installation Tips

- Write down the serial number (usually located on the bottom of the unit) in an easily accessible location prior to installing the unit in a rack
- It is recommended to test unit to ensure the unit is working properly prior to installing the unit in a rack
- For HDMI or DVI Input and/or Output Boards, we recommend to use copper cable no longer than 33 ft (10meters) for HD Video quality assurance. Above 33 ft (10meters), we recommend to use CATx or Fiber Optic extension system. This will assure future with higher resolution Video transmission.
- For CATx Input and/or Output Boards, PM CATx Extenders are required. PM CATx Transmitters pair with PM CATx Input Board and PM CATx Receivers pair with PM CATx Output Board. See pg. 35 for detail information.
- For Fiber Input and/or Output Boards, PM Fiber Extenders are required. PM Fiber Extender Transmitters pair with PM Fiber Input Board and PM Fiber Receivers pair with PM Fiber Output Board. See pg. 35 for detail information.
- Use crossed RS-232/422 cable for serial control
- Use crossed RJ-45 cable for LAN control

Installation and Setup

- Place the Matrix Router into a desired position and screw in the rack ear holes.
 - * Recommended to screw all 8 holes for secure installation
- Plug power cord into power supply unit on the Matrix Router. For redundancy power use, plug power cords into both power supply unit
- Connect source devices to the Matrix Router's Input Board using appropriate cables
- Connect display devices to the Matrix Router's Output Board using appropriate cables. Connect control devices to the Matrix Router's communication ports.
 - * Command Protocols are communicated through RS-232/422, LAN, or front panel touch screen. USB connection is only for firmware update.
- Make sure any connected Extenders' power are on.
 - * CATx Extenders may not need power if they will be powered via POE
- Turn on the power of display devices
- Turn on the power of Matrix Router
- Turn on the power of source devices

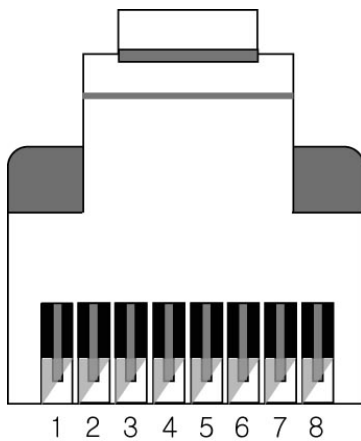
Note) For most of cases, PureLink's Auto EDID factory default setting will result in a satisfactory image on the display. It's almost plug-n-play system. There may be cases where additional adjustment is required, please refer to Auto-EDID management system section pg. 63 or contact PureLink technical support team for the assistance.

3.4 Cable Termination

- CATx (HDBaseT) cable
- RS-232/422 cable (PM Matrix)
- LAN cable
- Audio cable
- RS-232/422 cable (PM Extenders)

CATx Cable Termination (for CATx Input/Output Boards)

PM series Matrix Router and Extenders are designed TIA/EIA-566-B Standard. Please ensure that each PIN layout of the cable is corresponding with the picture below before connecting the cable. Please note that CATx or above level cable enables to deliver better quality and longer distance.



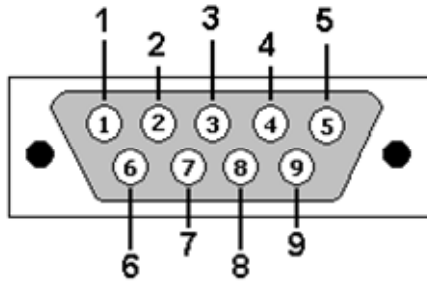
Pin	TIA/EIA-568B	Signal
	Wire color	Digital RGB
1	Orange/ White	TMDS Data2+
2	Orange	TMDS Data2-
3	Green/ White	TMDS Data1+
4	Blue	TMDS Data0+
5	Blue/ White	TMDS Data0-
6	Green	TMDS Data1-
7	Brown/ White	TMDS Clock+
8	Brown	TMDS Clock-

RS-232/422 Cable Termination (for Control)

Note) Crossover (Null modem) cable must be used for the communication with PM series Matrix Router

The following table shows the pinout of the RS-232/422 connector. Note that in the pinout table, some transmit/receive functions (abbreviated as Tx/Rx) are different for RS-232

versus RS-422. DB9 cables are available with male-to-male, female-to-female, and male-to-female connectors. PM series Matrix Router's RS-232/422 port uses a male DB9 connector and therefore requires a cable with a female connector.



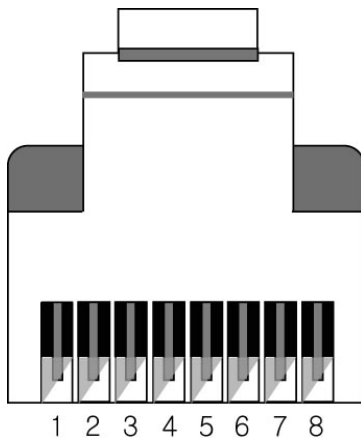
Pin	RS-232	RS-422
1	Not used	Not used
2	Rx: Receive	Rx-: Receive (-)
3	Tx: Transmit	Tx-: Transmit (-)
4	Not used	Not used
5	Ground	Ground
6	Not used	Not used
7	Not used	Tx+: Transmit (+)
8	Not used	Rx+: Receive (+)
9	Not used	Not used

LAN Cable Termination (for Control)

The following table shows the pinout of the LAN connector. Note that in the pinout table, some transmit/receive functions (abbreviated as Tx/Rx) are different for straight-through cable and crossover LAN cable.

Straight-through Cable: for connection of PM series Matrix Router to an Ethernet network

Crossover Cable : for direct connection between the PC or controller and the PM series Matrix Router.



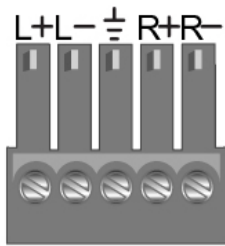
Pin	Crossover Cable	
	End 1 Wire Color	End 2 Wire Color
1	Orange/ White	Orange/ White
2	Orange	Green
3	Green/ White	Green/ White
4	Blue	Blue
5	Blue/ White	Blue/ White
6	Green	Orange
7	Brown/ White	Brown/ White
8	Brown	Brown

Pin	Straight-through Cable	
	End 1 Wire Color	End 2 Wire Color
1	Orange/ White	Orange/ White
2	Green	Green

3	Green/ White	Green/ White
4	Blue	Blue
5	Blue/ White	Blue/ White
6	Orange	Orange
7	Brown/ White	Brown/ White
8	Brown	Brown

Audio Cable Termination (for Audio Matrix Router)

5-pin Phoenix connector is used for Audio Matrix Router's Input/Output. Please ensure to follow the picture below for Audio cable termination before connecting the cable.

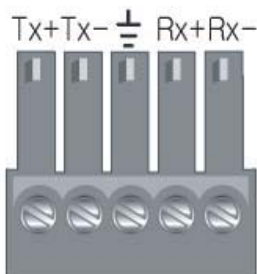


Pin	Audio Phoenix Connector
1	L + (Stereo Audio)
2	L -
3	Ground
4	R + (Stereo Audio)
5	R -

* Pinout from the left

RS-232/422 Cable Termination (for PM Extender Tx/Rx)

5-pin Phoenix connector is used for RS-232/422 communication between PM Extender Tx/Rx to the devices that are attached.



Pin	RS-232	RS-422
1	Tx	Tx +
2	Not used	Tx -
3	Ground	Ground
4	Rx	Rx +
5	Not used	Rx -

* Pinout from the left

Chapter 4. Operation

PM series Matrix Router can be operated via three convenient methods;

- 1) Front panel LCD touch screen
- 2) RS-232/422C
- 3) LAN (TCP/IP)

4.1 Front Panel Button Operation

Turn the power switch on

Once all channel indicator lights are on, the first step is completed.

Channel View and Input/Output Selection

- IN / OUT indicates connection status
- Press the IN / OUT KEY to display each channel's connection status and video resolution
- Press the CANCEL KEY to return to the initial screen

Create Menu

- Select an INPUT channel
- Press the OUT buttons to set a channel
- Press the ENTER button to save or switch input channels
- Press CANCEL to reverse a selection and return to the previous screen

Function

Select a FUNCTION button to view the sub-menu

Use the Create (UP) / Preview (Down) buttons to control the sub-menu options

On the sub-menu, user can check and configure below settings;

1. EDID
2. Preset
3. Product ID
4. RS232
5. LAN
6. Input Configuration
7. Output Configuration
8. Test Pattern
9. Monitoring Out

10. Firmware Version

11. Factory Reset

1. EDID

- 1) Ext M.EDID Load
- 2) Ext S.EDID Load
- 3) Int M.EDID Load
- 4) Int S.EDID Load

1) Ext M.EDID Load & 2) Ext. S.EDID Load

- This menu is to emulate EDID data from any display devices that are connected to the Matrix Router's Output via copper cables and save it on to Matrix Router's Input EEPROM.

✓ For CATx and Fiber Output Boards, EDID emulation is not possible. In this case, try EDID library feature.

✓

- Select Output #
- Selected Output's display device's EDID information will be displayed
- Select Input# where selected EDID data will be saved on to. Multiple Input can be selected at once.
- Push enter button to save.

3) Int M.EDID Load & 4) Int S.EDID Load

- On this menu, select an EDID from the library and save it on to the Input EEPROM. PM series Matrix Router has 14 selectable most widely used EDID data pre-programmed and 4 empty slots that can be used to upload and save EDID data from any external display device.

- Select EDID using ↑ ↓ arrow
- Select Input# where selected EDID data will be saved on to. Multiple Input can be selected at once.
- Push enter button to save

5) Ext EDID Save

- On this menu, user can emulate EDID data from any display devices that are connected to Matrix Router's Output via copper cables and save it on to the EDID library for future use.

