ZIGEN

COMPLETE HD/IP
CONNECTIVITY SOLUTIONS

HXL-44

4x4 4K Video Matrix with De-Embedded Digital Audio

4K 60 Hz 4:4:4, HDCP 2.2
ZigNet Full Web Interface and System Diagnostics

HXL-44 User Manual
Rev. 05.16.18

Important Safety Instructions

1. Do not use this product near water.

2. Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.

3. Do not install or place this product near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.

4. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.

5. Only use attachments/accessories specified by the manufacturer.

6. To reduce the risk of electric shock and/or damage to this product, never handle or touch this unit or power cord if your hands are wet or damp. Do not expose this product to rain or moisture.

7. Unplug this apparatus during lightning storms or when unused for long periods of time.

8. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

9. Batteries that may be included with this product and/or accessories should never be exposed to open flame or excessive heat. Always dispose of used batteries according to the instructions.

Warranty Information

Powered Product Warranty

Zigen warrants its powered products against any defects in materials and workmanship for a period of three years from the date of invoice. Touchscreen displays carry a one year parts and labor warranty. If a malfunction occurs during the warranty period, Zigen will repair or replace a product to its original operating condition. A return authorization number must be obtained from Zigen before products are returned for service.

Non-Powered and Cable Products - Lifetime Limited Performance Warranty

Zigen warrants that its non-powered products and cable products will be free from defects in material and workmanship for as long as you or your customer owns the product. All Zigen non-powered products and cables are designed and engineered to meet and exceed performance specifications. If, at anytime, the product fails due to manufacturer defect, Zigen will repair or replace the product to ensure that it meets original performance specifications. Reduced performance due to normal wear and tear, or damages caused by misuse or negligence will not be covered. Zigen will test and evaluate all non-powered and cable products claimed defective. Products must be shipped to Zigen, prepaid along with proof of purchase only after obtaining a Return Merchandise Authorization (RMA) number from Zigen. This statement of policy is in lieu of any other policy expressed or implied and no representative or person is authorized to assume any other liability or adopt any other policy for Zigen without our written consent.

Return Policy

If you would like to return a Zigen product, it can be done within 30 days of purchase for a full refund, less shipping and handling. Zigen will not be responsible for shipping and handling of product returns. Returns will only be accepted of products with proof of purchase, products in the original packaging with zero to minimal use and a Return Merchandise Authorization RMA number provided by Zigen.

Licensing

This product uses software that is subject to open source licenses, lwIP is licensed under the BSD license:

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Contacting Zigen

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Email

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www.zigencorp.com

Mailing Address

Zigen Corp.
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6934 Canby Avenue
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Reseda CA 91335
USA

Features

- 4 SPDIF ports provide de-embedded HDMI audio output
- Supports 4Kx2K@60Hz 4:4:4
- Supports HDMI 2.0, HDCP 2.2 compatible, and is backward compatible to the earlier versions
- Transmits 4Kx2K@60Hz 4:4:4 signal up to 16.4 feet (5m) via HDMI port
- Provides powerful EDID management tools, built-in EDID may be modified through ZigNet
- Controllable via front panel button, IR, RS232, TCP/IP or ZigNet
- LCD screen shows real-time I/O connection status
- Convenient firmware upgrade through Ethernet port
- Easy installation with rack-mounting design

Packing List

The HXL-44, packaged with the following items:

- 1 x HXL-44
- 2 x Mounting ears
- 6 x Screws
- 4 x Plastic cushions
- 1 x RS-232 cable
- 1 x IR remote
- 1 x Power adaptor (24VDC 1.25A)
- 1 x User manual

If any of these products are not present upon first opening of the package, please contact Zigen or your reseller.

This product uses UL-Listed power supplies

Table of Contents

Front Panel

1 POWER
Illuminates red when power is on, turns green in standby mode, and blinks red when upgrading.

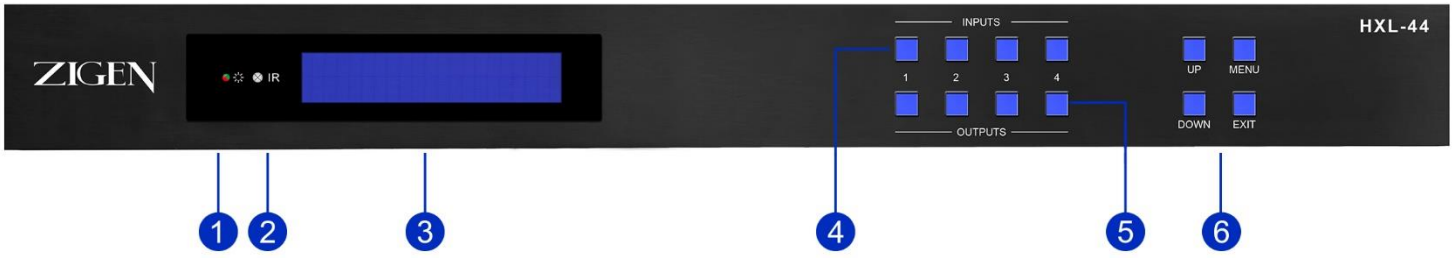
2 IR SENSOR
Built-in IR sensor, receives IR signals sent from IR remote.

3 LCD SCREEN
Displays real-time operation status.

4 INPUT SELECTOR
Total 4 input selector buttons, select one of the buttons to switch input source.

5 OUTPUT SELECTOR
Total 4 output selector buttons, select one of the buttons to select output channel.

6 MENU / NAVIGATION SELECTOR
Used to navigate the front panel menu and submenus.



Back Panel

1 INPUTS
HDMI input ports, 4 in total, connect with HDMI sources.

2 OUTPUTS
HDMI output ports, 4 in total, connect to HDMI zones.

3 SPDIF
Audio output ports for de-embedded HDMI audio, 4 in total.

4 RS-232
Serial control port, connect with control device.

5 IR IN
Connects to 3rd party control system to control the Matrix Switcher.

6 TCP/IP
Connect control PC for TCP/IP or 3rd party control.

7 DC 24V
Connect with 24VDC 1.25A power adaptor.

8 GROUND
Connect to earth ground.

Using the Front Panel

Cross-point Switching

Input/ Output 1-4 Buttons: Select an Input (top row of buttons) to route to desired Outputs (bottom row of buttons), a pair of Input and Output buttons will blink once a valid route has been made.

Menu

Switch Info: Displays the video connection matrix

EDID Management:

- **View Output EDID**: Displays EDID name of selected output. Selected output can be changed by pressing MENU button again.
- **View Input EDID**: Displays EDID name of selected input. Selected input can be changed by pressing MENU button again.
- **Set Input EDID**: Choose the desired EDID of the selected input by using the UP/DOWN buttons. Selected Input can be changed by pressing the MENU button again

Network:

- **View IP Address**: Displays the IP address
- **Set DHCP Options**: Select between DHCP and Static by using the UP/DOWN buttons.
- **Set Static IP**: Use UP/DOWN buttons to increase and decrease the IP address. Use the MENU button to cycle through the address fields.

Using the IR Remote

Inputs
Input channel selection buttons, same with the corresponding front panel buttons

Outputs
Output channel selection buttons, same with the corresponding front panel buttons

Menu

ALL:
Select all inputs/outputs.
To connect an input to all outputs:
Example: Input 1 to all Outputs:
→ Press INPUTS 1 + ALL + ENTER

EDID:
1) One input port learns the EDID data from one output port.
Example: Input 2 learns EDID data from output 4:
→ Press EDID + INPUTS 2 + OUTPUTS 4+ ENTER

2) All input ports learn EDID data from one output port.
Example: All input ports learn EDID data from output 3:
→ Press EDID + ALL + OUTPUTS 3 + ENTER

CLEAR: Clears the screen.

ENTER: Confirm operation.

Installation

Video

1. Use an HDMI cable to connect sources to the inputs on the back panel of the unit. The Zigen locking HDMI cable is recommended for a sturdy connection.

2. Use an HDMI cable to connect up to four displays to the outputs on the back panel of the unit. The Zigen locking HDMI cable is recommended for a sturdy connection.

The HDMI cable can then be connected in any of the following ways:

- Connect the HDMI cable to a display.
- Connect the HDMI cable to another Zigen switch or splitter, for cascading purposes.

