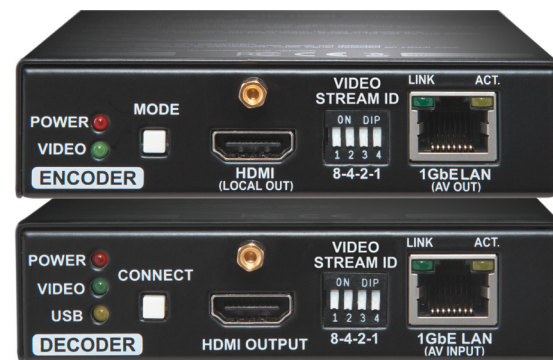


visual engineering
LIGHTWARE

User's Manual



VINX-120-HDMI-ENC
VINX-110-HDMI-DEC

Video Over IP Multimedia Extender

Important Safety Instructions

Class II apparatus construction.

The equipment should be operated only from the power source indicated on the product.

To disconnect the equipment safely from power, remove the power cord from the rear of the equipment, or from the power source. The MAINS plug is used as the disconnect device, the disconnect device shall remain readily operable.

There are no user-serviceable parts inside of the unit. Removal of the cover will expose dangerous voltages. To avoid personal injury, do not remove the cover. Do not operate the unit without the cover installed.

The appliance must be safely connected to multimedia systems. Follow instructions described in this manual.

Ventilation

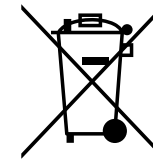
For the correct ventilation and to avoid overheating ensure enough free space around the appliance. Do not cover the appliance, let the ventilation holes free and never block or bypass the ventilators (if any).

WARNING

To prevent injury, the apparatus is recommended to securely attach to the floor/wall or mount in accordance with the installation instructions. The apparatus shall not be exposed to dripping or splashing and that no objects filled with liquids, such as vases, shall be placed on the apparatus. No naked flame sources, such as lighted candles, should be placed on the apparatus.

Waste Electrical & Electronic Equipment WEEE

This marking shown on the product or its literature, indicates that it should not be disposed with other household wastes at the end of its working life. To prevent possible harm to the environment or human health from uncontrolled waste disposal, please separate this from other types of wastes and recycle it responsibly to promote the sustainable reuse of material resources. Household users should contact either the retailer where they purchased this product, or their local government office, for details of where and how they can take this item for environmentally safe recycling. Business users should contact their supplier and check the terms and conditions of the purchase contract. This product should not be mixed with other commercial wastes for disposal.



Common Safety Symbols

Symbol	Description
	Direct current
	Alternating current
	Double insulation
	Caution: for indoor use only
	Caution: possibility of electric shock
	Caution

Symbol Legend

The following symbols and markings are used in the document:

WARNING! Safety-related information which is highly recommended to read and keep in every case!


ATTENTION! Useful information to perform a successful procedure; it is recommended to read.


INFO: A notice which may contain additional information. Procedure can be successful without reading it.


DEFINITION: The short description of a feature or a function.


TIPS AND TRICKS: Ideas which you may have not known yet but can be useful.

Navigation Buttons

 Go back to the previous page. If you clicked on a link previously, you can go back to the source page by pressing the button.

 Navigate to the Table of Contents.

 Step back one page.

 Step forward to the next page.

Document Information

All presented functions refer to the indicated products. The descriptions have been made during testing these functions in accordance with the indicated Hardware/Firmware/Software environment:

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Web version	1.0.0b9
Firmware package version	1.0.0b11

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Editor: Laszlo Zsedenyi

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1

Introduction

Thank you for choosing Lightware's VINX Video Network Extender devices. In the first chapter we would like to introduce the device by highlighting the most important features in the below listed sections:

- ▶ [DESCRIPTION](#)
- ▶ [BOX CONTENTS](#)
- ▶ [FEATURES OF THE DEVICE](#)
- ▶ [TYPICAL APPLICATION](#)

1.1. Description

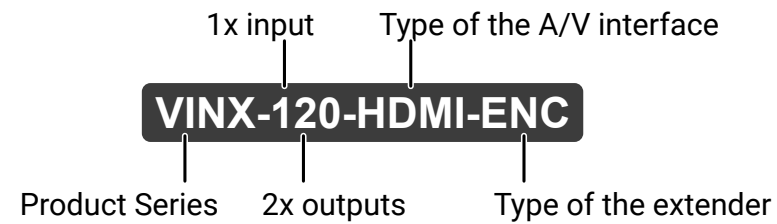
VINX-120-HDMI-ENC and VINX-110-HDMI-DEC are LAN-based Encoder/Decoder multimedia extenders to extend HDMI video from a local source to a remote sink. The Encoder and Decoder devices connect either via a direct CATx cable connection or through a Gigabit Ethernet Switch in between. The maximum delivery distance can reach up to 100 m with minimal latency and employing a quality, proprietary wavelet transform based image compression.

The maximum supported resolution is 3840 x 2160 @ 30Hz with 7.1 audio. The devices support both static and dynamic (DHCP) IP address settings. Pre-programmed factory EDID presets and user EDIDs are stored in the Encoder.

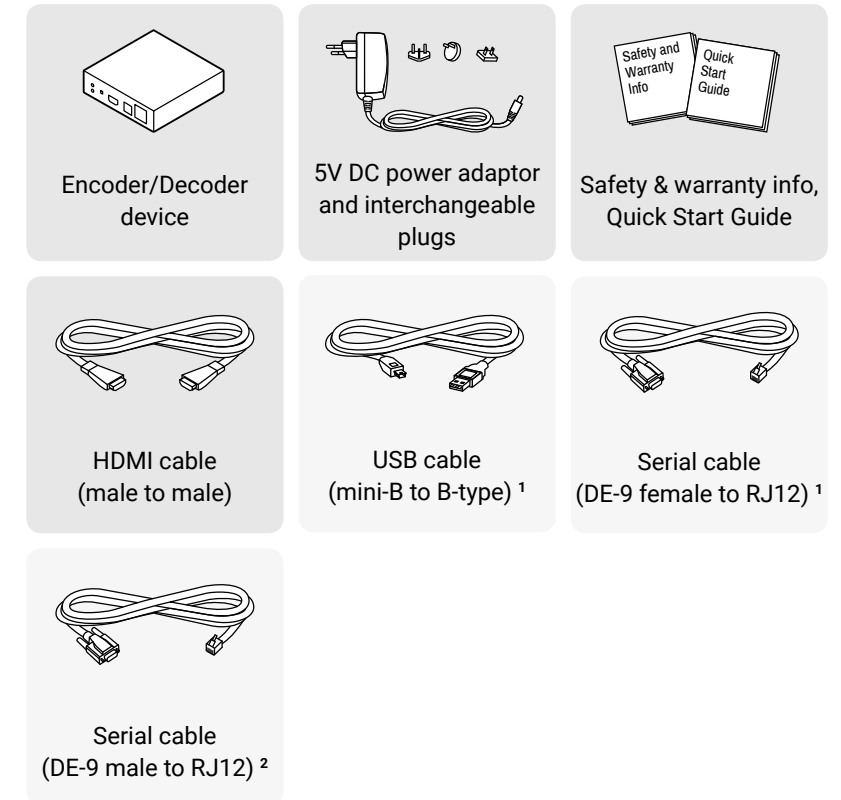
Devices feature embedded web for control.

DIP switches serve quick manual setting for device pairing over the network, a quick and easy installation method. Gap and bezel compensation can be adjusted for video walls. Scaling is available on the receiver side and videos can be freely cropped.

Model Denomination



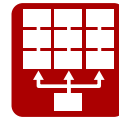
1.2. Box Contents



¹ Supplied with the Encoder

² Supplied with the Decoder

1.3. Features of the Device



Video Wall Application

The VINX devices can be arranged to a Video wall up to 8x8 Display devices. The displayed video can be the same on each display, one image enlarged to all the sinks, or the mixture of these.



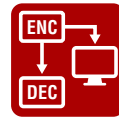
Supporting 4K Resolution

Up to HDMI 2.0 4K 2160p@60Hz 4:2:0 video input or 3840 x 2160 @ 30Hz resolution over a 1 Gigabit network with very low latency.



Advanced EDID Management

The user can emulate any EDID on the inputs independently, read out and store any attached monitor's EDID in the User memory locations, upload and download EDID files.



Local HDMI Output

A display device can be connected to the Encoder for local signal checking. The port carries the same video as the transmitted signal.



Frame Detector and Signal Analysis

The exact video and audio signal format can be determined such as timing, frequencies, scan mode, HDCP encryption, color range, color space and audio sample rate.



Scaling the Output Image

Scaling is available at the Decoder side and videos can be freely cropped.



Image Adjustment

The extended video can be rotated or flipped at the Decoder side.



Built-in Website

Easy access from a web browser to control and configure the devices – even with a mobile device.



USB Extension

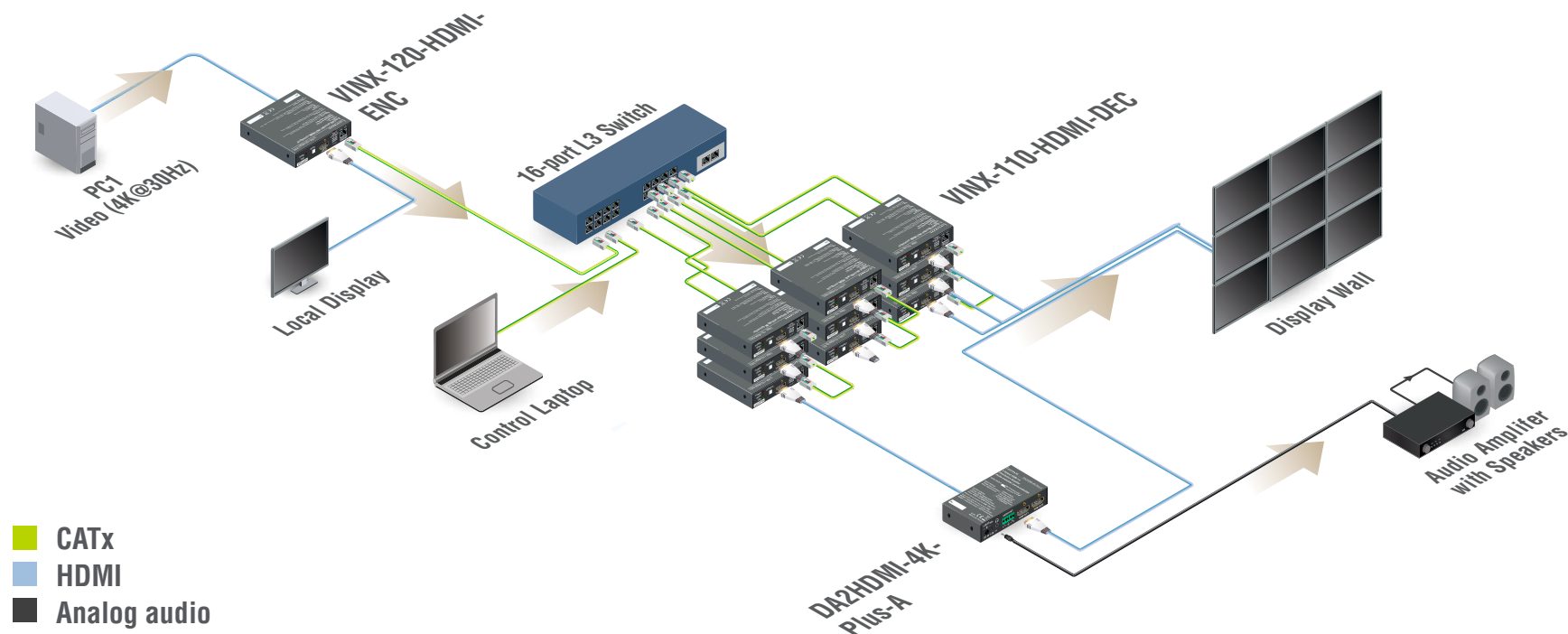
KVM extension for USB HID (Human Interface Devices, e.g. keyboard, mouse, presenter) and Mass Storage devices (Flash drive, Hard drive).



Serial Data Transmission

Transparent serial data transmission is available between the endpoints: Encoder and Decoder devices.

1.4. Typical Application



2

Installation

The chapter is about the installation of the device and connecting to other appliances, presenting also the mounting options and further assembly steps.

- ▶ MOUNTING OPTIONS
- ▶ CONNECTING STEPS

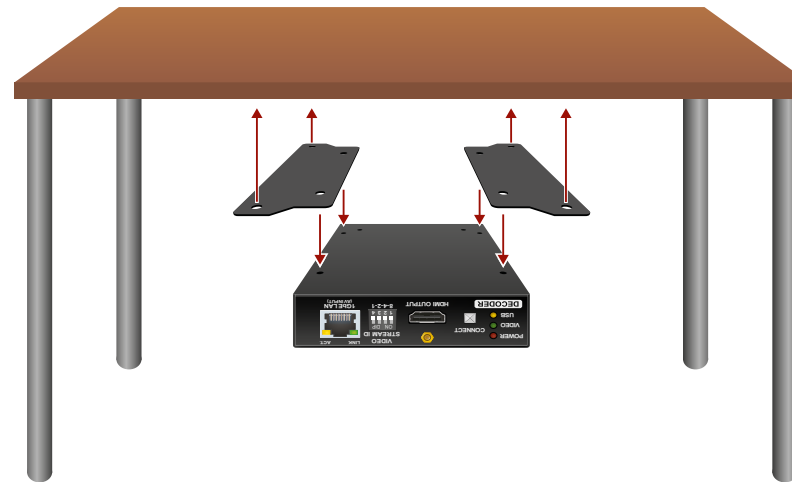
2.1. Mounting Options

INFO: In order to get the necessary mounting accessory please contact sales@lightware.com.

2.1.1. VESA100 Mounting Adapter for Extenders

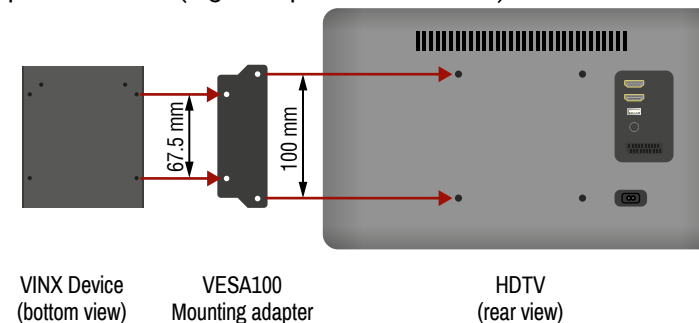
Mounting under the Desk

Two pieces of the adapter is needed for this kind of mounting. Fasten the adapters to the bottom of the extender and the desk as shown in the figure:



Mounting to a Display Device

Two mounting holes can be found on the bottom of the extender at each side, the VESA-compatible accessory plate can be fixed as indicated. The other two holes of the plate can be fixed to a VESA-compatible device (e.g. rear panel of an HDTV).



VINX Device
(bottom view)

VESA100
Mounting adapter

HDTV
(rear view)

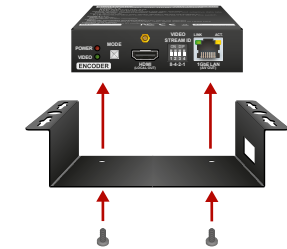
2.1.2. Rack Shelf Mounting

The 1U high rack shelf provides mounting holes for fastening four VINX devices and put them into a standard rack cabinet (width of the Rack shelf is 448 mm – without the ears). Fix the device to the Rack shelf as shown in the figure:

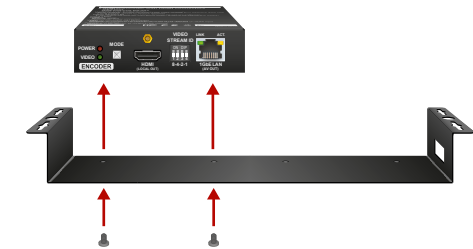


2.1.3. UD-kit Mounting

Mounting with UD-kit (Under Desk)



Mounting with UD-kit double (Under Desk Double)



2.2. Connecting Steps

2.2.1. Preparing the Network

For the correct installation build a Local Area Network with a Layer 3 (L3) type switch (highly recommended). However, Unicast mode requires only Layer 2 (L2) switch. In both cases the switch must support the Multicast routing.

ATTENTION! VINX Encoder and Decoder send certain system commands over multicast packages. If the multicast routing is disabled on the network, the signal transmission may fail.

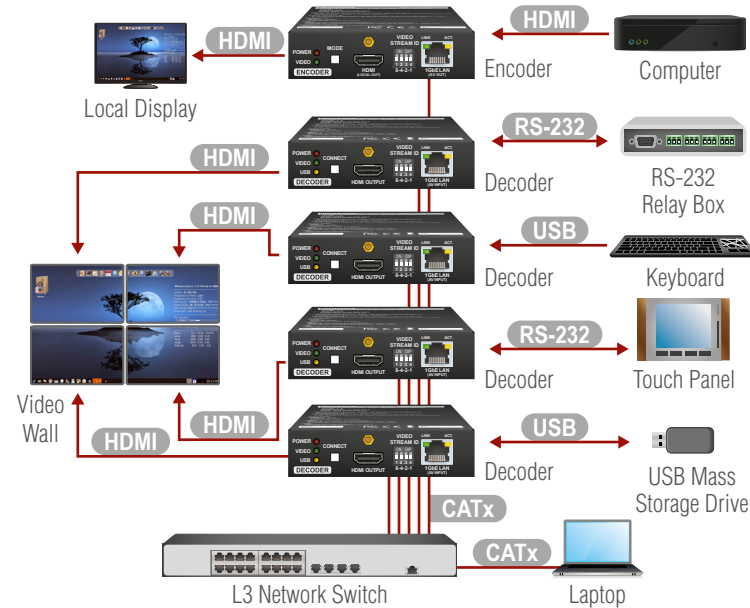
Layer 2 vs. Layer 3 Switch

By default, Lightware Video-over-IP Encoders and Decoders use multicast routing. The managed switch in the network shall offer the following capabilities:

- IGMPv2
- IGMP snooping
- IGMP fast leave
- IGMP Querier
- Multicast filtering
- 9k MTU - Jumbo/Giant frames

These features are supported by the Layer 3 type switches. Please see more technical information about the network requirements in the [Application Note \(LW-AN-001\)](#) section.

2.2.2. LAN Connection (Unicast or Multicast Mode)



CATx Connect a CATx cable between the VINX devices and the L3 Switch.

HDMI Connect an HDMI source device (e.g. a computer) to the HDMI input port of the Encoder. Optionally connect a Local Display to the Output port of the Encoder. Connect HDMI display devices to the HDMI output port of the Decoder devices.

RS-232 Optionally for RS-232 serial transmission: connect the desired devices (e.g. a Touch Control, Relay Box) to the RS-232 ports by the supplied serial cables.

USB Optionally for USB extension: connect USB devices to the USB ports of the Decoders. Connect the desired host device (e.g. Computer) to the Encoder via the USB mini-B type port. Please pay attention to the indicated port types (USB 1.1 and USB 2.0 support)

Power Connect the power cord of the supplied adaptor to the DC input first, then to the AC power socket.

CATx Connect a computer to the L3 Switch to arrange the necessary settings easily.

2.2.3. Further Steps

Step 1. Connect a computer to the network to arrange the necessary settings easily (see the [Establishing the Connection](#) section).

Step 2. Group the devices by the DIP switch or via the built-in website (see the [Video Status and Settings](#) section).

Step 3. Select the desired Decoder for USB transmission (see the [USB Settings \(Multicast Mode\)](#) section).

