LIGHTWARE

INNOVATIVE. RELIABLE. MADE IN EUROPE.

USER MANUAL



MMX4X2-HDMI
MMX4X2-HT200
MMX4X2-HDMI-USB20-L

Standalone Multimedia Matrix Switcher

Bookmark Page



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.

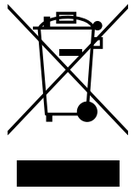
Ventilation

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

WARNING

To prevent injury, the apparatus is recommended to be securely attach to the floor/wall, or mounted in accordance with the installation instructions. The apparatus shall not be exposed to dripping or splashing, and no objects filled with liquids, such as vases, shall be placed on the apparatus. No naked flame sources, such as lit 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
	Protective conductor terminal
	Equipotential Connector
	On (Power)
	Off (Power)
	Double insulation
	Caution, possibility of eletric shock
	Caution
	Laser radiation
	Warning, Rotating fan
	Caution: for indoor use only

Table of Contents

1. INTRODUCTION 9
1.1. Description 10
1.2. Compatible Devices 10
1.3. Box Contents 11
1.3.1. Supplied Accessories 11
1.3.2. Optional Accessories 11
1.4. Features 12
1.4.1. List of Features (in alphabetical order) 12
1.4.2. Feature Availability 13
1.5. Typical Applications 14

2. PRODUCT OVERVIEW 16
2.1. MMX4x2-HT200 17
2.2. MMX4x2-HDMI 18
2.3. MMX4x2-HDMI-USB20-L 19
2.4. Front Panel LEDs 20
2.5. Rear Panel LEDs 20
2.6. Front Panel Buttons 21
2.6.1. OUT 1 and OUT 2 Video Select Buttons 21
2.6.2. Set Audio Config Button 21
2.6.3. Enable DHCP (Dynamic) IP Address 22
2.6.4. Reset to Factory Default Settings 22
2.6.5. Reseting the Device 22
2.6.6. Control Lock 22
2.6.7. Entering Firmware Update Mode 22

3. INSTALLATION 23
3.1. Mounting Options 24
3.1.1. Rack Shelf Mounting 24
3.1.2. Under-Desk Mounting Options 25
3.2. Electrical Connections 25
3.2.1. 12V DC Connection 25
3.2.2. HDMI Connector 26
3.2.3. Analog Audio Input and Output 26
3.2.4. RJ45 Connectors (TPS and Ethernet Ports) 26
3.2.5. USB Connectors 27
3.2.6. IR Connector 27
3.2.7. RS-232 Connector 27
3.2.8. GPIO - General Purpose Input/Output Ports 27
3.3. Connecting Steps 28

4. DEVICE CONCEPT 29
4.1. Compact Size Matrix Concept 30
4.2. Video Interface 30
4.3. Consumer Electronics Control (CEC) Interface 31
4.4. Audio Interface 31
4.4.1. Audio Input Modes 31
4.4.2. Audio Output Modes 31
4.4.3. Audio Options - Example 31
4.5. The Autoselect Feature 32
4.6. USB Interface 33
4.6.1. USB Control Interface 33
4.6.2. 4x1 USB 2.0 Switch 33
4.7. Ethernet Interface 33
4.7.1. Device Control over Ethernet 33
4.7.2. TCP Recognizer 34
4.7.3. Wake-on-Lan 34
4.8. The Event Manager Feature 34
4.9. Basic IT Security 35
4.10. TPS Interface 35
4.11. Bulk Device Management 36
4.11.1. Network Settings 36
4.12. RS-232 Serial Interface 36
4.12.1. Technical Background 36
4.12.2. RS-232 Recognizer 37
4.13. Messaging Options 38
4.14. Batch Commands 38
4.15. IR Interface 38
4.16. GPIO Interface 39
4.17. Further Built-in Features 40
4.17.1. Matrix Cloning – Configuration Backup and Restore 40
4.17.2. Advanced EDID Management 40

5. SOFTWARE CONTROL - LIGHTWARE DEVICE CONTROLLER 41
5.1. Install and Update 42
5.2. Running the LDC 42
5.3. Establishing the Connection 43
5.3.1. Ethernet Tab 43
5.3.2. Serial Tab 44
5.3.3. USB Tab 44
5.3.4. Further Tools 44
5.4. Bulk Device Management 45
5.4.1. Network Settings 45
5.5. Crosspoint Menu 46
5.5.1. Presets Tab 47
5.5.2. Port Tiles 47
5.6. Port Properties Windows 48
5.6.1. TPS Video Input 48
5.6.2. HDMI Video Input 48
5.6.3. HDMI Video Output 49
5.6.4. Digital Audio Input 50
5.6.5. Analog Audio Input 50
5.6.6. Digital Audio Output 51
5.6.7. Analog Audio Output 51
5.7. CEC Tool 52
5.8. Diagnostic Tools 53
5.8.1. Frame Detector 53
5.8.2. No Sync Screen (Test Pattern) 53
5.8.3. Cable Diagnostics 54
5.9. EDID Menu 55
5.9.1. EDID Operations 55
5.9.2. EDID Summary Window 56
5.9.3. Editing an EDID 56
5.9.4. Creating an EDID - Easy EDID Creator 56
5.10. Control Menu 57
5.10.1. RS-232 57
5.10.2. Ethernet 58
5.10.3. GPIO 60
5.10.4. Infra 60
5.10.5. Macros 62
5.10.6. Variables 63
5.10.7. USBSwitch 64
5.11. Event Manager 65
5.11.1. The Event Editor 65
5.11.2. Create or Modify an Event 66
5.11.3. Special Tools and Accessories 67
5.11.4. Clear One or More Event(s) 68
5.11.5. Export and Import Events 68
5.11.6. Event Creating - Example 68
5.12. Settings Menu 69
5.12.1. Status 69
5.12.2. Network 69
5.12.3. Front Panel 70
5.12.4. Backup 70
5.12.5. System 70
5.13. The Built-in Miniweb 71
5.13.1. Opening the Miniweb 71
5.13.2. The Default Status Page 72
5.13.3. Miniweb Customization 72
5.14. Configuration Cloning (Backup Tab) 73
5.14.1. Cloning Steps in a Nutshell 73

5.14.2. Save the Settings of the Device (Backup) ... 73
5.14.3. Upload the Settings to a Device (Restore) ... 74
5.14.4. Create and Restore Backups from the Device Memory ... 74
5.15. Advanced View Window ... 74

6. LW2 PROGRAMMERS' REFERENCE ... 75
6.1. Protocol Description ... 76
6.2. Instructions for the Terminal Application Usage ... 76
6.3. General LW2 Commands ... 77
6.3.1. Querying the Supported Commands ... 77
6.3.2. Querying the Product Type ... 77
6.3.3. Querying the Device Label ... 77
6.3.4. Querying the Control Protocol ... 77
6.3.5. Querying the Firmware Version of the CPU ... 77
6.3.6. Viewing Firmware for All Controllers ... 77
6.3.7. Viewing Installed Board ... 78
6.3.8. Connection Test ... 78
6.3.9. Restarting the Device ... 78
6.3.10. Compile Time ... 78
6.3.11. Querying the Health Status ... 78
6.3.12. Querying the Serial Number ... 78
6.3.13. Restoring the Factory Default Settings ... 78
6.4. AV Port Settings ... 79
6.4.1. Switching an Input to the Outputs ... 79
6.4.2. Muting an Output ... 79
6.4.3. Unmuting an Output ... 79
6.4.4. Locking an Output ... 79
6.4.5. Unlocking an Output ... 79
6.4.6. Viewing the Connection State on the Output ... 80
6.4.7. Viewing the Crosspoint Size ... 80
6.4.8. Setting the Video Autoselect Mode ... 80
6.4.9. Setting the Audio Autoselect Mode ... 81
6.4.10. Setting the Video Input Priorities ... 81
6.4.11. Setting the Audio Input Priorities ... 81
6.5. Network Configuration ... 82
6.5.1. Querying the Current IP Status ... 82
6.5.2. Setting the IP Address ... 82
6.5.3. Setting the Subnet Mask ... 82
6.5.4. Setting the Gateway Address ... 82
6.5.5. Applying the Network Settings ... 82
6.5.6. Enabling/disabling the Ethernet Port ... 83
6.6. Serial Port Configuration ... 83
6.6.1. Setting the Control Protocol ... 83
6.6.2. Serial Port Format Setting (Local port) ... 83
6.6.3. Serial Port Format Setting (Link port) ... 83
6.6.4. Serial Port Protocol Setting (Local port) ... 84
6.6.5. Serial Port Protocol Setting (Link port) ... 84
6.7. GPIO Port Configuration ... 84
6.7.1. Setting the Level and Direction for Each Pin ... 84
6.8. LW2 Commands – Quick Summary ... 85

7. LW3 PROGRAMMERS' REFERENCE ... 87
7.1. Overview ... 88
7.2. Instructions for the Terminal Application Usage ... 88
7.3. Protocol Rules ... 88
7.3.1. LW3 Tree Structure and Command Structure (examples) ... 88
7.3.2. General Rules ... 88
7.3.3. Legend for the Control Commands ... 89
7.3.4. Command Types ... 89
7.3.5. Prefix Summary ... 89
7.3.6. Error Messages ... 89
7.3.7. Escaping ... 90
7.3.8. Signature ... 90
7.3.9. Subscription ... 90
7.3.10. Notifications about the Changes of the Properties ... 90
7.4. System Commands ... 91
7.4.1. Querying the Product Name ... 91
7.4.2. Setting the Device Label ... 91
7.4.3. Resetting the Device ... 91
7.4.4. Restoring the Factory Default Settings ... 91
7.4.5. Querying the Package Version ... 91
7.4.6. Querying the CPU Firmware Version ... 91
7.4.7. Control Lock ... 92
7.4.8. Identifying the Device ... 92
7.4.9. Toggling the Dark Mode Setting ... 92
7.4.10. Setting the Delay of the Dark Mode Setting ... 92
7.4.11. Running a Macro ... 93
7.5. Cleartext Login Protection ... 93
7.5.1. Setting the Login Password ... 93
7.5.2. Logging Into the Device ... 93
7.5.3. Logging Out of the Device ... 93
7.5.4. Enabling/Disabling the Cleartext Login Function ... 93
7.6. Video Port Settings ... 94
7.6.1. Querying the Status of the Input Ports ... 94
7.6.2. Querying the Connected Input Port Number ... 94
7.6.3. Querying the Status of the Output Ports ... 95
7.6.4. Querying the Video Crosspoint Setting ... 95
7.6.5. Switching Video Input ... 95
7.6.6. Querying the Video Autoselect Settings ... 95
7.6.7. Changing the Autoselect Mode ... 96
7.6.8. Querying the Input Port Priority ... 96
7.6.9. Changing the Input Port Priority ... 96
7.6.10. Muting an Input Port ... 96
7.6.11. Unmuting an Input Port ... 96
7.6.12. Locking an Input Port ... 97
7.6.13. Unlocking an Input Port ... 97
7.6.14. Muting an Output Port ... 97
7.6.15. Unmuting an Output Port ... 97
7.6.16. Locking an Output Port ... 97
7.6.17. Unlocking an Output Port ... 97
7.6.18. HDCP Setting (Input Port) ... 97
7.6.19. HDCP Setting (Output Port) ... 98
7.6.20. Test Pattern Generator ... 98
7.6.21. HDMI Mode Settings (Output Port) ... 99
7.6.22. Querying the Recent TPS Mode ... 99
7.6.23. TPS Mode Settings ... 99
7.7. Audio Port Settings from Firmware v1.2.0 ... 100
7.7.1. Querying the Status of Source Port ... 100
7.7.2. Querying the Status of Destination Port ... 101
7.7.3. Querying the Audio Crosspoint State ... 101
7.7.4. Switching Audio Input ... 101
7.7.5. Querying the Audio Autoselect Settings ... 101
7.7.6. Changing the Autoselect Mode ... 102
7.7.7. Querying the Input Port Priority ... 102
7.7.8. Changing the Input Port Priority ... 102
7.7.9. Muting an Audio Input ... 102
7.7.10. Unmuting an Audio Input ... 103
7.7.11. Locking an Input Port ... 103
7.7.12. Unlocking an Input Port ... 103
7.7.13. Muting an Audio Output Port ... 103
7.7.14. Unmuting an Audio Output Port ... 103
7.7.15. Locking an Audio Output Port ... 104
7.7.16. Unlocking an Audio Output Port ... 104
7.7.17. Analog Audio Input Gain Setting ... 104
7.7.18. Analog Audio Output Level Settings by Exact Values ... 104
7.7.19. Analog Audio Output Level Settings by Steps ... 105
7.8. Audio Port Settings for Firmware v1.1.0 ... 105
7.8.1. Setting the Audio Source of HDMI Output 1 ... 105
7.8.2. Setting the Audio Source of HDMI Output 2 ... 106
7.8.3. Setting the Audio Source of Analog Audio Output ... 106
7.8.4. Muting/Unmuting Analog Audio Input ... 106
7.8.5. Muting/Unmuting Analog Audio Output ... 106
7.8.6. Analog Audio Input Level Settings by Exact Values ... 107
7.8.7. Analog Audio Input Level Settings by Steps ... 108
7.8.8. Analog Audio Output Level Settings ... 108
7.8.9. Analog Audio Output Level Settings by Steps ... 109
7.9. Event Manager Basics ... 110
7.9.1. How to arrange an Event? ... 110

7.9.2. Setting a Condition by Specifying a Direct Path 110
7.9.3. Setting a Condition by Linking Another Condition 110
7.9.4. Setting a Condition by Linking More Conditions 110
7.9.5. Setting an Action by Specifying a Direct Path 111
7.9.6. Setting an Action by Linking Another Action 111
7.9.7. Setting an Action by Linking a Macro 111
7.10. Event Manager Tool Kit 111
7.10.1. Setting the Delay 111
7.10.2. Setting the Name of the Event 112
7.10.3. Enabling/Disabling the Event 112
7.10.4. Triggering a Condition 112
7.10.5. Querying the Condition Counter 112
7.10.6. Querying the Condition Trigger Counter 113
7.10.7. Testing an Action 113
7.11. Variable-Management 114
7.11.1. Value Assignment 114
7.11.2. Addition and Subtraction (Add Method) 114
7.11.3. Addition and Subtraction (Cycle Method) 115
7.11.4. Value Change with Intervals (Case) 115
7.11.5. Scanning and Storing 116
7.11.6. Reformatting a Value 116
7.12. Ethernet Port Configuration 117
7.12.1. Setting the DHCP State 117
7.12.2. Changing the IP Address (Static) 117
7.12.3. Changing the Subnet Mask (Static) 117
7.12.4. Changing the Gateway Address (Static) 117
7.12.5. Applying Network Settings 117
7.13. Ethernet Tool Kit 118
7.13.1. Device Filter Based on MAC Address 118
7.13.2. LW2 Control Port Blocking 118
7.13.3. HTTP Port Blocking 118
7.13.4. HTTP Post Receiving Blocking 118
7.13.5. Powering on a Computer over Ethernet (Wake-on-LAN) 119
7.13.6. Setting the Hostname 119
7.14. Ethernet Message Sending 119
7.14.1. Sending a TCP Message (ASCII-format) 119
7.14.2. Sending a TCP Text (ASCII-format) 119
7.14.3. Sending a TCP Binary Message (HEX-format) 120
7.14.4. Sending a UDP Message (ASCII-format) 120
7.14.5. Sending a UDP Text (ASCII-format) 120
7.14.6. Sending a UDP Binary Message (HEX-format) 120
7.15. HTTP Messaging 121
7.15.1. Setting the Target IP Address 121
7.15.2. Setting the TCP Port 121
7.15.3. Setting the Target Path 121
7.15.4. Setting the Message Header 121
7.15.5. Sending a Post Message 121
7.15.6. Sending a Put Message 121
7.16. TCP Message Recognizer 122
7.16.1. Setting the IP Address of the TCP Server 122
7.16.2. Setting the TCP/IP Port Number of the TCP Server 122
7.16.3. Connecting to a TCP Server 122
7.16.4. Disconnecting from a TCP Server 122
7.16.5. Setting the Delimiter Hex 122
7.16.6. Setting the Timeout 123
7.16.7. Querying the Last Recognized Message (String) 123
7.16.8. Querying the Last Recognized Message (Hex) 123
7.16.9. Clearing the Last Recognized Stored Message 123
7.16.10. Querying the Last Recognized Active Message (String) 123
7.16.11. Querying the Last Recognized Active Message (Hex) 124
7.16.12. Setting the Active Timeout 124
7.16.13. Running an Immediate Event Action 124
7.17. RS-232 Port Configuration 125
7.17.1. Protocol Setting 125
7.17.2. BAUD Rate Setting 125
7.17.3. Stopbits Setting 125
7.17.4. Parity Setting 125
7.17.5. Databit Setting 126
7.17.6. RS-232 Operation Mode 126
7.17.7. Enabling/Disabling Command Injection 126
7.18. RS-232 Message Sending 126
7.18.1. Sending a Message (ASCII-format) via RS-232 126
7.18.2. Sending a Text (ASCII-format) via RS-232 126
7.18.3. Sending a Binary Message (HEX-format) via RS-232 127
7.18.4. Using Hexadecimal Codes 127
7.19. RS-232 Message Recognizer 127
7.19.1. Enabling/Disabling the Recognizer 127
7.19.2. Setting the Delimiter Hex 128
7.19.3. Setting the Timeout 128
7.19.4. Querying the Last Recognized Message (String) 128
7.19.5. Querying the Last Recognized Message(Hex) 128
7.19.6. Clearing the Last Recognized Stored Message 128
7.19.7. Querying the Last Recognized Active Message (String) 129
7.19.8. Querying the Last Recognized Active Message (Hex) 129
7.19.9. Setting the Active Timeout 129
7.19.10. Running an Immediate Event Action 129
7.20. CEC Command Sending 130
7.20.1. Press&Release Commands 130
7.20.2. Further Commands 130
7.20.3. Sending an OSD String 130
7.20.4. Sending CEC Commands in Hex Format 131
7.20.5. Querying the Last Received CEC Message 131
7.21. Infrared Port Configuration 132
7.21.1. Enabling/Disabling Command Injection Mode 132
7.21.2. Changing Command Injection Port Number 132
7.21.3. Enabling/Disabling Output Signal Modulation 132
7.22. Infrared Message Sending 133
7.22.1. Sending Pronto Hex Codes in Little-endian Format via IR Port 133
7.22.2. Sending Pronto Hex Codes in Big-endian Format via IR Port ... 133
7.23. GPIO Port Configuration 134
7.23.1. Querying the Direction of a GPIO Pin 134
7.23.2. Setting the Direction of a GPIO Pin 134
7.23.3. Querying the Output Level of a GPIO Pin 134
7.23.4. Setting the Output Level of a GPIO Pin 134
7.23.5. Toggling the Level of a GPIO Pin 134
7.24. USB 2.0 Switch Configuration 135
7.24.1. Setting the Active USB Host 135
7.24.2. Power Switch Delay 135
7.24.3. Querying the Host Presence 135
7.24.4. Setting the 5V Sending to the USB Peripherals 135
7.24.5. Querying the 5V Overcurrent State of a USB Peripheral 136
7.25. EDID Management 136
7.25.1. Querying the Emulated EDIDs 136
7.25.2. Querying the Validity of a Dynamic EDID 136
7.25.3. Querying the Preferred Resolution of a User EDID 136
7.25.4. Emulating an EDID to an Input Port 137
7.25.5. Emulating an EDID to All Input Ports 137
7.25.6. Copying an EDID to User Memory 137
7.25.7. Deleting an EDID from User Memory 137
7.25.8. Resetting the Emulated EDIDs 137
7.26. LW3 Commands - Quick Summary 138

8. FIRMWARE UPDATE 145
8.1. Introduction 146
8.2. Preparation 146
8.2.1. About the Firmware Package (LFP2 File) 146
8.2.2. LDU2 Installation 146
8.3. Running the Software 147
8.4. Updating via GUI 148
8.5. Command Line Interface (CLI) 151
8.5.1. How to Run 151
8.5.2. How to Use 151
8.6. CLI Commands 151
8.6.1. LDU2 Version 151
8.6.2. Check For New LDU2 Version 151
8.6.3. Help 152
8.6.4. Device Info 152
8.6.5. Update 153

8.6.6. Restore 154
8.6.7. Package Options 154
8.6.8. Complex Examples 155
8.6.9. Exit Codes 156
8.7. If the Update is not successful 156
9. TROUBLESHOOTING 157
9.1. Use Cases 158
9.2. How to Speed Up the Troubleshooting Process 159
10. TECHNOLOGIES 160
10.1. EDID Management 161
10.1.1. Understanding the EDID 161
10.1.2. Advanced EDID Management 161
10.2. HDCP Management 162
10.2.1. Protected and Unprotected Content 162
10.2.2. Disable Unnecessary Encryption 162
10.3. Pixel Accurate Reclocking 163
11. APPENDIX 164
11.1. Specifications 165
11.2. Maximum Extension Distances 167
11.3. Input/Output Port Numbering 167
11.4. Content of Backup File 168
11.5. Factory Default Settings 168
11.6. Applied Ports (Network Settings) 169
11.7. Mechanical Drawings 170
11.8. Cable Wiring Guide 171
11.8.1. Serial Ports 171
11.8.2. Audio Ports 171
11.9. Factory EDID List 172
11.10. Firmware Release Notes 174
11.11. LW3 Command Changes in Firmware v1.2.0 175
11.12. Hashtag Keyword List 177
11.13. Further Document Information 179
11.14. Limited Warranty Statement 179

Applied SW/FW/HW Environment

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

Rev.	Release date
FW package	v1.6.4b2
Lightware Device Controller (LDC) version	v2.20.0b3
Lightware Device Updater V2 (LDU2) version	v2.35.0b6

Document Revision History

Rev.	Release date	Changes	Editor
1.0	2017-02-17	Initial release	Tamas Forgacs
...			
v4	2026-02-09	New document template, cosmetic corrections	Laszlo Zsedenyi
v5	2026-09-04	ToC correction.	Laszlo Zsedenyi

Contact Us

sales@lightware.com

+36 1 255 3800

support@lightware.com

+36 1 255 3810

Lightware Visual Engineering PLC.

Gizella 51-57, Budapest H-1143, Hungary

www.lightware.com

©2026 Lightware Visual Engineering. All rights reserved.
All trademarks mentioned are the property of their respective owners.
Specifications are subject to change without notice.

1

Introduction

Thank you for choosing Lightware's MMX4x2 series device. In the first chapter we would like to introduce the device, highlighting the most important features in the coming sections.

- Description 10
- Compatible Devices 10
- Box Contents 11
- Features 12

1.1. Description

MMX4x2 series device is a unique mini size matrix switcher. The HT200 model has three HDMI inputs and one HDBaseT™ compatible TPS input port. It has two independent HDMI outputs. The HDMI model has four HDMI inputs and two independent HDMI outputs. Audio can be de-embedded from the HDMI signal to a balanced 5-pole Phoenix (Euroblock) port, and external audio signal can be embedded into the HDMI stream from another 5-pole Phoenix input port. The volume and gain properties of the audio signal can be modified at both input and output. The unit is fully 4K/UHD/3D capable and HDCP compliant. The device has a built-in Event Manager tool, configurable via the Lightware Device Controller software. Further control options are served by the USB, RS-232, infrared (in and out) and Ethernet ports.

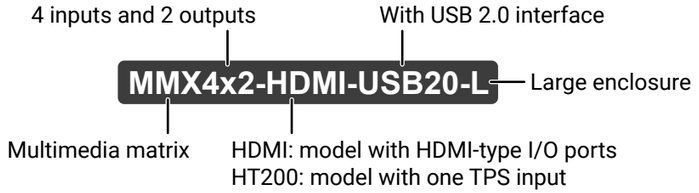
MMX4x2-HDMI-USB20-L Model

The model has four HDMI inputs and two independent HDMI outputs, as well as a USB 2.0 layer that provides the switching of four external USB peripherals (USB devices such as webcamera, speakerphone, multitouch display, etc.) to four independent host computers or laptops.

Unique USB functions allow seamless integration in Unified Communication and small Video Conference rooms. The USB 'Host5vSense' function makes the device to recognize if a USB cable is connected, and it triggers a condition as set in the Event Manager. For example, the last connected USB laptop can be selected as an input automatically. The 'Device5vEnable' means turning the 5V supply for USB peripherals ON or OFF.

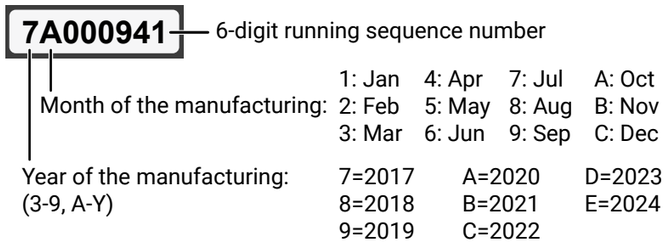
HDMI connectors are 4K capable, HDCP compliant, and additional control options are served by the USB, RS-232, infrared (in and out), Ethernet and GPIO ports.

Model Denomination

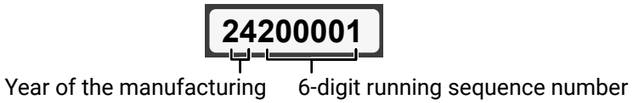


About the Serial Number

Lightware devices contain a label indicating the unique serial number of the product. The structure is the following:



From 1st of October 2024, serial number format of Lightware devices is the following: the first two digits are of the year of manufacture, while the remaining digits make up the running sequence number.



1.2. Compatible Devices

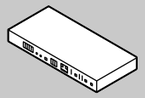
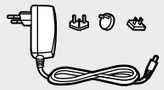
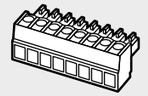
The MMX4x2-HT200 matrix is compatible with other Lightware TPS transmitters, matrix TPS and TPS2 boards, 25G TPS2 boards, as well as third-party HDBaseT-extenders, displays, but not compatible with the phased out TPS-90 extenders.

The MMX4x2-HT200 matrix is compatible with any third-party HDBaseT™ device.

HDBaseT™ and the HDBaseT Alliance logo are trademarks of the HDBaseT Alliance.

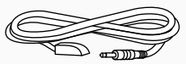
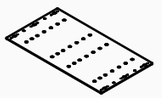
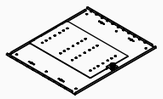
1.3. Box Contents

1.3.1. Supplied Accessories

	Supplied devices	Supplied accessories						
								
	MMX4x2 series matrix switcher	12V DC adaptor with interchangeable plugs	UTP patch cable (3 m)	Phoenix® Combicon 3-pole connector	Phoenix® Combicon 5-pole connector (2x)	Phoenix® Combicon 8-pole connector	Rack ears (2x) with M4x8 screws (4x)	Safety & warranty info, Quick Start Guide
MMX4x2-HDMI	✓	✓	✓	✓	✓	-	-	✓
MMX4x2-HT200	✓	✓	✓	✓	✓	-	-	✓
MMX4x2-HDMI-USB20-L	✓	✓	✓	✓	✓	✓	✓	✓

1.3.2. Optional Accessories

The optional accessories can be purchased separately; please contact sales@lightware.com.

	Optional accessories								
									
	Infrared emitter unit	Infrared detector unit	Room Automation Device (RAP-B511 / RAC-B501)	TBP6 button panel	PSU2x rack mountable power supply unit	1U high rack shelf	UD Mounting Kit Double	UD Mounting Plate F120	UD Mounting Pro P140
MMX4x2-HDMI	✓	✓	✓	✓	✓	✓	✓	✓	✓
MMX4x2-HT200	✓	✓	✓	✓	✓	✓	✓	✓	✓
MMX4x2-HDMI-USB20-L	✓	✓	✓	✓	✓	✓	-	✓	✓

The assembling of certain accessories can be found in the Mounting Options section.

1.4. Features

1.4.1. List of Features (in alphabetical order)

DIFFERENCE: The availability of the features are device-dependent, see the table at the following page.



4K and 3D Support

High bandwidth allows extension of resolutions up to 4K and even 3D sources and displays are supported.



Audio Embedder and De-embedder Function

The analog audio can be embedded to HDMI outputs and embedded audio can be routed to the analog audio output.



Autoselect Function for Video Inputs

The Autoselect feature can sense the port status on the video input ports and select one of them automatically. Various modes are available: first detect, last detect, priority detect.



Basic IT-security

These entry-level network security improvements help prevent unauthorized access to the Lightware device; cleartext login, TCP port blocking and MAC address filtering.



Batch of Commands

A batch of LW3 commands (salvo) can be run by the Lightware device either by a previously stored macro or by sending a file to the device with the desired commands.



Consumer Electronics Control

Supports transmitting standard CEC commands in order to remote control the source or sink device.



Dark Mode

Rental application requires this function, which keeps the LEDs unlit to hide the device during the event.



Deep Color Support and Conversion

It is possible to transmit the highest quality 36-bit video streams for perfect color reproduction.



Ethernet Control

Multiple simultaneous TCP/IP connections are available with a simple ASCII-based protocol for controlling or configuring the product or to perform a firmware update.



Event Manager

The Event Manager tool takes care of all the necessary control in a smaller configuration by performing predefined actions in response to device status changes.



Event Manager +

Triggering a condition, defining variables and checking two conditions for an action – these features are available by the improved Event Manager.



Forced Button Lock

The front panel buttons can be locked and unlocking is only possible via LW3 protocol command.



Frame Detector

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.



GPIO Control Port

7 GPIO pins operating at TTL digital signal levels that can be controlled with both LW2 and LW3 commands.



HDCP-compliant

The receiver fulfills the HDCP standard. HDCP capability on the digital video inputs can be disabled when non-protected content is extended.



Infra Code Sending

infrared code sending in Pronto Hex format – in Command injection mode, too. The code sending is available as an Action in Event Manager, too.



Miniweb

The Miniweb is able to display an adaptive surface with a virtual crosspoint and buttons for Event Manager Actions. The Miniweb can be displayed in a mobile device, too.



Pixel Accurate Reclocking

Each output has a clean, jitter free signal, eliminating signal instability and distortion caused by long cables or connector reflections.



RS-232 Recognizer

Supports recognizing incoming RS-232 messages to integrate with 3rd party devices like the video conference codec devices.



RS-232 Transmission

AV systems can also contain serial port controllers and controlled devices. Bi-directional serial port pass-through supports any unit that works with standard RS-232.



TCP Recognizer

Supports recognizing the incoming TCP messages to integrate with 3rd party devices like the video conference codec devices.



USB 2.0 Switch – 4x1

The USB 2.0 layer provides the switching of four external USB peripherals (e.g. webcamera, speakerphone, multitouch display, etc.) to four independent host computers or laptops.



Built-in Cable Compensation

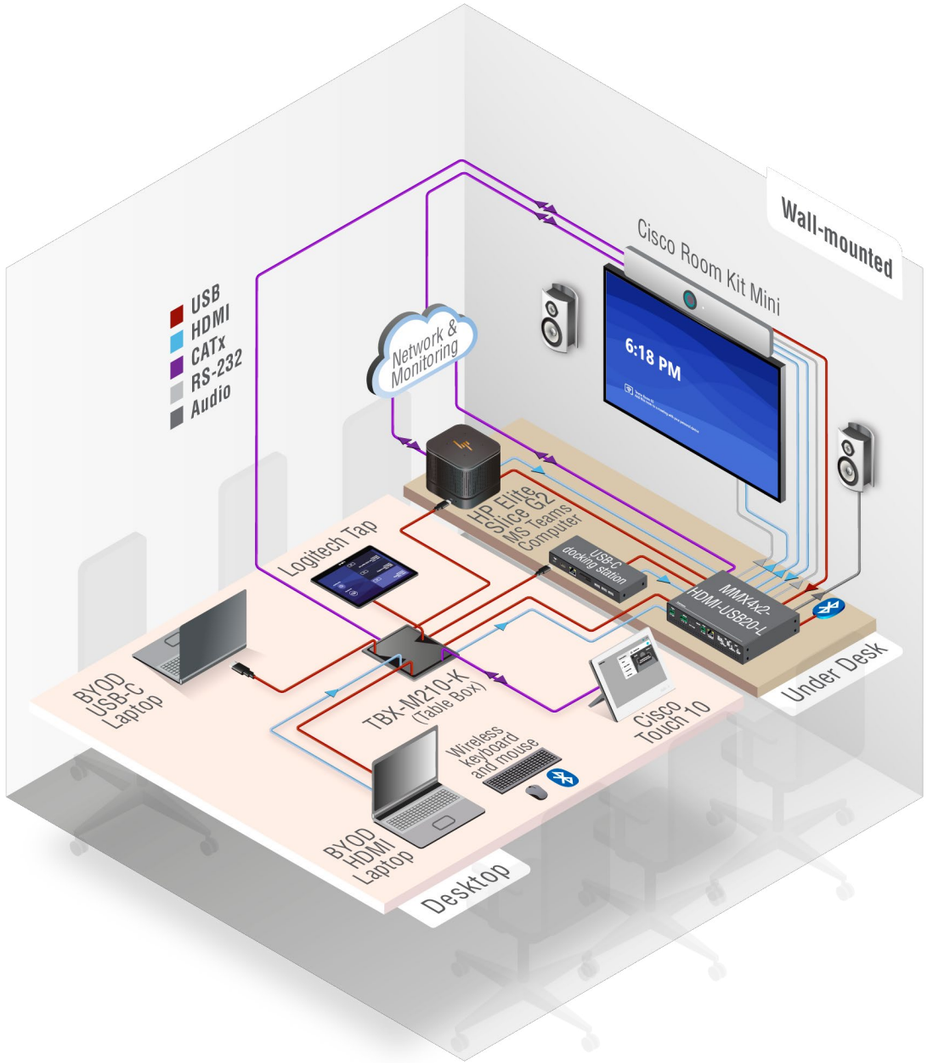
Each HDMI input port contains an individual built-in cable extender.