- Select Output #
- Selected Output's display device's EDID information will be displayed
- Select empty slot on EDID library where selected EDID data will be saved on to.
- Push enter button to save.

EDID status display:

- Write OK : EDID save process was successfully completed
- N.C : Not connected, when Output Board or monitor are not installed, or detected.
- Write Err : Write error, when EDID save process was not successfully completed.

2. Router ID

- By setting different ID to the Matrix Router, up to 255 units of PM series Matrix Router can be connected and operated in the same network either via serial or LAN communication. Router ID can be set between 001 ~ 255.

* Factory default setting is 001

Note) Router ID is associated with commend control Protocol; therefore, it is important to remember Matrix Router's current Router ID.

3. RS232

- There are four values those need to be set for serial communication; baud rate, data bits, stop bits, and parity. Click and select each value using touch screen and push enter button to save.

Factory default (recommended) settings for serial communication are:

Baud rate - 19200

Data bits - 8

Parity - none

Stop bits - 1

Flow control - none

and supported settings are:

Supported Baud Rate: 4800 Bps, 9600 Bps, 14400 Bps, 19200 Bps,
38400 Bps, 57600Bps, 76800 Bps, 115200 Bps

Supported Data bit: 5 bit, 6 bit, 7 bit, 8 bit

Supported Parity: Non, Even, Odd

Supported Stop bit: 1 bit, 2 bit

4. LAN

- PM series Matrix Router can be controlled through the 10/100 base Ethernet port using a command line interface.

There are four values that need to be set for LAN communication; IP address, Gateway address, Subnet mast, and Mac address. Please use below button indication to configure LAN settings;

- * Input #1 : 1
- * Input #2 : 2
- * Input #3 : 3
- * Input #4 : 4
- * Input #5 : 5
- * Input #6 : 6
- * Input #7 : 7
- * Input #8 : 8
- * Output #1 : 9
- * Output #2 : 0
- * Output #3 : .

Please use Output #3 button to mover cursor to the next data section
Please use Enter button to save the setting

Note) Please contact your Network Administrator for network information to avoid any IP conflict.

Factory default settings for LAN communication are:

IP Address: 192.168.000.002

Gateway Address: 192.168.000.001

Subnet Mask: 255.255.255.000

Mac Address: Matrix Router has its own MAC address and that MAC address allows user to communicate with PC network solutions without any communication conflict.

5. Input Configuration

- 1) Input Video Select
- 2) Input Audio Select

Some of the configuration applies to certain Input Board type only. For example, HDMI Input Board does not need to configure Video because there are no choices to make. First select Input # that wishes to make a change on Input section and then configure setting using Create (UP) / Preview (Down) and Enter buttons.

6. Output Configuration

- 1) Output M.Audio Select
- 2) Output S.Audio Select

It displays current Output Board's Audio configuration. Only Audio option can be configured on Output Boards. First select Output # that wishes to make a change on Output section and then use M.Audio (HDMI/SDI) and S.Audio (CATx/Fiber) section for configuration. Use Create (UP) / Preview (Down) and Enter buttons for setting configuration.

7. Test Pattern

PM series Matrix Router provides a built-in Test Pattern Generator, enabling easy testing from the Matrix Router to the display.

Use Create (UP) / Preview (Down), Input and Output and Enter buttons for setting configuration.

Timing Input #1: 1024 x 768 @ 60Hz
#2: 1920 x 1200 @ 60Hz
#3: 720 x 480P @ 60Hz
#4: 1280 x 720P @ 60Hz
#5: 1920 x 1080P @60Hz

Test Pattern Input #1: Colorbars
#2: Cross Hatch
#3: 16 Gray
#4: 256 Gray
#5: 4 Color Gray

8. Monitoring Out

PM Matrix Router provides an HDMI preview monitoring port, which further simplifies system testing by acting like an extra Video Output.

Select Input # that needs to be checked and push enter button.

Selected Input # will be Output to preview monitoring port.

9. Firmware Version

Matrix Router's firmware version can be checked using Up/Down buttons

10. Factory Reset

Factory reset will put the general setting back to the factory default mode.

Factory default setting value:

RS-232 Baud rate:	19200 Bps
IP Address:	192.168.000.002
Gateway:	192.168.000.001
Input/Output Connection:	No Connection
Product ID:	255

- All Video/Audio switching connection becomes clear
- Serial communication setting will be restored back to the factory default
Baud Rate: 19200, Data Bits: 8, Parity: None, Stop Bits: 1
- LAN Communication setting will be restored back to the factory default
IP Address: 192.168.000.002
Gateway Address: 192.168.000.001
Subnet Mask: 255.255.255.000

4.2 Command Line Operation

Control Programmer's Guide (Code Structure and Examples)

This section is designed for programmers who wish to create their own control programs using the command code. All PureLink digital Matrix Routers provide a simple character stream control used by external control devices attached to a PureLink device. Command codes are used primarily for control, during system installation and setup, and for diagnostic purposes.

Command code is a set of alphanumeric characters that combine to form control commands. Command code strings are entered into a terminal emulation program (such as windows HyperTerminal) running on an external control device. The control device (PC, third-party controller) sends the commands to the system. Control devices must be able to send and receive ASCII or HEXA code via an RS-232 or Ethernet port.

Command Code Formats

A command code is a series of command characters and numbers used to send commands to the system. Commands include basic formulas for creating and disconnecting switches, as well as for verifying the status of switches and other functions.

In a command code, each character is either general command (e.g, C for connect) or an identifier that indicates what the following number designates (e.g, "O" and the number following it designate an "Output number"). The command code *255CI01O01! Can be interested as follows: (*) Starting the command code (255) Router ID is 255 (C) Create connection on (I01) Input 01 to (O01) Output 01 (!) take the command. For a complete list of command characters and their functions, see page 67.

Note) For PM-128X and PM-256X, input and output # uses three digit format, instead of two digits. For example;

Input 01 (I001), Input 05 (I005), Output 01 (O001) and Output 100 (O100)

Ack value (Acknowledge value: Response from Pure Link device) will be echoed back to the terminal screen as the unit accepts them. When a command is successfully executed, all of the characters appear containing the character "s" which stands for status. For example;

Ex 1) Command (Connect Input 1 to Output 1)

*255CI01O01! ↵

Ack value

*255sC I01O01!

Ex 2) Command (Check Input connection status on Output 3)

*255?O03! ↵

Ack Value

*255s? I03O03!

General Rules for Command Codes

The commands are coded in ASCII and HEXA. Please refer to Table 5.1 on pg.68 for detailed descriptions of keys and functions. A basic command code setup is shown below;

Ex) *255CI01O01! ↵

Start + Router ID + Command + Input number + Output number + End + Enter

(*) (255) (C) (I01) (O01) (!) (↵)

- ▶ A command line allows execution of only one command. Multiple commands require execution of multiple strings; one command per string.
- ▶ All commands begin with * (Start) byte.
- ▶ All commands end with ! (End) byte.
- ▶ All commands will be executed when ↵ (Enter) is entered.
- ▶ The correct Router ID must be entered in a command code. Systems will not react to the command if a wrong Router ID is entered. The factory default Router ID is set to 255 and the universal Router ID is 999. Systems will react to the command whenever universal Router ID is entered in command code.
- ▶ Command codes typically are not case-sensitive.
- ▶ To specify multiple Inputs and Outputs, enter a “,” (Comma) between numbers. (Ex., *255CI01O01,02,03! ↵ : Connects Input 01 to Output 01, 02, and 03)
- ▶ Use - (Hyphen) for range connection. (EX., *255CI01O01-04! ↵ : Connects Input 01 to Output 01,02,03, and 04)

Table 5.1 Command Codes Characters Table

The table below shows command code characters (keys), which are used to generate control commands, their functions, and short function descriptions.

Key		Function	Description and Example	Byte
HEX	ASCII			
0x2A	*	Start the command	Header Code	1
0x21	!	End the command	Tail Code	1
0D0A	↵	Execute the command	Execute the command	1
0x43 0x63	C c	Connect* (Video and Audio)	Initiates a Connect (switch) command for both Video and Audio; this must precede Input # and Output # specification	1
0x56,0x43 0x76,0x63	VC vc	Connect (Video only)	Initiates a Connect (switch) command for Video only; this must precede Input # and Output # specification	2
0x41,0x43 0x61,0x63	AC ac	Connect* (Audio only)	Initiates a Connect (switch) command for Audio only; this must precede Input # or Output # specification	2
0x44 0x64	D d	Disconnect*	Disconnect command for both Video and Audio; this must precede Input # and Output # specification	1
0x56,0x44 0x76,0x64	VD vd	Disconnect (Video only)	Disconnect command for Video only; this must precede Input # and Output # specification	2
0x41,0x44 0x61,0x64	AD ad	Disconnect* (Audio only)	Disconnect command for Audio only; this must precede Input # and Output # specification	2
0x3F	?	Connection status	Video connection status check command; this must precede Input # or Output # specification	1
	A?	Audio connection status*	Audio connection status check command; this must precede Input # or Output # specification	2
	,	Space	Separates the numbers within entries that contain multiple numbers	1
	-	Range	Specifies a range of numbers in entries containing multiple	1

			numbers	
	IV	Input Video select (M: HDMI/SDI, S: DVI/CATx, Fiber, A: Auto mode)	Input Video select command; this must precede Input # and Video selection specification	2
	IA	Input Audio select (M: Embedded Audio, S: 3.5mm Stereo, A: Auto mode)	Input Audio select command; this must precede Input # and Audio selection specification	2
	IM	Input monitoring select	Input Video preview monitoring select command : this must precede Input #	2
	IF	Input channel information	Input channel information request command : this must precede Input #	2
	IE	Input Extender Video select (SP: VGA. SH: HDMI)	Input connected Extender's Video select (CATx, Fiber only) command : this must precede Input # and Video selection	2
	IP	Input Extender command Transmission	Send command to the device that is connected to the Input Extender (CATx, Fiber only): this must precede Input #, baud rate, timing	2
	OM	Output HDMI/SDI port Audio select (M: Embedded Audio, S: 3.5mm Stereo, A: Auto mode)	Output HDMI/SDI port's Audio select command; this must precede Output # and Audio selection	2
	OS	Output CATx/Fiber port Audio select (M: Embedded Audio, S: 3.5mm Stereo, A: Auto mode)	Output CATx/Fiber port's Audio select command; this must precede Output # and Audio selection	2
	OT	Output Test Pattern Select (T01: 1024 x 768 T02: 1920 x 1200 T03: 720 x 480p)	Output test pattern select command: this must precede Output #, resolution, and pattern type	2

