User Manual

Matrix Switcher
8x4 / 16x8
HX-2384Z / HX-331608Z

V.2016HX-3841608Z.00

COPYRIGHT AND TRADEMARKS

BEFORE YOU BEGIN

- Follow all instructions marked on the device during using.

- Provide proper ventilation and air circulation and do not use near water.

- It is better to keep it in a dry environment.

- Place the device on a stable surface (example cart, stand, table, etc.).

- The system should be installed indoor only. Install either on a sturdy rack or desk in a well-ventilated place.

- Make sure the rack is level and stable before extending a device from the rack if necessary.

- Make sure all equipments installed on the rack including power strips and other electrical connectors are properly grounded.

- Only use the power cord supported with the device.

- Do not use liquid or aerosol cleaners to clean the device.

- Always unplug the power to the device before cleaning.

- Unplug the power cord during lightning or after a prolonged period of non-use to avoid damage to the equipment.

- Do not stand on any device while installing the device to the rack.

- Do not attempt to maintain the device by yourself, any faults, please contact your vendor.

- Save this manual properly for future reference.

TABLE OF CONTENTS

TABLE OF FIGURES

CHAPTER 1 OVERVIEW

1.1 Introduction

The Matrix Switcher is high performance HDMI switching equipment combining with video and audio. It is used for input/output cross switching of multimedia signals. Through 8 or 16 sets separated HDMI sources, you can transmit multimedia input separately to each multi-output equipment, thereby minimizing signal attenuation and ensuring high definition, integrating high fidelity graphics and audio signal output. Through the extensible accessory devices, The Matrix Switcher can transmit data or detect signal to over long distances about 70 meters with extender (HX-SRW).

The Matrix Switcher is used mainly in TV broadcasting projects, multimedia conference halls, and large display performances, TV teaching and command control centers. It boasts features of power interruption protection during power surge, LCD display and synchronous and integrate audio/visual switching functions. Support HDMI Type A for input and RJ-45 for output connectors. Beside it also supports a RS-232 or LAN communication port enables convenient communication with remote control equipment to switch the multimedia signals.

Figure 1-1 HX-2384Z

Figure 1-2 HX-331608Z

1.2 Packing

Or	HDMI Matrix Switcher x 1 (HX-2384Z or HX-331608Z)
	Power Cord x 1
	RS-232 Communication Connected Cable x 1
	LAN Line x 1
	IR Receiver Cable x 1
	IR Blaster Cable x 1
	Matrix Switcher Remote Controller x 1
	AAA Battery x 2
	Female 1x5 Pole Captive Screw Socket x 2
	Female 1x3 Pole Captive Screw Socket x 4
	Rack-Mount Bracket x 2
	Screws (for Brackets) x 6
	Matrix Software x 1

	User Manual x 1

1.3 Accessories (Optional)

	IR Mini-Controller
	HDMI Remote Extender
	HDMI Cable *1

CHAPTER 2 FEATURES

- Truly seamless, glitch-free switching between each input
- 8 HDMI Inputs with 4 HDBaseT Outputs for HX-2384Z, and 16 HDMI Inputs with 8 HDBaseT Outputs for HX-331608Z
- Any Input can be routed/broadcast to any Output
- Supports up to 70 meters zero compression extension via one single CATx cable
- Supports interlaced video to progressive video. (like 1080i => 1080P)
- Supports up convert. (like VGA => 1080P@60)
- Supports down convert. (like 1080P@60 => VGA)
- Supports cross convert. (like 576i@50 => 1080P@60)
- HDTV resolution up to 1080P (12Bits)
- Compliant with the specification of HDMI
- Supports 2* aspect ratio modes: "FULL' mode and "1:1" mode.
- Supports 8* output resolution: VGA, 480P, SVGA, XGA, 720P, SXGA, UXGA, 1080P60
- HDCP Compliant
- EDID management (Copy from OUT port 1)
- Centralized control upon 32 series connections via RS-485
- Memory control can up to 8 sets
- Support resolution up to 1080P@60Hz (12-bit)
- Support original 3D pass through
- Support High Definition Audio
- Fast response time for channel switch
- IR pass-through supports all IN and OUT ports
- IR pass-through supports all kinds of IR frequency band
- IR pass-through supports duplex transmission between IN and OUT ports
- Support IR remote control
- Support IR Mini-Controller to select the input channel through Output configuration
- Support RS-232 control
- Support RS-485 serial control
- Remote Controller for operation

CHAPTER 3 SPECIFICATIONS

Hardware	
Input Connector	HX-2384Z: HDMI Type A x 8 HX-331608Z: HDMI Type A x 16
Output Connector	HX-2384Z: RJ-45 x 4 HX-331608Z: RJ-45 x 8
RS-232 Connector	DB9 Female
LAN Connector	RJ-45
RS-485 Connector	2
Dip Switcher	1 x 2 pins / 1 x 8 pins
IR EXT	1 x 3.5 Jack
LCD Module	1
Power	100VAC~240VAC, 50/60Hz, internal
Housing	Black Aluminum
Mounting	Rack mountable (2U-rack-mount kits for HX-2384Z) (3U-rack-mount kits for HX-331608Z)
Weight	HX-2384Z: 4250g HX-331608Z: 7500g
Dimensions (LxWxH)	HX-2384Z: 332x482x87mm HX-331608Z: 336x482x130mm (Full rack wide without grips)
Multimedia	
Max. Resolution	1080P@60Hz (12-bit)
Highest TMDS Frequency	300MHz
Control Information	
HDMI Cable Distance	At least 10 meter
Cat.5e Cable Distance	70 meters (Max.)
Baud Rate	9600 bps; 8 data bits, 1 stop bit, no parity
Ethernet Protocol	HTTP, DHCP, TCP/IP, ICMP (ping)
Program Control	Web Server, AVM Application
Serial Control Port	RS-232: 9 Pin Female D Type Connector RS-485: 1x5 Pole Captive Screw
Control Sequence	Matrix
Remote Control	Remote Controller, IR Receiver, IR Blaster
Web Server	LAN, RJ-45

CHAPTER 4 INSTALLATION

The Matrix Switcher has a black metallic housing. It can be placed on a sturdy desk directly or installed on a bracket (2U for HX-2384Z and 3U for HX-331608Z). You can also use the rubber feet pasted on the bottom of the chassis to protect your device when you want to place the device on a working desk.
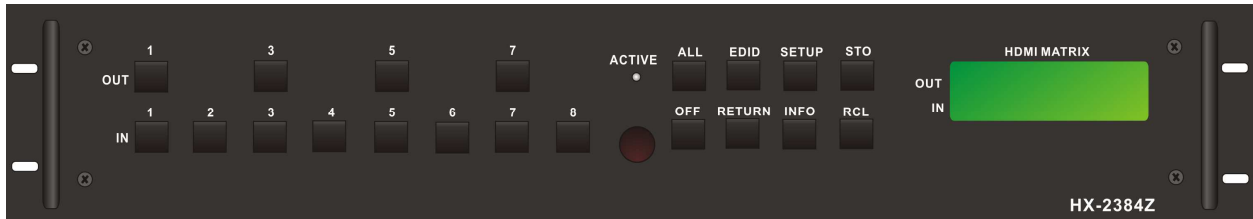
Figure 4-1 HX-2384Z with 2U Rack-Mount
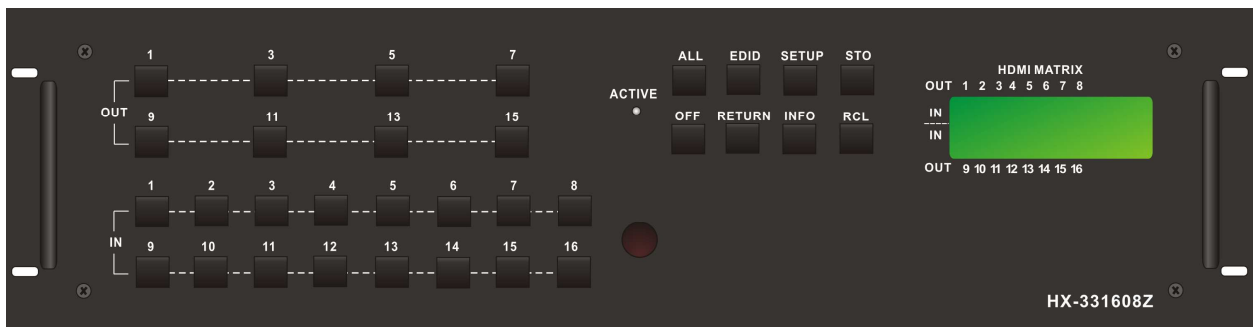
Figure 4-2 HX-331608Z with 3U Rack-Mount

Use the screws provided with the rack and a screw driver to firmly tighten the device in the rack to prevent working lose due to vibration on the rack.
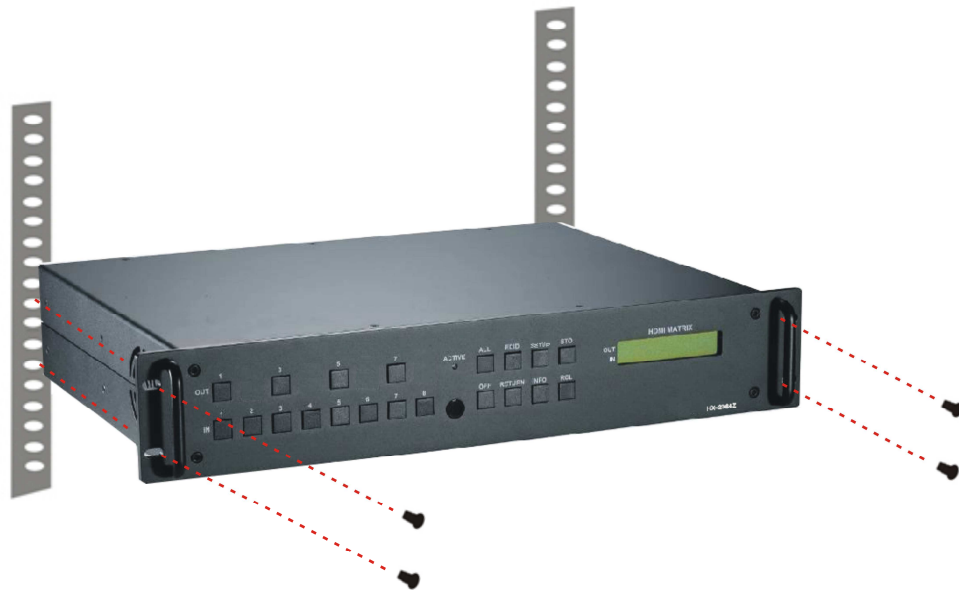
Figure 4-3 Mount the Device in the Rack

CHAPTER 5 FRONT/REAR PANELS

5.1 Front Panel

HX-2384Z supports up to 8 Input and 4 Output switching keys on the Front Panel allowing you to switch signal quickly.
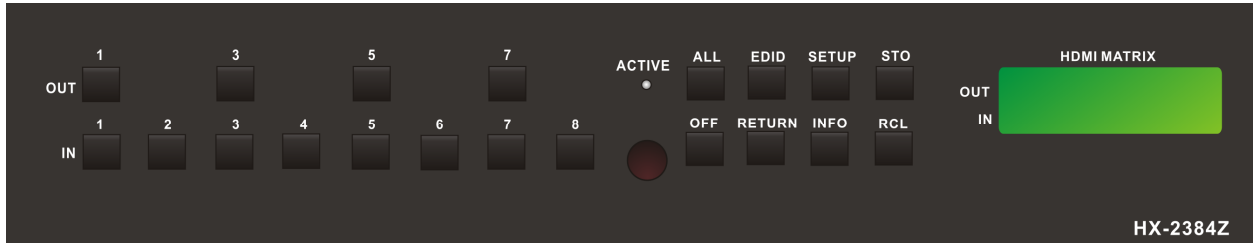
Figure 5-1 HX-2384Z Front Panel

HX-331608Z supports up to 16 Input and 8 Output switching keys on the Front Panel allowing you to switch signal quickly. Also refer to *Chapter 9 Operation Examples* about below descriptions.
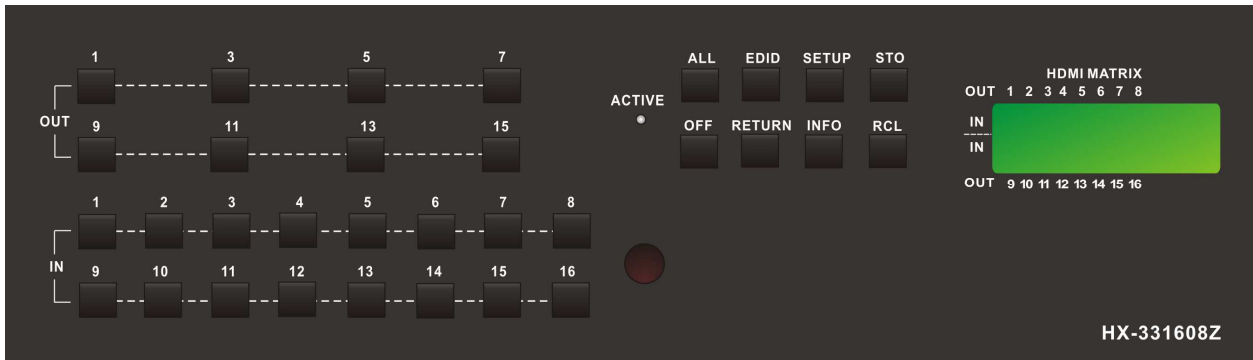
Figure 5-2 HX-331608Z Front Panel

- **OUT keys** (output channel)**:** Specify the Channel for HDMI signal output. These keys configure the status or access the settings; you can also use these keys to switch output channels.

- **IN keys** (input channel)**:** Specify the Channel for HDMI signal input. Use these keys to switch the connected input channels or use them to instead of number keys upon memory selections.

- **ALL:** This key allows user to set single input channel to all output channels. The usage of **"ALL"** key is the same as output key.
    - Press the **"ALL"** key.
    - Select the one of the IN keys.

- The selected **IN x** key will transfer the input signal to all output channels.
- You can also press the **"ALL"** key and then press the **"OFF"** key to disable all the displayed switching settings.

▪ **OFF:** Disable the entire output channels. Press one of the **OUT x** keys that want to be   disabled for the output channel, then press the **"OFF"** key. Likewise, press the **"ALL"** key and then press the **"OFF"** key to disable all the displayed switching settings. In addition to switching port menu, press **"OFF"** key can return to the main screen during implementing in other menu. You can also press **"OFF"** key to disable the light of LCD screen for saving power.

▪ **EDID: FIX** (fix mode) and **OUT1** (access the first output channel) selection key.
   - **FIX mode:** The Matrix Switcher supplies a set of fixed **EDID** values to support up to only 1080P high performance TV.
   - **OUT1 mode:** The Matrix Switcher will access the **EDID** values of high performance TV that connected to the first output channel, and copy the **EDID** value to all the input channels so that the DVD player can support to all the HDTV.

▪ **RETURN:** Press this key to go back to main screen.

▪ **SETUP:** Set the output resolution mode and aspect ratio.

   - **Resolution:** The switcher supports you VGA, 480P, SVGA, XGA, 720P, SXGA, UXGA and 1080P output resolutions. It can convert the input source resolution to correspond the output resolution.
   - **Aspect ratio:** The switcher allows you to set the screen aspect ratio to Full Screen or 1:1 Screen.

Original Image   Output Monitor Size   The output image size is same as the monitor.
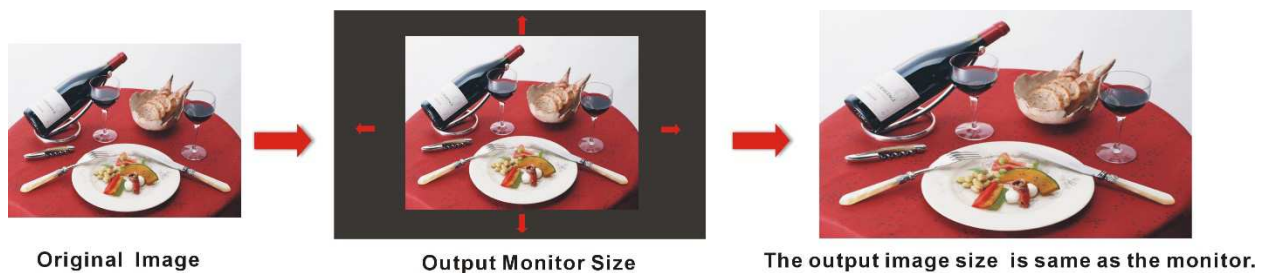
Figure 5-3 Aspect Ratio for Full Screen
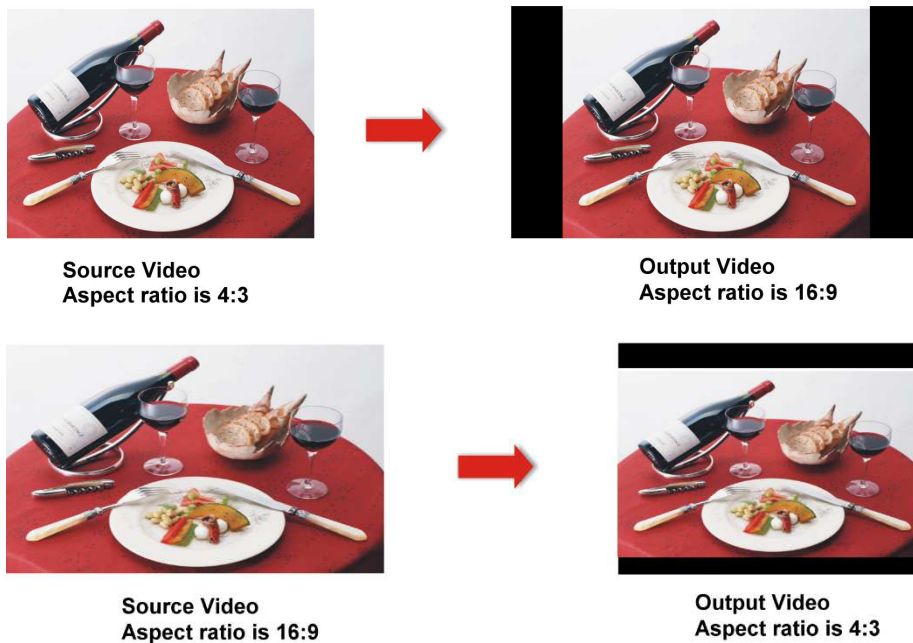
Figure 5-4 Aspect Ratio for 1:1

- **INFO:** This key can show you the ID, IP address and In/Out port information.
    - Press this key to show you the connected ID and address.
    - Press this key again to show you the status of all HDMI Type A or RJ-45 jacks on the rear panel. If the HDMI or RJ-45 jack is in HPD (hot plug detect), it will appear **"O"** on the screen. Alternatively, it will appear **"X"** specified the HDMI or RJ-45 jack is unused.

☞ Press **SETUP** and **INFO** keys simultaneously to show you the firmware versions of modules.

- **STO:** The **"Store Key"** saves all current output/input corresponding relations up to 8 sets for a memory control.
    - Press the **"STO"** key firstly.
    - Arrange memory location. (Support up to 8 sets of memories, user can select the memory location through OUT1~OUT8/IN1~IN8.)
    - The relations among all settings will be saved in the memory permanently.

- **RCL:** The **"Retriever Key"** retrieves all settings that are saved in the memory.
    - Press the **"RCL"** key firstly.
    - Then make a random to select one of output/input channel key 1~8.
    - The system will retrieve the saved all status and implement current status switching if the previously saving channel is selected.

☞ Press and hold **STO** and **RCL** keys simultaneously at least 1 sec. to restore to factory default values.

17

- **ACTIVE LED:** A clear LED indicator designed for reaction by pressing keys on the front panel and remote controller. Refer to *Appendix A Matrix Switcher Remote Controller*

- **IR Receiver:** Infrared receiver can receive signals from the Matrix Switcher Remote Controller.

- **LCD:** LCD display shows current Matrix Switcher status and operation status.

☞ Press any keys on the front panel or controller to enable the light of LCD momentarily. This function cannot be controlled by RS-232 or LAN.

5.2 Rear Panel

HX-2384Z supports up to 8 input jacks (HDMI Type A) and 4 output jacks (RJ-45) on the rear panel, each female terminals form the signal input/output jacks. The HX-2384Z signal input/output terminal channels are numbered as IN1~8/OUT1, 3, 5, 7 channels.
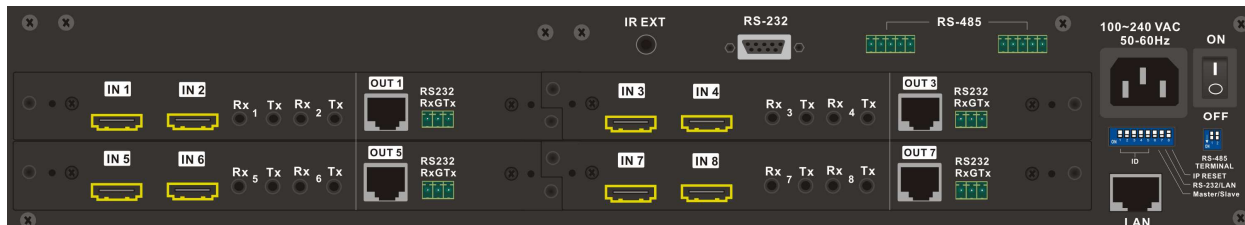
Figure 5-5 HX-2384Z Rear Panel

The HX-331608Z supports up to 16 input jacks (HDMI Type A) and 8 output jacks (RJ-45) on the rear panel, each female terminals form the signal input/output jacks. The HX-331608Z signal input/output terminal channels are numbered as IN1~16/OUT1, 3, 5, 7, 9, 11, 13, 15 channels. The input terminal channels supply you to connect to different equipment including Blu-ray/DVD players, graphics workstations, and number displays. The output jacks allow you to connect to extensible accessory devices for over long connections with terminals just like projectors, video recorders, displays and multiplexers and so on.
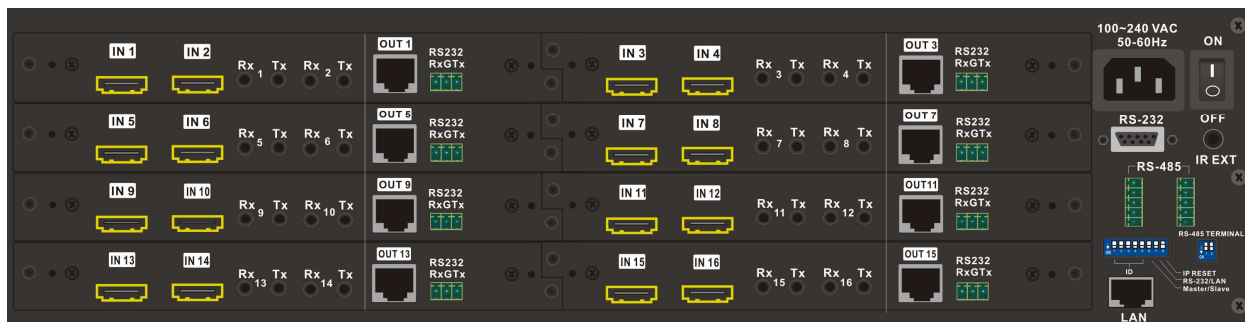
Figure 5-6 HX-331608Z Rear Panel

- **Power Port:** The Power Port is applicable for 100~240VAC, 50~60Hz connected to the outlet of power source. Refer to *6.4 Power Connection*.