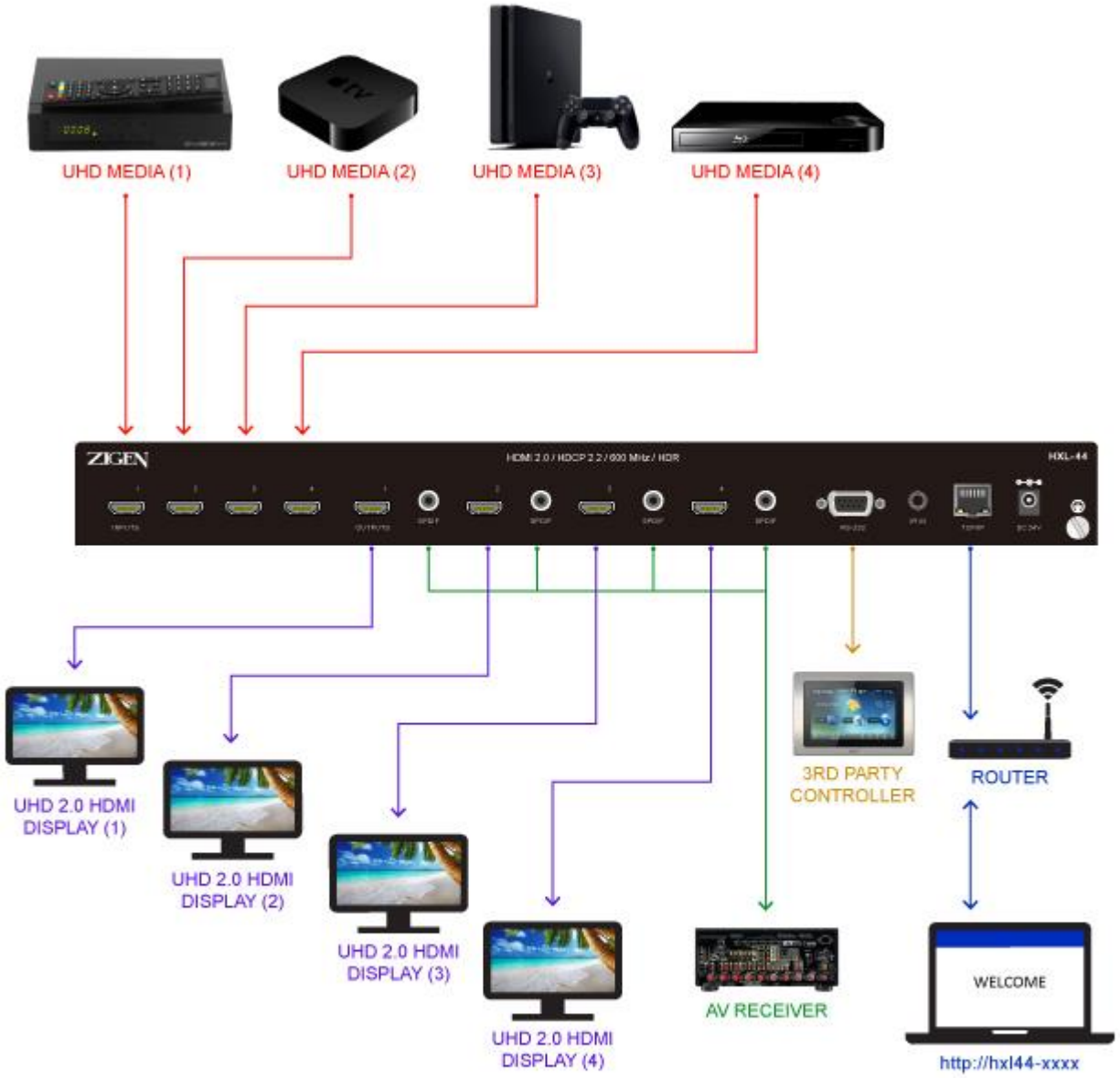
Power

3. Connect the included 24-VDC power supply to the 24-VDC power receptacle on the rear panel of the switch.

4. Connect the power supply to an electrical outlet.

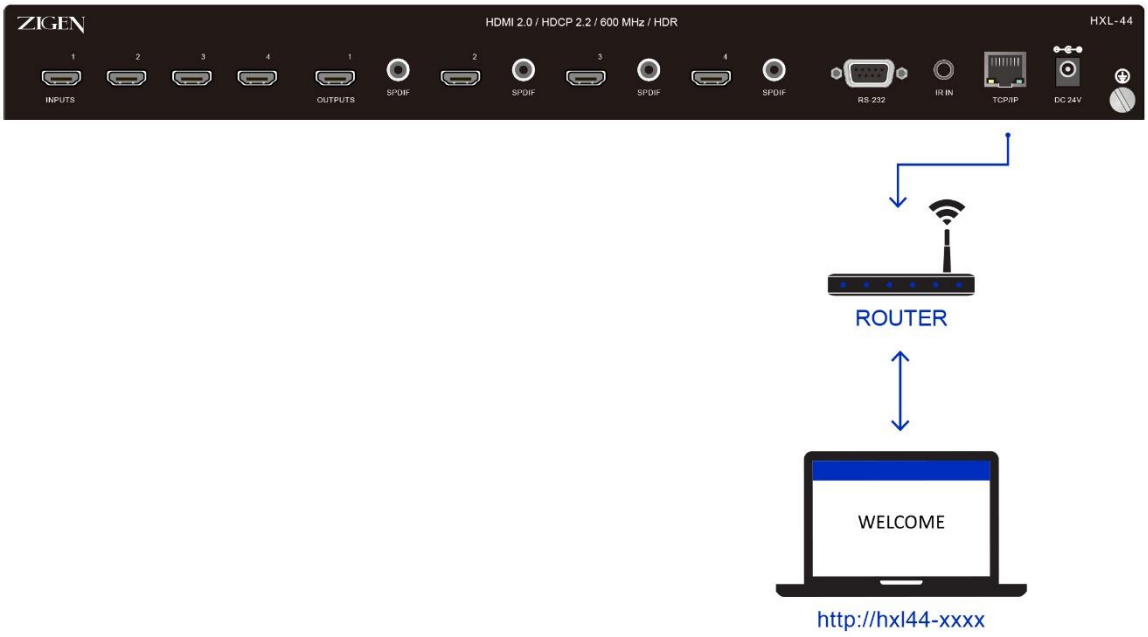
Important: Cable quality is critical when handling 18 GBPS HDMI signals. Zigen HDMI cables are designed and tested to work at 18 GBPS and reliably transport the full 18 GBPS throughput of HDMI 2.0.

Application Diagram (sample)

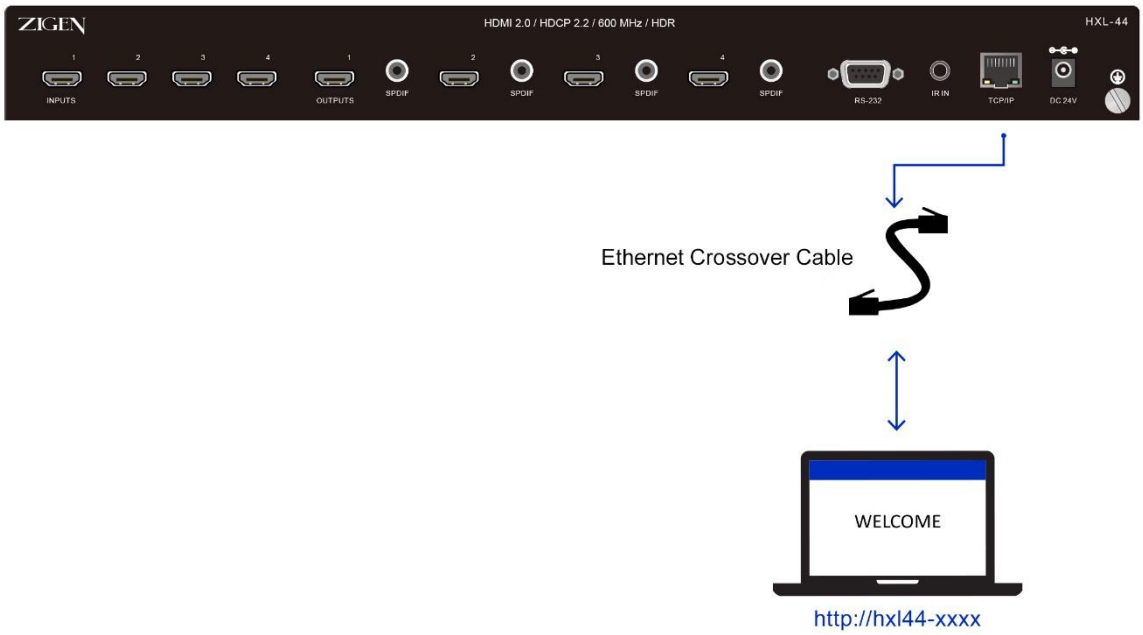


Connecting to ZigNet

Network Setup Option 1:
Connect the unit and a computer into a router or switch.



Network Setup Option 2:
Connect a computer directly into the unit by using an Ethernet crossover cable



IP Address Retrieval

Option A:

1. Open the browser of your choice.
2. Type in the hostname in the address bar if using Windows or hostname.local if using a Mac or Linux

Requirements:

Must have netbios support on Windows, Bonjour on Mac, or mDNS searcher like Avahi on Linux.