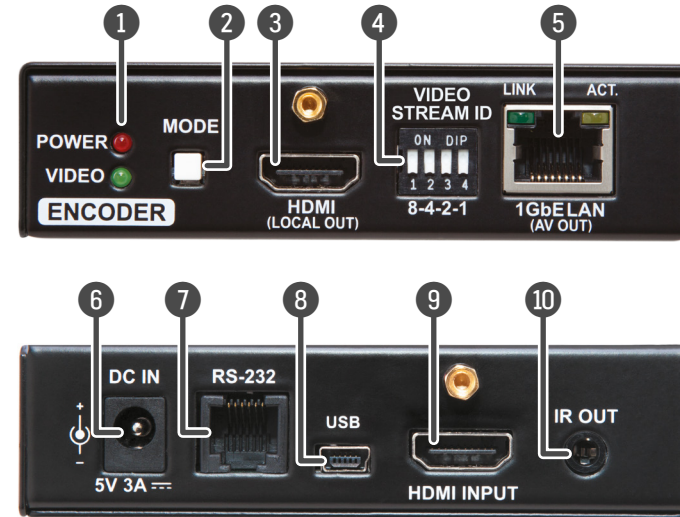
3

Product Overview

The following sections are about the physical structure of the device, input/output ports and connectors

- ▶ [VINX ENCODER FRONT AND REAR VIEW](#)
- ▶ [VINX DECODER FRONT AND REAR VIEW](#)
- ▶ [ELECTRICAL CONNECTIONS](#)
- ▶ [FRONT PANEL LEDs](#)
- ▶ [DIP SWITCH](#)
- ▶ [VINX DEVICE CONCEPT](#)
- ▶ [VIDEO INTERFACE](#)
- ▶ [USB INTERFACE](#)
- ▶ [RS-232 INTERFACE](#)

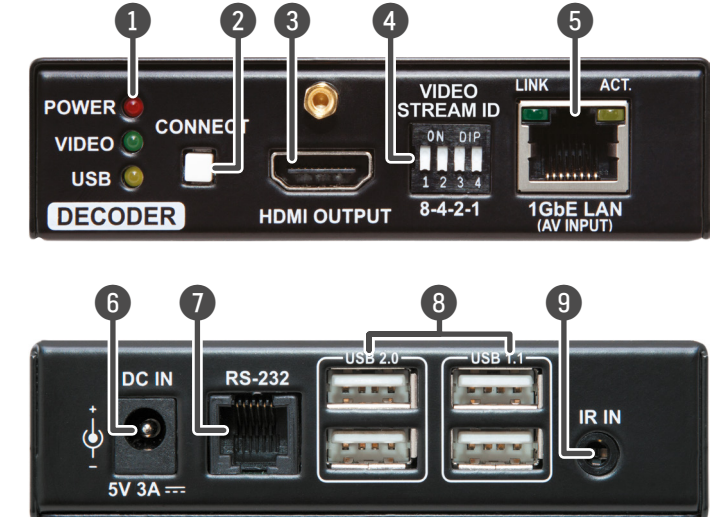
3.1. VINX Encoder Front and Rear View



- 1 **Status LEDs** See the [Front Panel LEDs](#) section.
- 2 **Mode Button** **Short press** (less, than 3 sec): switching between Video and Graphics modes.
Long press (more, than 3 sec): reset to factory default settings.
- 3 **HDMI Output Port** Forwarding the same Audio / Video content as the AV Output Port.
- 4 **DIP Switch** Linking Encoder and Decoder devices; for more information see the [DIP Switch](#) section.
- 5 **AV Output Port** RJ45 connector for outgoing A/V signal to the Decoder device or Network switch.
- 6 **DC 5V Input** 5V DC input for local power supply.
- 7 **RS-232 Port** RJ12 connector for transparent serial communication (point-to-point or point-to-multi point).
- 8 **USB Port** Mini B-type connector for USB pass-through (IP KVM) application.
- 9 **HDMI Input Port** Video port for DVI or HDMI signal.
- 10 **IR Output Port** IR signal output connector (for 3.5 mm Jack, 2-pole, TS plug).

WARNING! Always use the supplied 5V power adaptor. Warranty void if damage occurs due to use of a different power source.

3.2. VINX Decoder Front and Rear View

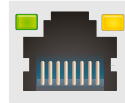


- 1 **Status LEDs** See the [Front Panel LEDs](#) section.
- 2 **Connect Button** **Short press** (less, than 3 sec): acquire USB connection (only in Multicast mode)
Long press (more, than 3 sec): reset to factory default settings.
- 3 **HDMI Output Port** HDMI output to a sink device.
- 4 **DIP Switch** Linking Encoder and Decoder devices; for more information see the [DIP Switch](#) section.
- 5 **AV Input Port** RJ45 connector for incoming A/V signal from the Encoder device or Network switch.
- 6 **DC 5V Input** 5V DC input for local power supply.
- 7 **RS-232 Port** RJ12 connector for transparent serial communication (point-to-point or point-to-multi point).
- 8 **USB Ports** USB 1.1 and 2.0 compatible A-type ports for transmitting USB HID devices in Unicast mode.
- 9 **IR Input Port** IR signal input connector (for 3.5 mm Jack, 3-pole, TRS plug).

3.3. Electrical Connections

1 GbE LAN

The devices provide standard RJ45 connectors for outgoing/incoming Video/Control signals. Always use high quality Ethernet cable for connecting Encoders and Decoders.



The Wiring of the Twisted Pair Cables

The recommended termination is based on TIA/EIA T 568 A or TIA/EIA T 568 B standards:

Pin	TIA/EIA T568 A	Wire Color	TIA/EIA T568 B	Wire Color
1		white/green		white/orange
2		green		orange
3		white/orange		white/green
4		blue		blue
5		white/blue		white/blue
6		orange		green
7		white/brown		white/brown
8		brown		brown

HDMI Input and Output Ports

The devices are assembled with standard 19-pole HDMI connectors for inputs and outputs. Special HDMI cables can be fastened to the housing by the nut.



RS-232 Port

The devices contain a standard RJ12 connector which is used for RS-232 serial connection. The port can be used to connect serial devices by using the supplied serial cables. Please see the [RS-232 Interface](#) section for more details.



USB Ports

The USB ports allow USB extension. The Encoder is assembled with USB mini-B type port (connecting a computer), and the Decoder device contains two USB 1.1 and two USB 2.0 compatible A-type port. For more information about the USB extension see the [USB Interface](#) section.



3.4. Front Panel LEDs

POWER LED

- OFF: the device is not powered.
- BLINKING: booting is in progress.
- ON: the device is powered on.



VIDEO LED

- OFF: there is no network connection.
- BLINKING: the device is connected to a network but there is no video stream in progress.
- ON: the device is connected to a network and video stream is in progress.

USB LED (only in Decoders)

- OFF: there is no USB transmission between the Encoder and the Decoder.
- ON: the USB transmission is active between the Encoder and the Decoder.

POWER and VIDEO LEDs (only in Encoders)

- BLINKING together: there is a Video Stream ID clash in the network, e.g. another Encoder is set to the same Video Stream ID.

3.5. DIP Switch

The DIP switch can be used to set the Video Stream ID manually (HW setting). The interpretation of the DIP switch values can be found in the [DIP Switch States](#) section; please see the examples below:

DIP Switch State	Video Stream ID		/SYS/MB/GPIO. DipSwitch value
	Set by	Value	
	SW setting	see the built-in web	0x0
	HW setting	1	0x1
	HW setting	8	0x8

3.6. VINX Device Concept

The key feature of the VINX series is the A/V signal transmission from an Encoder to many Decoder devices. The number of the Encoder and Decoder devices is 'limited' to 100 within a system. The video wall can be expanded at a later time, e.g. building a wall with 12 Decoders and add further 12 Decoders later. Another feature is the transmission of RS-232, USB and Infrared signals.

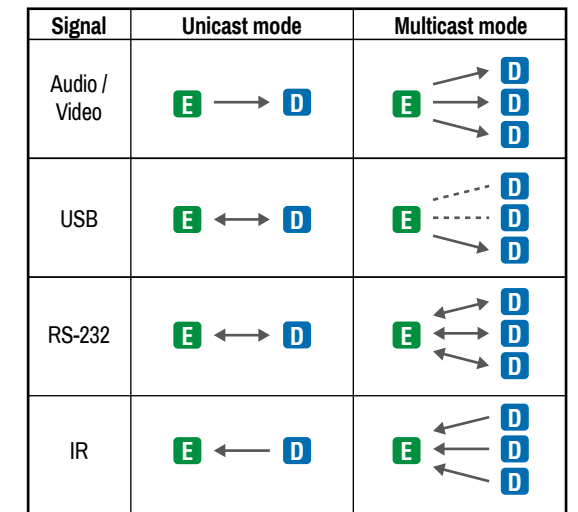
Unicast Mode (Point-to-Point Connection)

A Decoder is connected to an Encoder device.

Multicast Mode (Point-to-Multi point Connection)

Many Decoder devices are connected to the same Encoder.

The USB transmission is available only at one Encoder-Decoder connection at the same time. The desired device can be activated by the front panel button or via the built-in website.



Encoder Decoder

3.7. Video Interface

The following chapters describe the modes of the video transmissions. When the necessary network settings are arranged, the followings have to be set:

Video Stream ID Setting

DEFINITION: The **Video Stream ID** is a four-digit number sequence that identifies a certain stream generated by an Encoder and received by a Decoder.

The Video Stream ID creates the connection between a, Encoder and a Decoder. Set the Video stream ID to the same value in the desired VINX devices:

- Use the **DIP switch** and set a value other than '0000', or
- Set the **DIP switch** to '0000' and define the ID via the **built-in web page**, see the [Video Status and Settings](#) section, or
- Set the **DIP switch** to '0000' and define the ID by sending the necessary **LW3 command** to the device, see the [Setting up a Video Wall \(Example\)](#) section.

Unicast/Multicast Mode Setting

DEFINITION: The **Unicast** mode means an Encoder and a Decoder are connected directly.

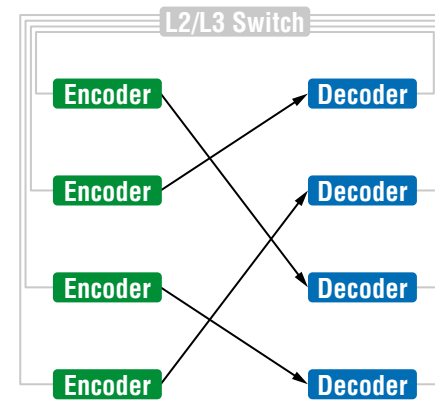
DEFINITION: The **Multicast** mode means Encoders and Decoders are connected via a switch in a Local Area Network (LAN).

Set the desired working mode of the extenders by:

- Selecting the mode via the **built-in web page**, see the [Advanced Settings](#) section, or
- Sending the necessary **LW3 command** to the device, see the [Setting the Working Mode \(Unicast/Multicast\)](#) section.

3.7.1. One-to-one Video Transmission (Unicast Mode)

The Encoder and the Decoder devices are arranged in a LAN by connecting them to an **L2 or L3 switch**. Setting the extenders to Unicast mode it is possible to extend the video signal by an Encoder to a dedicated Decoder.



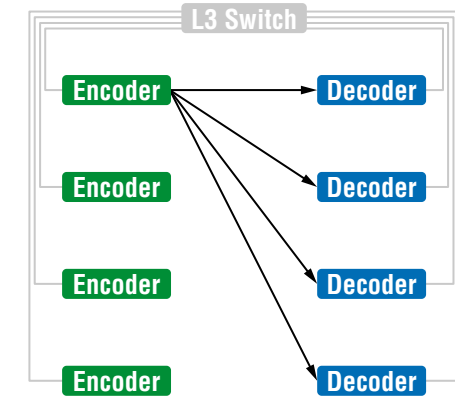
Displayed images of the Sinks connected to the Decoders



INFO: The Encoder and the Decoder can be connected directly and set to Unicast mode. In this case there is no need an L2/L3 switch but there is no way to communicate with other VINX devices.

3.7.2. One-to-All Video Transmission (Multicast Mode)

The Encoder and Decoder devices are arranged in a LAN by connecting them to an **L3 switch**. Setting the extenders to Multicast mode a certain video can be extended from an Encoder to multiple Decoders.



Video Wall Montage

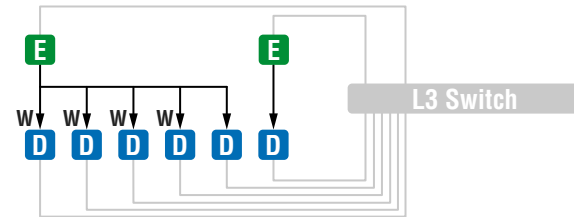


Tiled Video Wall

3.7.3. Layout Examples

Multicast Mode with Video Wall

The Layout



Features

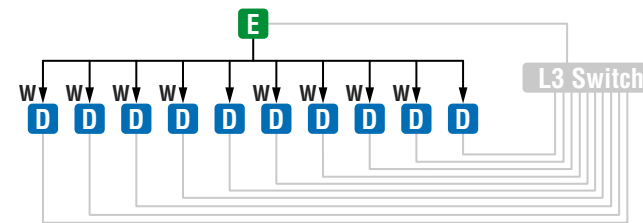
- 2x2-sized video wall is defined and further two single displays are installed (bottom row).
- Any of the video signals can be displayed on the wall and on a single display device.
- The other video signal can be seen on the other display device.
- The video signal on the wall can be changed by using software tools (built-in web or LW3 protocol commands).

Legend

- E** Encoder
- W** The Decoder is assigned to a Video wall
- D** Decoder

Two Video Walls and Local Monitors with One Encoder

The Layout

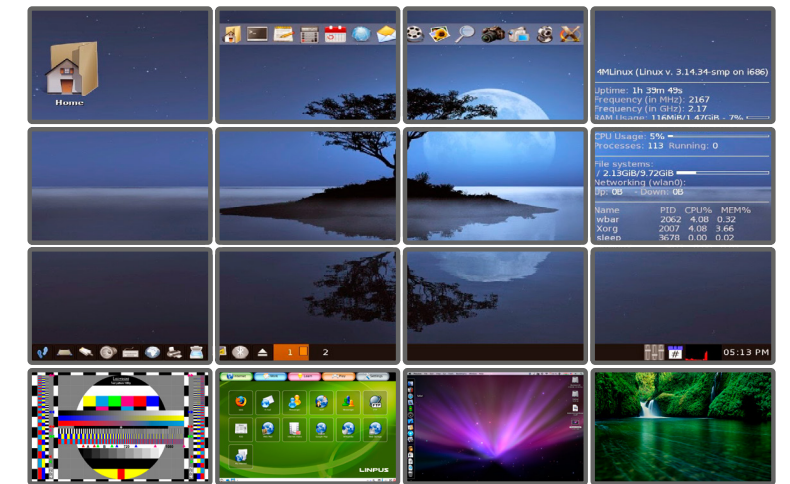
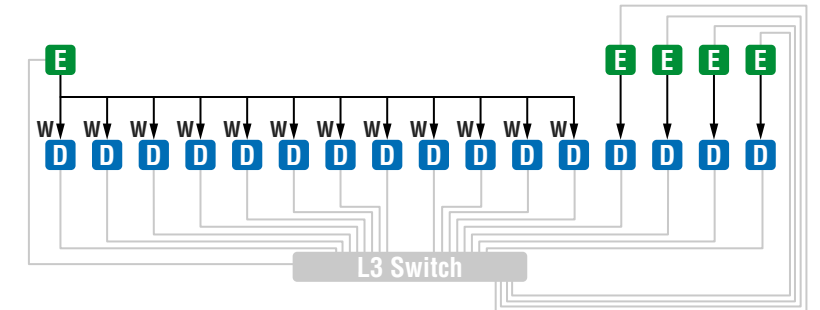


Features

- Two 2x2-sized video walls are defined and further 2 single displays are installed (e.g. the video walls and the local displays are located in different rooms).
- One video signal is displayed on the two video walls and on two local monitors.

Small View and Large View Combined in Multicast Mode

The Layout



Features

- 3x4-sized video wall is defined and further four single displays are installed (bottom row).
- Any of the video signals can be displayed on the wall and on a single display device.
- The other video signals can be seen on the other single display devices (bottom row).
- The video signal on the wall can be changed by using software tools (built-in web or LW3 protocol commands).

3.8. USB Interface

USB 1.1 and USB 2.0 data transmission works between an Encoder and a certain Decoder device. Connect the host device (e.g. a computer) to the Encoder and all the desired USB devices to the Decoder. Supported USB devices:

- **USB HID devices:** keyboard, mouse, presenter.
- **Mass storage devices:** USB flash drive, external hard drive.

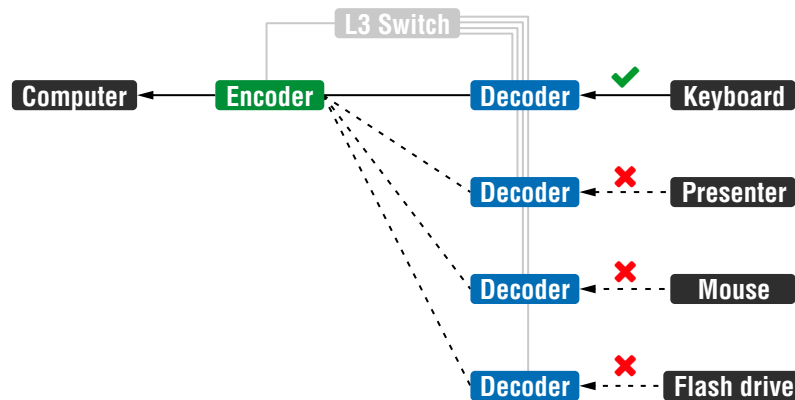
The transmission works in Unicast and Multicast mode as well, but in latter case the desired Decoder has to be selected by any of the following ways:

- Pressing the **Mode** button on the front panel for less, than 3 seconds (the connected display device will show **Starting USB**, the other Sinks will show **Stopping USB**),
- Pressing the **Acquire USB connection** button in the Advanced tab on the built-in web page (see the [USB Settings \(Multicast Mode\)](#) section), or
- Sending an LW3 command to the desired Decoder.

The USB devices connected to the other Decoders will be still powered but the data transmission is suspended.

ATTENTION! The active Decoder works like an extended USB hub connected to a computer. Please pay attention for the storage device to remove safely before unplugging it or interrupting during a disc operation.

INFO: The USB transmission is automatically enabled between the Encoder and the Decoder in Unicast mode.



USB Transmission between an Encoder and a Decoder

3.9. RS-232 Interface

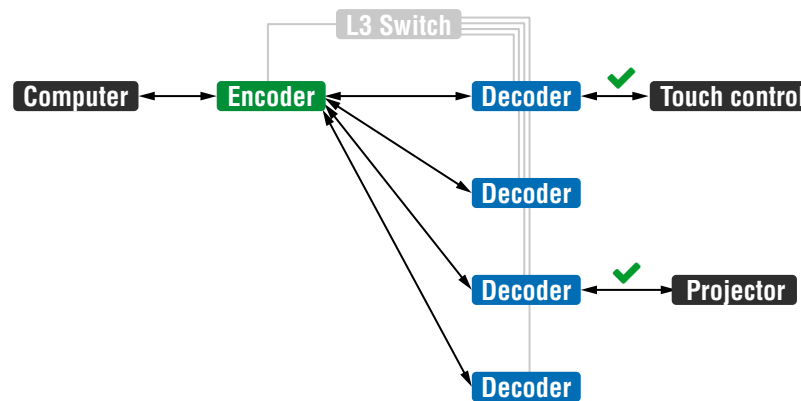
Serial data transmission works between an Encoder and all the connected Decoders which have the same Video Stream ID. This transmission is independent of the current working mode (Unicast/Multicast). To connect serial devices please use the cables supplied with the extenders.

ATTENTION! The serial data is transmitted only if video is transmitted between the affected devices.

Pass-through Mode

DEFINITION: The **Pass-through mode** means fully transparent bidirectional data transmission from an RS-232 port of a VINX Extender to an RS-232 port of a VINX Decoder – and Vice versa.

All data received from the serial port of the Decoders is transmitted to the serial port of the Encoder and vice versa: the data received from the serial port of the Encoder is transmitted to the serial port of all connected Decoders.



RS-232 Data Transmission (Pass-through mode)

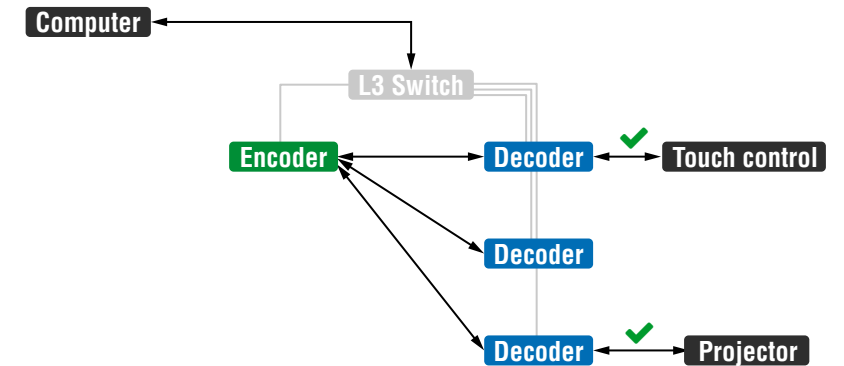
Besides, transmitting data between two Decoders is not possible; see the above figure: sending serial data from the Touch Control to the Projector is not possible.

ATTENTION! The data transmission works only if the serial port parameters are set to the same values in all devices: serial data sender/receiver and the VINX Encoder and Decoder devices.

Command Injection Mode

DEFINITION: The **Command Injection mode** is like an RS-232 bidirectional converter. The mode allows data transmission between a TCP/IP device and a serial device.