- **Power Switch:** To switch power **ON** or **OFF** the Matrix Switcher.

- **RS-232:** Use a 9-pin **RS-232** cable to connect both computer serial port (COM1 or COM2) and Matrix Switcher **RS-232** communication port, refer to *6.6.1 RS-232*. The computer then can be deployed to control the Matrix Switcher after installing of application software. Refer to *7.1 Software Introduction* for a software control or

Appendix D RS-232 Communication Protocol for an individual configuration.

- **RS-485:** Connection ports allow you to connect/control more than one Matrix product, refer to *6.6.2 RS-485*.

- **RxGTx:** Use the transmission line with RS-232 to connect the remote control PC for a data transmission between local and remote.

    - Rx: Receive RS-232-level signal pin. (data in)
    - G: GND
    - Tx: Transmit RS-232-level signal pin. (data out)

- **LAN Port:** Use the RJ-45 connection cable to connect the Internet and the Matrix Switcher. The entire PCs at the same network can control the Matrix Switcher through the LAN port. Refer to *6.6.4 LAN Port.*

- **Switchers:** Matrix Switcher supports 8 pins DIP and 2 pins DIP switchers for connected configurations. For more information, refer to *6.6 Ports and Switchers*.

    - Pin 1~Pin5: ID
    - Pin 6: Master/Slave
    - Pin 7: RS-232/LAN
    - Pin 8: IP RESET

- **IR EXT:** This is used to connect the IR Receiver Cable for the Matrix Switcher Remote Controller. Refer to *6.3 IR EXT Connection*.

- **INPUT1~8 or 16:** Matrix Switcher Input jacks are connected to the Blu-ray players, DVD players, STBs or other source devices.

HDMI Type A: Pin Definitions:

Pin #	Signal	Pin #	Signal
1	TMDS Data2+	11	TMDS Clock Shield
2	TMDS Data2 Shield	12	TMDS Clock-
3	TMDS Data2-	13	CEC (NC on device)
4	TMDS Data1+	14	Utility (NC on device)
5	TMDS Data1 Shield	15	DDC-SCL
6	TMDS Data1-	16	DDC-SDA
7	TMDS Data0+	17	DDC-Ground
8	TMDS Data0 Shield	18	+5V Power
9	TMDS Data0-	19	Hot Plug Detect
10	TMDS Clock+		

- **OUTPUT1, 3, 5, 7 or 9, 11, 13, 15:** Matrix Switcher Output jacks are connected to extensible accessory devices (HX-SRW) for HDTVs, projectors or other sink devices connection.

☞ OUTPUT1, 3, 5, 7 or 9, 11, 13, 15 RJ-45 jacks are only used for extender (HX-SRW) connection.

- **IR Tx 1, 3, 5, 7 or 9, 11, 13, 15 Ports:** Used to connect to the IR Blaster Cable for IR pass-through.
  IR Blaster Pin Definitions:

- **IR Rx 1, 3, 5, 7 or 9, 11, 13, 15 Ports**: Used to connect to the IR Receiver Cable for IR pass-through.
  IR Receiver Pin Definitions:

☞ 1. For a Matrix Connection, the Master IR Rx 1, 3, 5, 7 or 9, 11, 13, 15 signal can be output from any Slave IR Tx port.

2. For a Matrix Connection, the Master IR Rx 1, 3, 5, 7 or 9, 11, 13, 15 signal can only be output from Matrix itself IR Tx 1, 3, 5, 7 or 9, 11, 13, 15 port. An Even IR Rx port is not useful.

CHAPTER 6 CONNECTIONS
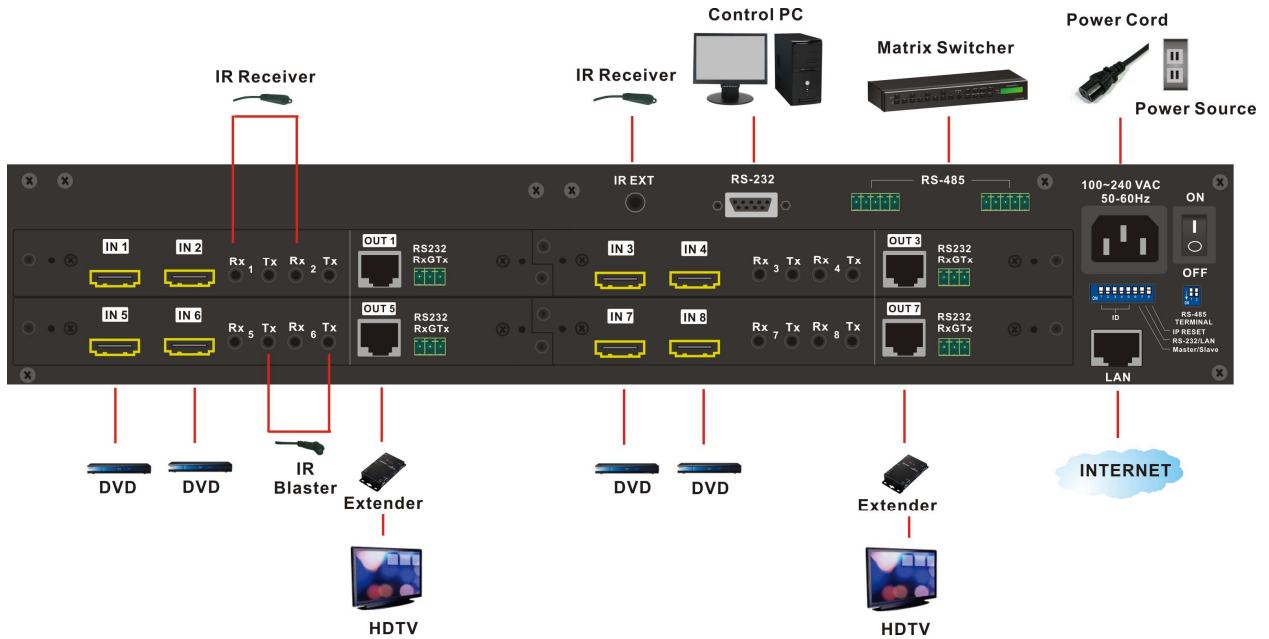
Figure 6-1 HX-2384Z Connections
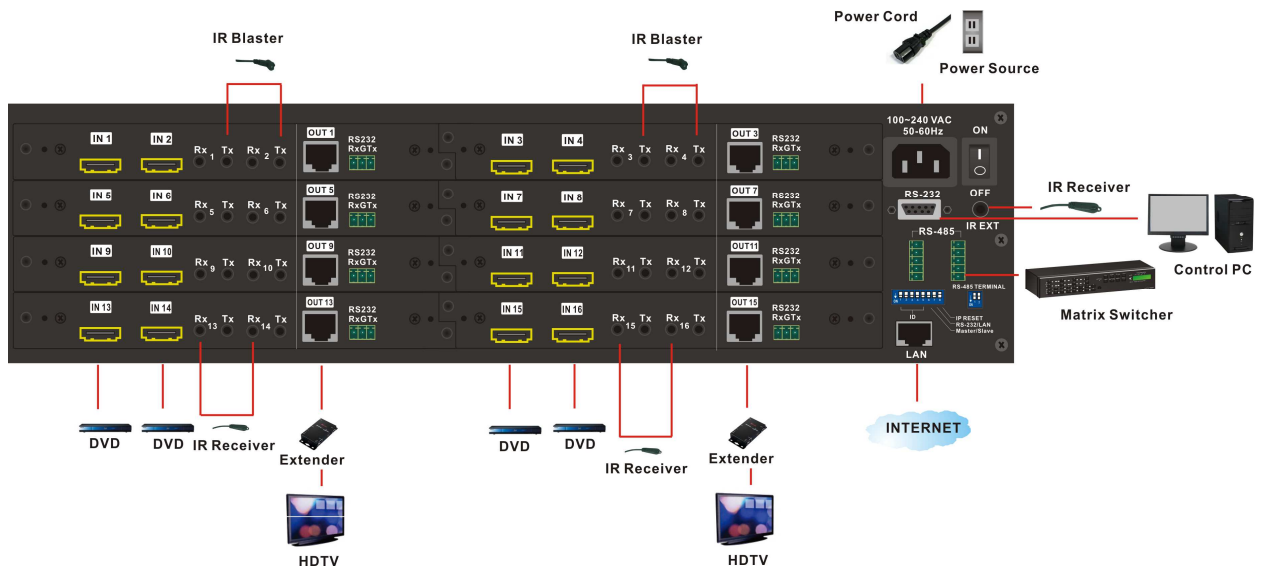
Figure 6-2 HX-331608Z Connections

The HX-2384Z/HX-331608Z supports individual independent modules I/O modules for reparation or upgrade. Each module can be configured individually based on module number. You can search these module numbers by pressing **SETUP** key when you want to upgrade firmware version.
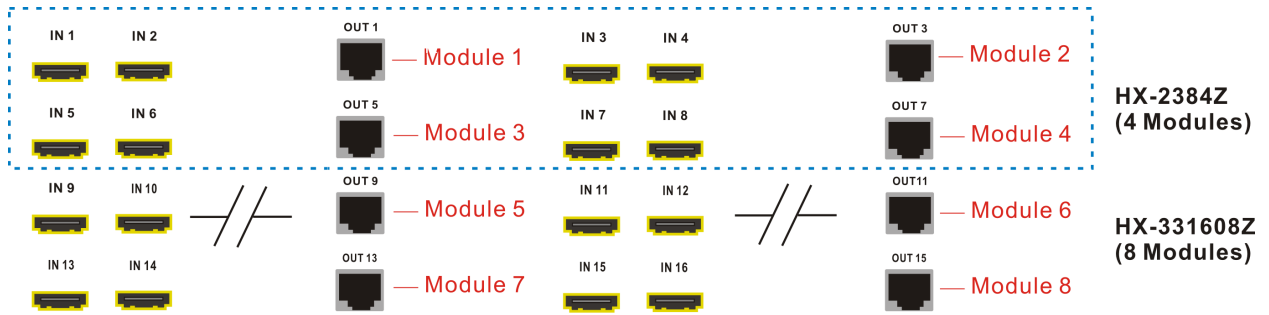
Figure 6-3 Module Deployment

6.1 Input/Output Connections

Use the HDMI connecting cable to connect the Input serial jack (No.1 ~ No.8 or 16) to the HDMI jack of the Blu-ray/DVD player/graphics workstations/number displays. Use the Cat.5e cable to connect the output RJ-45 jack (No.1, 3, 5, 7 or 9, 11, 13, 15) to the RJ-45 jack of extenders (HX-SRW). Through the extender (HX-SRW), you can extend the connection of HDTVs, projector, video recorder, displayer or multiplexer to your Matrix Switcher.
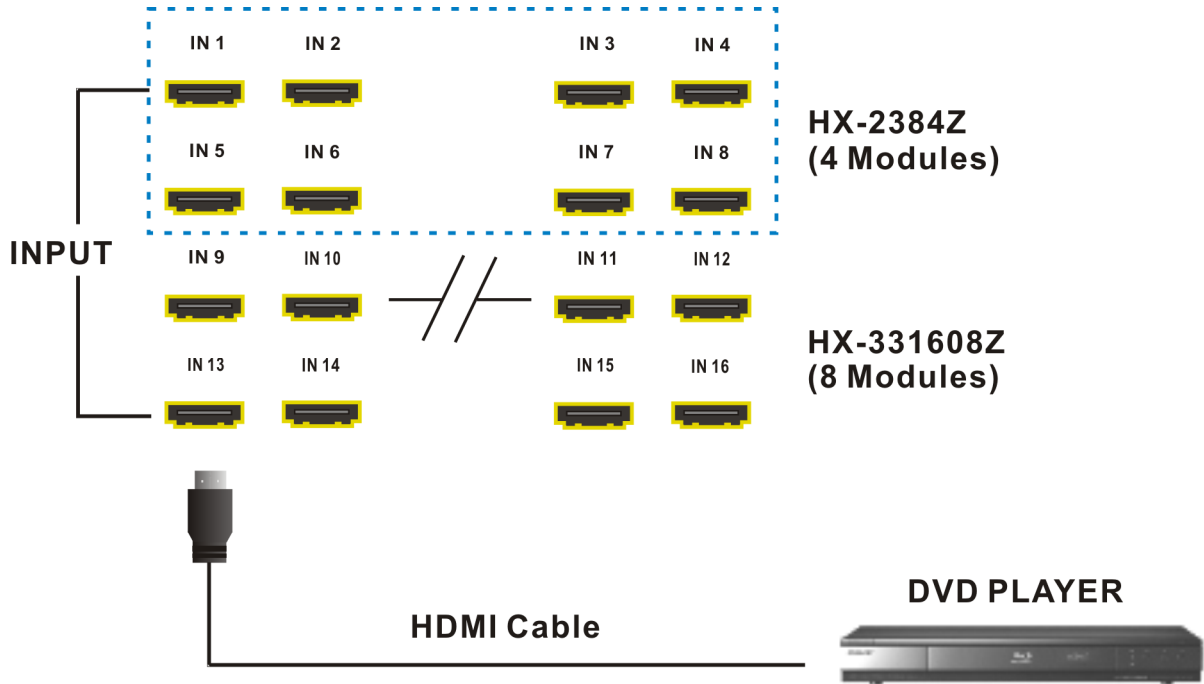
Figure 6-4 Input Connections
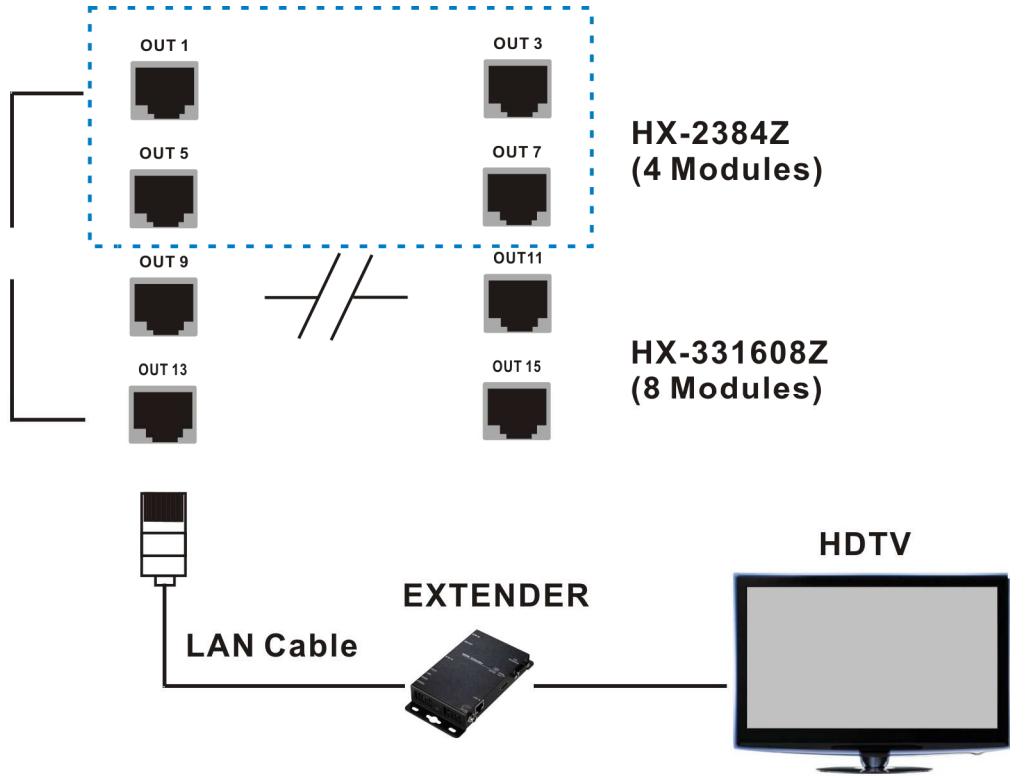
Figure 6-5 Output Connections

6.1.1 Output LED

This Matrix Switcher supports HDBaseT output for a long distance signal transmission. Output connector is RJ-45 jack with two LED indicators. The LED indicators show you the status of output transmission.
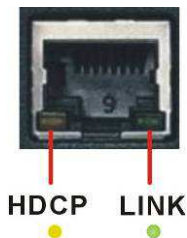
* The left LED of RJ-45 output jack is specified for HDCP (Yellow).

* The right LED of RJ-45 output jack is specified for LINK (Green).

☞ The LED indicators are only designed for the Output – RJ-45 jack of Matrix Switcher.

LED Indicators:

LED	Off	Blink	On
LINK (Green)	No Link	Low Power Mode	HDBaseT Link
HDCP (Yellow)	No HDMI Signals	No Encryption	HDCP Encryption

6.1.2 Output Cable

HDBaseT was designed to provide Full HD performance up to 70 meters of Cat.5e or superior cables. In a typical installation, the cable is stretched to its full length between the HDBaseT Transmitter device and the HDBaseT Receiver device. However sometimes, especially, in demonstrations or in a lab environment, the cable is rolled randomly in small turns for convenience. The randomly rolled UTP cable suffers additional signal impairments (compared to straight cable) and therefore the maximal operating reach might be reduced. When a Cat.5e cable is randomly rolled, it is recommended to limit its length to approximate 50 meters. Rolling a Cat.5e cable around a 70 cm fixed diameter plastic drum has just a minor effect on the FEXT (Far End Cross Talk) when compared to a fully stretched cable.

✔Order Rolled   ✘Random Rolled
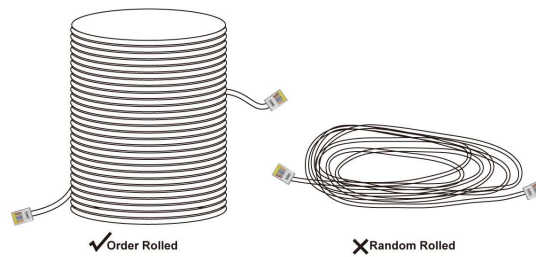
Figure 6-6 Output LAN Cable

6.2 IR Pass-Through Connection

The Matrix Switcher provides an IR Receiver Cable and IR Blaster Cable accessories for IR pass-through. IR Receiver Cable can be connected to IR Rx ports or IR EXT on the rear panel. On the other hand, IR Blaster Cable can be connected to IR Tx ports on the rear panel.

- Support you an IR channel to control the player from TV or control the TV from player.
- Support all kinds of IR frequency band
- IR pass-through switch is based on HDMI switched
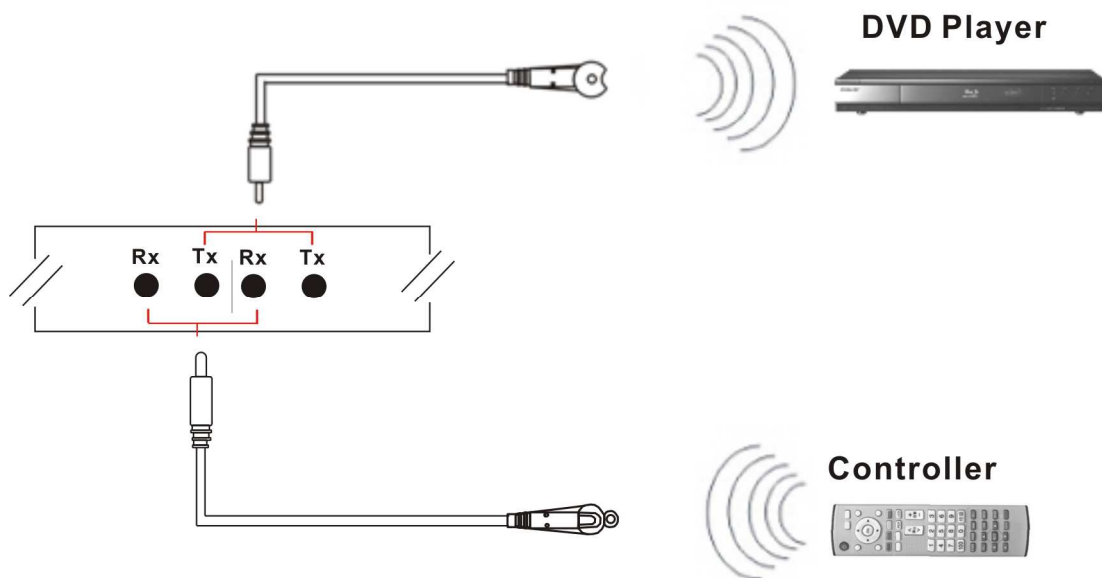
Figure 6-7 IR Extended Aiming – Multimedia

☞ The Output - IR Tx/Rx are designed on the Extender (HX-SRW). IR OUT is specified for IR Tx, alternatively, IR1 IN and IR2 IN are specified for IR Rx. Refer to *Appendix A Matrix Switcher Remote Controller*.