Option B:

1. Press the menu button.
2. Navigate to the “Network” submenu using the up/down buttons.
3. Press menu while “Network” is selected.
4. Press menu while “View IP address” is selected.
5. The IP address should be shown.

**Note: If the IP address field is blank, the HXL44 is trying to resolve an IP address.

RS-232 Configuration

Configuring an RS-232 Connection

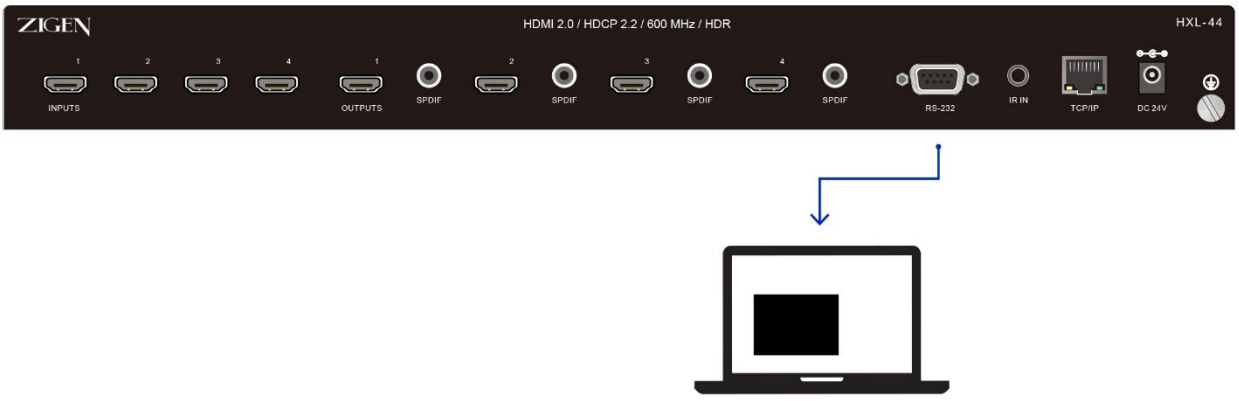
1. Connect the RS-232 port on the back of the HXL-44 to a computer using an RS-232 cable.

2. Open a hyper-terminal app of your choice (Putty recommended) on a computer.

3. Enter default settings shown below:

    Baud Rate: 9600
    Data Bits: 8
    Stop Bits: 1
    Parity: None
    Flow Control: None

4. Your unit should now be connected.



Telnet IP Configuration

Configuring a Telnet IP Connection

1. Connect the HXL-44 to the network or with a crossover cable.

2. Open a Telnet client application of your choice (Putty recommended) on a computer.

3. Enter the IP address or host name of your HXL-44 and set the port to 23.

4. Once connected you will receive a welcome message.

RS-232 / IP Communication Protocol

The HXL-44 RS-232 communication protocol uses a fixed length with 5 bytes of data as defined below. The default baud rate is 9600 bps, no parity bit, 8 data bits, and 1 stop bit. The IP communication uses Telnet default. Use IP address or hostname with port 23 to connect to device. The commands and responses are the same for RS-232 and IP.

Host Request

A standard command is composed of the following 5 bytes:

Device + Command + 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)
*Note: Host must send CRC code following the last byte.

Device Byte (DB)

Name	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
DB	0	0	1	0	0	0	0	0

Device ID: Device ID should be set to 0x20.

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 (000000-111111)					

Request Type: Please refer to “Table – Host Request List”.

Table – Host Request List

Request	Description	Index	Value	ACK
Switch Tools				
0x01	Switch Video Output Channel	Output	Input	A
0x03	Store Video Preset	0	Preset Slot	A
0x05	Recall Video Preset	0	Preset Slot	A
0x07	Request Video Output Channel	Output	0	B
Plug Detect				
0x09	Request Input Plug Status	Input	0	B
0x0B	Request Output Plug Status	Output	0	B
EDID				
0x20	Select Input EDID Type	0	EDID	A

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. (1-4)
Input	The input that will be selected. (1-4)

Value Byte (VB)

Name	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
IB	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. (1 – 4)
Preset Slot	Select the preset slot (1 through 4).
EDID	Select Output EDID or custom EDID file to set to all inputs. Use 1-4 for output EDID 1-4 and 5 for custom EDID file.

CRC Byte (CB)

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

CRC: Host must send CRC code following last byte.

Table- CRC Table

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	00	5E	BC	E2	61	3F	DD	83	C2	9C	7E	20	A3	FD	1F	41
10	9D	C3	21	7F	FC	A2	40	1E	5F	01	E3	BD	3E	60	82	DC
20	23	7D	9F	C1	42	1C	FE	A0	E1	BF	5D	03	80	DE	3C	62
30	BE	E0	02	5C	DF	81	63	3D	7C	22	C0	9E	1D	43	A1	FF
40	46	18	FA	A4	27	79	9B	C5	84	DA	38	66	E5	BB	59	07
50	DB	85	67	39	BA	E4	06	58	19	47	A5	FB	78	26	C4	9A
60	65	3B	D9	87	04	5A	B8	E6	A7	F9	1B	45	C6	98	7A	24
70	F8	A6	44	1A	99	C7	25	7B	3A	64	86	D8	5B	05	E7	B9
80	8C	D2	30	6E	ED	B3	51	0F	4E	10	F2	AC	2F	71	93	CD
90	11	4F	AD	F3	70	2E	CC	92	D3	8D	6F	31	B2	EC	0E	50
A0	AF	F1	13	4D	CE	90	72	2C	6D	33	D1	8F	0C	52	B0	EE
B0	32	6C	8E	D0	53	0D	EF	B1	F0	AE	4C	12	91	CF	2D	73
C0	CA	94	76	28	AB	F5	17	49	08	56	B4	EA	69	37	D5	8B
D0	57	09	EB	B5	36	68	8A	D4	95	CB	29	77	F4	AA	48	16
E9	E9	B7	55	0B	88	D6	34	6A	2B	75	97	C9	4A	14	F6	A8
F0	74	2A	C8	96	15	4B	A9	F7	B6	E8	0A	54	D7	89	6B	35

Example: Switch output 6 to input 3.

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

Byte 2 (RB) is 0x01: Switch Video Output Channel = 0x01
Byte 3 (IB) is 0x06: Output 6 = 0x06
Byte 4 (VB) is 0x03: Input 3 = 0x03
Byte 5 (CB) is 0x93: CRC code from Byte 1 to Byte 4.

CRC Calculation

CRC 0 = 0 (initial value)
CRC 1 = CRC_TABLE[CRC 0 ^ Byte 1] = CRC_TABLE[0x00 ^ 0x20] = 0x23
CRC 2 = CRC_TABLE[CRC 1 ^ Byte 2] = CRC_TABLE[0x23 ^ 0x01] = 0x0F
CRC 3 = CRC_TABLE[CRC 2 ^ Byte 3] = CRC_TABLE[0x9F ^ 0x06] = 0x8D
CRC 4 = CRC_TABLE[CRC 3 ^ Byte 4] = CRC_TABLE[0x8D ^ 0x03] = 0x93

Device ACK Packet

When the device receives supported commands from the host, it will respond with the following ACK types. Table – ACK Type List

ACK Type	Byte 1	Byte 2	Byte 3	Byte 4	Last Byte
A	AB				CB
B	AB	LB	Index 1	Value 1	CB

ACK Type A (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 (0x20)				
CB	CRC							

ACC: The devices acknowledge status. Accept or Reject.

1: Command is accepted (ACK).

2: Command is rejected (NAK).

Device ID: The HXL-44's ID is 0x20.

CB: Device always sends the CRC byte following the last byte.

ACK Type B (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 (0x20)				
LB	Length for the total data bytes (Index+Value)							
IB	Index							
VB	Value							
CB	CRC							

ACC: The devices acknowledge status. Accept or Reject.

1: Command is accepted (ACK).

2: Command is rejected (NAK).

Device ID: The HXL-44's ID is 0x20.

LB: LB value is equal to the total data bytes (Index+Value), not including the CRC byte.

IB & VB: IB/VB often is the input or output port number depending on the command. Please see table below.

CB: Device always sends the CRC byte following the last byte.

IB/VB: Command Response

Command	Description	Index	Value
0x07	Request Video Output Channel	Output	Input
0x09	Request Video Input Plug Status	Input	0: Unplugged 1: Plugged in
0x0B	Request Video Output Plug Status	Output	

RS-232 / Telnet IP Commands

The following commands are all in hex format and are null terminated.