When a device is connected to the network (e.g. TCP/IP connection from a computer) and a serial device is connected to the RS-232 port of a VINX device they can communicate with each other.



RS-232 Data Transmission (Command Injection mode)

The mode can be enabled as described in the [Setting the RS-232 Port Mode](#) section.

4

Software Control - Using the Built-in Website

The VINX extenders allow setting all the parameters via a user-friendly interface. Open a web browser (Mozilla Firefox or Google Chrome is highly recommended) and connect to the extender to access the parameters and settings. The features of this built-in web are described in these sections.

- ▶ [ESTABLISHING THE CONNECTION](#)
- ▶ [THE MAIN WINDOW](#)
- ▶ [EDID MENU](#)
- ▶ [ADVANCED SETTINGS](#)
- ▶ [VIDEO WALL SETUP](#)

TIPS AND TRICKS: To get the best visibility of the screenshots in this chapter adjust the zoom setting of your PDF Reader software to 150% magnification.

4.1. Establishing the Connection



ATTENTION! The supported web browsers are Mozilla Firefox and Google Chrome.

INFO: The default setting of the IP address is dynamic (DHCP).

- Step 1.** Arrange the desired extenders with source/sink devices. Follow the steps described in the [Connecting Steps](#) section.
- Step 2.** Connect a suitable control device (e.g. computer, mobile device) to the same network.
- Step 3.** Open the web browser and type the IP address of the desired VINX device in the address line. If the IP address is not known try the following:
 - a) The factory default IP address is Dynamic (DHCP). Check the list of the connected devices (DHCP client list) in the DHCP server and note the IP address.
 - b) When you successfully connected to a device, all the other counterpart devices will be listed on its web page, see the **Main settings tab** (General section).

4.2. The Main Window

4.2.1. General Settings

- UNICAST** The current working mode
- DIP SWITCH** The Video stream ID is set by the DIP switch
-  The given Decoder belongs to a video wall
-  Displaying the Main Menu (if there is not enough space)

Grouping the VINX Extenders

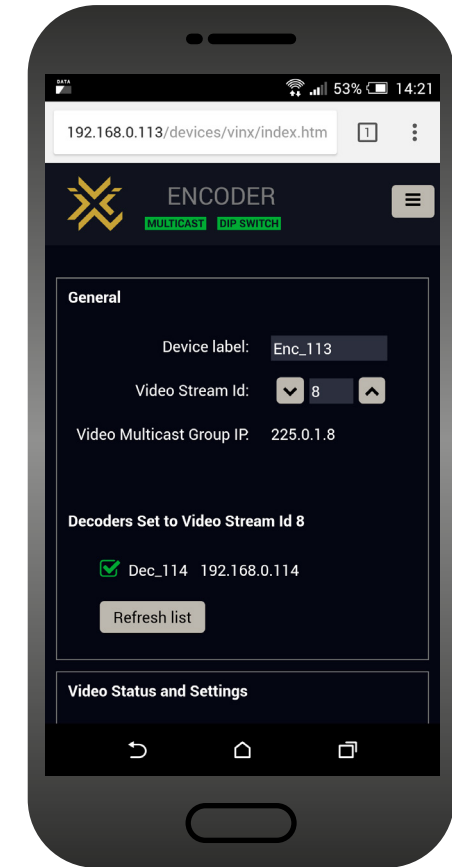
Video Stream ID

The current ID number is shown. The following rules are defined to avoid Video Stream ID conflicts:

- When the DIP switch is in **0000** position the SW setting will be valid or else the HW setting (DIP switch) will be valid.
- When the DIP switch is set back to **0000** the SW setting will inherit the ID (the previous DIP switch value).
- SW setting and HW setting can be combined within the group but in this case the DIP switch value will determine the common Video Stream ID.

Decoder Assignment

The list contains the VINX devices which are available within the same subnet. Mark the desired devices to connect.



The Main Window of the Built-in Website (Displayed on a Mobile Device)

ATTENTION! It might happen that two or more Encoders installed in the same system with the same Video Stream ID. That would result display problems (e.g. more mouse cursors are displayed when desktop images are shown). Check the Video Stream ID settings of the Encoders.

4.2.2. Video Status and Settings

The properties of the incoming and outgoing video signals are displayed with the followings:

- Selecting the emulated EDID (see the [EDID Operations](#) section).
- Enabled/disable HDCP encryption on the input.
- Selecting the video quality (see below).
- Displaying the Frame Detector in a new window.

ATTENTION! If the HDCP setting is changed a window will pop up to confirm your selection. The device is restarted automatically when clicking **Yes**.

ATTENTION! The EDID information cannot be read by the source attached to the HDMI input of an Encoder if HDCP is disabled on the input. That may stop the video transmission in the case of certain source devices.

INFO: In the case of the Decoder, the incoming signal is detected only if a display device is connected to the output port.

Video Transmission Quality

The extended video signal is compressed which allows setting the desired video quality in the Encoder as follows:

- **Video mode** (Lower Quality, less bandwidth): the encoding quality is adjusted to the available bandwidth.
- **Graphics mode** (Higher Quality, more bandwidth): the best possible video quality is produced even if it causes the stream to break due to bandwidth limitation in the transmission path.

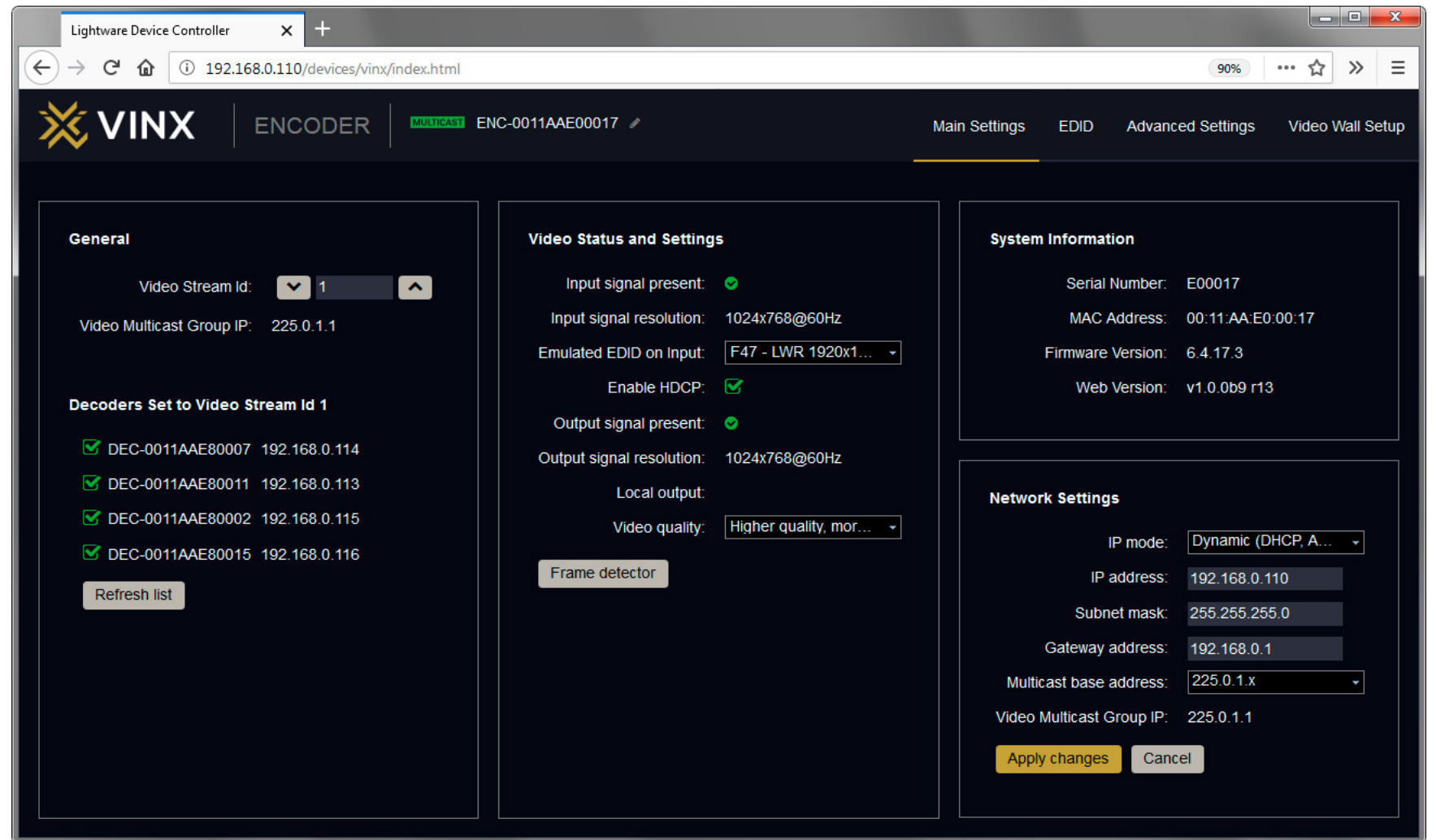
ATTENTION! When the mode is changed by the **Mode** button of the Encoder **Video mode / Graphic mode** text is displayed on the sinks connected to the Decoders.

4.2.3. Network Settings

The factory default IP address is set dynamically by a DHCP server. The drop-down list and the further parameters allow changing the network settings to the desired value.

ATTENTION! When the desired Network parameters are set press the **Apply changes** button; the device will reboot.

ATTENTION! Please use the port number 6107 for connecting to the device directly from a third-party application (e.g. a terminal software or other controller application).



*The Main Window of the Built-in Website
(Displayed on a Computer)*

4.3. EDID Menu

DEFINITION: The **Extended Display Identification Data (EDID)** is the passport of display devices. It contains information about the capabilities of the display, such as supported resolutions, refresh rates, the type and manufacturer of the display device, etc.

See more information in the [EDID Management](#) section.

The left panel contains the **Source EDIDs**, the right panel contains the **Destination places** where the EDIDs can be emulated or copied.

4.3.1. EDID Operations

Changing the Emulated EDID

- Step 1.** Choose the desired **EDID list** on the source panel and select an **EDID**.
- Step 2.** Select the **Emulated** tab on the Destination panel.
- Step 3.** Select the desired **port** on the right panel.
- Step 4.** Press the **Transfer** button to change the emulated EDID.

Learning an EDID

The process is the same as changing the emulated EDID; the only difference is the Destination panel: select the **User** tab. Thus, one or more EDIDs can be copied into the user memory.

Exporting an EDID

The source EDID can be downloaded as a file (*.EDID) to the computer.

- Step 1.** Select the desired **EDID** from the Source panel.
- Step 2.** Press the **Export** button and save the file to the computer.

Importing an EDID

Previously saved EDID file (*.EDID) can be uploaded to the user memory:

- Step 1.** Select the **User** tab on the Source panel and select a **memory** slot.
- Step 2.** Press the **Import** button below the Source panel.
- Step 3.** Browse the file in the opening window then press the **Open** button. The content of the EDID file is imported into the selected User memory.

ATTENTION! The new EDID overwrites the selected memory place.

Deleting EDID(s)

The EDID(s) from the User memory can be deleted as follows:

- Step 1.** Select the **User** tab on the Destination panel.
- Step 2.** Select the desired **memory** slot(s); one or more can be selected (**Select All** and **Select None** buttons can be used).
- Step 3.** Press the **Clear selected** button to delete the EDID(s).

Mem...	Manu...	Resolution	Audio	Monitor Name
F1	LWR	640x480p60.00Hz	N/A	D640x480p60
F3	LWR	800x600p60.32Hz	N/A	D800x600p60
F4	LWR	1024x768p60.00Hz	N/A	D1024x768p60
F5	LWR	1280x768p50.00Hz	N/A	D1280x768p50
F6	LWR	1280x768p59.94Hz	N/A	D1280x768p60
F7	LWR	1280x768p75.00Hz	N/A	D1280x768p75
F8	LWR	1360x768p60.02Hz	N/A	D1360x768p60
F9	LWR	1280x1024p50.00Hz	N/A	D1280x1024p50
F10	LWR	1280x1024p60.02Hz	N/A	D1280x1024p60
F11	LWR	1280x1024p75.02Hz	N/A	D1280x1024p75
F15	LWR	1680x1050p60.00Hz	N/A	D1680x1050p60
F20	LWR	1600x1200p50.00Hz	N/A	D1600x1200p50
F21	LWR	1600x1200p60.00Hz	N/A	D1600x1200p60
F22	LWR	1920x1200p50.00Hz	N/A	D1920x1200p50
F23	LWR	1920x1200p59.56Hz	N/A	D1920x1200p60
F29	LWR	1920x1080p60.00Hz	N/A	Univ_DVI
F32	LWR	640x480p59.95Hz	2chLPCM	H640x480p59
F33	LWR	720x480p59.94Hz	2chLPCM	H720x480p59

Memory	Manu...	Resolution	Audio	Monitor Name
U1	DEL	1920x1200p59.95Hz	N/A	DELL U2412M
U2	N/A	N/A	N/A	N/A
U3	N/A	N/A	N/A	N/A
U4	N/A	N/A	N/A	N/A
U5	N/A	N/A	N/A	N/A

The EDID Menu of the Built-in Website

4.3.2. EDID Memory Structure

The EDID memory consists of four sections:

- **Factory EDID list** shows the pre-programmed EDIDs (F1-F132).
- **Decoder EDID list** shows the EDIDs of the display devices connected to the assigned Decoders. The Decoders store the last display devices' EDID on the HDMI output, so there is an EDID shown even if there is no display device attached to the output port at that moment.

- **User memory locations** (U1 – U5) can be used to save custom EDIDs. Any EDID from any of the User/Factory/Decoder EDID lists can be copied to the user memory.
- **Emulated EDID** shows the currently emulated EDID for the HDMI input port of the Encoder. The source column displays the memory location that the current EDID was routed from.

4.4. Advanced Settings

4.4.1. Common Settings (Encoder and Decoder)

The submenu contains two tabs: **Multicast** and **Unicast**. The currently valid mode is highlighted with blue. Press the desired button to choose the mode and access the settings.

ATTENTION! When the mode is changed the device must be restarted; you will get a notification.

Network Settings

For the details please see the [Network Settings](#) section.

Upgrade Firmware

For the details please see the [Firmware Upgrade](#) section.

Programmers' LW3 Terminal

See the [LW3 Terminal](#) section (next page).

RS-232 Settings (Pass-through mode)

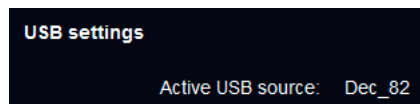
The RS-232 serial data transmission is fully transparent between the Encoder and the connected Decoder devices. All data received on the serial port of the Decoders is transmitted to the serial port of the Encoder and vice versa: the data received on the serial port of the Encoder is transmitted to the serial port of all connected Decoders.

ATTENTION! The data transmission works only if the serial port parameters set to the same values in all the devices: serial data sender/receiver and the VINX Encoder and Decoder devices.

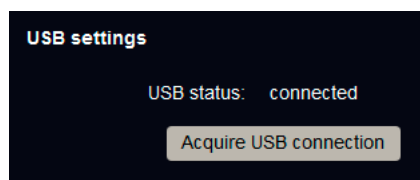
See more information in the [RS-232 Interface](#) section.

USB Settings (Multicast Mode)

The **Encoder** displays the name of the currently connected Decoder.



The **Decoder** displays if the USB connection is established; press the button to acquire the connection if needed.



The screenshot shows the web interface for a VINX Encoder in Multicast Mode. The browser address bar shows '192.168.0.110/devices/vinx/index.html'. The interface has a dark theme and includes the following sections:

- System Information:** Serial Number: E00017, MAC Address: 00:11:AA:E0:00:17, Firmware Version: 6.4.17.3, Web Version: v1.0.0b10 r14.
- Upgrade Firmware:** Selected firmware file to upload, with buttons for 'Choose file' and 'Upgrade Firmware'.
- Network Settings:** IP mode: Dynamic (DHCP, A...), IP address: 192.168.0.110, Subnet mask: 255.255.255.0, Gateway address: 192.168.0.1, Multicast base address: 225.0.1.x, Video Multicast Group IP: 225.0.1.1. Buttons for 'Apply changes' and 'Cancel'.
- RS232 Settings:** Baudrate: 115200, Data bits: 8, Parity: None, Stop bits: 1. Buttons for 'Apply changes' and 'Cancel'.
- Programmers' LW3 Terminal:** A button labeled 'Programmers' LW3 Terminal'.
- USB settings:** Active USB source: DEC-0011AAE80002.
- Reboot:** A button labeled 'Restart the device'.

The Advanced View of an Encoder in Multicast Mode

4.4.2. Scaler Settings (Decoders)

DEFINITION: Scaling a video signal means changing the image resolution. The new resolution may change the aspect ratio and/or the appearance of the image.

Output Scaling

The outgoing video signal can be set in each Decoders separately. The following options are available:

- **Pass-through:** the resolution, the refresh rate, and the type of the outgoing and incoming signals are the same.
- **Auto detect from EDID:** the resolution of the outgoing video is scaled to meet with the preferred timing coming from the EDID of the connected display device.
- **Custom:** a wide range of the scaling resolution is available from 640x480 till 4096x2160.

Output Standard

When the Output scaling is set to **Custom**, the outgoing signal can be set to **DVI** or **HDMI**.

Picture Rotation/Flip

The following options are available:

- No rotation,
- Flip vertically,
- Flip horizontally,
- Rotate 90 degrees,
- Rotate 180 degrees,
- Rotate 270 degrees.

The screenshot displays the VINX Decoder web interface in Multicast Mode. The browser address bar shows the URL `192.168.0.117/devices/vinx/index.html`. The interface includes a navigation menu with 'Main Settings', 'Advanced Settings', and 'Video Wall Setup'. The 'Advanced Settings' page is active, showing several configuration panels:

- System Information:** Serial Number: E80002, MAC Address: 00:11:AA:E8:00:02, Firmware Version: 6.4.17.3, Web Version: v1.0.0b10 r14.
- Network Settings:** IP mode: Dynamic (DHCP, A...), IP address: 192.168.0.117, Subnet mask: 255.255.255.0, Gateway address: 192.168.0.1, Multicast base address: 225.0.1.x, Video Multicast Group IP: 225.0.1.1.
- Upgrade Firmware:** Selected firmware file to upload, with buttons for 'Choose file' and 'Upgrade Firmware'.
- Programmers' LW3 Terminal:** A button labeled 'Programmers' LW3 Terminal'.
- RS232 Settings:** Baudrate: 115200, Data bits: 8, Parity: None, Stop bits: 1, with 'Apply changes' and 'Cancel' buttons.
- USB settings:** USB status: not connected, with an 'Acquire USB connection' button.
- Scaler settings:** Output scaling: Auto detect from EDID, Custom: Scaling disabled, Output standard: HDMI, Picture rotation / flip: No rotation.