		T04: 1280 x 720p T05: 1920 x 1080p P01: Color bars P02: Cross Hatch P03: 16 Gray P04: 256 Gray P05: 4 Color Gray		
	OF	Output channel information	Output channel information request command : this must precede Output #	2
	OE	Output Extender Scaler timing select	Output Extender (CATx, Fiber only) Scaler timing select command: this must precede Output # and Video timing	2
	OP	Output Extender command transmission	Send command to the device that is connected to the Output Extender (CATx, Fiber only) : this must precede Output #, baud rate, timing	2
	AV	Audio Matrix Router's Output Audio volume set (1.0db step attenuation)*	Output Audio volume control command: this must precede Output # and volume specification	2
	AF	Audio Matrix Router's Output Audio volume Information*	Audio Matrix Router's Output Audio volume information request command : this must precede Output #	2
0x49 0x69	l i	Router ID check	Router ID check command; check Router's current ID number	1
	?version	Firmware version check	Firmware version check command; *255?version! ↵	
0x40	@	Baud rate setting	Baud rate sting command; *255@001!↵ → 19200 *255@002!↵ → 38400 *255@003!↵ → 57600 *255@004!↵ → 115200	
0x4E	N	Networking setting	Network configuration setting	1

0x6E	n		command: - IP Setting *255NIP125.135.199.004! ↵ - Subnet Mask Setting *255NSM255.255.255.000! ↵ - Gate Way Setting *255NGW192.168.000.001! ↵ - MAC Address Setting *255NMA00.50.C2.B0.20.05! ↵ - Port Number Setting *255NPN3000! ↵ - Network Information *255NNI000! ↵	
0x48 0x68	H h	Connection check	Router communication connection check command: *255H000! ↵	1

* Audio commands are for the independent green blocks Audio Matrix Router

Command Ack (Acknowledge) Value Response

When command codes are entered into a terminal emulation program (such as HyperTerminal) and are accepted by the system, they respond back to the terminal screen one at a time, as noted below in the table. The complete command has executed successfully when all of the entered characters including “s” which stands for status, appear. If a command character is not accepted, a different character than the one entered appears and all or part of the command has not been executed.

Ack (Acknowledge) Value Response Table

The following table shows ack value response characters along with their descriptions and meanings, which may appear instead of the initially entered character or number. If these characters appear, all or part of the command has not been executed.

Table 5.2 Descriptions of Acknowledge (ACK) Signals

Ack value	Description
Input 1 is not connected	No information in channel 1
Command Code Error	Indicates that system has rejected all or part of the command
Router ID Error	Indicates that the wrong ID number was entered

Command Code Ack Value Examples

Command Code Entered	Ack Value as appears in the control program	Explanation of Result
*255CI01O01! ↵	*255sC I01O01!	The command was successfully Executed
*255CO01! ↵	Command Code Error	The command was not executed because the Input number was not included
*255CI01O01 ↵	Command Code Error	The command was not executed because “!” (End) was not included
*300CI01O01! ↵	Router ID Error	The command was not executed because the actual Router ID and entered Router ID did not match

Connecting Switches

A switch is an active connection between an Input (source) signal and one or more Output (display) devices. The signals connected in a switch command are either individual signals or groups of signals coming through the connectors on the rear of the unit.

* Audio commands are for the independent green blocks Audio Matrix Router

The “C” key initiates a Connect command for routing a switch. The characters and numbers that follow the “C” command tell the system, which Inputs and Outputs to connect. The last character “!” is found at the end of a command code which tells the system to execute the command.

For example, the command code

*255CI01O01! ↵

can be interpreted as follows: (*) Starting the command code (255) Router ID is 255 (C) Create connection on (I01) Input 01 to (O01) Output 01 (!) take the command. For a complete list of command characters and their functions, see examples below.

To connect a switch:

Enter the Connect command below. Replace the “#”s with the Input and Output number(s).

*255CI#O#! ↵

Note) For PM-128X and PM-256X, input and output # uses three digit format, instead of two digits. For example;

Input 01 (I001), Input 05 (I005), Output 01 (O001) and Output 100 (O100)

Examples (Connect Video and Audio):

Command Codes	Action
*255CI01O01! ↵	Connect both Video and Audio Input 1 to Output 1
*255CI01O08,I08O02!↵	Connect both Video and Audio Input 1 to Output 8 and Input 8 to Output 2
*255CI01O01,I02O02,I03O03!↵	Connect both Video and Audio Input 1 to Output 1, Input 2 to Output 2, and Input 3 to Output 3
*255CI01O01,02,03! ↵	Connect both Video and Audio Input 1 to Output 1, 2, and 3
*255CI01O01-07! ↵	Connect both Video and Audio Input 1 to Output 1, 2, 3, 4, 5, 6, and 7

Examples for PM-128X and PM-256X (Connect Video and Audio):

Command Codes	Action
*255CI001O001! ↵	Connect both Video and Audio Input 1 to Output 1
*255CI001O008,I008O002!↵	Connect both Video and Audio Input 1 to Output 8 and Input 8 to Output 2
*255CI001O001,I002O002,I003O003!↵	Connect both Video and Audio Input 1 to Output 1, Input 2 to Output 2, and Input 3 to Output 3
*255CI001O001,002,003! ↵	Connect both Video and Audio Input 1 to Output 1, 2, and 3
*255CI001O001-007! ↵	Connect both Video and Audio Input 1 to Output 1, 2, 3, 4, 5, 6, and 7

Examples (Connect Video only):

Command Codes	Action
*255VCI01O01! ↵	Connect Video Input 1 to Output 1
*255VCI01O08,I08O02! ↵	Connect Video Input 1 to Output 8 and Input 8 to Output 2
*255VCI01O01,I02O02,I03O03!↵	Connect Video Input 1 to Output 1, Input 2 to Output 2, and Input 3 to Output 3
*255VCI01O01,02,03! ↵	Connect Video Input 1 to Output 1, 2, and 3
*255VCI01O01-07! ↵	Connect Video Input 1 to Output 1, 2, 3, 4, 5, 6, and 7

Examples for PM-128X and PM-256X (Connect Video only):

Command Codes	Action
*255VCI001O001! ↵	Connect Video Input 1 to Output 1
*255VCI001O008,I008O002! ↵	Connect Video Input 1 to Output 8 and Input 8 to Output 2
*255VCI001O001,I002O002,I0	Connect Video Input 1 to Output 1, Input 2 to Output 2, and

03O003! ↵	Input 3 to Output 3
*255VCI001O001,002,003! ↵	Connect Video Input 1 to Output 1, 2, and 3
*255VCI001O001-007! ↵	Connect Video Input 1 to Output 1, 2, 3, 4, 5, 6, and 7

Examples (Connect Audio only):

Command Codes	Action
*255ACI01O01! ↵	Connect Audio Input 1 to Output 1
*255ACI01O08,I08O02! ↵	Connect Audio Input 1 to Output 8 and Input 8 to Output 2
*255ACI01O01,I02O02,I03O03! ↵	Connect Audio Input 1 to Output 1, Input 2 to Output 2, and Input 3 to Output 3
*255ACI01O01,02,03! ↵	Connect Audio Input 1 to Output 1, 2, and 3
*255ACI01O01-07! ↵	Connect Audio Input 1 to Output 1, 2, 3, 4, 5, 6, and 7

Examples for PM-128X and PM-256X (Connect Audio only):

Command Codes	Action
*255ACI001O001! ↵	Connect Audio Input 1 to Output 1
*255ACI001O008,I008O002! ↵	Connect Audio Input 1 to Output 8 and Input 8 to Output 2
*255ACI001O001,I002O002,I0 03O003! ↵	Connect Audio Input 1 to Output 1, Input 2 to Output 2, and Input 3 to Output 3
*255ACI001O001,002,003! ↵	Connect Audio Input 1 to Output 1, 2, and 3
*255ACI001O001-007! ↵	Connect Audio Input 1 to Output 1, 2, 3, 4, 5, 6, and 7

Disconnecting Switches

The characters and numbers in a Disconnect command tell the system which Input or Output to disconnect. The “D” key initiates a Disconnect command for routing a switch. The characters and numbers that follow the “D” command tell the system that Inputs and Outputs to disconnect. The last character “!” is found at the end of the Command code, which tells the system to execute the command.

For example, the command code

*255DI01O00! ↵

It can be interpreted as follows: (*) Starting the command code (255) Router ID is 255 (D) Disconnect on (I01) Input 01 to (O00) Output 00 (!) take the command. For a complete list of command characters and their functions, see the command list below

To disconnect a switch:

Enter the Disconnect command below. Replace the “#”s with the Input and Output number(s).