6.3 IR EXT Connection

The Matrix Switcher provides an IR Receiver Cable for more convenient to react to the Matrix Switcher Remote Controller. If it is difficult for you to aim at IR Receiver on the front panel due to the location of Matrix switcher, please connect IR Receiver Cable to the IR EXT port located on the rear panel for optional position.
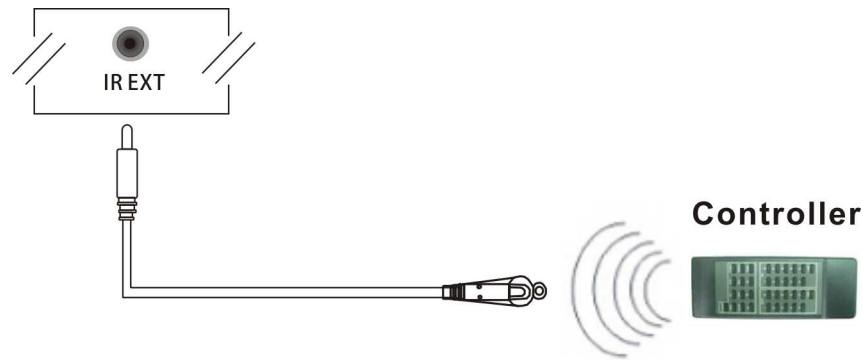
Figure 6-8 IR EXT Connection

6.4 Power Connection

Use the included power cord to connect the power port on the rear panel of Matrix Switcher to the outlet.
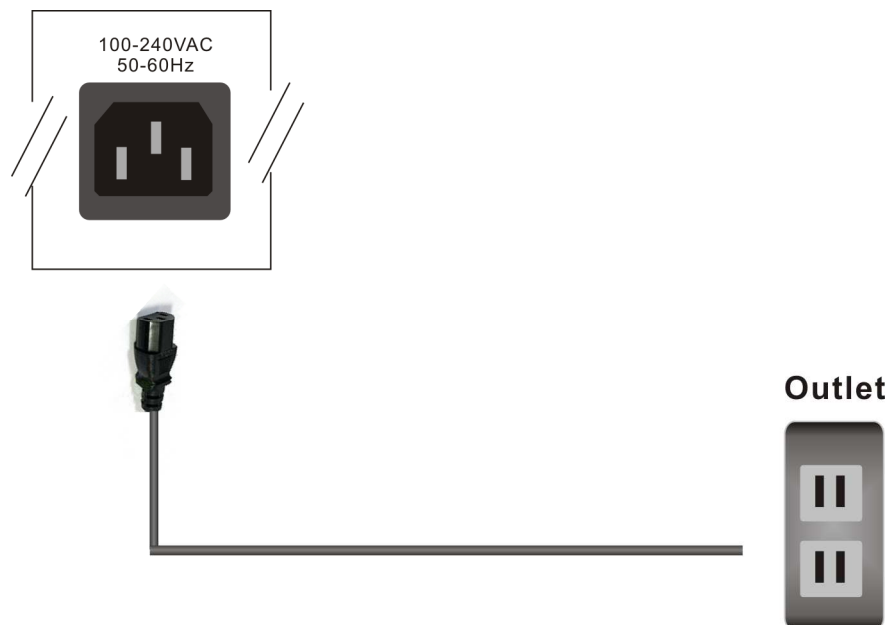
Figure 6-9 Power Connection

6.5 Matrix Switcher Remote Control

Use the RS-232 connecting cable to connect the computer serial communication port (COM1 or COM2) to the RS-232 communication port of the Matrix Switcher. The computer can then be used to control the Matrix Switcher after installing of application software. Aside from using the front panel keys for switching operation, you are also permitted to use the RS-232 connection port for remote operation.
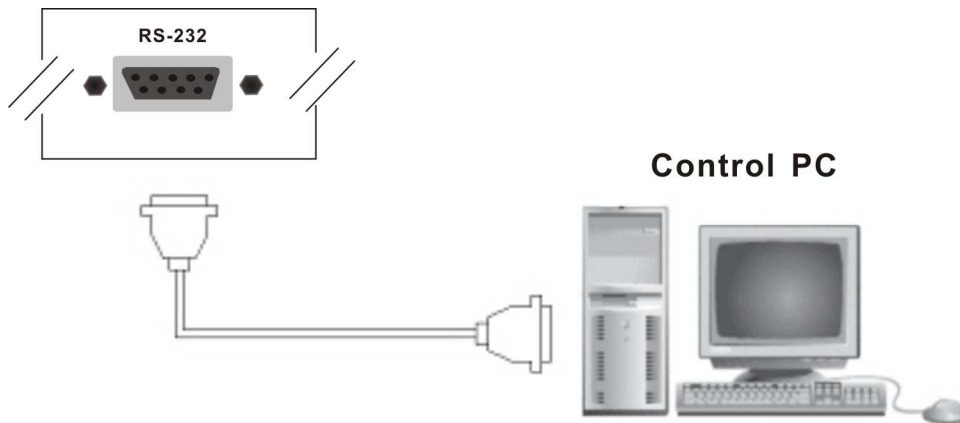
Figure 6-10 RS-232 and Control PC Connection

Matrix Switcher also supports a LAN port allows you to control all the series connection devices through PC Browser.
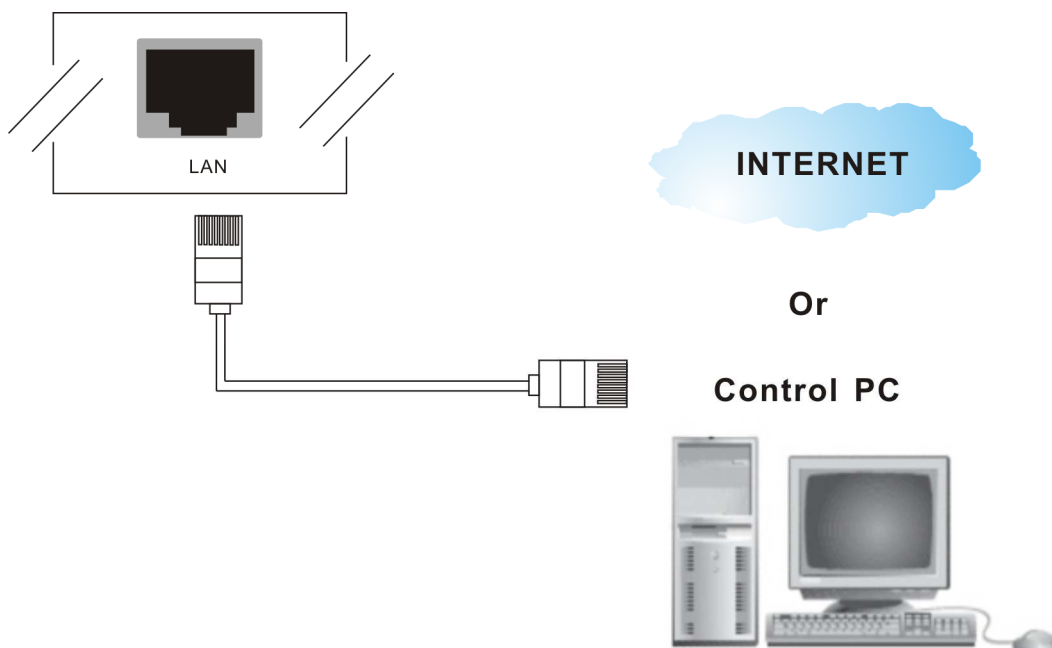
Figure 6-11 LAN Port Connection

☞ Matrix Switcher supports RS-232 and RS-485 on the rear panel for a remote control and allows you to operate settings via the keys located on the front panel.

6.6 Ports and Switchers

The Matrix Switcher provides standard RS-232 and RS-485 serial communication ports. Beside the front panel for key switching operation, you can also use the RS-232 or RS-485 serial communication port to carry out remote operation.

6.6.1 RS-232

The RS-232 Pin functions are described as below:

Pin No.	Abbreviation	Description
1	N/u	Null
2	TXD	Send
3	RXD	Receive
4	N/u	Null
5	GND	Ground
6	N/u	Null
7	N/u	Null
8	N/u	Null
9	N/u	Null

☞ The Matrix RS-232 port is defined by DCE.

Female DB9(From PC)
Pin4 Connected to Pin6
Pins 1,7,8 Connected together
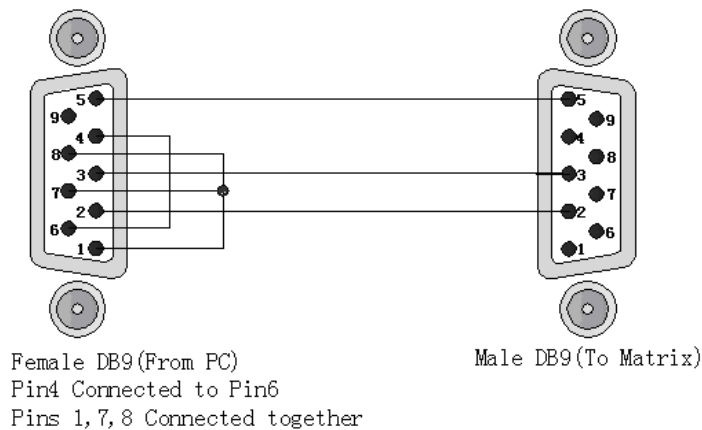
Male DB9(To Matrix)

Figure 6-12a RS-232 – From Female DB9 (PC) to Male DB9 (Matrix)
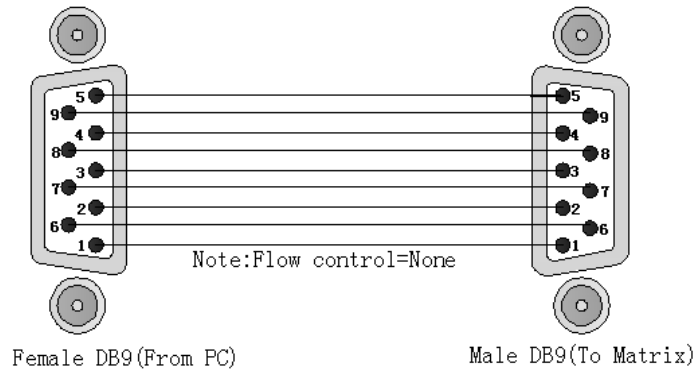
Figure 6-12b RS-232 – From Female DB9 (PC) to Male DB9 (Matrix)
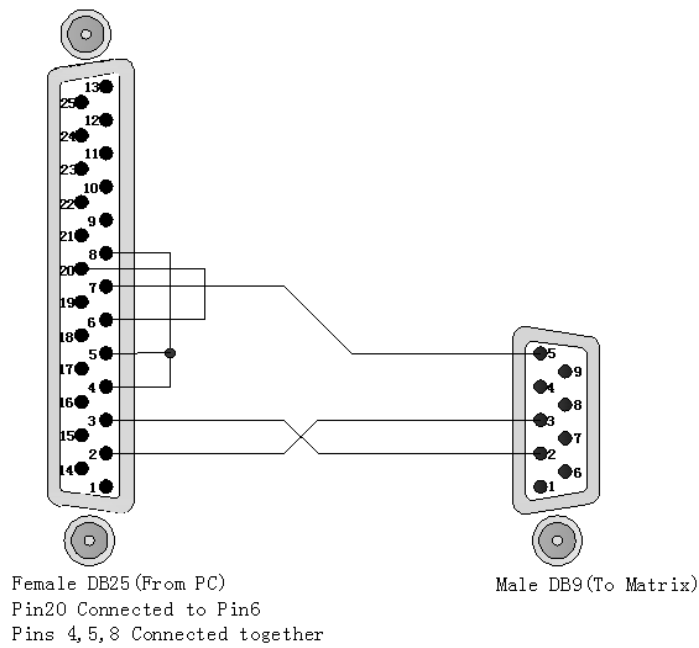
Figure 6-13 RS-232 – From Female DB25 (PC) to Male DB9 (Matrix)

6.6.2 RS-485 (Matrix Connection)

RS-485 is a standard defining the electrical characteristics of drivers and receivers for use in balanced digital multipoint systems. Digital communications networks implementing the RS-485 standard can be used effectively over long distances and in electrically noisy environments. This Matrix Switcher supports up to two RS-485 ports allows you to control more than one Matrix Switcher. If the master device is specified for LAN, it allows you to control all the series devices with web browser. Remember all the ID of each device upon series connection has to be uniquely.
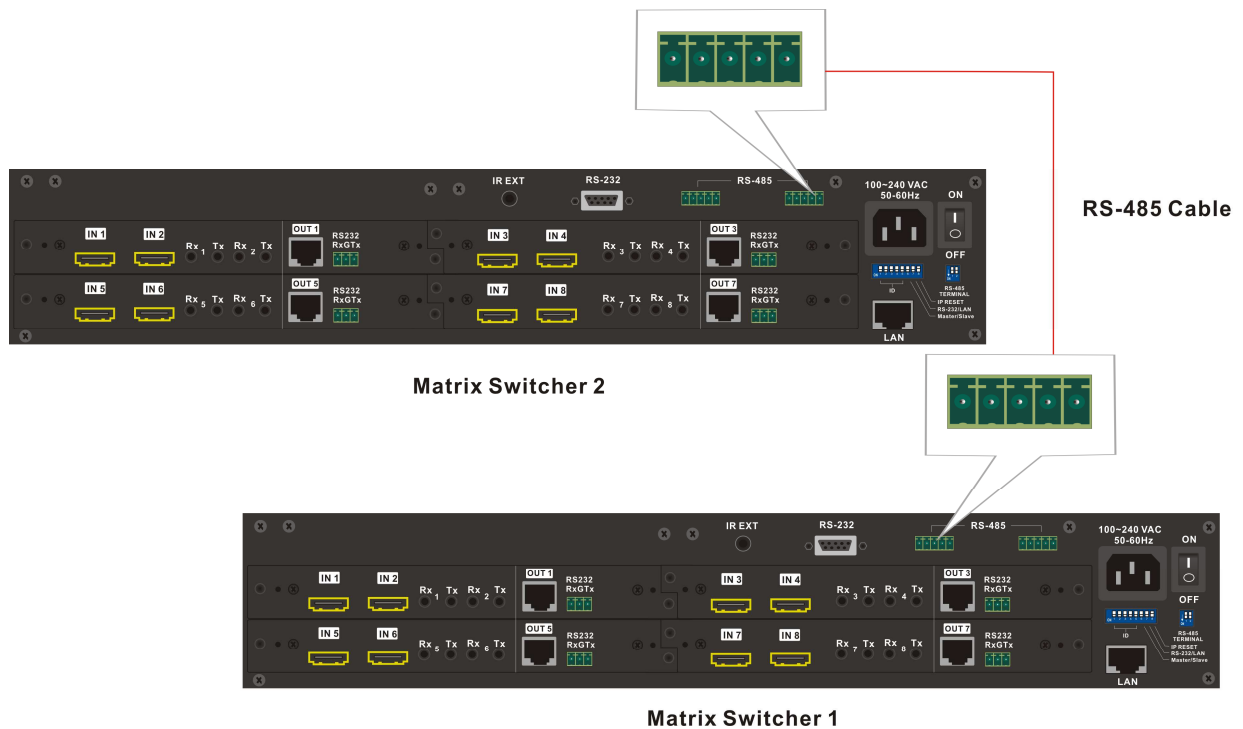
Figure 6-14 RS-485 Connection for HX-2384Z

RS-485 Cable

Matrix Switcher 2

Matrix Switcher 1
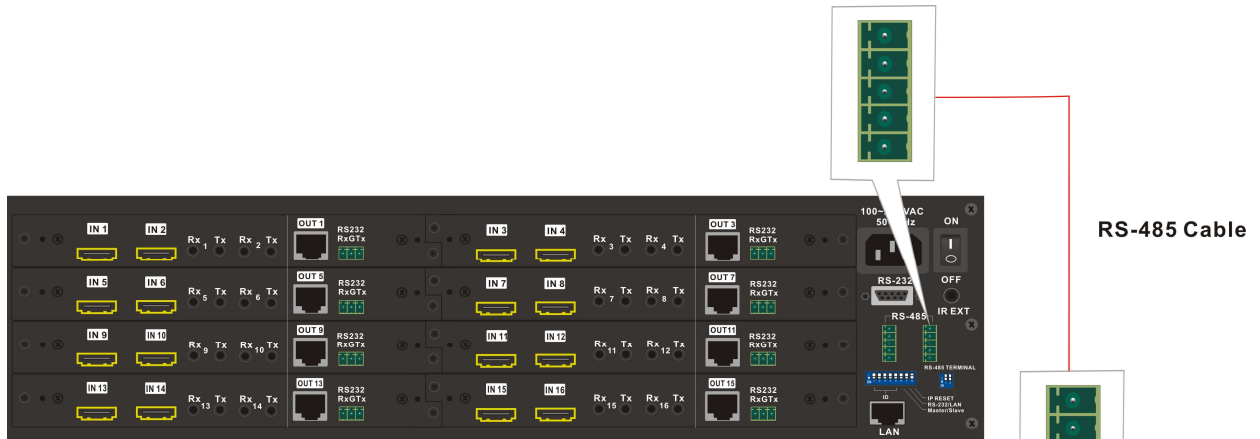
Figure 6-15 RS-485 Connection for HX-331608Z

RS-485 Cable

Matrix Switcher 2

Matrix Switcher 1
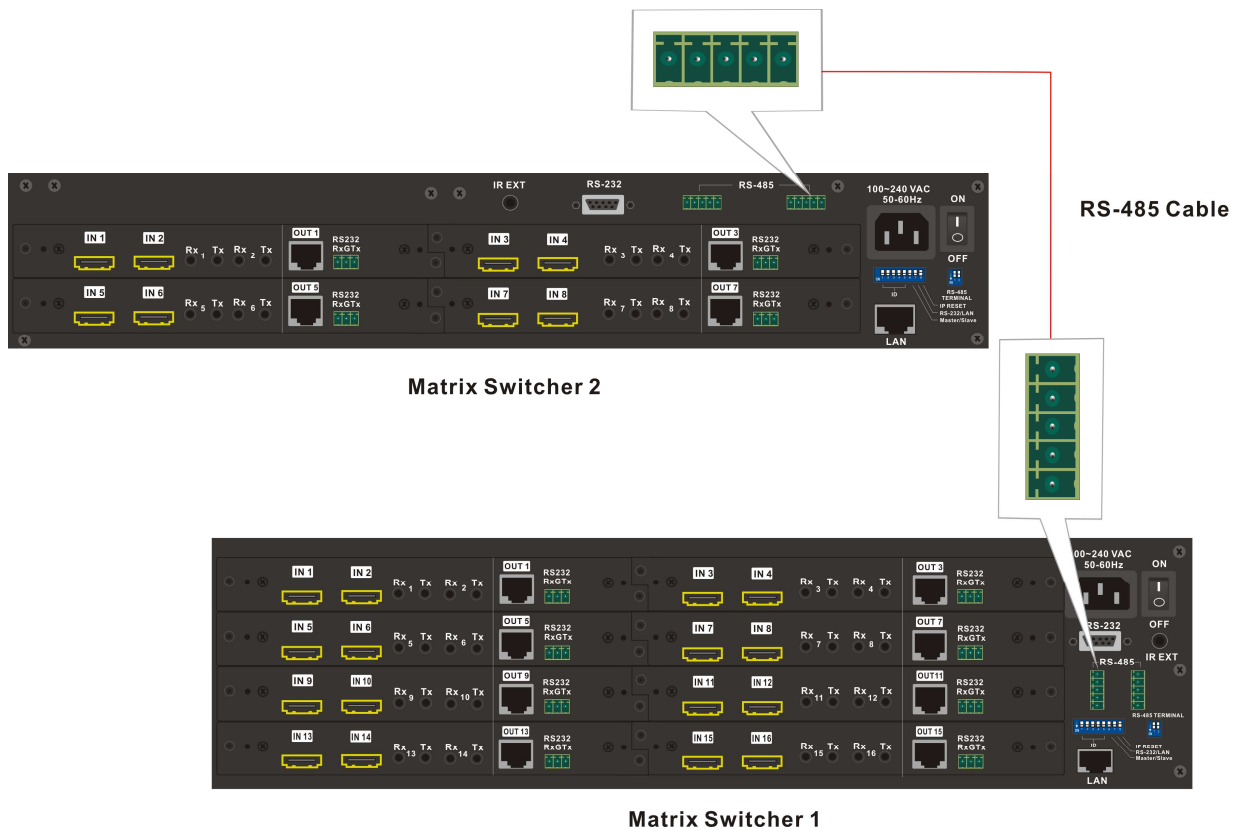
Figure 6-16 RS-485 Connection for HX-2384Z and HX-331608Z

See Pin definitions as below:

RS-485

+ - ⊥ + -
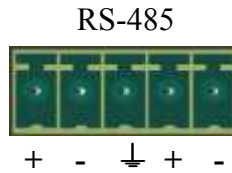
Figure 6-17 RS-485 Port

Serial connection between Matrix RS-485:

Pin1 TX（+）←──────→TX（+）--- Transmitted Data +

Pin2 TX（-）←──────→ TX（-）--- Transmitted Data -

Pin3 Gnd ←──────→(Ground)

Pin4 RX（+）←──────→ RX（+）--- Received Data +

Pin5 RX（-）←──────→ RX（-）--- Received Data -

☞ 1. RS-232 and RS-485 baud rates: 9600bps, no odd or even calibration address, 8bit data transmission address, 1bit stop address (96, N, 8, 1).

2. To use the above matrix function, you have to set the RS-232/LAN pin to RS-232 mode and the ID must not be 31 (ALL OFF). Refer to *6.6.5 DIP Switcher 8 Pins.*

6.6.3 RS-232 (RxGTx Port)

See Pin definitions as below:

RxGTx

Figure 6-18 RxGTx Port

Pin1 Rx : Receive RS-232-level signal pin. (data in)

Pin2 G : GND

Pin3 Tx : Transmit RS-232-level signal pin. (data out)

6.6.4 LAN Port

This Matrix Switcher supports a network RJ-45 registered jack using 8P8C modular connector, which specifies the physical male and female connectors as well as the pin assignments of the wires in a telephone cable. (A common LAN cable is available.)