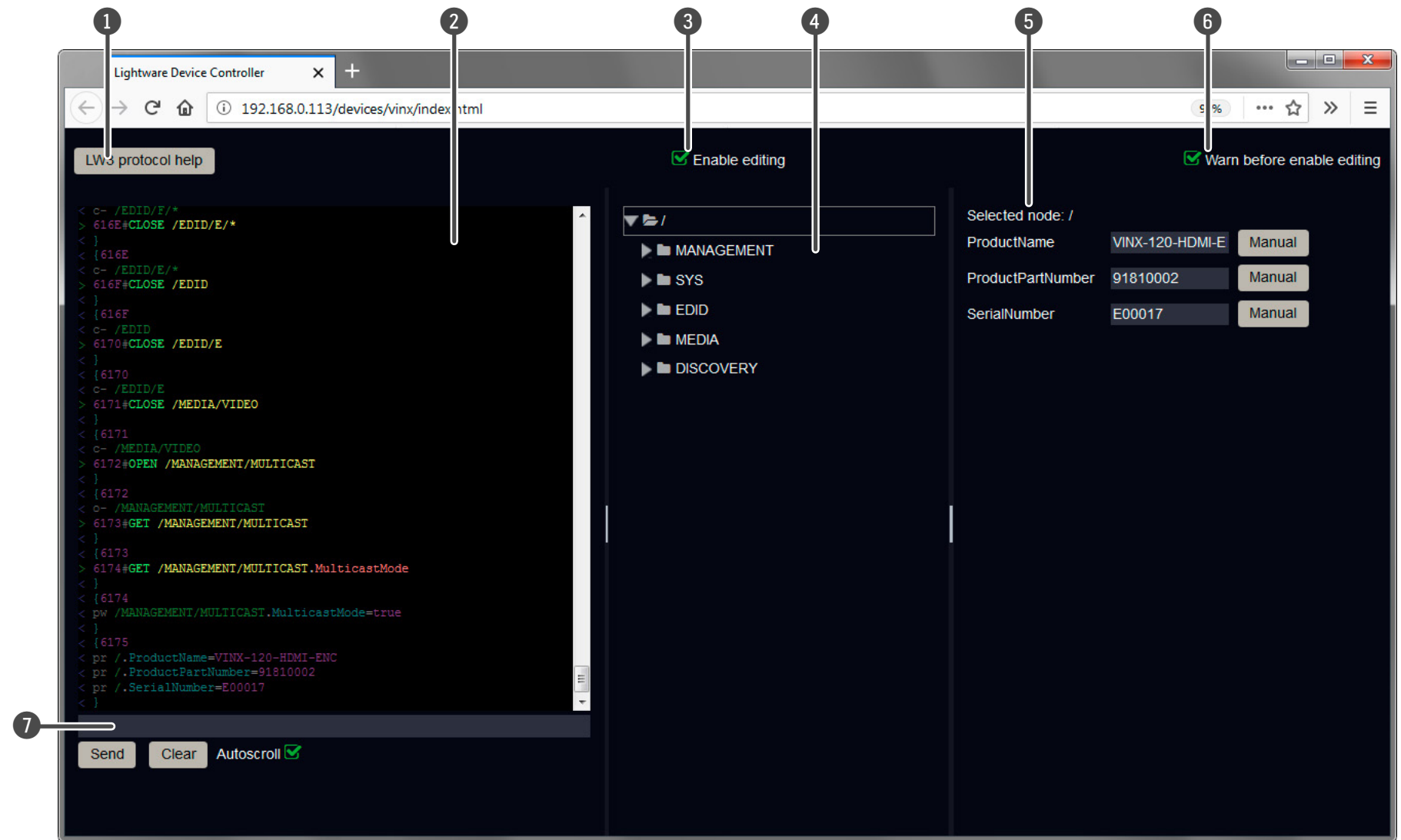
The Advanced View of a Decoder in Multicast Mode

4.4.3. LW3 Terminal

This window is the surface of the Lightware Protocol 3 (LW3) tree with a terminal window. Commands and specific parameters (which are not available on the graphical user interface of the LDC) can be run and set. The introduction of the LW3 protocol and the most important commands can be found in the [Programmers' Reference](#) section.

Legend

- 1 **LW3 Protocol Help** Displaying the most important information about LW3 protocol commands in a new window.
- 2 **Terminal Window** Commands and responses with time and date stamps are listed in this window. Sent command starts with '>' character, received response starts with '<' character. The content of the window can be emptied by the **Clear** button. If the **Autoscroll** option is ticked, the list is scrolled automatically when a new line is added.
- 3 **Edit Mode** The default appearance is the read-only mode. If you want to modify the values or parameters, tick the option. You will be prompted to confirm your selection.
- 4 **Protocol Tree** LW3 protocol tree; select an item to see its content.
- 5 **Node List** The parameters and nodes of the selected item in the protocol tree are shown.
 - **Manual** button: displaying the manual (short description) of the node in a pop-up window.
 - **Set** button: Saving the value/parameter typed in the textbox.
 - **Call** button: Executing the method, e.g. reloading the factory default settings.
- 6 **Warning Mode** If this option is enabled, a warning window pops up when you enable the **Edit mode**.
- 7 **Command Line** Type the desired command and execute it by pressing the **Send** button.



The Terminal Window

4.5. Video Wall Setup


ATTENTION! This tab is displayed only when the device is in Multicast mode. Although changing parameters usually takes effect within an acceptable period of time, it might happen that feedback is not received and not visible on the web page for several seconds.

Basic Rules

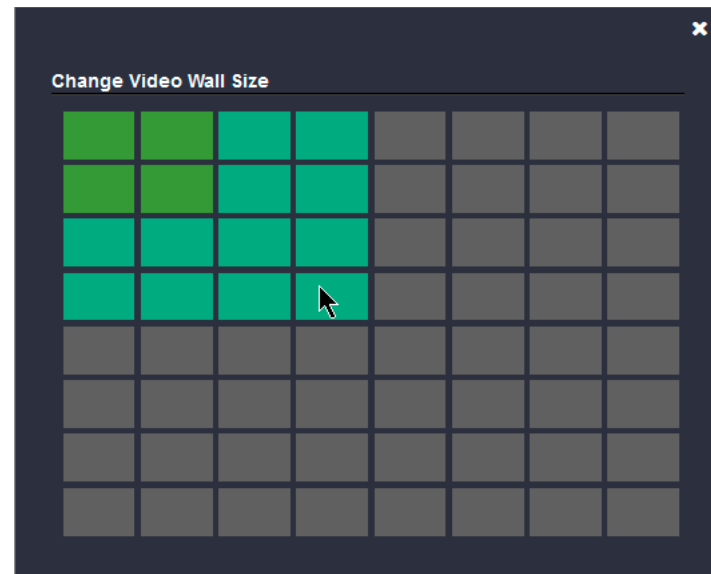
- One Decoder can be a part of only one video wall.
- The video wall must have a unique name within a system; the length of the name shall not exceed 24 characters.
- The video wall parameters are stored in the LW3 protocol tree of the Decoders but you can also create/access it in the Encoder.

4.5.1. Creating a Video Wall

Step 1. Navigate to the **Video Wall Setup** page.

Step 2. Press the **New video wall** button. Enter the desired name of the wall (press the pencil icon  to change) and press the **Enter** or click on the pencil icon.

Step 3. Press the **Change Video Wall Size** button to set the exact size of the wall. A new window will pop up, click on the desired size.



Step 4. Drag and drop the Decoders to the desired place in the Video wall. The setting is saved automatically in all affected Decoders.

ATTENTION! A New video wall is stored only when at least one Decoder is linked to the wall.

Video Wall Setup Page

4.5.2. Gap and Bezel Settings

ATTENTION! Always press the **Apply changes** button if you want to save the changes of the below mentioned parameters.

DEFINITION: Hereby defined **Gap** means the physical distance between the edges of the display devices – see the attached figure.

DEFINITION: The **Bezel** means the thickness of the Display device's frame – see the attached figure.

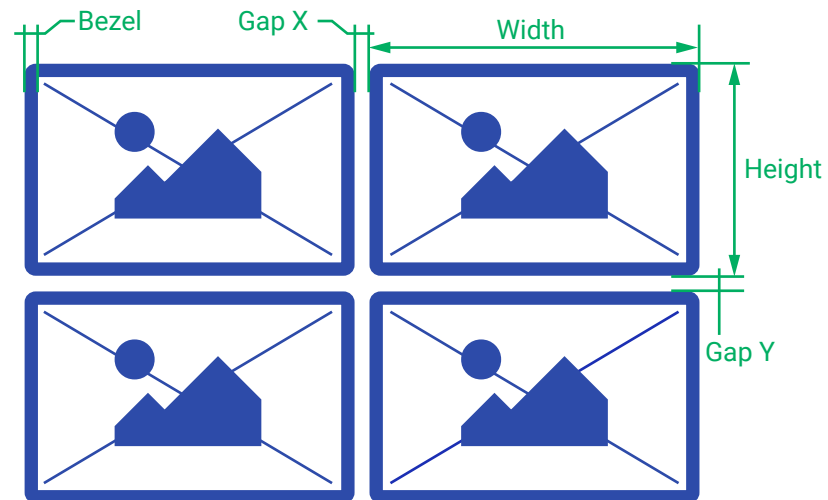
In certain cases, the dimensions of the sinks and the arrangement of the video wall requires special parameters to set. The Gap and Bezel parameters allow setting the non-visible areas (between the display devices) of the image:



No Gap (left) and Manually Set Gap (right)

- **No Gap:** The left figure shows that no gap is defined. In this case, the whole image is shown on the screens but the image looks a bit distorted.
- **Defined Gap:** The right figure shows that gap is defined, therefore, some part of the image is not visible, but the appearance of the overall image is more realistic.

Set the bezel and gap parameters which suit the best for the current image content.



The following parameters can be set:

- **Display Size** (width and height): the physical size (dimensions) of the screen (screen size + bezel).
- **Bezel Settings** (top, bottom, left, right): the physical size (thickness) of the bezel.
- **Gap Settings** (horizontal, vertical): the distance of the displays (see the following section).

INFO: If the Bezel and Gap values are set to zero the dimensions do not matter.

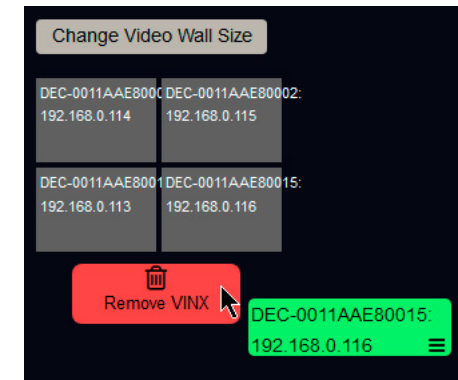
4.5.3. Modifying a Video Wall

The Name of the Video Wall

Click on the icon to edit the name of the video wall. Press the **Enter** or the icon to save the new name.

Changing the Layout of the Decoders

Step 1. Drag and drop a Decoder to the below indicated red colored (hidden) place; the device will be removed from the wall.



Step 2. Another Decoder can be dragged and dropped to the empty place.

Step 3. The removed Decoder can be dragged and dropped to another place from the **Dustbin** if necessary.

ATTENTION! If you change the size of an existing video wall the previously assigned Decoders will be lost; drag and drop the devices again to the desired places.

TIPS AND TRICKS: The Dustbin works like a buffer storage: all the removed Decoders are stored after each other and the last deleted one is on the top (accessible).

4.5.4. Deleting a Video Wall

Step 1. Select the desired video wall from the list.

Step 2. Click in the **Delete video wall** button and confirm in the pop-up window. The original image will be displayed on all connected Decoders.

Step 3. It might happen that feedback is not received and not visible on the web page. Wait 10 seconds when the video wall is deleted and press the **Refresh wall and unit list** button.

5

Programmers' Reference

The device can be controlled through Lightware 3 (LW3) protocol commands to ensure the compatibility with other Lightware products. The supported LW3 commands are described in this chapter.

- ▶ OVERVIEW
- ▶ ELEMENTS OF THE TREE STRUCTURE
- ▶ CONTROLS AND PREFIXES
- ▶ TREE STRUCTURE EXAMPLES
- ▶ LW3 COMMANDS
- ▶ SYSTEM COMMANDS
- ▶ NETWORK CONFIGURATION
- ▶ ENCODER-RELATED COMMANDS
- ▶ DECODER-RELATED COMMANDS
- ▶ SERIAL PORT SETTINGS
- ▶ ARRANGING THE EXTENDERS TO GROUPS
- ▶ VIDEO WALL SETTINGS
- ▶ SETTING UP A VIDEO WALL (EXAMPLE)
- ▶ EDID MANAGEMENT (ENCODER)
- ▶ LW3 COMMANDS - QUICK SUMMARY

5.1. Overview

Lightware 3 (LW3) protocol is used by more and more Lightware products ; the protocol is ASCII-based and all commands are terminated with a carriage return (Cr, '\r') and line feed (Lf, '\n') pair. It is organized as a tree structure that provides outstanding flexibility for implementing a human readable, but programmatically still ease to parse, which is suitable for different products with a different feature list. In order to implement a flexible, easy-to-use protocol that is straightforward to adapt to new devices and provides outstanding scalability and sustainability, we decided to organize all settings, parameters and properties of the device to a tree structure with 'nodes', 'properties' and 'methods'.

5.2. Elements of the Tree Structure

ATTENTION! All names and values are case-sensitive. The space character is replaced by the '•' character in the elements and commands descriptions.

5.2.1. Node

- The basic building block of the tree structure is the 'node'.
- The node can have multiple child nodes, but only one parent.
- The tree has only one root the 'root node'.
- The leaves of the tree are also nodes, which do not have child nodes.
- The nodes are separated by a slash ('/') character.
- All the slashes are 'right slashes', no backslash is used.
- The identifier of the root node is a slash ('/')
- The node name can contain the elements of the English alphabet and numbers.
- Recommended convention for case sensitivity:
 - Fix nodes (that cannot be altered) are capitalized.
 - User created nodes can contain both lowercase and capital letters, no restrictions.
- The path of a node has to contain all parent nodes from the root node.

Format: (the root node): nX•/

Path: nX•/[nodeName]/[nodeName]/[nodeName]

Legend:

n: node

'X' can be:

' ': default for a node.

'm': the manual of the node.

'E': error message for the node.

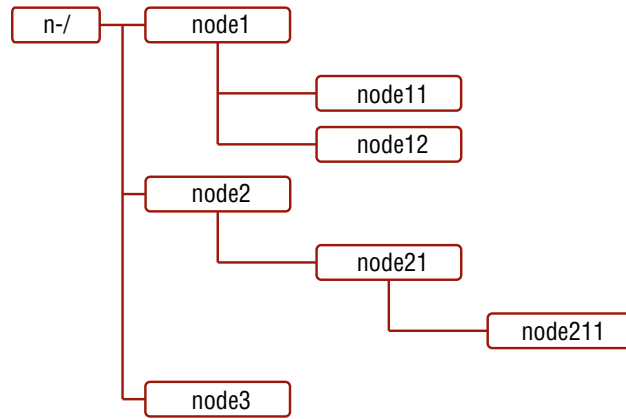
's': this is a symlink node.

'v': this node has virtual children.

'r': this is a remote node.

INFO: All parent nodes must be listed in the path of a node.

Following example presents the structure of the tree traversal:



Tree structure of the nodes

Path of the nodes:

```

n- /node1
n- /node1/node11
n- /node1/node12
n- /node2
n- /node2/node21
n- /node2/node21/node211
n- /node3
  
```

5.2.2. Property

The 'property' in the LW3 protocol is basically a leaf, which has a well-defined value.

- A property has a value.
- A property cannot have child nodes or child properties. It is always a leaf.
- A node can have any number of properties (may not have any).
- A property is referenced with a dot ('.') after the node name.
- The properties' name can contain the elements of the English alphabet, numbers and underscore ('_') character.
- By convention, properties are beginning with a capital letter, all other characters are lowercase ones. In the case of compound words, all words are beginning with a capital letter (CamelCase).
- The value of the property can contain any readable ASCII character.
- A property can be read-only or read/write.

Format: pX●/[nodeName].[propertyName]=[propertyValue]

Legend:

p: property

'X' can be:

'r': if the property is read-only.

'w': if the property is readable, writable.

'm': the manual of the property.

'E': error message for the property.

'v': virtual node property: contains a node path to a node which will be linked to the property's parent node.

Example:

The following two ones are read-only properties:

```

pr●/node1/node12.ReadOnlyProperty=value1
pr●/.DeviceName=VINX-110-HDMI-DEC
  
```

The following two ones are read-write properties:

```

pw●/node1/node12.ReadWriteProperty=value2
pw●/SYS/MB.DeviceLabel=Dec_81
  
```

5.2.3. Method

The 'method' in the LW3 protocol is also a leaf. It cannot have a value, such as the properties, but it can be invoked with a parameter with the help of a special 'CALL' command.

- A method cannot have child nodes or child methods. It is always a leaf.
- A node can have any number of methods (may not have any).
- A method is referenced with a colon (':') after the node.
- The methods' name can contain the elements of the English alphabet, numbers and underscore ('_') character.
- By convention, methods are beginning with lowercase letter. In case of compound words, the very first letter is lowercase, and the first letter of each other words are capitalized (lowerCamelCase).
- The parameter of the method can contain any readable ASCII character.
- The method always has a return 'state' if the method could be executed. The state could be either 'OK' or 'FAILED'.
- The method does not necessarily have a return 'value'. If it does, it can contain additional information, which is always specific to the current case (the return value can specify why the execution failed).
- When the method cannot be executed (e.g. the parameter list is illegal), there is an error message.

Format: mX●/[nodeName]:[methodName]=[returnValue]

Legend:

m: method

'X' can be:

'O': when the execution of the method was successful (OK).

'F': when the execution of the method failed.

'm': the manual of the method.

'E': error message for the method.

Example:

```

mO●/node1/node12:method1
mO●/MEDIA/VIDEO/I1:HdcpEnable
mE●%E001:Syntax error
mm●/EDID:reset [] Reset all settings to factory default
  
```

5.3. Controls and Prefixes

5.3.1. Escaping

Property values and method parameters can contain characters that are used as control characters in the protocol. They must be escaped. The escape character is the backslash ('\') and escaping means injecting a backslash before the character that should be escaped (like in C language).

Control characters are the followings: \ { } # % () \r \n \t

Example:

The original text: John●(Doe).●#3:●5%2=1●node1\node11

The escaped text: John●\\(Doe\\).●\\#3:●5\\%2=1●node1\\node11

5.3.2. Error Messages

There are several error messages defined in the LW3 protocol, all of them have a unique error number.

Format: XE●[primitive]●%EYYY:●[Error message]

Legend:

'X' can be:

- ' ': syntax error. Cannot parse the command at all.
- 'n': node error.
- 'p': property error.
- 'm': method error.

YYY: error code, which can be one of the followings:

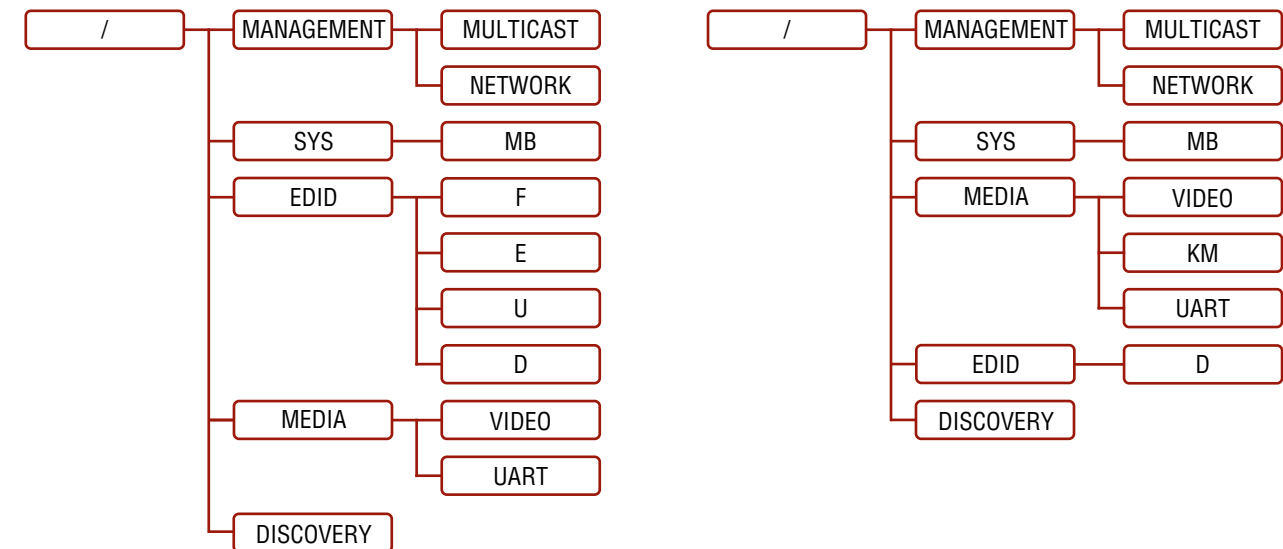
YYY: error code	Name	Default text
000	Lw3ErrorCodes_None	
001	Lw3ErrorCodes_Syntax	Syntax error
002	Lw3ErrorCodes_NotFound	Not found
003	Lw3ErrorCodes_AlreadyExists	Already exists
004	Lw3ErrorCodes_InvalidValue	Invalid value
005	Lw3ErrorCodes_IllegalParamCount	Illegal parameter count
006	Lw3ErrorCodes_IllegalOperation	Illegal operation
007	Lw3ErrorCodes_AccessDenied	Access denied
008	Lw3ErrorCodes_Timeout	Timeout
009	Lw3ErrorCodes_CommandTooLong	Command too long
010	Lw3ErrorCodes_InternalError	Internal error
011	Lw3ErrorCodes_NotImplemented	Not implemented

5.3.3. Prefix Summary

The following prefixes are defined in the LW3 protocol:

- 'n-': a node,
- 'nE': an error for a node,
- 'nm': a manual for a node,
- 'pr': a read-only property,
- 'pw': read-write property,
- 'pE': an error for the property,
- 'pm': a manual for the property,
- 'm-': a method,
- 'mO': a response after a success method execution,
- 'mF': a response after a failed method execution,
- 'mE': an error for a method,
- 'mm': a manual for a method.

5.4. Tree Structure Examples



The LW3 Protocol Tree of the Encoder (left) and the Decoder (right)

5.5. LW3 Commands

5.5.1. Get Command

The 'GET' command can be used to get the child nodes, properties and methods of a specific node. It can also be used to get the value of a property.