Code	Function
20 01 01 00 1F	Output 1 disconnect
20 01 01 01 41	Output 1 select Input 1
20 01 01 02 A3	Output 1 select Input 2
20 01 01 03 FD	Output 1 select Input 3
20 01 01 04 7E	Output 1 select Input 4
20 01 02 00 4A	Output 2 disconnect
20 01 02 01 14	Output 2 select Input 1
20 01 02 02 F6	Output 2 select Input 2
20 01 02 03 A8	Output 2 select Input 3
20 01 02 04 2B	Output 2 select Input 4
20 01 03 00 8E	Output 3 disconnect
20 01 03 01 D0	Output 3 select Input 1
20 01 03 02 32	Output 3 select Input 2
20 01 03 03 6C	Output 3 select Input 3
20 01 03 04 EF	Output 3 select Input 4
20 01 04 00 E0	Output 4 disconnect
20 01 04 01 BE	Output 4 select Input 1
20 01 04 02 5C	Output 4 select Input 2
20 01 04 03 02	Output 4 select Input 3
20 01 04 04 81	Output 4 select Input 4
20 03 00 01 CA	Video Settings Save to Memory 1
20 03 00 02 28	Video Settings Save to Memory 2
20 03 00 03 76	Video Settings Save to Memory 3
20 03 00 04 F5	Video Settings Save to Memory 4
20 05 00 01 1B	Video Settings Load from Memory 1
20 05 00 02 F9	Video Settings Load from Memory 2
20 05 00 03 A7	Video Settings Load from Memory 3
20 05 00 04 24	Video Settings Load from Memory 4

EDID RS232 Codes

Code	Function
20 20 00 00 E4	EDID Default (4K/60Hz 4:4:4, 8-CH Audio, No HDR)
20 20 00 01 BA	EDID Copy From Output 1
20 20 00 02 58	EDID Copy From Output 2
20 20 00 03 06	EDID Copy From Output 3
20 20 00 04 85	EDID Copy From Output 4
20 20 00 05 DB	EDID Copy From Memory

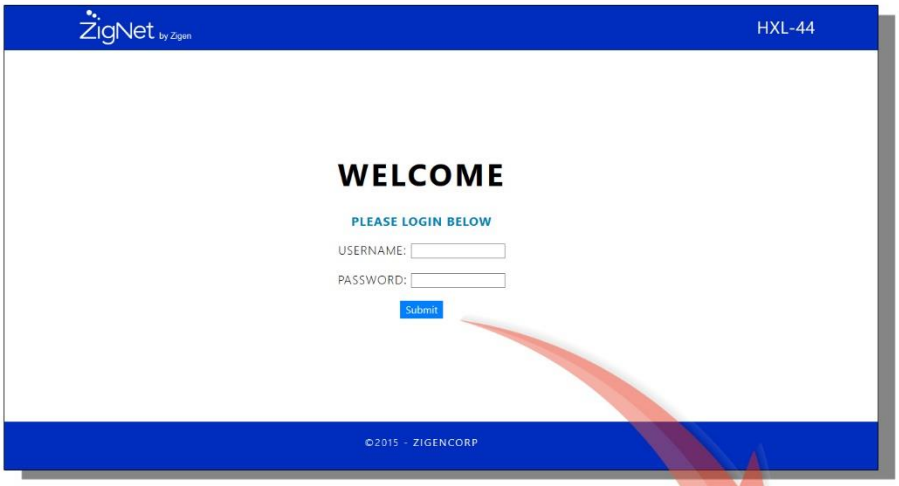
Introduction to ZigNet

Introduction

ZigNet provides easy management of all features used by the HXL-44.

ZigNet is a highly functional web server that is accessible either remotely across the Internet or directly with a connection between a personal computer on a local area network, or a connection directly to the Ethernet connector on the back panel of the unit.

The following is the Welcome page for ZigNet, requesting login information.



Logging In

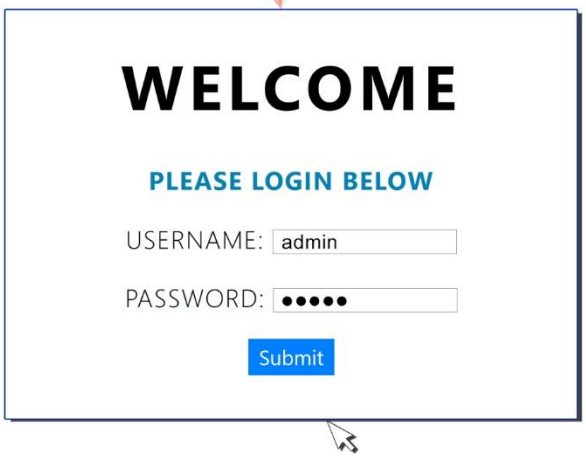
1. Launch web browser.

2. Type the IP address of the unit in the address bar.

3. The login page will be displayed.

4. Enter Username and Password.
   Default Username: admin
   Default Password: Zigen

5. Press Submit.



Navigation Bar

From the navigation bar, select the appropriate link to get to the corresponding page.
The blue bar below the link indicates that the page is selected.

Control Page

Allows the user to switch the inputs for the outputs, change EDID settings and adjust audio settings.

Diagnostics Page

Allows the user to monitor video signals and system vitals.

Alert Page

Allows the user to receive customizable email alerts.

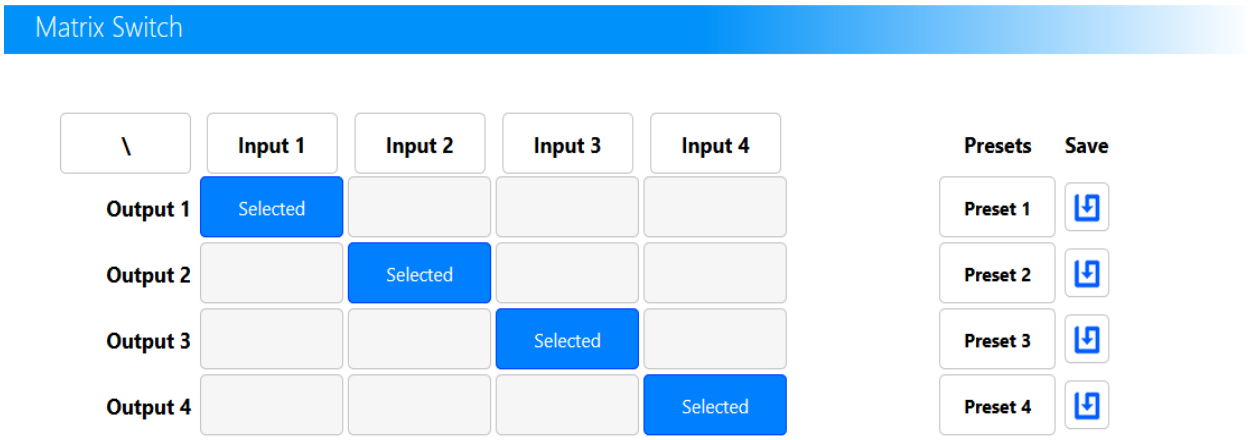
Admin Page

Allows the user to change administration settings and save installation notes.

Control Page

Matrix Switch

Click the desired input (source). The active Input is indicated by a blue bar.



EDID Management

Active EDID

Displays the current EDID sent to the source.

Sink EDID

Displays the EDID available at the sink.

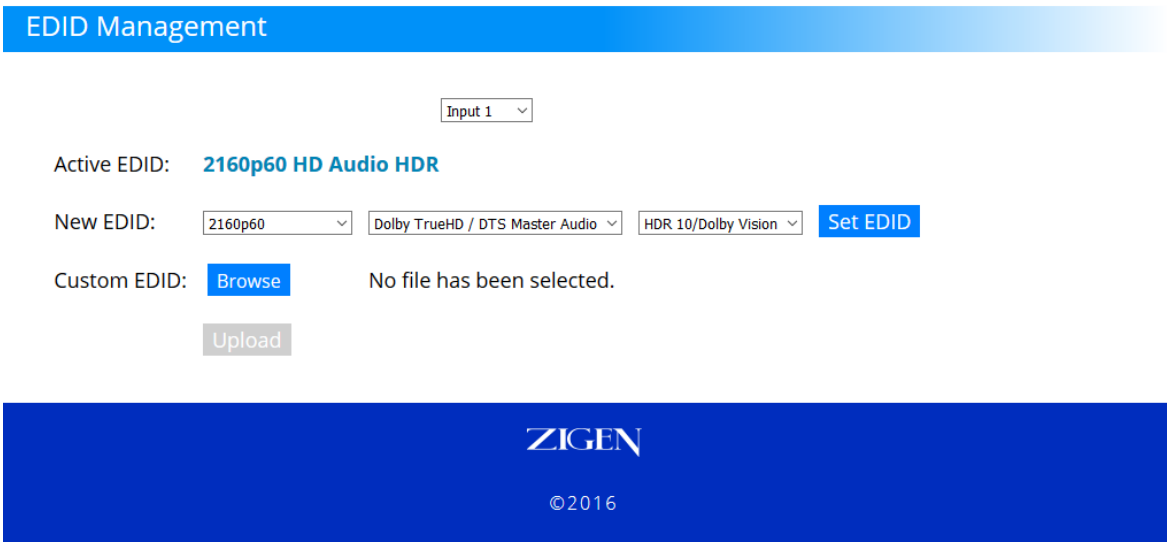
New EDID

Use the three drop down menus to select a new EDID configuration and press Set EDID.