Pin	Pair	Wire		Color
1	2	1		white/orange
2	2	2		orange
3	3	1		white/green
4	1	2		blue
5	1	1		white/blue
6	3	2		green
7	4	1		white/brown
8	4	2		brown
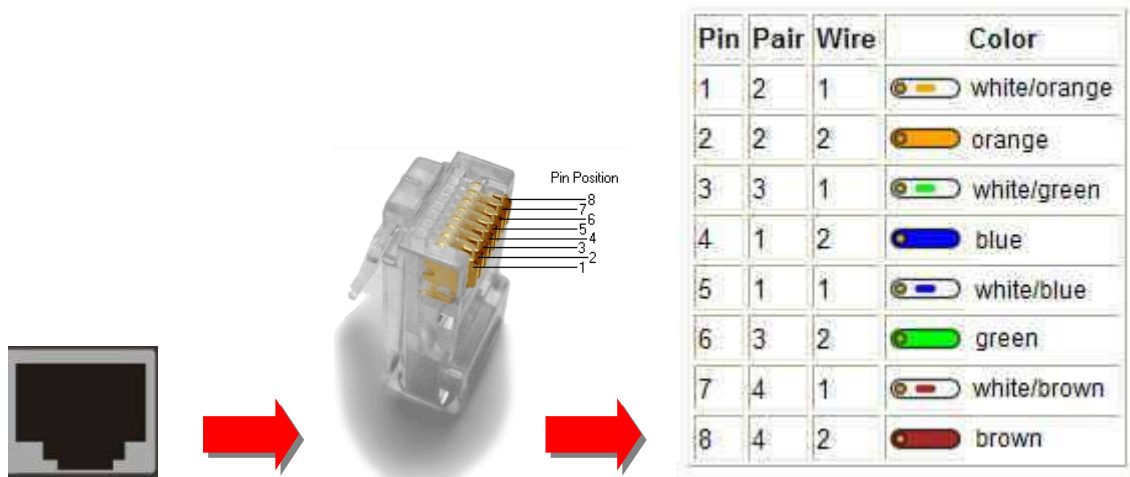
Figure 6-19 RJ-45 Connector

6.6.5 DIP Switcher 8 Pins
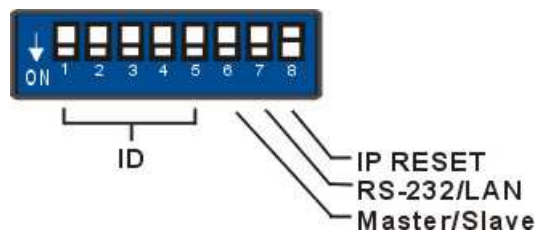
Figure 6-20 DIP Switcher

A. DIP Switcher Pin 1 to 5: Switch to down (ON) is specified for **"0"**, on the other hand to up (OFF) is specified for **"1"**. For Device ID settings refer to *6.6.7 Device ID Settings*.

B. DIP Switcher Pin 6: Mater/Slave Enable/Disable. Only one Matrix Switcher can be connected to other device and control PC via RS-232/LAN that is specified as Master, others are specified as Slave.

   ON: RS-485 Serial Master

   OFF: RS-485 Serial Slave.

C. DIP Switcher Pin 7: Switch between RS-232 port and LAN port connection.

   ON: RS-232

   OFF: LAN

☞ No matter RS-232 or LAN configurations, you have to set the PIN 1-5 device ID to down (ALL ON).

D. DIP Switcher Pin 8: Reset the web server IP address to **192.168.0.3**

The steps are as below:

  1. Please adjust the pin8 to ON and re-start the Matrix Switcher.

  2. After the Matrix Switcher re-starts about 10 seconds, shut down it.

  3. For a normal operation, please adjust the pin8 to OFF, then power on the Matrix Switcher again. The IP address will be restored to the default value: **192.168.0.3**

6.6.6 DIP Switcher 2 Pins

Figure 6-21 RS-485 Terminal Switcher

DIP Switch RS-485 Terminator: RS-485 Terminator for ON/OFF

   ON: RS-485 Terminator ON.

   OFF: RS-485 Terminator OFF.

Proceed Multi Matrix Switcher connections, the RS-485 Terminator for the last device must be set to ON. Others must be set to OFF.

6.6.7 Device ID Settings

Device ID Settings

The Device ID determines the position of a Matrix system. When multiple Matrix products are connected to one PC or when the Matrix products are serially connected, the Device ID decides which Matrix product is to be controlled. Device ID must not set to same number. Use the ON/OFF switches 1, 2, 3, 4, 5 on the rear panel to set the ID number as below:

Number Setting Table

ID Address （Decimal）	ID Address （Hexadecimal）	ID Address （Binary）	ON/OFF Switching Positions				
			SW5	SW4	SW3	SW2	SW1
0	00	00000	ON	ON	ON	ON	ON
1	01	00001	ON	ON	ON	ON	OFF
2	02	00010	ON	ON	ON	OFF	ON
3	03	00011	ON	ON	ON	OFF	OFF
4	04	00100	ON	ON	OFF	ON	ON
5	05	00101	ON	ON	OFF	ON	OFF
6	06	00110	ON	ON	OFF	OFF	ON
7	07	00111	ON	ON	OFF	OFF	OFF
8	08	01000	ON	OFF	ON	ON	ON
9	09	01001	ON	OFF	ON	ON	OFF
10	0A	01010	ON	OFF	ON	OFF	ON

ID Address（Decimal）	ID Address（Hexadecimal）	ID Address（Binary）	ON/OFF Switching Positions				
			SW5	SW4	SW3	SW2	SW1
11	0B	01011	ON	OFF	ON	OFF	OFF
12	0C	01100	ON	OFF	OFF	ON	ON
13	0D	01101	ON	OFF	OFF	ON	OFF
14	0E	01110	ON	OFF	OFF	OFF	ON
15	0F	01111	ON	OFF	OFF	OFF	OFF
16	10	10000	OFF	ON	ON	ON	ON
17	11	10001	OFF	ON	ON	ON	OFF
18	12	10010	OFF	ON	ON	OFF	ON
19	13	10011	OFF	ON	ON	OFF	OFF
20	14	10100	OFF	ON	OFF	ON	ON
21	15	10101	OFF	ON	OFF	ON	OFF
22	16	10110	OFF	ON	OFF	OFF	ON
23	17	10111	OFF	ON	OFF	OFF	OFF
24	18	11000	OFF	OFF	ON	ON	ON
25	19	11001	OFF	OFF	ON	ON	OFF
26	1A	11010	OFF	OFF	ON	OFF	ON
27	1B	11011	OFF	OFF	ON	OFF	OFF
28	1C	11100	OFF	OFF	OFF	ON	ON
29	1D	11101	OFF	OFF	OFF	ON	OFF
30	1E	11110	OFF	OFF	OFF	OFF	ON
31	1F	11111	OFF	OFF	OFF	OFF	OFF

CHAPTER 7 MATRIX APPLICATION SOFTWARE

7.1 Software Introduction

The 《AV Matrix》 matrix control software applies to different input/output matrixes.

☞ To use the matrix function, the ID can not be set to 31 (ALL OFF).

7.1.1 Software Description

The 《AV Matrix》 matrix testing software is an application tool developed for matrix testing and application. The software operation environment is as below:

- Window98/2000/NT/XP operating systems
- 32M internal memory or above
- 10M hard disk space or above
- CD-ROM
- At least one serial communication port

7.1.2 Software Activation

Power on the computer: Implement the **AV Matrix.msi** in the bundled CD-ROM to activate installation window as below, click **"Next"**. And follow the instructions on window to finish the installation.
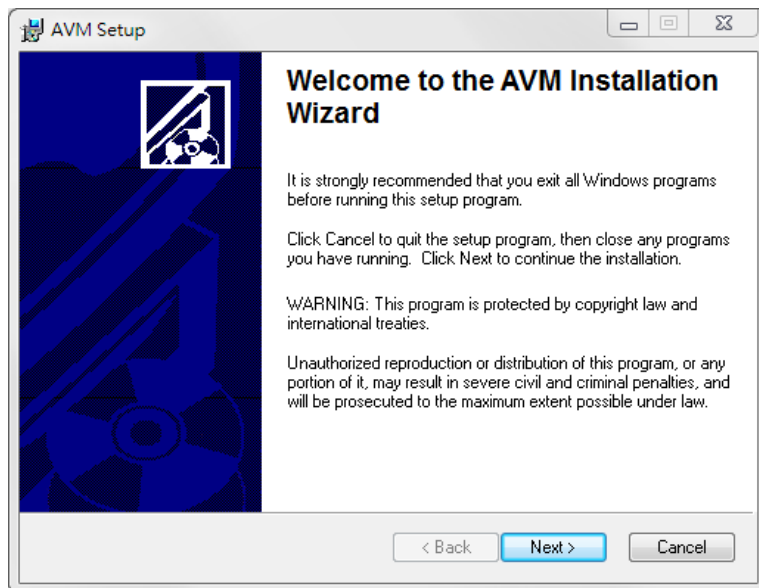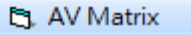
Figure 7-1 AV Matrix Installation Window

7.1.3 Connect Matrix Switcher and PC

You must power off the Matrix Switcher. Then, connect the Matrix RS-232 port to the PC RS-232 port with the bundled communication cable. And make sure the DIPs on the rear panel are set to Master and RS-232. (Refer to the previous section *6.6.1 RS-232*)

7.2 Matrix Configuration

After finishing installation, click 🗂 AV Matrix to active AV Matrix Application. In the **"Options"** window, select the connected PC Port number and Baud rate, and then click **"OK"**.
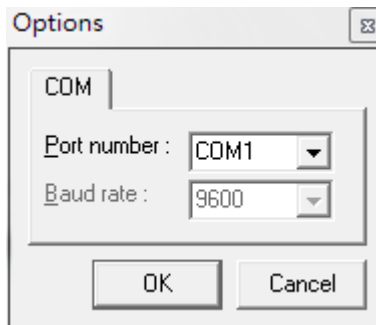
Figure 7-2 AV Matrix Options Window

The software controls signal connection between the corresponding input port and output port as required. The AV Matrix software application main window is shown as below:
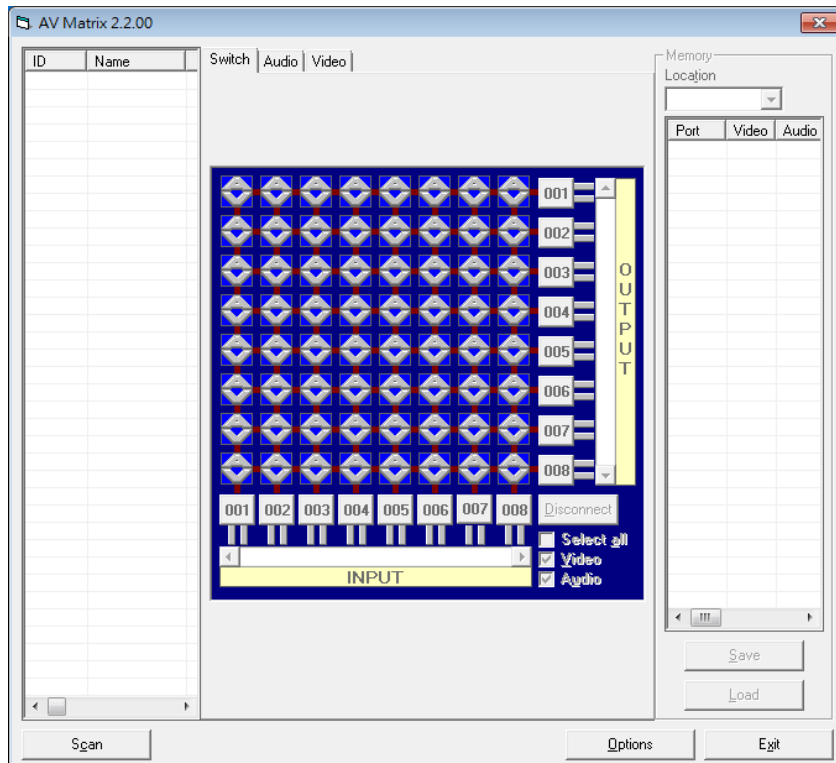
Figure 7-3 《AV Matrix》Software Application Main Window

☞ The Device ID is based on the DIP of switcher located on the rear panel.

Slide the scrollbar on the lower left area of main window to view all contents (including ID, Name, A/V, I/O (only for VO/AO reference), Memory, VI Plug, AI Plug, VO Plug, AO Plug, EDID Type, Volume, Bass, Treble, Subwoofer, Delay, Delay Unit, Max Delay and Version) as described below:

- **ID:** Specify the ID address of Matrix Switcher.

- **Name:** The name of Matrix Switcher.

- **A/V:** Specify the character of audio or video. Or both of audio and video are supported   will show **"Both"**.

- **I/O:** Ports quantities of Input and Output.

- **Memory:** Show the quantities of memory sets.

- **AI/VI Plug:** Enable to detect the status of all input ports for audio/video.

- **AO/VO Plug:** Enable to detect the status of all output ports for audio/video.

- **EDID Type: FIX** (fix mode) and **TV1** (access the first output channel) selection key.

  - **FIX mode:** The Matrix Switcher will supply a set of fixed **EDID** values to support up to only 1080P high performance TV.
  - **Output1 mode:** The Matrix Switcher will access the **EDID** values of high performance TV that connected to the first output channel, and copy the **EDID** value to all the input channels so that the DVD player can support to all the HDTV.

- **Version:** Show the version information of Matrix Switcher.
  The functions as below are only for Audio Matrix Switcher (This Matrix Switcher is not supported):

- **Volume/Bass/Treble/Subwoofer:**   Show   the   Volume/Bass/Treble/Subwoofer function is Enable or Disable.

- **Delay:** Show whether enable or disable the multimedia output delay time function.

- **Delay Unit:** Show the delay time of multimedia output. The unit for delay time is **"ms"**.

- **Max Delay:** Show the maximum permissive delay time. The unit for maximum delay time is **"ms".**

7.2.1 Main Operation Interface

Refer to the main window as above, the marked blue area shows crossing matrix of output ports 001, 003, 005 and 007 (HX-2384Z) or 001, 003, 005, 007, 009, 011, 013 and 015 (HX-331608Z) and input ports 001-008 (HX-2384Z) or 001-016 (HX-331608Z). You can slide the scrollbar on the **INPUT/OUTPUT** area to view all configured ports. For the basic operation is described as below:

Examples for selecting Matrix Switcher functions:

Example: Now there is a Matrix Switcher having all the input/output ports properly connected to the equipment. If you want to set channel 1 input to channel 3, 5 and 7 output; channel 3 inputs to channel 1 output. There are 2 ways to implement the switching. Please follow the ways and steps to finish the switching functions:

▪ **First way:** Directly click on the corresponding icons on the Matrix to transform

 them into to complete the switching operation.

▪ **Second way:**

 Step 1: First select the **"Output"** number keys 003, then select 005 and final select 007 to the right of the blue configuration area, and select the **"Input"** number key 001 to the bottom. Then, press consecutively the previously selected **"Output"** number keys 003, 005 and 007. This way, you have selected **"Input"** 001 and **"Output"** 003, 005 and 007 switching.

 Step 2: First select the **"Output"** number key 001 to the right of the blue configuration area, and select the **"Input"** number key 003 to the bottom. Then, press the previously selected **"Output"** number key 001. This way, you have selected Input 03 and Output 001 switching.

 Upon completion of the above steps, you have actually completed the switching operation of having channel 1 input to channel 3, 5 and 7 outputs while at the same time successfully switched from channel 3 input to channel 1 output.

 The main configuration window also shows you some function buttons to easy operation:

▪ **Switch Tab:** Click **"Switch"** tab to show the main configuration window.

▪ **Audio Tab:** Click the **"Audio"** tab to show the audio related configuration window. (This feature is not available for HX-2384Z/HX331608Z.)

- **Video Tab:** Click the **"Video"** tab to show the video related configuration window. For more information, refer to *7.2.3 EDID Configuration Function*

- **Disconnect:** To disable the connections. After you had configured the connection between input and output ports, you can click this button to disable the connections

- **Select all output:** Click this button to select all output ports including output 001, 003, 005 and 007 (HX-2384Z) or 001, 003, 005, 007, 009, 011, 013 and 015 (HX-331608Z).

- **Video check box:** Used for video configurations.

- **Audio check box:** Used for audio configurations. (This feature is not available for HX-2384Z/HX331608Z.)

- **Scan:** To search the device controlled by the AV Matrix Application configuration. When the device name located on the left of main configuration window is empty, you can click the **Scan** to research and update the device **ID** and **Name** and other related information. End the **Scan** function by pressing the Scan again during scanning process. And the left of main configuration window will show you the detected information presently.

- **Options:** Allows you to configure the **Port number** and **Baud rate**.

- **Exit:** Click this button to exit the configuration window.

- **Save:** Click this button to save the connected combinations both output ports and input ports into the memory set.

- **Load:** Click this button to retrieve the previously saved settings.

  For more information and operations, please refer to next chapters.

7.2.2 Main Operation Interface

Disable all the unused output ports.

A specific example of operation is described as below:

The present input and output relations are shown in Figure 7-4a below:
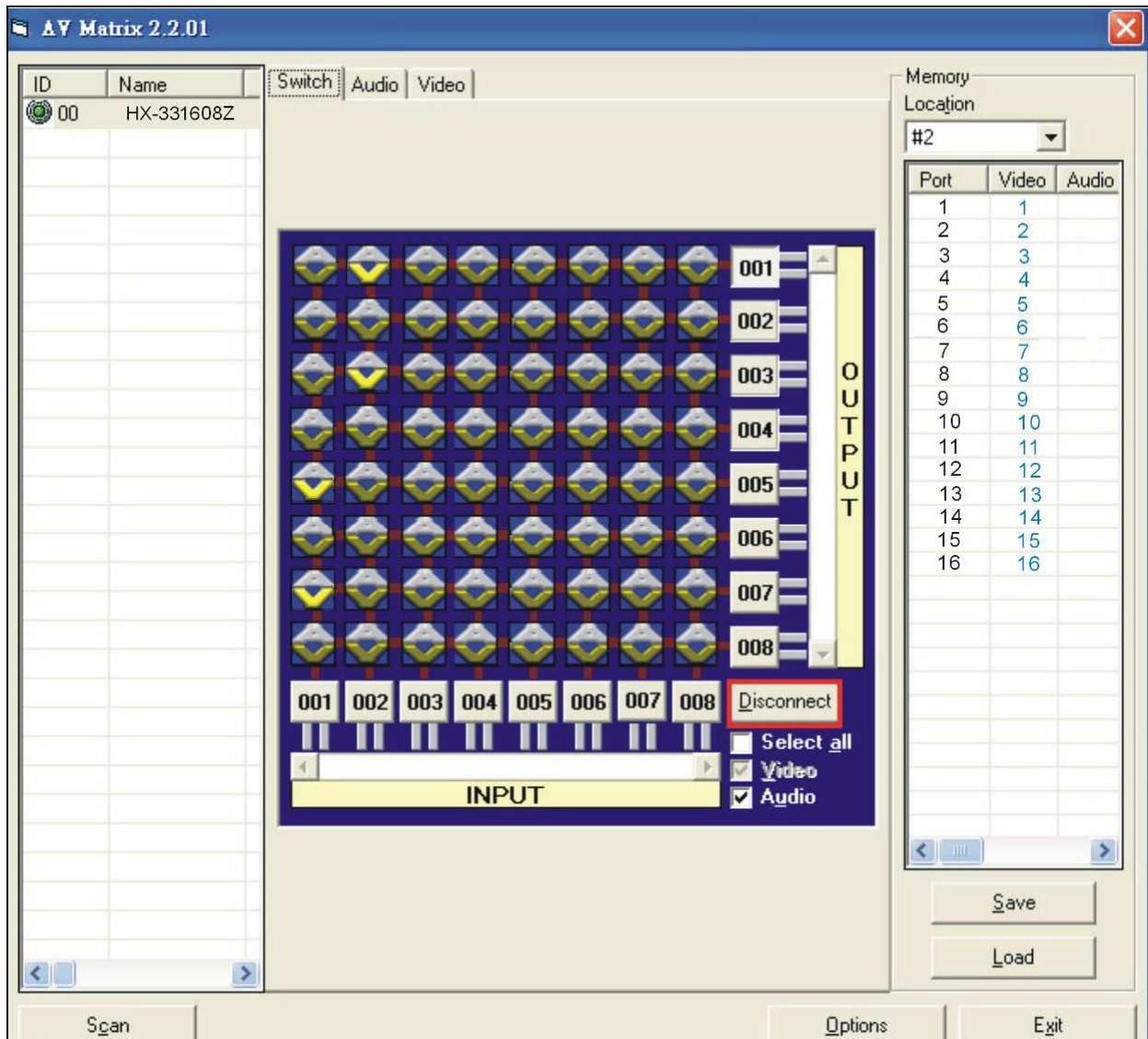
Figure 7-4a Disconnect Function Key for HX-331608Z Reference

43

Follow the steps as below to disable the output ports including port 003 and 001.

Step 1: First press down the output number keys 003 and 001 to the right of the blue configuration area.

Step 2: Press the **"Disconnect"** key;

Step 3: Press the previously pressed output number keys 003 and final 001 to complete the operation.