The Response Format

The first two characters of a response unambiguously identify the type of the element that the response line concerns. The first character is the type of the element (node, property or method), the second is for miscellaneous information (e.g. read/write rights).

The defined prefixes are:

```
'n-':  node
'pr':  property - only readable
'pw':  property - writable, readable
'm-':  method executable
```

After the prefix, the response contains the full path of the node, property or method after a space character.

Get All Children of a Node

Get all of the child nodes of a parent node, with one GET command.

Command format: GET●[nodePath]

Response format: n-●[nodePath]

Example:

```
> GET /MEDIA
< n- /MEDIA/VIDEO
< n- /MEDIA/UART
```

Get All Properties and Methods of a Node

Get all properties and methods of a node, with one GET command and asterisk character.

Command format: GET●[nodePath].*

Response format: (for properties)

pX●[nodePath].[propertyName]=[parameter]

Legend:

X can be:

```
'r':  read-only
'w':  read-write
```

Response format: (for methods)

m-●[nodePath]:[methodName]

Example:

```
> GET /EDID.*
< pr /EDID.EdidStatus=F47:E1
< m- /EDID:copy
< m- /EDID:delete
< m- /EDID:reset
< m- /EDID:switch
< m- /EDID:switchAll
```

Get All Child Nodes, Properties and Methods of a Node

Get all child nodes, properties and methods of a node with one command, without using a wild card.

Command format: GETALL●[nodePath]

Response format: (for nodes)

n-●[nodePath]

Response format: (for properties)

pX●[nodePath].[propertyName]=[parameter]

Legend:

X can be:

```
'r':  read-only
'w':  read-write
```

Response format: (for methods)

m-●[nodePath]:[methodName]

Example:

```
> GETALL /EDID
< n- /EDID/F
< n- /EDID/D
< n- /EDID/U
< n- /EDID/E
< pr /EDID.EdidStatus=F47:E1
< m- /EDID:copy
< m- /EDID:delete
< m- /EDID:reset
< m- /EDID:switch
< m- /EDID:switchAll
```

5.5.2. Set Command

The setter command can be used to modify the value of a property.

Command format: SET●[nodePath].[propertyName]=[newPropertyValue]

Response format:

The response for setting a property to a new value is the same as the response for the 'GET' command. The value in the response is the new value if the execution of the 'SET' command was successful, otherwise the unmodified 'old value' with an error message.

pw●[nodePath].[propertyName]=[newPropertyValue]

Example:

```
> SET /MEDIA/UART/P1.BaudRate=115200
< pw /MEDIA/UART/P1.BaudRate=115200
```

Error response format:

If there were errors during setting a property, an error message follows the unmodified property value.

pE●[nodePath].[propertyName]=[unmodifiedValue]●%E00X:Error message

Legend: XXX: error number.

Examples:

```
> SET /MEDIA/VIDEO/I1.ForceHdcpVersion=3
< pE /MEDIA/VIDEO/I1.ForceHdcpVersion %E004:Invalid value
```

```
> SET /MEDIA/VIDEO/I1.SignalPresent=2
< pE /MEDIA/VIDEO/I1.SignalPresent %E007:Access denied
```

5.5.3. Invocation

A method can be invoked with the help of the 'CALL' command.

Command format: CALL●[nodePath]:[methodName]([parameter])

Response format:

The response for a method execution is a state and a value. The state is mandatory and always defined if the method could be executed. It can be either a success or a failure. The value is optional and it can contain additional information, such as the reason why the state is a failure or a specific value when the state is success that the client can process. It is also possible to get an error message when the method could not be executed – e.g. the parameter was illegal - and hence not even the state of the execution could be specified.

mX●[nodePath]:[methodName]=Y

Legend:

X can be:

'O': if the execution is successful.

'F': if the execution is failed, but the method could be executed.

'E': if the method could not be executed: e.g. illegal parameter count.

Y can be:

- The return value of the method if any.
- It is valid that a method does not have any return value. In this case, the equal sign ('=') can be omitted.

Example:

```
> CALL /EDID:switch(D1:E1)
< mO /EDID:switch
```

Error response format:

If there were errors during the execution, an error message is received, which follows the method name.

mE●[nodePath]:[methodName]●%E00X:Error message

Example:

```
> CALL /EDID:switch(D1:R1)
< mE /EDID:switch %E004:Invalid value
```

5.5.4. Manual

For every node, property and method in the tree there is a manual. The manual is a human readable text that describes the syntax and provides a hint for how to use the primitives.

Command format:

for nodes: MAN●[nodePath]

for property: MAN●[nodePath].[propertyName]

for method: MAN●[nodePath]:[methodName]

Response format:

The human readable manual is separated by a space (' ') character from the primitives.

for nodes: nm●[nodePath]●Human readable manual

for property: pm●[nodePath].[propertyName]●Human readable manual

for method: mm●[nodePath]:[methodName]●Human readable manual

Example: (for a property)

```
> MAN /MEDIA/VIDEO/I1.ForceHdcpVersion
< pm /MEDIA/VIDEO/I1.ForceHdcpVersion 0:A11 | 1:HDCP1.x | 2:HDCP2.2
```

Example: (for a method)

```
> MAN /SYS:reset
< mm /SYS:reset Restart the device
```

5.5.5. Signature

For some command, the response can contain multiple lines. Each line is terminated with a carriage return (Cr, '\r') and line feed (Lf, '\n') characters. In several cases the number of the lines in the response cannot be determined in advance, e.g. the client is intended waiting for the whole response and also wants to be sure, that the received lines belong together and to the same command. In these cases, a special feature the 'signature' can be used.

The signature is a four digit long hexadecimal value that can be optionally placed before every command. In that case, the response to that particular command will also be preceded by the signature, and the corresponding lines will be between brackets.

Command format: XXXX#[command]

Legend: xxxx: 4-digit long hexadecimal value.

Response format:

```
{XXXX
[command lines]
}
```

Example:

```
> 1103#GET /MEDIA/VIDEO.*
< {1103
< pr /MEDIA/VIDEO.I1=I1
< pr /MEDIA/VIDEO.O1=O1
< pr /MEDIA/VIDEO.PortCount=2
< }
```

INFO: The lines of the signature are also Cr and Lf terminated.

5.5.6. Subscription

A user can subscribe to any node. Subscribe to a node means that the user will get a notification if any of the properties of the node is changed. These notifications are asynchronous messages - such as the ones described above - and hence, they are useful to keep the client application up-to-date, without receiving any unwanted information. When the user does not want to be informed about the changes anymore, he can simply unsubscribe from the node.

ATTENTION! The subscriptions are handled separately for connections. Hence, if the connection is terminated all registered subscriptions are deleted. After closing a connection the subscribe command has to be sent in order to get the notifications of the changes on that connection.

Subscribe to a Node

Command format: OPEN●[nodePath]

Response format: o-●[nodePath]

Example:

```
> OPEN /MEDIA/VIDEO
< o- /MEDIA/VIDEO
```

Subscribe to Multiple Nodes

In order to subscribe to multiple nodes, the asterisk wild card can be used.

Command format: OPEN●[nodePath]/*

Response format: o-●[nodePath]/*

Example:

```
> OPEN /MEDIA/VIDEO/*
< o- /MEDIA/VIDEO/*
```

Get the Active Subscriptions for the Current Connection

Command format: OPEN

Response format: o-●[nodePath]

Example:

```
> OPEN
< o- /MEDIA/VIDEO
< o- /EDID
< o- /DISCOVERY
```

Unsubscribe from a Node

Command format: CLOSE●[nodePath]

Response format: c-●[nodePath]

Example:

```
> CLOSE /MEDIA/VIDEO
< c- /MEDIA/VIDEO
```

Unsubscribe from Multiple Nodes

Command format: CLOSE●[nodePath]/*

Response format: c-●[nodePath]/*

Example:

```
> CLOSE /MEDIA/VIDEO/*
< c- /MEDIA/VIDEO/*
```

5.5.7. Notifications about the Changes of the Properties

When the value of a property is changed and the user is subscribed to the node, which the property belongs to, an asynchronous notification is generated. This notification is called as the 'change message'. The format of such a message is very similar to the response for the 'GET' command.

Format: CHG●[nodePath].[propertyName]=[newPropertyValue]

Example:

```
< CHG /EDID.EdidStatus=F48:E1
```

A Short Example of How to Use the Subscription

In the following, an example is presented, how the subscriptions are working and how to use them. In the example, there are two independent users controlling the device through two independent connections ('Connection #1' and 'Connection #2'). The events in the rows occur after each other.

```
Connection #1 > OPEN /MEDIA/VIDEO/QUALITY
Connection #1 < o- /MEDIA/VIDEO/QUALITY
Connection #1 > GET /MEDIA/VIDEO/Quality.QualityMode
Connection #1 < pm /MEDIA/VIDEO/QUALITY.QualityMode=graphic
Connection #2 > GET /MEDIA/VIDEO/Quality.QualityMode
Connection #2 < pm /MEDIA/VIDEO/QUALITY.QualityMode=graphic
Connection #2 > SET /MEDIA/VIDEO/Quality.QualityMode=video
Connection #2 < pw /MEDIA/VIDEO/QUALITY.QualityMode=video
Connection #1 < CHG /MEDIA/VIDEO/QUALITY.QualityMode=video
```

Explanation: The first user (Connection #1) set a subscription to a node. Later the other user (Connection #2) made a change, and thanks for the subscription, the first user got a notification about the change.

GENERAL WARNING! PLEASE TAKE CARE WHEN MODIFYING THE PARAMETERS BY THE COMMANDS LISTED IN THE FOLLOWING SECTIONS. WRONG SETTINGS MAY RENDER THE DEVICE UNUSABLE.

5.6. System Commands

5.6.1. Querying the Product Name

The name of the product is a read-only parameter and cannot be modified.

Command format: GET●/.ProductName

Response format: pr●/.ProductName=<Product_name>

Example:

```
> GET /.ProductName
< pr /.ProductName=VINX-120-HDMI-ENC
```

5.6.2. Setting the Device Label

ATTENTION! This property is a writable parameter and not the same as the **ProductName**.

Command format: SET●/SYS/MB.DeviceLabel=<Custom_name>

Response format: pw●/SYS/MB.DeviceLabel=<Custom_name>

The <Custom_name> may consist of ASCII characters and can be 32 characters length. Longer names are truncated.

Example:

```
> SET /SYS/MB.DeviceLabel=Enc_80
< pw /SYS/MB.DeviceLabel=Enc_80
```

5.6.3. Querying the Serial Number

Command format: GET●/.SerialNumber

Response format: pr●/.SerialNumber=<serial_nr>

Example:

```
> GET /.SerialNumber
< pr /.SerialNumber=87654321
```

5.6.4. Querying the Firmware Version

Command format: GET●/SYS/MB.FirmwareVersion

Response format: pr●/SYS/MB.FirmwareVersion=<firmware_version>

```
> GET /SYS/MB.FirmwareVersion
< pr /SYS/MB.FirmwareVersion=6.4.17.3
```

5.6.5. Querying the Core Version

Command format: GET●/SYS/MB.CoreVersion

Response format: pr●/SYS/MB.CoreVersion=<core_version>

```
> GET /SYS/MB.CoreVersion
< pr /SYS/MB.CoreVersion=v1.0.0b4 r7
```

5.6.6. Resetting the Device

The extender can be restarted; the current connections (RS-232, USB, etc...) will be terminated.

Command format: CALL●/SYS:reset()

Response format: m0●/SYS:Reset

Example:

```
> CALL /SYS:reset()
< m0 /SYS:reset
```

5.6.7. Restoring the Factory Default Settings

Command format: CALL●/SYS:factoryDefaults()

Response format: m0●/SYS:factoryDefaults=

Example:

```
> CALL /SYS:factoryDefaults()
< m0 /SYS:factoryDefaults=
```

The device is restarted, the current connections are terminated, and the default settings are restored. See the complete list in the [Factory Default Settings](#) section.

5.7. Network Configuration

ATTENTION! When you change a network property the **applySettings** method must be called always to store the new settings. After that, the device is restarted automatically.

ATTENTION! Please use the port nr. 6107 for connecting to the device.

5.7.1. Querying the IP Address

Command format: GET●/MANAGEMENT/NETWORK.IpAddress

Response format: pr●/MANAGEMENT/NETWORK.IpAddress=<IP_Address>

Example:

```
> GET /MANAGEMENT/NETWORK.IpAddress
< pr /MANAGEMENT/NETWORK.IpAddress=192.168.0.100
```

5.7.2. Querying the DHCP State

Command format: GET●/MANAGEMENT/NETWORK.DhcpEnabled

Response format: pw●/MANAGEMENT/NETWORK.DhcpEnabled=true|false

Example:

```
> GET /MANAGEMENT/NETWORK.DhcpEnabled
< pw /MANAGEMENT/NETWORK.DhcpEnabled=true
```

Explanation:

The IP address assignment is dynamic, the device gets the IP address from the DHCP server.

5.7.3. Changing the DHCP State

Command format: SET●/MANAGEMENT/NETWORK.DhcpEnabled=true|false

Response format: pw●/MANAGEMENT/NETWORK.DhcpEnabled=true|false

Example:

```
> SET /MANAGEMENT/NETWORK.DhcpEnabled=false
< pw /MANAGEMENT/NETWORK.DhcpEnabled=false
```

Explanation:

The IP address assignment is set to static, thus, you have to set it manually.

5.7.4. Setting a Static IP Address

When the **DhcpEnabled** property is **false** you can set a static IP address.

Command format: SET●/MANAGEMENT/NETWORK.StaticIpAddress=<IP_address>

Response format: pw●/MANAGEMENT/NETWORK.StaticIpAddress=<IP_address>

Example:

```
> SET /MANAGEMENT/NETWORK.StaticIpAddress=192.168.0.85
< pw /MANAGEMENT/NETWORK.StaticIpAddress=192.168.0.85
```

5.7.5. Querying the Subnet Mask

Command format: GET●/MANAGEMENT/NETWORK.NetworkMask

Response format: pr●/MANAGEMENT/NETWORK.NetworkMask=<netmask>

Example:

```
> GET /MANAGEMENT/NETWORK.NetworkMask
< pr /MANAGEMENT/NETWORK.NetworkMask=255.255.255.0
```

5.7.6. Setting a Static Subnet Mask

When the `DhcpEnabled` property is `false` you can set a static subnet mask.

Command format: SET●/MANAGEMENT/NETWORK.StaticNetworkMask=<netmask>

Response format: pw●/MANAGEMENT/NETWORK.StaticNetworkMask=<netmask>

Example:

```
> SET /MANAGEMENT/NETWORK.StaticNetworkMask=255.255.255.0
< pw /MANAGEMENT/NETWORK.StaticNetworkMask=255.255.255.0
```

5.7.7. Querying the Gateway Address

Command format: GET●/MANAGEMENT/NETWORK.GatewayAddress

Response format: pr●/MANAGEMENT/NETWORK.GatewayAddress=<gw_address>

Example:

```
> GET /MANAGEMENT/NETWORK.GatewayAddress
< pr /MANAGEMENT/NETWORK.GatewayAddress=192.168.0.1
```

5.7.8. Setting a Static Gateway Address

When the `DhcpEnabled` property is `false` you can set a static subnet mask.

Command format: SET●/MANAGEMENT/NETWORK.StaticGatewayAddress=<gw_address>

Response format: pw●/MANAGEMENT/NETWORK.StaticGatewayAddress=<gw_address>

Example:

```
> SET /MANAGEMENT/NETWORK.StaticGatewayAddress=192.168.0.5
< pw /MANAGEMENT/NETWORK.StaticGatewayAddress=192.168.0.5
```

5.8. Encoder-related Commands

5.8.1. Querying the Input Video Signal Presence

The HDMI input port can be queried if video signal is present.

Command format: GET●/MEDIA/VIDEO/I1.SignalPresent

Response format: pr●/MEDIA/VIDEO/I1.SignalPresent=0|1

Parameters:

.SignalPresent	0	1
Signal presence	not present	present

Example:

```
> GET /MEDIA/VIDEO/I1.SignalPresent
< pr /MEDIA/VIDEO/I1.SignalPresent=1
```

5.8.2. Querying the Resolution of the Input Video Signal

The resolution and the refresh rate of the incoming video signal can be queried.

Command format: GET●/MEDIA/VIDEO/I1.Resolution

Response format: pr●/MEDIA/VIDEO/I1.Resolution=<resolution_and_refresh_rate>

Example:

```
> GET /MEDIA/VIDEO/I1.Resolution
< pr /MEDIA/VIDEO/I1.Resolution=1280x720@60Hz
```

5.8.3. Querying the Video Quality Mode

The extended video signal is compressed which allows setting the desired video quality in the Encoder:

- **Video mode** (Higher Quality, more bandwidth): the quality is adjusted to the available bandwidth.
- **Graphics mode** (Lower Quality, less bandwidth): the best possible quality is produced even if it causes the stream to break due to a bandwidth limitation in the transmission path.

Command format: GET●/MEDIA/VIDEO/QUALITY.QualityMode

Response format: pw●/MEDIA/VIDEO/QUALITY.QualityMode=video|graphic

Example:

```
> GET /MEDIA/VIDEO/QUALITY.QualityMode
< pw /MEDIA/VIDEO/QUALITY.QualityMode=video
```


5.8.4. Setting the Video Quality Mode

The extended video signal is compressed which allows setting the desired video quality in the Encoder; see the details in the previous section.

Command format: SET●/MEDIA/VIDEO/QUALITY.QualityMode=video|graphic

Response format: pw●/MEDIA/VIDEO/QUALITY.QualityMode=video|graphic

Example:

```
> SET /MEDIA/VIDEO/QUALITY.QualityMode=graphic
< pw /MEDIA/VIDEO/QUALITY.QualityMode=graphic
```

5.8.5. Querying the HDCP State

The current state of the HDCP encryption can be queried at the input port; see the [HDCP Management](#) section.

Command format: GET●/MEDIA/VIDEO/I1.HdcpState

Response format: pr●/MEDIA/VIDEO/I1.HdcpState=0|1

Parameters:

.HdcpState	0	1
HDCP encryption	Disabled	Enabled

Example:

```
> GET /MEDIA/VIDEO/I1.HdcpState
< pr /MEDIA/VIDEO/I1.HdcpState=1
```

5.8.6. Setting the HDCP State

HDCP capability can be enabled/disabled on the input port of the Encoder, thus, non-encrypted content can be seen on a non-HDCP compliant display if the content allows it; see the [HDCP Management](#) section.

Command format: SET●/MEDIA/VIDEO/I1.HdcpEnable=false|true

Response format: pw●/MEDIA/VIDEO/I1.HdcpEnable=false|true

ATTENTION! When you change this property the `applySettings` method must be called always to store the new setting. If the HDCP State is changed the device is restarted automatically.

Example:

```
> SET /MEDIA/VIDEO/I1.HdcpEnable=false
< pw /MEDIA/VIDEO/I1.HdcpEnable=false
> CALL /MEDIA/VIDEO/I1:applySettings()
< m0 /MEDIA/VIDEO/I1:applySettings
```

ATTENTION! The EDID information cannot be read by the source attached to the HDMI input of an Encoder if HDCP is disabled on the input. That may stop the video transmission in the case of certain source devices.

5.9. Decoder-related Commands

5.9.1. Querying the Resolution of the Output Video Signal

The resolution and the refresh rate of the outgoing video signal can be queried.

Command format: GET●/MEDIA/VIDEO/O1.Resolution

Response format: pr●/MEDIA/VIDEO/O1.Resolution=<resolution_and_ref_rate>

Example:

```
> GET /MEDIA/VIDEO/O1.Resolution
< pr /MEDIA/VIDEO/O1.Resolution=1600x1200@60Hz
```

5.9.2. Querying the Scaling Mode of the Output Video Signal

Command format: GET●/MEDIA/VIDEO/O1/SCALER.ScalingMode

Response format: pw●/MEDIA/VIDEO/O1/SCALER.ScalingMode=OFF|EDID|MANUAL

Parameters:

.ScalingMode	OFF	EDID	MANUAL
Scaling mode	the resolution is not changed	the resolution is set to meet with the preferred timing of the sink device	the output resolution is set manually

Example:

```
> GET /MEDIA/VIDEO/O1/SCALER.ScalingMode
< pw /MEDIA/VIDEO/O1/SCALER.ScalingMode=MANUAL
```

See more information about the scaling modes in the [Scaler Settings \(Decoders\)](#) section.

5.9.3. Setting the Scaling Mode of the Output Video Signal

Command format: SET●/MEDIA/VIDEO/O1/SCALER.ScalingMode=OFF|EDID|MANUAL

Response format: pw●/MEDIA/VIDEO/O1/SCALER.ScalingMode=OFF|EDID|MANUAL

Parameters: see the previous section.