1.4.2. Feature Availability

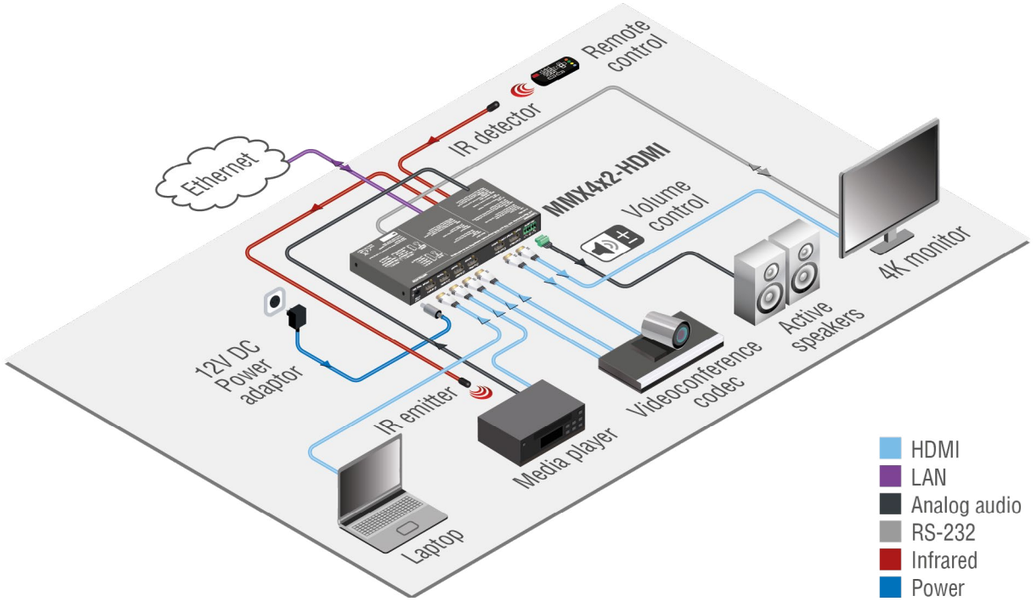
	Basic features														Advanced Control Pack (from FW package v1.3.1)			Advanced Control Pack v3 (from FW package v1.6.0b19)					
	4K and 3D Support	Audio Embedder and De-embedder Function	Autoselect Function for Video Inputs	Deep Color Support and Conversion	Ethernet Control	Event Manager	Forced Button Lock	Frame Detector	GPIO Control Port	HDCP-compliant	Miniweb	Pixel Accurate Reclocking	RS-232 Transmission	USB 2.0 Switch – 4x1	Consumer Electronics Control	Infra Code Sending	RS-232 Recognizer	Basic IT Security	Batch Coamnds	Dark Mode	Event Manager +	TCP Recognizer	Built-in Cable Compensation
MMX4x2-HDMI	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓
MMX4x2-HT200	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓
MMX4x2-HDMI-USB20-L	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

1.5. Typical Applications

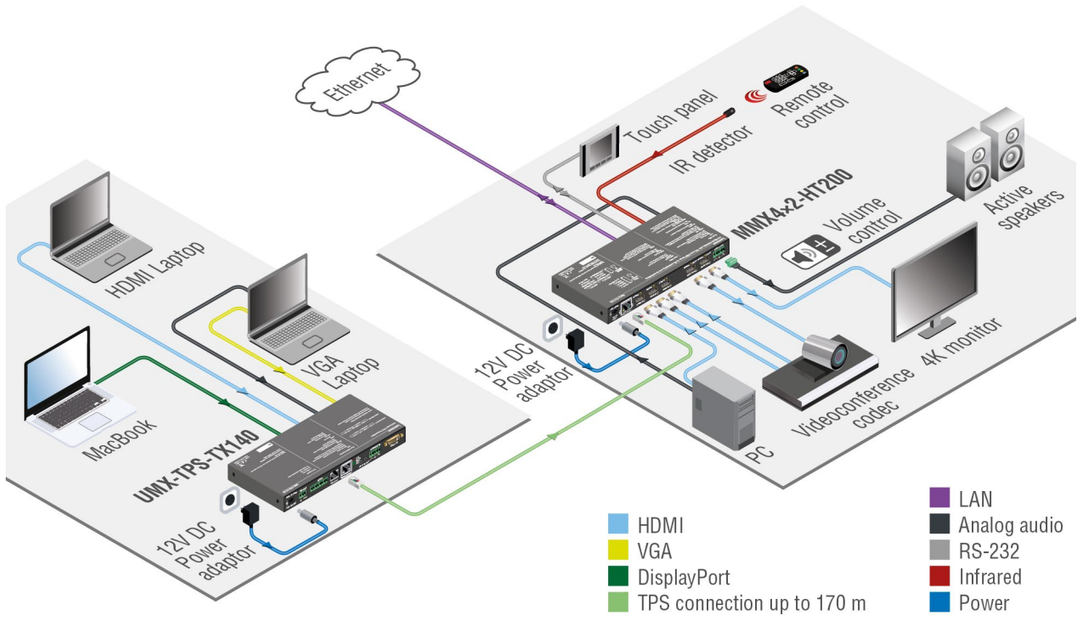
Standalone Application - MMX4x2-HDMI-USB20-L



Standalone Application - MMX4x2-HDMI



Standalone Application - MMX4x2-HT200



2

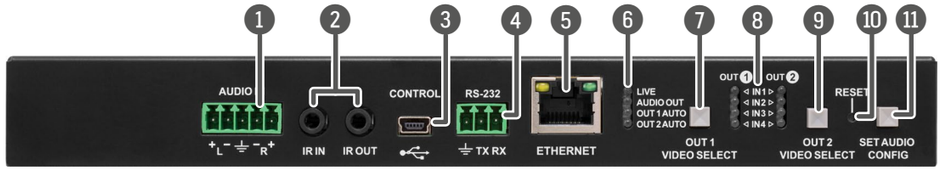
Product Overview

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

- Typical Applications **14**
- MMX4x2-HT200 **17**
- MMX4x2-HDMI **18**
- MMX4x2-HDMI-USB20-L **19**
- Front Panel LEDs **20**
- Rear Panel LEDs **20**
- Front Panel Buttons **21**

2.1. MMX4x2-HT200

Front View



1	**Audio input port**	5-pole Phoenix connector for balanced analog audio. Pin assignment can be found in the Analog Audio Input and Output section.
2	**IR IN and OUT**	3-pole TRS connector, also known as 3.5 mm (1/8”) jack plug for optional infrared receiver (IR IN) and transmitter (IR OUT). Pin assignments can be found in the 1 section.
3	**USB**	USB interface for LDC connection to control the matrix.
4	**RS-232**	3-pole Phoenix connector for controlling the device with LDC, third-party control systems, or third-party device control. Pin assignment can be found in the RS-232 Connector section.
5	**Ethernet**	Locking RJ45 connector for device control and firmware update.
6	**Status LEDs**	The LEDs give immediate feedback about the current state of the device. See the details in the Front Panel LEDs section.
7	**Video select button for Output 1**	Pushing the button selects the video source for Output 1. See the sequence in the OUT 1 and OUT 2 Video Select Buttons section.
8	**Input select LEDs**	The LEDs give feedback about the current crosspoint settings.
9	**Video select button for Output 2**	Pushing the button selects the video source for Output 2. See the sequence in the OUT 1 and OUT 2 Video Select Buttons section.
10	**Reset button**	Pressing the reset button reboots the device. It has the same result as unplugging and re-plugging the power connector.
11	**Set Audio Config button**	Audio configuration and special functions are available through this button. See more information about the audio configuration modes in the Set Audio Config Button section and the special functions in the Enable DHCP (Dynamic) IP Address section.

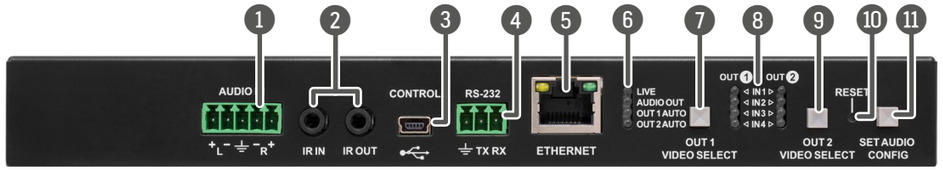
Rear View



1	**12V DC 1A input port**	Local power in; connect the output of the supplied 12V DC power adaptor. For more details, see the next section.
2	**TPS input port**	Locking RJ45 connector. Connect a twisted pair cable between the transmitter and the matrix. Maximum cable extension distances can be found in the Maximum Extension Distances section.
3	**HDMI input ports**	HDMI input ports for sources. LED operation can be found in the Rear Panel LEDs section.
4	**HDMI output ports**	Connect an HDMI cable between the sink device and the matrix. LED operations can be found in the Rear Panel LEDs section.
5	**Audio output port**	5-pole Phoenix connector for balanced analog audio output. Pin assignment can be found in the Analog Audio Input and Output section.

2.2. MMX4x2-HDMI

Front View



1	**Audio input port**	5-pole Phoenix connector for balanced analog audio. Pin assignment can be found in the Analog Audio Input and Output section.
2	**IR IN and OUT**	3-pole TRS connector, also known as 3.5 mm (1/8”) jack plug for optional infrared receiver (IR IN) and transmitter (IR OUT). Pin assignments can be found in the 1 section.
3	**USB**	USB interface for LDC connection to control the matrix.
4	**RS-232**	3-pole Phoenix connector for controlling the device with LDC, third-party control systems, or third-party device control. Pin assignment can be found in the RS-232 Connector section.
5	**Ethernet**	Locking RJ45 connector for device control and firmware update.
6	**Status LEDs**	The LEDs give immediate feedback about the current state of the device. See the details in the Front Panel LEDs section.
7	**Video select button for Output 1**	Pushing the button selects the video source for Output 1. See the sequence in the OUT 1 and OUT 2 Video Select Buttons section.
8	**Input select LEDs**	The LEDs give feedback about the current crosspoint settings.
9	**Video select button for Output 2**	Pushing the button selects the video source for Output 2. See the sequence in the OUT 1 and OUT 2 Video Select Buttons section.
10	**Reset button**	Pressing the reset button reboots the device. It has the same result as unplugging and re-plugging the power connector.
11	**Set Audio Config button**	Audio configuration and special functions are available through this button. See more information about the audio configuration modes in the Set Audio Config Button section and the special functions in the Enable DHCP (Dynamic) IP Address section.

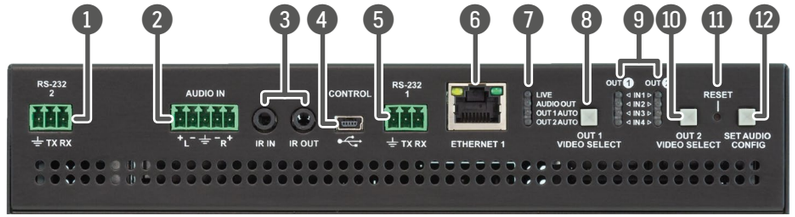
Rear View



1	**12V DC 1A input port**	Local power in; connect the output of the supplied 12V DC power adaptor. For more details, see the next section.
3	**HDMI input ports**	HDMI input ports for sources. LED operation can be found in the Rear Panel LEDs section.
4	**HDMI output ports**	Connect an HDMI cable between the sink device and the matrix. LED operations can be found in the Rear Panel LEDs section.
5	**Audio output port**	5-pole Phoenix connector for balanced analog audio output. Pin assignment can be found in the Analog Audio Input and Output section.

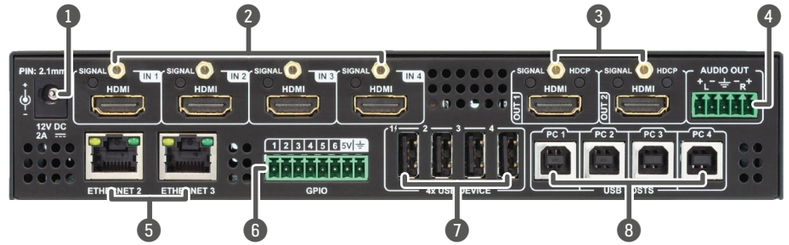
2.3. MMX4x2-HDMI-USB20-L

Front View



1	**RS-232 (#2)**	3-pole Phoenix connector for controlling the device with LDC, third-party control systems, or third-party device control. Pin assignment can be found in the RS-232 Connector section.
2	**Audio input port**	5-pole Phoenix connector for balanced analog audio. Pin assignment can be found in the Analog Audio Input and Output section.
3	**IR IN and OUT**	3-pole TRS connector, also known as 3.5 mm (1/8”) jack plug for optional infrared receiver (IR IN) and transmitter (IR OUT). Pin assignments can be found in the 1 section.
4	**USB**	USB interface for LDC connection to control the matrix.
5	**RS-232 (#1)**	3-pole Phoenix connector for controlling the device with LDC, third-party control systems, or third-party device control. Pin assignment can be found in the RS-232 Connector section.
6	**Ethernet (#1)**	RJ45 connector for network-sharing, applying device control or performing a firmware update.
7	**Status LEDs**	The LEDs give immediate feedback about the current state of the device. See the details in the Front Panel LEDs section.
8	**Video select button for Output 1**	Pushing the button selects the video source for Output 1. See the sequence in the OUT 1 and OUT 2 Video Select Buttons section.
9	**Input select LEDs**	The LEDs give feedback about the current crosspoint settings.
10	**Video select button for Output 2**	Pushing the button selects the video source for Output 2. See the sequence in the OUT 1 and OUT 2 Video Select Buttons section.
11	**Reset button**	Pressing the reset button reboots the device. It has the same result as unplugging and re-plugging the power connector.
12	**Set Audio Config button**	Audio configuration and special functions are available through this button. See more information about the audio configuration modes in the Set Audio Config Button section and the special functions in the Enable DHCP (Dynamic) IP Address section.

Rear View



1	**12V DC input connector**	Local power in; connect the output of the supplied 12V DC power adaptor.
2	**HDMI input ports**	HDMI input ports for sources. LED operation can be found in the Rear Panel LEDs section.
3	**HDMI output ports**	Connect an HDMI cable between the sink device and the matrix. LED operations can be found in the Rear Panel LEDs section.
4	**Audio output port**	5-pole Phoenix connector for balanced analog audio output. Pin assignment can be found in the Analog Audio Input and Output section.
5	**Ethernet (#2)**	RJ45 connector for network-sharing, applying device control or performing a firmware update.
6	**GPIO port**	8-pole Phoenix connector with configurable general purpose input/output pins.
7	**USB-A ports**	Downstream ports for connecting USB peripherals (e.g. camera, keyboard, multitouch display).
8	**USB-B ports**	Upstream ports for connecting USB host devices (e.g. computer).

2.4. Front Panel LEDs

Status LEDs

LIVE LED			
○		off	The device is not powered.
☼	green	blinking slow	Device is powered and operational.
☼	green	blinking fast	Device is in bootload mode (firmware update).
●	green	on	The device is powered but no operation.
AUDIO OUT LED			
○		off	Embedded audio is not present or analog audio output is muted.
☼	green	blinking	Embedded audio format is not supported for audio de-embedding.
●	green	on	Embedded audio is present and de-embedded.
OUT 1 AUTO LED			
○		off	Autoselect is disabled on HDMI Output 1.
●	green	on	Autoselect is enabled on HDMI Output 1.
OUT 2 AUTO LED			
○		off	Autoselect is disabled on HDMI Output 2.
●	green	on	Autoselect is enabled on HDMI Output 2.

INFO: You can find more information about Autoselect feature in The Autoselect Feature section.

Crosspoint Status LEDs

IN1..IN4 LEDs			
☼	green	blinking	Input is selected, signal is not present.
☼	amber	blinking	Pre-programmed audio configuration (1..4) is selected by the Set Audio Config button. See the details in the Set Audio Config Button section.
●	green	on	Input is selected, signal is present.

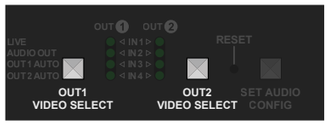
2.5. Rear Panel LEDs

HDMI input LEDs			
○		off	Signal is not present on input.
●	green	on	Signal is present on input.
TPS input LED (only at MMX4x2-HT200 model)			
○		off	No TPS link is established between the matrix and the transmitter.
☼	green	blinking	Low power mode or Ethernet fallback mode is active, see details in the Consumer Electronics Control (CEC) Interface section.
●	green	on	TPS link is established.
HDMI output LEDs			
○		off	Output signal is not present or muted.
●	green	on	Signal is present.
HDCP LEDs			
○		off	Output signal is not HDCP-encrypted.
☼	green	blinking	Non-HDCP capable device is connected, encrypted signal is replaced with red screen.
●	green	on	Output signal is HDCP-encrypted.

2.6. Front Panel Buttons

2.6.1. OUT 1 and OUT 2 Video Select Buttons

You can select the input source for the desired output port by pushing the buttons. The sequence is the following for each device.



MMX4x2-HDMI: *#autoselect*

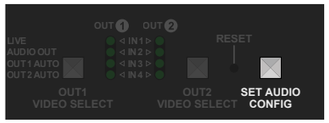
→ HDMI IN ❶ → HDMI IN ❷ → HDMI IN ❸ → HDMI IN ❹ → Autoselect →

MMX4x2-HT200:

→ TPS IN ❶ → HDMI IN ❷ → HDMI IN ❸ → HDMI IN ❹ → Autoselect →

2.6.2. Set Audio Config Button

You can select the pre-programmed audio configuration mode by pushing the button. The sequence is the following:



→ Config #1 → Config #2 → Config #3 → Config #4 →

When the **Set audio config** button is pressed, the given audio config is loaded and the corresponding **<IN#>** LEDs blink in amber six times. E.g. if **Config #3** is loaded, the **<IN3>** LEDs blink six times.

Config #1 Copy HDMI OUT 1 audio to HDMI OUT 2 and Analog Audio Out.			
A1 (HDMI OUT 1, Stream 1)	**A2 (HDMI OUT 2, Stream 2)**	**A3 (Analog In)**	
✓			**O1 (HDMI OUT 1)**
✓			**O2 (HDMI OUT 2)**
✓			**O3 (ANALOG OUT)**

Config #2 Copy HDMI OUT 2 audio to HDMI OUT 1 and Analog Audio Out.			
A1 (HDMI OUT 1, Stream 1)	**A2 (HDMI OUT 2, Stream 2)**	**A3 (Analog In)**	
	✓		**O1 (HDMI OUT 1)**
	✓		**O2 (HDMI OUT 2)**
	✓		**O3 (ANALOG OUT)**

Config #3 Use audio from Analog Input on all outputs.			
A1 (HDMI OUT 1, Stream 1)	**A2 (HDMI OUT 2, Stream 2)**	**A3 (Analog In)**	
		✓	**O1 (HDMI OUT 1)**
		✓	**O2 (HDMI OUT 2)**
		✓	**O3 (ANALOG OUT)**

Config #4 Keep Original Audio on HDMI outputs, de-embed from HDMI OUT 2 to Analog Audio Out.			
A1 (HDMI OUT 1, Stream 1)	**A2 (HDMI OUT 2, Stream 2)**	**A3 (Analog In)**	
✓			**O1 (HDMI OUT 1)**
	✓		**O2 (HDMI OUT 2)**
	✓		**O3 (ANALOG OUT)**

2.6.3. Enable DHCP (Dynamic) IP Address



The device has a static IP address as a factory default setting. If this setting does not fit the circumstances during install or usage, DHCP can be enabled from the front panel:

Step 1. Make sure the device is powered on and operational.

Step 2. Press and keep pressing the **Set Audio Config** button for 5 seconds.

Step 3. After 5 seconds the front panel LEDs start blinking; release the button and press it **3 times again** quickly (within 3 seconds).

Step 4. The LEDs get dark, DHCP gets enabled. *#dhcp*

2.6.4. Reset to Factory Default Settings



To restore factory default values, do the following steps:

Step 1. Make sure the device is powered on and operational.

Step 2. Press and keep pressing the **Set Audio Config** button for 10 seconds. After 5 seconds the front panel LEDs start blinking, but keep on pressing the button.

Step 3. After 10 seconds the LEDs start blinking faster; release the button and press it **3 times again** quickly (within 3 seconds).

Step 4. The LEDs get dark, the device restores the factory default settings and reboots. *#factory*

Factory default settings are listed in the Factory Default Settings section.

2.6.5. Reseting the Device



In a few cases (after firmware update, etc) you may need to reset the device. Pushing the reset button has the same result as disconnecting and reconnecting the power adaptor to the matrix. To reset the device, follow the steps: *#reboot #restart*

Step 1. Push the button with a thin object for a second.

Step 2. Wait until the device reboots. You can use the matrix when the LIVE LED is blinking slowly again.

ATTENTION: Resetting the device does not reset the settings to factory defaults. To reset factory default settings, see the previous section.

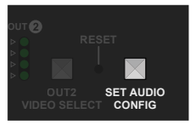
2.6.6. Control Lock



Press the **OUT2 Video Select** and **Set Audio Config** buttons **together** (within 100 ms) to disable/enable front panel buttons; the front panel LEDs blink 4 times when locking/unlocking. If the control lock is enabled and a button is pressed, the front panel LEDs blink 3 times quickly.

2.6.7. Entering Firmware Update Mode

ATTENTION: This function is applicable only in special cases when the device is to be updated by the Lightware Device Updater (LDU) software. Do not use this option with LDU2 software.



It may happen that the firmware update process is not successful, and the device cannot be switched to bootload mode automatically. In this case, the device can be forced into firmware update mode as follows:

Step 1. Make sure the matrix is powered off.

Step 2. Press and keep pressing the **Set Audio Config** button.

Step 3. **Power on the matrix** while the **Set Audio Config** button is being pressed. If the device is switched to firmware update mode, the LIVE LED is blinking quickly (less than 500 ms duty cycle). The other LEDs are off.

The procedure of firmware update can be found in the Firmware Update chapter.

3

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 **24**
- Electrical Connections **25**
- Connecting Steps **28**

3.1. Mounting Options

To mount the matrix, Lightware supplies optional accessories for different usage. There are two kinds of mounting kits with a similar fixing method. The receiver has two mounting holes with inner thread on the bottom side; see the bottom view in the Mechanical Drawings section. To order mounting accessories, please contact sales@lightware.com. Fasten the device with the screws enclosed to the accessory.

More details about accessories can be found in the Mounting Assembly Guide.

WARNING! Always use the supplied screws. Using different (e.g. longer) screws may damage the device.

INFO: The matrix is half-rack sized.

3.1.1. Rack Shelf Mounting

1U High Rack Shelf

Affected models:

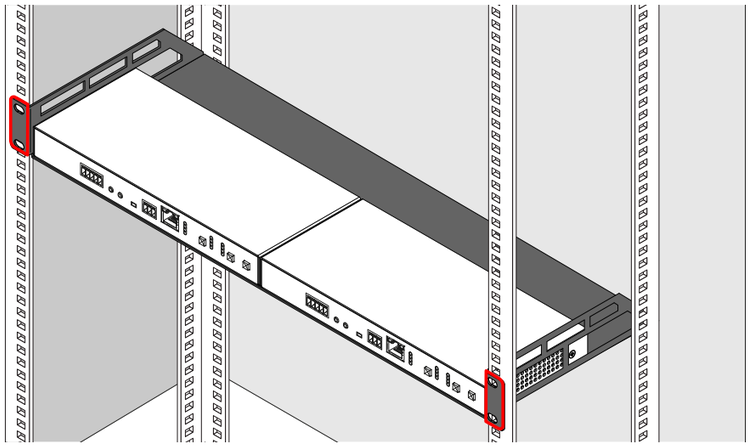
- MMX4x2-HDMI
- MMX4x2-HT200
- MMX4x2-HDMI-USB20-L

This accessory allows rack mounting for half-rack, quarter-rack and pocket sized units.



1U high rack shelf

1U high rack shelf provides mounting holes for fastening two half-rack or four quarter-rack sized units. Pocket sized devices can also be fastened to the self.



Rack Ear-mounting

DIFFERENCE: This kind of mounting is available for MMX4x2-HDMI-USB20-L model only.

Affected model:

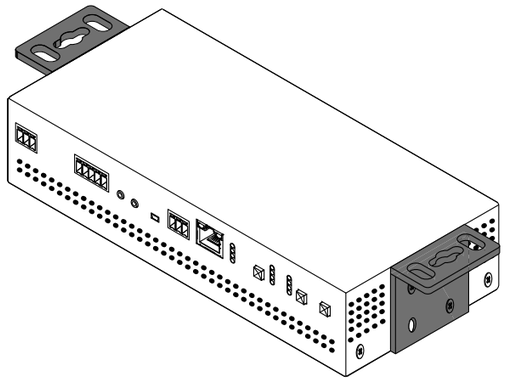
- MMX4x2-HDMI-USB20-L

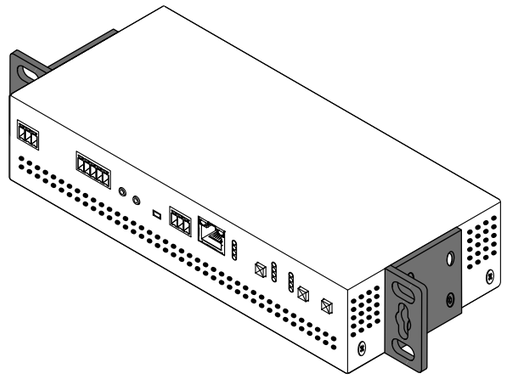
The device can be mounted by the supplied rack ears.



Rack ears

Use the M4 Allen-head screws supplied with the matrix to fix the ear to the housing. The design allows rotating the ears by 90°; choose the layout that fits the installation the best.





3.1.2. Under-Desk Mounting Options

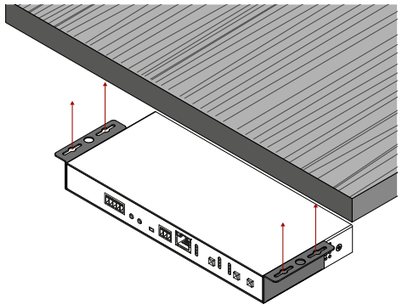
Under-desk Double Mounting Kit

DIFFERENCE: This kind of mounting is recommended for MMX4x2-HDMI and MMX4x2-HT200 models only.



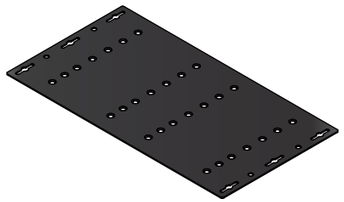
Under-desk double mounting kit

The UD-kit double makes it easy to mount a single matrix on any flat surface (e.g. furniture).



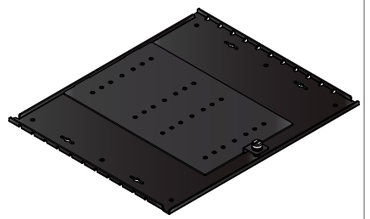
INFO: The chipboard screws are not supplied with the mounting kit.

UD Mounting Plate F120

Accessory	Number of mountable devices	Features
UD Mounting Plate F120 	1 half-rack sized	Lightweight design

INFO: For more details about the options of the applications and the assembly steps, please see the Mounting Assembly Guide.

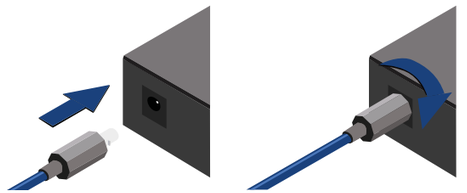
UD Mounting Pro P140

Accessory	Number of mountable devices	Features
UD Mounting Pro P140 	1 half-rack sized	Easy to change the mounted devices

INFO: For more details about the options of the applications and the assembly steps, please see the Mounting Assembly Guide.

3.2. Electrical Connections

3.2.1. 12V DC Connection



Locking DC connector

Do not forget to turn the plug counterclockwise before disconnecting the power adaptor.

WARNING! Always use the supplied 12V power adaptor. Warranty void if damage occurs due to use of a different power source.

3.2.2. HDMI Connector

The device provides standard 19 pole HDMI connectors for output. Always use high quality HDMI cables for connecting sources and displays.

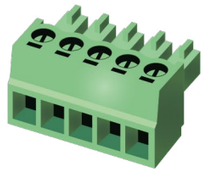


3.2.3. Analog Audio Input and Output

5-pole Phoenix connector is used for balanced analog audio input and output. Unbalanced audio signals can be connected as well. For unbalanced output, connect + and ground to the source and connect – to the ground.



Pin nr.	Signal
1	Left+
2	Left-
3	Ground
4	Right-
5	Right+



Analog audio connector and plug pin assignments

Compatible Plug Type

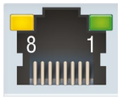
Phoenix® Combicon series (3.5mm pitch, 5-pole), type: MC 1.5/5-ST-3.5.

You can find more information about analog audio function in the Audio Interface section. Audio cable wiring guide is in the Cable Wiring Guide section.

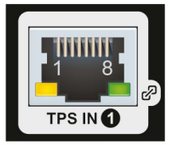
3.2.4. RJ45 Connectors (TPS and Ethernet Ports)

The device provides standard RJ45 connectors for TPS IN and LAN ports. Always use high quality Ethernet cables for connecting transmitters and receivers. Maximum CATx cable distances for the TPS connection can be found in the Maximum Extension Distances section. You can find more information about TPS interface in the TPS Interface section.

RJ45 LED States



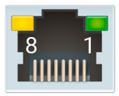
Ethernet port		
	LED1, amber	LED2, green
OFF	no link	10 Mbps
Blinking	activity	N/A
ON	link is active	100 Mbps

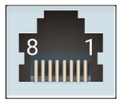


TPS input port		
	LED1, amber	LED2, green
OFF	N/A	no TPS link
Blinking 1 flash/sec		low power mode, RS-232 and Ethernet
Blinking 2 flashes/sec		low power mode, only RS-232
Blinking 6 flashes/sec		Ethernet fallback mode
ON		TPS link is active

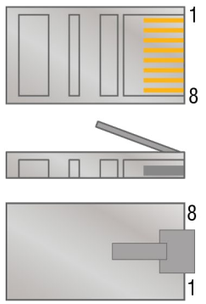
Wiring of TPS and LAN Cables

Lightware recommends the termination of LAN cables on the basis of TIA/EIA T 568 A or TIA/EIA T 568 B standards.





Pin	TIA/EIA T568A	TIA/EIA T568B
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



3.2.5. USB Connectors







The matrix provides a standard USB mini B-type connector on the front panel for device control purposes.

DIFFERENCE: The following ports are available for MMX4x2-HDMI-USB20-L model only.

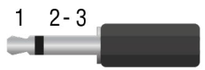
USB 2.0 B-type ports are for connecting USB host devices (computers).

USB 2.0 A-type ports are for connecting USB peripherals (camera, multi-touch display, etc...).

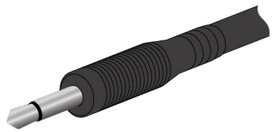
3.2.6. IR Connector

An infrared detector and an infrared emitter can be connected to the matrix with TRS (Tip, Ring, and Sleeve) connectors. They are also known as (3,5 mm or approx. 1/8") audio jack, phone jack, phone plug, and mini-jack plug. The pin assignments are the following for the detector and the emitter:

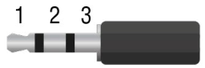
EMITTER: 2-pole TS



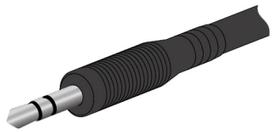
Pin nr.	Signal
1 Tip	+5V
2 Ring	Signal (active low)
3 Sleeve	



DETECTOR: 3-pole TRS



Pin nr.	Signal
1 Tip	Signal (active low)
2 Ring	Ground
3 Sleeve	+5V



INFO: Ring pole of the emitter is optional. If your infrared emitter has a three-pole TRS plug, then the Ring and the Sleeve carry the same signal (Output -).

You can find more information about Infrared interface in the Messaging Options section.

3.2.7. RS-232 Connector

The matrix contains a 3-pole Phoenix connector, which is used for RS-232 serial connection.



Pin nr.	Signal
1	Ground
2	TX data
3	RX data



RS-232 connector pin assignments

Compatible Plug Type

Phoenix® Combicon series (3.5mm pitch, 3-pole), type: MC 1.5/3-ST-3.5.

You can find more information about RS-232 interface in the RS-232 Serial Interface section.

3.2.8. GPIO - General Purpose Input/Output Ports

DIFFERENCE: This section refers to MMX4x2-HDMI-USB20-L model only.

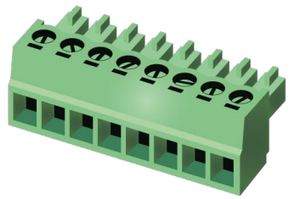
The matrix switcher contains an 8-pole Phoenix connector with six GPIO pins, which operate at TTL digital signal levels, and can be set to high or low level (Push-Pull). The direction of the pins can be input or output (adjustable). Voltage ranges for GPIO inputs are the following:

	Input voltage [V]	Output voltage [V]	Max. current [mA]
Logical low level	0 - 0,8	0 - 0.5	30
Logical high level	2 - 5	4.5 - 5	18

INFO: The maximum total current for the six GPIO pins is 180 mA.



Pin nr.	Signal
1	Configurable
2	
3	
4	
5	
6	
7	5V
8	Ground



GPIO connector and plug pin assignments

ATTENTION: The sum of the current that the GPIO and the USB-A ports can supply together is max. 2A.

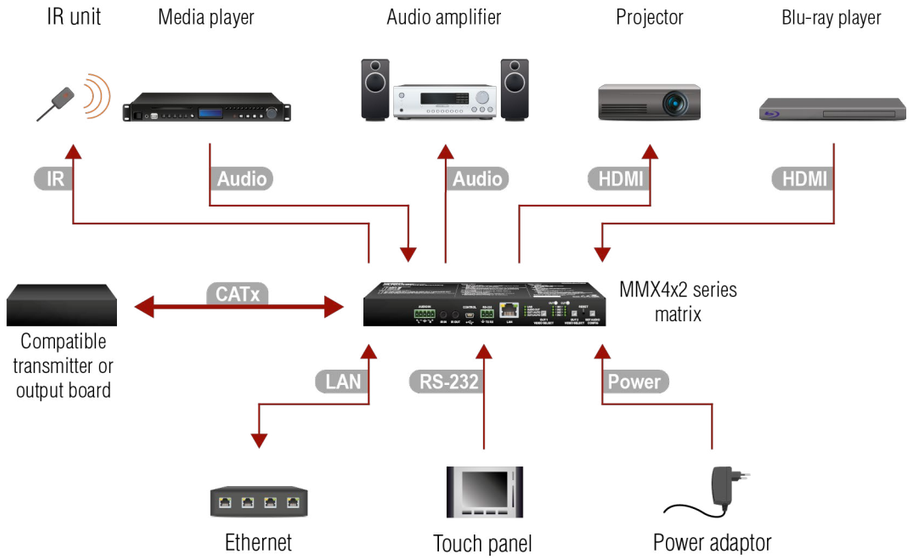
Compatible plug type

Phoenix® Combicon series (3.5mm pitch 8-pole), type: MC 1.5/8-ST-3.5.

You can find more information about GPIO interface in the GPIO Interface section.

3.3. Connecting Steps

MMX4x2-HDMI and MMX4x2-HT200



CATx **For MMX4x2-HT200 model only:** connect the matrix and the transmitter by a CATx cable via the TPS connectors.

HDMI Connect the matrix and the input sources (e.g. Blu-ray player) by HDMI cables via the HDMI input ports.

HDMI Connect the sink devices to the HDMI output ports.

Audio Optionally connect an audio device (e.g. a media player) to the audio input port.

Audio Optionally connect an audio device (e.g. a audio amplifier) to the audio output port.

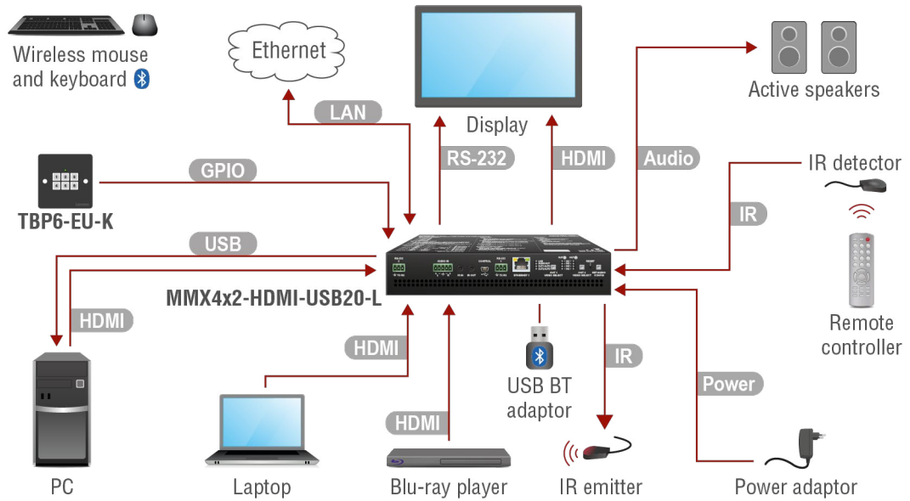
LAN Optionally connect the matrix to a LAN network in order to control the device.