Custom EDID

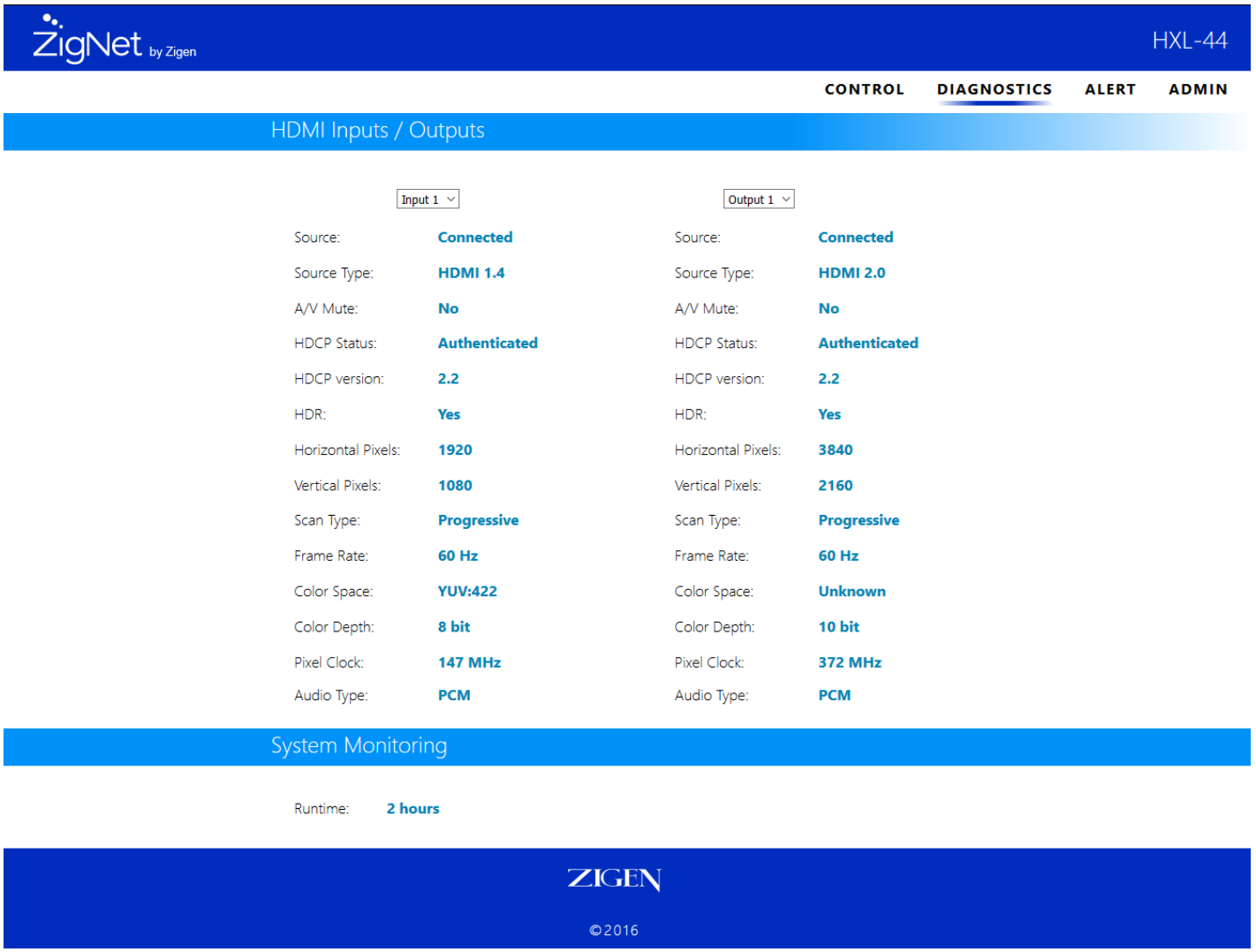
Press Browse to upload a custom EDID configuration.

Select your custom EDID file and press Upload.



Diagnostics Page

Diagnostics displays the status and parameters of the HDMI Input, Outputs and the disposition of the system.

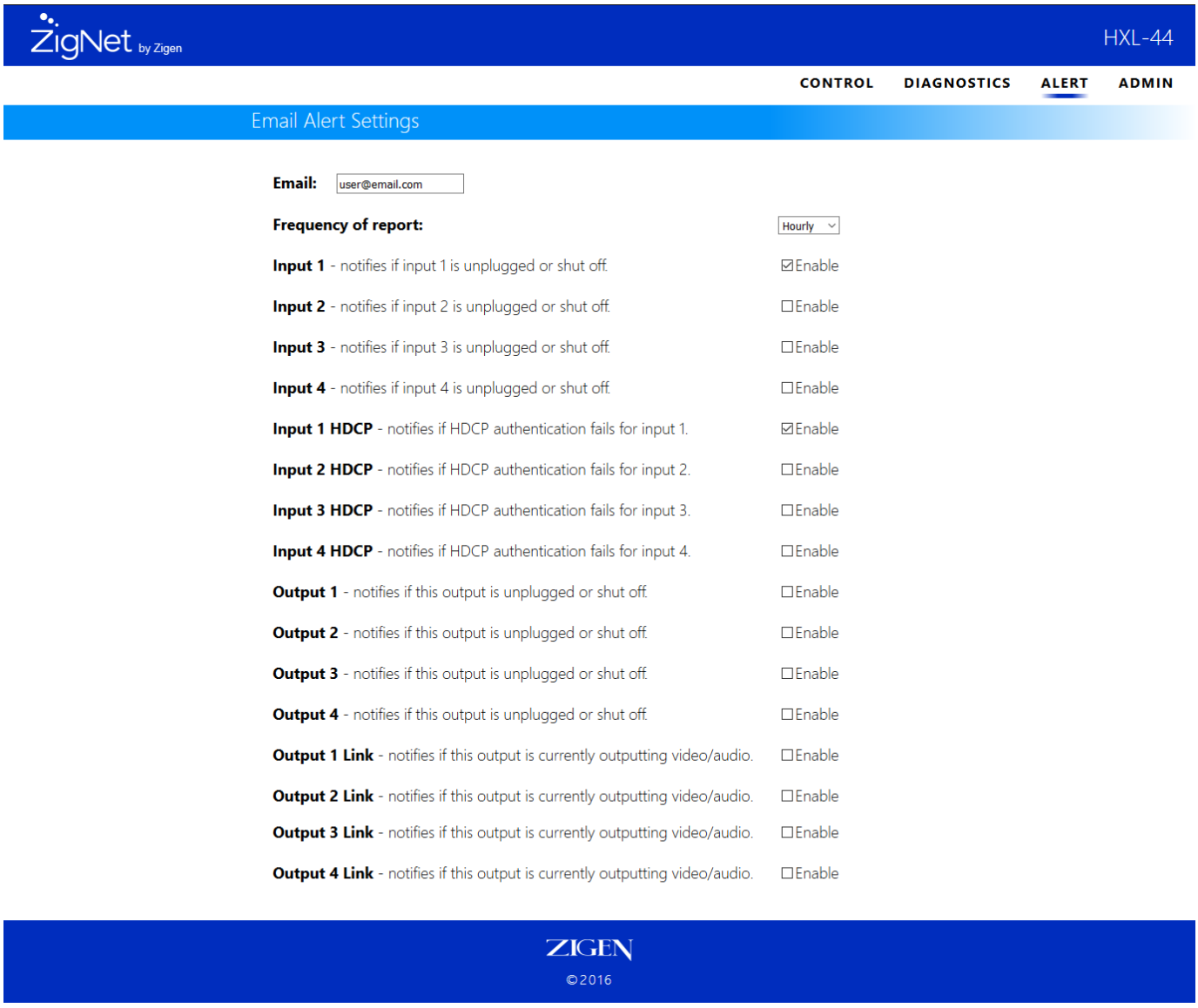


See appendix for Diagnostics Specifications (pg. 28) for detailed explanations.

Alert Page

The Email Alert page allows full customization of system notifications.

Toggle between specific alerts and choose the frequency of notifications.



Admin Page

Device Settings and Information

Hostname: type desired host name and press Change Name.

Manual IP Address: Use these fields to change the IP address used in static IP mode and the IP address used in DCHP mode when no IP address can be obtained. Settings will take place after reset.

IP Mode: The IP mode allows selecting between DHCP and Static IP mode.