The final results will be as shown in Figure 7-4b below:
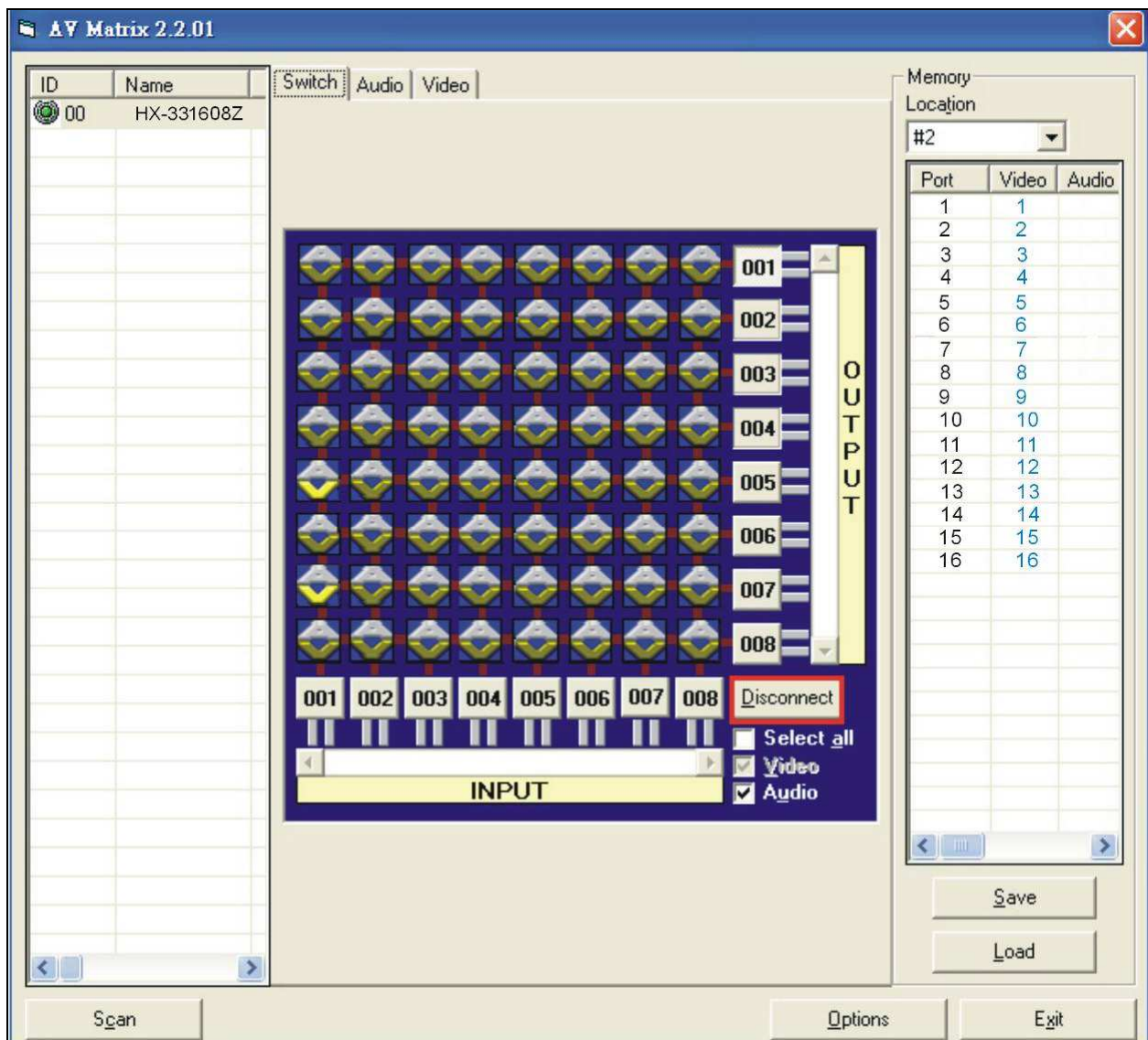
Figure 7-4b Disconnect Function Key for HX-331608Z Reference

7.2.3 EDID Configuration Function

Click **"Video"** tab to enter the video configuration window. In the video configuration window allows you to configure the **EDID** type of channel as **FIX** or **Output1**. In Matrix Switcher, the audio and video can be processed synchronously. Beside, all ports for EDID functions are also processed entirely. You cannot configure the port separately.

FIX mode: The Matrix Switcher will supply a set of fixed **EDID** values to support up to only 1080P high performance TV.

Output1 mode: The Matrix Switcher will access the **EDID** values of high performance TV that connected to the first output channel, and copy the **EDID** value to all the input channels so that the DVD player can support to all the HDTV.
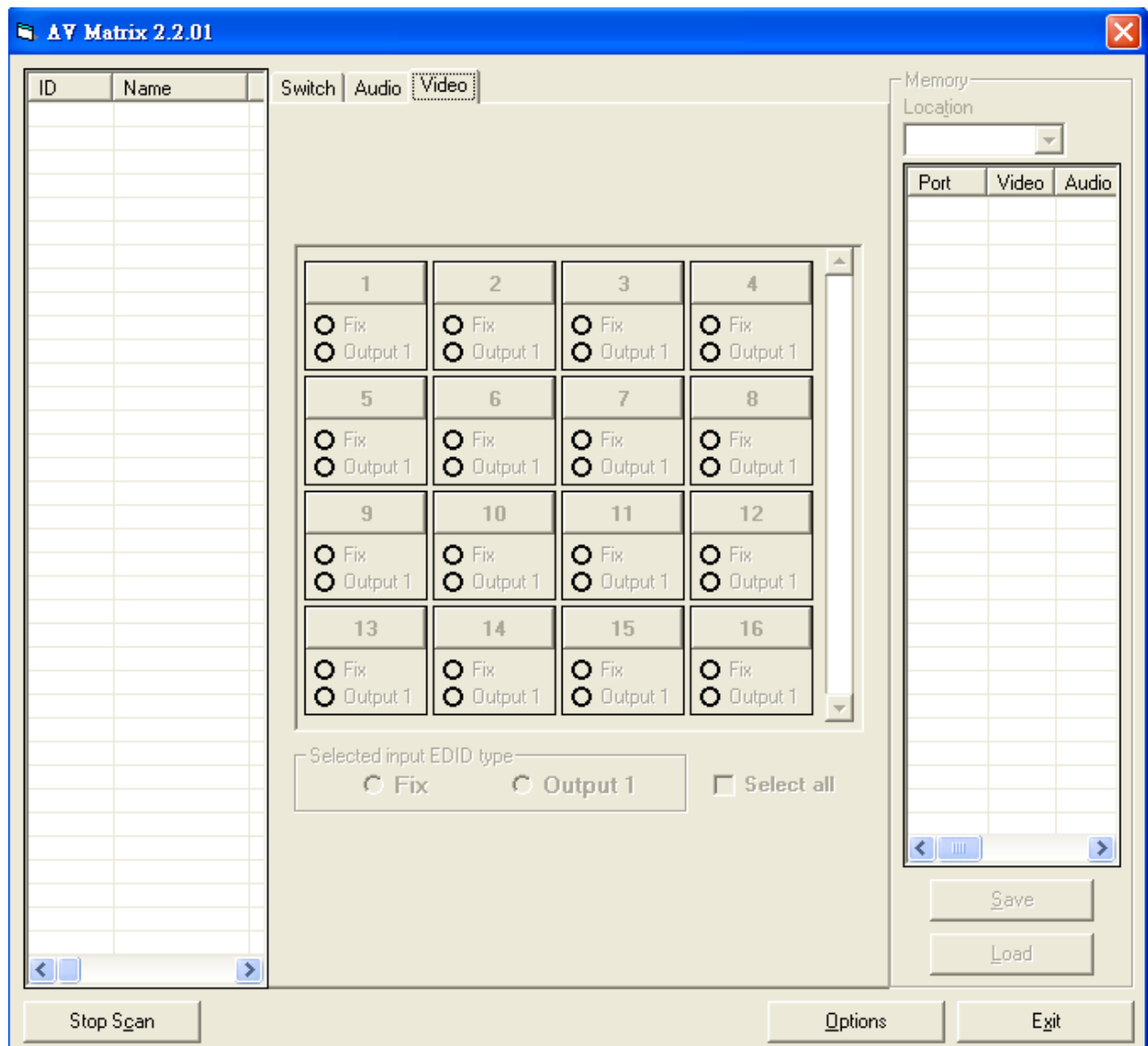
Figure 7-5 Video Configuration Window

7.2.4 RS-232-Memory Function

Function Description: To store and retrieve the settings.

Memory Save Function Description: The function saves all the present input/output switching relations to any Locations from #1 to #8 you desired.

A specific example of the Save Function is described below:
Store all the present input/output switching relations to Location #1. First, select Location #1, as shown below. Then click the **Save** key to save all the present input/output switching relations to Location #1.
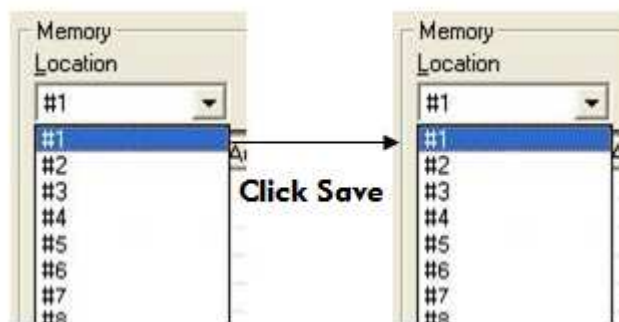
Figure 7-6 Save Function Example

Retrieve Function Description: To retrieve the saved input/output switching relations.

A specific example of the Retrieve Function is described below:
To retrieve the all settings saved in Location #1. First, select Location #1 as shown in the figure below. Then click the **Load** key to retrieve all the settings stored in Location #1.
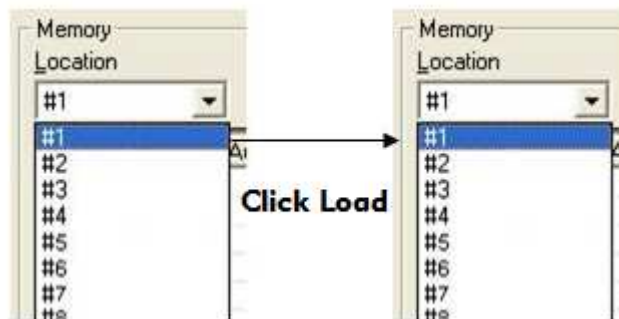
Figure 7-7 Retrieve Function Example

7.2.5 Option Functions

Activation Function:

In the main configuration menu, select **Options** to prop-up the **Options Window** as left shown in Figure 7-11.
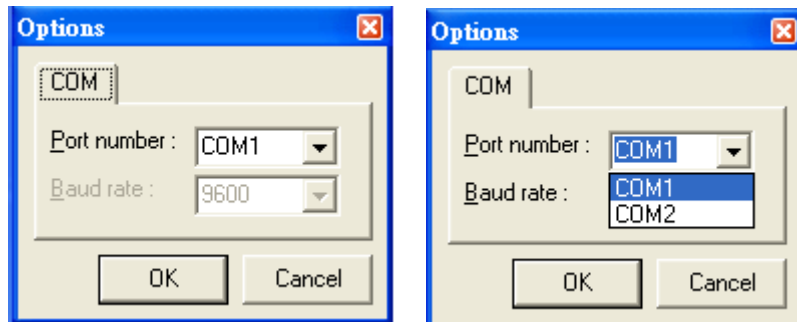
Figure 7-8 Options

7.2.6 Other Application

In the right main window displays the presently saved switching status as shown in Figure 7-12 below:

Figure 7-9 Memory Configuration Status

When input corresponding to Output is enabling, it shows the Output ports correspond to the Input ports; when they are disable it will show red **"None"** in the relative field.

7.2.7 Communication Protocol/Control Command Code

Communication Protocol: Baud rate 9600bps, no odd or even calibration bit address, 8bit transmission address, 1bit stop address. Please refer to the **"Command list.pdf"** in the CD-ROM for more relative **Command Code** information. Also see *Appendix D RS-232 Communication Protocol.*

CHAPTER 8 REMOTE CONFIGURATIONS

8.1 Telnet Commands

You can operate and configure the Switcher via a remote terminal session using Telnet. Follow the steps as below to log into the Switcher by means of a Telnet session:

1. Connect the Switcher to LAN port of your network with RJ-45 cable.

2. Power on both Switcher and control PC.

3. Open a terminal session (command line) on your control PC.

4. At the prompt, key in the Switcher's IP address as below:
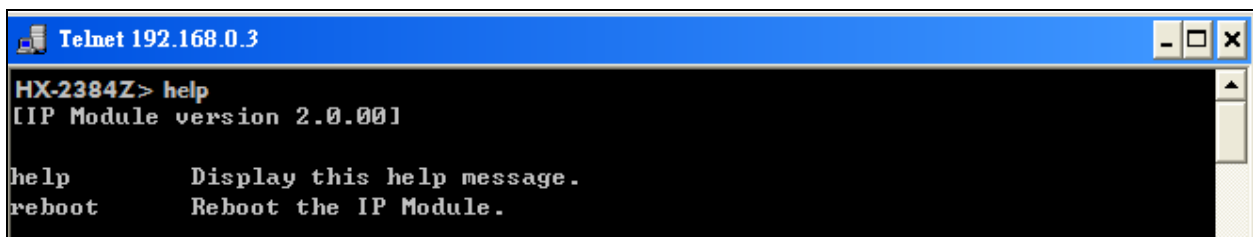
TELNET [IP Address]:**192.168.0.3**

5. Press **Enter**

☞ Please switch the DIP Switcher PIN 7 to UP and PIN 1-5 to DOWN for LAN configuration. The command examples for this chapter are for HX-2384Z reference.

8.1.1 Command List and Reboot

Once the connection with Switcher is established, the Telnet prompt screen will appear, type **help** [Enter] to show the command list.

Figure 8-1 Help Command

- **Display the command list.**
  HX-2384Z> help   [Enter]

- **Reboot the IP Module.**
  HX-2384Z> reboot   [Enter]

8.1.2 IP/Telnet Configuration
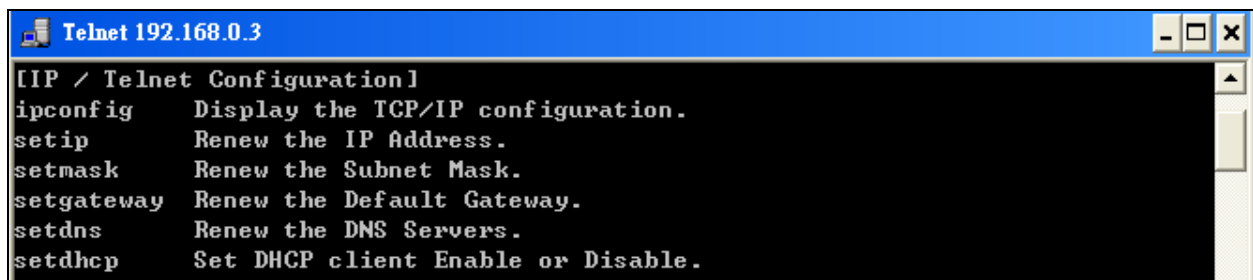
Figure 8-2 IP/Telnet Configuration

- **Display the TCP/IP configuration**
  HX-2384Z> ipconfig   [Enter]
  Current IP: 192.168.0.3
  Current IP Mask: 255.255.255.0
  Current Gateway: 192.168.0.1

- **Renew the IP Address**
  HX-2384Z> setip [ip addr]   [Enter]

  [ip addr]: xxx.xxx.xxx.xxx

  Example:
  Set IP address: 192.168.0.2

      HX-2384Z> setip 192.168.0.2   [Enter]
      HX-2384Z> setip IP address: 192.168.0.2

- **Renew the Subnet Mask**

  HX-2384Z> setmask [netmask]   [Enter]

  [netmask]: xxx.xxx.xxx.xxx

  Example:
  Set subnet mask address: 255.255.255.0

      HX-2384Z> setmask 255.255.255.0   [Enter]
      HX-2384Z> setmask Subnet Mask: 255.255.255.0

- **Renew the Default Gateway**

  HX-2384Z> setgateway [ip addr]   [Enter]

  [ip addr]: xxx.xxx.xxx.xxx

Example:
Set gateway address: 192.168.0.1

    HX-2384Z> setgateway 192.168.0.1   [Enter]
    HX-2384Z> setgateway Gateway: 192.168.0.1

- **Renew the DNS Servers**

    HX-2384Z> setdns [ip addr]   [Enter]

[ip addr]: xxx.xxx.xxx.xxx

Example:
Set DNS IP address: 192.168.0.1

    HX-2384Z> setdns 8.8.8.8   [Enter]
    HX-2384Z> setdns DNS IP:8.8.8.8

- **Set DHCP Enable or Disable**

    HX-2384Z> sethdcp [status]   [Enter]

[status]: 0: Disable 1: Enable
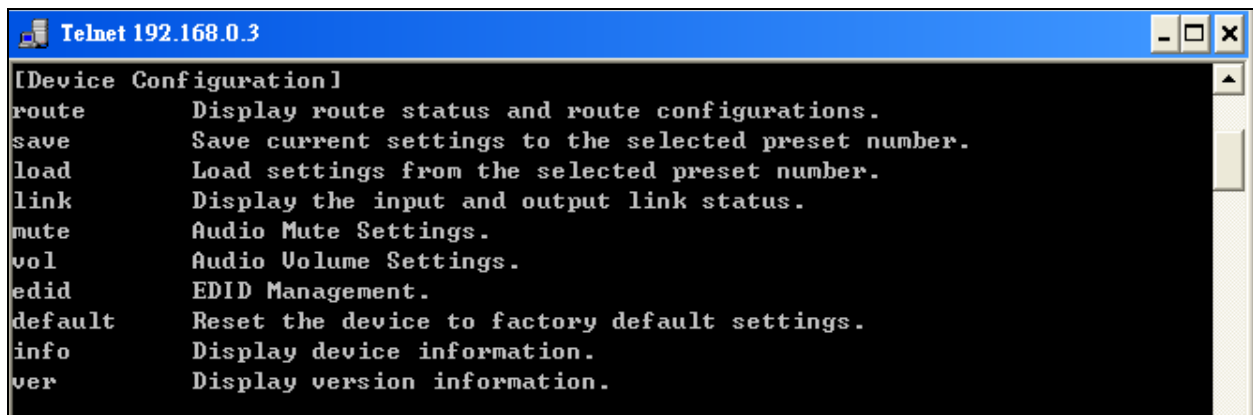
Example:
Set DHCP to disable.

    HX-2384Z> setdhcp 0   [Enter]
    HX-2384Z> setdhcp DHCP Client: Disable

☞ Please reboot to make the new values take effect.

8.1.3 Device Configuration

Figure 8-3 Device Configuration

- **Display current route status**
  HX-2384Z> route   [Enter]
  Output 01: Input = 00
  Output 02: Input = 01
  Output 03: Input = 00
  Output 04: Input = 03
  Output 05: Input = 00
  Output 06: Input = 06
  Output 07: Input = 00
  Output 08: Input = 07

  ☞ The output 2/4/6/8 is not useful that will show you a random value.

- **Route configurations**
  HX-2384Z> route [xx] [yy]   [Enter]

  xx – select output port, 0: select all outputs
  yy – select input port, 0: disconnect

  Example:
  1. Set the output 3 and input 5.

     HX-2384Z> route 3 5   [Enter]
     Output 03: Input = 05

     Display reset route status.

     HX-2384Z> route   [Enter]
     Output 01: Input = 00
     Output 02: Input = 01
     Output 03: Input = 05

2. Set all outputs to accept signals come from input 5.

    HX-2384Z> route 0 5   [Enter] or HX-2384Z>route 5 [Enter]
    Output 01: Input = 05
    Output 02: Input = 01
    Output 03: Input = 05
    Output 04: Input = 03
    Output 05: Input = 05
    Output 06: Input = 06
    Output 07: Input = 05
    Output 08: Input = 07

☞ The output 2/4/6/8 is not useful that will show you a random value.

3. Disconnect the input signal to output 1.

    HX-2384Z> route 1 0   [Enter]
    Output 01: Input = 00

    Display reset route status.
    HX-2384Z> route   [Enter]
    Output 01: Input = 00
    Output 02: Input = 01
    Output 03: Input = 05

HX-2384Z> route [xx][yy0][yy1]…[yyn]   [Enter]

Route outputs sequentially to the specified input.
Route the output to the specified input yy0.
Route the next 1 output to the specified input yy1.
Route the next n output to the specified input yyn, n<=8.

Example:
Set output port sequentially to the corresponding input 3 and 4.

HX-2384Z> route 1 3 4   [Enter]
Output 01: Input = 03
Output 03: Input = 04

- **Display the input and output link status**
HX-2384Z> link   [Enter]
Output 01: Connected
Output 02: Connected
Output 03: Connected
Output 04: Connected
Output 05: Connected
Output 06: Connected
Output 07: Connected
Output 08: Connected
Input 01: Not Connected
Input 02: Not Connected
Input 03: Not Connected

Input 04: Not Connected
Input 05: Not Connected
Input 06: Not Connected
Input 07: Not Connected
Input 08: Not Connected

☞ This command is used for HDMI HPD (hot plug detect), when an HDMI signals is detected, the resulting hot-plug detection instantiates a start-up communication sequence. Output is for remote output (HDBT)

- **Display EDID status**
  HX-2384Z> edid   [Enter]
  Input 01: EDID = 00
  Input 02: EDID = 00
  Input 03: EDID = 00

- **EDID management**
  HX-2384Z> edid <edid>   [Enter]

  <input>: select input port, 0: select all inputs
  <edid>: select edid source, 0: default 1080P, 1 copy port1

  Example:
  HX-2384Z> edid 1   [Enter]
  Input 01: EDID = 00
  Input 02: EDID = 00
  Input 03: EDID = 00

- **Reset the device to factory default settings**
  HX-2384Z> default   [Enter]
  Reset the device to factory default settings.

- **Display device information**
  HX-2384Z> info   [Enter]
  Device Name: HX-2384Z
  Output Total: 8
  Input Total: 8
  Memory Total: 8
  Support Link Status: Output
  Support EDID management

- **Display version information**
  HX-2384Z> ver   [Enter]
  IP Module version 2.0.00
  AV Matrix Protocol <API> version 2.30
  Device Firmware version 1.0.00

8.1.4 AV Matrix Protocol Command
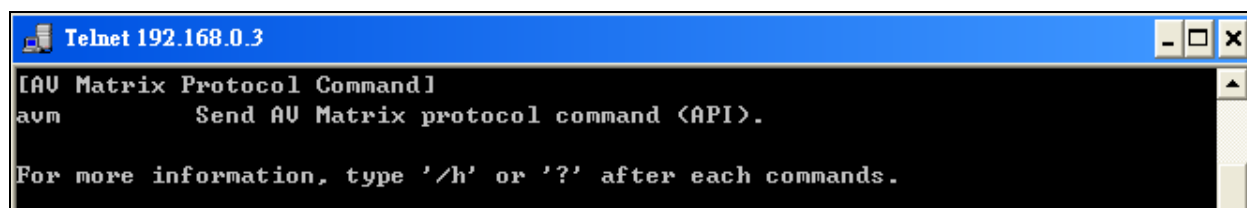
Figure 8-4 AV Matrix Protocol Command

- **Send AV Matrix protocol command <API>**

  HX-2384Z> avm <instruction> <index> <value>   [Enter]

  <instruction>: AVM Protocol Byte 2
  <index>: AVM Protocol Byte 3
  <value>: AVM Protocol Byte 4

- **Send OUTPUT Resolution**

  HX-2384Z> avm 36 [xx][yy]   [Enter]

  xx – select output port
  yy – select resolution

  1. 720x480P 60HZ   2. 800x600 60HZ
  3. 1024x768 60HZ   4. 1280x720P 60HZ
  5. 1280X1024 60HZ   6. 1600X1200 60HZ
  7. 1920X1080P 60HZ   8. 1920X1080P 50HZ

  Example:

  HX-2384Z> avm 36 1 3   [Enter]
  Response: ACK
  HX-2384Z>avm 37 1 0
  Response: 3

- **Send OUTPUT Scale**

  HX-2384Z> avm 38 [xx][yy]   [Enter]

  xx – select output port
  yy – select ratio (length and width), 0: 1:1 aspect radio, 1: Full screen ratio

  Example:

  HX-2384Z> avm 38 1 1   [Enter]
  Response: ACK
  HX-2384Z>avm 39 1 0
  Response: 1

8.2 RS-232 Commands

You can also operate and configure the Switcher via a remote terminal session using RS-232. Follow the steps as below to log into the Switcher by means of a RS-232 session (the example as below is for Hyper Terminal):

1. Connect the Switcher to your control PC with RS-232 cable.

2. Power on both Switcher and control PC.

3. Open the Hyper Terminal by clicking **Start │ Programs │ Accessories Communications │ Hyper Terminal** on your control PC.