RS-232 Optionally for RS-232 extension: connect a controller/controlled device (e.g. touch panel) to the RS-232 port.

IR Optionally for Infrared extension:
- Connect the infrared emitter to the IR OUT port of the device.
- Connect the infrared detector to the IR IN port of the device.

Power Connect the power adaptor to the DC input on the matrix first, then to the AC power socket.

MMX4x2-HDMI-USB20-L



HDMI Connect the source devices (e.g. PC, Laptop, Blu-ray player) to the HDMI input ports of the matrix by HDMI cables.

HDMI Connect the sink devices (e.g. Display) to the HDMI output ports of the matrix by HDMI cables.

Audio Optionally connect an audio device (e.g. Active speakers) to the analog audio output port by an audio cable.

LAN Optionally connect the matrix to a LAN in order to control the device and/or to connect further devices to the Ethernet.

RS-232 Optionally connect the Display over RS-232 to send control commands.

USB Connect a USB host device (e.g. PC) to the USB-B (upstream) port of the matrix.

USB Connect the desired USB peripherals (e.g. Bluetooth adaptor) to the USB-A (downstream) ports of the matrix.

IR Optionally for Infrared extension:
Connect the infrared emitter to the IR OUT port of the matrix, and/or
Connect the infrared detector to the IR IN port of the matrix.

GPIO Optionally connect a device to the GPIO port (e.g. Lightware's TBP6-EU-K button panel for room control options).

Power Connect the power adaptor to the DC input on the matrix first, then to the AC power socket.

4

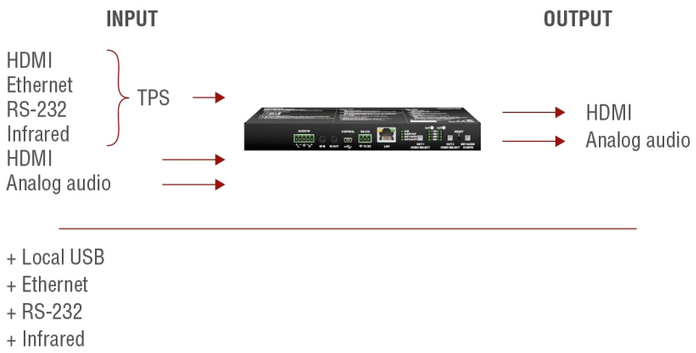
Device Concept

The following chapter describes the features of the device with a few real-life examples.

- Compact Size Matrix Concept **30**
- Video Interface **30**
- Consumer Electronics Control (CEC) Interface **31**
- Audio Interface **31**
- The Autoselect Feature **32**
- USB Interface **33**
- Ethernet Interface **33**
- The Event Manager Feature **34**
- Basic IT Security **35**
- TPS Interface **35**
- Bulk Device Management **36**
- RS-232 Serial Interface **36**
- Messaging Options **38**
- Batch Commands **38**
- IR Interface **38**
- GPIO Interface **39**
- Further Built-in Features **40**

4.1. Compact Size Matrix Concept

MMX4x2 series device is a multi-functional audio/video matrix switcher with four inputs and two outputs designed into a compact size frame. The HT200 model is built with HDBaseT™ (TPS) technology. The device can be controlled over various interfaces, e.g. Ethernet, USB, RS-232, and Infrared, and it is built with audio embedder and de-embedder functions.



Summary of the interfaces - MMX4x2-HT200

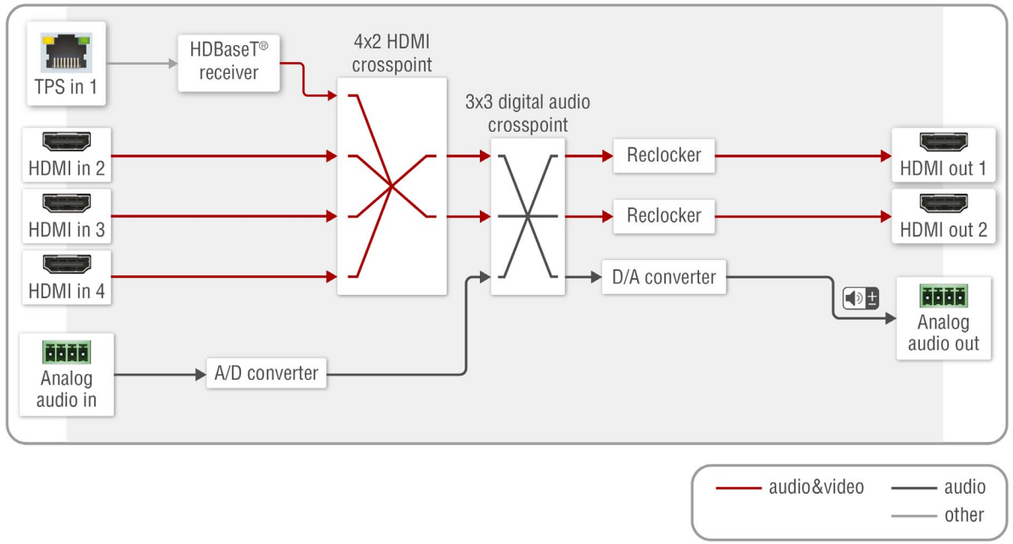
INFO: Only MMX4x2-HT200 model has TPS input. MMX4x2-HDMI model has HDMI+analog audio inputs and HDMI+analog audio outputs.



Summary of the interfaces - MMX4x2-HDMI-USB20-L

4.2. Video Interface

The following figure describes the port diagram of the MMX4x2-HT200 matrix:



Port diagram of MMX4x2-HT200 matrix switcher

The device has four video input ports (one TPS, three HDMI) and the 4x2 HDMI crosspoint routes the video signal further to the two video output ports (HDMI). The device also has an analog audio input port (5-pole Phoenix) and an analog audio output port (5-pole Phoenix). The 3x3 Digital audio crosspoint routes the audio signals toward the HDMI (audio embedding) and analog audio output ports.

The video crosspoint settings can be controlled in any of the following ways:

- Pressing **OUT 1 / OUT 2 Video Select** button on the device,
- Using Lightware Device Controller (LDC),
- Sending LW2 or LW3 protocol commands, or
- Using the **Autoselect** function.

4.3. Consumer Electronics Control (CEC) Interface

DIFFERENCE: The features mentioned below are available from firmware v1.3.1.

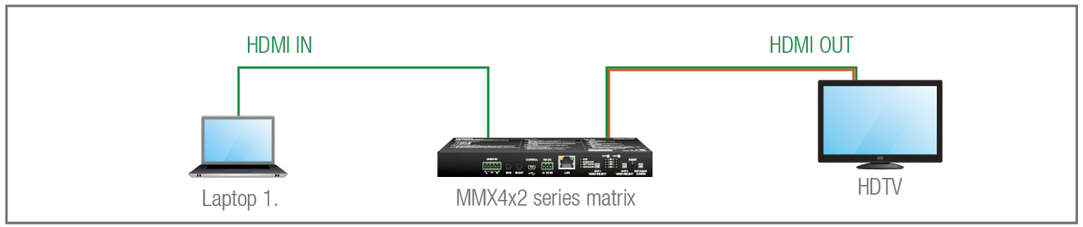
The CEC is a bi-directional communication, defined in the HDMI standard. This feature is for remote control of the source and sink devices in an AV system.

MMX4x2 model is able to send and receive CEC commands, from the input ports towards the source, and from outputs port towards the sink. For more information about sending CEC messages, see CEC Command Sending section.

CEC has a dedicated pin in the HDMI connector. DVI connector does not contain this pin, so the CEC transmission is unavailable when HDMI-DVI connector or adapter is in the signal route.

CEC Application Example

When active signal is detected on HDMI in, the switcher automatically sends a CEC message to the HDTV to wake up.



Create an event in the event manager:

- Set a condition: signal is present on the input port (I1),
- Set an action: send a CEC command 'Image view' on the output port (O1).

See the details about the Event Manager settings in the The Event Manager Feature section.

4.4. Audio Interface

4.4.1. Audio Input Modes

The device can receive embedded audio signal on the HDMI inputs and analog audio signal over the analog audio input port.

In case of the MMX4x2-HT200 model, embedded audio signal can be received on the TPS input port as well.

Audio Embedding

The matrix has a built-in audio embedder function, which means the audio signal that is received on the analog audio input port is able to be embedded into the HDMI outputs.

4.4.2. Audio Output Modes

The MMX4x2 series matrix can transmit two types of audio:

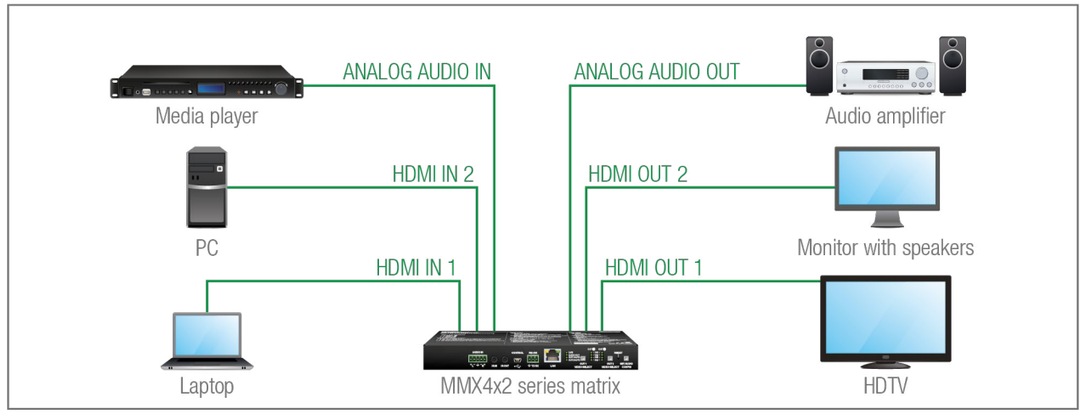
- Embedded (HDMI) and
- Analog balanced stereo audio.

Audio De-embedding

The matrix has a built-in audio de-embedder, which means the device is able to de-embed audio from its HDMI outputs to its analog audio output port.

ATTENTION: De-embedding function supports 2 channel PCM audio signals only. Other audio formats are not supported, and de-embedding will not be successful.

4.4.3. Audio Options - Example



The Concept

Three sources are connected to the matrix: the Laptop on HDMI input 1, the PC on HDMI input 2, and a Media player on the analog audio input. On the output side three sink devices wait for the audio signals: an HDTV on HDMI output 1, a Monitor with speakers on HDMI output 2, and an Audio Amplifier on the analog audio output line. The video line of the Laptop is switched to HDTV and the PC is switched to the Monitor with speakers. The embedding and de-embedding functions of the matrix allow infinite variations to transmit the analog and digital audio signals.

The following ways are available for the audio devices:

- When the sink device is the **HDTV**, the audio source can be the **Laptop**, the **PC**, and the **Media Player**.
- When the sink device is the **Monitor with speakers**, the audio source can be the **Laptop**, the **PC**, and the **Media player**.
- When the sink device is the **Audio amplifier**, the audio source can be the **Laptop**, the **PC** or the **Media player**.

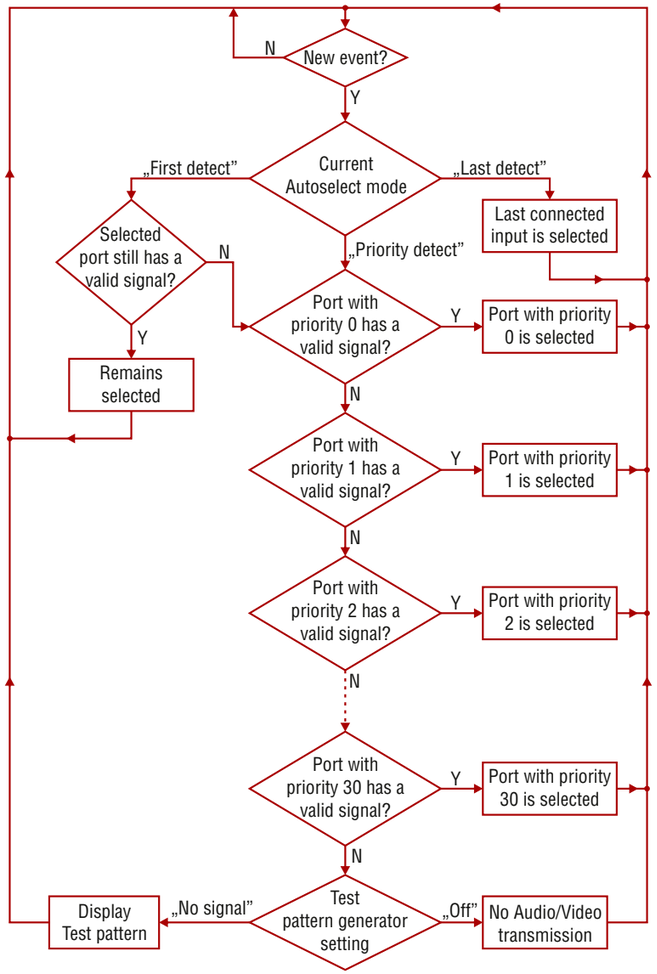
INFO: All related settings are available in the LDC software, see the details in the Bulk Device Management section.

4.5. The Autoselect Feature

Beside manually selecting crosspoints, you can choose the Autoselect option both in case of audio and video ports.

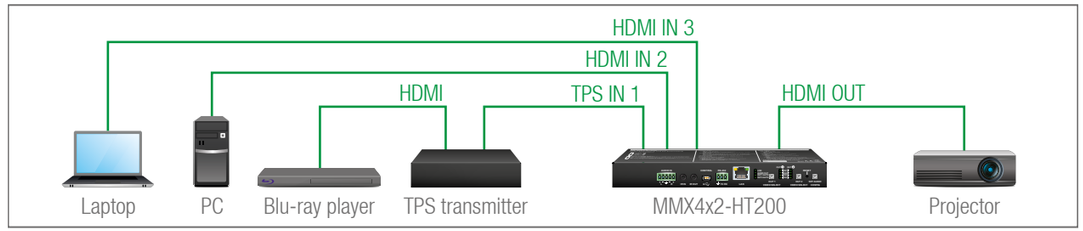
There are three types of Autoselect as follows:

- **First detect mode**: the selected input port is connected to the output while it has an active signal.
- **Priority detect mode**: it is always the highest priority active input that is selected to be transmited.
- **Last detect mode**: it is always the last attached input that is selected to be transmitted.



Flowchart of Autoselection modes

Automatic Input Selection - Example



The Concept

If there is no other source connecting to the matrix, only the Laptop, the source on HDMI input 3 will be automatically switched to the HDMI output. If the Laptop and the PC are also connected to the matrix, the source on the HDMI input 2 will be switched to the HDMI output. If the Blu-ray player is connected through the TPS transmitter, TPS input 1 will be switched to the HDMI output – independently of the presence of the other video signals.

Settings

- **HDMI output**: Set the Autoselect to **Enabled**. The Autoselect mode is Priority detect. The priorities are the following (the lowest number means the highest priority):

Source device	Input port	Priority
Laptop	I3 (HDMI IN 3)	**2**
PC	I2 (HDMI IN 2)	**1**
Blu-ray player (via a TPS transmitter)	I1 (TPS IN 1)	**0**

Priorities can be set in Lightware Device Controller software, see related settings in the HDMI Video Output section.

4.6. USB Interface

4.6.1. USB Control Interface

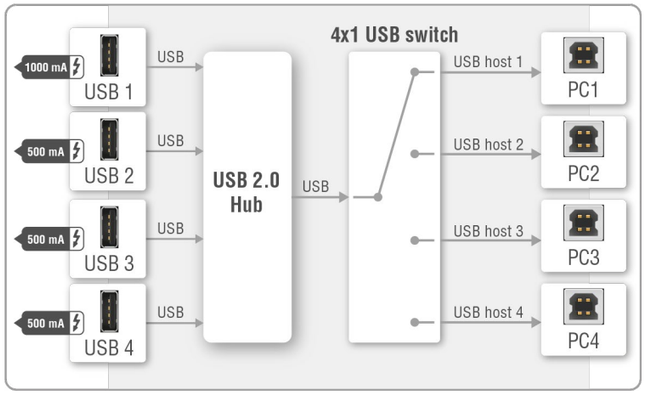
The device can be controlled over front panel USB port (mini B-type connector). This interface supports only LW3 protocol. The interface can be used to establish a connection to Lightware Device Controller software.

4.6.2. 4x1 USB 2.0 Switch

DIFFERENCE: This section refers to the MMX4x2-HDMI-USB20-L model only.

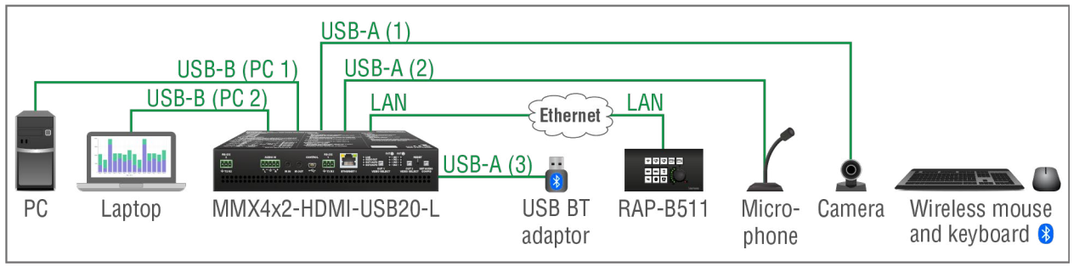
The device contains a built-in USB 2.0 hub. USB host devices (e.g. PC-s) can be connected to the four USB B-type connectors, and USB peripherals (e.g. camera, speakerphone, mouse, etc.) can be connected to the four USB A-type connectors. You can switch the USB peripherals to connect one host device. Please note that only one USB host can be active at the same time, thus all connected USB peripherals will be connected to the same USB host device. The connected USB peripherals can be powered up to 500mA, except at the first port where max. 1000 mA can be supplied.

ATTENTION: The sum of the current that the GPIO and the USB-A ports can supply together is max. 2A.



USB port diagram - MMX4x2-HDMI-USB20-L

Switching USB Peripherals to Another PC – Example.



The Concept

The PC and the laptop are connected to USB B-type ports of the matrix switcher (HDMI connection is not necessary for the USB functionality). USB peripherals (camera, microphone, keyboard and mouse) are connected to the USB A-type ports. The user can select to switch the USB peripherals to the PC or to the laptop.

Settings

The PC is connected to the **PC 1** USB B-type port, the laptop is connected to the **PC2** USB B-type port.

Change the USB host device as needed by setting the /MEDIA/USB/USBSWITCH.**HostSelect** property to **1** or **2**. It can be established by sending an **LW3 command** by an external device, e.g. RAP-B511 Button panel.

The function can be also combined with the **Event Manager** to have a more comfortable automatic system: when a USB host device is connected to the **PC3** port, switch the HDMI input 3 to output 1.

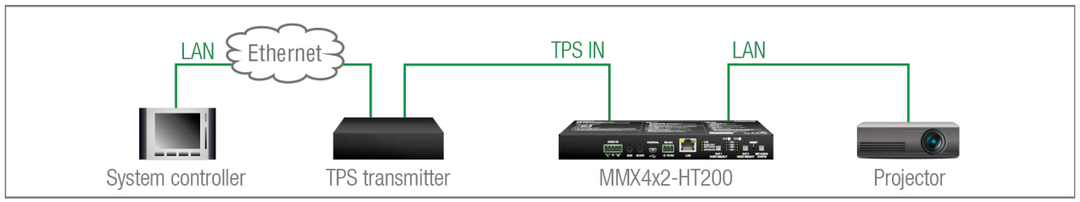
4.7. Ethernet Interface

The device can be controlled over the Ethernet port(s). This interface supports both LW2 and LW3 protocols.

4.7.1. Device Control over Ethernet

The interface can be also used to remote control a third-party device and establish the connection to Lightware Device Updater software and perform firmware update.

Third-party Device Control via Local Ethernet (Example)



The following ways are available for device control:

- The **System controller** can communicate with the **Matrix** via the TPS line of the **Transmitter** with using LW2/LW3 protocol commands.
- The **System controller** can communicate directly with the **Projector** via their IP:port address.
- The **Matrix** can send commands (e.g. as an action by the Event Manager) to the IP:port address of the **Projector** by using LW3 protocol commands. See Event Manager usage in the Event Manager section, and find the related LW3 protocol commands in the Ethernet Message Sending section.

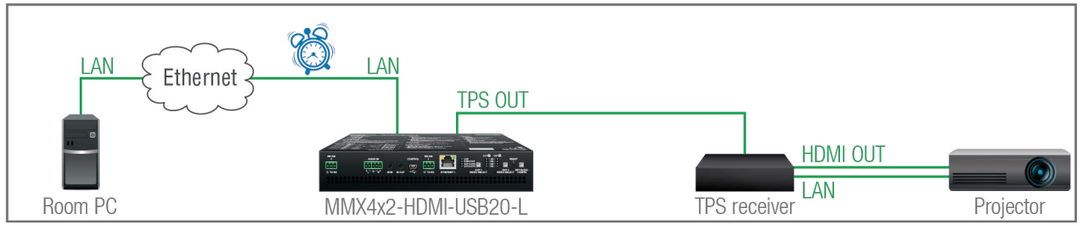
4.7.2. TCP Recognizer

DIFFERENCE: The features mentioned below are available from firmware v1.6.0b19.

The feature is almost the same as in case of the RS-232, but for the network interface: the incoming TCP messages can be processed, which may trigger actions. The combination of the TCP recognizer and the Event Manager gives numerous opportunities for creating automatic room solutions.

TCP Recognizer Example

When the Projector switches off, the button light (1) of the TBP6-EU button panel is turned off automatically.



When the power-off process is started in the projector, it will send a message over Ethernet. That message will be recognized by the MMX4x2 switcher and will be used as a Condition in Event Manager.

How to set up the switcher?

Step 1. Configure the recognizer for the communication by the LDC, (see the Ethernet section) or by LW3 protocol commands (see the TCP Message Recognizer section). Define the desired device as a TCP client. (The Projector is saved as 'C1' in this example.)

Step 2. Create the following event in the Event Manager:
E1. When the `(PWR!001 "On")` message is recognized from the C1 client, the GPIO pin 1 is set to low level.

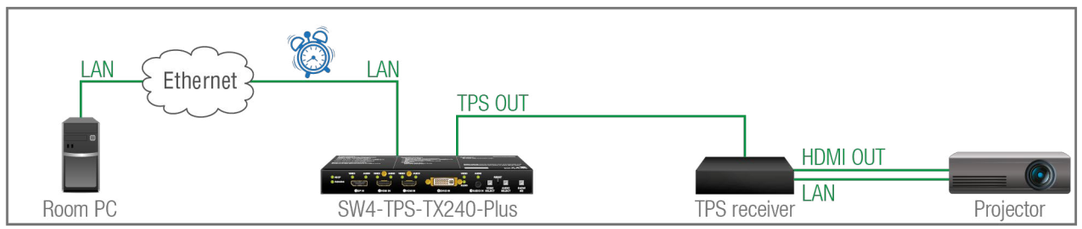
For more information about setting the events in LDC, see the Event Manager section.

4.7.3. Wake-on-Lan

DIFFERENCE: This feature is available from FW package v1.6.0b19.

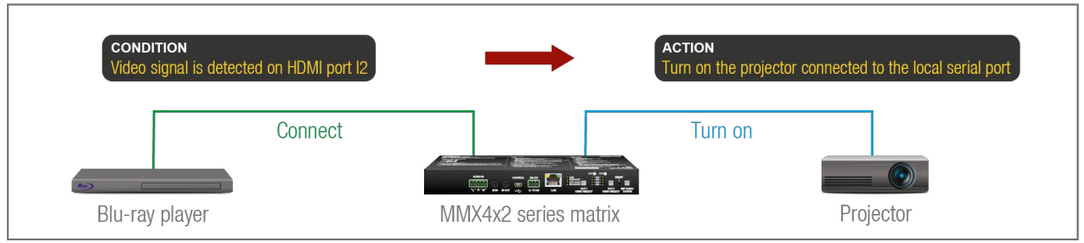
The well-known wake-on-lan feature (sending magic Packet to the target PC) is available. This can be used to power on a computer automatically: just send a simple LW3 command, see the Powering on a Computer over Ethernet (Wake-on-LAN) section.

INFO: Please make sure the feature is enabled in the target PC and it is powered (but switched off).



4.8. The Event Manager Feature

The Event Manager feature means that the device can sense changes on its ports and is able to react according to the pre-defined settings. Lightware Device Controller contains a user-friendly software tool and allows creating Events by defining a Condition and an Action.



Event Manager example

See more information about the settings in the Event Manager section in LDC.

Event Manager +

DIFFERENCE: The features mentioned below are available from firmware v1.6.0b19.

The AND Operator

The practical experience has shown that there is a need to examine more conditions (up to four) as follows: if one of the set conditions becomes true (while the other conditions are fulfilled), then the set Action is launched. For example, in a meeting room we have the following situation:

- Signal is present on an input port,
- A GPIO pin state becomes 'low' (by an external device).

If the two **Conditions** are present at the same time, the **Action** is launched. Just create the two **Conditions** into separate Events, then create a third Event, select the two **Conditions** and define the **Action**.

See the Combine Links section for the settings in LDC.

Event Manager Variables

A brand new area is opened by implementing the variables. You can create custom variables in number or text format, which can be used in the Event Manager. The variables can have the following properties/ methods:

- Numeric (integer) type with min/max value setting, or string-type (determined automatically)
- Increment/step the numeric value,
- Value-dependent case operations,
- Reading and storing the value of an LW3 property into a string or a numeric variable.

The defined variables are stored in a non-volatile memory and the value is kept in case of a reboot. This feature allows creating a monitoring/controlling system without connecting an additional control processor.

See the Variables section for the settings in LDC.

Condition Trigger

This improvement in the Event Manager works as if a condition is detected. When a complex control system is built, a Condition may trigger numerous Actions. A typical example is when a system is powered on and the 'ready-to-use' state has to be loaded. In this case, there could be many actions that are based on the same condition. In order to reduce the number of the commands, you can trigger one 'key' condition, which could start the whole process.

See the Condition Triggering section for the settings in LDC.

4.9. Basic IT Security

DIFFERENCE: This feature is available only for SW4-TPS-TX240-Plus from FW package v1.6.0b19.

These entry-level network security improvements help to prevent unauthorized access to the Lightware device:

- **Cleartext login**
- **IP Port Block**
- **MAC Filtering**

The **Cleartext Login** tool allows setting a password for login, thus the device will not accept any command coming from an interface (RS-232, Ethernet, etc...), only the device type and the serial number can be queried without login. You can set all affected TCP/IP ports individually to enable or disable.

The **IP Port Block** feature is an additional protection for the Cleartext login. There are TCP/IP ports in Lightware devices that are not protected by the login, so you can disable them if necessary. Example: due to the working method of the LW2 communication, the Cleartext login does not provide protection when LW2 command is sent to the device, that is why the TCP port no.10001 shall be blocked manually.

Another level of security is the **MAC Filtering** tool. You can create an 'allowlist' of network devices based on the MAC address, which are allowed:

- Controlling the device (Send option), or
- Querying parameters (Receive option) to/from the Lightware device.

The table below shows the protection levels of these features.

IP Port	Function	MAC Filter	Cleartext Login	IP Port Block
80	HTTP Post&Get	✓	-	✓
81	LW3 control (Miniweb)	✓	✓	-
6107	LW3 protocol	✓	✓	-
800x	Command injection (RS-232)	✓	-	✓
900x	Command injection (infrared)	✓	-	✓
10001	LW2 protocol	✓	-	✓

ATTENTION: Be careful when combining these functions; improper settings may cause malfunction.

Most of these features are available in LDC, see the Settings Menu section.

4.10. TPS Interface

DIFFERENCE: This section refers to the MMX4x2-HT200 model only.

The MMX4x2-HT200 model is built with TPS (Twisted Pair Single) interface that uses HDBaseT™ technology. It means the unit receives video, audio, Ethernet, RS-232, and Infrared signals via a single CATx cable.

TPS Interface Working Modes

The TPS working mode between the transmitter and the receiver is determined by the mode set in them. Both devices' TPS mode settings together determine the finally established TPS transmission mode.

The following TPS modes are defined in the receiver:

- **Auto**: The TPS mode is determined automatically.
- **HDBaseT**: Ideal for high resolution signals up to 4K.
- **Long reach**: Ideal for big distances up to 1080p@60Hz with extended cable lengths.
- **LPPF1***: Only RS-232 communication is transmitted (@ 9600 baud).
- **LPPF2***: Only RS-232 (@ 9600 baud) and Ethernet communication are transmitted.

* LPPF: Low Power Partial Functionality.

		Selected mode on RX side				
		LPPF1	**LPPF2**	**HDBaseT**	**Long reach**	**Auto**
Selected mode on TX side	**LPPF1**	LPPF1	LPPF1	LPPF1	LPPF1	LPPF1
	LPPF2	LPPF1	LPPF2	LPPF2	LPPF2	LPPF2
	HDBaseT	LPPF1	LPPF2	HDBaseT	Long reach	HDBaseT
	Long reach	LPPF1	LPPF2	Long reach	Long reach	Long reach
	Auto	LPPF1	LPPF2	HDBaseT	Long reach	HDBaseT **

** If there is valid HDMI/DVI signal is on the TX side, the TPS mode will be HDBaseT on both side. If the transmitter does not transmit HDMI/DVI signal, the TPS mode will automatically be changed to LPPF2 or LPPF1. Long reach mode is not available when both sides are set to Auto mode.

When using automatic operation mode selection, the device determines the mode of operation. If both halves of the pair are set to Auto mode, the source side is the initiator. It will negotiate each state transition with its sink side partner.

When one of the devices is configured to manual operation mode selection, the other device may be placed in automatic mode. In this case, the mode transition negotiation is initiated by the host-managed device and the auto-mode device follows through. The allowed cable lengths and resolutions are listed in the Maximum Extension Distances section.

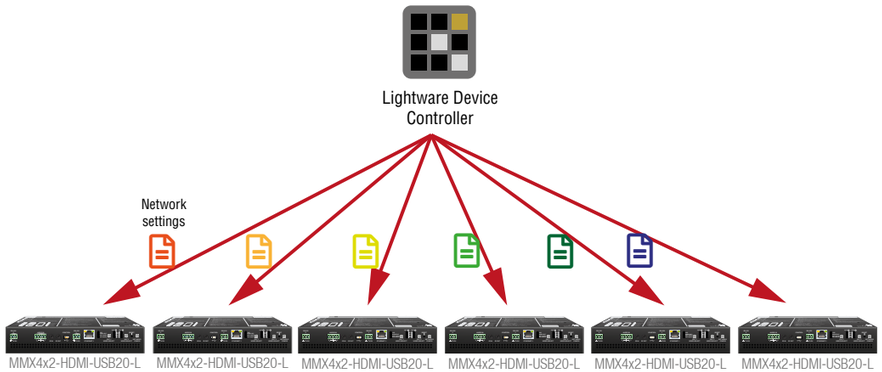
4.11. Bulk Device Management

It is possible to configure several devices at once with the Bulk Device Management tool. This feature can be accessed by clicking on the **Tools** button in the bottom left corner of the Device Discovery window of the LDC and choosing the Bulk Management option.

See the Bulk Device Management section for more details.

4.11.1. Network Settings

This function makes it possible to change and adjust the network settings of several devices at once (unique settings for each device), without having to set them at each device one by one. A .csv file can be created containing the list and desired settings of the devices and it can be uploaded into the LDC to be applied to the devices quickly.

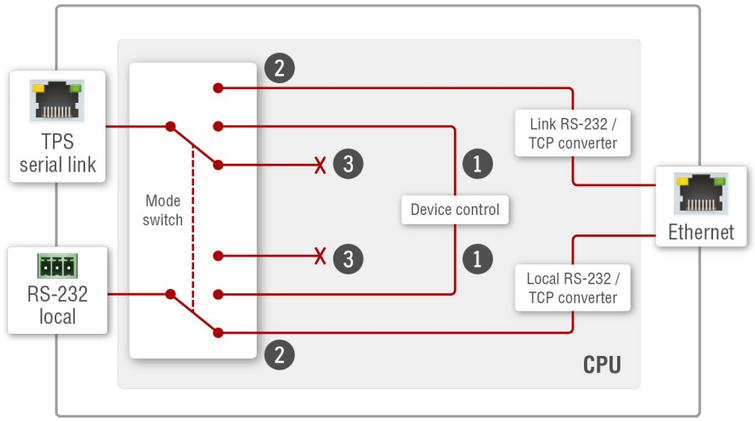


4.12. RS-232 Serial Interface

4.12.1. Technical Background

ATTENTION: Only MMX4x2-HT200 model has TPS serial link port.

Serial data communication can be established via the local RS-232 port (Phoenix connector) or via the TPS port. The RS-232 ports – which are connected to the CPU – can be configured separately (e.g. if the Baud rates are different, the CPU does the conversion automatically between the ports). The RS-232 port can be switched to Control mode, Command Injection mode, or can be disconnected; see the figure below.



Block diagram of the MMX4x2-HT200 serial interface

The following settings are defined:

1. The serial port is in **Control mode**.
2. The serial port is in **Command Injection mode**.
3. The serial port is **Disconnected**.

INFO: All settings are available in the LDC software, see details in the RS-232 section.

Only one mode can be used at a time: Control mode, or Command Injection mode, or can be disconnected. You can set different modes for the TPS serial link and local RS-232 port.

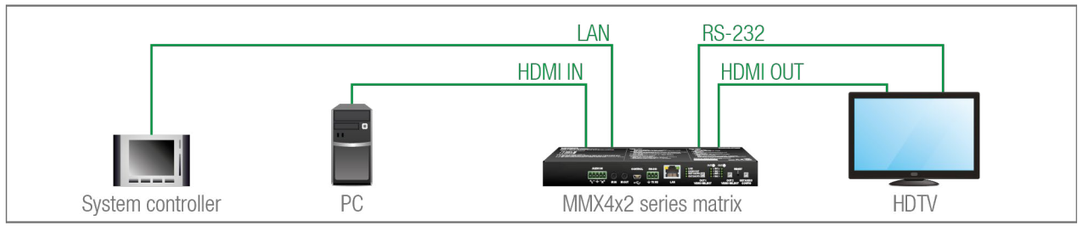
Control Mode

The incoming data from the given port is processed and interpreted by the CPU. The mode allows to control the matrix directly. LW2 or LW3 protocol commands are accepted – depending on the current port setting.