Firmware: Select browse to upload firmware updates.
Select the firmware update file and press Install Firmware. File type: *.bin
A progress bar will show upload transfer process. Once the transfer is complete the unit will reset itself and commence the update.

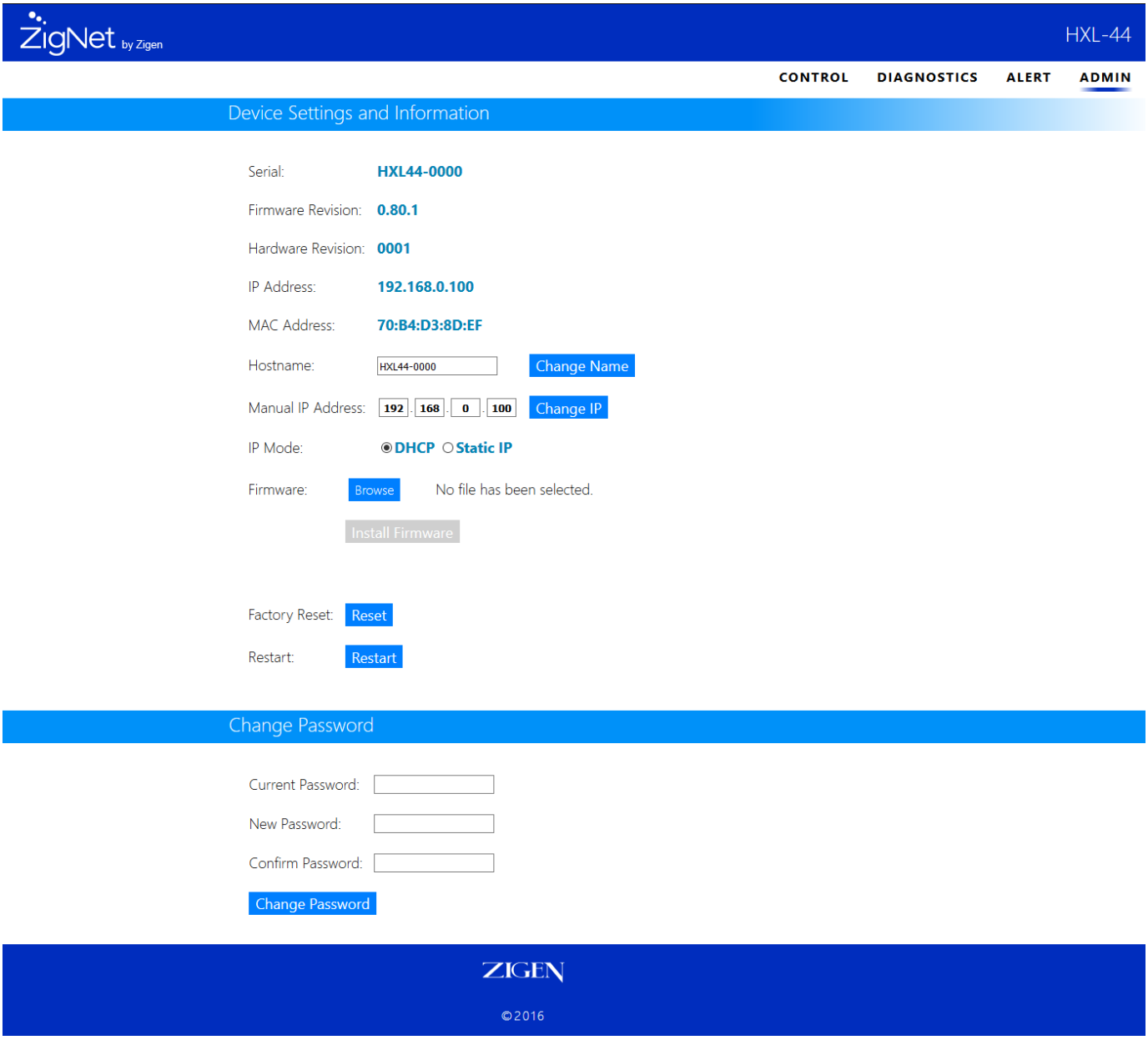
Factory Reset: Allows the unit to restore all settings back to factory defaults.

Restart: This feature restarts the unit.

Change Password

To change the password, type the current password, the desired new password and confirm the new password.

Admin Page


ZigNet by Zigen
HXL-44
CONTROL
DIAGNOSTICS
ALERT
ADMIN
Device Settings and Information
Serial:
HXL44-0000
Firmware Revision:
0.80.1
Hardware Revision:
0001
IP Address:
192.168.0.100
MAC Address:
70:B4:D3:8D:EF
Hostname:
HXL44-0000
Change Name
Manual IP Address:
192
168
0
100
Change IP
IP Mode:
DHCP
Static IP
Firmware:
Browse
No file has been selected.
Install Firmware
Factory Reset:
Reset
Restart:
Restart
Change Password
Current Password:
New Password:
Confirm Password:
Change Password
ZIGEN
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Specifications

Input Signal	4 HDMI
Input Connector	Female Type-A HDMI
Output Signal	4 HDMI; 4 SPDIF audio
Output Connector	Female Type-A HDMI; COAX connector
Control Signal	1 IR IN; 1 TCP/IP; 1 RS232
Control Connector	3.5mm mini jack; female RJ45; 3-pin pluggable terminal block
Video Signal	HDMI2.0& HDCP2.2
Audio Signal	Dolby Digital, DTS, DTS-HD and HD-Master
General	
EDID Management	In-built EDID data and manual EDID management
Resolution Range	640x480@60Hz ~ 4Kx2K@60Hz 4:4:4
HDMI Cable Length	≤5m
Power Supply	24VDC, 1.25A
Power Consumption	14W (Max)
Dimension (W*H*D)	437.0mm × 44.0mm × 236.5mm
Weight	1.75Kg
Temperature	-10℃~ 55℃
Reference Humidity	10% ~ 90%

Diagnostics Specifications

Source: Indicates if a source is connected to the unit.

Source Type: Indicates if the source is connected through an HDMI or DVI interface.

A/V Mute: Indicates if video is being received or output to a display.

HDCP Status: Indicates the HDCP authentication status.

HDR – High Dynamic Range refers to a technique in imaging to reproduce a greater range of luminosity.

HDCP version: Shows the HDCP version (2.2 / 1.4).

Pixel Clock: Displays the Pixel Clock frequency.

Color Space: Displays HDMI signal color space (RGB, YUV, etc).

Scan Type: Indicates whether the video is interlaced or progressive.

Audio Type: Displays audio CODEC used in the HDMI audio stream.

Color Depth: Displays the color bit width of the video (8, 10, 12 or 16 bit).

Frame Rate: Video frame rate.

Vertical Pixels: The amount of vertical pixels in the video resolution.

Horizontal Pixels: The amount of horizontal pixels in the video resolution.

This section details the parameters on the Diagnostics Page (pg. 23)