*255DI#O#! ↵

Note) For PM-128X and PM-256X, input and output # uses three digit format, instead of two digits. For example;

Input 01 (I001), Input 05 (I005), Output 01 (O001) and Output 100 (O100)

Examples (Disconnect Video and Audio):

Command Codes	Action
*255DI01O00! ↵	Disconnect both Video and Audio Input 1 to no Output (00)
*255DI00O03,04,05! ↵	Disconnects both Video and Audio Outputs 3, 4, and 5
*255DI00O03-06! ↵	Disconnects both Video and Audio Output 3, 4, 5, and 6
*255DALLIO! ↵	Disconnects both Video and Audio all Inputs and Outputs

Examples (Disconnect Video only):

Command Codes	Action
*255VDI01O00! ↵	Disconnect Video Input 1 to no Output (00)
*255VDI00O03,04,05! ↵	Disconnects Video Outputs 3, 4, and 5
*255VDI00O03-06! ↵	Disconnects Video Output 3, 4, 5, and 6
*255VDALLIO! ↵	Disconnects Video all Inputs and Outputs

Examples (Disconnect Audio only):

Command Codes	Action
*255ADI01O00! ↵	Disconnect Audio Input 1 to no Output (00)
*255ADI00O03,04,05! ↵	Disconnects Audio Outputs 3, 4, and 5
*255ADI00O03-06! ↵	Disconnects Audio Output 3, 4, 5, and 6
*255ADALLIO! ↵	Disconnects Audio all Inputs and Outputs

Connection Status Check

A connection status can be checked to confirm that the switch has been correctly executed or to confirm correct routing to multiple Outputs. The characters and numbers in a status command tell the system which Input or Output to check.

To check connection status:

Enter the Connection status check command below. Replace the “#”s with the Input and Output number(s).

*255?I#! ←or *255?O#! ←

Note) For PM-128X and PM-256X, input and output # uses three digit format, instead of two digits. For example;

Input 01 (I001), Input 05 (I005), Output 01 (O001) and Output 100 (O100)

Examples (Video status):

Command Codes	Action
*255?I01! ←	Check Video Output connection status on Input 1
*255?O07! ←	Check Video Input connection status on Output 7
*255?ALLIO! ←	Check Video all Input and Output connection status

Examples (Audio status):

Command Codes	Action
*255A?I01! ←	Check Audio Output connection status on Audio Input 1
*255A?O07! ←	Check Audio Input connection status on Audio Output 7
*255A?ALLIO! ←	Check Audio all Input and Output connection status

Input Board Function Configuration

Input Board's Video and/or Audio function can be configured via command control. Configuration command can be sent to individual port or multiple ports at once.

IV: Input Video source select command

IA: Input Audio source select command

IF: Input channel information request command

IE: Input Extender source select command

IP: Input Extender command transmission (pass through) command

IV: Input Video Source Select

The "IV" is an initiation command for Input Video selection. The characters and numbers that follow the "IV" command tell the system, which Input # will be set to which Video source. The last character "!" is found at the end of a command code which tells the system to execute the command.

Note) For PM-128X and PM-256X, input and output # uses three digit format, instead of two digits. For example;

Input 01 (I001), Input 05 (I005), Output 01 (O001) and Output 100 (O100)

For example, the command code

*255IVI01A,I02M,I03S! ↵

can be interpreted as follows: (*) Starting the command code (255) Router ID is 255 (IV) Input Video selection on (I01) Input 01 to (A) auto mode, (I02) Input 02 to (M) HDMI/SDI, (I03) Input 03 to (S) DVI/CATx/Fiber (!) take the command. For a complete list of command characters and their functions, see examples below.

Input Video Source Select

A: Auto, M: HDMI/SDI, S: DVI/CATx/Fiber

- * For HDMI Input Board, only M (HDMI) can be selected
- * For SDI Input Board, only M (SDI) can be selected
- * For DVI Input Board, M (HDMI) or S (DVI) can be selected
- * For CATx Input Board, M (HDMI) or S (CATx) can be selected
- * For Fiber Input Board, M (HDMI) or S (Fiber) can be selected

Example:

Command Codes	Action
*255IVALLM! ↵	Set all Input source to HDMI/SDI
*255IVI01A,I02M,I03S! ↵	Set Input 1(Auto), Input 2(HDMI/SDI), Input3 (DVI/CATx/Fiber)
*255IVI01-09M! ↵	Set Input1 ~ 9 to HDMI/SDI

IA: Input Audio Source Select

The "IA" is an initiation command for Input Audio selection. The characters and numbers that follow the "IA" command tell the system, which Input # will be set to which Audio source. The last character "!" is found at the end of a command code which tells the system to execute the command.

For example, the command code

*255IAI01A,I02M,I03S! ↵

can be interpreted as follows: (*) Starting the command code (255) Router ID is 255 (IA) Input Audio selection on (I01) Input 01 to (A) auto mode, (I02) Input 02 to (M) Embedded Audio, (I03) Input 03 to (S) 3.5mm stereo Audio (!) take the command. For a complete list of command characters and their functions, see examples below.

Input Audio Source Select

A: Auto, M: Embedded Audio, S: 3.5mm Stereo Audio

(M) Embedded Audio refers to embedded Audio from the HDMI source or inserted Audio from Extender Transmitter for CATx and Fiber Input Boards

(S) 3.5mm stereo Audio refers to inserted Audio from Input Board's 3.5mm stereo jack

Example:

Command Codes	Action
*255IAALLS! ↵	Set all Input Audio to 3.5mm stereo Audio
*255IAI01A,I02M,I03S! ↵	Set Input 1(auto), Input 2(embedded), and Input 3 (3.5mm stereo Audio)
*255IAI01-09M! ↵	Set Input1 ~ 9 to embedded

IM: Input Video Preview Monitoring Select

The "IM" is an initiation command for Input monitoring selection. The characters and numbers that follow the "IM" command tell the system, which Input Video to be Output to preview monitoring port. The last character "!" is found at the end of a command code which tells the system to execute the command.

For example, the command code

*255IMI02! ↵

can be interpreted as follows: (*) Starting the command code (255) Router ID is 255 (IM) Input monitoring selection on (I02) Input 02 (!) take the command. For a complete list of command characters and their functions, see examples below.

Example:

Command Codes	Action
*255IMI02! ↵	Set Input 2 to monitoring out
*255IMI00! ↵	No monitoring out

IF: Input Channel Information Request

The "IF" is an initiation command for Input channel general information selection. The characters and numbers that follow the "IF" command tell the system, which Inputs' channel information will be requested. The last character "!" is found at the end of a command code which tells the system to execute the command.

For example, the command code

*255IFI01! ↵

can be interpreted as follows: (*) Starting the command code (255) Router ID is 255 (IF) Input channel general information request on (I01) Input 01 (!) take the command. For a complete list of command characters and their functions, see examples below.

Example:

Command Codes	Action
*255IFI01! ↵	Check Input Channel 1 Information

IE: Input Extender Source Select

The "IE" is an initiation command for Input Extender source selection. The characters and numbers that follow the "IE" command tell the system, which Inputs' Extender source selection will be made. The last character "!" is found at the end of a command code which tells the system to execute the command.

- ✓ IE command only applies to the CATx/Fiber Input Board with PM-CT102,103 (CATx) and PM-FT102,103 (Fiber) Extender Transmitter.

For example, the command code

*255IEI01SP! ↵

can be interpreted as follows: (*) Starting the command code (255) Router ID is 255 (IE) Input Extender source selection on (I01) Input 01 Extender (SP) source to select VGA (!) take the command. For a complete list of command characters and their functions, see examples below.

IE: Input Extender Source Select

SP: VGA (PC), SH: HDMI

Example:

Command Codes	Action
*255IEI01SP! ↵	Set Input1 Extender source to VGA
*255IEI02SP,I14SH! ↵	Set Input2 Extender source to VGA, Input14 to HDMI
*255IEI01-09SH!	Set Input1-9 Extender source to HDMI

IP: Input Extender Command Transmission (Pass Through Mode)

The "IP" is an initiation command for sending command to the device that is connected to the Input Extender's rs-232/422 port. The characters and numbers that follow the "IP" command tell the system, send a command to the device through Input Extender. The last character "!" is found at the end of a command code which tells the system to execute the command.

In order to send control command to the AV devices that are connected to the PM Extender, it needs to open the communication port and then send a command;

```

Port open command:      *255IPi01@001! ↵
Command to the AV devices: I01"21 89 01 50 57 30 0A 0D"0D
Port close command:    *255IPC!
                                ↓      ↓
                                <Carriage return in HEX format >
    
```

RS-232 Baud rate(bps) :

```

@001:4800    @002:9600    @003:14400
@004:19200  @005:38400    @006:57600
@007:76800  @008:115200
    
```

For example, the command code

```

*255IPi01@001! ↵
"*(type code)!↵ "↵ <Please note that there should be two carriage return for this
  *255IPC!           specific command string; the one right after the !, and the last
                    one should go after the closing quotation mark. No space in
                    between.>
    
```

can be interpreted as follows: (*) Starting the command code (255) Router ID is 255 (IP) Input Extender command transmission on (I01) Input 01 Extender, (@001) at baud rate 4800 (!) take the command. Once communication port is open, command "21 89 01 50 57 30 0A 0D " can be sent. After receiving feedbacks from AV devices, close the port *255IPC!

For a complete list of command characters and their functions, see examples below.