Command Injection Mode

In this mode, the matrix works as a TCP/IP <-> RS-232 bidirectional converter. The TCP/IP data signal is converted to RS-232 data and vice versa. TCP/IP port numbers are defined for the serial ports (TPS and local) for this purpose. E.g. the default Command Injection port number of the local RS-232 port is 8001. If data is coming from the TPS interface which is addresses to the port no. 8001, it will be transmitted to the Tx pin of the local RS-232 port. This also works in the opposite direction of course, and the method is the same on the serial interface of the TPS port as well.

RS-232 Signal Transmission – Example



The following ways are available for controlling the devices:

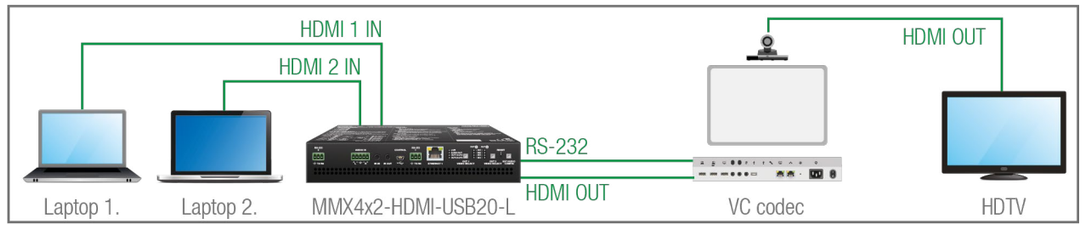
- The **System controller** can send TCP messages to the IP:port address of the **Matrix**. In this case, the control is one-way, the System controller sends commands to the **HDTV**. You can see the details about TCP message sending in the Ethernet Message Sending section.
- The **System controller** sends messages over the LAN port of the **Matrix** to the given port number. The Matrix converts the incoming TCP messages to RS-232 commands and transmits over the local RS-232 port to the **HDTV**. The local RS-232 port has to be set to Command Injection mode. In this case the direction of the communication is bi-directional between the Matrix and the System controller, so the answer of the HDTV is received by the System controller.

4.12.2. RS-232 Recognizer

This tool is able to recognize and store the incoming RS-232 message until the previously defined string (delimiter) has arrived or the timeout has passed after the last data. The last incoming serial data is stored and it can trigger an action in Event Manager.

RS-232 Recognizer Example

When the **MMX4x2** has an active video signal, the switcher logs in the VC codec automatically.



When the active signal is present on the output of the MMX4x2, it triggers a bi-directional communication with the VC codec via RS-232:

- MMX4x2 (starts the communication on RS-232): **PING**
- VC codec (requests the login name): **Login name:**
- MMX4x2 (sends the login name): **Admin**
- VC codec (requests the password): **Password:**
- MMX4x2 (sends the password): **Admin**

First configure the recognizer for the serial communication, after that set the events in the Event Manager.

The RS-232 recognizer settings can be arranged by LW3 protocol commands (see more information in RS-232 Message Recognizer section).

Create the following events in the event manager:

E1. When the signal is present on O1 port of the MMX4x2, it sends a message '**PING**' on P1 port of RS-232 to the VC codec. For more details, see RS-232 Message Recognizer section.

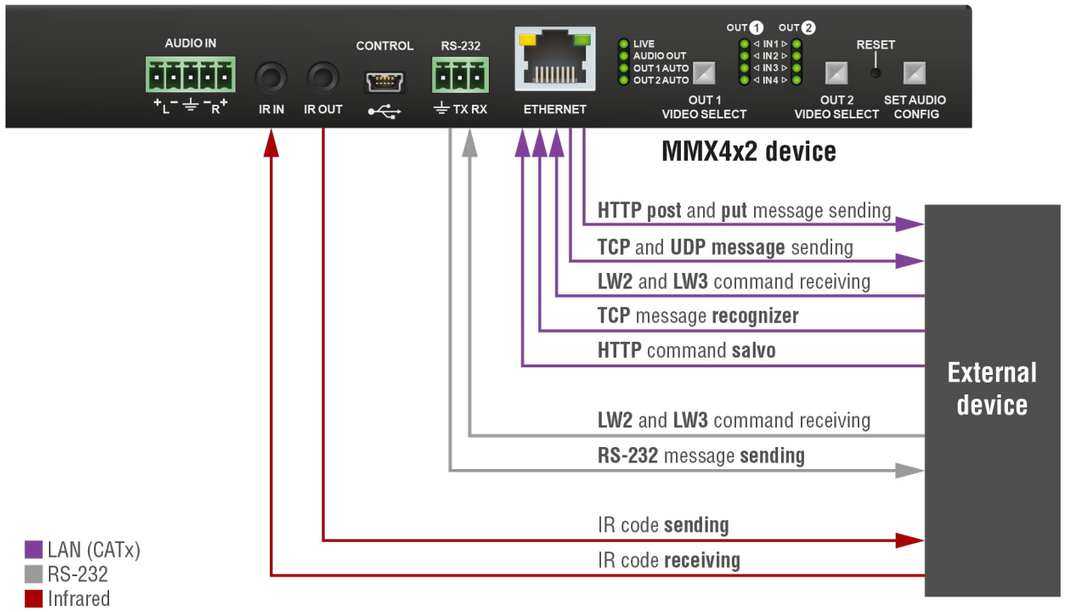
E2. Set a condition where **Login name:** is the recognized RS-232 message. Action is sending serial message ('**Admin**') on the P1 port to the VC codec.

E3. Set a condition where **Password:** is the recognized RS-232 message. Action is sending serial message ('**Admin**') on the P1 port to the VC codec.

For more information about setting the events, see Event Manager section.

4.13. Messaging Options

MMX4x2 devices offer many ways to communicate with other devices. The figure below shows the possibilities:



Messaging Options – sending and receiving

INFO: In case of MMX4x2-HT200, the communication channels above are available via the TPS port, too.

4.14. Batch Commands

DIFFERENCE: The features mentioned below are available from firmware v1.6.0b19.

These features can be used to process a group of pre-defined commands. The commands can be stored in the device as macros or you can save the commands in a plain text file and send the device by an HTTP message.

LW3 over HTTP (Command Salvo)

This feature allows the LW device to be controlled over HTTP. In this case, a batch of commands is sent over HTTP to the Lightware device for processing. Save the LW3 commands into a file, post it to the <IP_address>/protocol.lw3 file and the commands are processed immediately.

Running Macros

In this case, the command sequences (macros) are stored in the device. You can create your custom macros in a file, upload them into the device and run at any time. The number of the macros depends on the device type, at most 50 macros can be saved in an MMX4x2. See more information in the Macros section.

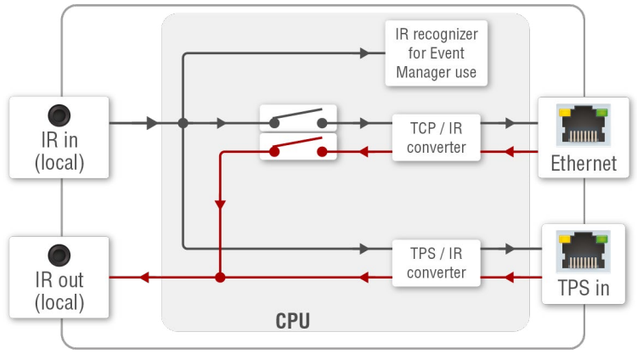
4.15. IR Interface

ATTENTION: The device has no built-in Infrared receiver and transmitter. For the complete usage attach an infrared emitter unit to the IR OUT and an infrared detector unit to the IR IN connectors.

Technical Background

ATTENTION: Only MMX4x2-HT200 model has TPS LAN port.

The Infrared signal transmission is similar to the serial data communication. The MMX4x2 series matrix contains dedicated IR I/O connection and the MMX4x2-HT200 model can also transmit/receive infrared signal via the TPS interface. The signal is in pronto HEX format in both cases.



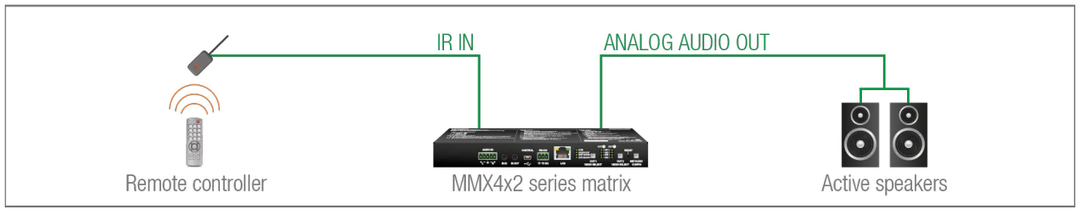
Block diagram of the infrared interface

With the help of the device's IR recognizer functionality you can assign actions in Event Manager. The second option is the command injection mode (like at serial interface in the previous section) where you can send IR commands over LAN. Command injection mode can be turned on and off by input/output ports.

INFO: All settings are available in the LDC software, see settings in the Infra section.

INFO: The modulation of output IR signal can be turned off or on by LW3 command, see the Enabling/Disabling Output Signal Modulation section.

Control by IR Signal - Example



The Concept

An IR detector is attached to the Infrared input port of the Matrix and IR signals are sent by the Remote controller. A pair of active speakers are also connected to the analog audio output port of the Matrix.

The volume can be controlled via the Matrix by using the remote controller in the following way:

- Set an action in **Event Manager** as follows: if the volume control buttons are pressed on the **Remote controller**, it shall increase or decrease the volume of the analog audio port of the **Matrix**. In this case you can control the audio device via the Matrix remotely. See the details about the Event Manager settings in the Event Manager section.

TIPS AND TRICKS: You can increase or decrease the levels of analog audio output ports in steps by LW3 protocol commands, see the details in the Analog Audio Output Level Settings by Steps section.

Advanced IR functionality

DIFFERENCE: The features mentioned below are available from firmware v1.3.1.

MMX4x2 series can send Little-endian pronto hex IR codes on its IR output port as follows:

With Event Manager (see more details in the Event Manager section)

The code can be saved into an action in the Event Manager with the following parameters:

- **Category:** Infra
- **Expression:** Send pronto hex
- **Port:** D1
- **Pronto hex:** <custom_code> .The maximum length of the code can be 184 characters (184 bytes).

With LW3 protocol command (for more information, see the Infrared Message Sending)

The maximum length of the code can be 765 characters (765 bytes).

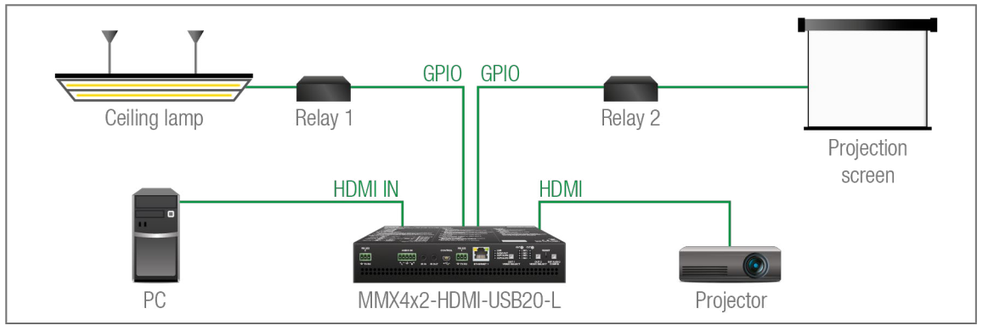
Sending Bigger-endian pronto hex code is also available, see the Sending Pronto Hex Codes in Big-endian Format via IR Port.

4.16. GPIO Interface

DIFFERENCE: This section refers to the MMX4x2-HDMI-USB20-L model only.

The General Purpose Input/Output (GPIO) port is a multi-functional input/output interface to control the matrix switcher or third-party devices and peripherals. You can establish the connection between the controller/controllable device and the matrix switcher by the 8-pole Phoenix connector. The direction of the six pins are configurable independently of each other.

GPIO Options - Example



The Concept

The ceiling lamp is turned off by Relay 1 and the projection screen is rolled down by Relay 2 when signal is received from the PC over the HDMI input. Both relays are controlled by the GPIO port.

Settings of the Transmitter

- **For Relay 1**: create an event in Event Manager: when signal is present on Input 1 (I1), set the GPIO pins to low level to open Relay 1. Also create another event: when signal is not present on Input 1 (I1), set the GPIO pins to hight level to close Relay 1.
- **For Relay 2**: create an event in Event Manager: when signal is present on Input 1 (I1), set the GPIO pins to high level to close Relay 2. Also create another event: when signal is not present on Input 1 (I1), set the GPIO pins to low level to open Relay 1

When the PC starts playing the video presentation, the signal is received over the HDMI input, so the GPIO pins send a signal to Relay 1 to open, which turns off the lights. Furthermore, the GPIO pins also send a signal to Relay 2 to close and the projection screen is rolled down. When the presentation ends, the signal ceases on the HDMI input, so the GPIO pins send a signal to Relay 1 to close, which turns on the lights, and sends a signal to Relay 2 to open, so the projection screen returns to its enclosure.

ATTENTION: Please always check the electrical parameters of the devices that you want to control. Please see the GPIO - General Purpose Input/Output Ports section for the details.

See the LDC settings for GPIO port in the GPIO section. See the details about the Event Manager settings in the Event Manager section.

4.17. Further Built-in Features

4.17.1. Matrix Cloning – Configuration Backup and Restore



The device (configuration) cloning of MMX4x2 series matrix is a simple method that eliminates the need to repeatedly configure multiple devices to have identical (non-factory) settings. If the devices are installed in the same type of system multiple times, then it is enough to set up only one device to fit the user's needs and then copy those settings to the others, thus saving time and resources. Configuration cloning can be also done by LDU2 over Command Line for many devices in one step, see the Restore section. See more information about the settings in the Configuration Cloning (Backup Tab) section.

4.17.2. Advanced EDID Management

Factory Preset EDIDs

The factory EDIDs (F1-F120) are factory preprogrammed and cannot be modified. These are the most common resolutions. They are specially provided to force graphic cards to output only the exact pixel resolution and refresh rate. Universal EDID allows multiple resolutions, including all common VESA defined resolutions. The use of universal EDID is recommended for fast and easy system setup.

Sources and Destinations

The EDID memory consists of four parts:

- **Factory EDID** list shows the pre-programmed EDIDs (F1-F120).
- **Dynamic EDID** list shows the display device connected to the device's outputs. The unit stores the last display devices' EDID on either output, so there is an EDID shown even if there is no display device attached to the output port at the moment.
- **User memory** locations (U1 – U14) can be used to save custom EDIDs.
- **Emulated EDID** list shows the currently emulated EDID for the inputs. The source column displays the memory location that the current EDID was routed from.

The source reads the EDID from the Emulated EDID memory on the INPUT port. Any EDID from any of the User/Factory/Dynamic EDID lists can be copied to the user memory.

There are two types of emulation: **static** and **dynamic**.

- **Static EDID emulation**: an EDID from the Factory or User EDID list is selected. Thus the Emulated EDID remains the same until the user emulates another EDID.
- **Dynamic EDID emulation**: it can be enabled by selecting D1 or D2 EDID memory. The attached monitor's EDID is copied to the input; if a new monitor is attached to the output, the emulated EDID changes automatically.

See more information about the settings in the EDID Menu section.

5

Software Control - Lightware Device Controller

The device can be controlled by a computer through Ethernet and RS-232 interfaces by the Lightware Device Controller (LDC). The software can be installed on a Windows PC or macOS. The application and the User Manual can be downloaded from www.lightware.com.

- Install and Update 42
- Running the LDC 42
- Establishing the Connection 43
- Bulk Device Management 45
- Crosspoint Menu 46
- Port Properties Windows 48
- CEC Tool 52
- Diagnostic Tools 53
- EDID Menu 55
- Control Menu 57
- Event Manager 65
- Settings Menu 69
- The Built-in Miniweb 71
- Configuration Cloning (Backup Tab) 73
- Advanced View Window 74

5.1. Install and Update

ATTENTION: Please note that the minimum system requirement is 1 GB RAM and the minimum display resolution shall be 1280x720.

ATTENTION: Certain ports are used for the communication in the background; please check the list in the Applied Ports (Network Settings) section.

INFO: After the installation, the Windows and the Mac application have the same look and functionality. This type of the installer is equal with the Normal install in case of Windows, and results in an updateable version with the same attributes.

Installation for Windows OS

Run the installer. If the User Account Control drops a pop-up message, click **Yes**. During the installation you will be prompted to select the type of the installation: **normal** and the **snapshot** install:

Normal install	Snapshot install
Available for Windows and macOS	Available for Windows
The installer can update only this instance	Cannot be updated
Only one updateable instance can exist for all users	More than one different version can be installed for all users

Comparison of installation types

ATTENTION: Using the Normal install as the default choice is highly recommended.

Installation for macOS

ATTENTION: Please check the firewall settings on the macOS device. LDC needs to be added to the exeptions of the blocked softwares for the proper operation.

Mount the DMG file by double clicking on it, and drag the LDC icon over the Applications icon to copy the program into the Applications folder. If you want to copy the LDC into another location, just drag the icon over the desired folder.

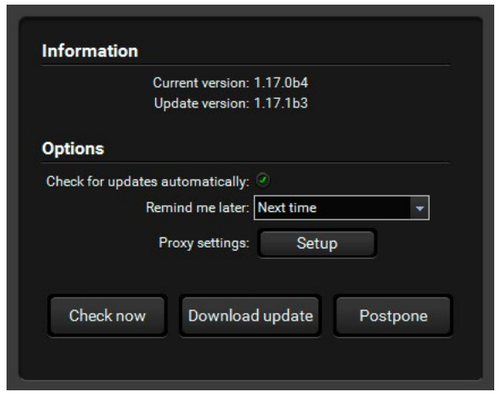
Updating of LDC

Step 1. Run the application.

The **Device Discovery** window appears automatically, and the program checks the available updates on Lightware's website and opens the update window if the LDC found updates.

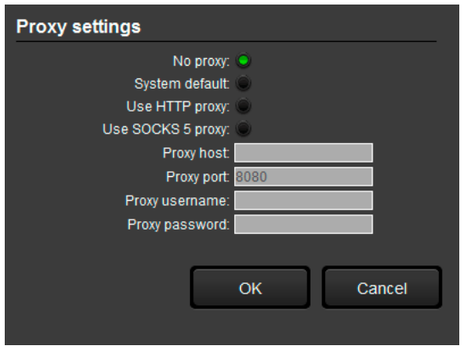
The current and the update version number can be seen at the top of the window and they are shown in this window even with the snapshot install.

The **Update** window can also be opened by clicking on the **About icon** and the **Update** button.



Step 2. Set the desired update setting in the **Options** section.

- If you do not want to check for the updates automatically, **uncheck** the option.
- If you want to postpone the update, a reminder can be set with different delays from the **drop down list**.
- If the proxy settings traverse the update process, set the proper values, then click on the **OK** button.

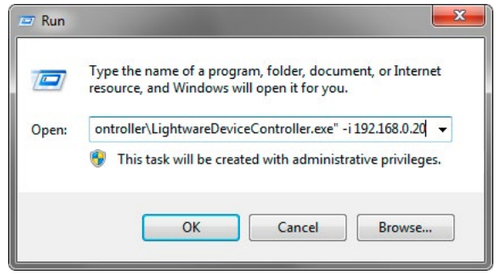


Step 3. Click on the **Download update** button to start the update.

The updates can be checked manually by clicking on the **Check now** button.

5.2. Running the LDC

The common way to start the software is to double-click on the LDC icon. But the LDC can be run by command line parameters as follows:



Connecting to a Device with Static IP Address

The LDC is connected to a device with the indicated static IP address directly; the Device Discovery window is not displayed. When the port number is not set, the default port is used: 10001 (LW2 protocol).

For LW3 devices use the 6107 port number.

Format: `LightwareDeviceController -i <IP_address>:<port>`

Example: `LightwareDeviceController -i 192.168.0.20:6107`

Connecting to a Device via a Serial Port

The LDC is connected to a device with the indicated COM port directly; the Device Discovery window is not displayed. If no Baud rate is set, the application will detect it automatically.

Format: `LightwareDeviceController -c <COM_port>:<Baud>`

Example: `LightwareDeviceController -c COM1:57600`

Adjusting the Zoom

The window can be zoomed to a specific value to fit to the resolution of the desktop (higher/lower). '1' is the default value (100%).

Format: `LightwareDeviceController -z <magnifying_value>`

Example: `LightwareDeviceController -z 1.2`

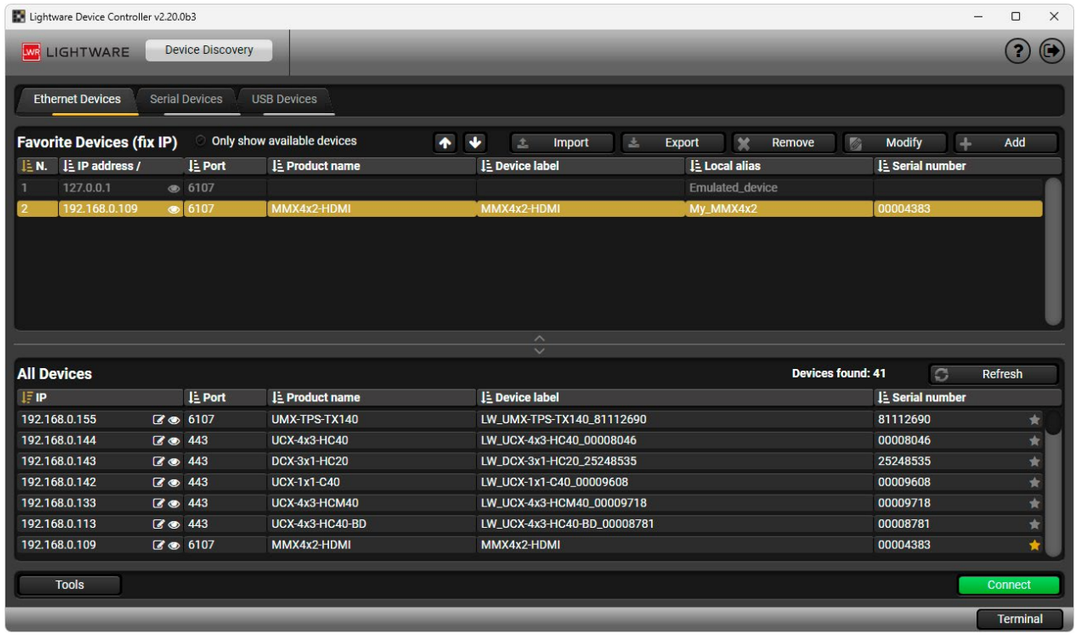
ATTENTION: The last set value is stored and applied when LDC is started without a parameter.

5.3. Establishing the Connection

Step 1. Connect the device to a computer via Ethernet or RS-232.

Step 2. Run the controller software; the **Device discovery** window appears automatically. There are three tabs for the different types of interfaces; Ethernet, Serial and USB.

Step 3. Select the desired unit and click on the green **Connect** button (or just double-click on the device).



Device discovery window in LDC

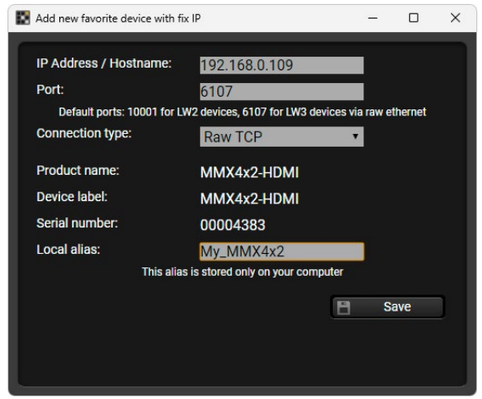
5.3.1. Ethernet Tab

The Ethernet tab consists of two lists. **All devices** list contains all Lightware devices that are available in the connected network (in the 255.255.0.0 subnet). However, there is no need to browse all the available devices as you can expand the list of **Favorite devices** with any Lightware device that is connected via Ethernet in any of the following ways:

- Mark the desired device with the ★ symbol in the **All Devices** list,
- Press the **Add** button and add the device in the appearing window, or
- **Import** the list of favorite devices that was **exported** previously.

Add New Favorite Device

Press the **Add** button; in the appearing window you can enter the **IP address**. The **hostname** of the desired device can be used instead, if it is supported. That allows setting a unique name to identify the device in a network. If the hostname is saved in this window and the IP address is changing, the device will still be available and connectible.



> **ATTENTION:** The hostname connection-feature does not work when the target device is accessed over VPN.

See more information about the hostname property in the Setting the Hostname section.

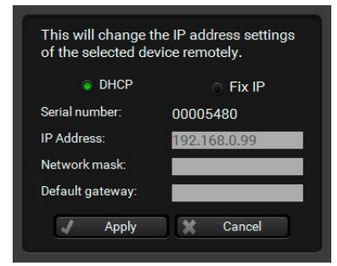
Import/Export the List of Favorite Devices

The list of favorite devices can be exported/imported by the dedicated buttons (saved as *.JSON file). The list can be imported later (in another computer, too), but please note that the current list will be overwritten by the imported list.

Changing the IP Address

To modify the IP address settings quickly, it is not necessary to enter the device's settings/network menu, you can set them by clicking on the pencil icon beside the IP address.

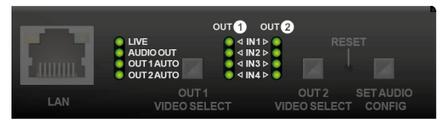
You can see the new settings only in this window. The device needs a few seconds to apply the new settings.



Identifying the Device

If you click on the icon, the status LEDS will blink for 10 seconds. The feature helps to find the device itself physically.

#identifyme



Highlighting the Device

DIFFERENCE: This feature is available only from FW package v1.6.0b19.

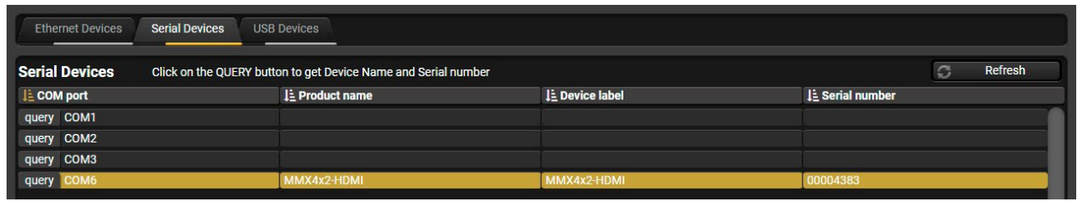
The opposite feature is also available to help finding the desired device. Press the **Show Me** button for **5 seconds** until the front panel LEDs start to blink slowly. In parallel, the device is **highlighted in green for 4 seconds** in the Device discovery window of the LDC. *#highlightme*



INFO: "Highlight Me" is the default function of the **Show Me** button. If you assign a different function to the button, the feature above will not be available.

5.3.2. Serial Tab

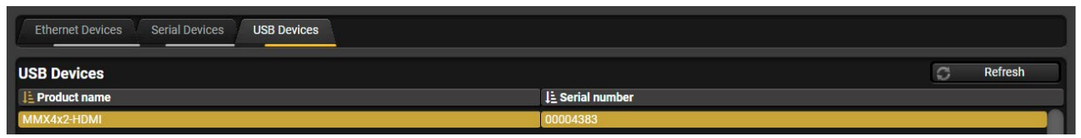
If the device is connected via the RS-232 port, click on the **Query** button next to the desired serial port to display the device's name and serial number. Double-click on the device, or select it and click on the green **Connect** button.



ATTENTION: Before the device is connected via the local RS-232 port, make sure that **Control mode** and **LW3 protocol** are set on the serial port. Furthermore, the RS-232 port must be free and other serial connection must not be established to the device over that port.

5.3.3. USB Tab

If the device is connected via the USB port, it will be displayed in the list. If it is connected after opening this tab, press the **Refresh** button.



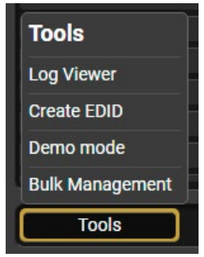
5.3.4. Further Tools

The **Tools** menu contains the following options:

- **Log Viewer:** The tool can be used for reviewing log files that have been saved previously.
- **Create EDID:** This tool opens the Easy EDID Creator wizard, which can be used for creating unique EDIDs in a few simple steps. Functionality is the same as of the Easy EDID Creator.
- **Demo Mode:** This is a virtual MX-FR17 matrix router with full functionality built into the LDC. Functions and options are the same as of a real MX-FR17 device.
- **Bulk Management**: This tool allows changing the network settings of several devices at once. See the details in the next section.

The **Terminal** window is also available by pressing its button on the bottom.

5.4. Bulk Device Management



It is possible to configure several devices at once with the Bulk Device Management tool. This feature can be accessed by clicking on the Tools button in the bottom left corner of the Device Discovery window and choosing the Bulk Management option.

DIFFERENCE: This function is available from the firmware version v2.6.0b6 of the LDC and v1.6.4b2 of the MMX4x2 series devices.

5.4.1. Network Settings

It is possible to set the network settings of several devices at once by using a .csv file that contains the list of the devices that we need to configure, then uploading it into the LDC.

Please note that if the data in the file is missing or incorrect, then the discovery of the affected device will fail and an '**Invalid data**' message will be displayed in the State column. In case of an IP or MAC address conflict, the message is '**Duplicated**'.

BULK DEVICE MANAGEMENT

DEVICE DISCOVERY

Network Settings | Device Configuration

EXPORT TEMPLATE

CHOOSE NETWORK FILE | template_new.csv

Discovered	MAC Address	Part Number	DHCP	IP Address	Netmask	Gateway	Host Name	Device Label	State
✓	a8:d2:36:ff:50:23	91560003	DISABLED	192.168.0.111	255.255.255.0	192.168.0.1		LW_UMX-HDMI-140-Plus_00005023	Invalid Data
✓	a8:d2:36:00:55:60	91310042	ENABLED	192.168.0.116	N/A	N/A	MMX8x4	LW_MMX8x4-HT420M_00005560	
✓	a8:d2:36:ff:38:59	91540059	DISABLED	192.168.0.121	255.255.255.0	192.168.0.1	lightware-00003859	UMX-TPS-TX140-kicsirizs	
✓	a8:d2:36:ff:44:29	91310034	ENABLED	192.168.0.121	N/A	N/A	lightware-00004429	MMX4x2-HDMI	Duplicated
✓	a8:d2:36:ff:22:63	91540065	ENABLED	192.168.0.117	N/A	N/A	lightware-00002263	LW_SW4-TPS-TX240-Plus_00002263	
✓	a8:d2:36:ff:99:99	91540021	ENABLED	192.168.0.122	N/A	N/A	lightware-99999999	LW_HDMI-TPS-RX110AY_00005909	
✓	a8:d2:36:f0:69:74	91310082	ENABLED	192.168.0.112	N/A	N/A	lightware-00006974	LW_UCX-4x2-HC30D_00006974	
✓	a8:d2:36:f0:73:16	91310078	ENABLED	192.168.0.115	N/A	N/A	lightware-00007316	LW_MMX2-4x3-H20_00007316	
✓	a8:d2:36:ff:66:02	91310075	ENABLED	192.168.0.127	N/A	N/A	mtg-room1	MMX8x8_USB	

MACADDRESS	PARTNUMBER	DHCP	IP	NETMASK	GATEWAY	HOSTNAME	DEVICELABEL
a8:d2:36:ff:50:23	91560003	DISABLED	192.168.0.111	255.255.255.0	192.168.0.1	lightware-00005023	LW_UMX-HDMI-140-Plus_00005023
a8:d2:36:00:55:60	91310042	ENABLED	192.168.0.116	255.255.255.0	192.168.0.1	MMX8x4	LW_MMX8x4-HT420M_00005560
a8:d2:36:ff:38:59	91540059	DISABLED	192.168.0.121	255.255.255.0	192.168.0.1	lightware-00003859	UMX-TPS-TX140-kicsirizs
a8:d2:36:ff:44:29	91310034	ENABLED	192.168.0.120	255.255.255.0	192.168.0.1	lightware-00004429	MMX4x2-HDMI
a8:d2:36:ff:22:63	91540065	ENABLED	192.168.0.117	255.255.255.0	192.168.0.1	lightware-00002263	LW_SW4-TPS-TX240-Plus_00002263
a8:d2:36:ff:99:99	91540021	ENABLED	192.168.0.122	255.255.255.0	192.168.0.1	lightware-99999999	LW_HDMI-TPS-RX110AY_00005909
a8:d2:36:f0:69:74	91310082	ENABLED	192.168.0.112	255.255.255.0	192.168.0.1	lightware-00006974	LW_UCX-4x2-HC30D_00006974
a8:d2:36:f0:73:16	91310078	ENABLED	192.168.0.115	255.255.255.0	192.168.0.1	lightware-00007316	LW_MMX2-4x3-H20_00007316
a8:d2:36:ff:66:02	91310075	ENABLED	192.168.0.127	255.255.255.0	192.168.0.1	mtg-room1	MMX8x8_USB

Changing the network settings can be done in a few easy steps:

Step 1. First alter the settings you need to change in the .csv file that contains the devices. You can use a template file accessible via the **Export template** button and saving the file to your computer, then filling it out with the parameters of the devices. The file contains the MAC address, Partnumber, DHCP status, IP address, Netmask, Gateway, Hostname and Device label of each device.

Step 2. Upload the .csv file into the LDC by pressing the **Choose network file** button and browsing the file in the pop-up window. This will result in a list of the devices appearing on the screen.

Step 3. Finally, press the **Apply settings** button to execute the changes. This might take up to a minute to finish.

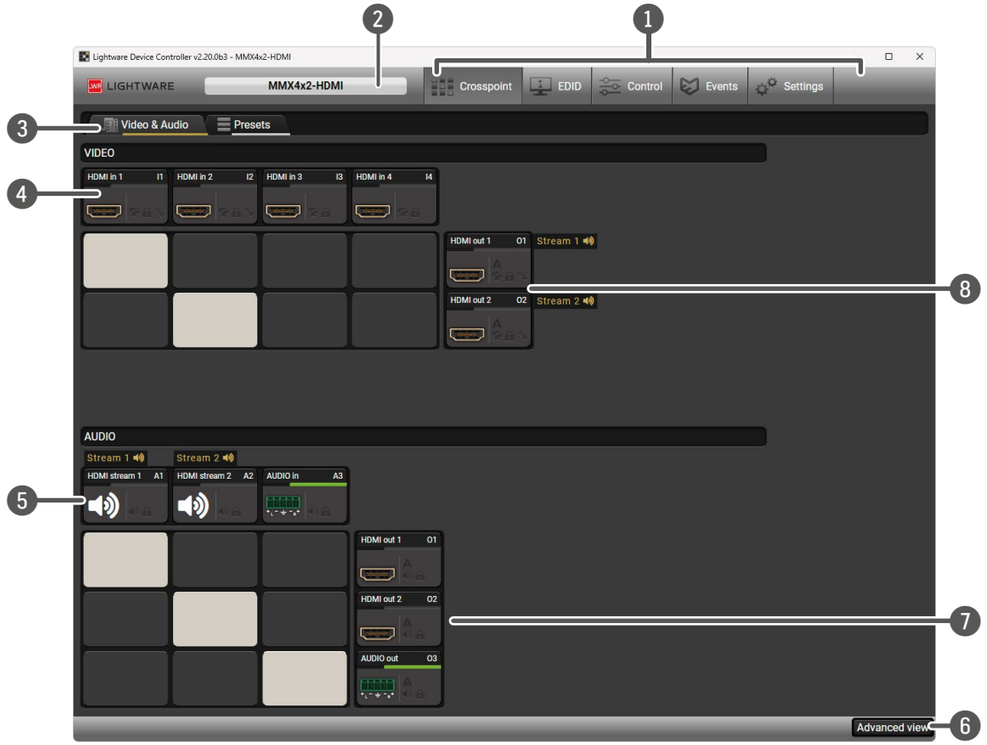


Message	DHCP enabled	DHCP disabled	Device discovered
All Done	Successful procedure		✓
Partly Done	Failure setting the hostname and/or the Device label		✗
Unavailable device	Hostname **and** Device label missing	IP address, Network, **and/or** Gateway missing	✗
Failed	Hostname **and** Device label incorrect	IP address, Network **and** Gateway incorrect	✓
IP mismatch	-	Hostname **and** Device label incorrect	✗

ATTENTION: The '**Failed**' and '**IP mismatch**' status indicators are not common, they appear when the multicast and/or the port used for LMDMP connection is disabled, or if the firmware version of the device is below the recommended (see the pop-up window when opening the Bulk Management or the beginning of this chapter).