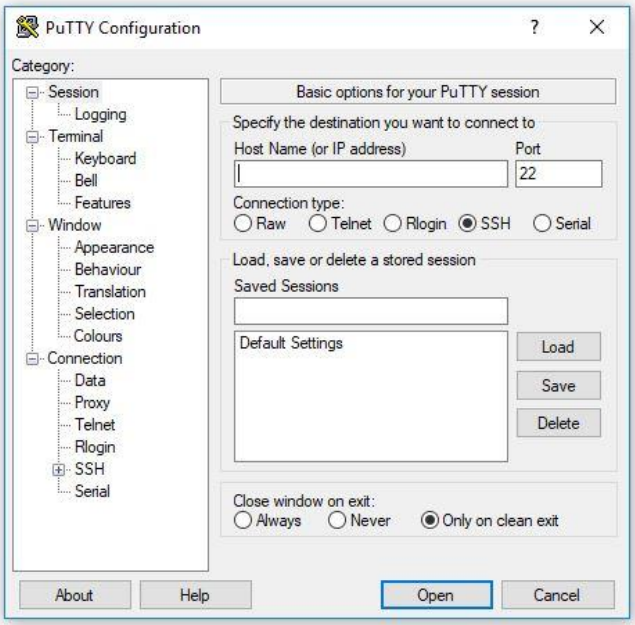
Glossary

4:4:4 – Type of chroma subsampling. 4:4:4 defines 12 unique values of color per 4 pixels.
4:2:2 – Type of chroma subsampling. 4:2:2 defines 8 unique values of color per 4 pixels.
4:2:0 – Type of chroma subsampling. 4:2:0 defines 6 unique values of color per 4 pixels.
4K60 – defines a video format of 3840 x 2160 pixels at 60 Hz.
CEC – Consumer electronics control. A channel in the HDMI connection that allows consumer electronics to control other media.
S/PDIF – Digital audio interconnect delivering digital audio over a coaxial cable with RCA connectors.
DHCP – Dynamic Host Configuration Protocol is a standardized network protocol used to designate IP addresses to media.
DIP Switch – dual in-line package switch is a manual electric switch that is packaged with others in a group.
Dolby TruHD – High performance audio codec from Dolby.
DTS-HD Master – High performance audio codec from DTS.
EDID – Extended Display Information Data is used to relay specifications and capabilities of a sink device to a source device.
HDCP – High-bandwidth Digital Content Protection is a form of digital copy protection to prevent copying of digital audio and video content across connections.
HDMI – High Definition Multimedia Interface is a proprietary audio/video interface for transmitting video data and audio data.
HDR – High Dynamic Range refers to a technique in imaging to reproduce a greater range of luminosity.
HPD – Hot plug detect is a signal in the HDMI interface that allows a sink device to notify a source that a connection is valid.
IR – Infrared
LAN – Local Area Network.
Null Modem – Null modem is referred to as a device or implementation that allows the receiver and transmitter lines of the RS232 protocol to be swapped.
RCA – also called a phono connector is an electrical connector used to carry audio and video signals.
RGB – A color format in which color data is represented as a combination of Red, Green, and Blue.
RS-232 – RS-232 is a standard for serial communication transmission of data. It is commonly used with a DB-9 connector.
SMPTE – SMPTE is a foundation that has set standards for television and digital cinema formats. In this manual it is used to refer to cinema formats such as 4096 x 2160.
Static IP – In contrast to DHCP, static IP refers a to unit or device that has a set IP address and configured to attempt connect with the predefined IP address.
UHD – Ultra High Definition. This is commonly referred to the video format 3840 x 2160.
YUV – Defines color space in terms of luminance and chrominance.
VESA – Video Electronics Standards Association is a technical standards organization for computer display formats.
ZigNet – Proprietary web control developed by Zigen, Inc.

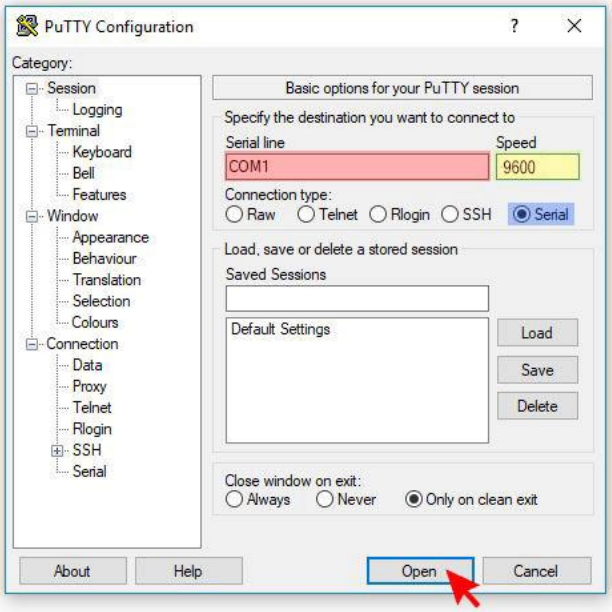
Putty Example

RS-232 SETUP

1. Download the latest version of Putty here: https://www.chiark.greenend.org.uk/~sgtatham/putty/latest.html
2. Open Putty



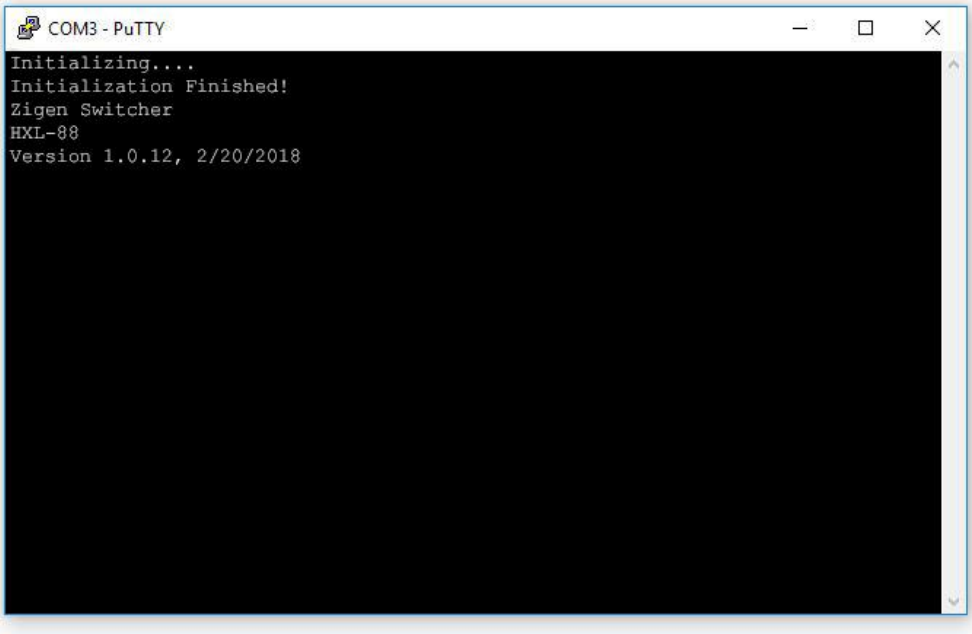
3. Select Serial then set baud rate (Speed) to 9600, define the COM port of your device, and click Open.



Putty Example

RS-232 SETUP

4. For a valid connection, confirm a welcome message appears.



Infrared (IR) Protocol

The HXL-44 Plus IR protocol uses the NEC standard over 38kHz. An example IR message that uses the protocol with address 0x00 and command 0xAD is shown below this section.

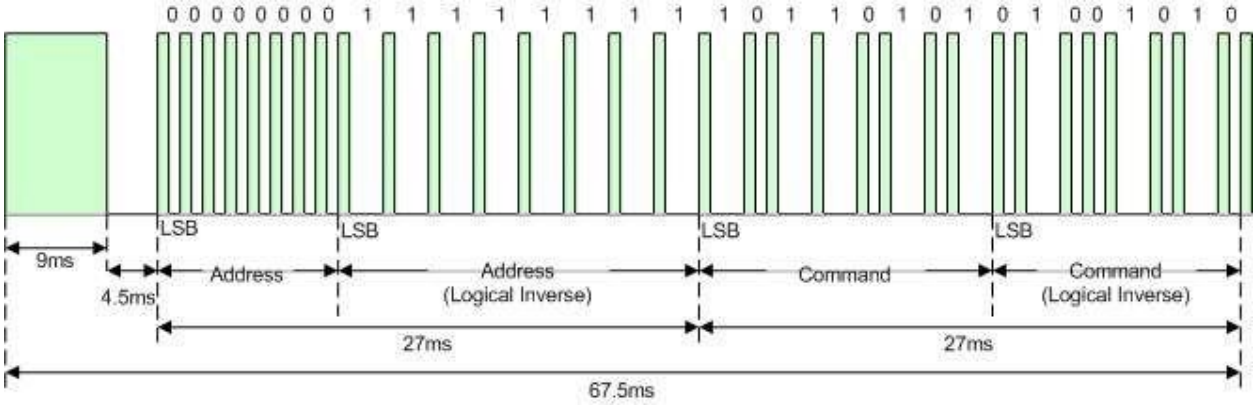


Illustration 1: NEC Protocol

IR Commands

Below are pronto hex codes for IR commands for the HXL-44 Plus. All IR commands use address 0x4B.

Set Output 1 to Input 1

Description: Set HDMI Output 1 to Input 1. Command:
0x28 Pronto Hex:

0000 006C 0000 0022 015B 00AD 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016

0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0041

0016 0041 0016 0016 0016 0041 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016

0016 0041 0016 0016 0016 0016 0016 0041 0016 0041 0016 0041 0016 0016 0016 0041 0016 0016
0016 0041 0016 0041 0016 05F7

Infrared (IR) Protocol

Set Output 2 to Input 1

Description: Set HDMI Output 2 to Input 1. Command:
0x35 Pronto Hex:

0000 006C 0000 0022 015B 00AD 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016

0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0041

0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0016 0016 0041

0016 0041 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0041 0016 05F7

Set Output 3 to Input 1

Description: Set HDMI Output 3 to Input 1. Command:
0x4C Pronto Hex:

0000 006C 0000 0022 015B 00AD 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016

0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0041

0016 0041 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0041 0016 0016

0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0041

0016 0041 0016 0016 0016 0041 0016 05F7

Set Output 4 to Input 1

Description: Set HDMI Output 4 to Input 1. Command:
0x62 Pronto Hex:

0000 006C 0000 0022 015B 00AD 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016

0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0041

0016 0041 0016 0016 0016 0041 0016 0016 0016 0041 0016 0016 0016 0016 0016 0016

0016 0041 0016 0041 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0016 0016 0016 0016 0041 0016 05F7