4. The **New Connection – Hyper Terminal** screen will appear. Input the connection name and select a representative icon. Then click **OK**.

5. Select the connecting port that you want to use, click **OK**. Default port is **COM1**.

6. Set the Bits per second to **9600**, Data Bits to **8** (Default), Parity to **None** (Default), Stop bits to **1** (Default) and flow control to **None** from the drop-down list, click **OK**.

☞ Please switch the DIP Switcher PIN 1-5, PIN 7 to DOWN (ON) for RS-232 configuration.

8.2.1 Commands List and Status

Once the connection with Switcher is established, type **help** in the Hyper Terminal screen to show the command list.

- **Show the command list**

```
help
------------------------------------------------------------
--              HX-2384Z Systems HELP              --
------------------------------------------------------------
--  HX-2384Z          F/W Version : 1.0.00         --
--                                                 --
-- help    : Help                                  --
-- status  : Show Global System Status             --
--                                                 --
-- HDMI Output Setup Command                       --
--   x = [1-2], y = [1-6]                          --
```
```
-- route x y   : Set Output x to Input y           --
--                                                 --
-- EDID Setup Command                              --
--   x = [0-5], (0: 1080P, 1-2: HDMI, 3-4: HDBT, 5: 720P)  --
-- edid x : HDMI Input Copy EDID from Output x     --
--                                                 --
-- Audio Mute Command                              --
--   x = [1-8], y = [0-1] (0: Unmute, 1: Mute)     --
--       x - Auido Index                           --
--       1: Audio Out 1        2: Audio Out 2      --
--       3: Source 1           4: Source 2         --
--       5: Mic 1 to Audio Out 1  6: Mic 1 to Audio Out 2  --
--       7: Mic 2 to Audio Out 1  8: Mic 2 to Audio Out 2  --
-- mute x y  : Set x to mute On/Off                --
--                                                 --
-- Audio Volume Command                            --
--   x = [1-8], y = [0-30]                         --
-- volume x y  : Set x to volume y                 --
--                                                 --
-- Restore Default Command                         --
-- default : Restore to factory default settings   --
```

Figure 8-5 Command List

- **Show the Status of Your Switcher**

```
HX-2384Z> status
HX-2384Z F/W Version 1.0.00

Output 01 : Input = 00, Not Connected
Output 03 : Input = 00, Not Connected
Output 05 : Input = 00, Not Connected
Output 07 : Input = 00, Not Connected
```

Figure 8-6 Switcher Status

8.2.2 HDMI Command

- **HDMI Output Setup Command**

```
-- HDMI Output Setup Command                              --
--   x = [0-8] (0: ALL), y = [0-8] (0: OFF)               --
-- route x y   : Set Output x to Input y                  --
```

Figure 8-7 HDMI Output Setup Command

Example:

Set output 1 signal comes from input 5.

```
HX-2384Z> route 1 5
Output 01 : Input = 05

HX-2384Z> status
HX-2384Z F/W Version 1.0.00

Output 01 : Input = 05, Not Connected
Output 03 : Input = 00, Not Connected
Output 05 : Input = 00, Not Connected
Output 07 : Input = 00, Not Connected
```

Figure 8-8 HDMI Output Setup Command - Example

8.2.3 EDID Command

- **EDID Setup Command**

```
-- EDID Setup Command                                     --
--   x = [0-1], (0: 1080P, 1: Copy from OUT 1)            --
-- edid x : HDMI Input Copy EDID from Output x            --
```

Figure 8-9 EDID Setup Command

Example:

Set resolution copied from EDID output 2. For EDID value configurations, please refer to *8.1.3 Device Configuration.*

```
HX-2384Z> edid 0
HDMI Input : EDID = 0, Default EDID 1080P
HX-2384Z> edid 1
HDMI Input : EDID = 1, Copy from OUT 1
```

Figure 8-10 EDID Setup Command - Example

8.2.4 HDMI Output Resolution Commands

```
-- HDMI Output Resolution Setup Command        --
--   x = [0-8] (0: ALL), y = [1-8]              --
--   Resolution - 1: 720x480@60Hz   2: 800x600@60Hz    --
--               3: 1024x768@60Hz   4: 720P@60Hz        --
--               5: 1280x1024@60Hz  6: 1600x1200@60Hz   --
--               7: 1080P@60Hz      8: 1080P@50Hz        --
-- res x y      : Set Output x to Resolution y          --
```

Figure 8-11 HDMI Output Resolution Setup Command

Example:

```
HX-2384Z> res 1 7
Output 01 : Resolution = 07
```

Figure 8-12 Resolution Setup Command - Example

8.2.5 Restore Default Command

- **Restore to Factory Default Settings**

```
HX-2384Z> default
Reset the device to factory default settings.

HX-2384Z> status
HX-2384Z F/W Version 1.0.00

Output 01 : Input = 01, Not Connected
Output 03 : Input = 03, Not Connected
Output 05 : Input = 05, Not Connected
Output 07 : Input = 07, Not Connected
```
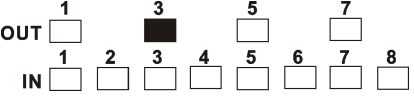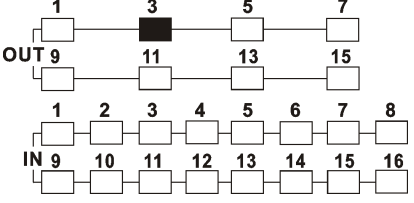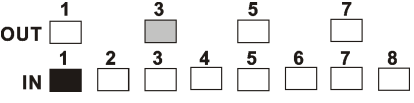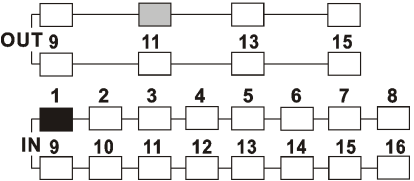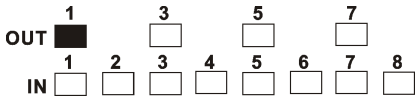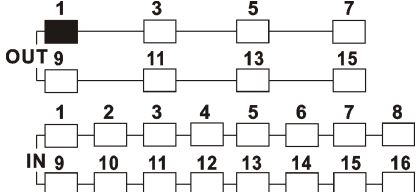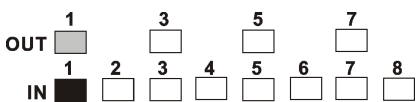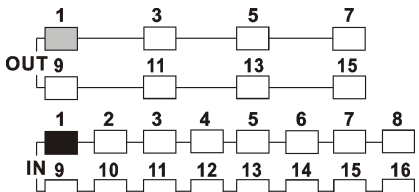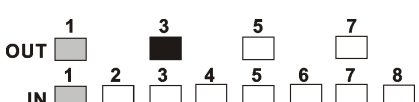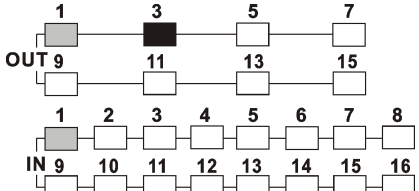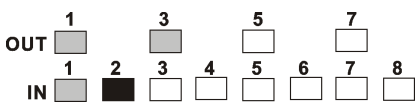
Figure 8-13 Restore Default Command

CHAPTER 9 OPERATION EXAMPLES

Example 1: Switch the NO.1 input signal to the NO.3 output channel.

Key	LCD Display	Operation
	HX-2384Z OUT 1 3 5 7 EDID IN 0 0 0 0 FIX **HX-331608Z** OUT 1 3 5 7 EDID IN 0 0 0 0 OUT1 IN 0 0 0 0 OUT 9 11 13 15	1. Press the NO.3 key of the output channel, then the input channel will begin to flicker.
	HX-2384Z OUT 1 3 5 7 EDID IN 0 1 0 0 FIX **HX-331608Z** OUT 1 3 5 7 EDID IN 0 1 0 0 OUT1 IN 0 0 0 0 OUT 9 11 13 15	2. Press the NO.1 key of the Input channel.

Example 2: Switch the NO.1 and NO.2 input signals to NO.1 and NO.3 output channels.

Key	LCD Display	Operation
OUT 1 3 5 7 / IN 1 2 3 4 5 6 7 8	HX-2384Z OUT 1 3 5 7 EDID IN 0 0 0 0 FIX	1. Press the NO.1 key of the output channel, then the input channel will begin to flicker.
OUT 1 3 5 7 / 9 11 13 15 / IN 1 2 3 4 5 6 7 8 / 9 10 11 12 13 14 15 16	HX-331608Z OUT IN 1 3 5 7 EDID IN 0 0 0 0 OUT1 OUT 0 0 0 0 9 11 13 15	
OUT 1 3 5 7 / IN 1 2 3 4 5 6 7 8	HX-2384Z OUT 1 3 5 7 EDID IN 1 0 0 0 FIX	2. Press the NO.1 key of the Input channel.
OUT 1 3 5 7 / 9 11 13 15 / IN 1 2 3 4 5 6 7 8 / 9 10 11 12 13 14 15 16	HX-331608Z OUT IN 1 3 5 7 EDID IN 1 0 0 0 OUT1 OUT 0 0 0 0 9 11 13 15	
OUT 1 3 5 7 / IN 1 2 3 4 5 6 7 8	HX-2384Z OUT 1 3 5 7 EDID IN 1 0 0 0 FIX	3. Press the NO.2 key of the output channel, then the input channel will begin to flicker.
OUT 1 3 5 7 / 9 11 13 15 / IN 1 2 3 4 5 6 7 8 / 9 10 11 12 13 14 15 16	HX-331608Z OUT IN 1 3 5 7 EDID IN 1 0 0 0 OUT1 OUT 0 0 0 0 9 11 13 15	
OUT 1 3 5 7 / IN 1 2 3 4 5 6 7 8	HX-2384Z OUT 1 3 5 7 EDID IN 1 2 0 0 FIX	4. Press the NO.2 key of the Input channel.

60

Key	LCD Display	Operation
1 3 5 7 OUT 9 11 13 15 1 2 3 4 5 6 7 8 IN 9 10 11 12 13 14 15 16	HX-331608Z OUT 1 3 5 7 EDID IN 1 2 0 0 OUT1 IN 0 0 0 0 OUT 9 11 13 15	

Example 3: "All" settings.

Key	LCD Display	Operation
ALL → OFF	**HX-2384Z** OUT 1 3 5 7 EDID IN 1 2 0 0 FIX OUT 1 3 5 7 EDID IN 0 0 0 0 FIX **HX-331608Z** OUT 1 3 5 7 EDID IN 1 2 0 0 OUT1 IN 0 0 0 0 OUT 9 11 13 15 OUT 1 3 5 7 EDID IN 0 0 0 0 OUT1 IN 0 0 0 0 OUT 9 11 13 15	1. Press the **ALL** key on the front panel, and then press the **OFF** key to cancel all the settings.
ALL 1 3 5 7 OUT 1 2 3 4 5 6 7 8 IN	**HX-2384Z** OUT 1 3 5 7 EDID IN 0 0 0 0 FIX OUT 1 3 5 7 EDID IN 8 8 8 8 FIX	2a. Press **ALL** key then select input 8 that indicate all outputs will switch to selected inputs. **E.g.** Input is 8.
ALL 1 3 5 7 OUT 9 11 13 15 1 2 3 4 5 6 7 8 IN 9 10 11 12 13 14 15 16	**HX-331608Z** OUT 1 3 5 7 EDID IN 0 0 0 0 OUT1 IN 0 0 0 0 OUT 9 11 13 15 OUT 1 3 5 7 EDID IN 16 16 16 16 OUT1 IN 16 16 16 16 OUT 9 11 13 15	2b. Press **ALL** key then select input 16 that indicate all outputs will switch to selected inputs. **E.g.** Input is 16.

Example 4: "STO" and **"RCL"** functions.

Key	LCD Display	Operation
STO ■	HX-2384Z OUT **Store to Memory:** IN **1 2 3 4 5 6 7 8** HX-331608Z OUT IN **Memory Control Menu** IN **Store to Memory:** OUT **1 2 3 4 5 6 7 8**	1. Press the **STO** key on the front panel. The **Store to Memory** begins to flicker about 8 seconds.
OUT 1 3 5 7 / IN 1 2 3 4 5 6 7 8 **OR** OUT 1 3 5 7 / IN 1 2 3 4 5 6 7 8 OUT 1 3 5 7 9 11 13 15 / IN 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 **OR** OUT 1 3 5 7 9 11 13 15 / IN 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	HX-2384Z OUT **Store to Memory:** IN **Save to 1** HX-331608Z OUT IN **Memory Control Menu** IN **Store to Memory:** OUT **Save to 1**	2. Press the IN1 key or OUT1 key to save the setting in the NO.1 memory location.
RCL ■	HX-2384Z OUT **Recall from Memory:** IN **1 2 3 4 5 6 7 8** HX-331608Z OUT IN **Memory Control Menu** IN **Recall from Memory:** OUT **1 2 3 4 5 6 7 8**	3. Press the **RCL** key on the front panel, The **Recall from Memory** begins to flicker about 8 seconds.

Key	LCD Display	Operation
	HX-2384Z OUT **Recall from Memory:** IN **Load from 1** HX-341608Z OUT IN IN **Memory Control Menu** OUT **Recall from Memory:** **Load from 1**	4. Press the IN1 key or OUT1 key to Load the previously saving.

Example 5: "STO" and **"RCL"** combinations – restore to factory default values.

Key	LCD Display	Operation
STO RCL ■ + ■	HX-2384Z OUT **Reset configuration** IN **Press<STO> to reset.** HX-331608Z OUT IN **Reset Configuration** IN **Are you sure to** OUT **Reset all settings?** **Press <STO> to reset.**	1. Press and hold the **STO** and **RCL** keys about 2~3 seconds simultaneously on the front panel to restore all settings to factory default values. Follow the screen information, press **"STO"** key to begin resetting.
	HX-2384Z OUT 1 3 5 7 **EDID** IN 1 3 5 7 **FIX** HX-331608Z OUT IN 1 3 5 7 **EDID** IN 1 3 5 7 **OUT1** OUT 9 11 13 15 9 11 13 15	2. After finish resetting, All of settings will restore to the factory default values.

Example 6: "SETUP" function. Set the NO.1 output to 1280x1024 60HZ resolution.

- IN1: 720x480P 60HZ
- IN2 800x600 60HZ
- IN3: 1024x768 60HZ
- IN4: 1280x720P 60HZ
- IN5: 1280x1024 60HZ
- IN6: 1600x1200 60HZ
- IN7: 1920x108P 60HZ
- IN8: 1920x108P 50HZ

Key	LCD Display	Operation
	HX-2384Z OUT 1 3 5 7 Resolu IN 0 0 0 0 tion	1. Press the NO.1 key of the output channel, then the input channel will begin to flicker.
	HX-331608Z OUT 1 3 5 7 Resolution IN 0 0 0 0 tion IN 0 0 0 0 OUT 9 11 13 15	
	HX-2384Z OUT 1 3 5 7 Resolu IN 5 0 0 0 tion	2. Press the NO.5 key of the Input channel. Final, press RETURN key to finish the setting.
	HX-331608Z OUT 1 3 5 7 Resolution IN 5 0 0 0 tion IN 0 0 0 0 OUT 9 11 13 15	

Example 7: "SETUP" function. Set the NO.1 output to 1:1 aspect ratio.

- IN1: 1:1 aspect ratio
- IN2: Full screen ratio

Key	LCD Display	Operation
SETUP OUT: 1 3 5 7 IN: 1 2 3 4 5 6 7 8	HX-2384Z OUT 1 3 5 7 Full IN X X X X Screen	1. Press the NO.1 key of the output channel, then the input channel will begin to flicker.
SETUP OUT: 1 3 5 7 / 9 11 13 15 IN: 1 2 3 4 5 6 7 8 / 9 10 11 12 13 14 15 16	HX-331608Z OUT 1 3 5 7 Full IN X X X X Screen IN X X X X OUT 9 11 13 15	
SETUP OUT: 1 3 5 7 IN: 1 2 3 4 5 6 7 8	HX-2384Z OUT 1 3 5 7 Full IN O X X X Screen	2. Press the NO.1 key of the Input channel.
SETUP OUT: 1 3 5 7 / 9 11 13 15 IN: 1 2 3 4 5 6 7 8 / 9 10 11 12 13 14 15 16	HX-331608Z OUT 1 3 5 7 Full IN O X X X Screen IN X X X X OUT 9 11 13 15	

Example 8: "EDID" functions.

Key	LCD Display	Operation
EDID	HX-2384Z OUT **1 3 5 7 EDID** IN **0 0 0 0 OUT1** OUT **1 3 5 7 EDID** IN **0 0 0 0 FIX** HX-331608Z OUT IN **1 3 5 7 EDID** IN **1 1 1 1 FIX** OUT **2 2 2 2** **9 11 13 15** OUT IN **1 3 5 7 EDID** IN **1 1 1 1 OUT1** OUT **2 2 2 2** **9 11 13 15**	Press the **EDID** key to switch FIX and OUT1, refer to *EDID*.

Example 9: "INFO" function.

Key	LCD Display	Operation
INFO	HX-2384Z OUT **ID: 0 Master: LAN** IN **IP: 192.168.0.3** **OR** OUT **X X X X OUT** IN **X X X X IN** HX-331608Z OUT IN **HX-331608Z Ver:1.0.00** IN **ID: 0 Master: LAN** OUT **IP: 192.168.0.3** **OR** OUT **X X X X OUT** IN **X X X X IN** IN **X X X X IN** OUT **X X X X OUT**	Press the **INFO** key to show you the device and I/O jack information.

Example 10: "SETUP" and **"INFO"** combinations.

Key	LCD Display	Operation
SETUP INFO ■ + ■	HX-2384Z **OUT** **1:V1.0.00 2:V1.0.00** **IN** **3:V1.0.00 4:V1.0.00** HX-331608Z **OUT** **IN** **1:V1.0.00 2:V1.0.00** **IN** **3:V1.0.00 4:V1.0.00** **5:V1.0.00 6:V1.0.00** **OUT** **7:V1.0.00 8:V1.0.00**	1. Press the **SETUP** and **INFO** keys simultaneously on the front panel. The screen will show you the firmware version of module. (The version value is only for reference.)
	HX-2384Z **OUT** **1:V1.0.00 2:V1.0.00** **IN** **3:V0.0.00 4:V1.0.00** HX-331608Z **OUT** **IN** **1:V1.0.00 2:V1.0.00** **IN** **3:V0.0.00 4:V1.0.00** **5:V1.0.00 6:V1.0.00** **OUT** **7:V1.0.00 8:V1.0.00**	2. If one of modules firmware upgrade is wrong, the screen will show you another version value or **"VX.X.XX"** error information.(Be sure all version values are the same before any configuration.)

CHAPTER 10 TROUBLESHOOTING

1. What to do if LCD is fail in display?

Answer: Check the connection of power cord is not loosening and the power cord is in a good status having no any damage. Check the power source is normally.

2. What to do if the HDMI Matrix front panel keys switching not responsive?

Answer: The HDMI Matrix front panel keys employ scanning testing and require longer response time. Press the keys for 2 seconds and then release. This way, key switching will be responsive in operation.

3. What to do if the serial port (usually refer to the computer serial port) fails to control the HDMI Matrix?

Answer: Check that the communication port set by the control software is correctly connected to the corresponding serial port of the equipment. Also, check if the computer communication port is in good order. Check the ID address and DIP Switcher are configured correctly. Refer to *6.6.7 Device ID Settings* and *6.6.6 DIP Switcher 2 Pins*.

4. What to do if the corresponding audio signal fails to output during HDMI Matrix switching?

Answer:
(1) Check if there is signal on the input end. If there is no input signal, it could be that the input connection cable is broken or the connector gets loosen. You are advised to replace the connection cable.
(2) Check if there is signal on the output end. If there is no output signal, it could be that the cable is broken or the connector gets loosen. You are advised to replace the connection cable.
(3) Check if the output port number is the same as the controlled port number.
(4) Check the connections of input and output ports are correctly.
(5) If none of the above circumstances happen, it could be internal failure of the product itself. You must send for repair by qualified technical engineers.

5. What to do if you sense the power leakage during plugging or unplugging of the input/output ports?

Answer: It could be that the equipment power is not properly grounded. You must properly ground your equipment; otherwise product life can easily be shortened.

6. What to do if the HDMI Matrix panel keys and communication ports are out of order?

Answer: Check if the equipment power input is in good contact and the computer communication ports are in good order. If yes, it could be some internal failure of the product, please send for repair by qualified technical engineer.

7. What to do if operation and function failure occurred?

Answer: Check if the equipment and the Matrix system are in proper connection. If the problem persists, send the product to the maintenance center for repair.

8. How to avoid the equipment failure due to the high temperature?

Answer: Place the equipment in a ventilate location. If it is still not to be improved, please check with the build-in fan whether is damaged. Or contact your agency for helping.

9. What to do if IR function failure occurred?

Answer: Check the remote controller is in a fully battery and the IR connector is not loosening. Check whether the remote controller is aiming at the IR receiver accurately.

APPENDIX A MATRIX SWITCHER REMOTE CONTROLLER

The Matrix Switcher supports a remote control interface allows you to control the channels and video features switch of Matrix Switcher through remote controller.

Figure A-1 Matrix Switcher Remote Controller

- **OSD, SCAN, ▲, ▼, AUDIO, VIDEO** and **+10** keys are useless.
- **ID** key is the same as **"INFO"** function on the front panel.
- **Power** key is the same as **"RETURN"** function on the front panel except for on the main screen status. On the main screen, press **Power** key can disable the LCD light.