Example:

```
> SET /MEDIA/VIDEO/O1/SCALER.ScalingMode=OFF
< pw /MEDIA/VIDEO/O1/SCALER.ScalingMode=OFF
```

See more information about the scaling modes in the [Scaler Settings \(Decoders\)](#) section.

5.9.4. Setting the Resolution of the Output Video Signal

The resolution and the refresh rate of the outgoing video signal can be set.

Command format: SET●/MEDIA/VIDEO/01/SCALER.OutputResolution

Response format: pw●/MEDIA/VIDEO/01/SCALER.OutputResolution=<Resolution_code>

Parameters:

The <Resolution_code> is an 8-character long code covering the scaled resolution and refresh rate. The complete list can be found in the [Output Resolutions \(Scaler\)](#) section.

Example:

```
> SET /MEDIA/VIDEO/01/SCALER.OutputResolution=81004088
< pw /MEDIA/VIDEO/01/SCALER.OutputResolution=81004088
```

Explanation:

The new value of the parameter is 81004088 which means the resolution of the output signal is set to 1280x720@60Hz.

ATTENTION! Set the **ScalingMode** property to **MANUAL** after changing the **Resolution** property manually to apply the new settings.

5.9.5. Querying the Signal Type of the Output Video Signal

Command format: GET●/MEDIA/VIDEO/01/SCALER.SignalType

Response format: pw●/MEDIA/VIDEO/01/SCALER.SignalType=DVI|HDMI

Example:

```
> GET /MEDIA/VIDEO/01/SCALER.SignalType
< pw /MEDIA/VIDEO/01/SCALER.SignalType=HDMI
```

5.9.6. Setting the Signal Type of the Output Video Signal

Command format: SET●/MEDIA/VIDEO/01/SCALER.SignalType=DVI|HDMI

Response format: pw●/MEDIA/VIDEO/01/SCALER.SignalType=DVI|HDMI

Example:

```
> SET /MEDIA/VIDEO/01/SCALER.SignalType=HDMI
< pw /MEDIA/VIDEO/01/SCALER.SignalType=HDMI
```

INFO: The property has an affect only when the **ScalingMode** property is set the **MANUAL**.

5.9.7. Querying the State of the USB Connection

When the extenders are in Multicast mode the USB transmission has to be determined by selecting the active Decoder. To query the current state of a given Decoder use the following command:

Command format: GET●/MEDIA/KM.Controlling

Response format: pr●/MEDIA/KM.Controlling=false|true

Parameters:

.Controlling	false	true
USB connection state	not connected to the Encoder	connected to the Encoder

Example:

```
> GET /MEDIA/KM.Controlling
< pr /MEDIA/KM.Controlling=false
```

See more information about the USB features in the [Layout Examples](#) section.

5.9.8. Establishing the USB Connection

When the extenders are in Multicast mode the USB transmission has to be determined by selecting the active Decoder. To establish the connection between the Decoder and the Encoder use the following command:

Command format: CALL●/MEDIA/KM:acquireControl(true)

Response format: mO●/MEDIA/KM:acquireControl

Example:

```
> CALL /MEDIA/KM:acquireControl(true)
< mO /MEDIA/KM:acquireControl
```

ATTENTION! Establishing the connection to a Decoder will disconnect the USB transmission of the previously connected Decoder.

5.10. Serial Port Settings

ATTENTION! The new port settings are stored but applied only if the `applySettings` method is called which will reboot the device.

INFO: Below listed commands can be used to set the RS-232 port parameters. To query the current value of a parameter use the GET command, e.g.: `GET /MEDIA/UART/P1.BaudRate`.

5.10.1. Setting the Port Availability

The port must be enabled for the RS-232 data transmission; send the following command:

Command format: SET●/MEDIA/UART/P1.Enabled=false|true

Response format: pw●/MEDIA/UART/P1.Enabled=false|true

Example:

```
> SET /MEDIA/UART/P1.Enabled=true
< pw /MEDIA/UART/P1.Enabled=true
```

5.10.2. Setting the RS-232 Port Mode

The RS-232 port can be set to **Pass-through** or **Command Injection** mode. Different port numbers are required for the two modes, please see the below table. The introduction of these modes can be found in the [RS-232 Interface](#) section.

Command format: SET●/MEDIA/UART/P1.Guest=true|false

Response format: pw●/MEDIA/UART/P1.Guest=true|false

Parameters:

Parameter	false	true
RS-232 port working mode	Pass-through	Command Injection
Required port number	6107	6752

Example:

```
> SET /MEDIA/UART/P1.Guest=false
< pw /MEDIA/UART/P1.Guest=false
```

ATTENTION! Do not forget to call the `applySettings` method to apply the changes.

5.10.3. Setting the Baud Rate of the Port

Command format: SET●/MEDIA/UART/P1.Baudrate=<Baud_value>

Response format: pw●/MEDIA/UART/P1.Baudrate=<Baud_value>

Parameters:

The value of the <Baud_value> can be set without limitation to the desired value.

Example:

```
> SET /MEDIA/UART/P1.Baudrate=57600
< pw /MEDIA/UART/P1.Baudrate=57600
```

5.10.4. Setting the Data Bits

Command format: SET●/MEDIA/UART/P1.DataBits=<Databits_value>

Response format: pw●/MEDIA/UART/P1.DataBits=<Databits_value>

Parameters:

The value of the <Databits_value> can be set without limitation to the desired value.

Example:

```
> SET /MEDIA/UART/P1.DataBits=8
< pw /MEDIA/UART/P1.DataBits=8
```

5.10.5. Setting the Stop Bits

Command format: SET●/MEDIA/UART/P1.StopBits=<Stopbits_value>

Response format: pw●/MEDIA/UART/P1.StopBits=<Stopbits_value>

Parameters:

The value of the <Stopbits_value> can be set without limitation to the desired value.

Example:

```
> SET /MEDIA/UART/P1.StopBits=1
< pw /MEDIA/UART/P1.StopBits=1
```

5.10.6. Setting the Parity

Command format: SET●/MEDIA/UART/P1.Parity=n|o|e

Response format: pw●/MEDIA/UART/P1.Parity=n|o|e

Parameters:

.Parity	n	o	e
Parity setting	none	odd	even

Example:

```
> SET /MEDIA/UART/P1.Parity=n
< pw /MEDIA/UART/P1.Parity=n
```

5.11. Arranging the Extenders to Groups

5.11.1. Querying the Working Mode (Unicast/Multicast)

Command format: GET●/MANAGEMENT/MULTICAST.MulticastMode<>

Response format: pw●/MANAGEMENT/MULTICAST.MulticastMode=false|true

Parameters:

.MulticastMode	false	true
The current mode	Unicast mode	Multicast mode

Example:

```
> GET /MANAGEMENT/MULTICAST.MulticastMode
< pw /MANAGEMENT/MULTICAST.MulticastMode=false
```

5.11.2. Setting the Working Mode (Unicast/Multicast)

Command format: SET●/MANAGEMENT/MULTICAST.MulticastMode=false|true

Response format: pw●/MANAGEMENT/MULTICAST.MulticastMode=false|true

Parameters: See the previous section.

Example:

```
> SET /MANAGEMENT/MULTICAST.MulticastMode=true
< pw /MANAGEMENT/MULTICAST.MulticastMode=true
```

ATTENTION! When you change the working mode the **applySettings** method must be called always to store the new settings. After that, the device is restarted automatically.

5.11.3. Querying the Video Stream ID Setting Method

The Video stream ID can be set by the front panel DIP switch or by software.

Command format: GET●/SYS/MB/PHY.ChannelIdSetBySoftware

Response format: pr●/SYS/MB/PHY.ChannelIdSetBySoftware=false|true

Parameters:

.ChannelIdSetBySoftware	false	true
The current setting	HW setting (DIP switch)	SW setting

Example:

```
> GET /SYS/MB/PHY.ChannelIdSetBySoftware
< pr /SYS/MB/PHY.ChannelIdSetBySoftware=false
```

Explanation:

The current Video Stream ID is HW setting, the front panel DIP switch is valid. Above parameter can be changed only by the DIP switch.

5.11.4. Querying the DIP Switch State

The current state of the DIP switch can be queried as follows:

Command format: GET●/SYS/MB/GPIO.DipSwitch

Response format: pr●/SYS/MB/GPIO.DipSwitch=<DIP_state>

Example:

```
> GET /SYS/MB/GPIO.DipSwitch
< pr /SYS/MB/GPIO.DipSwitch=0x8
```

Explanation:

The interpretation of the DIP switch states are described in the [DIP Switch States](#) section.

5.11.5. Querying the Video Stream ID

The response of the below command contains the current Video Stream ID, but contains no information about the setting method (HW setting/SW setting).

Command format: GET●/SYS/MB/PHY.VideoChannelId

Response format: pw●/SYS/MB/PHY.VideoChannelId=<channel_ID>

Parameter:

The value of the <channel_ID> can be between 1 and 255.

Example:

```
> SET /SYS/MB/PHY.VideoChannelId=10
< pw /SYS/MB/PHY.VideoChannelId=10
```

5.11.6. Setting the Video Stream ID

If the front panel DIP switch is in 0000 state (the value of the `/SYS/MB/PHY.ChannelIdSetBySoftware` property is `true`) the Video Stream ID can be set by the following command:

Command format: SET●/SYS/MB/PHY.VideoChannelId=<channel_ID>

Response format: pw●/SYS/MB/PHY.VideoChannelId=<channel_ID>

Parameter:

The value of the <channel_ID> can be between 1 and 255.

Example:

```
> SET /SYS/MB/PHY.VideoChannelId=8
< pw /SYS/MB/PHY.VideoChannelId=8
```

5.12. Video Wall Settings

Basic Rules

- One Decoder can be a part of only one video wall.
- The video wall must have a unique name within a system; the length of the name shall not exceed 24 characters.
- The video walls are stored in the LW3 protocol tree of the Decoders.
- All the Decoders and the Encoder must be set one-by-one. The set parameters are applied only in the given device.

Short Instructions

- Step 1.** All the affected VINX devices must be in Multicast mode. See the [Setting the Working Mode \(Unicast/Multicast\)](#) section to set the mode if necessary.
- Step 2.** Set the same Video Stream ID in the Encoder and in all desired Decoders. Use the front panel DIP switch and/or the commands as described in the [Setting the Video Stream ID](#) section.
- Step 3.** Send the Video Wall setup command to each Decoder one-by-one as described in the [Assigning a Decoder to a Video Wall](#) section.

5.12.1. Setting the Name of the Video Wall

Set the name of the video wall in the Decoder devices as follows:

Command format: SET●/MEDIA/VIDEO/01/VIDEOWALL.Name=<wall_name>

Response format: pw●/MEDIA/VIDEO/01/VIDEOWALL.Name=<wall_name>

Example:

```
> SET /MEDIA/VIDEO/01/VIDEOWALL.Name=Office_2x2
< pw /MEDIA/VIDEO/01/VIDEOWALL.Name=Office_2x2
```

5.12.2. Assigning a Decoder to a Video Wall

ATTENTION! Setting the name of the video wall is highly recommended (see the previous section).

Command format: SET●/MEDIA/VIDEO/01/VIDEOWALL.Layout=<wall_parameters>

Response format: pw●/MEDIA/VIDEO/01/VIDEOWALL.Layout=<wall_parameters>

Legend:

The <wall_parameters> include the following order of settings:

<tot_col>;<tot_row>;<col_pos>;<row_pos>;<wid>;<hei>;<Hgap>;<Vgap>;<Btop>;<Bbot>;<Blef><Brig>;

<wall_parameters>	Description
<tot_col>	Total number of columns
<tot_row>	Total number of rows
<col_pos>	Column position of the Decoder
<row_pos>	Row position of the Decoder
<wid>	The width of the screen (display area) (mm)
<hei>	The height of the screen (display area) (mm)
<Hgap>	Horizontal gap between the sinks (mm)
<Vgap>	Vertical gap between the sinks (mm)
<Btop>	Top bezel of the given sink (mm)
<Bbot>	Bottom bezel of the given sink (mm)
<Blef>	Left bezel of the given sink (mm)
<Brig>	Right bezel of the given sink (mm)

Example:

```
> SET /MEDIA/VIDEO/01/VIDEOWALL.Layout=2;2;1;1;520;320;0;0;0;0;0;0;
< pw /MEDIA/VIDEO/01/VIDEOWALL.Layout=2;2;1;1;520;320;0;0;0;0;0;0;
```

Explanation:

2x2 sized video wall is defined, the current Decoder is positioned in the first column, in the first row. The size of a display device is 520x320 mm. No bezel and gap are set.

INFO: If the Bezel and Gap values are zero the dimensions do not matter.

5.13. Setting up a Video Wall (Example)

The following list of commands show how a video wall can be created by sending LW3 commands. The specifications are the followings:

- **Name:** Office_2x2
- **Size:** 2x2
- **Video Stream ID:** 10
- **IP address:** Encoder: 192.168.0.80, Decoders: see the figure
- **Display width:** 520x320 mm (each display)
- **Bezel:** 20 mm (at all sides)
- **Gap:** 10 mm

A1	B1
192.168.0.81	192.168.0.82
A2	B2
192.168.0.83	192.168.0.84

INFO: The IP address of each device has been set previously and the DIP switch is in **0000** position.

Commands Sent to the Encoder

```
> SET /MANAGEMENT/MULTICAST.MulticastMode=true
< pw /MANAGEMENT/MULTICAST.MulticastMode=true
> SET /SYS/MB/PHY.VideoChannelId=10
< pw /SYS/MB/PHY.VideoChannelId=10
```

Commands Sent to the Decoder (A1)

```
> SET /MANAGEMENT/MULTICAST.MulticastMode=true
< pw /MANAGEMENT/MULTICAST.MulticastMode=true
> SET /SYS/MB/PHY.VideoChannelId=10
< pw /SYS/MB/PHY.VideoChannelId=10
> SET /MEDIA/VIDEO/01/VIDEOWALL.Layout=2;2;1;1;520;320;20;20;0;10;0;10;
< pw /MEDIA/VIDEO/01/VIDEOWALL.Layout=2;2;1;1;520;320;20;20;0;10;0;10;
> SET /MEDIA/VIDEO/01/VIDEOWALL.Name=Office_2x2
< pw /MEDIA/VIDEO/01/VIDEOWALL.Name=Office_2x2
```

Commands Sent to the Decoder (B1)

```
> SET /MANAGEMENT/MULTICAST.MulticastMode=true
< pw /MANAGEMENT/MULTICAST.MulticastMode=true
> SET /SYS/MB/PHY.VideoChannelId=10
< pw /SYS/MB/PHY.VideoChannelId=10
> SET /MEDIA/VIDEO/01/VIDEOWALL.Layout=2;2;2;1;520;320;20;20;0;10;10;0;
< pw /MEDIA/VIDEO/01/VIDEOWALL.Layout=2;2;2;1;520;320;20;20;0;10;10;0;
> SET /MEDIA/VIDEO/01/VIDEOWALL.Name=Office_2x2
< pw /MEDIA/VIDEO/01/VIDEOWALL.Name=Office_2x2
```

Commands Sent to the Decoder (A2)

```
> SET /MANAGEMENT/MULTICAST.MulticastMode=true
< pw /MANAGEMENT/MULTICAST.MulticastMode=true
> SET /SYS/MB/PHY.VideoChannelId=10
< pw /SYS/MB/PHY.VideoChannelId=10
> SET /MEDIA/VIDEO/01/VIDEOWALL.Layout=2;2;1;2;520;320;20;20;10;0;0;10;
< pw /MEDIA/VIDEO/01/VIDEOWALL.Layout=2;2;1;2;520;320;20;20;10;0;0;10;
> SET /MEDIA/VIDEO/01/VIDEOWALL.Name=Office_2x2
< pw /MEDIA/VIDEO/01/VIDEOWALL.Name=Office_2x2
```

Commands Sent to the Decoder (B2)

```
> SET /MANAGEMENT/MULTICAST.MulticastMode=true
< pw /MANAGEMENT/MULTICAST.MulticastMode=true
> SET /SYS/MB/PHY.VideoChannelId=10
< pw /SYS/MB/PHY.VideoChannelId=10
> SET /MEDIA/VIDEO/01/VIDEOWALL.Layout=2;2;2;2;520;320;20;20;10;0;10;0;
< pw /MEDIA/VIDEO/01/VIDEOWALL.Layout=2;2;2;2;520;320;20;20;10;0;10;0;
> SET /MEDIA/VIDEO/01/VIDEOWALL.Name=Office_2x2
< pw /MEDIA/VIDEO/01/VIDEOWALL.Name=Office_2x2
```

5.14. EDID Management (Encoder)

The Advanced EDID Management is available also by sending LW3 protocol commands. The structure of the EDID memory can be found in the [EDID Menu](#) section.

5.14.1. Querying the Emulated EDID

Command format: GET●/EDID.EdidStatus

Response format: pr●/EDID.EdidStatus=<EDID_mem><loc>:E1

Parameters:

<EDID_mem> value	<EDID_mem> type	<loc> value
F	Factory preset EDIDs	1-132
U	User-saved EDIDs	1-5
D	The EDID of the Display device at the local output	1
E	Emulated EDID	1

INFO: There are empty slots in the Factory EDID range for future developments. See the [Factory EDID List](#) section.

Example:

```
> GET /EDID.EdidStatus
< pr /EDID.EdidStatus=F47:E1
```

Explanation:

F47 EDID (Factory #47) is currently emulated on the input port of the Encoder (E1).

5.14.2. Setting the Emulated EDID on the Input Port

Command format: CALL●/EDID:switch(<source>:<destination>)

Response format: mO●/EDID:switch

Parameters:

<source>: Source EDID memory place: Factory / User / Dynamic.

<destination>: The emulated EDID memory of the desired input port.

Example:

```
> CALL /EDID:switch(F49:E2)
< mO /EDID:switch
```

5.14.3. Querying the Preferred Resolution of an EDID

Command format: GET●/EDID/<EDID_mem>/<EDID_mem><loc>.PreferredResolution

Response format: pr●/EDID/<EDID_mem>/<EDID_mem><loc>.PreferredResolution=<Resolution>

Parameters:

See the [Querying the Emulated EDID](#) section.

Example:

```
> GET /EDID/U/U2.PreferredResolution
< pr /EDID/U/U2.PreferredResolution=1920x1080p60.00Hz
```

INFO: Use the **Manufacturer** property to query the manufacturer and the **MonitorName** property to query the name of the monitor.

5.14.4. Copying an EDID

Command format: CALL●/EDID:copy(<source>:<destination>)

Response format: mO●/EDID:copy

Parameters:

<source>: Source EDID memory place: Factory / User / Dynamic.

<destination>: The emulated EDID memory of the desired input port in the User memory.

Example:

```
> CALL /EDID:copy(D1:U1)
< mO /EDID:copy
```

Explanation:

The EDID of the last connected sink (HDMI output, D1) has been copied to U1 User memory slot.