Set Output 1 to Input 2

Description: Set HDMI Output 1 to Input 2. Command:
0x24 Pronto Hex:

0000 006C 0000 0022 015B 00AD 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016

0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0041

0016 0041 0016 0016 0016 0041 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016

0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0041 0016 0041 0016 0016 0016 0041 0016 0016 0016 05F7

Set Output 2 to Input 2

Description: Set HDMI Output 2 to Input 2. Command:
0xB5 Pronto Hex:

0000 006C 0000 0022 015B 00AD 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016

0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0041

0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0016 0016 0041

0016 0041 0016 0016 0016 0041 0016 0016 0016 0041 0016 0016 0016 0041 0016 0016

0016 0016 0016 0041 0016 0016 0016 05F7

Set Output 3 to Input 2

Description: Set HDMI Output 3 to Input 2. Command:
0xC2 Pronto Hex:

0000 006C 0000 0022 015B 00AD 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016

0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0041

0016 0041 0016 0016 0016 0041 0016 0016 0016 0041 0016 0016 0016 0016 0016 0016

0016 0016 0016 0041 0016 0041 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0016 0016 0016 0016 05F7

Set Output 4 to Input 2

Description: Set HDMI Output 4 to Input 2. Command:
0xCA Pronto Hex:

0000 006C 0000 0022 015B 00AD 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016

0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0041

0016 0041 0016 0016 0016 0041 0016 0016 0016 0041 0016 0016 0016 0041 0016 0016

0016 0016 0016 0041 0016 0041 0016 0041 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 05F7

Description: Set HDMI Output 1 to Input 3. Command:
0xD7 Pronto Hex:

0000 006C 0000 0022 015B 00AD 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016

0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0041

0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0016 0016 0041

0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016

0016 0041 0016 0016 0016 0016 0016 05F7

Set Output 2 to Input 3

Description: Set HDMI Output 2 to Input 3. Command:
0xDE Pronto Hex:

0000 006C 0000 0022 015B 00AD 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016

0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0041

0016 0041 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041

0016 0016 0016 0041 0016 0041 0016 0041 0016 0016 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0016 05F7

Set Output 3 to Input 3

Description: Set HDMI Output 3 to Input 3. Command:
0xE3 Pronto Hex:

0000 006C 0000 0022 015B 00AD 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016

0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0041

0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0016 0016 0016 0016 0016

0016 0041 0016 0041 0016 0041 0016 0016 0016 0016 0016 0041 0016 0041 0016 0041 0016 0016 0016 0016 0016 0016 0016 0016 05F7

Set Output 4 to Input 3

Description: Set HDMI Output 4 to Input 3. Command:
0xEC Pronto Hex:

0000 006C 0000 0022 015B 00AD 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016

0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0041

0016 0041 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0041 0016 0016

0016 0041 0016 0041 0016 0041 0016 0041 0016 0041 0016 0016 0016 0016 0016 0041

0016 0016 0016 0016 0016 0016 0016 05F7

Set Output 1 to Input 4

Description: Set HDMI Output 1 to Input 4. Command:
0xF3 Pronto Hex:

0000 006C 0000 0022 015B 00AD 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016

0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0041

0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0016 0016 0016 0016 0041

0016 0041 0016 0041 0016 0041 0016 0016 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016
0016 0016 0016 0016 05F7

Set Output 2 to Input 4

Description: Set HDMI Output 2 to Input 4. Command: 0xA8
Pronto Hex:

0000 006C 0000 0022 015B 00AD 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016

0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0041

0016 0041 0016 0016 0016 0041 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016

0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0016 0016 0041 0016 0016 0016
0041 0016 0016 0016 05F7

Set Output 3 to Input 4

Description: Set HDMI Output 3 to Input 4. Command: 0x93
Pronto Hex:

0000 006C 0000 0022 015B 00AD 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016

0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0041

0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0016 0016 0016 0016 0041

0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0041 0016 0016

0016 0041 0016 0041 0016 0016 0016 05F7

Set Output 4 to Input 4

Description: Set HDMI Output 4 to Input 4. Command: 0x7B
Pronto Hex:

0000 006C 0000 0022 015B 00AD 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016

0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0041

0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0016 0016 0041 0016 0041

0016 0041 0016 0041 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0016 0016 0016 0016 0041 0016 05F7

Broadcast Input 1

Description: Set all HDMI Outputs to Input 1.

Command: 0x6D Pronto Hex:
0000 006C 0000 0022 015B 00AD 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016

0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0041

0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016

0016 0041 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 05F7

Broadcast Input 2

Description: Set all HDMI Outputs to Input 2. Command: 0x50
Pronto Hex:

0000 006C 0000 0022 015B 00AD 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016

0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0041

0016 0041 0016 0016 0016 0041 0016 0016 0016 0016 0016 0016 0016 0016 0016 0041

0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0016

0016 0041 0016 0016 0016 0041 0016 05F7

Broadcast Input 3

Description: Set all HDMI Outputs to Input 3. Command: 0x3A
Pronto Hex:

0000 006C 0000 0022 015B 00AD 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016

0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0041

0016 0041 0016 0016 0016 0041 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041

0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0016 0016 0016 0016 0016 0016 0041 0016 0041 0016 05F7

Broadcast Input 4

Description: Set all HDMI Outputs to Input 4. Command: 0x2E
Pronto Hex:

0000 006C 0000 0022 015B 00AD 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016

0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0041

0016 0041 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0016

0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 05F7

Set Output 1 EDID

Description: Send Output 1 EDID to all the inputs. Command: 0x1A
Pronto Hex:

0000 006C 0000 0022 015B 00AD 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016

0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0041

0016 0041 0016 0016 0016 0041 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041

0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0016 0016 0016

0016 0041 0016 0041 0016 0041 0016 05F7

Infrared (IR) Protocol

Set Output 2 EDID

Description: Send Output 2 EDID to all the inputs. Command: 0x74
Pronto Hex:

0000 006C 0000 0022 015B 00AD 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016

0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0041

0016 0041 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041

0016 0041 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0016 0016 0016 0016 0016 0016 0041 0016 05F7

Set Output 3 EDID

Description: Send Output 3 EDID to all the inputs. Command: 0x85
Pronto Hex:

0000 006C 0000 0022 015B 00AD 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016

0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0041

0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0016 0016 0016

0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0016 0016 05F7

Set Output 4 EDID

Description: Send Output 4 EDID to all the inputs. Command: 0x85
Pronto Hex:

0000 006C 0000 0022 015B 00AD 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016

0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0041

0016 0041 0016 0016 0016 0041 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041

0016 0016 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0041 0016 0016 0016 05F7

Troubleshooting & Maintenance

Problems	Potential Causes	Solutions
Color losing or no video signal output.	The connecting cables may not be connected correctly or it may be broken.	Check whether the cables are connected correctly and in working condition.
	Fail or loose connection.	Make sure the connection is good.
Color losing or no video signal output.	No signal at the input / output end	Check with oscilloscope or multi-meter if there is any signal at the input/ output end.
	Fail or loose connection	Make sure the connection is good
	Input source is with HDCP while the HDCP compliance is switched off.	Send command /%[x]:[1]. To change HDCP compliance status.
	The display doesn't support the input resolution.	Switch for another input source or enable the display to learn the EDID data of the input.
No output on the amplifiers connected to audio output ports	The amplifiers are not able to decode HDMI audio	Change for amplifiers that are capable to decode HDMI audio.
Cannot control the device via front panel buttons	Front panel buttons are locked.	Send command /%Unlock; to unlock.
Cannot control the device via IR remote	The battery has run off.	Change for new battery.
	The IR remote is broken.	Send it to authorized dealer for repairing.
	Beyond the effective range of the IR signal or not pointing at the IR receiver	Adjust the distance and angle and point right at the IR receiver.
Power Indicator remains off when powered on	Fail or loose power connection	Check whether the cables are connected correctly.

Problems	Potential Causes	Solutions
EDID management does not work normally	The HDMI cable is broken at the output end.	Change for another HDMI cable which is in good working condition.
There is a blank screen on the display when switching	The display does not support the resolution of the video source.	Switch again.
		Manage the EDID data manually to make the resolution of the video source automatically compliant with the output resolution.
Cannot control the device by control device (e.g. a PC) through RS232 port	Wrong connection	Check to ensure the connection between the control device and the unit.
	Wrong RS232communication parameters	Type in correctRS232communication parameters: Baud rate: 9600; Data bit: 8; Stop bit: 1; Parity bit: none.
	Broken RS232 port	Send it to authorized dealer for checking.
Static becomes stronger when connecting the video connectors	Bad grounding	Check the grounding and make sure it is connected well.
Cannot control the device by RS232 / IR remote / front panel buttons	The device has already been broken.	Send it to authorized dealer for repairing.