APPENDIX B IR MINI-CONTROLLER

The Matrix Switcher supports an IR Mini-Controller to allow you to select input channel through infrared sensor upon an extended connection – Extender (HX-SRW). The signal for IR Mini-Controller is only available to the IR Receiver Cable connected to the IR1 IN or IR2 IN IR receiver of Extender (HX-SRW). If there are over 2 IR Receivers receive the signal, all of them will be switched to the same selected input simultaneously. In order to avoid the event occurs described above, you can configure the positions of your IR Receivers based on different environments. The IR Mini-Controller is optional.
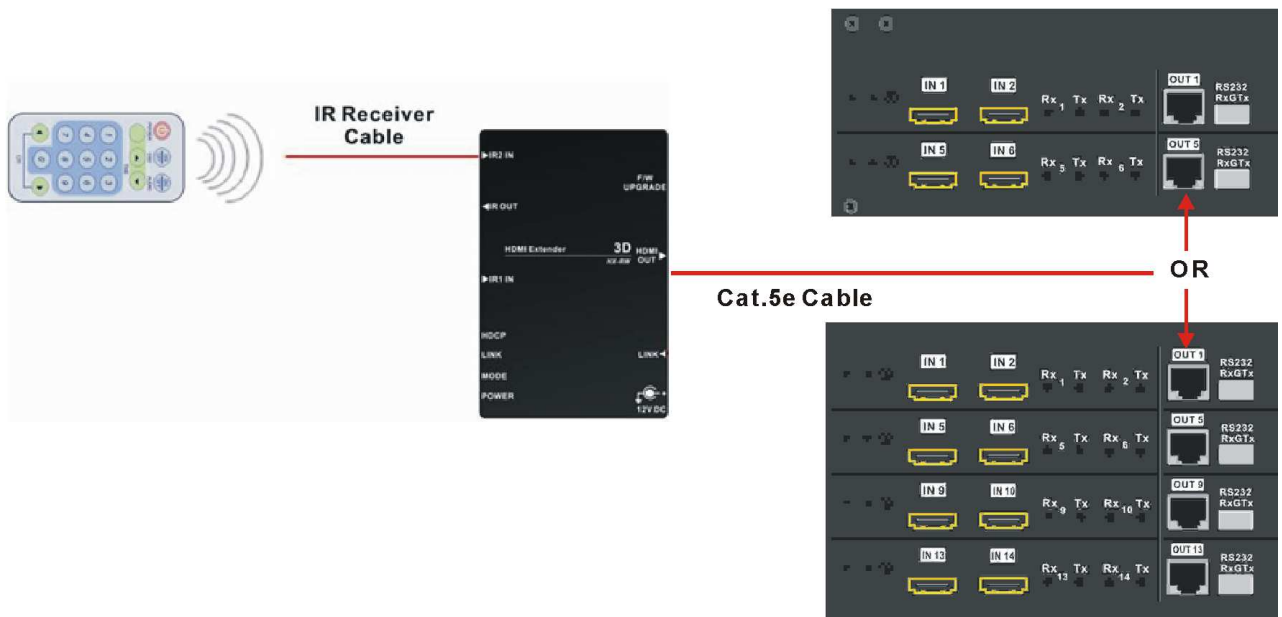
Figure B-1 IR Mini Controller

- **0~9** keys are used for channel selection.
- ◀ and ▶ keys are used to increase or decrease channel . ◀ is specified to decrease channel, alternately, ▶ is specified to increase channel. For example, press ▶ keys to add increased 1 channel to channel16; it will go back to channel 1. Otherwise, if you are in channel 1, you can press ◀ key to go to channel 16.
- Press Power key to switch to **"0" (OFF)**.
- Other keys are useless.
- For channel configurations, e.g. channel 1, you can press **"1"** key and wait about 3 seconds, alternately, you can also press **"01"** keys to switch channel directly.

APPENDIX C FIRMWARE UPGRADE

This Chapter will introduce you how to upgrade firmware on your web browser. For firmware upgrade, you have to upload the firmware file to your web server and then upload it to your device from web server.

Follow the steps as below to upgrade the firmware:

1. Open the **Browser** on your PC, key in the default IP address: **http://192.168.0.3** to login the AV MA TRIX Control configuration. Click **"F/W Upgrade"** to begin firmware upgrade.

Figure C-1 Update Switcher's Firmware

2. Click **"Browser"** to select upgraded .bin firmware, then click **"Upload"** to upload the firmware to web server.
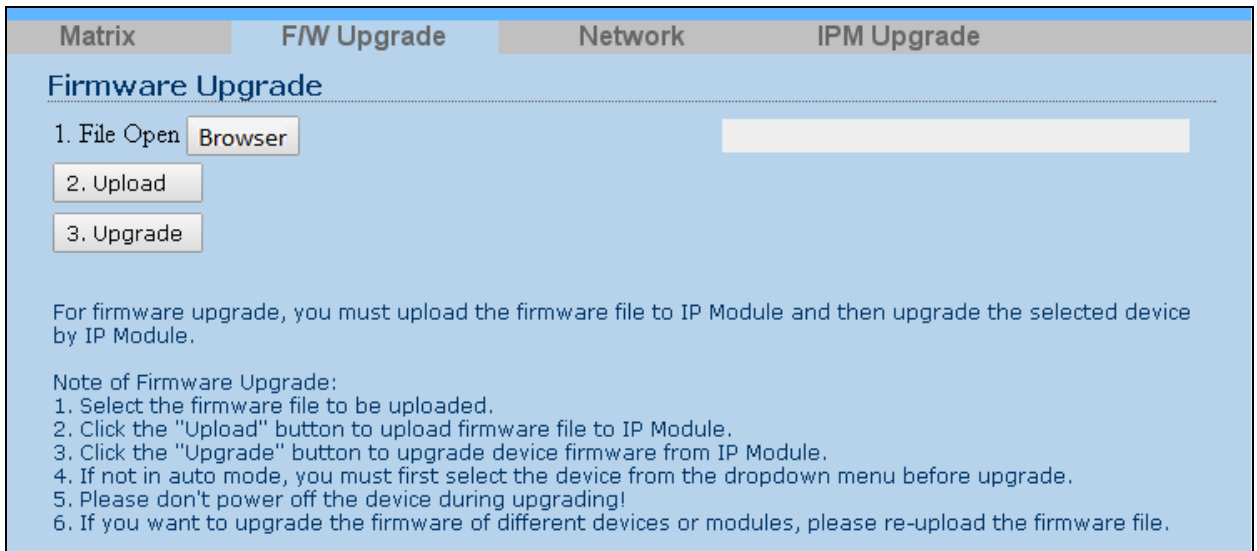
Figure C-2 Update Switcher's Firmware

3. After clicking **"Upgrade",** the upload message screen as below will appear. Click **"OK"** to continue.
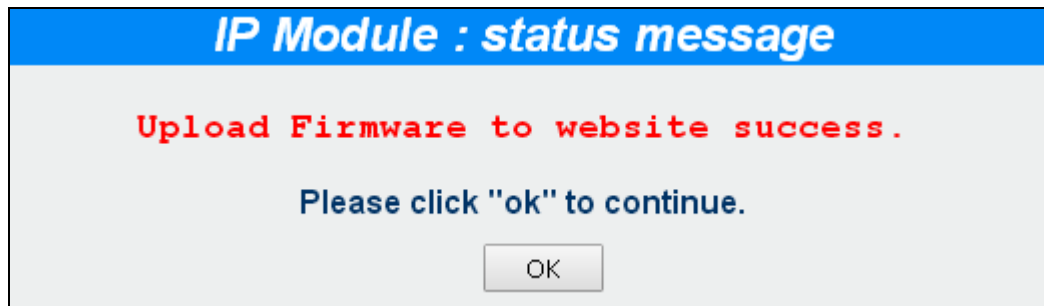
Figure C-3 Upload Status Message

4. Select **"0: General"** form the drop-down list and click **"Upgrade"** to upload the firmware to your device.
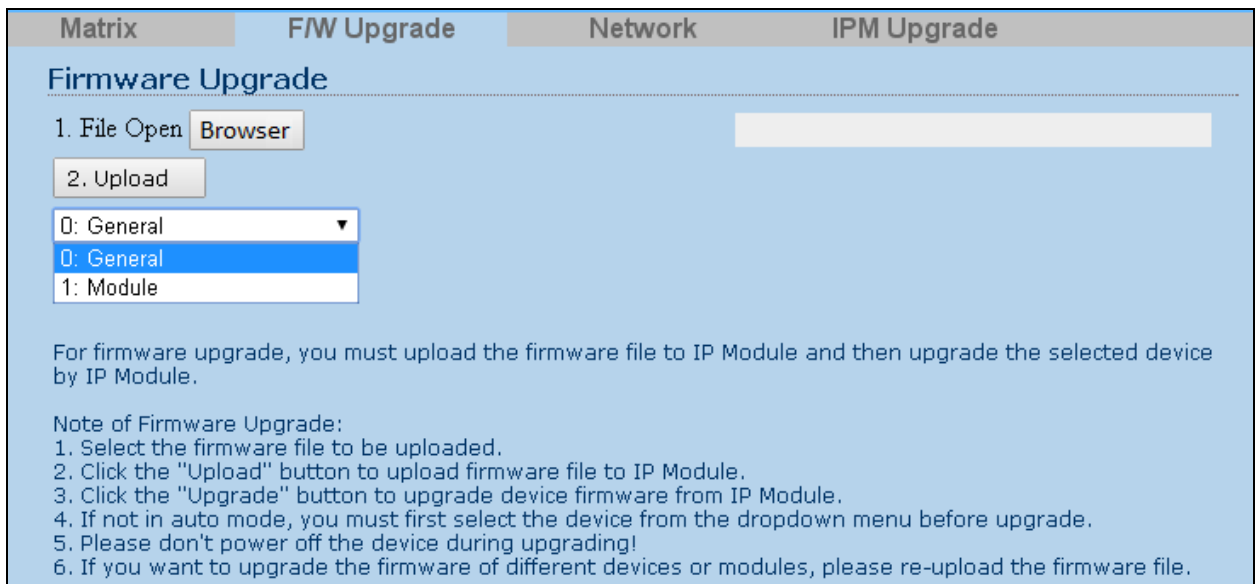
Figure C-4 Update Switcher's Firmware

5. Select **"1: Matrix I/O Module"** will allow you to upgrade I/O modules. You have to decide which device you want to configure, and then select the suitable Device ID and I/O Module from the drop-down menu. Click **"Update"** to upgrade.
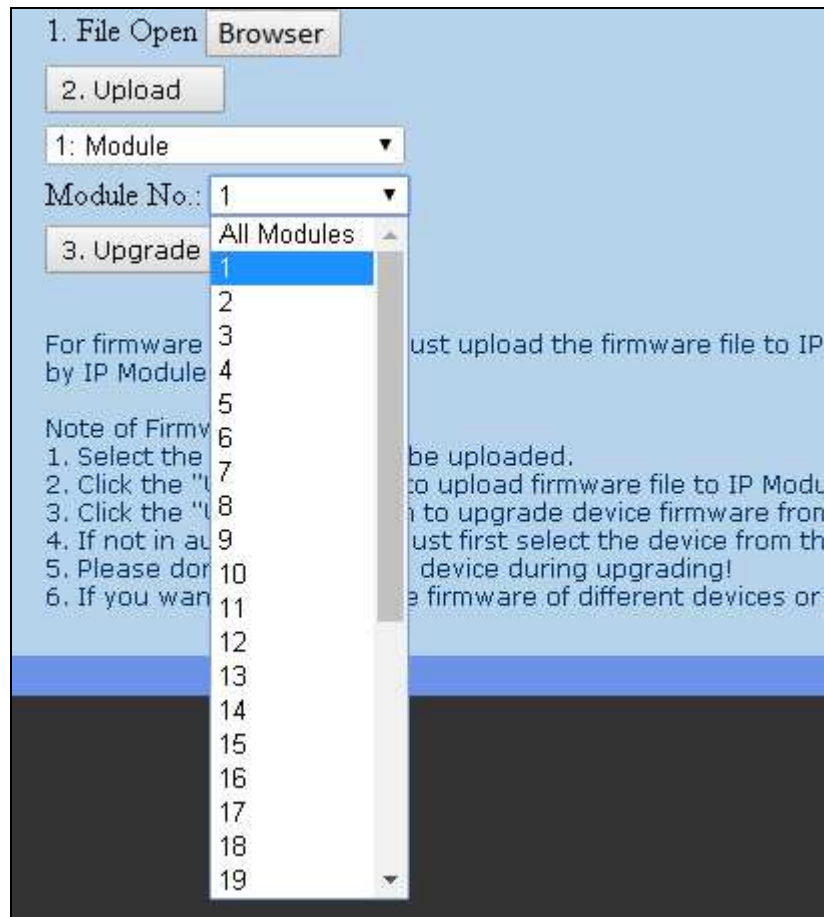
Figure C-5 Update Switcher's Firmware

☞ The Matrix Switcher supports modules for upgrading; you have to upgrade each module individually.

6. After finishing firmware upgrade successfully, **"Firmware Upgrade to Device Success"** information will appear as below.
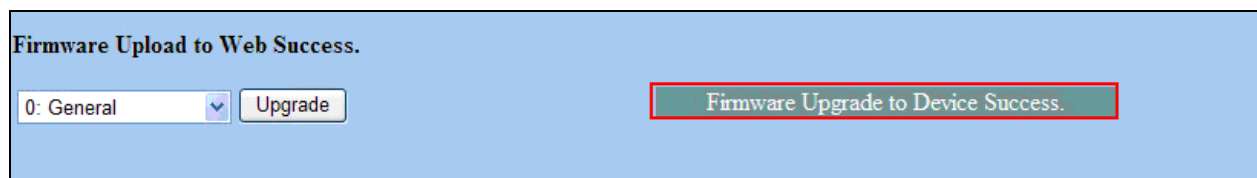
Figure C-6 Update Switcher's Firmware

Besides, the firmware upgrade will not stop even though the web connection is fail suddenly. Please check with the LCD screen to confirm the firmware upgrade has been finished successfully or wait at least 2 minutes then power off to restart your PC.

7. If there is a firmware already exists on the web server during firmware upgrade. The **"Erase Flash"** information window will appear to notice you to remove the existed firmware before upgrading the new one.

Firmware Web Upgrade

Erase Flash

Note of firmware web upgrade:

1. The current method of web upgrade will store the upload firmware file to web flash space.

2. The "Erase Flash" button will appear when the web flash space isn't empty. Please click the button to erase it. Then the "Erase Flash" button will be hidden and the upload form will appear.

3. Select the upload file then click "Upload" button, Please confirm the Firmware length less than 232K.

4. If upload completed, click the "Upgrade" button will reset the device and inform Bootload software to update the current firmware from the uploaded data in web flash space, Please don't power off the device during upgrading!

Figure C-7 Update Switcher's Firmware

APPENDIX D RS-232 COMMUNICATION PROTOCOL

This AV Matrix RS-232 communication protocol uses fixed length with 5 bytes of information as define below. The default baud rate is 9600 bps, no parity, 8 data bit and 1 stop bit. Command timeout is 300 milliseconds, and byte to byte timeout is 30 ms.

Use the RS-232 connecting cable to connect the computer serial port to the RS-232 communication port of the Matrix Switcher. The computer can control the Matrix Switcher via RS-232. Aside from using the front panel keys for operation, you are also permitted to use the RS-232 connection port for remote operation.

D-1 Host Request

A standard command is 5 bytes:

Device + Request + Index + Value + CRC

Byte 1: Device Byte (DB)
Byte 2: Request Byte (RB)
Byte 3: Index Byte (IB)
Byte 4: Value Byte (VB)
Byte 5: CRC Byte (CB)

☞ Host must send CRC code to follow the last byte.

D-1.1 Device Byte

Name	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
DB	BT	0	1	Device ID (0 - 31)				

BT: Broadcast Command Flag.

    0 - Instruction for Device ID only

    1 - Instruction for all devices. (Device ID must be written 0)

☞ Devices will not response, when receiving the broadcast command.

0: Reserve, Always 0.

1: Identifier, Always 1.

Device ID: Device id ranges from 0 to 31. (Please refer to device's user manual)

D-1.2 Request Byte

Request Byte (RB)

Name	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
RB	0	0	Request Type (0 - 63)					

Request Type: Please refer to **"Table - Host Request List"**.

0: Reserve, Always 0.

Table - Host Request List

Request	Description	Index	Value	ACK	Note
0x00	Dummy call	-	-	A	1, 2
**Switch Tools**					
0x01	Switch Video Output Channel	Output	Input	A	2
0x02	Switch Audio Output Channel	Output	Input	A	2
0x03	Store Video Status	Setting	Memory	A	2, 3
0x04	Store Audio Status	Setting	Memory	A	2, 3
0x05	Recall Video Status	Setting	Memory	A	2
0x06	Recall Audio Status	Setting	Memory	A	2
0x07	Request Video Output Channel	Output	Memory	B	
0x08	Request Audio Output Channel	Output	Memory	B	
**Plug Detect (Not Applicable in HX-2384Z/331608Z)**					
0x09	Request Video Input Plug Status	Input	0	B	
0x0A	Request Audio Input Plug Status	Input	0	B	
0x0B	Request Video Output Plug Status	Output	0	B	
0x0C	Request Audio Output Plug Status	Output	0	B	
**Audio Control**					
0x10	Control Audio Output Mute	Output	Enable	A	2
0x11	Request Audio Output Mute Status	Output	Memory	B	
0x12	Control Audio Output Volume	Output	Level	A	2
0x13	Request Audio Output Volume	Output	Memory	B	
0x14	Control Audio Output Bass	Output	Level	A	2
0x15	Request Audio Output Bass	Output	Memory	B	

0x16	Control Audio Output Treble	Output	Level	A	2
0x17	Request Audio Output Treble	Output	Memory	B	
0x18	Control Audio Output Subwoofer	Output	Level	A	2
0x19	Request Audio Output Subwoofer	Output	Memory	B	
0x1C	Control Audio Output Delay Low	Output	Delay1	A	2
0X1D	Request Audio Output Delay Low	Output	Memory	B	
0X1E	Control Audio Output Delay High	Output	Delay2	A	2
0X1F	Request Audio Output Delay High	Output	Memory	B	
EDID Control					
0x20	Select Input EDID Type	0	EDID	A	2
0x21	Request Input EDID Type	1	0	B	
Video Control					
0x24	Set Output Resolution Mode	Output	Res	A	
0x25	Get Output Resolution Mode	Output	0	B	
0x26	Set Output Aspect Ratio	Output	Aspect	A	
0x27	Get Output Aspect Ratio	Output	0	B	
Device Information					
0x30	Request Protocol Version	0	0	C	1
0x31	Request Firmware Version	0	0	C	
0x3F	Request Device Information	0	0	D	1
0x3F	Request Extend Information	1	0	E	

Command Note:

1. All devices support the command.

2. Support broadcast commands.

3. Memory #0 is the current status, it can't be stored. Memory #1 – 8 is allowed to be stored.

4. Use 0x3F to confirm the device connected is properly and supported commands.

D-1.3 Index Byte

Index Byte (IB)

Name	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
IB	Index							

Index: Please refer to **"Table - Host Request List"** and **"Table - Command Index List"**.

Table – Command Index List

Index	Description
Output	The output that will be selected. (Port 1 = 1, Port 2 = 2… Port n = n) 0: All outputs
Input	The input that will be selected. (Port 1 = 1, Port 2 = 2… Port n = n) 0: All inputs
Setting	The setting type that will be selected. 0: All Settings 1: Switch Settings only 2: Video/Audio Settings only
-	Don't care

D-1.4 Value Byte

Value Byte (VB)

Name	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
VB	Value							

Value: Please refer to **"Table - Host Request List"** and **"Table - Command Value List"**.

Table – Command Value List

Value	Description
Input	The input that will be connected. (Port 1 = 1, Port 2 = 2… Port n = n) 0: Disconnect
Memory	Select Memory Location 0 : Current Status (Can't be stored)
Enable	1: Enable Status (example: Mute, Plug) 0: Disable Status (example: Unmute, Unplug)
Level	Level Range (0 – 100) 0x81: Increase a step 0x82: Decrease a step
Delay	Audio delay time is 16-bit data. (Unit: 5 ms or 10 ms) Delay1 - The audio delay time low byte. (Bit0 – Bit7) Delay2 - The audio delay time high byte. (Bit8 – Bit15) The audio delay time unit decided by the DTUF flag of the extend information. The maximum Delay decided by the DTMAX flag of the extended information.
EDID	EDID Type 0: Fixed (Device default EDID) 1: Output 1 (Copy the EDID from the output 1)
-	Don't care

D-1.5 Byte 5 – Check Byte

Check Byte (CB)

Name	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
CB	CRC (cyclic redundancy check)							

CRC: Host must send CRC code to follow the last byte.

Example: 20 01 05 03 93 --- Device ID 0, Switch Video Output 6 to the Input 3.

Byte 1 (DB) is 0x20 – Device: Identifier + Device ID = 0x20 + 0 = 0x20

Byte 2 (RB) is 0x01 – Request: Switch Video Output Channel = 0x01

Byte 3 (IB) is 0x06 – Index: Output 6 = 6

Byte 4 (VB) is 0x03 – Value: Input 3 = 3

Byte 5 (CB) is 0x93 – CRC code from Byte 1 to Byte 4. (CRC4). CRC is 0x93

CRC Calculation

CRC 0 = 0 (initial value)

CRC 1 = Crc8(CRC 0 ^ **Byte 1**) = Crc8(0x20) = 0x23

CRC 2 = Crc8(CRC 1 ^ **Byte 2**) = Crc8(0x23 ^ 0x01) = Crc8(0x22) = 0x9F

CRC 3 = Crc8(CRC 2 ^ **Byte 3**) = Crc8(0x9F ^ 0x06) = Crc8(0x99) = 0x8D

CRC 4 = Crc8(CRC 3 ^ **Byte 4**) = Crc8(0x8D ^ 0x03) = Crc8(0x8E) = 0x93

Use the algebraic representations of the polynomials is the **CRC-8-Dallas/Maxim**

Polynomial: $x^8 + x^5 + x^4 + 1$ (0x31 or 0x8C)

For "^" (XOR)

XOR Truth Table

Input		Output
A	B	
0	0	0
0	1	1
1	0	1
1	1	0

Example:

```
        BYTE  BIT  7  6  5  4  3  2  1  0
A       0x23       0  0  1  0  0  0  1  1
B       0x01       0  0  0  0  0  0  0  1
----------------------------------------------------------------
A ^ B   0x22       0  0  1  0  0  0  1  0
```

A ^ B = 0x23 ^ 0x01 = 0x22

CRC calculation for C Language

```c
command[0] = 0x20;   // Byte 1 : Target
command[1] = 0x01;   // Byte 2 : Instruction
command[2] = 0x06;   // Byte 3 : Index
command[3] = 0x03;   // Byte 4 : Value

crc = 0;   // initial value

for (i = 0; i < length; i++) {           // length = 4, Byte 1 to Byte 4

  crc ^= command[i];

  for (j = 0; j < 8; j++) {
    if (crc & 0x01) {
      crc = ((crc >> 1) ^ 0x8C);
    } else {
      crc = (crc >> 1);
    }
  }
}

command[4] = crc;              // Byte 5 : CRC Value
```

D-2 Device ACK Packet

When the device receives supported commands comes from the host, and then will response with following ACK:

Table – ACK Type List

Ack Type	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	…	Last Byte
Type A	AB							CB
Type B	AB	LB	Index 1	Value 1	Index 2	Value 2	…	CB
Type C	AB	LB	Data 1	Data 2				CB
Type D	AB	LB	INF	OP	IP	Name 1	…	CB
Type E	AB	LB	EXINF	VEINF	AEINF	PLUG	…	CB

D-2.1 ACK Type A

ACK Byte + CRC Byte (Total 2 Bytes)

Name	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
AB	ACC	0	0	Device ID (0 – 31)				
CB	CRC							

ACC: The devices acknowledge status. Accept or Reject.