5.5. Crosspoint Menu

DIFFERENCE: The appearance of the Crosspoint menu and the Audio port parameters show less features and settings in case of firmware package v1.0.0. *#crosspoint #switch*



1	**Main menu**	The available menu items are displayed. The active one is showed with dark grey background color.
2	**Information ribbon**	The label shows the device label, which can be edited in the Settings menu - Status tab. Device discovery window can be displayed by clicking on this ribbon. Hover the mouse cursor over the information ribbon; the **product name** and the **IP address** of the device will appear as a tooltip text.
3	**Submenu selector**	The audio and video crosspoint menu and the preset settings are available under the two tabs.
4	**Video input ports**	Each tile represents a video input port (TPS Video Input / HDMI Video Input). The tile below the port shows the current crosspoint setting; if the port is switched to the output, the color of the tile is white, otherwise grey.
5	**Audio input ports**	Each tile represents an audio input port. The A1 and A2 are logical audio ports, they mean the audio channel of the selected TPS/HDMI inputs. The A3 is the Analog Audio Input.
6	**Advanced view**	Displays the Advanced View Window, showing the Terminal window and the LW3 protocol tree.
7	**Audio output ports**	HDMI and analog audio output ports; clicking on the O1/O2 tiles opens the Digital Audio Output window; clicking on the O3 tiles opens the Analog Audio Output window.
8	**Video output ports**	HDMI video output ports; clicking on the tile opens the HDMI Video Output port properties window.

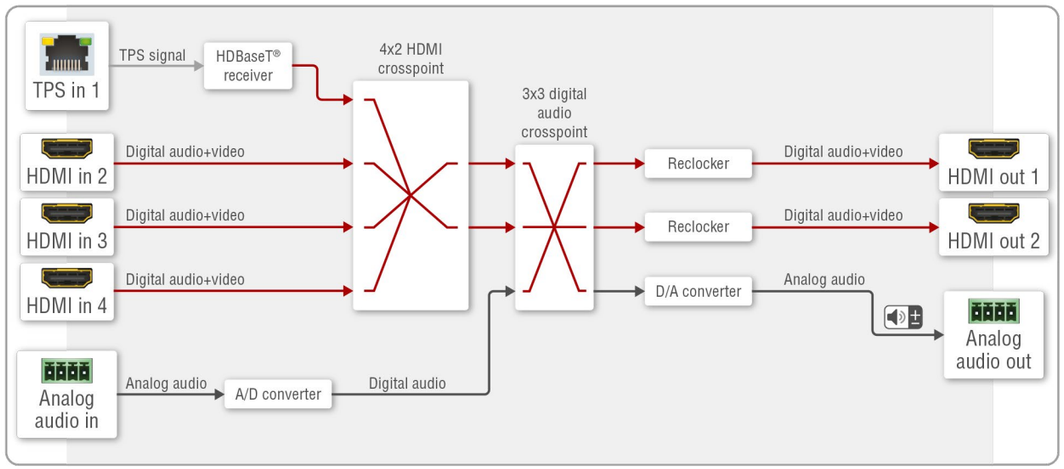
Steps of Crosspoint Selection:

Step 1. Select the source from the video inputs (I1...I4) in the VIDEO section. It will specify the digital audio input selection as well.

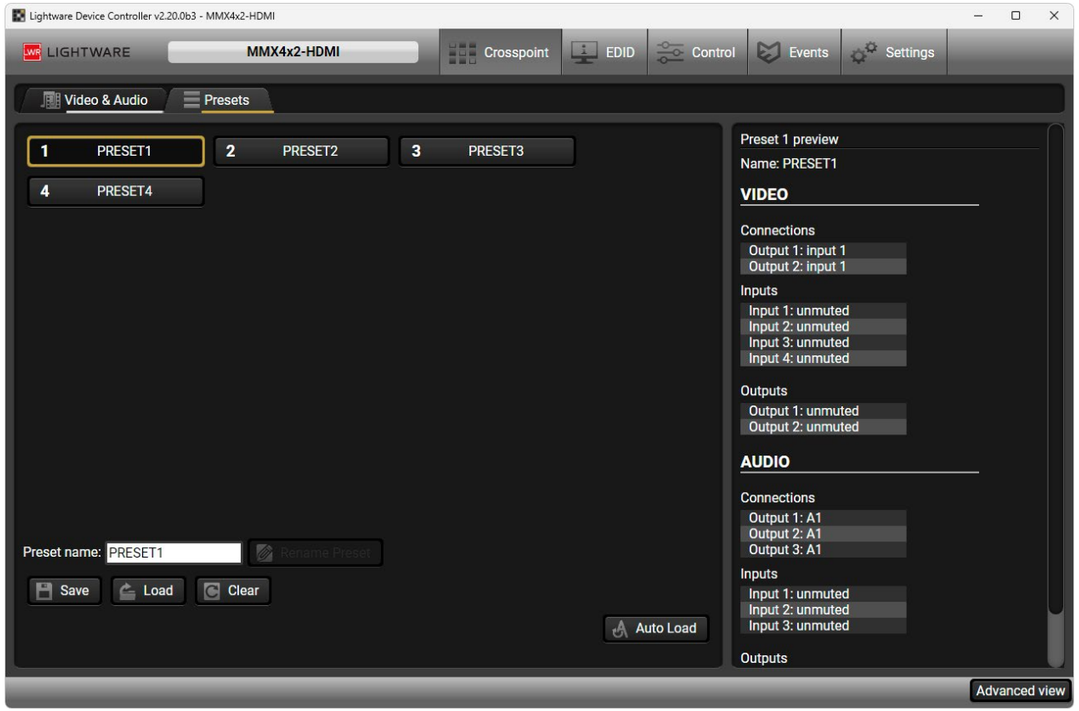
Step 2. Select the audio source from the audio inputs (A1...A3). A1 and A2 digital audio inputs come from the previously selected HDMI video outputs. A3 is the analog audio input, which can be embedded into the HDMI output.

TIPS AND TRICKS: Pre-programmed audio crosspoint settings can be selected by the **Set Audio Config** button, see the details in the Set Audio Config Button section.

The Port Diagram of MMX4x2-HT200



5.5.1. Presets Tab



Preset tab in the Crosspoint menu

The recent crosspoint states and settings can be saved into four presets and loaded when required. You can set a unique name with the **Rename Preset** button and save it with the **Save** button. Previously saved presets can be recalled by the **Load** button and setttings deleted by the **Clear** button.

Auto Load Mode Button

When the **Auto Load** button is highlighted in green, the mode is active. In this case, confirmation is not required: the selected preset is loaded immediately when the button is pressed.



5.5.2. Port Tiles

The colors of the port tiles and the displayed icons represent different states and information:



1. Port name
2. Port symbol
3. Port number
4. Signal present indicator
   green: present
   grey: not present
5. State indicators

State Indicators

#lock #unlock #mute #unmute

Following icons display different states of the port/signal:

Icon	Icon is grey	Icon is black	Icon is green
	Signal is not encrypted with HDCP	Signal is encrypted with HDCP	-
	Port is unmuted	Port is muted	-
	Port is unlocked	Port is locked	-
	Autoselect is disabled	-	Autoselect is enabled

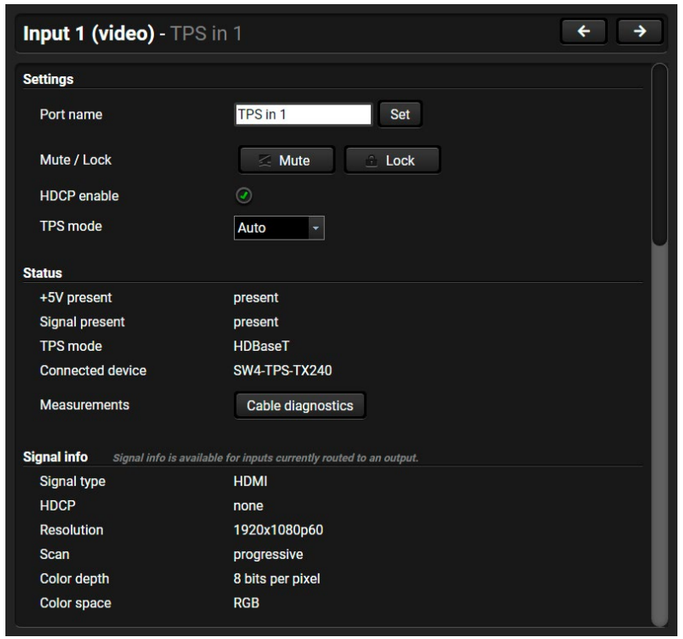
5.6. Port Properties Windows

Clicking on the port tile opens the Port properties window. This section shows the available settings and status information by port types. #lock #unlock #mute #unmute

5.6.1. TPS Video Input

INFO: Only the MMX4x2-HT200 model has a TPS input port.

Clicking on the TPS video input port icon opens the Port properties window. The most important information and settings are available from the panel.



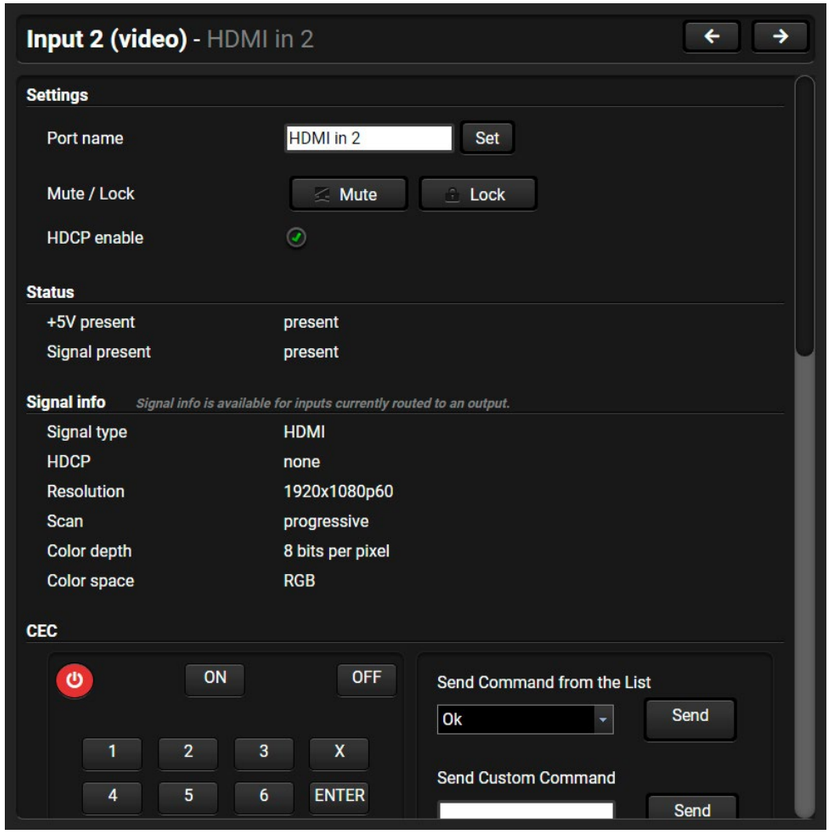
Port properties window of the TPS video input

Available settings and tools: #signaltype

- Mute/unmute the port;
- Lock/unlock the port;
- HDCP setting (enable / disable);
- TPS mode (see the details in the TCP Recognizer section); #tpsmode
- Send and receive Consumer Electronics Control (CEC) commands by the CEC Tool,
- Frame Detector;
- No Sync Screen (Test Pattern);
- Reloading factory default settings for the selected port.

5.6.2. HDMI Video Input

Clicking on the HDMI video input port icon opens the Port properties window. The most important information and settings are available from the panel.

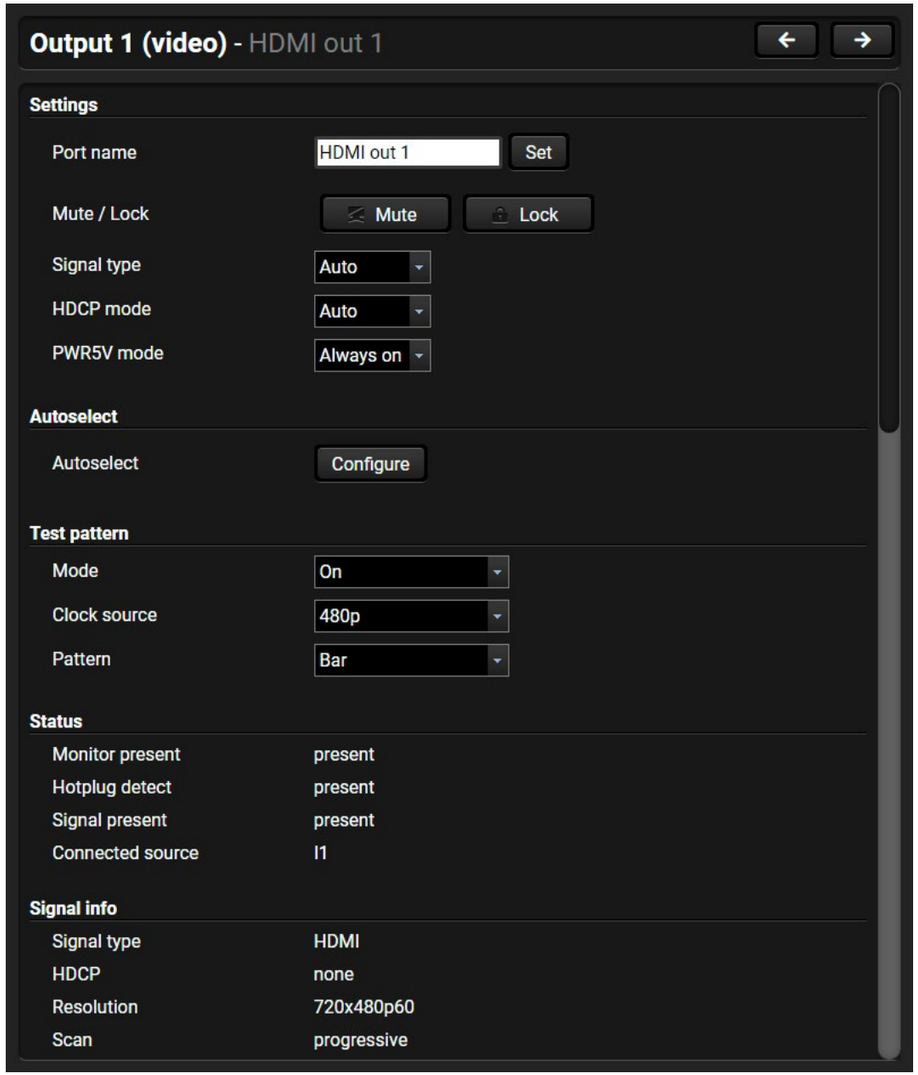


Port properties window of the HDMI video input

Available settings and tools: #signaltype

- Mute/unmute the port;
- Lock/unlock the port;
- HDCP setting (enable / disable);
- Send and receive Consumer Electronics Control (CEC) commands by the CEC Tool,
- Frame Detector;
- Reloading factory default settings for the selected port.

5.6.3. HDMI Video Output



Port properties window of the HDMI video output

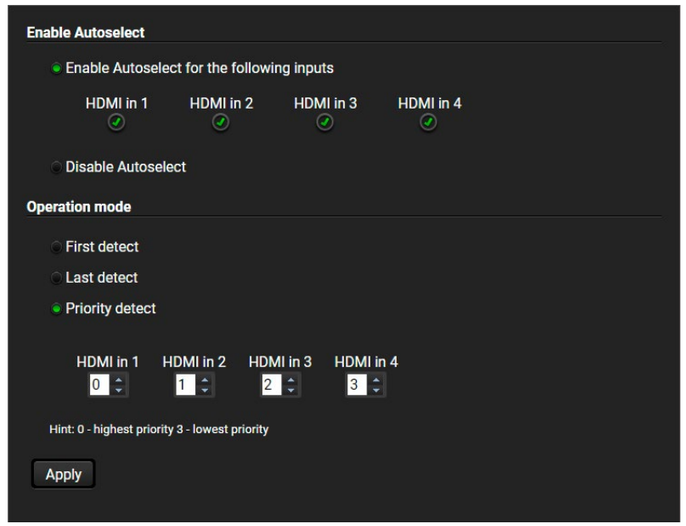
Available settings and tools:

- Mute/unmute the port;
- Lock/unlock the port;
- **Autoselect** settings (see below)
- **Signal type**: Auto / DVI / HDMI - The outgoing signal format can be selected from a drop-down menu;
- **HDCP mode**: Auto / Always - The transmitter forces the source to send the signal without encryption if the content allows when Auto mode is selected; *#signaltype #hdcp*
- **Connected source**
- **Power 5V mode**: Auto / Always on / Always off - The setting lets the source and the sink devices be connected – independently from the transmitted signal;
- **No sync screen**: configuration settings of the test pattern. See more details in the No Sync Screen (Test Pattern) section.
- **Frame detector** diagnostic tool (see the Frame Detector section);
- Send and receive Consumer Electronics Control (CEC) commands by the CEC Tool,
- Reloading factory default settings for the selected port.

Autoselect Settings *#autoselect*

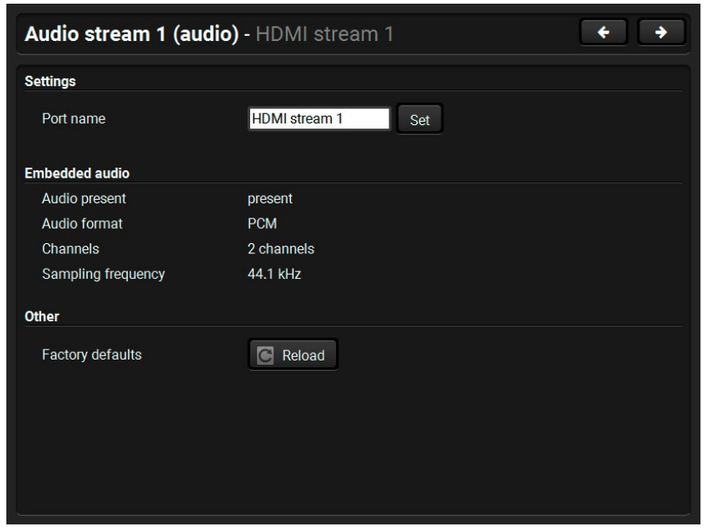
Pay attention to the following settings for the proper operation of the Autoselect function:

- Be sure that no input is set to the same priority number;
- Be sure that all priority values are filled in (no empty space);
- Be sure that all inputs are enabled with the green tick on the right side;
- Always click on the **Set priorities** button after the changes to launch the new settings.
- Set the Autoselect settings to **Enabled**; see more details in The Autoselect Feature section.



5.6.4. Digital Audio Input

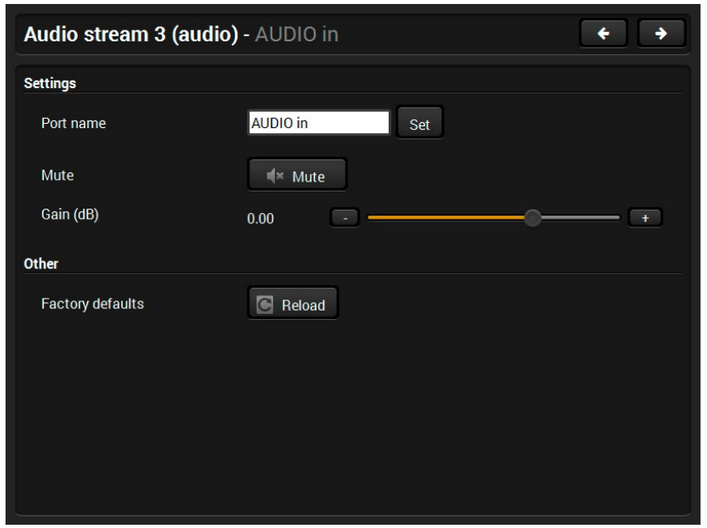
A1 and A2 inputs are logical audio ports which are the audio channels of the selected HDMI input ports.



Port properties window of the A1 digital audio input

ATTENTION: If the TPS/HDMI video input port is muted/locked, the digital audio input port belonging to it will also be muted/locked.

5.6.5. Analog Audio Input



Port properties window of the analog audio input

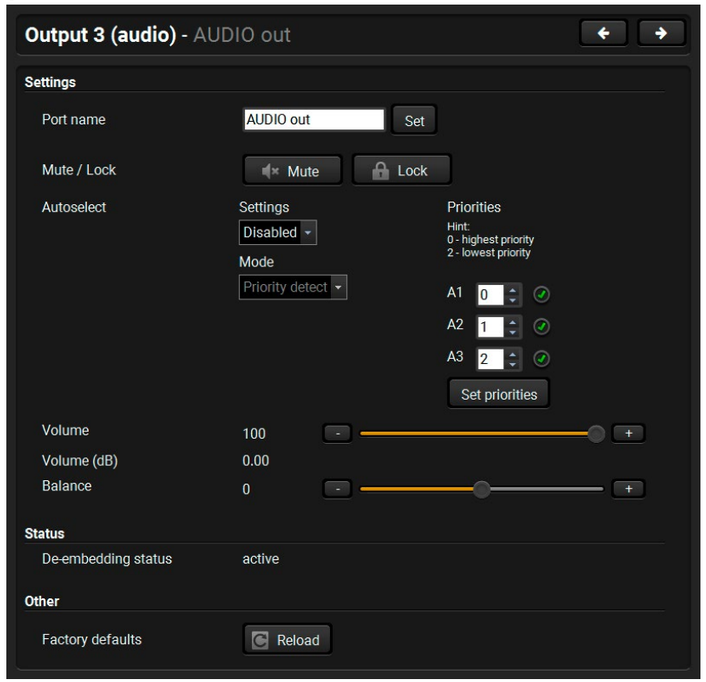
Certain parameters of the analog audio input signal can be set as follows: *#analogaudio*

- Mute/unmute the port;
- Lock/unlock the port;
- Gain: -12 to 6 dB, in step 3 dB (default is 0 dB);
- Reloading factory default settings for the selected port.

5.6.6. Digital Audio Output

The port properties windows of the video and audio outputs are mirrored. For example the same window will be opened when you select the HDMI OUT1 on the Video or the Audio sections. The available settings can be found in the HDMI Video Output section.

5.6.7. Analog Audio Output



Port properties window of the analog audio output

Available settings: *#analogaudio #volume #balance*

- Mute/unmute the port;
- Lock/unlock the port;
- **Autoselect settings**: enable / disable, mode, and priorities. (See more details about the feature in The Autoselect Feature section);
- Volume: from 100 to 0%, in step 1% (0 dB to -57 dB, in step 0.375 dB (default is 0 dB));
- Balance: from -100 to 100, in step 1 (default is 0 = center);
- Reloading factory default settings for the selected port.

5.7. CEC Tool

The device is able to send and receive Consumer Electronics Control (CEC) commands. This feature is for remote control of the source or sink device. CEC is a bi-directional communication via the HDMI cable.

#cec



1	**Drop-down command list**	Containing the basic CEC commands, most of them are displayed on the graphical interface, too (on the left side). Click on the **Send** button to send the command.
2	**Custom command textbox**	The text field is for sending hexadecimal commands to the source. The maximum allowed length is 30 characters (15 bytes). Click on the **Send** button to send the command.
3	**OSD string textbox**	Unique text can be shown on the sink device up to 14 characters. The send OSD (On-screen display) command textbox is the input field of the string. Alphanumeric characters, glyphs and space are accepted. Click on the **Send** button to execute the command.
4	**Received Command box**	Displays all the sent (in red) CEC commands and the received answers (in blue) with a timestamp. **Legend of the received message:** < [10:33:17] ACK Answer for the acknowledged command. < [10:35:01] NACK Answer for the not acknowledged command. < [10:33:17] IN PROGRESS The command is being processed. < [10:33:17] FAILED Answer for other failure. *< [10:35:40] feature_abort_<*>* This is the most common answer from the third-party devices when the command is delivered, but the execution is refused. The cause of the refusal stands after 'feature_abort' expression.
5	**Clear button**	Click on the **Clear** button to erase the content of the terminal window.
6	**CEC command button panel**	This panel provides the quick and easy management of CEC commands. These buttons are pre-programmed with basic functions and send commands towards the sink. The communication is displayed in the Received Command box. For the list of the commands, see the CEC Command Sending section. Both the layout and functionality are similar to the design of a remote control.

It can occur that the third-party device can receive, but not execute the command because it is not supported by the product. Check the accepted commands in the documentation of the device.

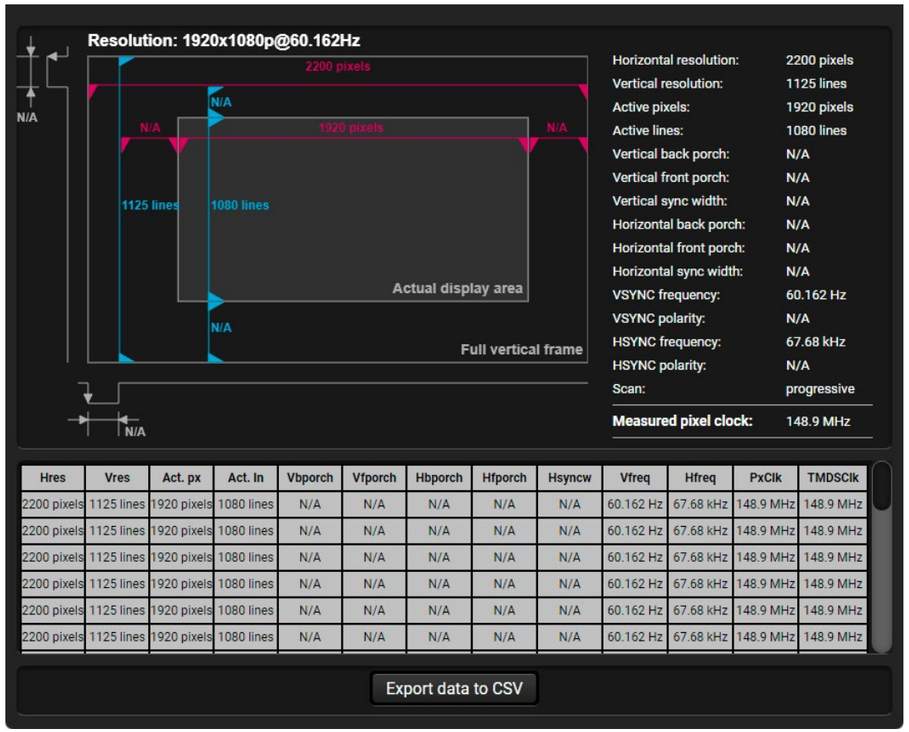
INFO: The first 2x2 bit of the CEC commands contains identification data of the source and destination address. In this case that is always 40.

ATTENTION: Make sure that the controlled unit is CEC-capable and this function is enabled.

5.8. Diagnostic Tools

5.8.1. Frame Detector

The ports can show detailed information about the signal like blanking intervals and active video resolution. This feature is a good troubleshooter if compatibility problems occur during system installation. To access this function, open the port properties window and click on **Frame detector** button.



Hres	Vres	Act. px	Act. ln	Vbporch	Vfporch	Hbporch	Hfporch	Hsyncw	Vfreq	Hfreq	PxClk	TMDSClk
2200 pixels	1125 lines	1920 pixels	1080 lines	N/A	N/A	N/A	N/A	N/A	60.162 Hz	67.68 kHz	148.9 MHz	148.9 MHz
2200 pixels	1125 lines	1920 pixels	1080 lines	N/A	N/A	N/A	N/A	N/A	60.162 Hz	67.68 kHz	148.9 MHz	148.9 MHz
2200 pixels	1125 lines	1920 pixels	1080 lines	N/A	N/A	N/A	N/A	N/A	60.162 Hz	67.68 kHz	148.9 MHz	148.9 MHz
2200 pixels	1125 lines	1920 pixels	1080 lines	N/A	N/A	N/A	N/A	N/A	60.162 Hz	67.68 kHz	148.9 MHz	148.9 MHz
2200 pixels	1125 lines	1920 pixels	1080 lines	N/A	N/A	N/A	N/A	N/A	60.162 Hz	67.68 kHz	148.9 MHz	148.9 MHz
2200 pixels	1125 lines	1920 pixels	1080 lines	N/A	N/A	N/A	N/A	N/A	60.162 Hz	67.68 kHz	148.9 MHz	148.9 MHz

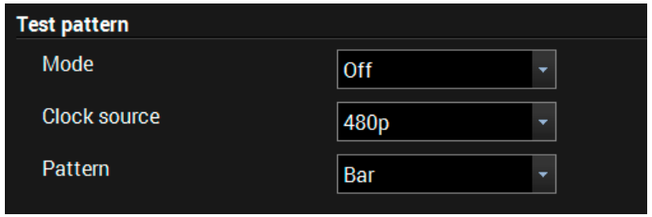
Frame detector window

Lightware's Frame Detector function works like a signal analyzer and makes it possible to determine the exact video format that is present on the port, thus helps to identify many problems. E.g. actual timing parameters may differ from the expected and this may cause some displays to drop the picture.

Frame Detector measures detailed timings on the video signals just like a built-in oscilloscope, but it is much more easy to use. Actual display area shows the active video size (light gray). Dark gray area of the full frame is the blanking interval, which can contain the info frames and embedded audio data for HDMI signals. Shown values are measured directly on the signal and not retrieved only from the HDMI info frames.

#diagnostic #framedetector

5.8.2. No Sync Screen (Test Pattern)



Test pattern options in the port properties window of the HDMI output

The No sync screen feature generates an image that can be displayed when there is no incoming signal on the port. The following settings can be set for the Test Pattern function:

Mode *#nosyncscreen #testpattern*

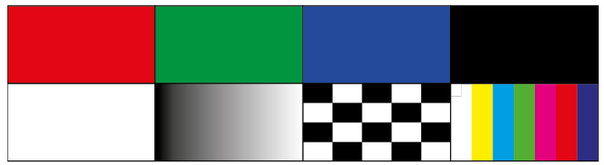
- **On**: the video output port always transmits the test pattern.
- **No signal**: the video output port transmits the test pattern if there is no incoming signal on the selected input port.
- **Off**: the test pattern function is disabled, the video output port transmits the video signal of the selected input port.

Clock Source

- 480p
- 576p
- Original video signal

Pattern

- Red
- Green
- Blue
- Black
- White
- Ramp
- Chess
- Bar
- Cycle

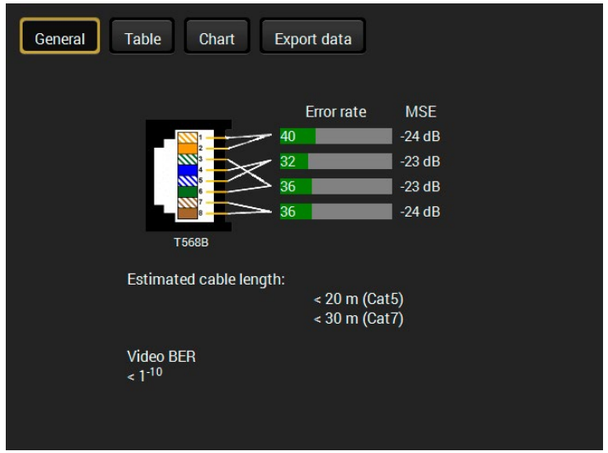


5.8.3. Cable Diagnostics

DIFFERENCE: This tool is available for the MMX4x2-HT200 model only.

The cable diagnostics is a useful tool to determine any cable-related issue in case of TPS connection. The estimated cable length and the quality of the link are measured periodically, and the diagnostic window shows the values in real-time. If the green bars hit the first line in the middle, they turn red. It means the number of errors during the extension is higher than what is generally deemed acceptable. The link might be alive, but recovering of the received data is not guaranteed. *#cablediagnostics*

INFO: Each bar represents a differential line in the CATx cable. The inappropriate termination of the cable usually causes high error rates. Check the cable terminations or change the cable.



Reference Values

Value	Explanation
1^{-10} - 1^{-9}	Excellent image quality
1^{-8}	Minor error, not recognizable by eyes
1^{-7}	Sometimes recognizable flash on a special test pattern
1^{-6}	Small noise can be seen
1^{-5}	Easy to recognize image error
1^{-4}	Bad image quality

"Video BER < 1^{-10}" value displayed above means that on average there is 1 bad pixel after 10^{10} pixels, which means the number of the bit errors is about 1 pixel in every 80 seconds.

INFO: You can find more details about maximum twisted pair cable distances in the Maximum Extension Distances section.

Table and Chart Views

Cable diagnostics can be displayed in advanced modes as well. Two ways are available: **table view** and **chart view**. Data can be exported to a file by clicking on the **Export data** button.