Example:

Command Codes	Action
*255IPi01@001! ↵	Open communication port with a device that is connected to Input #1 Extender at 9400 bps baud rate
I01"abcdefg↵ " ↵	Send command (abcdefg) to Input #1
*255IPC!	Close communication port

*255IP102-06@004! ↵	Open communication port with devices that are connected to Input #2 ~ 6 Extender at 19200 bps baud rate
*255IP105@004,I07@008! ↵	Open communication port with devices that are connected to Input #5 at 19200 bps baud rate and Input #7 at 115200 bps baud rate
IALL"pm↵ " ↵	Send command (pm) to all open ports
I02"purelink↵ " ↵	Send command (purelink) to Input #2
I01-04"pm-256x↵ " ↵	Send command (pm-256x) to Input #1 ~ 4

Output Board Function Configuration

Output Board's Video and/or Audio function can be configured via command control. Configuration command can be sent to individual port or multiple ports at once.

OM: Output Audio select on HDMI/SDI command

OS: Output Audio select on CATx/Fiber port command

OT: Output Audio test pattern select command

OF: Output channel information request command

OE: Output Extender Scaler timing select command

OP: Output Extender command transmission (pass through) command

OH: 3G/HD-SDI Output Scaler timing select command

OM: Output Audio Select on HDMI/SDI port

The "OM" is an initiation command for Output Audio selection on HDMI/SDI port. The characters and numbers that follow the "OM" command tell the system, which Output #'s HDMI/SDI Audio will be set to which Audio source. The last character "!" is found at the end of a command code which tells the system to execute the command.

For example, the command code

*255OMO01A,O02M,O03S! ↵

can be interpreted as follows: (*) Starting the command code (255) Router ID is 255 (OM) Output Audio selection on HDMI/SDI ports on (O01) Output 01 to (A) auto mode, (O02) Output 02 to (M) Embedded Audio, (O03) Output 03 to (S) 3.5mm Audio (!) take the command. For a complete list of command characters and their functions, see examples below.

Output HDMI/SDI Ports Audio Select

A: Auto, M: Embedded Audio, S: 3.5mm Stereo Audio

(M) Embedded Audio refers to embedded Audio from Input source side

(S) 3.5mm stereo Audio refers to inserted Audio from Output Board's 3.5mm stereo jack

Note) For PM-128X and PM-256X, input and output # uses three digit format, instead of two digits. For example;

Input 01 (I001), Input 05 (I005), Output 01 (O001) and Output 100 (O100)

Example:

Command Codes	Action
*255OMALLM! ↵	Set all HDMI/SDI Output Audio selection to embedded
*255OMO01A,O02M,O03S! ↵	Set HDMI/SDI Output Audio on Output 1 (Auto), Output 2 (embedded), and Output 3 (3.5mm stereo Audio)
*255OMO01-09M! ↵	Set HDMI/SDI Output Audio on Output 1~9 to embedded

OS: Output Audio Select on CATx/Fiber port

The "OS" is an initiation command for Input Audio selection on CATx/Fiber port. The characters and numbers that follow the "OS" command tell the system, which Output #'s CATx/Fiber Audio will be set to which Audio source. The last character "!" is found at the end of a command code which tells the system to execute the command.

For example, the command code

*255OSO01A,O02M,O03S! ↵

can be interpreted as follows: (*) Starting the command code (255) Router ID is 255 (OS) Output Audio selection on CATx/Fiber ports on (O01) Output 01 to (A) Auto mode, (O02) Output 02 to (M) embedded Audio, (O03) Output 03 to (S) 3.5mm Audio (!) take the command. For a complete list of command characters and their functions, see examples below.

Output CATx/Fiber Ports Audio Select

A: Auto, M: Embedded Audio, S: 3.5mm Stereo Audio

(M) Embedded Audio refers to embedded Audio from Input source side

(S) 3.5mm stereo Audio refers to inserted Audio from Output Board's 3.5mm stereo jack

Example:

Command Codes	Action
*255OSALLM! ↵	Set all CATx/Fiber Output Audio selection to embedded
*255OSO01A,O02M,O03S! ↵	Set CATx/Fiber Output Audio on Output 1 (Auto), Output 2 (embedded), and Output 3 (3.5mm stereo Audio)
*255OSO01-09M! ↵	Set CATx/Fiber Output Audio on Output 1~9 embedded

OT: Output Test Pattern Select

The "OT" is an initiation command for Output test pattern selection. The characters and numbers that follow the "OT" command tell the system, send test pattern to which Output. The last character "!" is found at the end of a command code which tells the system to execute the command.

- ✓ For test pattern command, Output #(s), resolution, and pattern type selection are required

For example, the command code

*255OTO01T02P04! ↵

can be interpreted as follows: (*) Starting the command code (255) Router ID is 255 (OT) Output test pattern on (O01) Output 01 at (T02) resolution 1920 x 1200 and (P04) 256 Gray pattern (!) take the command. For a complete list of command characters and their functions, see examples below.

Resolution Table

- T00: Test pattern disable
- T01: 1024 x 768
- T02: 1920 x 1200
- T03: 720 x 480P
- T04: 1280 x 720P
- T05: 1920 x 1080P

Pattern Type Table

- P00: Test pattern disable
- P01: Color bars
- P02: Cross Hatch
- P03: 16 Gray
- P04: 256 Gray
- P05: 4Color Gray

Example:

Command Codes	Action
*255OTALLT01P01! ↵	Set all Output to 1024x768 and color bars test pattern
*255OTO01,O02,O03T02P04! ↵	Set Output 1,2 and 3 to 720x480p and 256 gray test Pattern

*255OTO01-09T05P05! ↵	Set Output1~9 to 1920x1080p and 4 color gray test Pattern
*255OTALLT00P00! ↵	Disable test pattern to all outputs

OF: Output Channel Information Request

The "OF" is an initiation command for Output channel general information request. The characters and numbers that follow the "OF" command tell the system, to request Output channel information of selected Output. The last character "!" is found at the end of a command code which tells the system to execute the command.

For example, the command code

*255OFO01! ↵

can be interpreted as follows: (*) Starting the command code (255) Router ID is 255 (OF) Output channel general information request on (O01) Output 01 (!) take the command. For a complete list of command characters and their functions, see examples below.

Example:

Command Codes	Action
*255OFO02! ↵	Request Output 2 information

OE: Output Extender Scaler Timing Select

The "OE" is an initiation command for Output Extender Scaler timing selection. The characters and numbers that follow the "OE" command tell the system, set scaling timing on selected Output. The last character "!" is found at the end of a command code which tells the system to execute the command. For a complete list of command characters and their functions, see examples below.

- ✓ OE command only applies to the HDMI with scaling Board and CATx/Fiber Output Board with PM-CR102 (CATx) and PM-FR102 (Fiber) Extender Receiver.

T00	Auto	T09	1080p (50Hz)	T18	SXGA (1280x1024@75Hz)
T01	480p (60Hz)	T10	1080p (59Hz)	T19	SXGA (1280x1024@85Hz)
T02	576p (50Hz)	T11	1080p (60Hz)	T20	UXGA (1600x1200@60Hz)
T03	720p (50Hz)	T12	SVGA (800x600@60Hz)	T21	1360x768@60Hz
T04	720p (59Hz)	T13	SVGA (800x600@75Hz)	T22	1366x768@60Hz
T05	720p (60Hz)	T14	XGA (1024x768@60Hz)	T23	1440x900@60Hz
T06	1080i (50Hz)	T15	XGA (1024x768@75Hz)	T24	1920x1200@60Hz
T07	1080i (59Hz)	T16	XGA (1024x768@85Hz)		

T08	1080i (60Hz)	T17	SXGA (1280x1024@60Hz)
-----	--------------	-----	-----------------------

Example:

Command Codes	Action
*255OEO01T00! ↵	Set Output 1 Extender Scaler timing to Auto
*255OEO02T11!	Set Output 2 Extender Scaler timing to 1080p

OP: Output Extender Command Transmission (Pass Through Mode)

The "OP" is an initiation command for send command to the device that is connected to the Output Extender's rs-232/422 port. The characters and numbers that follow the "OP" command tell the system, send a command to the device through Output Extender. The last character "!" is found at the end of a command code which tells the system to execute the command.

In order to send control command to the AV devices that are connected to the PM Extender, it needs to open the communication port and then send a command;

```

Port open command:          *255OPO01@001! ↵
Command to the AV devices:  O01"21 89 01 50 57 30 0A 0D"0D
Port close command:        *255OPC!           ↓ ↓
                                   <Carriage return in HEX format>
    
```

RS-232 Baud rate(bps) :

```

@001:4800          @002:9600          @003:14400
@004:19200        @005:38400          @006:57600
@007:76800        @008:115200
    
```

For example, the command code

*255OPI01@001! ↵

""(type code)!↵ " ↵ <Please note that there should be two carriage return for this

*255OPC! specific command string; the first one right after the !, and the last one should go after the closing quotation mark. No space in between>

Above example can be interpreted as follows: (*) Starting the command code (255) Router ID is 255 (OP) Output Extender command transmission on (O01) Output 01 Extender, (@001) at baud rate 4800 (!) take the command. Once communication port

is open, command "21 89 01 50 57 30 0A 0D " can be sent. After receiving feedbacks from AV devices, close the port *255OPC!

For a complete list of command characters and their functions, see examples below.

Example:

Command Codes	Action
*255OPO01@001! ↵	Open communication port with a device that is connected to Output #2 Extender at 4800 bps baud rate
O01"abcdefg↵ " ↵	Send command (abcdefg) to output #1
*255OPC!	Close communication port
*255OPO02-06@004! ↵	Open communication port with a device that are connected to Output #2 ~ 6 Extender at 19200 bps baud rate
*255OPO05@004,O07@008! ↵	Open communication port with a device that is connected to Output #5 at 19200 bps baud rate and Output #7 at 115200 baud rate
OALL"pm↵ " ↵	Send command (pm) to all open ports
O02"purelink↵ " ↵	Send command (purelink) to output #2
O01-04"pm-256x↵ " ↵	Send command (pm-256x) to output #1 ~ 4

OH: 3G/HD-SDI Output Scaler timing select command

The "OH" is an initiation command for 3G/HD-SDI Output Scaler timing selection. The characters and numbers that follow the "OH" command tell the system, set scaling timing on selected Output. The last character "!" is found at the end of a command code which tells the system to execute the command. For a complete list of command characters and their functions, see examples below.