5.14.5. Deleting an EDID from the User Memory

Command format: CALL●/EDID:delete(U<loc>)

Response format: mO●/EDID:delete

Example:

```
> CALL /EDID:delete(U1)
< mO /EDID:delete
```


5.15. LW3 Commands - Quick Summary

System Commands

Operation / Path	
5.6.1	Querying the Product Name
	/ProductName
5.6.2	Setting the Device Label
	/SYS/MB.DeviceLabel
5.6.3	Querying the Serial Number
	/SerialNumber
5.6.4	Querying the Firmware Version
	/SYS/MB.FirmwareVersion
5.6.5	Querying the Core Version
	/SYS/MB.CoreVersion
5.6.6	Resetting the Device
	/SYS:reset()
5.6.7	Restoring the Factory Default Settings
	/SYS:factoryDefaults()

Network Configuration

Operation / Path	
5.7.2	Querying the DHCP State
	/MANAGEMENT/NETWORK.DhcpEnabled
5.7.3	Changing the DHCP State
	/MANAGEMENT/NETWORK.DhcpEnabled
5.7.4	Setting a Static IP Address
	/MANAGEMENT/NETWORK.IpAddress
5.7.4	Setting a Static IP Address
	/MANAGEMENT/NETWORK.StaticIpAddress
5.7.5	Querying the Subnet Mask
	/MANAGEMENT/NETWORK.NetworkMask
5.7.6	Setting a Static Subnet Mask
	/MANAGEMENT/NETWORK.StaticNetworkMask

Operation / Path	
5.7.7	Querying the Gateway Address
	/MANAGEMENT/NETWORK.GatewayAddress
5.7.8	Setting a Static Gateway Address
	/MANAGEMENT/NETWORK.DhcpEnabled

Encoder-related Commands

Operation / Path	
5.8.4	Setting the Video Quality Mode
	/MEDIA/VIDEO/I1.HdcpState
5.8.6	Setting the HDCP State
	/MEDIA/VIDEO/I1.HdcpEnable
5.9	Decoder-related Commands
	/MEDIA/VIDEO/I1.HdcpState
5.8.2	Querying the Resolution of the Input Video Signal
	/MEDIA/VIDEO/I1.Resolution
5.8.3	Querying the Video Quality Mode
	/MEDIA/VIDEO/QUALITY.QualityMode
5.8.4	Setting the Video Quality Mode
	/MEDIA/VIDEO/QUALITY.QualityMode

Decoder-related Commands

Operation / Path	
5.9.1	Querying the Resolution of the Output Video Signal
	/MEDIA/VIDEO/O1.Resolution
5.9.2	Querying the Scaling Mode of the Output Video Signal
	/MEDIA/VIDEO/O1/SCALER.ScalingMode
5.9.3	Setting the Scaling Mode of the Output Video Signal
	/MEDIA/VIDEO/O1/SCALER.ScalingMode
5.9.4	Setting the Resolution of the Output Video Signal
	/MEDIA/VIDEO/O1/SCALER.OutputResolution

Operation / Path	
5.9.5	Querying the Signal Type of the Output Video Signal
	/MEDIA/VIDEO/O1/SCALER.SignalType
5.9.6	Setting the Signal Type of the Output Video Signal
	/MEDIA/VIDEO/O1/SCALER.SignalType
5.9.7	Querying the State of the USB Connection
	/MEDIA/KM.Controlling
5.9.8	Establishing the USB Connection
	/MEDIA/KM:acquireControl

Serial Port Settings

Operation / Path	
5.10.1	Setting the Port Availability
	/MEDIA/UART/P1.Enabled
5.10.2	Setting the RS-232 Port Mode
	/MEDIA/UART/P1.Baudrate
5.10.3	Setting the Baud Rate of the Port
	/MEDIA/UART/P1.Guest
5.10.4	Setting the Data Bits
	/MEDIA/UART/P1.DataBits
5.10.5	Setting the Stop Bits
	/MEDIA/UART/P1.StopBits
5.10.6	Setting the Parity
	/MEDIA/UART/P1.Parity

Arranging the Extenders to Groups

Operation / Path	
5.11.1	Querying the Working Mode (Unicast/Multicast)
	/MANAGEMENT/MULTICAST.MulticastMode
5.11.2	Setting the Working Mode (Unicast/Multicast)
	/MANAGEMENT/MULTICAST.MulticastMode

Operation / Path	
5.11.3	Querying the Video Stream ID Setting Method
	/SYS/MB/PHY.ChannelIdSetBySoftware
5.11.4	Querying the DIP Switch State
	/SYS/MB/GPIO.DipSwitch
5.11.5	Querying the Video Stream ID
	/SYS/MB/PHY.VideoChannelId
5.11.6	Setting the Video Stream ID
	/SYS/MB/PHY.VideoChannelId

Video Wall Settings

Operation / Path	
5.12.1	Setting the Name of the Video Wall
	/MEDIA/VIDEO/O1/VIDEOWALL.Name
5.12.2	Assigning a Decoder to a Video Wall
	/MEDIA/VIDEO/O1/VIDEOWALL.Layout

EDID Management (Encoder)

Operation / Path	
5.14.1	Querying the Emulated EDID
	/EDID.EdidStatus
5.14.2	Setting the Emulated EDID on the Input Port
	/EDID:switch(<source>:<destination>)
5.14.3	Querying the Preferred Resolution of an EDID
	/EDID/<EDID_mem>/<EDID_mem>:<loc>.PreferredResolution
5.14.4	Copying an EDID
	/EDID:copy(<source>:<destination>)
5.14.5	Deleting an EDID from the User Memory
	/EDID:delete(U<loc>)

6

Firmware Upgrade

The devices can be upgraded via the built-in web page. In order to get the firmware pack with the necessary components (*.lfp file) for your specific product, please contact support@lightware.com.

6.1. Upgrading Steps

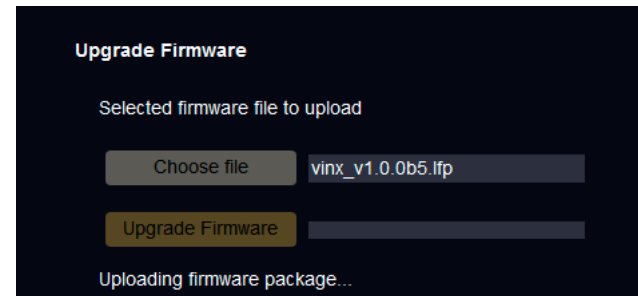
Before Starting the Upgrade

ATTENTION! While the firmware is being upgraded, the normal operation mode is suspended as the device is switched to bootload mode. Signal processing is not performed. Do not interrupt the firmware upgrade. If any problem occurs, reboot the device and restart the process.

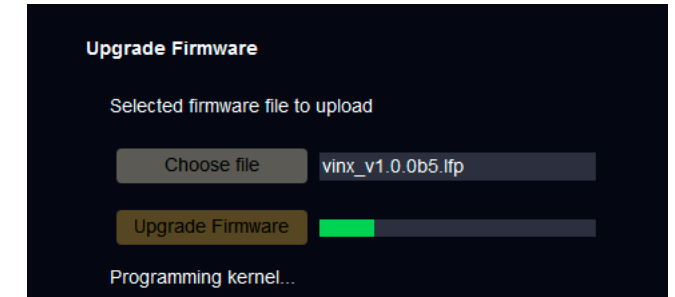
ATTENTION! The settings and parameters (e.g. User EDID memory) will not be lost by upgrading the firmware.

Configuration and Settings

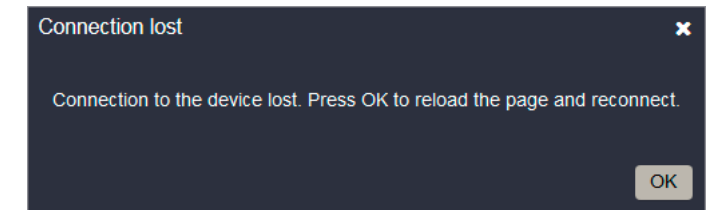
- Step 1.** Get the necessary firmware pack (*.lfp file) and save it to the control device (computer/mobile device).
- Step 2.** Establish the connection from the computer/mobile device to the desired VINX extender as described in the [Establishing the Connection](#) section.
- Step 3.** Navigate to the **Advanced Settings** tab.
- Step 4.** Locate the **Upgrade Firmware** section and press the **Choose file** button. Browse the firmware package file and press the **OK**.
- Step 5.** Press the **Upgrade Firmware** button. The firmware pack will be uploaded into the device and the upgrade process is started automatically.



- Step 6.** The progress bar and a short label will show the current state of the process.



- Step 7.** When the programming is finished the device will reboot and the connection will be lost. Powering off and on again the device is recommended.



7

Technologies

The following sections contain descriptions and useful technical information how the devices work in the background. The content is based on experiences and cases we met in the practice. These sections help to understand features and technical standards like the followings:

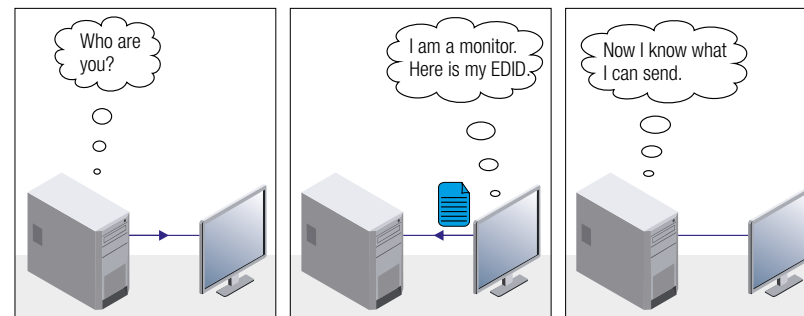
- ▶ EDID MANAGEMENT
- ▶ HDCP MANAGEMENT

7.1. EDID Management

7.1.1. Understanding the EDID

The Extended Display Identification Data (EDID) is the passport of display devices (monitors, TV sets, projectors). It contains information about the capabilities of the display, such as supported resolutions, refresh rates (these are called Detailed Timings), the type and manufacturer of the display device, etc.

After connecting a source to a display (DVI, HDMI, DP), the source reads out the EDID to determine the resolution and refresh rate of the image to be transmitted.



EDID Communication

Most DVI computer displays have 128-byte long EDID structure. However, Digital Televisions and HDMI capable displays may have another 128 bytes, which is called E-EDID and defined by CEA (Consumer Electronics Association). This extension contains information about additional Detailed Timings, audio capabilities, speaker allocation and HDMI capabilities. It is important to know that all HDMI capable devices must have CEA extension, but not all devices with HDMI capable are HDMI capable.

Common Problems Related to EDID

Problem: "My system consists of the following: a computer, a Lightware device, a WUXGA (1920x1200) LCD monitor, and an SXGA (1280x1024) projector. I would like to see the same image on the monitor and the projector. What EDID should I choose on the Lightware device?"

Solution: If you want to see the image on both displays, you need to select the resolution of the smaller display (in this case SXGA), otherwise the smaller display may not show the higher resolution image.

Problem: "I have changed to a different EDID on an input port of the Lightware device to have a different resolution but nothing happens."

Solution: Some graphics cards and video sources read out the EDID only after power-up and later they do not sense that EDID has been changed. You need to restart your source to make it read out the EDID again.

7.1.2. Advanced EDID Management

Each DVI sink (e.g. monitors, projectors, plasma displays, etc...) must support the EDID data structure. Source BIOS and operating systems are likely to query the sink using DDC2B protocol to determine what pixel formats and interface are supported. DVI standard uses EDID data structure to identify the monitor type and capabilities. Most DVI sources (VGA cards, set top boxes, etc.) will output DVI signal after accepting the connected sink's EDID information. In the case of EDID readout failure or missing EDID, the source will not output DVI video signal.

Lightware devices provide the Advanced EDID Management function that helps system integration. The built-in EDID Router can store and emulate factory pre-programmed- and User programmable EDIDs. The EDID of the attached monitors or projectors for each output are stored in a non-volatile memory. This way the EDID of a monitor is available when the monitor is unplugged or switched off.

INFO: The user is not required to disconnect the video cable to change an EDID as opposed to other manufacturer's products. EDID can be changed even if a source is connected to the input and powered ON.

INFO: When EDID has been changed, the router toggles the HOTPLUG signal for 2 seconds. Some sources do not sense this signal. In such cases, the source device must be restarted or powered OFF and ON again.

7.2. HDCP Management

Lightware Visual Engineering is a legal HDCP adopter. Several functions have been developed which helps to solve HDCP related problems. Complex AV systems often have both HDCP and non-HDCP components. The matrix allows transmitting HDCP encrypted and unencrypted signals. The devices will be still HDCP compliant as they will never output an encrypted signal to a non-HDCP compliant display device. If an encrypted signal is switched to a non-compliant output, a red screen alert or muted screen will appear.

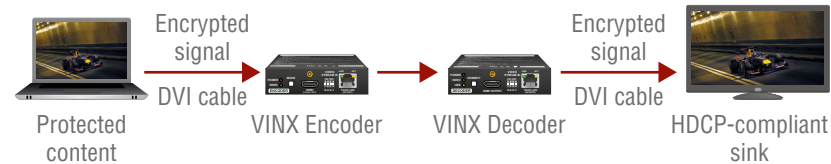
7.2.1. Protected and Unprotected Content

Many video sources send HDCP protected signal if they detect that the sink is HDCP capable – even if the content is not copyrighted. This can cause trouble if an HDCP capable device is connected between the source and the display. In this case, the content cannot be viewed on non-HDCP capable displays and interfaces like event controllers. Rental and staging technicians often complain about certain laptops, which are always sending HDCP encrypted signals if the receiver device (display, matrix router, etc.) reports HDCP compliancy. However, HDCP encryption is not required all the time e.g. computer desktop image, certain laptops still do that.

To avoid unnecessary HDCP encryption, Lightware introduced the HDCP enabling/disabling function: the HDCP capability can be disabled in the Lightware device. If HDCP is disabled, the connected source will detect that the sink is not HDCP capable, and turn off authentication.

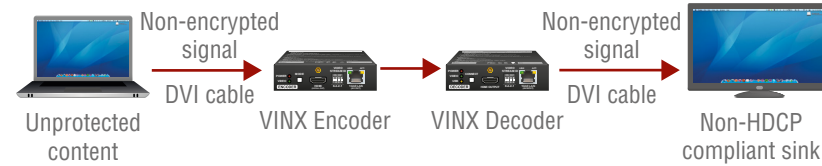
7.2.2. Disable Unnecessary Encryption

HDCP Compliant Sink



All the devices are HDCP-compliant, no manual setting is required, both protected and unprotected contents are transmitted and displayed on the sink.

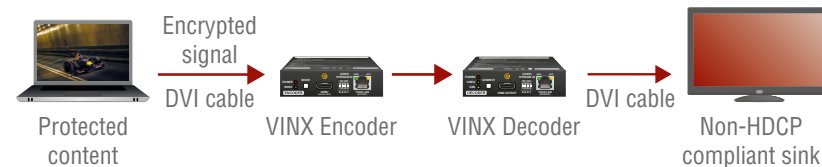
Not HDCP-compliant Sink 1.



Non-HDCP compliant sink is connected to the matrix. Some sources (e.g. computers) always send HDCP encrypted signals if the receiver device reports HDCP compliancy, however, HDCP encryption is not required all the time (e.g. computer desktop image). If HDCP is enabled in the matrix, the image will not be displayed on the sink.

Setting the HDCP parameter to Auto on the output port and disable HDCP on the input port, the transmitted signal will not be encrypted if the content is not protected. Thus, non-HDCP compliant sinks will display non-encrypted signal.

Not HDCP-compliant Sink 2.



The layout is the same as in the previous case: non-HDCP compliant display device is connected to the matrix but the source would send protected content with encryption. If HDCP is enabled on the input port of the matrix, the source will send encrypted signal. The sink is not HDCP compliant, thus, it will not display the video signal (but blank/red/muted/etc. screen). If HDCP is disabled on the input port of the matrix, the source will not send the signal. The solution is to replace the display device to an HDCP-capable one.

8

Appendix

Tables, drawings, guides, and technical details as follows:

- ▶ [SPECIFICATION](#)
- ▶ [MECHANICAL DRAWINGS](#)
- ▶ [OUTPUT RESOLUTIONS \(SCALER\)](#)
- ▶ [FACTORY EDID LIST](#)
- ▶ [FACTORY DEFAULT SETTINGS](#)
- ▶ [DIP SWITCH STATES](#)
- ▶ [APPLICATION NOTE \(LW-AN-001\)](#)
- ▶ [FURTHER INFORMATION](#)

8.1. Specification

General

Compliance	CE
EMC Compliance (Emission)	IEC/EN 55032:2015
EMC Compliance (Immunity)	IEC/EN 55024:2011
Warranty	3 years
Cooling.....	Passive
Operating Temperature.....	0 to +40°C (+32 to +122°F)
Operating Humidity.....	10% to 90%, non-condensing

Power

Power Supply	External power adaptor (supplied)
Power Adaptor	In 100-240 V AC 50/60 Hz, Out 5V DC, 3 A
Power Consumption (Decoder)	5 W (max)
Power Consumption (Encoder).....	8.5 W (max)

Enclosure

Material.....	1 mm steel
Dimensions in mm.....	100.4W x 115D x 26H
Dimensions in inch	3.95W x 4.53D x 1.02H
Weight.....	375 g

Video Ports

Input/Output Port Types.....	19-pole HDMI type A receptacle
Supported Standards.....	DVI 1.0, HDMI 2.0
Supported Resolutions	up to 3840x2160p@60Hz (4:2:0)
HDCP Compliance	Yes, v2.2
Audio Support	Embedded LPCM, Dolby Digital,
.....	Dolby Digital Plus, DTS, Dolby TrueHD, DTS-HD bit stream

Data Communication Ports

USB Ports

USB Port Type (Encoder).....	mini-B type receptacle
USB Port Type (Decoder).....	type A receptacle, 4 pcs.
.....	2 pcs. USB 1.1 and 2 pcs. USB 2.0 compliant
Data Communication Mode.....	Transparent

RS-232 Ports

Serial Port Type.....	RJ12 female receptacle
Supported Baud Rates.....	4800, 9600, 19200, 38400, 57600, 115200
Supported Data Bit Settings.....	5, 6, 7, 8
Supported Parity Settings	none, odd, even
Supported Stop Bit Settings.....	1, 2
Data Communication Mode	Duplex, transparent

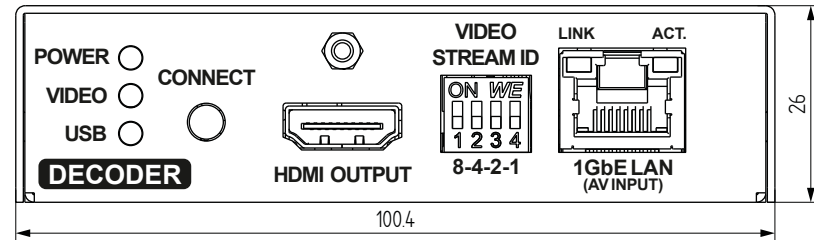
Infrared Ports

IR Port Type (Encoder).....	3.5mm Jack (IR output)
IR Port Type (Decoder)	3.5mm Jack (IR input)

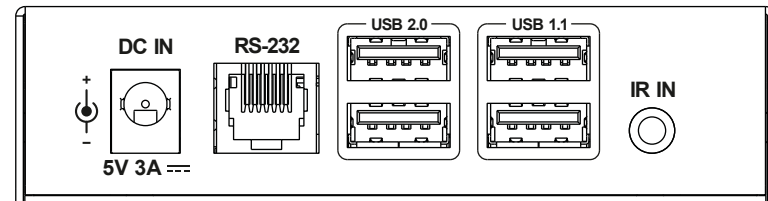
8.2. Mechanical Drawings

INFO: The dimensions of the Encoder and Decoder devices are the same.