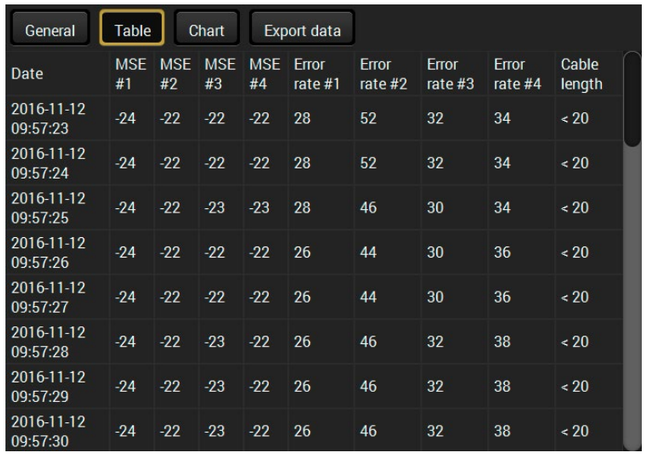


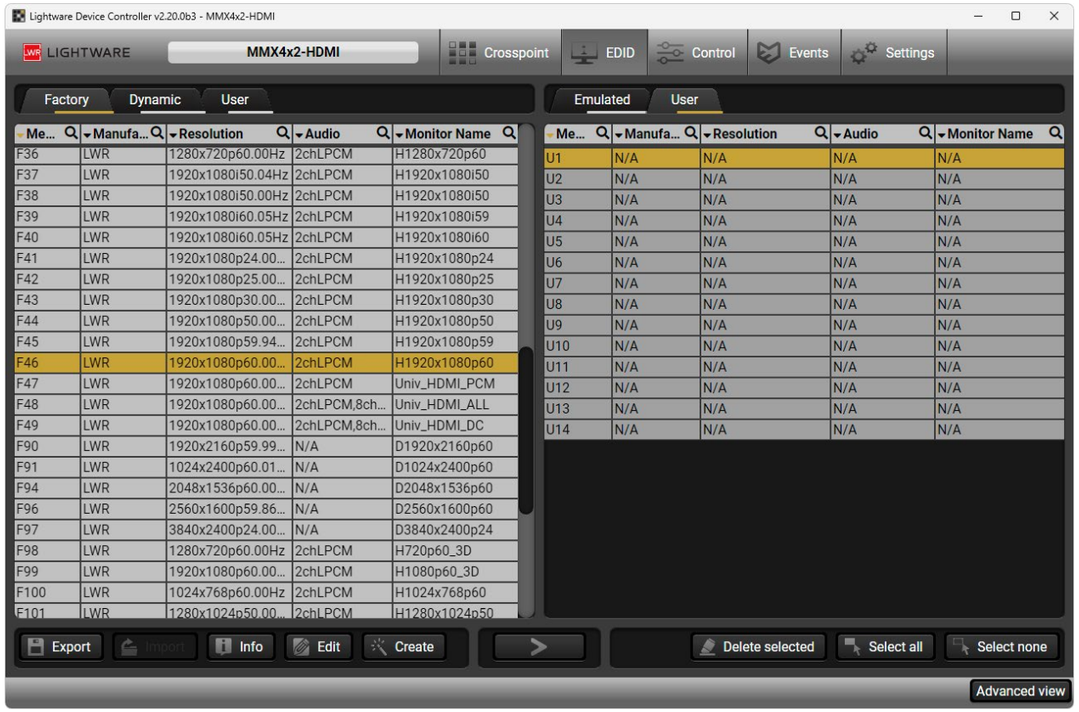
Table view of cable diagnostics



Chart view of cable diagnostics

5.9. EDID Menu

Advanced EDID Management can be accessed by selecting the EDID menu. There are two panels: the left one contains Source EDIDs, the right one contains Destination places where the EDIDs can be emulated or copied. *#edid*



EDID menu

Control Buttons

Export	Exporting an EDID (save to a file)		Transfer button: executing EDID emulation or copying
Import	Importing an EDID (load from a file)	Delete selected	Deleting EDID (from User memory)
Info	Display EDID Summary window	Select All	Selecting all memory places in the right panel
Edit	Opening Advanced EDID Editor with the selected EDID	Select none	Selecting none of the memory places in the right panel
Create	Opening Easy EDID Creator		

5.9.1. EDID Operations

Changing Emulated EDID

Step 1. Choose the desired **EDID list** on the source panel and select an **EDID**.

Step 2. Press the **Emulated** button on the top of the Destination panel.

Step 3. Select the desired **port** on the right panel (one or more ports can be selected); the EDID(s) will be highlighted with a yellow cursor.

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: press the **User** button. Thus one or more EDIDs can be copied into the user memory either from the factory memory or from a connected sink (Dynamic).

Exporting an EDID

ATTENTION: This function is working on Windows and macOS operating systems and under Firefox or Chrome web browsers only.

Source EDID can be downloaded as a file (*.bin, *.dat or *.edid) to the computer.

Step 1. Select the desired **EDID** from the Source panel (line will be highlighted in yellow).

Step 2. Press the **Export** button to open the dialog box and save the file to the computer.

Importing an EDID

Previously saved EDID (*.bin, *.dat or *.edid file) can be uploaded to the user memory:

Step 1. Press the **User** button on the top of 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 browsed EDID is imported into the selected User memory.

ATTENTION: The imported EDID overwrites the selected memory place even if it is not empty.

Deleting EDID(s)

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

Step 1. Press the **User** button on the top of the Destination panel.

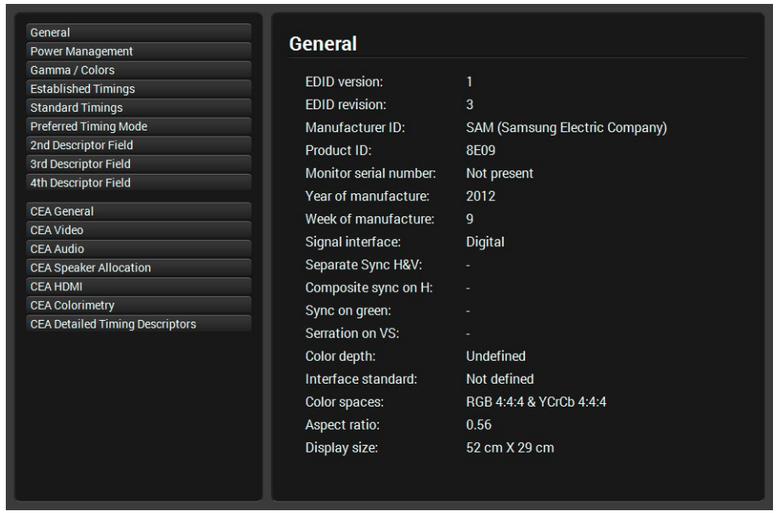
Step 2. Select the desired **memory** slot(s); one or more can be selected (“Select All” and “Select None” buttons can be used). The EDID(s) will be highlighted in yellow.

Step 3. Press the **Delete selected** button to delete the EDID(s).

5.9.2. EDID Summary Window

Select an EDID from the Source panel and press the **Info** button to display the EDID summary.



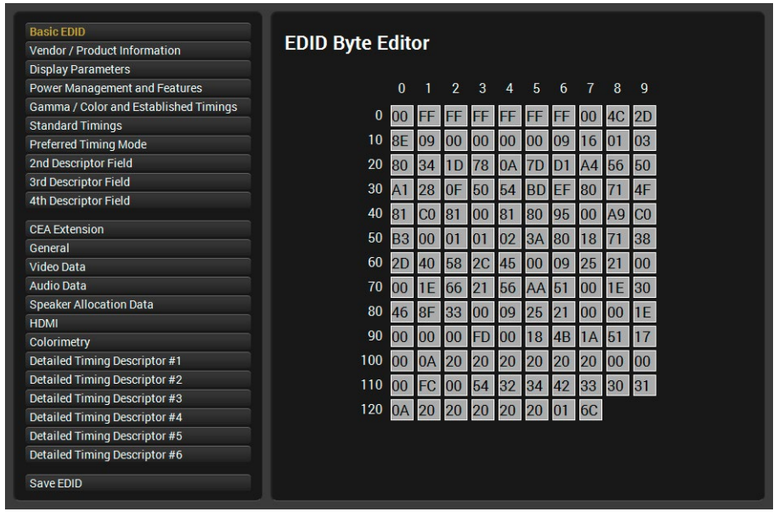


EDID summary window

5.9.3. Editing an EDID

Select an EDID from the Source panel and press the **Edit** button to display the Advanced EDID Editor window. The editor can read and write all descriptors that are defined in the standards, including the additional CEA extensions. Any EDID from the device's memory or a saved EDID file can be loaded into the editor. The software resolves the raw EDID and displays it as readable information to the user. All descriptors can be edited, saved in an EDID file, or uploaded to the User memory. For more details about the EDID Editor, please visit our website and download the EDID Editor Application Notes.





EDID Editor window

5.9.4. Creating an EDID - Easy EDID Creator

Since the Advanced EDID Editor mentioned above needs more complex knowledge about EDID, Lightware introduced a wizard-like interface for fast and easy EDID creation. With Easy EDID Creator, it is possible to create custom EDIDs in four simple steps. For more details about the EDID Editor, please visit our website and download the EDID Editor Application Notes.

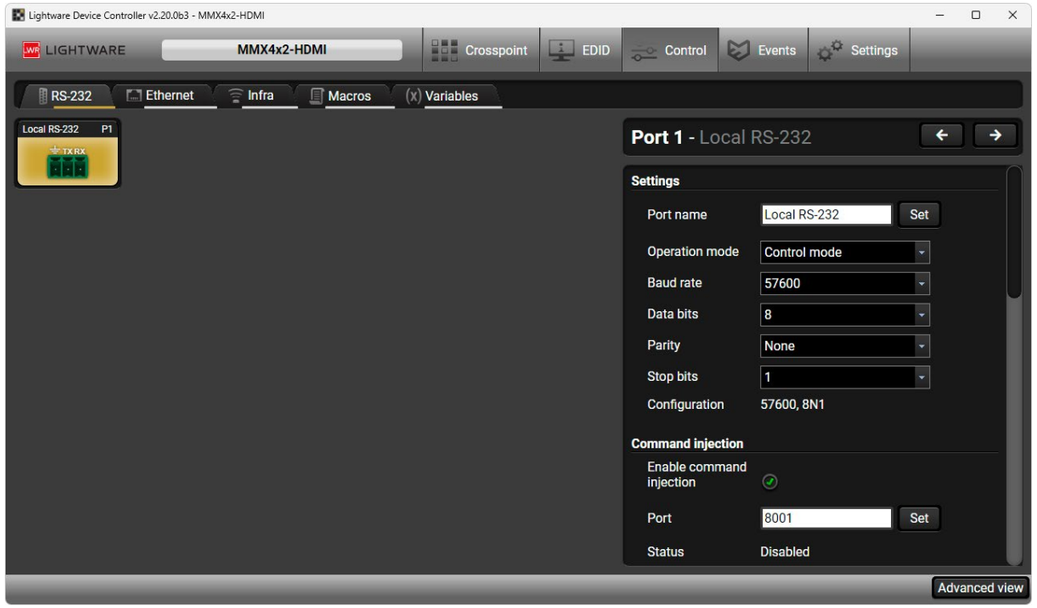




5.10. Control Menu

5.10.1. RS-232

DIFFERENCE: MMX4x2-HDMI-USB20-L model is assembled with two local RS-232 ports. TPS port can be found on MMX4x2-HT200 model only.



RS-232 tab in Control menu

The following settings and functions are available (both on local and TPS serial ports):

- Operation mode: Control, Command Injection, or Disconnected (for more details about serial interface modes see the RS-232 Serial Interface section);
- Baud rate: 4800, 7200, 9600, 14400, 19200, 38400, 57600, 115200;
- Data bits: 8 or 9;
- Parity: None, Odd, or Even;
- Stop bits: 1, 1.5, or 2;
- Command injection: enable or disable; port number; *#commandinjection*
- Control protocol: LW2 or LW3; *#protocol #rs232 #rs-232 #serial*
- Message sending via serial port; *#message*
- Reloading factory defaults (see factory default settings in the Factory Default Settings section).

ATTENTION: If the matrix is connected to a TPS2 output board of a matrix frame, the RS-232 configuration settings (baud rate, data bits, etc..) will not be changeable on the matrix side.

RS-232 Message Sending



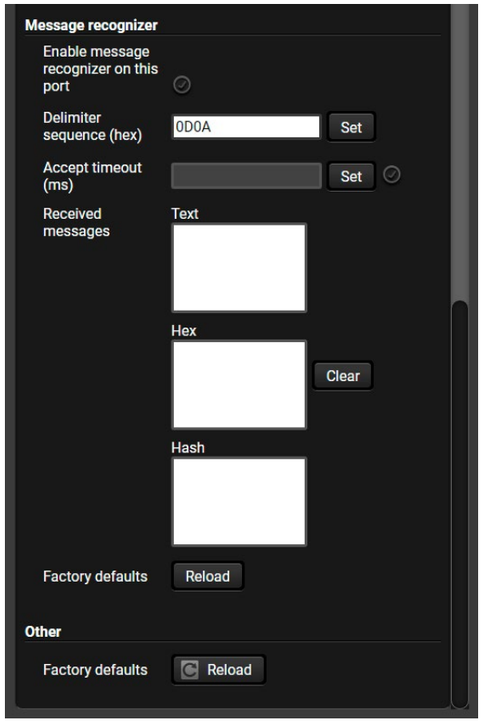
The message in the field can be sent out via the current RS-232 port. Response cannot be seen in the surface.

ATTENTION: The escaping is done automatically when sending a message via this surface. When the message is an LW3 command, it has to be closed by Carriage return and Line feed, e.g.: CALL /MEDIA/VIDEO/XP:switch(I1:O1)\x0d\x0a.

RS-232 Message Recognizer

DIFFERENCE: This feature is available from firmware v1.3.1.

This tool can be used to recognize messages coming from the RS-232 port. The message can be used as a Condition in Event Manager and an Action can be defined for it.



Definitions

Delimiter sequence (hex): Each message is closed by this separator (if defined).

Accept timeout (ms): When the set time has passed after the last received message and delimiter was not detected, the device saves the data into the Text, Hex, and Hash properties. The timeout setting is useful if there is no special or easily defined delimiter in the incoming data, but there is a time gap between the messages.

Text: The recognized message in ASCII-format.

Hex: The recognized message in Hexadecimal format.

Hash: Binary data that is mapped from the original message. The length of the hash is shorter, and the same message results in the same hash.

Working Method

A message gets recognized from the incoming data if one of the following occurs:

- The set DelimiterHex is detected in the message, or
- The set TimeOut has passed since receiving the last data bit.

5.10.2. Ethernet

DIFFERENCE: MMX4x2-HDMI-USB20-L model has three Ethernet ports. TPS port can be found on MMX4x2-HT200 model only.

Ethernet Ports

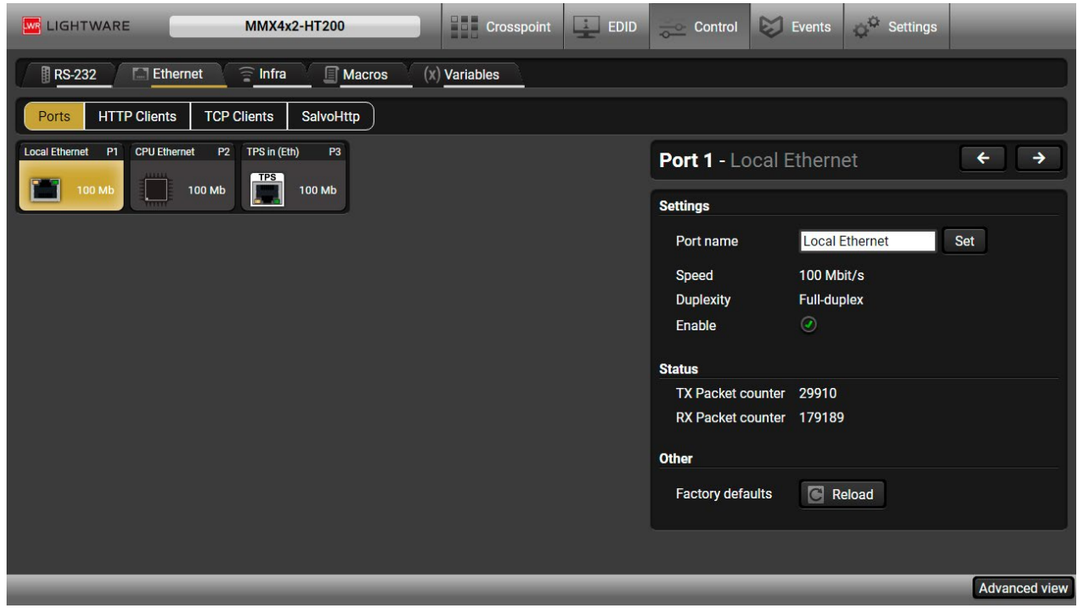
Three ports are displayed in the Ethernet settings: Local, CPU, and TPS*. You can check the status of the Ethernet line via each port: the speed and the duplexity of the connection.

The following settings are available for each port:

- Enabling / disabling the port; **
- Reloading factory defaults.

* Only MMX4x2-HT200 model has TPS Ethernet port.

** CPU Ethernet port cannot be disabled.



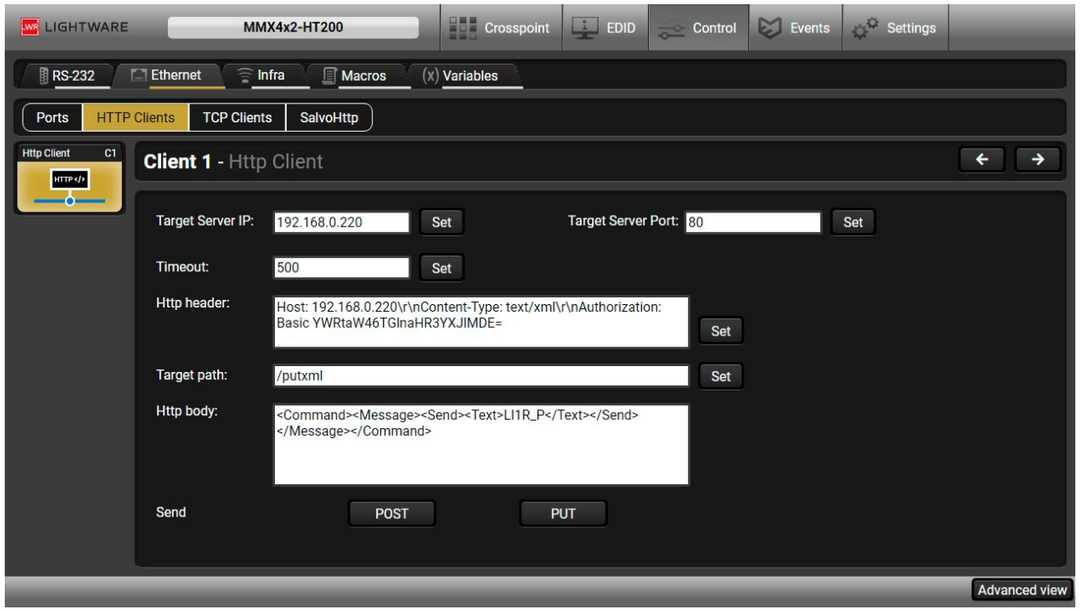
Ports tab in the Control/Ethernet menu

HTTP Clients (HTTP Post and Put Message Sending)

ATTENTION: This feature means posting or putting **HTTP** messages from the Lightware device to another device. Encrypted transmission (**HTTPS**) is not supported.

The HTTP Clients tab allows sending HTTP post and put messages to the desired server IP:port no. Control commands can be send to the target device, but it is not suitable for processing the response (e.g. querying a parameter/status), since the response is just an acknowledge (ACK). *#http*

The feature is available also by LW3 commands, see the HTTP Messaging section.

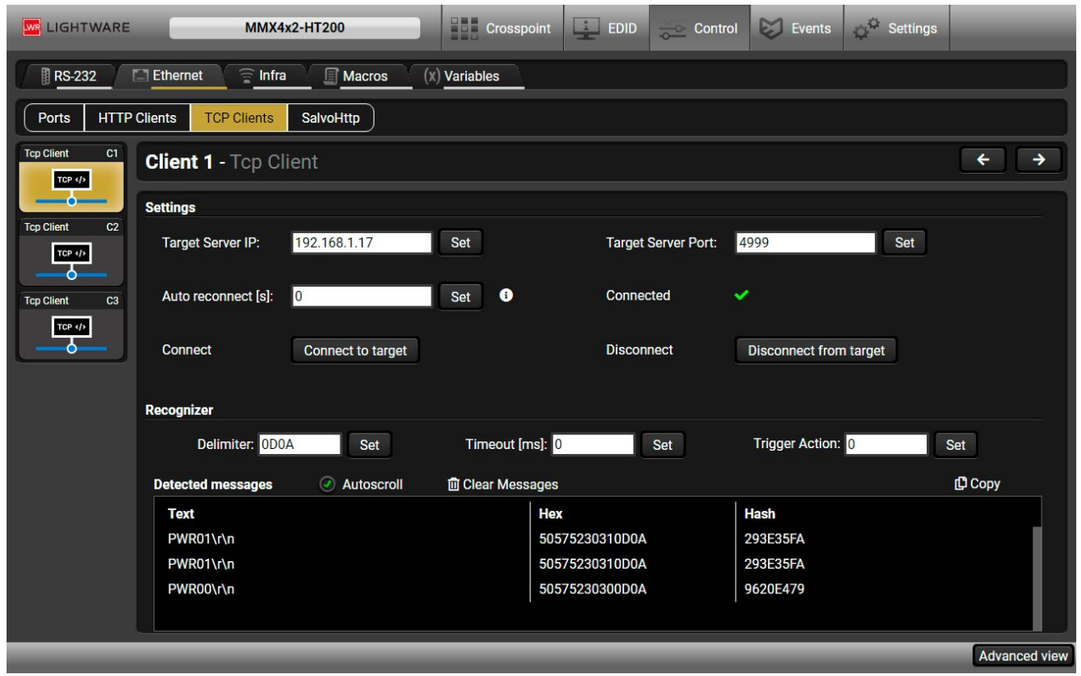


HTTP Clients tab in the Control/Ethernet men

When you press the enter in the **Http header** or **Http body** text box, the \r\n is added automatically.

TCP Clients (TCP Message Recognizer)

This tab is for the preparation and monitoring interface for the TCP recognizer feature. The incoming TCP messages can be detected, which may trigger Event Manager Actions. A simple example can be seen in the TCP Recognizer section. #tcprecognizer #message



TCP Clients tab in the Control/Ethernet menu

The target device has to be set as a TCP client (three clients can be set):

Step 1. Type and set the **Target IP address**.

Step 2. Type and set the **TCP port number**.

Step 3. Make sure the same **TCP port is opened** and Enabled in the target device.

Step 4. Press the **Connect to target** button.

Step 5. Make the target device send a message and check it in the Detected messages list.

- **Auto reconnect:** Numeric value; sets the time (seconds) between the automatic reconnections.
- **Delimiter:** When the delimiter hex string is detected in the incoming data, the message is saved from the first bit until the delimiter (or the data between the two delimiters).
- **Timeout:** If there is no response within the set time interval (milliseconds), the data that is received from the last delimiter will be accepted.
- **Trigger Action:** If data is received that is closed with the recognized delimiter, an Action can be run. Type the number of the Event (without letter 'E').

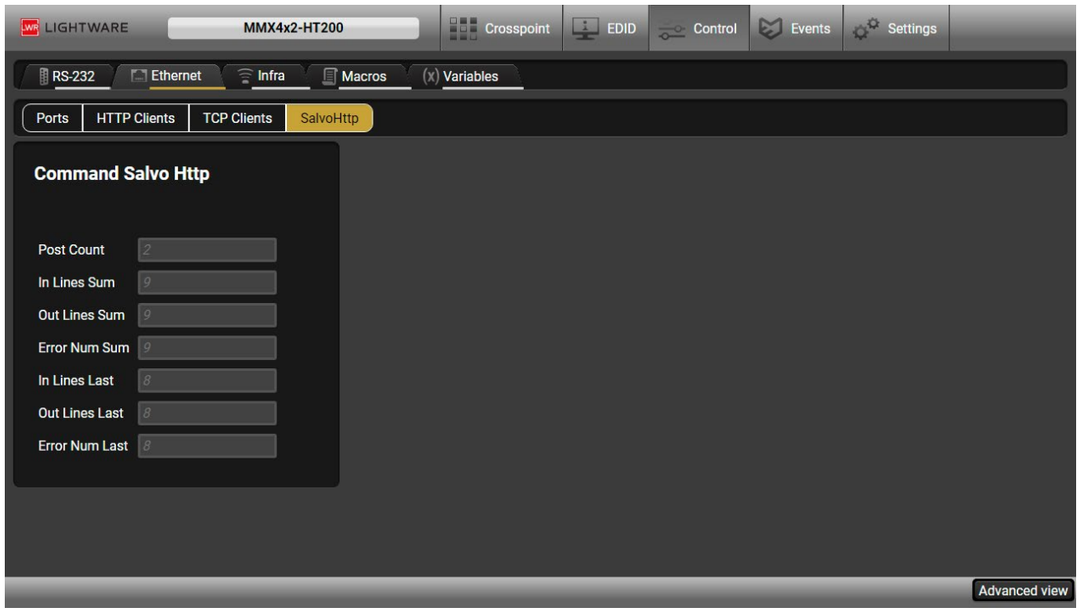
SalvoHttp Status Page (Receiving HTTP Message)

> **ATTENTION:** This feature means sending **HTTP** messages from an external device to the Lightware device. Encrypted transmission (**HTTPS**) is not supported.

In this case, a batch of commands can be sent over HTTP to the Lightware device for processing. Post the commands to the <IP_address>/protocol.lw3 address and the commands are processed immediately and sequentially. #http

Control commands can be sent to the Lightware device, but it is not suitable for querying a parameter/status, since the LW3 responses are not sent back to the sender.

> **ATTENTION:** If the Cleartext Login (Login Settings) is enabled in the device, the login has to be the first command. No commands will be processed without a successful login. See the syntax in the Logging Into the Device section.



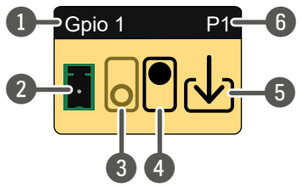
SalvoHttp tab in the Control/Ethernet menu

5.10.3. GPIO

DIFFERENCE: This section refers to the MMX4x2-HDMI-USB20-L model only.

The GPIO port has 6 pins, which operate at TTL digital signal levels and can be controlled by LDC or protocol commands. Select a GPIO pin under the Port settings section; the settings (pin direction and input level) are displayed on the port tiles as well. *#gpio*





1. GPIO pin name
2. GPIO port icon
3. Low level indicator *
4. High level indicator *
5. Pin direction:
   Input: down arrow
   Output: up arrow
6. GPIO port number

* The black-highlighted symbol means the current setting.

INFO: Output level can be set only in case of setting the pin direction to Output. In case of input direction the output level setting and the Toggle button is not available.

For more details about GPIO interface, see the GPIO Interface section.

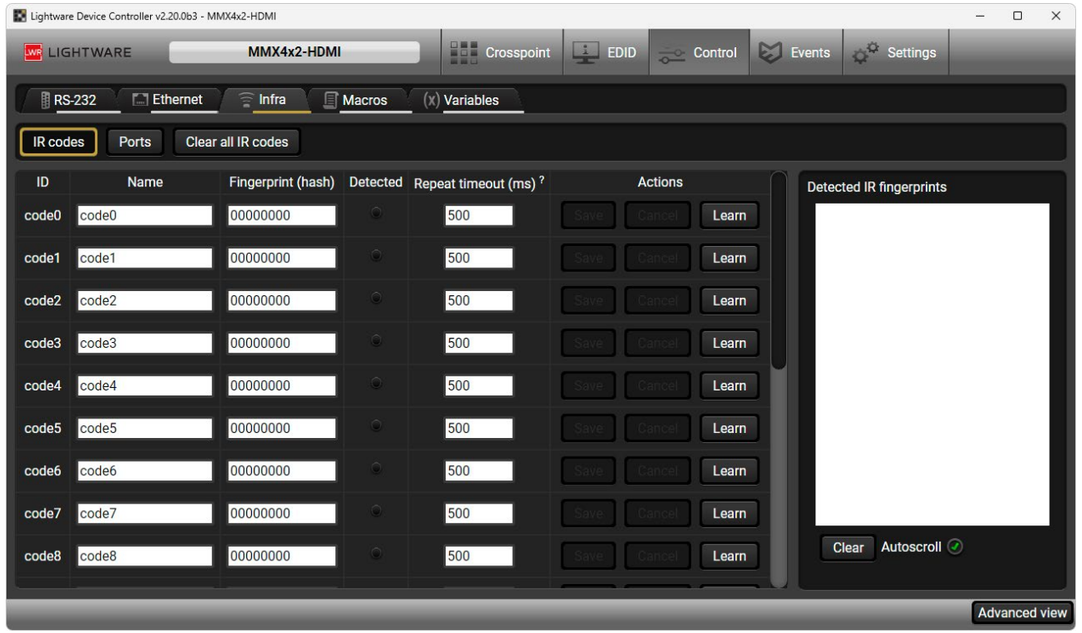
5.10.4. Infra

ATTENTION: The device has no built-in Infrared receiver and transmitter. For the complete usage attach an IR emitter unit to the IR OUT and an IR detector unit to the IR IN connectors.

Infrared (IR) receiver and transmitter options can be found on this tab. There are three submenus available under it: **IR codes**, **Ports**, and **Clear all IR codes**.

IR Codes *#infra #infrared*

The user can set the name of the IR code, the fingerprint (hash), and the repeat timeout in ms, and actions can be ordered to each IR code as well.



IR codes window in Control menu

Description	Function
ID	Code number.
Name	You can give an unique name for the desired code.
Fingerprint (hash)	Fingerprint code in pronto hex format.
Detected	Indicator gives feedback about the given IR code detected currently.
Repeat timeout (ms)	You can set a timeout to avoid involuntary code recurrence.
Actions	Action buttons for the desired IR code: **Save**: saving the fingerprint. **Cancel**: canceling the fingerprint. **Learn**: learning the detected IR code.
Detected IR fingerprints	You can check the detected IR codes in this panel. Pressing the **Clear** button deletes all current fingerprints and you can switch the automatic scrolling on or off by putting/removing the tick by **Autoscroll**.

20 fingerprints can be stored in the device at the same time. Each of them can be ordered to an action in Event Manager. For more details about events, see Event Manager section.

Learning IR Codes

Step 1. Connect the IR detector unit to the IR IN port of the receiver.

Step 2. Click on the **Learn** button.

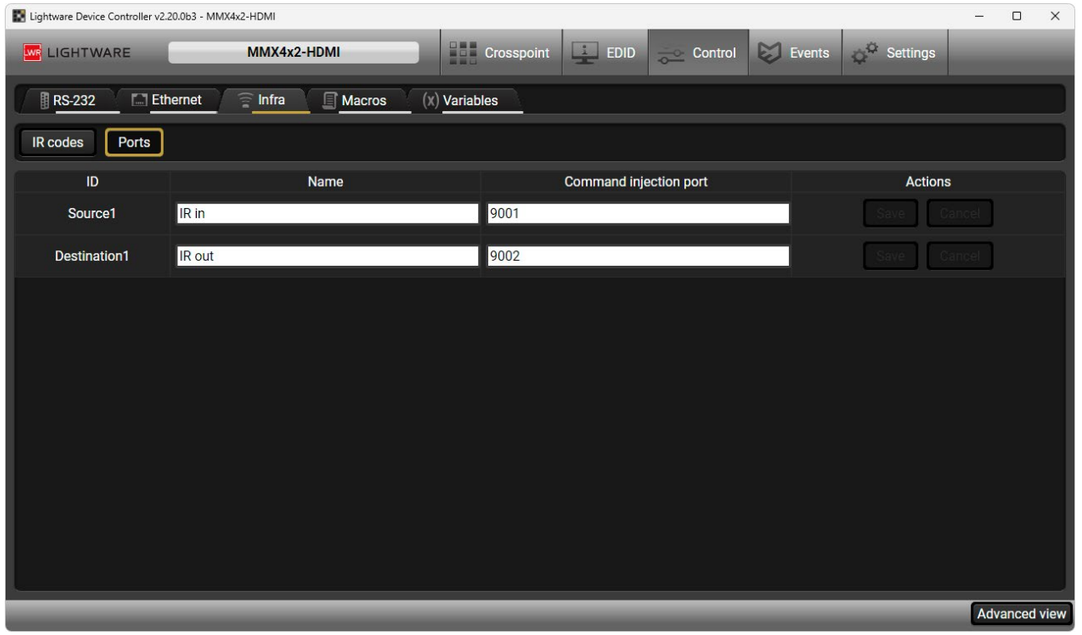
Step 3. Turn the remote controller to the IR detector. A pop-up window appears in LDC - press your remote button to learn.

Step 4. Once the code is received, a new window pops up in LDC - learning completed. Click on **OK** to continue.

Step 5. Optionally type a unique name for the code in the **Name** text box. The default name is code#, e.g. code0.

Ports

The user can set the name and command injection port for each source and destination. For more details, about IR interface see the Messaging Options section.



Infra tab - Ports window

Clear all IR codes

Clicking on the button deletes all stored IR fingerprints.

5.10.5. Macros

DEFINITION: Macro is a batch of pre-defined commands stored in the device. *#macro*

You can create your custom macros in a file, upload them to the device and run at any time. The number of the macros depends on the device type, for example MMX4x2 can handle up to 50 macros.

Important Notes about Macros

- The macros are stored in device presets.
- The commands of a macro are executed sequentially (even if error happens at a command).
- Macros allow long commands that is suitable for e.g. infra code sending.
- Macros cannot be edited in the device.
- Macros are not saved when backup is created. See the Saving the Macros section.

Macro File Structure

`<preset_name>`: it will be displayed in the Settings/Backup submenu (device configurations list).

`<macro_name>`: each Macro must have a unique name.

`<LW3_commands>`: LW3 SET and CALL commands. Syntax is not checked, error is not reported.

ATTENTION: If you use the same name for a new macro, the existing one will be deleted.

Open a simple text editor and save the file with 'LW3' extension.

Uploading New Macros into a New Preset

Format:

```
;<preset_name>
;Begin <macro1_name>
<LW3_commands>
;End <macro1_name>
;Begin <macro2_name>
<LW3_commands>
;End <macro2_name>
```

Example:

```
;myDeviceMacros
;Begin myMacro1
CALL /MEDIA/VIDEO/XP:unmuteSource(I3)
CALL /MEDIA/VIDEO/XP:switch(I3:O1;I3:O2)
;End myMacro1
;Begin myMacro2
CALL /MEDIA/VIDEO/XP:unmuteSource(I4)
CALL /MEDIA/VIDEO/XP:switch(I4:O1;I4:O2)
;End myMacro2
```

The recommended way for macros is to use a Device configuration preset for this purpose exclusively. If new macros to add or change any of them, use the dedicated preset. The uploading steps are the following:

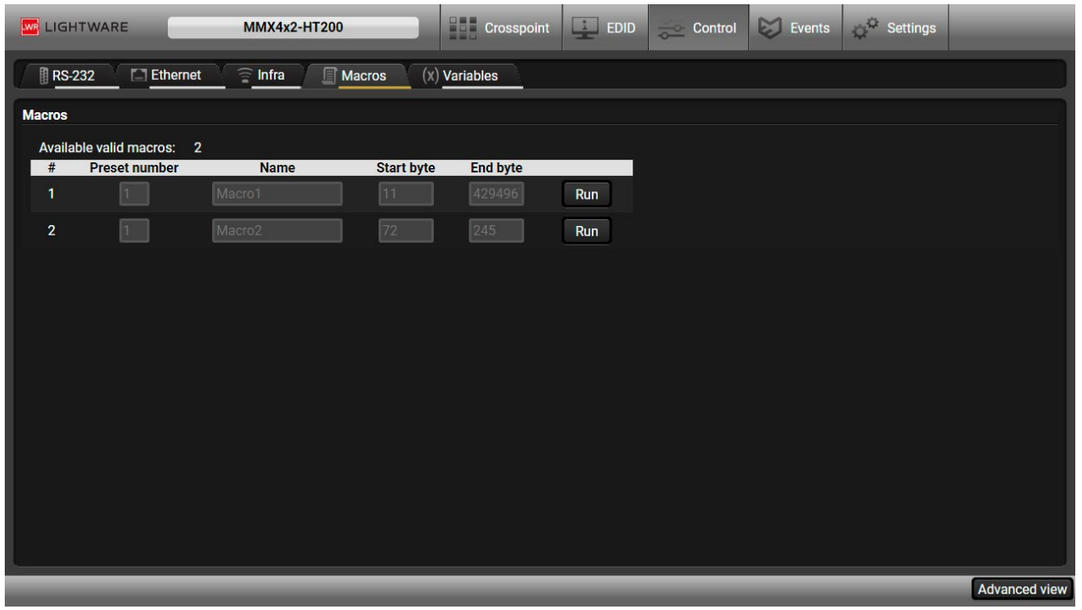
Step 1. Create the **file** with macros according to the macro file structure and save it.