　　　1: device accepts this request. (ACK; acknowledge)

　　　0: device rejects this request. (NAK; negative acknowledge)

☞ The device sends the Nak packet is always 2 bytes. (NAK + CRC)

0: Reserve, Always 0.

1: Identifier, Always 1.

Device ID: Device id ranges from 0 to 31. (Please refer to device's user manual)

CRC: Device always sends the CRC code to follow the last byte.

D-2.2 ACK Type B

ACK Byte + LB + Index1 + Value1 + Index2 + Value2 +…..+ CRC Byte

Name	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
AB	ACC	0	0	Device ID (0 – 31)				
LB	Length for the total data bytes (Index + Value)							
IB n	Index							
VB n	Value							
…	…							
CB	CRC							

AB & CB: These are the same as the ACK Type A.

LB: LB value is equal to the total data bytes (Index + Value), not include the CRC byte. The maximum LB value of the ACK Type B is twice the total number of output or input.

IB: Often means that the input or output port number. (Port 1 = 1, Port 2 = 2… Port n = n)

VB: Response the status refers to the table.

Request	Description	Index	Value
0x07	Request Video Output Channel	Output	Input
0x08	Request Audio Output Channel		
0x09	Request Video Input Plug Status	Input	Enable 1: Plug 0: Unplug
0x0A	Request Audio Input Plug Status		
0x0B	Request Video Output Plug Status	Output	
0x0C	Request Audio Output Plug Status		
0x11	Request Audio Output Mute Status	Output	0: Unmute, 1: Mute
0x13	Request Audio Output Volume		Level Range (0 – 100)
0x15	Request Audio Output Bass		
0x17	Request Audio Output Treble		
0x19	Request Audio Output Subwoofer		
0x1D	Request Audio Output Delay Low		Delay1
0x1F	Request Audio Output Delay High		Delay2
0x21	Request Input EDID Type	Input	EDID Type

Please refer to **"Table – Command Index List"** and **"Table – Command Value List"**.

D-2.3 ACK Type C

ACK Byte + LB + Data 1 + Data 2 + CRC Byte (Total 5 Bytes)

Name	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
AB	ACC	0	0	Device ID (0 – 31)				
LB	Length for the total data bytes (This byte is always 2)							
DB 1	Data 1							
DB 2	Data 2							
CB	CRC							

AB & CB: These are the same as the ACK Type A.

LB: LB value is always 2 (Data 1 + Data 2). Not include the CRC byte.

DB: Data Bytes as define below.

Request	Description	Data 1		Data 2
0x30	Request Protocol Version	VER1		VER2
0x31	Request Firmware Version	VERA	VERB	VERC

Version Type A:

RS-232 Protocol Version contains the VER1 and VER2 (ex: VER1.VER2)

VER1: Data 1, Bit 7 - Bit 0 (Range 0 - 99)

VER2: Data 2, Bit 7 - Bit 0 (Range 0 - 99)

If the Data 1 is 0x01 and Data 2 is 0x07; VER1 = 1 and VER2 = 7; RS-232 protocol version is v1.07

If the Data 1 = 0x23 and Data 2 = 0x45; VER1 = 0x23 = 35 and VER2 = 0x45 = 69; RS-232 protocol version is v35.69

Version Type B:

Firmware Version contains the VERA, VERB and VERC (ex: VERA.VERB.VERC)

VERA: Data 1, Bit 7 - Bit 4 (Range 0 - 9)

VERB: Data 1, Bit 3 - Bit 0 (Range 0 - 9)

VERC: Data 2, Bit 7 - Bit 0 (Range 0 - 99)

If the Data 1 is 0x10 and Data 2 is 0x07; VERA = 1, VERB = 0 and VERC = 7; Firmware version is v1.0.07

If the Data 1 = 0x23 and Data 2 = 0x45; VERA = 2, VERB = 3 and VERC = 69; Firmware version is v2.3.69

D-2.4 ACK Type D

ACK Byte + LB + INF + OP + IP + Name 1 + Name 2 + Name 3 +.....+ CRC Byte

Name	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
AB	ACC	0	0	Device ID (0 - 31)				
LB	Length for the total data bytes (INFO +.....+ Name n)							
INFO	Audio	Video	Extend	0	Total Memory Location (0 - 15)			
OP	Total Output Port							
IP	Total Input Port							
NB 1	Device Name (ASCII code)							
…	…							
NB n	Device Name (ASCII code)							
CB	CRC							

AB & CB: These are the same as the ACK Type A.

LB: LB value is the total length of the data bytes, not include the AB, LB and CB.

The maximum LB value of the ACK Type D is 19.

INFO: Device information

Bit 7: 1 - Support Audio switch tools request. (Request 0x02, 0x04, 0x06 and 0x08)

0 - Not support Audio switch tools request.

Bit 6: 1 - Support Video switch tools request. (Request 0x01, 0x03, 0x05 and 0x07)

0 - Not support Video switch tools request.

Bit 5: 1 - Extended information exists. (Request 0x3F [0x01])

0 - Extended information does not exist.

Bit 4: Reserve, always 0.

Bit 3~0: Total Memory location ranges from 0 to 15.

☞ Request [Index], if 0x3F [0x01] → Request = 0x3F and Index = 0x01

OP: The total number of output.

IP: The total number of input.

NB: Device Name (ASCII code). (The maximum length is 16)

D-2.5 ACK Type E

ACK Byte + LB + EXTI + VIDI + AUDI + PLUG +.....+ CRC Byte

Name	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
AB	ACC	0	0	Device ID (0 - 31)				
LB	Length for the total data bytes (EXINF +.....+ DTMAX)							
EXINF	LBMAX		0	0	0	0	0	FWVER
VEINF	EDID	0	0	0	0	0	0	0
AEINF	DTUF	DELAY	0	0	SW	TRE	BASS	VOL
PLUG	0	0	0	0	AOPD	VOPD	AIPD	VIPD
DTMAX	Delay Time Maximum (unit: 100 ms)							
CB	CRC							

AB & CB: These are the same as the ACK Type A.

LB: LB value is the total length of the data bytes, not include the AB, LB and CB.

EXINF: Device extended information

    LBMAX - defines the maximum LB value of the variable length command

        0 - The maximum LB is 64 Bytes (default)

        1 - The maximum LB is 128 Bytes

        2 - The maximum LB is 254 Bytes (255 is reserved)

        3 - Reserved

    The LB value of the Ack packet is not limited by LBMAX.

    If the extended information does not exist, the default maximum length is 128.

    FWVER - Firmware version command flag. (Request 0x31)

        1 - Support Firmware version command.

        0 - Not support Firmware version command.

VEINF: Video Extend Information

    EDID - Input EDID type select command flag. (Request 0x20 and 0x21)

        1 - Support Input EDID type select command.

        0 - Not support Input EDID type select command.

AEINF: Audio Extend Information

    VOL - Volume and Mute command flag. (Request from 0x10 to 0x13)

        1 - Support Volume and Mute command.

        0 - Not support Volume command.

    BASS - Bass command flag. (Request 0x14 and 0x15)

        1 - Support Bass command.

        0 - Not support Bass command.

TRE - Treble command flag. (Request 0x16 and 0x17)

    1 - Support Treble command.

    0 - Not support Treble command.

SW - Subwoofer command flag. (Request 0x18 and 0x19)

    1 - Support Subwoofer command.

    0 - Not support Subwoofer command.

DELAY – Audio delay command flag. (Request from 0x1C to 0x1F)

    1 - Support audio delay command.

    0 - Not support audio delay command.

DTUF - defines the audio delay time scale units.

    1 - Audio delay time scale unit is 10ms

    0 - Audio delay time scale unit is 5ms (default)

☞ If the AEINF is not equal to 0, the device support Request 0x04[0x02] and 0x06[0x02].

PLUG: Plug Detect Support Information.

VIPD - Video input plug detection command flag. (Request 0x09)

    1 - Support Video input plug detection.

    0 - Not support Video input plug detection.

AIPD - Audio input plug detection command flag. (Request 0x0A)

    1 - Support Audio input plug detection.

    0 - Not support Audio input plug detection.

VOPD - Video output plug detection command flag. (Request 0x0B)

    1 - Support Video output plug detection.

    0 - Not support Video output plug detection.

AOPD - Audio output plug detection command flag. (Request 0x0C)

    1 - Support Audio output plug detection.

    0 - Not support Audio output plug detection.

Others - Bit 7~4 are reserve, always 0

☞ PLUG is not applicable in HX-2384Z/331608Z.

DTMAX: defines audio maximum delay time. (Unit: 100 ms)

APPENDIX E EXTENDER (HX-SRW)

The extension of HDMI video signal device supports up to 70 meters away by using an Extender and Cat.5e cable.

HDMI Extender is ideal for:

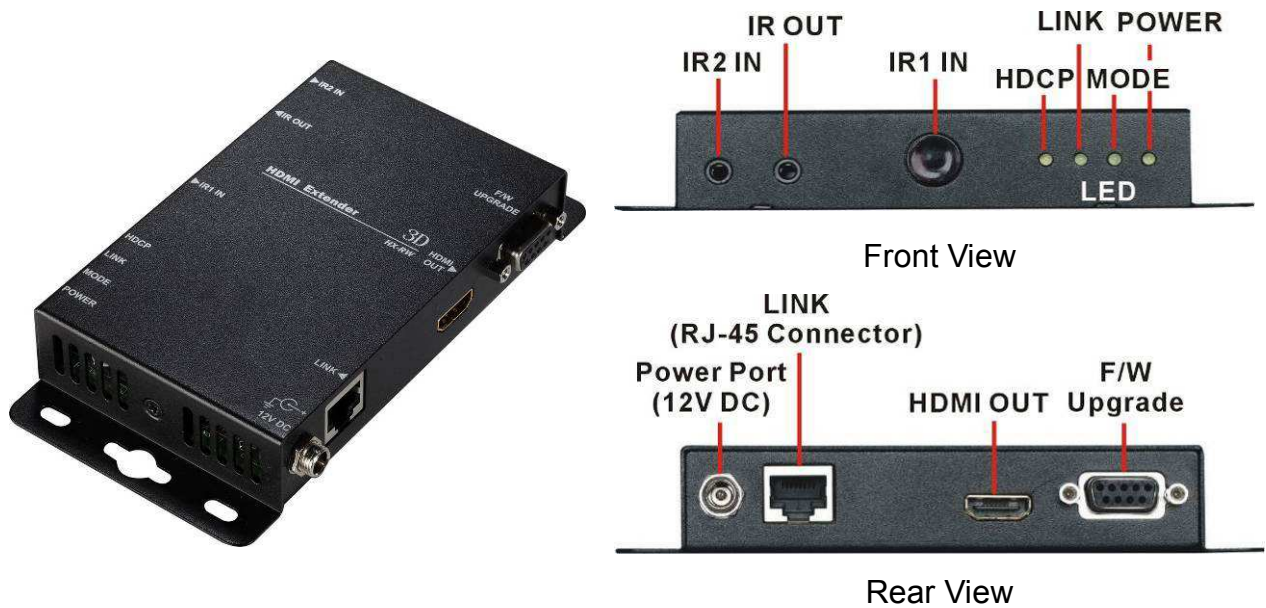▪ Test bench facilities

▪ Data Center

▪ Help desks

Front View

Rear View

Figure E-1 HDMI Extender Panel Views

LED Indicators (Green):

LED	Off	Blink	On
POWER	Power Off	-	Power On
MODE	-	Power Connected	-
LINK	No Link	Low Power Mode	HDBaseT Link
HDCP	No HDMI Signals	No Encryption	HDCP Encryption

E-1 Features

- Through the Extender (HX-SRW), you can use the output of HX-2384Z or HX-331608Z to display identical image and extension of HDMI signal up to 70 meter on HDTV
- HDCP Compliant
- Support 3D pass-through
- Support all frequency band IR pass-through
- One Cat.5e cable extension
- Support resolution up to 4K x 2K
- HDBaseT technology
- Use Cat.5e cable to install easily

E-2 Specifications

Function	HX-SRW
HDMI OUT	HDMI A-Type Female
LINK	RJ-45 Connector
IR OUT	3.5 ϕ Stereo Jack
IR2 IN	3.5 ϕ Stereo Jack
F/W UPGRADE	DB9 Female
Max. Resolution	4K x 2K
Cable Distance	70 m
Power Adapter (Min.)	DC 12V with Lock
Housing	Metal
Weight	308g
Dimensions (LxWxH)	150x80x25 mm

E-3 Installation

1. Turn off the HDTV.
2. Connect the HDMI cable between the HDTV and the **"HDMI OUT"** port of Extender (HX-SRW).
3. Connect the Cat.5e cables between Matrix Output port and the **"LINK"** port of Extender (HX-SRW).
4. Connect the power cord and turn on the extender.
5. Turn on the HDTV.

E-4 IR Receiver Cable Directions

Put IR Receiver Cable into the Extender (HX-SRW) **"IR2 IN"** port and place the IR Receiver Cable, so that you can point to it easily with your IR remote controller.

IR Receiver Cable:

Figure E-2 IR Receiver Cable

E-5 IR Blaster Cable Directions

Plug IR Blaster Cable into Extender (HX-SRW) **"IR OUT"** port located on the front-panel.

IR Blaster Cable:
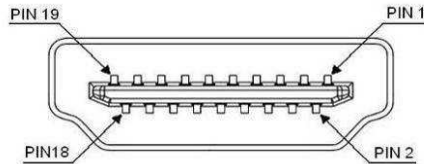

Figure E-3 IR Blaster Cable

E-6 HDMI Output Connector

Figure E-4 HDMI Output Connector

Pin #	Signal	Pin #	Signal
1	TMDS Data 2+	11	TMDS Clock Shield
2	TMDS Data 2 Shield	12	TMDS Clock -
3	TMDS Data 2-	13	CEC
4	TMDS Data 1+	14	Utility (NC on device)
5	TMDS Data 1 Shield	15	DDC SCL
6	TMDS Data 1-	16	DDC SDA
7	TMDS Data 0+	17	DDC/CEC Ground
8	TMDS Data 0 Shield	18	+5 Power
9	TMDS Data 0-	19	Hot Plug Detect
10	TMDS Clock+		

E-7 Wiring Information for Link Connector

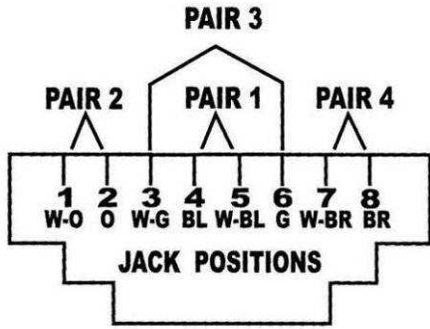**Figure E-5 Wiring Information for Link Connector**

Conductor Identification	RJ-45 Pin Assignment	Color Code for Conductor
Pair 1	5	White-Blue
	4	Blue
Pair 2	1	White-Orange
	2	Orange
Pair 3	3	White-Green
	6	Green
Pair 4	7	White-Brown
	8	Brown

☞ However sometimes, especially in demonstrations or in a lab environment, the cable is rolled randomly in small turns for convenience. The randomly rolled UTP cable suffers additional signal impairments (compared to a straight cable) and therefore the maximal operating reach might be reduced. Rolling a Cat.5e cable around a 70 cm fixed diameter plastic drum has just a minor effect on the FEXT (Far End Cross Talk) when compared to a fully stretched cable. Refer to *6.1.2 Output Cable.*

E-8 Firmware Upgrade

Before upgrading firmware, you have to receive a Firmware burn package containing all software needed for burning. Follow the steps as below to upgrade the Extender (HX-SRW) firmware:

1. Connect the power cord to the power port on the panel of Extender (HX-SRW). The other end of the power cord connected to a suitable power source.

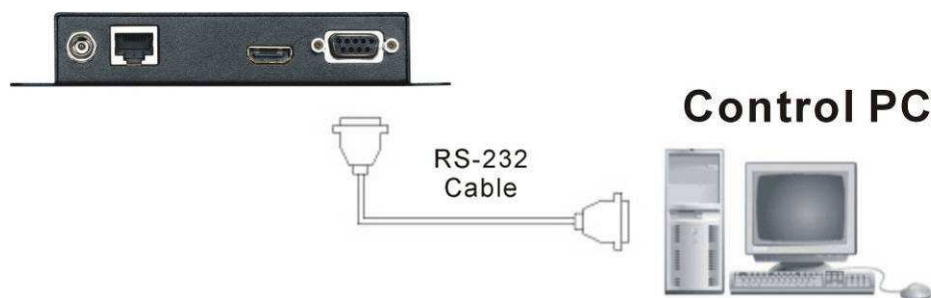2. Connect the control PC and Extender (HX-SRW) with a RS-232 cable.

Figure E-6 Update Extender's Firmware

3. On the control PC, decompress the Firmware burn package file.
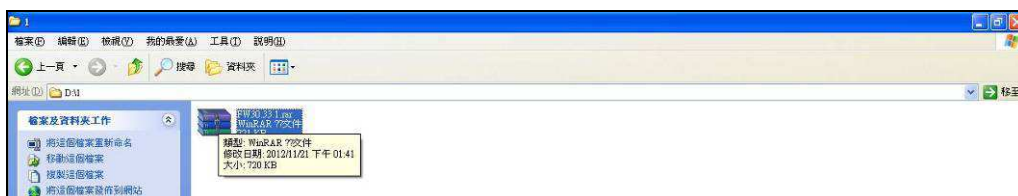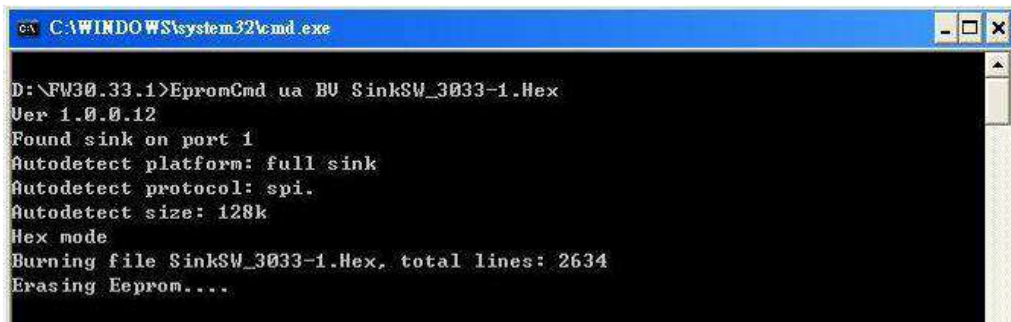
Figure E-7 Update Extender's Firmware

4. Process the UpdateRX_xxxx.bat file to upgrade Extender (HX-SRW) firmware. (xxxx is specified for firmware version)

Figure E-8 Update Extender's Firmware
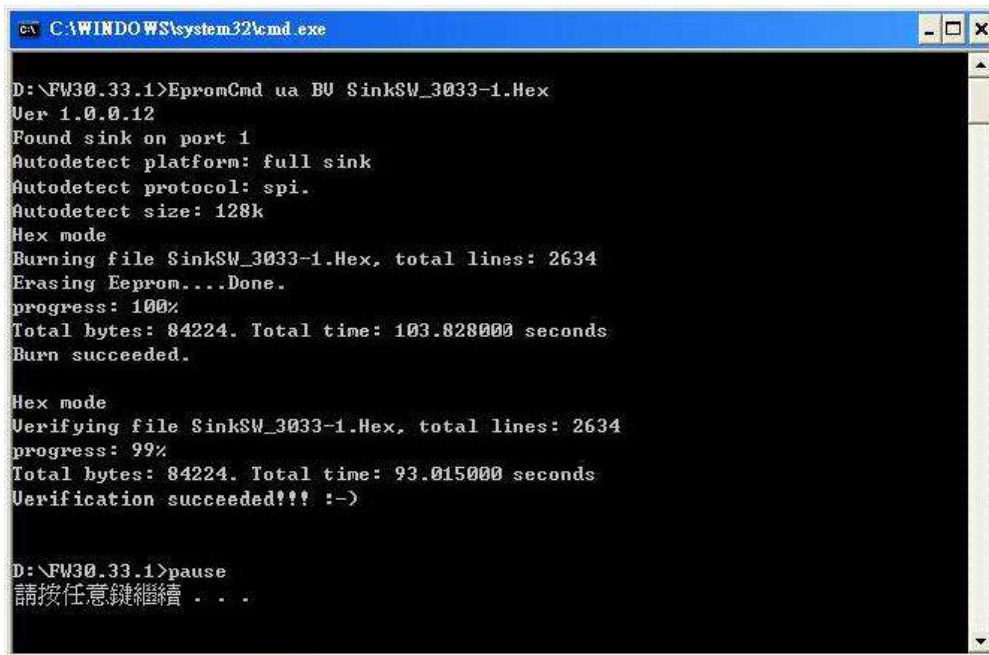
5. The burning windows will pop-up and begin to upgrade.

Figure E-9 Update Extender's Firmware

6. Final, the burning is finish as below.

Figure E-10 Update Extender's Firmware