✓ OH command only applies 3G/HD-SDI Output boards

T01	NTSC	T05	1920x1080i @50	T09	1920x1080p @30
T02	PAL	T06	1920x1080i @50	T10	1920x1080p @50
T03	1280x720p @50	T07	1920x1080p @24	T11	1920x1080p @60
T04	1280x720p @60	T08	1920x1080p @25		

Audio Matrix Volume Configuration

Audio Matrix volume configuration commands are for the green block Audio Matrix Router

AV: Output Audio Volume Setting (1.0dB Step Attenuation)

The "AV" is an initiation command for Audio Matrix Router's Output Audio volume setting. The characters and numbers that follow the "AV" command tell the system, set Audio volume on desired Audio Matrix Router's Output. The last character "!" is found at the end of a command code which tells the system to execute the command.

For example, the command code

*255AVO01V01, O03V02! ←

can be interpreted as follows: (*) Starting the command code (255) Router ID is 255 (AV) set Audio volume on Audio Matrix Router's Output on (O01) Output 01 to (V01) -1.0dB (O03) Output 03 to (V02) -2.0dB (!) take the command. For a complete list of command characters and their functions, see examples below.

V00: 0 dB Attenuation

V01: -1.0dB Attenuation

V02: -2.0dB Attenuation

-

-

-

V98: -98.0dB Attenuation

V99: Mute

Example:

Command Codes	Action
*255AVALLV00! ←	Set all Output volume to 0dB attenuation
*255AVO01V01,O03V02! ←	Set Output1(-1.0dB), and Output3(-2.0dB) attenuation
*255AVO01-09V99! ←	Set Output1 ~ 9 to mute

AF: Output Audio Volume Status Request

The "AF" is an initiation command for Audio Matrix Router's Output Audio volume information request. The characters and numbers that follow the "AF" command tell the system, to request Audio volume information of selected Output. The last character "!" is found at the end of a command code which tells the system to execute the command.

For example, the command code

*255AFO01! ←

can be interpreted as follows: (*) Starting the command code (255) Router ID is 255 (AF) request Audio volume information on (O01) Output 01(!) take the command. For a complete list of command characters and their functions, see examples below.

Examples:

Command Codes	Action
*255AFO01! ↵	Check Audio Matrix Router Output 1 Audio volume information
*255AFALLIO! ↵	Check Audio Matrix Router's all Output volume information

Router ID Check

User can confirm the Router's Current ID setting.

✓ Universal Router ID is 999

Example:

Command Codes	Action
*999I000! ↵	Check Router's ID

Firmware Version Check

User can confirm Router's current firmware version.

Example:

Command Codes	Action
*999?version! ↵	Check Router's Firmware version

Baud Rate Setting

User can set baud rate for RS-232 command control.

Enter the Baud rate setting command below. Replace the "#"s with the Input and Output number(s).

*255@#!↵

@001: Baud rate at 19200

@002: Baud rate at 38400

@003: Baud rate at 57600

@004: Baud rate at 115200

Example:

Command Codes	Action
*255@001! ↵	Set baud rate at 19200
*255@002! ↵	Set baud rate at 38400
*255@003! ↵	Set baud rate at 57600
*255@004! ↵	Set baud rate at 115200

Network Configuration:

User can check and set network configuration for LAN control.

Examples:

Command Codes	Action
*255NNI000! ↵	Check current Network Information
*255NIP192.168.000.004! ↵	Set IP address at 125.135.199.004
*255NSM255.255.255.000! ↵	Set Subnet Mask at 255.255.255.000
*255NGW192.168.000.001! ↵	Set Gate Way at 192.168.000.001
*255NMA00.00.C2.B0.20.05! ↵	Set Mac Address at 00.00.C2.B0.20.05
*255NPN3000! ↵	Set Port Number at 3000

Connection Checking:

User can check the connection status.

Example:

Command Codes	Action
*255H000! ↵	Check connection status

Front Panel Touch Screen Security Lock/Unlock

User can enable or disable the front panel touch screen.

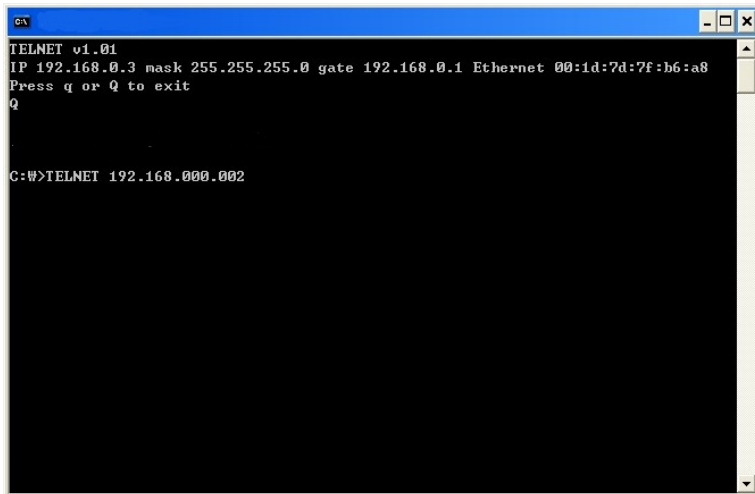
Example:

Command Codes	Action
*255KST! ↵	Touch Lock Status Return
*255KON! ↵	Touch Lock On
*255KOFF! ↵	Touch Lock Off

4.3 LAN (TCP/IP) Operation

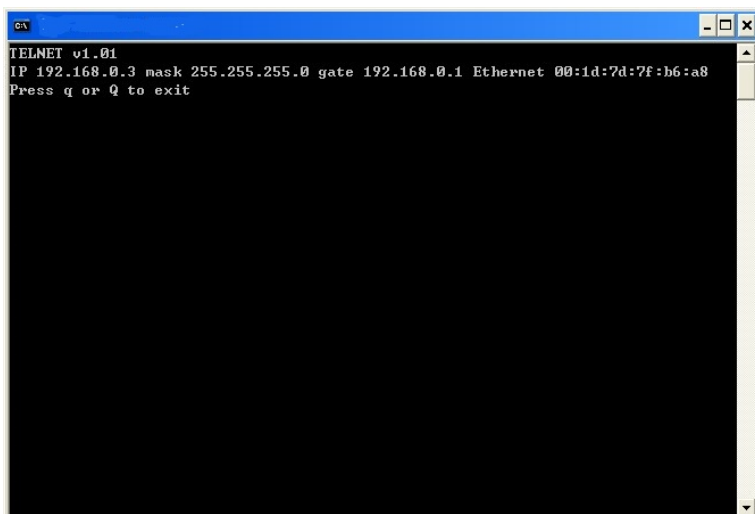
TELNET Protocol with LAN(TCP/IP)

The PM series Matrix Router can be controlled from remote locations through the LAN port using WINDOWS XP DOS prompts, hyper-terminal, or TELNET program (the control code is fully compliant with RS-232C).



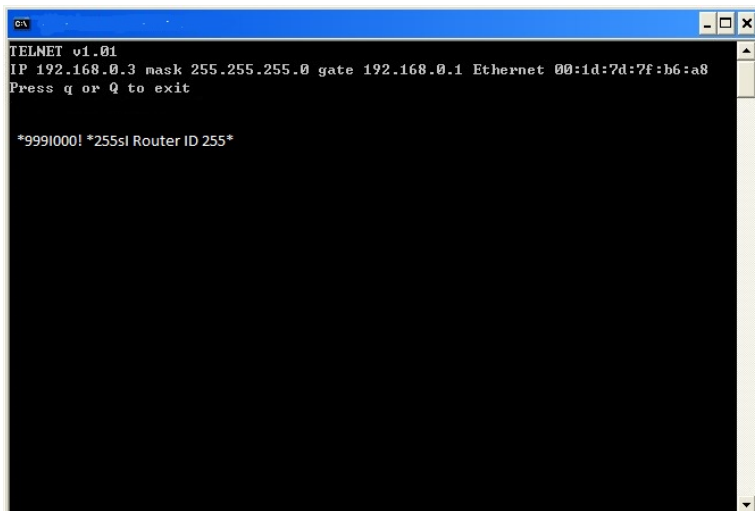
```
GA
TELNET v1.01
IP 192.168.0.3 mask 255.255.255.0 gate 192.168.0.1 Ethernet 00:1d:7d:7f:b6:a8
Press q or Q to exit
Q
C:\>TELNET 192.168.000.002
```

Enter TELNET <Router IP
Address> in the DOS
prompt



```
GA
TELNET v1.01
IP 192.168.0.3 mask 255.255.255.0 gate 192.168.0.1 Ethernet 00:1d:7d:7f:b6:a8
Press q or Q to exit
```

Message indicating
TELNET connection will
appear



```
GA
TELNET v1.01
IP 192.168.0.3 mask 255.255.255.0 gate 192.168.0.1 Ethernet 00:1d:7d:7f:b6:a8
Press q or Q to exit
*999I000! *255sl Router ID 255*
```

Router ID verification command code
Send “ *999I000! ”
Router will send response:
“ *255sl Router ID 255”

HTTP Protocol with LAN(TCP/IP)

Control PC Search

Searching data for channel configuration

Character train should begin with "LCD.CGI" to "O01=I08" to Output 01 = Input 8. The sequence and size of the character train must be the same.

To RESET the Protocol, a new connection to the server (Switcher) must be established.