Step 2. Navigate to the **Settings/Backup** submenu.

Step 3. Select a device configuration **preset** at the bottom of the page.

Step 4. Press the **Upload** button, browse the LW3 file and press **Open**.

ATTENTION: The preset and the macros of the selected slot will be erased. If there is a macro with the same name already in the device, it will be removed and the new one will be available.



Discovered Macros in the device shown under Control/Macros submenu

Adding Macros to an Existing Preset

Step 1. Navigate to the **Settings/Backup** submenu.

Step 2. Select a device configuration **preset** at the bottom of the page.

Step 3. Press the **Download** button and click on **Save** in the pop-up window.

Step 4. Open the **file** with a simple text editor and add the desired macros to the bottom of the commands between the `;Begin <macro_name>` and `;End <macro_name>` labels.

Step 5. Save the file and navigate to the **Settings/Backup** submenu.

Step 6. Select the same device configuration **preset** as selected in **Step 2**.

Step 7. Press the **Upload** button, browse the LW3 file and press **Open**.

If you follow the steps above, the existing macros of the selected preset will be preserved. But if there is a macro with the same name already in the device, it will be removed and the new will be available.

Saving the Macros

When you make a backup of the device, the macros are not saved in that file. Sometimes it is necessary to save the macros into a file and for example apply them in another (same type of) device. Follow these steps:

Step 1. Navigate to the **Settings/Backup** submenu.

Step 2. Select the device configuration **preset** that is used for the macros at the bottom of the page.

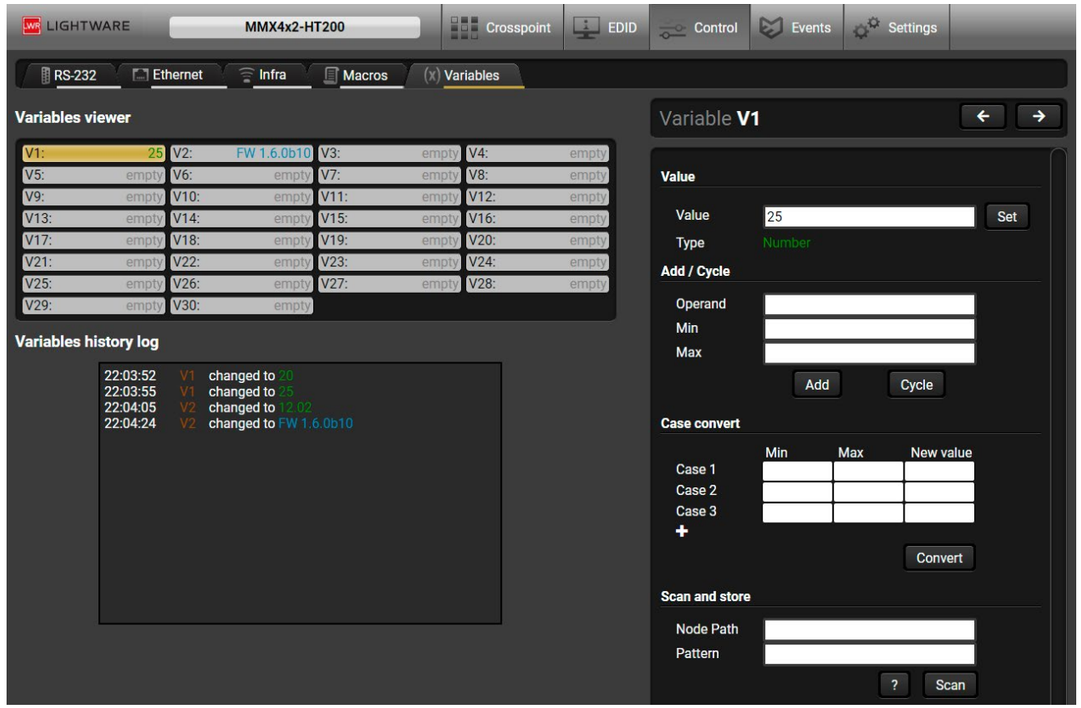
Step 3. Press the **Download** button and click on **Save** in the pop-up window.

5.10.6. Variables

A brand new area is opened by implementing the variables. You can create custom variables in number or text format, which can be used in the Event Manager. The variables can have the following properties/ methods: *#variables*

- Numeric (integer) type with min/max value setting, or string-type (determined automatically)
- Increment/step the numeric value,
- Value-dependent case operations,
- Reading and storing the values of LW3 properties into string or numeric variables.
- The max length of a string variable can be 15 characters. Numeric variable is defined between -2147483648 and 2147483647.

The defined variables are stored in a non-volatile memory and the value is kept in case of a reboot.



Variables tab in the Control menu

Value Section

You can set the value of the variable by the field. The type of the variable is determined automatically based on its value (numeric/string).

Add / Cycle Section

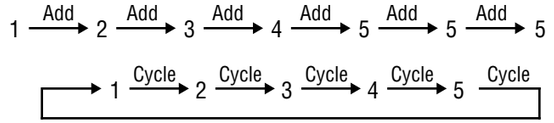
This section can be used for numeric types.

- **Operand**: the increment, the number that will be added to the current value (negative value is accepted).
- **Min (optional)**: the lowest allowed value
- **Max (optional)**: the highest allowed value
- **Add** button: the operand will be added to the current value. If the result would be higher than the max setting, the max will be valid; if the result would be lower than the min setting, the min will be valid
- **Cycle** button: the operand will be added to the current value. If the result would be beyond the limit (min/max), the value will be stepped to the other end of the interval.

Examples

The following shows the difference between the **Add** and the **Cycle** options. The input values are the same in both cases:

- **Min**: 1
- **Max**: 5
- **Operand**: 1



In **Add** case: when the value hits the limit (max), the operand will not increase the value any more.

In **Cycle** case: when the value hits the limit (max), the value will be stepped to the other end of the interval.

A similar case happens vice versa: when the operand is a negative number and the value hits the min value.

> TIPS AND TRICKS: Set min=1, max=2, operand=1 and use the **cycle** method. Thus the value of the variable can be toggled, which can be linked to a property with two states (e.g. low/high level) in Event Manager.

Case Convert

This tool can be used to change the value of a variable if it fits in any of the defined intervals. The check and the change will be performed only if you press the **Convert** button. A typical example is when two different ranges of values have to meet:

Incoming values: between 0 and 255 (e.g. the slider of a controller can have these values).

Outgoing values: between 0 and 100 (e.g. the controlled device accepts these values).

Defined cases:

	Min	Max	New value
Case 1	1	25	10
Case 2	26	50	20
Case 3	51	75	30
Case 4	76	100	40
Case 5	101	125	50

	Min	Max	New value
Case 6	126	150	60
Case 7	151	175	70
Case 8	176	200	80
Case 9	201	225	90
Case 10	226	255	100

Scan and Store

This tool can be used to get the value (or a part) of an LW3 property. The defined path will be checked according to the pattern and the result will be saved into the variable (number or string type). Press the **?** button to open the pattern options:

Pattern	Pattern description
%s	String of characters stopping at the first whitespace character
%<number>s	The next <number> of characters (string) stopping at the first whitespace
%c	One character
%<number>c	The next <number> of characters
%[<characters>]	Defined character set, specified between brackets
%[^<characters>]	Negated character set, which will be skipped, specified between brackets
%*	Ignored part
<custom_text>	User-defined text

Examples

Node Path [1]	Property Value	Pattern [1]	Scanned result
/MANAGEMENT/STATUS.CpuTemperature	42 C; 0;75; 0;7	%s	42
/MANAGEMENT/STATUS.CpuFirmware	1.6.0b10 r96	%12s	1.6.0b10
/MEDIA/VIDEO/XP.DestinationPortStatus	T00AA;T00AF	%6c	T00AA
/MEDIA/UART/P1.Rs232Configuration	57600, 8N1	%*[^,], %s	8N1
/MEDIA/AUDIO/XP.SourcePortStatus	T000A;T000B;T000F	%*6c%5c	T000B
/MANAGEMENT/UID.PackageVersion	1.6.0b12 r64	%[^b]%*	1.6.0
/MANAGEMENT/NETWORK.HostName	lightware-00005031	lightware-	00005031

[1] defined by the user

Reformat

The value of the variable can be changed by adding text as prefix and/or postfix. Type **%s** to indicate where to insert the original value.

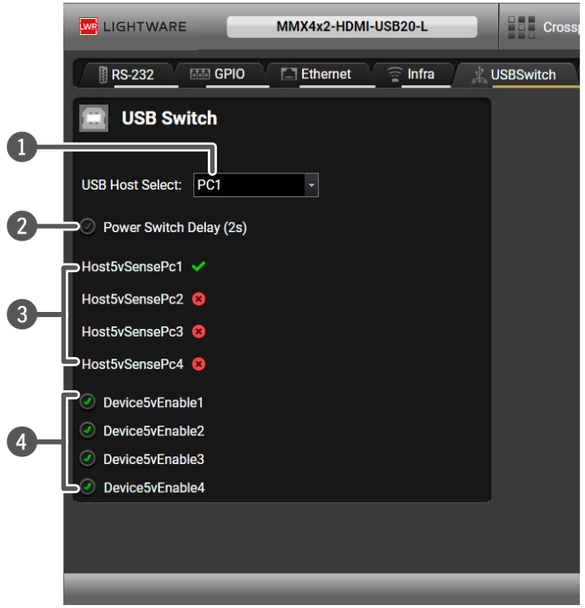
Example

- **Original value**: 3
- **Pattern**: input%s
- **Modified value**: input3

5.10.7. USBSwitch

DIFFERENCE: This section refers to the MMX4x2-HDMI-USB20-L model only.

Certain settings of the connected USB devices are available on this page:



1. Select the desired USB host device (computer) from the list.
2. When this option is enabled, the 5V power is turned off for 2 seconds towards the USB peripherals when the USB host is switched.
3. The symbols show whether a USB host device is connected to the port.
4. When the option is enabled, the device gets the 5V over the USB-A port.

About the Power Switch Delay

After switching between the hosts, certain connected USB peripherals need to be reset to operate properly. Enable the power switch delay function, then the 5V power of all the devices is off for 2 seconds. This forces the devices to restart, thus the user does not have to physically unplug/re-plug the connected USB device.

#usb

5.11. Event Manager

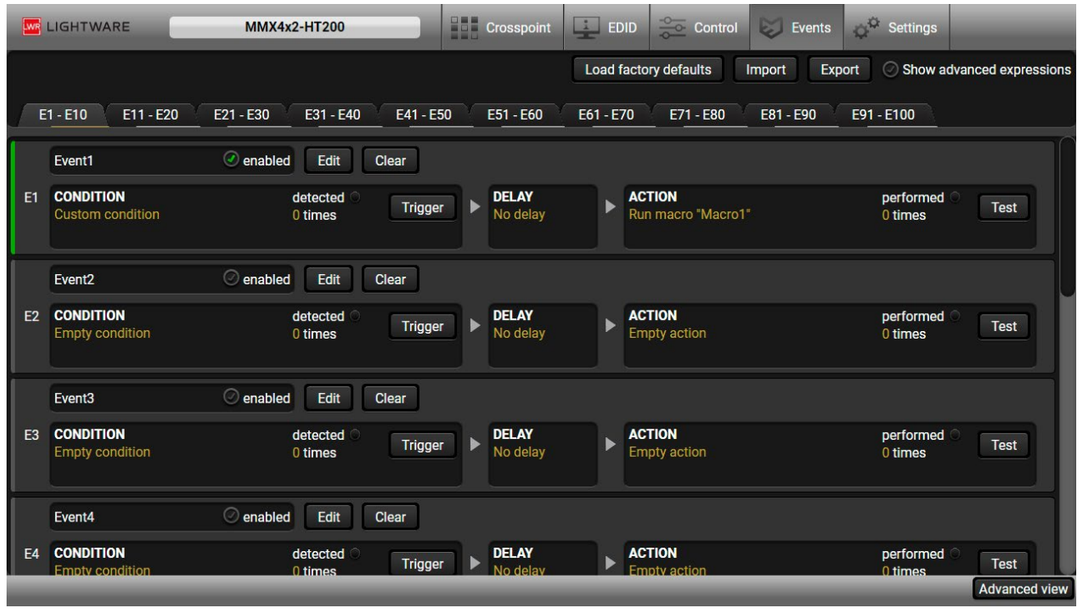
The feature means that the device can sense changes on its ports and is able to react according to the pre-defined settings. The development idea of the Event Manager is based on users' feedbacks. In many cases internal events (E.g. **Signal present** or **HDCP active**) are necessary for displaying but it is not easy when the device is hard to access (e.g. built under the desk).

INFO: For tips and tricks and detailed description about the application of Event Manager, please download the Event Manager Application Notes.

Event Manager can be configured to perform an action if a condition has been detected. E.g. the desired setup is that after a certain type of signal has been detected on I1 port, the port has to be switched to O1. The settings can be done via the LDC in the Control/Events tab, or by LW3 protocol commands. The number of configurable events depends on the device that you are currently using.

Numerous new ideas and requests have been received in connection with the features and settings of the Event Manager since the first release. Therefore, the user interface has been re-designed and many new functions have been implemented. The Event editor can be opened by pressing the Edit button at each Event.

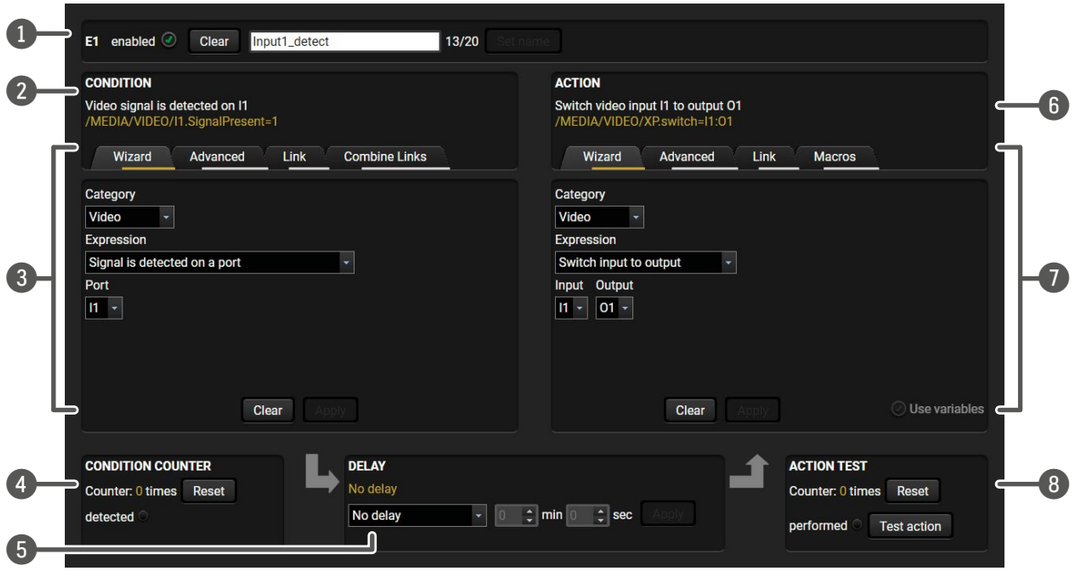
There is a **grey bar** on the left of the Event panel in each line. If a condition and an action are set and the Event is enabled, the bar is displayed **in green**. *#eventmanager*



Event Manager menu, list of Events

5.11.1. The Event Editor

Press the **Edit** button in the desired Event line to open the Event editor window.



1	**Event header**	The name of the Event is displayed. Type the desired name and press the Set name button. The Event can be cleared by the Clear button. Use the tick mark to enable/disable the Event.
2	**Condition header**	If the condition is set, the description (white colored text) and the exact LW3 protocol expression (yellow colored text) can be seen. If the advanced mode was used the description is "Custom condition".
3	**Condition panel**	Different tools are available at the tabs to set the desired Condition. The parameters and settings are displayed below the buttons.
4	**Condition counter**	If the set condition is detected (or triggered), the indicator turns green for two seconds and the counter is increased. The counter is reset at boot.
5	**Delay settings**	The action can be scheduled to follow the condition after the set time value.
6	**Action header**	If the action is set, the description (white colored text) and the exact LW3 protocol expression (yellow colored text) can be seen. If the advanced mode was used the description is "Custom action".
7	**Action panel**	Different tools are available at the tabs to set the desired Action. The parameters and settings are displayed below the buttons.
8	**Action test**	The set action can be tested to see the working method in the practice.

5.11.2. Create or Modify an Event

Wizard Mode

The wizard mode lists the most common conditions and actions, so the user does not have to look for LW3 nodes and properties.

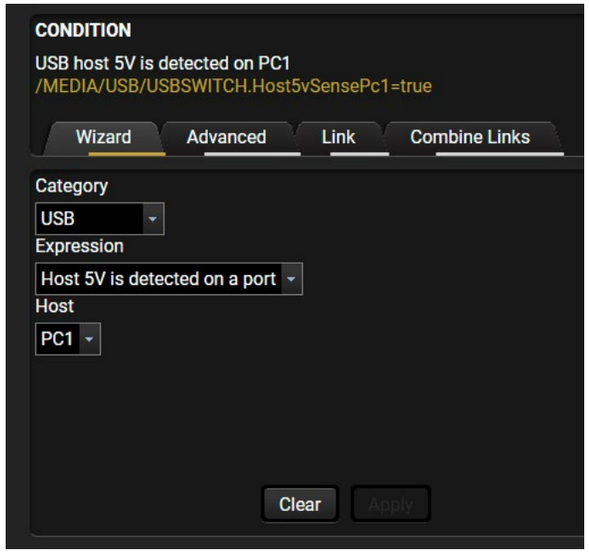
Step 1. Click on the **Edit** button of the desired Event; the **Event editor** is displayed.

Step 2. The wizard mode is displayed as default. Select the desired **Category** first (e.g. Audio or Video).

Step 3. Select the desired **Expression** from the drop-down menu. If any other parameter is necessary to set, it is going to be displayed.

Step 4. Press the **Apply** button to store the settings of the Condition.

INFO: This mode is also available for setting the **Action**.



Advanced Mode

The goal of this mode is the same as of the wizard: set the properties and methods for conditions and actions. The difference is the number of the available and usable properties and methods of the LW3 protocol. Advanced mode allows almost all of it.

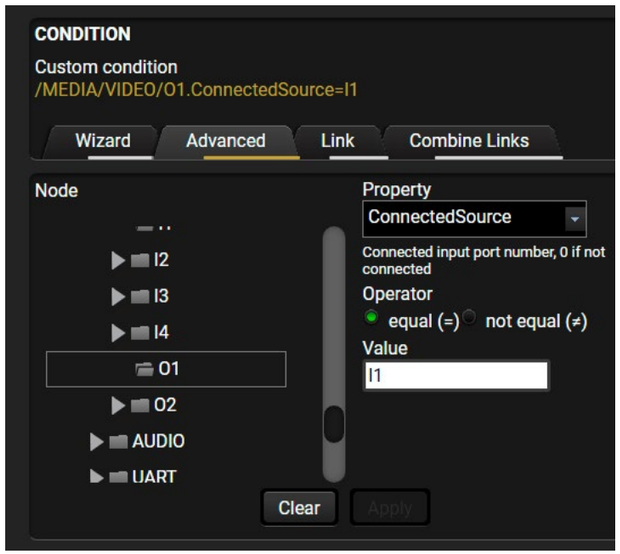
Step 1. Click on the **Edit** button of the desired Event; the **Event editor** is displayed.

Step 2. The wizard mode is the default, press the **Advanced** button. The LW3 protocol tree is displayed showing the list of the properties in the drop-down menu. Navigate to the desired node.

Step 3. Select the desired **Property** from the menu. The **manual** of the property is displayed below to help to select the necessary property and to set the value.

Step 4. Set the desired **value** and **operator**, then press the **Apply** button to store settings.

INFO: This mode is also available for setting the **Action**.



The Link Tool

The new interface allows creating more actions for the same condition. In that case, a condition can trigger more actions. To set such an Event, the Link tool has been introduced.

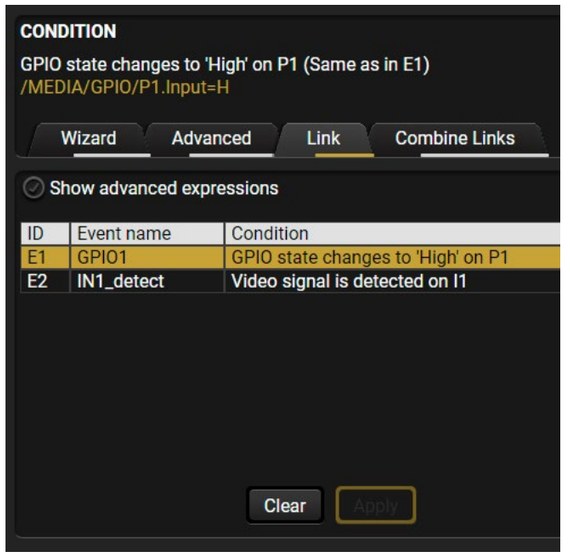
Step 1. Click on the **Edit** button of the desired Event; the **Event editor** is displayed.

Step 2. The wizard mode is displayed as default, press the **Link** button.

Step 3. All saved Events are analyzed and the **conditions** are listed (it takes a few seconds to finish). The **Show advanced expressions** option shows the exact path and set the value of the given property.

Step 4. Select the desired **Condition** and press the **Apply** button to store the settings.

INFO: This mode is also available for setting the **Action**.



Combine Links

The first generation of the Event Manager is able to sense a change (one condition), but in some cases that is not enough. The practical experience has shown there is a need to examine more conditions as follows: if one of the set conditions becomes true (while the other conditions are fulfilled), then the set Action is launched. The **Combine Links** tool allows setting these Conditions.

Follow the steps below:

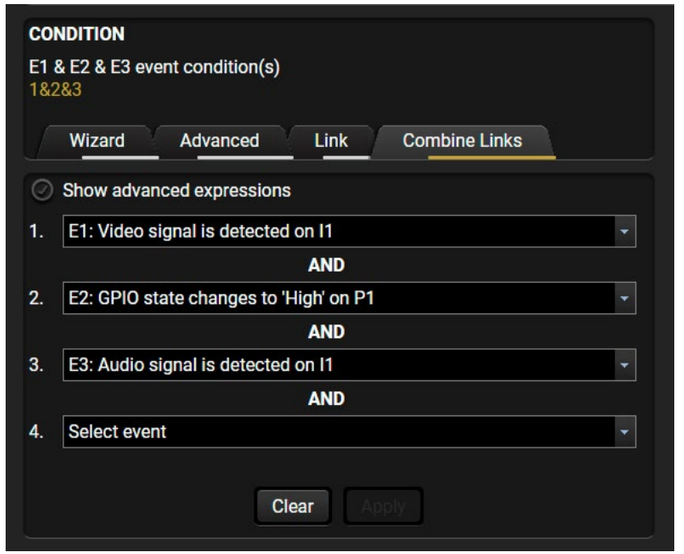
Step 1. Create the **Conditions** (up to four) in separate Events.

Step 2. Create a new Event and navigate to the **Combine Links** tab in the Editor.

Step 3. Select the desired **Conditions** in the **left** panel.

Step 4. Set the desired **Action** (and do not forget to **enable** the Events).

INFO: This mode is available for setting the **Condition only**.



Linking a Macro (Action)

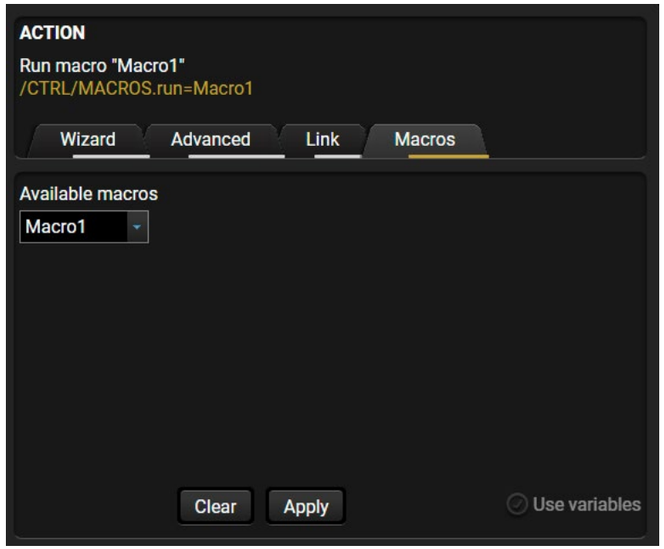
Macros stored in the device can be run as Actions. Thus a lot of commands can be run by using only one Event. The commands will be processed one-by-one after each other. *#macro*

Step 1. Click on the **Edit** button of the desired Event; the **Event editor** is displayed.

Step 2. The wizard mode is the default, press the **Macros** button in the **Action** panel.

Step 3. Select the desired **Macro** from the list then press the **Apply** button to store settings.

See more information about the Macro settings in the Macros section.



5.11.3. Special Tools and Accessories

The Name of the Event

The name of a port can be changed by typing the new name and clicking on the **Set** button. The following characters are allowed when naming: Letters (A-Z) and (a-z), numbers (0-9), special characters: hyphen (-), underscore (_), and space ( ).

Enable or Disable an Event

The set Event can be enabled or disabled in the Event list, or directly in the Event editor window by setting or removing the **tick mark** beside the name.

Testing the Condition

When the desired Condition is arranged, the setting can be tested. The Event list and the Event editor contains a small panel that shows an indicator if the set condition is detected (or triggered). The **detected** mark turns green for two seconds and the **Counter** is increased. The **Counter** is reset at boot or can be reset manually by the button in Event editor.

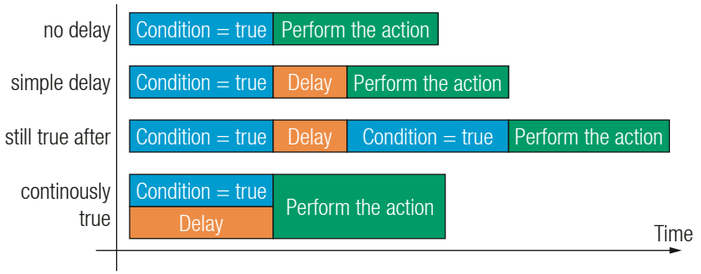
Testing the Action

The method is the same as testing the Condition, but in this case, the Action can be triggered manually by pressing the **Test** button.

TIPS AND TRICKS: The Test button is also placed on the Action panel in the Event list. Thus you can check the Actions without opening the Event editor.

Delay the Action

In most cases the Action is performed immediately after the Condition is detected. But sometimes a delay is necessary between the Condition and the Action. Therefore, the new Event Manager contains the Delay panel, which offers that feature with the settings below:



- **No delay**: when the Condition is detected, the Action is launched.
- **Simple delay**: when the Condition is detected, the Action is launched after the set time interval.
- **Still true after**: when the Condition is detected, the Action is launched after the set time interval only if the Condition still exists.
- **Continuously true**: when the Condition is detected, the Action is launched after the set time interval only if the Condition has been existing continuously.

TIPS AND TRICKS: **Show advanced expressions** option can be used to get the path or value of a property but just the expression is displayed. The option is available in the Event list window and also in the Editor.

Variables

The variables and the tools (shown in the Control/Variables tab) can be used in the Event Manager.

Condition Wizard *#variables*

The desired variable can be checked if its value is changed to a specific value.

Action Wizard

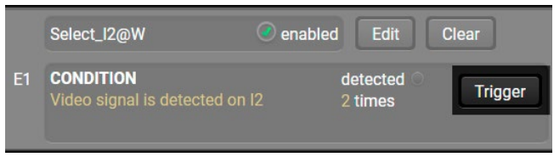
The value of a variable can be set/changed using the same methods as in the Control/Variables tab:

- Setting the exact value
- Increasing the value with/without limits
- Converting the value (e.g. interval change)
- Scanning and storing, or reformatting a property/parameter

If the **Use variables** option is enabled, you can link a variable by the **$** character. If you do so (e.g. $1), the device will handle it as the V1 variable. You can send the value of the variable e.g. as a TCP message.

Condition Triggering

This improvement works as if a condition is detected. When a complex control system is built, a Condition may trigger numerous Actions. A typical example is when a system is powered on and the 'ready-to-use' state has to be loaded. In this case, there could be many actions that are based on the same condition. In order to reduce the number of the commands, you can trigger one 'key' condition, which could start the whole process.



5.11.4. Clear One or More Event(s)

Clear an Event

Press the **Clear** button in the Event list or in the header section in the Event editor.

Clear all Events

When all the Events must be cleared, press the **Load factory defaults** button above the Event list. You will be prompted to confirm the process.

ATTENTION: Clicking on Load factory defaults button means the configuration of the buttons are also deleted, because the conditions and the actions of the buttons are saved as events.

5.11.5. Export and Import Events

The feature allows saving all the Events. The backup file can be uploaded to another MMX4x2 series matrix.

Export all the Events

Step 1. Press the **Export** button above the Event list.

Step 2. The Save as dialog box will appear. Set the desired folder and file name, then press the **Save** button.

The generated file is a simple text file, which contains LW3 protocol commands. The file can be viewed by a simple text editor, e.g. Notepad.

ATTENTION: Editing the file is recommended only for expert users.

Import all the Events

Step 1. Press the **Import** button above the Event list.

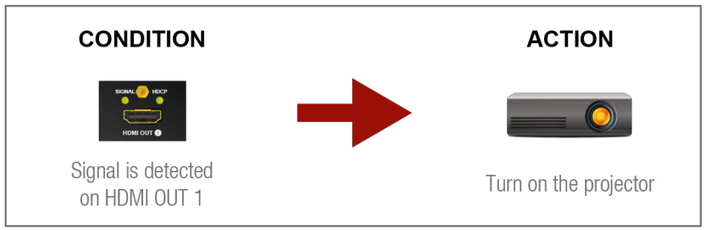
Step 2. The Open dialog box will appear. Select the desired folder and file, then press the **Open** button.

5.11.6. Event Creating - Example

The following example shows you on a real-life situation how to set up an Event.

The Concept

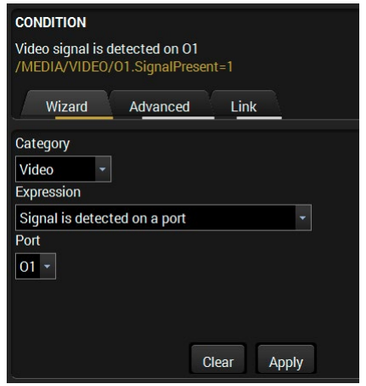
The MMX4x2-HDMI matrix is connected to a projector by the HDMI out 1 port. The matrix is also connected to the projector by the RS-232 port and can send commands via the serial line. The task is to turn on the projector when signal is detected on the HDMI out 1 port.



RS-232 Settings

Make sure that the serial line is established between the matrix and the projector. Check that the RS-232 settings of the matrix is set exactly the same as required for the projector: baud rate, data bits, parity, stop bits. The matrix needs to be set to: Control protocol: LW3; and RS-232 mode: Control. See the relevant LDC settings in the RS-232 section.

Setting the Event



You can create the Event in the Wizard in a few simple steps:

Step 1. Set the condition.

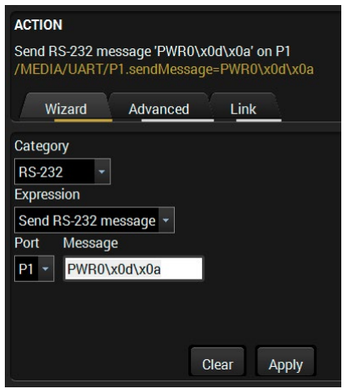
Select the required parameters to set the condition:

- **Category**: Video;
- **Expression**: Signal is detected on a port;
- **Port**: O1.

Click on the **Apply** button to complete the procedure. When it is done, the condition appears on the upper side in textual and LW3 command format as well.

Step 2. Set the action.

If the condition is fulfilled, the following action needs to be launched: the receiver sends a command to the projector over the serial line:



- **Power on** - the required command that is accepted by the projector: PWR0<CR><LF>

For this instance the command has to be closed with the <CR><LF> characters, so they need to be escaped. You can use the following format for escaping:

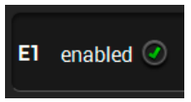
$$<command_1><\x0d\x0a><command_2><\x0d\x0a>...$$
$$...<command_n><\x0d\x0a>$$

In the current case the command is: PWR0\x0d\x0a

Select the required parameters to set the action:

- **Category**: RS-232;
- **Expression**: Send RS-232 message;
- **Port**: P1;
- **Message**: PWR0\x0d\x0a

Step 3. Enable the Event.

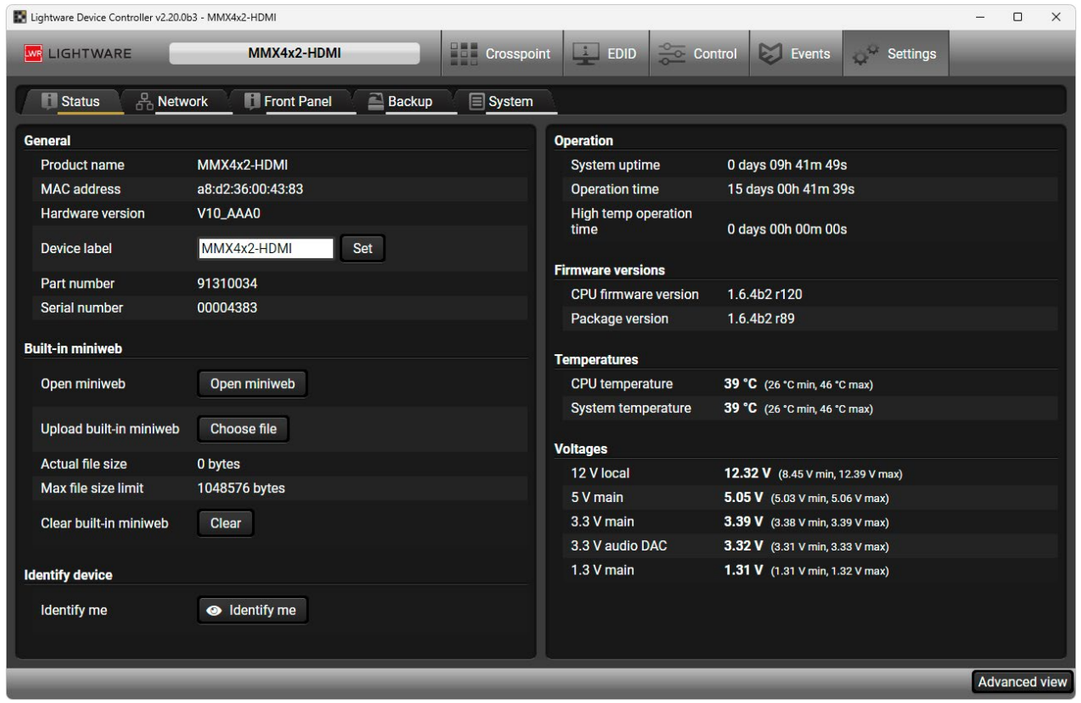


Select the **E1 enabled** tick in upper left corner to set the Event as launched.