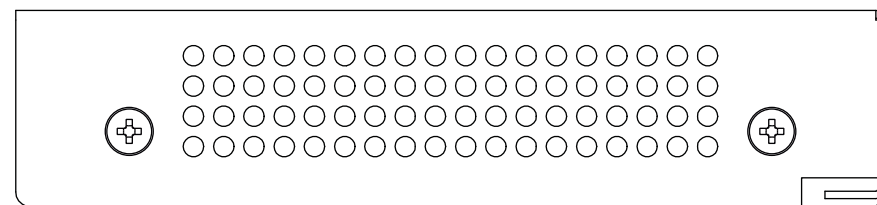
Front View



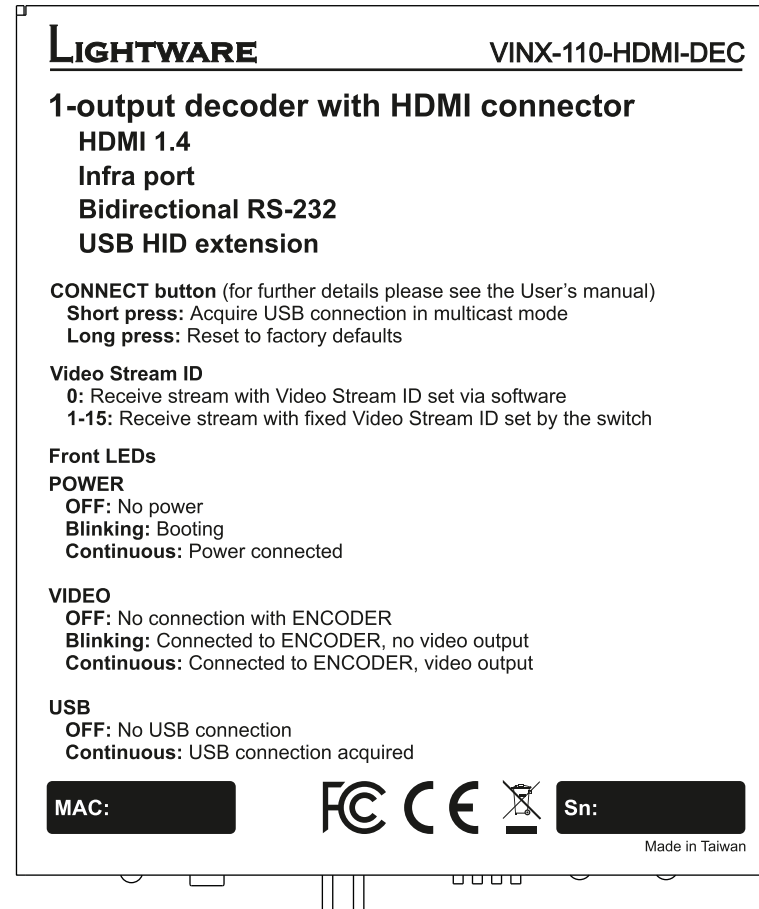
Rear View



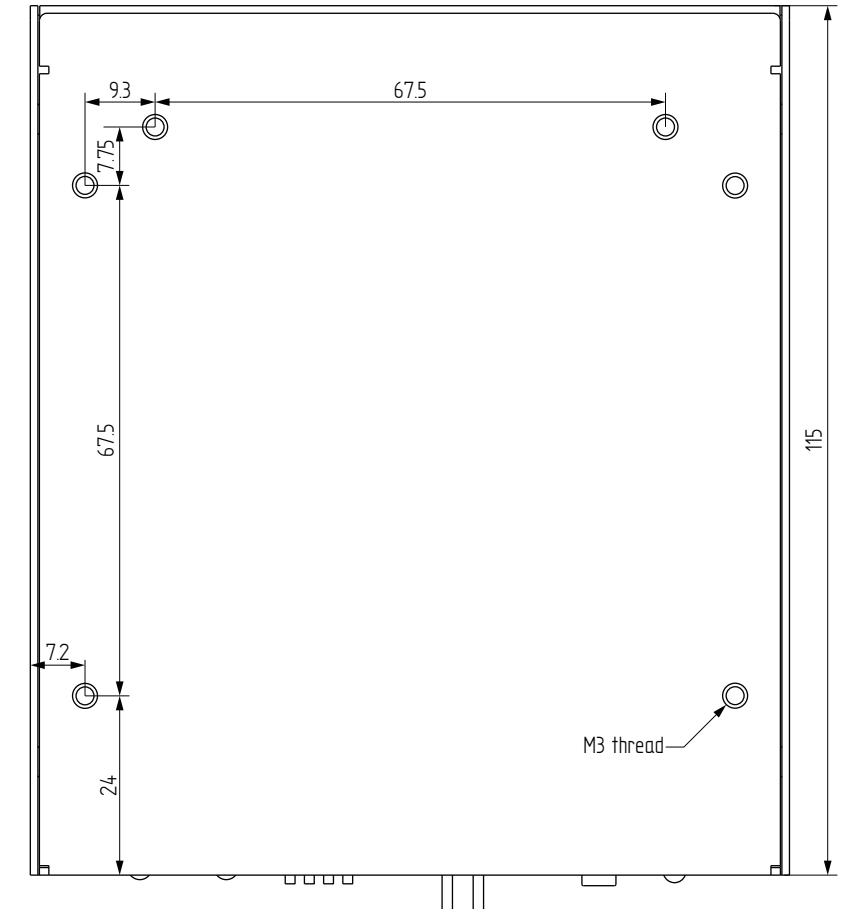
Side View



Top View



Bottom View



8.3. Output Resolutions (Scaler)

Resolution	Frame rate	HEX identifier
640x480	50	81004054
640x480	59.94	81004055
640x480	60	81004055
640x480	72	81004004
640x480	75	81004056
720x480 (480p)	50	810040A8
720x480 (480p)	59.94	810040A9
720x480 (480p)	60	810040A9
720x480 (480p)	75	810040AA
720x576 (576p)	50	8000025
800x600	50	81004059
800x600	59.94	8100405A
800x600	60	8100405A
800x600	72	81004009
800x600	75	8100400A
1024x768	50	8100405E
1024x768	60	8100405F
1024x768	75	81004060
1152x864	60	8100403E
1280x720 (720p)	50	81004087
1280x720 (720p)	59.94	81004087
1280x720 (720p)	60	81004088
1280x720 (720p)	75	81004089
1280x768	50	8100407B
1280x768	59.94	8100407C
1280x768	60	8100407C
1280x768	75	81004015
1280x800	59.94	81004040
1280x800	60	81004040
1280x800	75	81004042

Resolution	Frame rate	HEX identifier
1280x960	50	81004063
1280x960	59.94	81004064
1280x960	60	81004064
1280x1024	50	81004076
1280x1024	59.94	81004077
1280x1024	60	81004077
1280x1024	75	81004078
1360x768	50	8100408C
1360x768	59.94	8100408D
1360x768	60	8100408D
1360x768	75	8100408E
1366x768	59.94	8100404A
1366x768	60	8100404A
1440x900	59.94	81004021
1440x900	60	81004021
1440x900	75	81004023
1600x900	59.94	8100404E
1600x900	60	8100404E
1600x1024	59.94	810040EF
1600x1024	60	810040EF
1600x1200	50	8100406A
1600x1200	59.94	8100406B
1600x1200	60	8100406B
1680x1050	50	810040C1
1680x1050	59.94	810040C2
1680x1050	60	810040C2
1920x1080i	25	80000011
1920x1080 (1080p)	50	8100409B
1920x1080 (1080p)	59.94	8100409C
1920x1080 (1080p)	60	8100409C

Resolution	Frame rate	HEX identifier
1920x1200	50	810040C8
1920x1200	60	810040CA
2560x1080	24	80000056
2560x1080	25	80000057
2560x1080	30	80000058
2560x1080	60	80000059
2560x1200	30	810040F0
2560x1200	60	810040F1
2560x1600	60	810040F1
3840x2160	24	8000005D
3840x2160	25	8000005E
3840x2160	30	8000005F
4096x2160	24	80000062
4096x2160	25	80000063
4096x2160	30	80000064

8.4. Factory EDID List

Mem.	Resolution				Type
F1	640 x	480	@ 60.00	Hz	D
F3	800 x	600	@ 60.32	Hz	D
F4	1024 x	768	@ 60.00	Hz	D
F5	1280 x	768	@ 50.00	Hz	D
F6	1280 x	768	@ 59.94	Hz	D
F7	1280 x	768	@ 75.00	Hz	D
F8	1360 x	768	@ 60.02	Hz	D
F9	1280 x	1024	@ 50.00	Hz	D
F10	1280 x	1024	@ 60.02	Hz	D
F11	1280 x	1024	@ 75.02	Hz	D
F15	1680 x	1050	@ 60.00	Hz	D
F20	1600 x	1200	@ 50.00	Hz	D
F21	1600 x	1200	@ 60.00	Hz	D
F22	1920 x	1200	@ 50.00	Hz	D
F23	1920 x	1200	@ 59.56	Hz	D
F29	1920 x	1080	@ 60.00	Hz	U
F32	640 x	480	@ 59.95	Hz	H
F33	720 x	480	@ 59.94	Hz	H
F34	720 x	576	@ 50.00	Hz	H
F35	1280 x	720	@ 50.00	Hz	H
F36	1280 x	720	@ 60.00	Hz	H
F37	1920 x	1080	@ 50.04	Hz	H
F38	1920 x	1080	@ 50.00	Hz	H
F39	1920 x	1080	@ 60.05	Hz	H
F41	1920 x	1080	@ 24.00	Hz	H
F42	1920 x	1080	@ 25.00	Hz	H
F43	1920 x	1080	@ 30.00	Hz	H
F45	1920 x	1080	@ 60.00	Hz	H
F46	1920 x	1080	@ 60.00	Hz	H
F47	1920 x	1080	@ 60.00	Hz	U

Mem.	Resolution				Type
F48	1920 x	1080	@ 60.00	Hz	U
F49	1920 x	1080	@ 60.00	Hz	U
F96	2560 x	1600	@ 59.86	Hz	D
F100	1024 x	768	@ 60.00	Hz	H
F101	1280 x	1024	@ 50.00	Hz	H
F102	1280 x	1024	@ 60.02	Hz	H
F103	1280 x	1024	@ 75.02	Hz	H
F104	1600 x	1200	@ 50.00	Hz	H
F105	1600 x	1200	@ 60.00	Hz	H
F106	1920 x	1200	@ 59.56	Hz	H
F108	2560 x	1600	@ 59.86	Hz	H
F110	3840 x	2160	@ 24.00	Hz	H
F111	3840 x	2160	@ 25.00	Hz	H
F112	3840 x	2160	@ 30.00	Hz	H
F118	3840 x	2160	@ 30.00	Hz	U
F119	3840 x	2160	@ 30.00	Hz	U
F125	1368 x	768	@ 59.85	Hz	H
F131	4096 x	2160	@ 25.00	Hz	H
F132	4096 x	2160	@ 30.00	Hz	H

Legend

D: DVI EDID

H: HDMI EDID

U: Universal EDID (supporting many standard resolutions)

Please note that minor changes in the factory EDID list may be applied in farther firmware versions.

8.5. Factory Default Settings

Parameter	Setting/Value
IP address	Dynamic (DHCP is enabled)
RS-232 port setting	115200 BAUD, 8, N, 1
DIP switch state	0000
Connecting method	Unicast mode
Emulated EDID	F47 Factory preset (Universal HDMI EDID)
User EDID memory	Empty (cleared)
Output video mode (Encoder)	Graphics mode
Output scaling (Decoder)	Pass-through, no rotation
Available video walls	Empty (cleared)

8.6. DIP Switch States

DIP switch state	Video Stream ID	/SYS/MB/GPIO.DipSwitch value
0000	SW setting	0x0
0001	1	0x1
0010	2	0x2
0011	3	0x3
0100	4	0x4
0101	5	0x5
0110	6	0x6
0111	7	0x7
1000	8	0x8
1001	9	0x9
1010	10	0xa
1011	11	0xb
1100	12	0xc
1101	13	0xd
1110	14	0xe
1111	15	0xf

8.7. Application Note (LW-AN-001)

Gigabit Network Switch Requirements For VINX Devices

Network Properties

Network-based AV products use different network protocols for different operations. The network protocol can be UDP/IP and TCP/IP, the transmission mode can be Broadcast, Unicast, and Multicast.

These network protocols should be familiar to any network engineer. Because our network-based AV solutions bridge the gap between the audio-visual (AV) and information technology (IT) worlds, Lightware suggests involvement of both AV and IT departments in any installation.

Lightware products are designed to be plug-and-play. The figures in the next section illustrate the basic installation of one Decoder and one Encoder. A video source provides the digital video content to the Encoder which converts to Ethernet packets and sends to the attached Decoder. The Decoder reconstitutes the video with synchronized audio for presentation to the attached display.

Point-to-point vs Network Connection

VINX Encoders and Decoders have two typical applications:

- Point-to-point connection
- Point-to-multi point connection

Point-to-point Connection

Unicast routing is required; this mode uses a one-to-one association between the source and the destination: each destination address uniquely identifies a single Decoder endpoint.



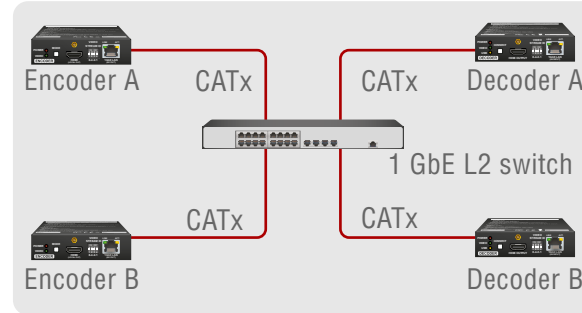
Point-to-Multi Point Connection

Multicast routing protocol is required; this mode uses a one-to-many-of-many or many-to-many-of-many association; datagrams are routed simultaneously in a single transmission to many recipients.



Unicast Routing

The network routing requirement of the VINX devices for point-to-point connection is the unicast routing protocol. Please note the unicast routing is not the default setting of the Encoder and Decoder, users have to set it in the devices.



Hardware Requirement:

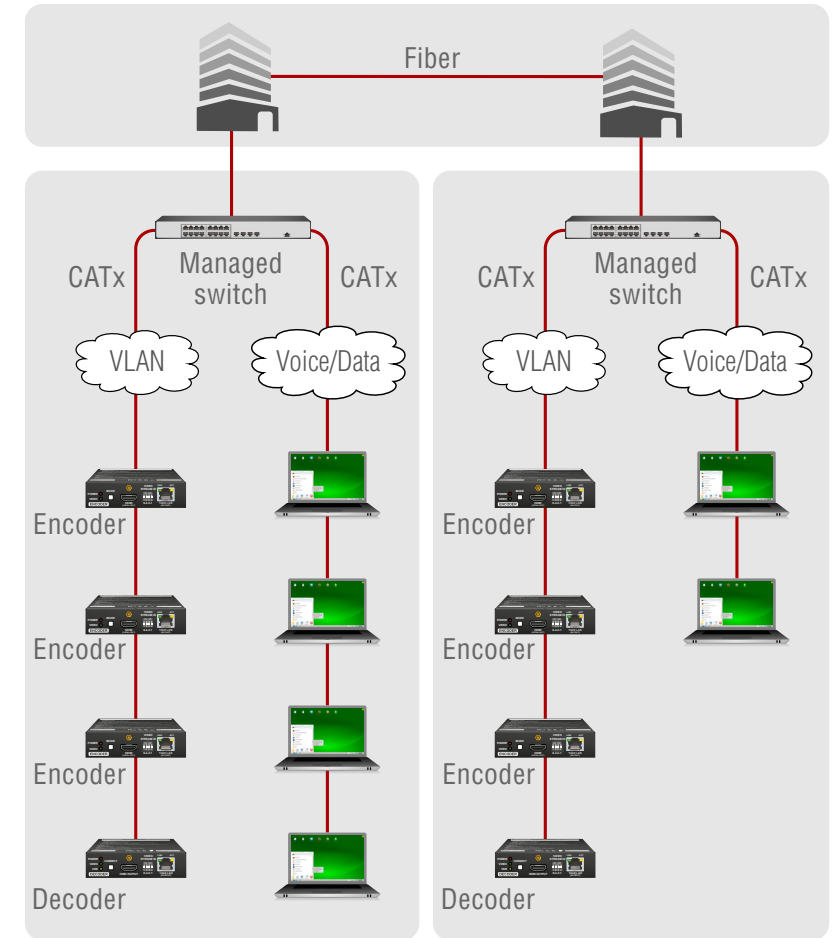
- 1 GbE Layer 2 (L2) switch

ATTENTION! VINX Encoder and Decoder send certain system commands over multicast packages. If the multicast routing is disabled on the network, the signal transmission can fail.

Managed Switch for Multicast Routing

In TCP/IP terminology Layer 2 is the data link layer that is responsible for splitting the information coming from higher layers in the TCP/IP stack into Ethernet frames. An Ethernet frame includes, among others, labeling information with source and destination physical addresses (called source and destination MAC address). These physical addresses uniquely identify the source and destination physical devices (e.g. a VINX Encoder and a VINX Decoder). Ethernet frames provide error resilience by incorporating a redundancy check field through which transmission errors can easily be detected. The device that uses only the physical address information found in the Ethernet frame to route a packet from one of its input ports to one or more of its output ports is an unmanaged switch.

A managed switch, on the other hand, can handle the traffic and forward input packets to output packets by utilizing information from higher layers. This gives the managed switch more flexibility and also allows for more sophisticated functions like multicast forwarding. Since even a simple VINX network, where one VINX Encoder supplies more VINX Decoders, relies on multicasting, a multicast capable switch (i.e. a managed one) is mandatory. If non-managed switches transmit the multicast packages, the multicast traffic is usually converted to broadcast and transmitted over all interfaces.



Hardware Requirement:

- 1 GbE Layer 3 (L3) switch

Why is it important?

By default, Lightware Video-over-IP Encoders and Decoders use multicast routing. The managed switch in the network shall offer the following capabilities:

- IGMPv2
- IGMP snooping
- IGMP fast leave
- IGMP Querier
- Multicast filtering
- 9k MTU - Jumbo/Giant frames

Managed Switch Properties in Details

IGMPv2

IGMPv2 is version 2 of the Internet Group Management Protocol. This protocol is used by end-point devices to signal their interest in receiving a specific multicast content via subscribing to the multicast group corresponding to the content. Using IGMPv2 packets, the end-point devices can send a leave message to indicate that they are no longer interested in receiving the stream of the multicast group. Moreover, a multicast capable router can periodically poll the end-point devices on its interfaces which multicast streams they are interested to receive. The answer to such a query is called a membership report. IGMPv2 must be supported by the managed switch.

IGMP Snooping

IGMP snooping is a feature which allows the switch to monitor IGMP traffic when enabled. The information collected from the IGMP packets is used by the managed switch to determine which interfaces the multicast traffic should be forwarded to. In other words, IGMP snooping is used to conserve bandwidth by allowing the switch to root multicast traffic to those interfaces where it is really required.

IGMP Fast Leave

IGMP fast leave (or immediate leave), when configured, reduces the amount of time it takes for the managed switch to stop sending multicast traffic (corresponding to a multicast group defined by a multicast address) to an interface, where all end-point devices that used to be interested in a stream have sent a IGMP leave message. Without fast leave being enabled the managed switch would first send out a query message and then would stop forwarding when no end-points answered within a pre-specified time interval. If fast leave is enabled, the switch stops forwarding the traffic without sending a query message.

IGMP Querier

In order for IGMP snooping to work properly, IGMP messages must traverse in the subnet between managed switches. However, if there is no multicast capable router present periodically sending out query messages and receiving answers to those queries, IGMP messages are usually not forwarded upstream from one switch to another. By enabling the IGMP querier feature in a managed switch, the managed switch will act like a router and periodically query the devices in the subnet (even other managed switches) to send their membership reports. From those report all the listening switches with IGMP snooping enabled will be able to determine where multicast traffic should be rooted to.

Multicast Filtering

Some control information from VINX devices is transmitted via multicast packets. However, these packets are not registered during certain startup intervals or not registered at all. In order for all VINX devices in the subnet to receive such control information, multicast filtering must be set up, so that unregistered groups are forwarded to all interfaces on the managed switch.

Jumbo/Giant Frames

Ethernet frames consist of a header and a payload. Since the header has a fixed length (20 or 26 bytes) the bigger the payload, the higher the useful bandwidth is. Similarly, the higher the useful bandwidth, the better the picture quality of the encoded video stream will be. To maximize picture quality, the Ethernet frame size (and consequently, the payload) should be as high as possible. In a normal Ethernet frame, the payload can be at most 1500 bytes. An Ethernet jumbo frame, however, can carry up to 9000 bytes of payload. Since the goal of the transmission is to provide the best possible picture quality in all circumstances, the VINX Encoder device produces Ethernet jumbo frames. Thus, the handling of jumbo frames has to be enabled in the managed switches.

8.8. Further Information

Limited Warranty Statement

1. Lightware Visual Engineering LLC (Lightware) warrants to all trade and end user customers that any Lightware product purchased will be free from manufacturing defects in both material and workmanship for three (3) years from purchase unless stated otherwise below. The warranty period will begin on the latest possible date where proof of purchase/delivery can be provided by the customer. In the event that no proof can be provided (empty 'Date of purchase' field or a copy of invoice), the warranty period will begin from the point of delivery from Lightware.

1.1. 25G and MODEX product series will be subject to a seven (7) year warranty period under the same terms as outlined in this document.

1.2. If during the first three (3) months of purchase, the customer is unhappy with any aspect of a Lightware product, Lightware will accept a return for full credit.

1.3. Any product that fails in the first six (6) months of the warranty period will automatically be eligible for replacement and advanced replacement where available. Any replacements provided will be warranted for the remainder of the original unit's warranty period.

1.4. Product failures from six (6) months to the end of the warranty period will either be repaired or replaced at the discretion of Lightware. If Lightware chooses to replace the product then the replacement will be warranted for the remainder of the original unit's warranty period.

2. The above-stated warranty and procedures will not apply to any product that has been:

2.1. Modified, repaired or altered by anyone other than a certified Lightware engineer unless expressly agreed beforehand.

2.2. Used in any application other than that for which it was intended.

2.3. Subjected to any mechanical or electrical abuse or accidental damage.

2.4. Any costs incurred for repair/replacement of goods that fall into the above categories (2.1., 2.2., 2.3.) will be borne by the customer at a pre-agreed figure.

3. All products to be returned to Lightware require a return material authorization number (RMA) prior to shipment and this number must be clearly marked on the box. If an RMA number is not obtained or is not clearly marked on the box, Lightware will refuse the shipment.

3.1. The customer will be responsible for in-bound and Lightware will be responsible for out-bound shipping costs.

3.2. Newly repaired or replaced products will be warranted to the end of the originally purchased products warranty period.

Document Revision History

Rev.	Release date	Changes	Editor
1.0	21-12-2017	Initial release.	Laszlo Zsedenyi
1.1	19-02-2018	Minor corrections.	Laszlo Zsedenyi
1.2	23-03-2018	Built-in website chapter updated.	Laszlo Zsedenyi

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