Switching Channels

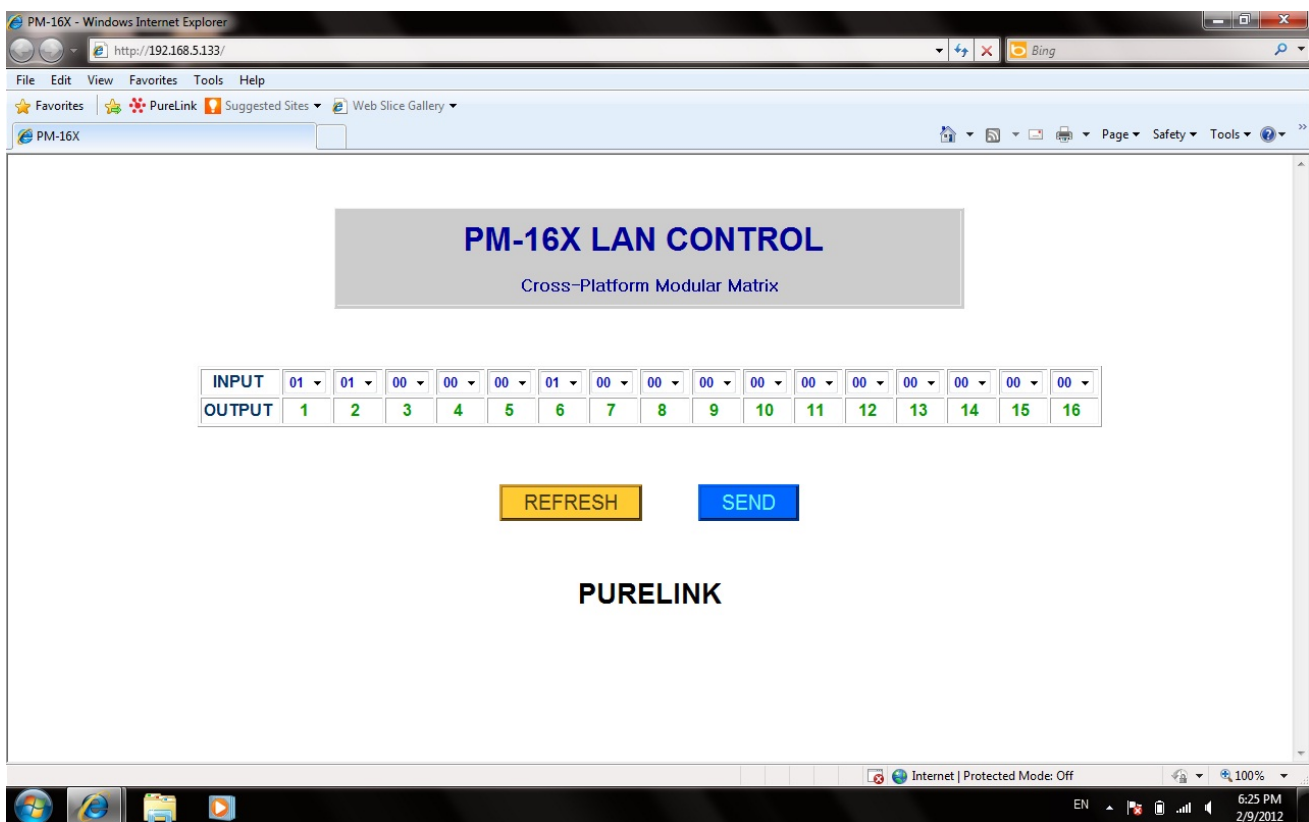
http://192.168.0.2/LCD.CGI?O01=I01&O02=I02&O03=I03&O04=I04&O05=I05&O06=I06
&O07=I07&O08=I08&Submit_=SEND

RESET

http://192.168.0.2/LCD.CGI?O01=I01&O02=I02&O03=I03&O04=I04&O05=I05&O06=I06
&O07=I07&O08=I08&Submit_=RESET

Control PC Transmission

Information from each channel that needs to be sent must be extracted to prevent the entire Explore html data from being transmitted.



Run Explorer and enter the newly configured IP address to open the channel configuration window above.

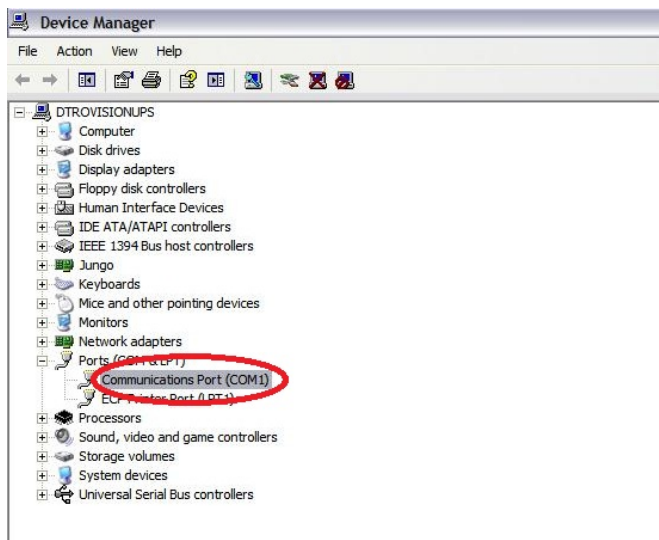
Select desired channel and click **SEND** to change the channel.

Chapter 5. Additional Information

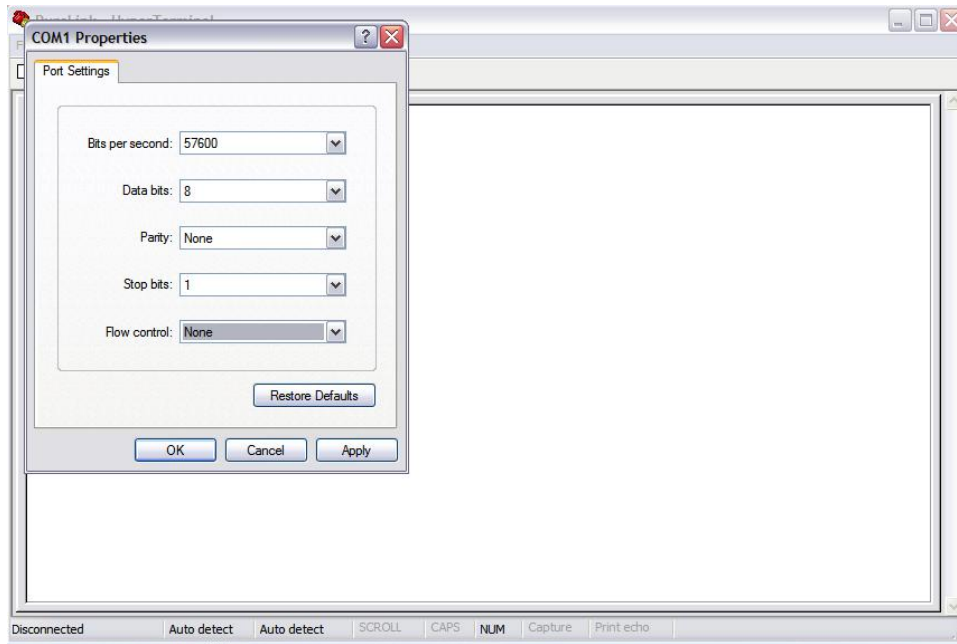
5.1 Firmware Update Instruction

1. Set PM series Matrix Router's baud rate to 115200bps using front panel LCD touch screen or control command. (Data bits : 8bit, Stop bits : 1bit, Parity : disable)
2. Connect PC to PM series Matrix Router using USB cable (update cable is included in an original box)
 - ✓ Please disconnect RS-232 cable from the Matrix Router during firmware update.

Confirm if PM series Matrix Router (USB serial port) is properly connected to the PC on PC's device manager section.

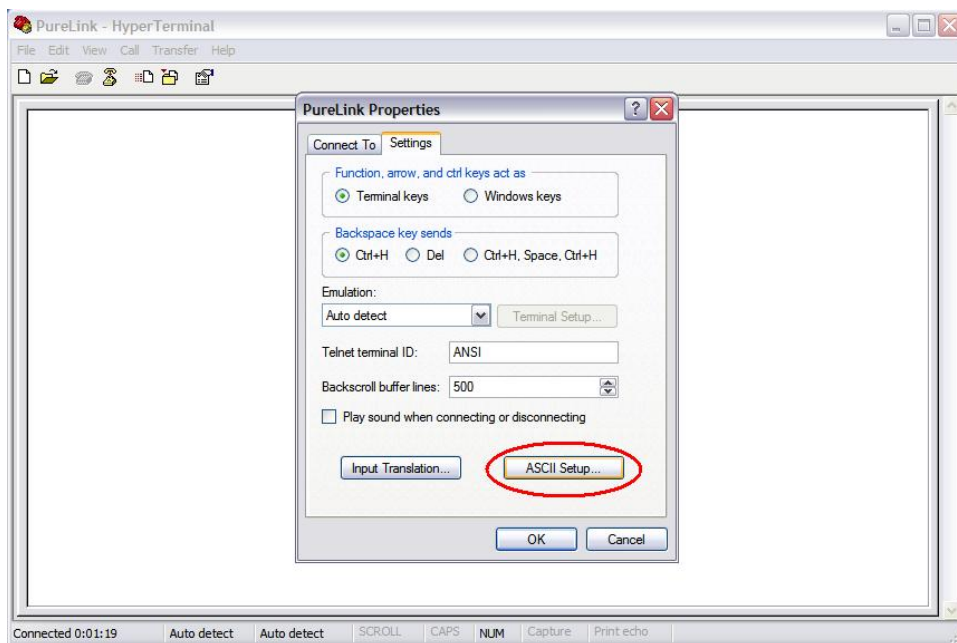


3. Create a hyper terminal connection (connect it using same com port number; COM1)
 - Create a name (ex, PureLink)
 - Bits per second: 115200bps
 - Data bits: 8
 - Parity: None
 - Stop bits: 1
 - Flow control: None

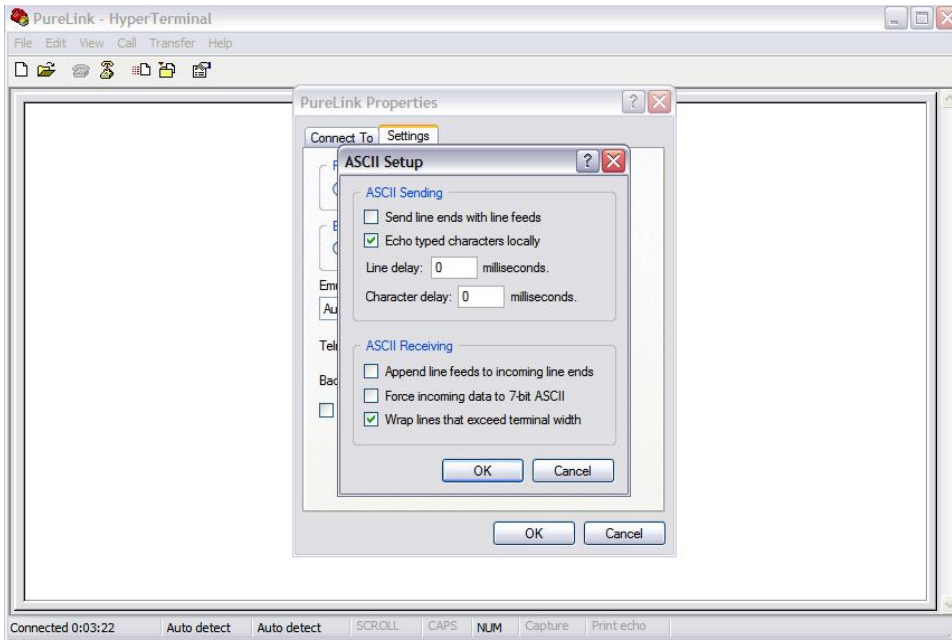


4. Hyper terminal setting

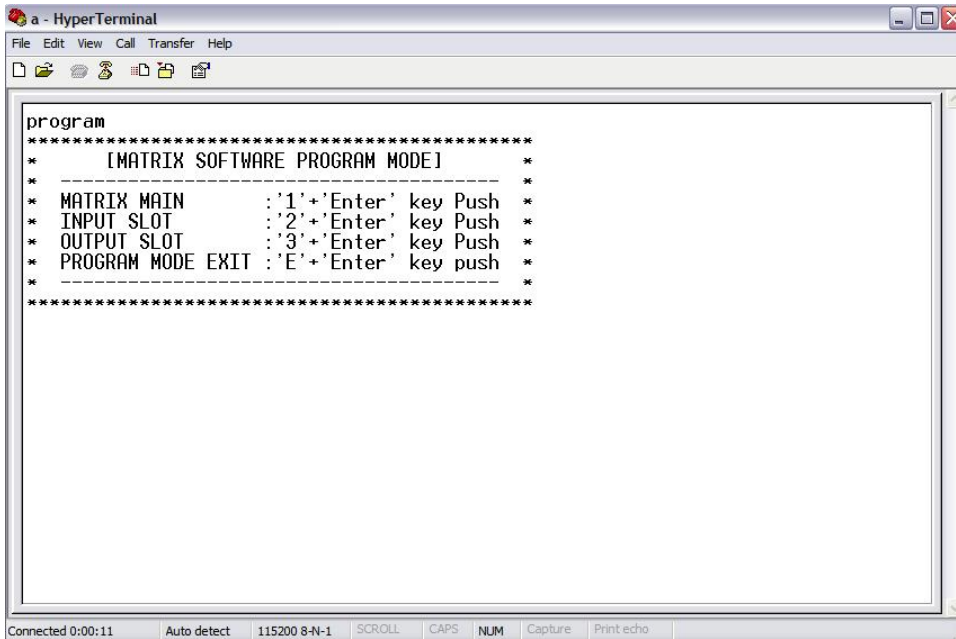
Go to file --> Properties setting --> ASCII setup



Check on "Echo typed characters locally" and then ok.

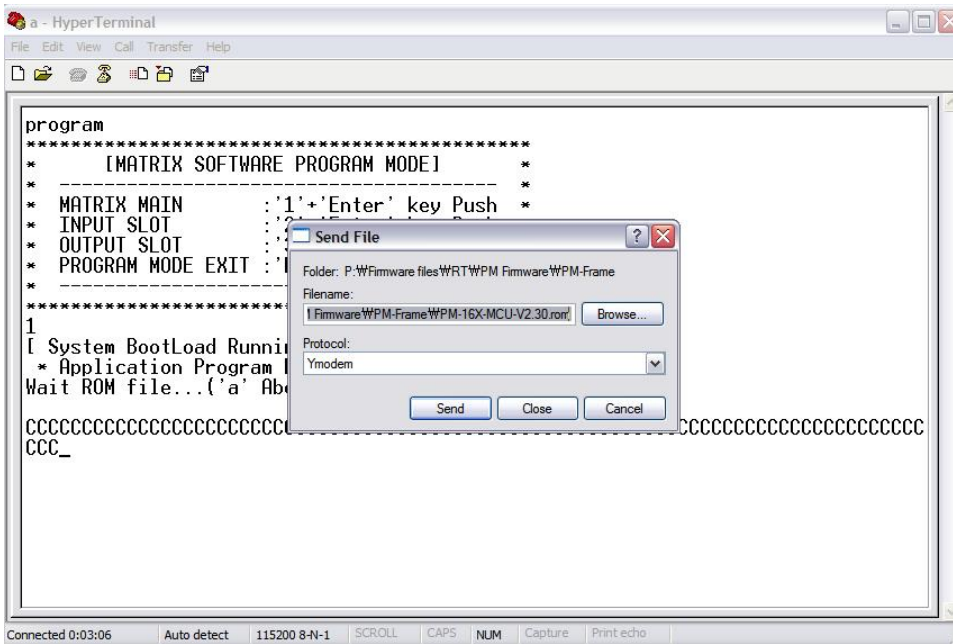


5. Type "program" and enter

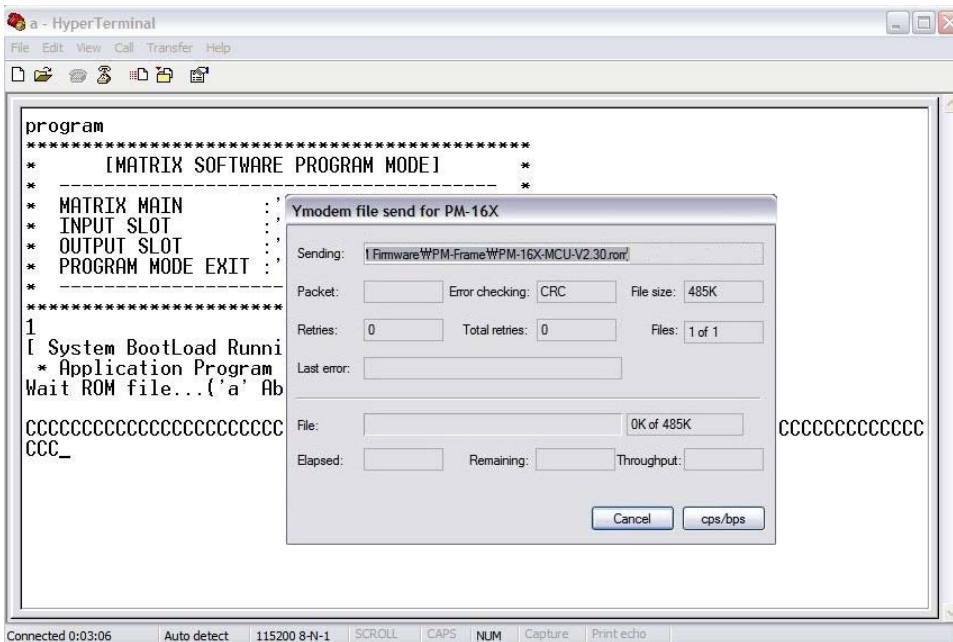


6. Type "1" and enter

8. Select firmware file (.rom) and then, => Send (S)



9. Firmware update progress window



Firmware update completion window => Once firmware update is completed, disconnect USB cable and power cycle the unit (OFF/ON)
Set baud rate back to 19200

5.2 Manufacturer's Warranty (2-Year)

Dtrovision warrants this PM series Matrix Router to be free from defects in workmanship and materials, under normal use and service, for a period of five (5) years parts for PM series Matrix Routers and its I/O Boards, and three (3) years on labor from the date of purchase from Dtrovision or its authorized resellers.

If the product does not operate as warranted during the applicable warranty period, Dtrovision shall, at its option and expense, execute one of the following as necessary:

1. Repair the defective product or part
2. Deliver to customer and equivalent product or part to replace the defective item
3. Refund to customer the purchase price paid for the defective product

All products that are replaced become the property of Dtrovision, LLC. Replacement products may be new or reconditioned. Repaired or replacement products or parts come with a 90-day warranty or the remainder of the warranty period. Dtrovision shall not be responsible for any software, firmware, information, or memory data loss of contained in, stored on, or integrated with any products returned to Dtrovision for repair under warranty.

Customer Service

Any customer service inquiries can be submitted electronically through the Q&A form on our website at www.purelinkav.com. For immediate assistance please contact us at (201) 488-3232 to reach our customer care or tech support team.