INFO: If you do not find the required category/expression/etc that you need, choose the Advanced mode in the Wizard where the entire LW3 structure tree is available. For example instead of signal detection, you can set a specified resolution or color range either as a condition.

5.12. Settings Menu

5.12.1. Status



Status tab in Settings menu

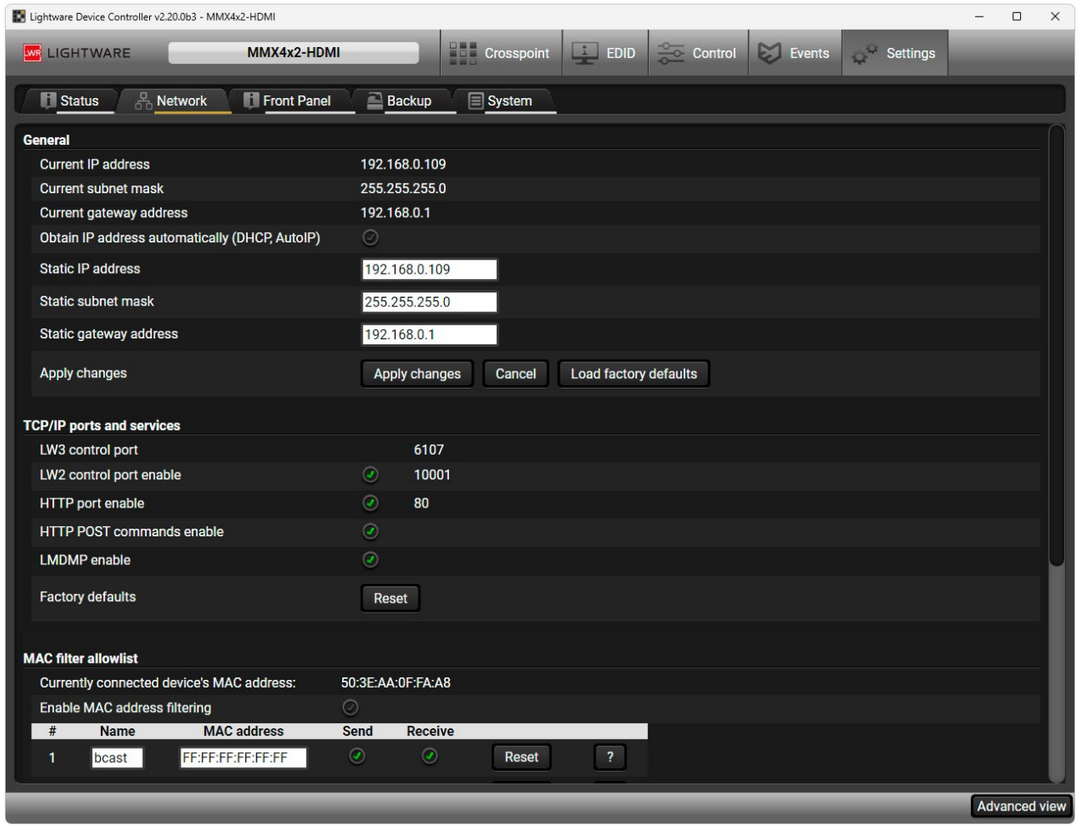
The most important hardware and software related information can be found on this tab: hardware and firmware version, serial numbers, temperatures, operation time, and voltage information. Device label can be changed to a unique description by the **Set** button.

Please note that the Miniweb-related descriptions can be found in The Built-in Miniweb section.

If you click on the **Identify me** button, the status and crosspoint LEDs will blink in green for 10 seconds. The feature helps to identify the device itself in the rack shelf.

#devicelabel #label #producttype #firmwareversion #identifyme #status #serialnumber

5.12.2. Network



Network tab in Settings menu

General

IP address and DHCP settings can be set on this tab. Always press the **Apply settings** button to save changes. Factory defaults settings can be recalled with a dedicated button.

TCP/IP Ports and Services

The IP Port Block feature is an additional protection for the Cleartext login, see the Cleartext Login (Login Settings) section. There are TCP/IP ports in Lightware devices that are not protected by the login, so you can disable them if necessary. For example, due to the working method of the LW2 communication, the Cleartext login does not provide protection when LW2 command is sent to the device, that is why the TCP port no.10001 shall be blocked manually. *#dhcp #ipaddress #network #portblock*

MAC Filter Allowlist

Another level of the security is the MAC Filtering tool. You can create a list of network devices based on the MAC address that are allowed: *#macfilter*

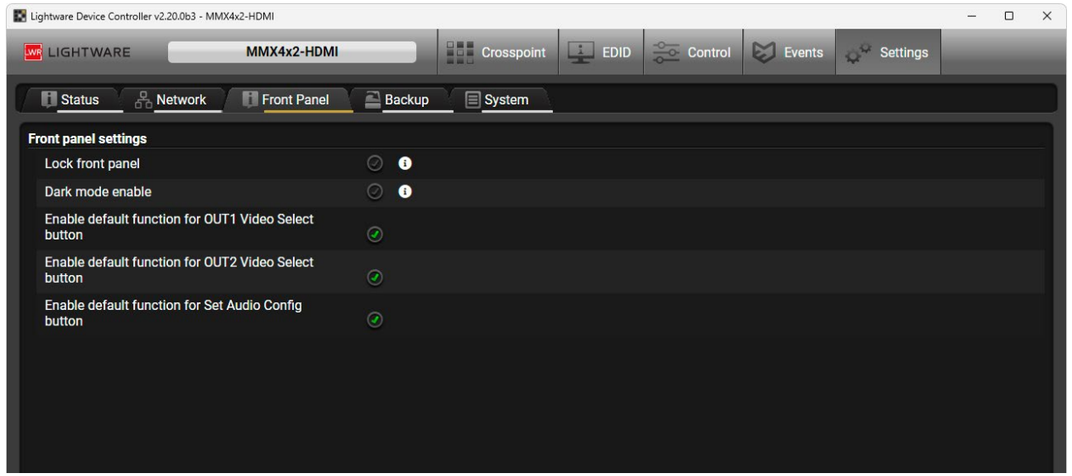
- Controlling the device (Send option), or
- Querying parameters (Receive option) to/from the Lightware device.

Do not forget to press the **Apply changes** button to store the new settings.

ATTENTION: The first three lines (as seen in the picture) are factory default values and they are necessary for the proper working.

ATTENTION: If the device is installed in a network where it gets IP address from a DHCP server and you plan to use the MAC filtering, make sure the MAC address of the DHCP server is added to the whitelist. Otherwise, the device will not get an IP address and will be unreachable.

5.12.3. Front Panel



Front panel tab in the Settings menu

Front Panel Settings

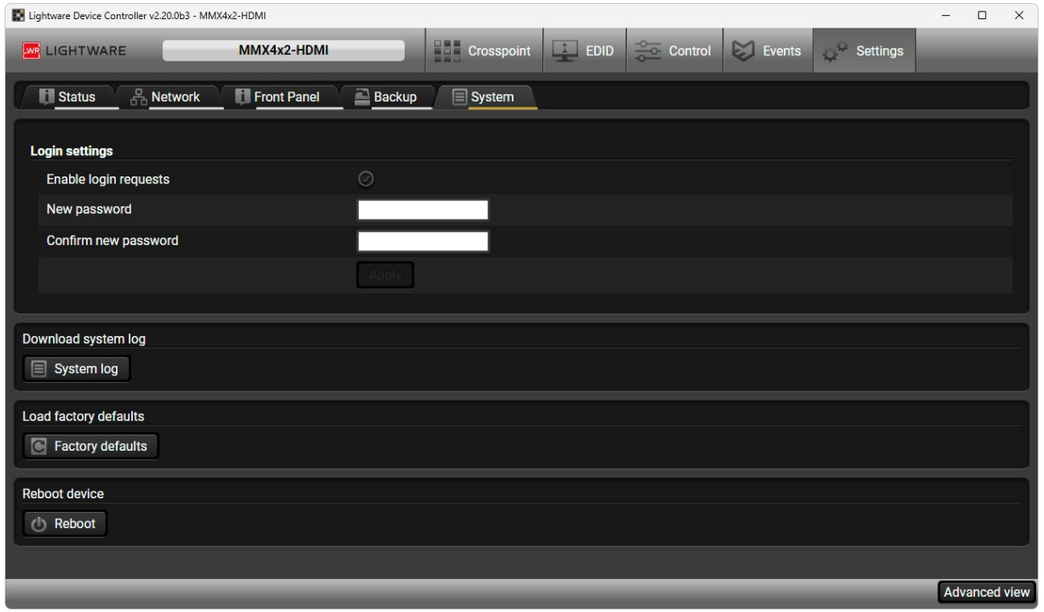
- **Lock front panel:** When this option is enabled, the front panel buttons are locked and they can be unlocked by disabling this option, pressing the **OUT2 Video select** and the **Set audio config** buttons together or with LW3 protocol command.
- **Dark mode enable:** When Dark mode is enabled, all LEDs on the unit are switched off after 1 minute (by default) if no buttons are pressed. Pressing any button brings back the status info on the LEDs without performing the function of the button itself. *#darkmode*

The further options can be used to set the default function for the buttons or disable and use them for another function by the Event Manager.

5.12.4. Backup

Details about this function can be found in the Configuration Cloning (Backup Tab) section.

5.12.5. System



System tab in Settings menu

Cleartext Login (Login Settings)

DIFFERENCE: This feature is available only from FW package v1.6.0b19.

This cleartext login tool allows setting a password for login, thus the device will not accept any command coming from a control interface (RS-232, Ethernet, etc...) without login. The device will be visible in the Device Discovery window (as the device type and the serial number can be queried without login), but connection can be established only after successful login. The login is valid until a TCP socket break in case of Ethernet connection. *#login*

INFO: The login password is erased and the login is disabled when restoring the factory default values.

Further functions

- **Download system log** - saving the file of the device.
- **Load factory defaults** - recalling factory defaults settings and values. All factory default settings are listed in the Factory Default Settings section.
- **Reboot** - rebooting the system. *#factory #log #systemlog #reboot #restart*

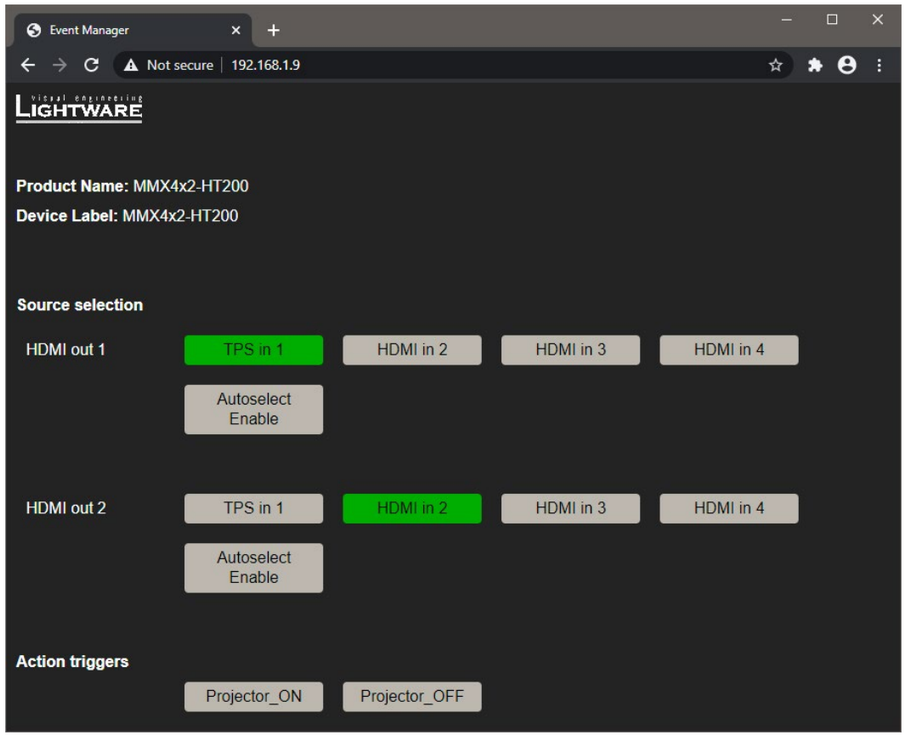
5.13. The Built-in Miniweb

DEFINITION: The Miniweb is a dedicated location in the memory where an HTML file can be uploaded to. If the `<IP_address>/index.html` page is opened in a web browser the file is displayed.

ATTENTION: The Miniweb is available from firmware package v1.2.0. The default control page can be installed in the device during the first firmware update process by the user if the necessary parameter is enabled. See the Step 3. Check the update parameters. section.

The default control page allows the following: *#builtinweb #miniweb #web*

- **Source selection:** This block can be used to select an input or enable/disable the Autoselect remotely e.g. from a mobile device.
- **Action triggers:** The action trigger buttons can be used to perform a configured Event Action without waiting for the condition to occur. This can be done remotely by a mobile device, too.

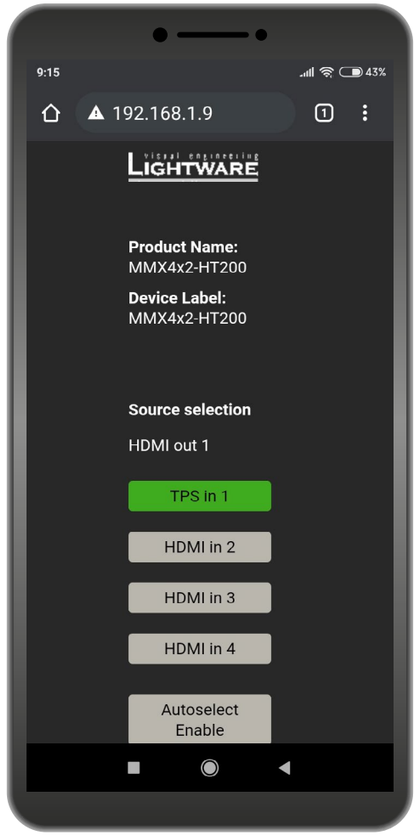


The Control page displayed in a desktop browser (with action trigger buttons)

5.13.1. Opening the Miniweb

The Miniweb is available by:

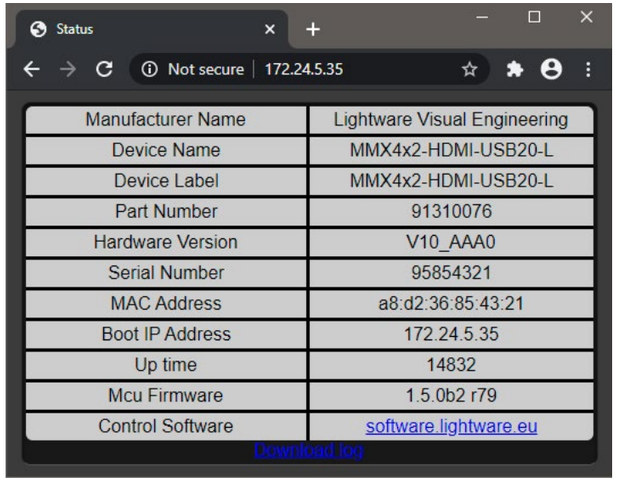
- Opening the **web browser** and typing the **IP address** of the desired device in the address line,
- Launching the **LDC**, connecting to the device, navigating to **Settings/Status** and pressing the **Open miniweb** button.
- The hostname can be used instead of the IP address; see the Setting the Hostname section.



The Control page displayed in a smartphone browser

5.13.2. The Default Status Page

If there is no control page uploaded, the default status page will be displayed (which is also available by opening the **<IP_address>/status.html** address). This page works without login as well.



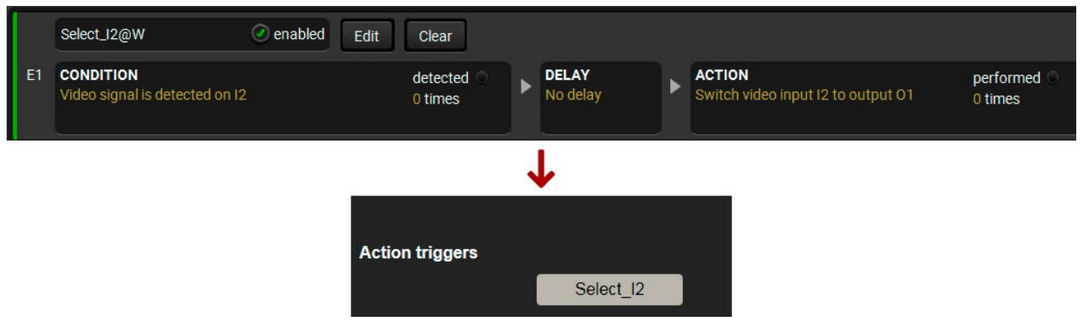
The factory default status page (status.html)

5.13.3. Miniweb Customization

The buttons of **Action triggers** section are linked to Actions of certain Events in the Event Manager. These buttons are displayed **only** for specific events:

- Any Event that does **not** have the **@W** suffix in its name will **not** be displayed as a trigger button.
- The displayed trigger buttons will get a **text label** with the **event name** minus the suffix.

To add the desired Action as a button, **append the name** of the desired Event with the **@W** characters - see below (type uppercase for 'W' as it is case-sensitive):

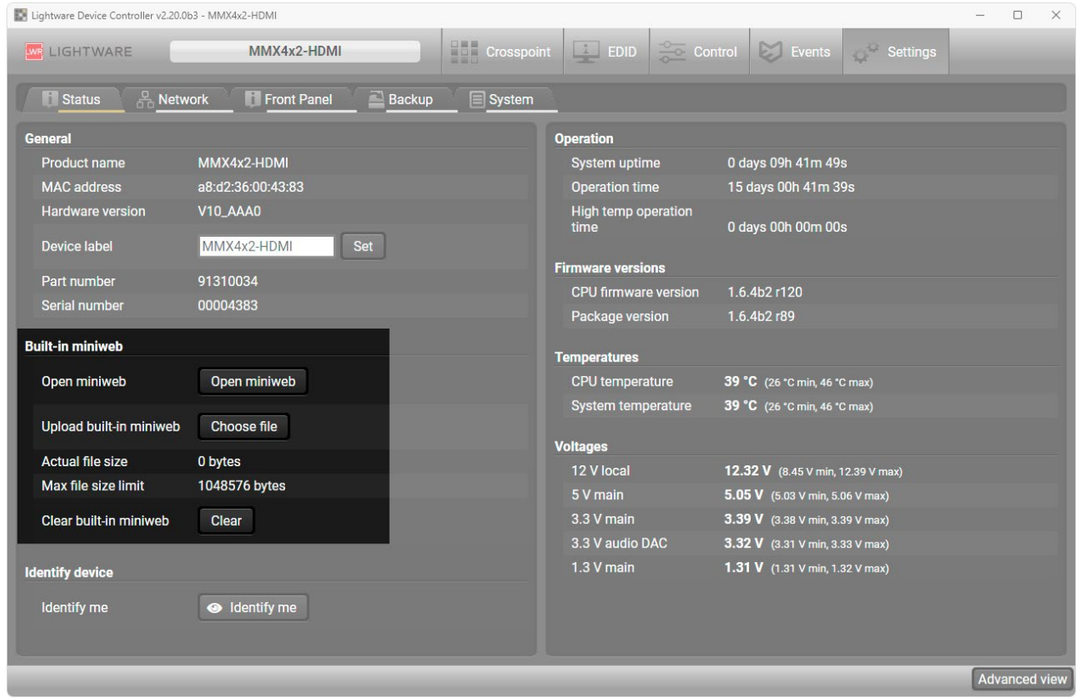


Action trigger button added in the Event Manager and displayed in the Control page

Customized HTML

The default control page can be replaced in the LDC; navigate to the **Settings/Status** page. Custom HTML file can be uploaded by pressing the **Choose file** button. Pay attention to the size of the HTML file. Only one file is allowed and the maximum file size is 10 KB (in case of SW4-TPS-TX240-Plus it's 80 KB).

Press the **Clear** button to remove the control page. The default control page can be restored during a firmware update process, see the Step 3. Check the update parameters. section.

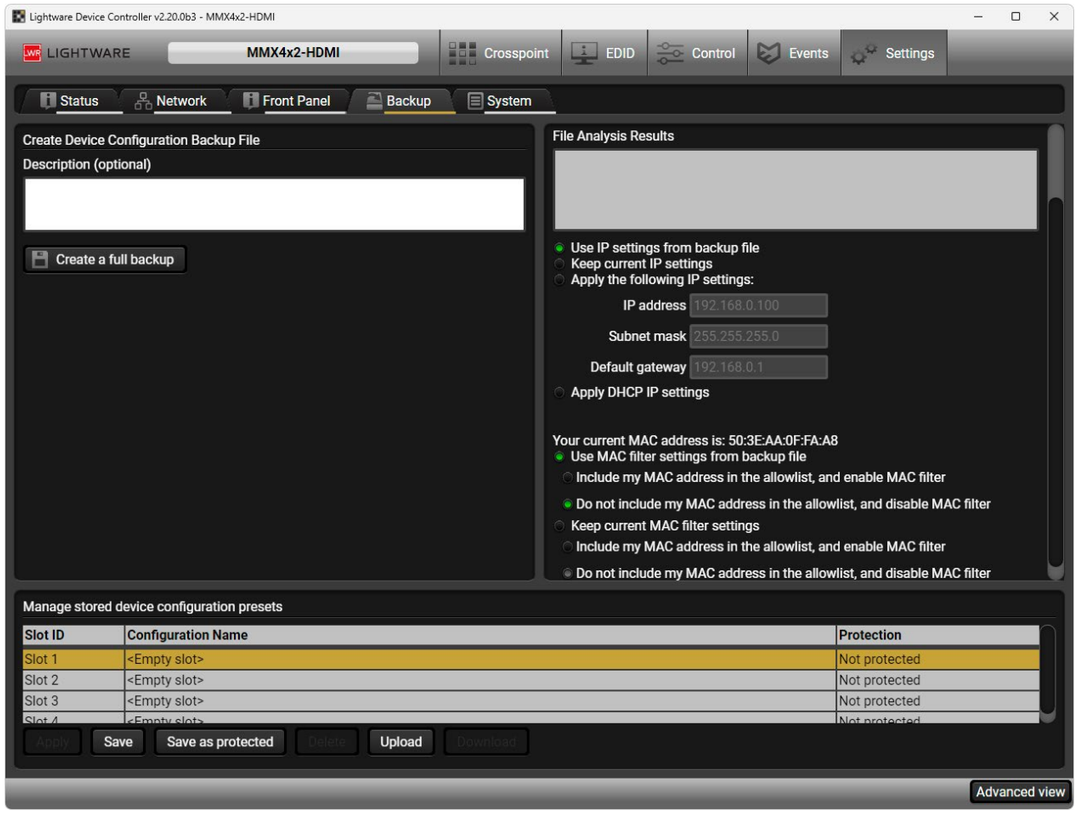


The Built-in miniweb section in LDC

5.14. Configuration Cloning (Backup Tab)

The configuration cloning of Lightware LW3 devices is a simple method that eliminates the need to repeatedly configure certain devices to have identical (non-factory) settings. If the devices are installed in the same type of system multiple times, then it is enough to set up only one device to fit the user's needs and then copy those settings to the others, thus saving time and resources. *#backup* *#configurationcloning*

ATTENTION: Macros cannot be saved into the backup file. If you have macros stored in a Configuration slot, download it separately and upload it in the target device.



Backup tab

5.14.1. Cloning Steps in a Nutshell

Installing multiple devices with the same customized configuration settings can be done in a few easy steps:

Step 1. Configure one device with all your desired settings with the LDC software.

Step 2. Backup the full configuration file to your computer.

Step 3. If needed, make some modifications to the configuration file using a text editor (e.g. Notepad). E.g. modifying the static IP address is needed when DHCP is not used.

Step 4. Connect to the other device that needs to be configured and upload (restore) your configuration file.

Step 5. Done! You can have as many totally identical, customized devices as you like.

ATTENTION: Macros cannot be saved into the backup file. If you have macros stored in a Configuration slot, download it separately and upload it in the target device.

5.14.2. Save the Settings of the Device (Backup)

Step 1. Apply the desired settings in the transmitter (port parameters, crosspoint, etc.)

Step 2. Select the **Settings** / **Backup** tab from the menu.

Step 3. Write a short **description** in the text box on the left (optional).

Step 4. Press the **Create a full backup** button. You will be prompted to save the file to the computer. The default file name is the following:

```
BACKUP_<DEVICE TYPE>_SN<SERIAL NUMBER>.LW3
```

Step 5. Set the desired **file name**, select the folder and **save** the file.

TIPS AND TRICKS: Using the exact product type in the filename is recommended, since it makes the file usage more comfortable.

About the Backup File

The backup file is a simple text file, which contains LW3 protocol commands. The first line is the description, and the further lines are the commands that will be executed during the restoration. The file can be viewed (and/or edited) by a simple text editor, e.g. Notepad.

ATTENTION: Editing the command lines is recommended for expert users only.

See the entire list of saved data in the Content of Backup File section.

5.14.3. Upload the Settings to a Device (Restore)

WARNING! Please note that the settings will be permanently overwritten with the restored parameters in the device. Withdrawal is not possible.

ATTENTION: The cloning can be successful if the backup file is downloaded from the same type of source device as the destination device.

The Restoring Process

Step 1. Select the **Settings** / **Backup** tab from the menu.

Step 2. Click on the **Choose file** button on the right panel and **browse** the desired file.

Step 3. The file is checked and the result will be displayed in the textbox below. If the file is correct, the settings can be restored.

Step 4. Choose the **IP settings** that you want to use after backup. You can apply settings from the backup file, keep actual settings, set it manually in a dialog box or apply DHCP.

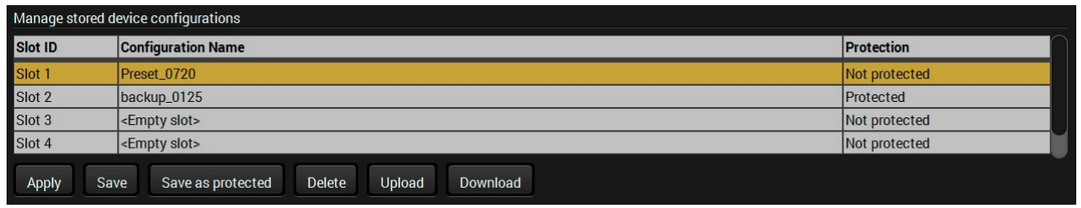
Step 5. Select the desired **MAC filter settings** to be applied in the device. See more information about this feature in the MAC Filter Allowlist section.

Step 6. Press the **Start restore process** button and click on the **Yes** button when asked.

Step 7. Reboot the device to apply the network settings after finishing.

5.14.4. Create and Restore Backups from the Device Memory

The device can store configurations in its own memory, four slots are available for this purpose.



You can save the configuration to the desired slot:

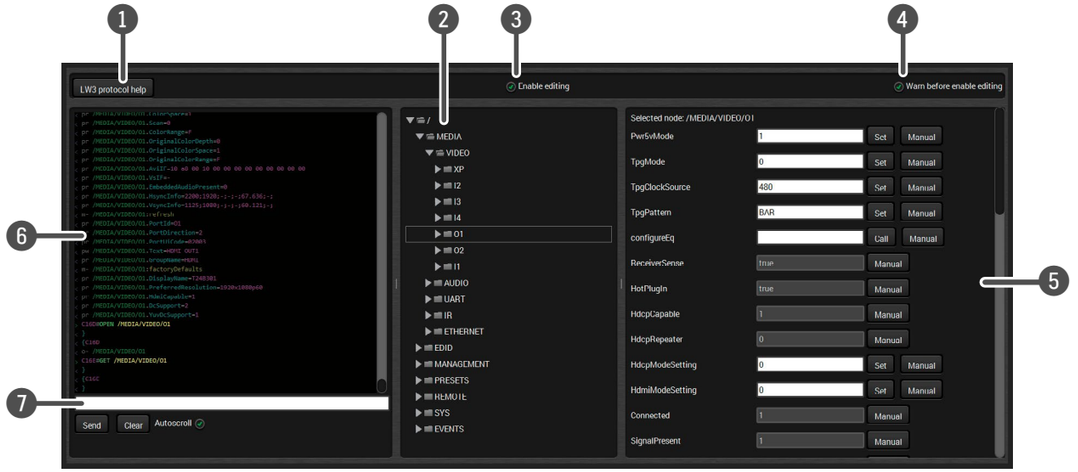
- **without protection:** it can be easily applied/deleted, or
- **with protection:** it may request a password to apply or delete the configuration.

Apply	Loading the selected configuration	Delete	Deleting the selected configuration
Save	Saving the current configuration to the selected slot without protection	Upload	Loading a configuration from a file to the selected slot
Save as protected	Saving the current configuration to the selected slot with a password	Download	Saving the selected configuration as a file

The presets can be used for the macros as well, please see the Macros section.

WARNING! Loading factory default settings will erase all presets in the device memory!

5.15. Advanced View Window



1	**LW3 protocol help**	Pushing the button opens a help window that describes the most important information about LW3 protocol commands in HTML format.
2	**Protocol tree**	LW3 protocol tree; select an item to see its content.
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	**Warning mode**	If this is checked, a warning window pops up when you enable Edit mode.
5	**Node list** *#advancedview* *#terminal*	Correspondent parameters and nodes are shown that are connected to the selected item in the protocol tree. The commands typed in these fields are escaped automatically **Manual** button: Manual (short description) of the node can be called and displayed in the terminal window. **Set** button: Saves the value/parameter typed in the textbox. **Call** button: Calls the method, e.g. reloads factory default settings.
6	**Terminal window**	Commands and responses with time and date are listed in this window. The sent command starts with '>' character, the received response starts with '<' character. The color of each item depends on the type of the command and the response. 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.
7	**Command line**	The commands typed in this line are not escaped automatically. See more information in the Escaping section.

6

LW2 Programmers' Reference

The device can be controlled through a reduced command set of LW2 protocol commands to ensure the compatibility with other Lightware products. The supported LW2 commands are described in this chapter.

- Protocol Description **76**
- Instructions for the Terminal Application Usage **76**
- General LW2 Commands **77**
- AV Port Settings **79**
- Network Configuration **82**
- Serial Port Configuration **83**
- GPIO Port Configuration **84**
- LW2 Commands – Quick Summary **85**

6.1. Protocol Description

The protocol description hereinafter stands for Lightware protocol 2. The commands below can be sent to the device in RAW format via the TCP/IP port no. 10001.

The receiver accepts commands surrounded by curly brackets - { } - and responds data surrounded by round brackets - ( ) - only if a command was successfully executed. All input commands are converted to uppercase, but response commands can contain upper and lower case letters as well.

Legend for Control Commands

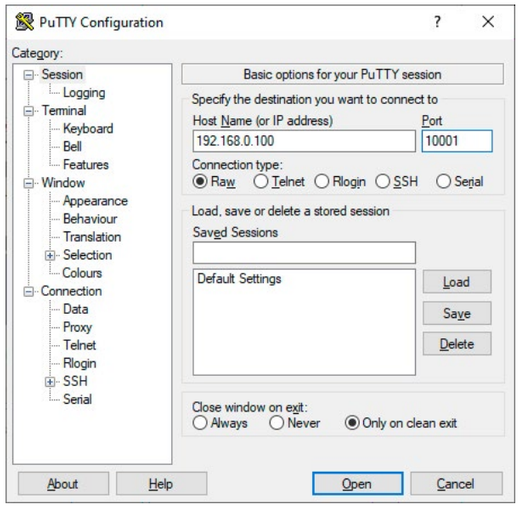
Format	Explanation
<in>	Input number in 1- or 2-digit ASCII format (01, 5, 07, 16, etc.)
<out>	Output number in 1- or 2-digit ASCII format
<in/out>	input or output port number in 1- or 2-digit ASCII format *
<in2>	Input number in 2-digit ASCII format (01, 02, 10, 12 etc.)
<out2>	Output number in 2-digit ASCII format (01, 02, 10, 12 etc.)
<in2/out2>	input or output number in 2-digit ASCII format*
<loc>	Location number in 1-, 2- or 3-digit ASCII format
<id>	id number in 1- or 2-digit ASCII format
<id2>	id number in 2-digit ASCII format
CrLf	Carriage return, Line feed (0x0D, 0x0A)
·	Space character (0x20)
⇉	Each command issued by the controller
←	Each response received from the router

* The command has the same arguments on the input ports and the output port, as well.

6.2. Instructions for the Terminal Application Usage

Terminal Application

The LW2 protocol commands can be applied to the receiver using a terminal application. You need to install one of them on your control device, for example **Putty** or **CLI**. *#terminal*



Establishing Connection

Follow the steps for establishing connection to the receiver:

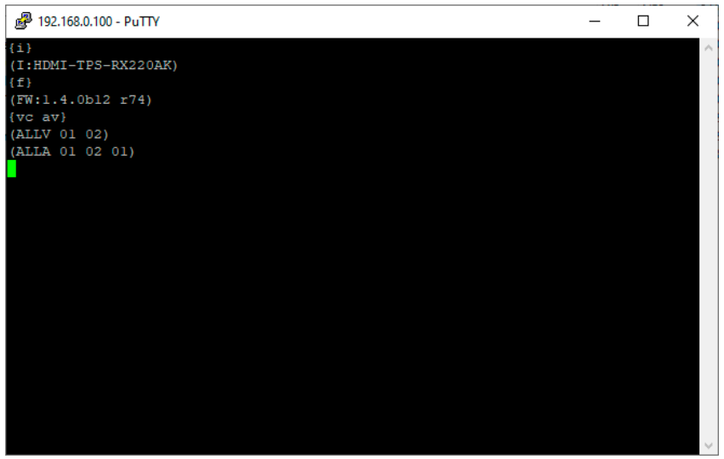
Step 1. Connect the receiver to a LAN over Ethernet.

Step 2. Open the terminal application (e.g. Putty).

Step 3. Add the **IP address** of the device (default: 192.168.0.100) and the **port number (10001)**.

Step 4. Select the **Raw** connection type, and open the connection.

Once the terminal window is opened, you can enter the LW2 protocol commands, which are listed in the following sections.



LW2 protocol command communication in a terminal window

6.3. General LW2 Commands

6.3.1. Querying the Supported Commands

The LW2 commands supported by the device can be queried by this command.

Command and Response *#producttype*

→ {LCMD}
← (LCMD# <command>: <description>)CrLf
← ...
← (LCMD END)CrLf

Example

→ {lcmd}
← (LCMD# LCMD: List all commands)
← (LCMD# PING: Always response PONG)
← (LCMD# CT: Compile time)
← ...
← (LCMD END)

INFO: The response is longer, not all the lines can be seen in the example.

6.3.2. Querying the Product Type

The device responds its name.

Command and Response *#producttype*

→ {i}
← (I:<PRODUCT_TYPE>)CrLf

Example

→ {i}
← (I:MMX4x2-HT200)

6.3.3. Querying the Device Label

The response shows the device label, which is a read-only parameter in LW2, but it can be changed by an LW3 command, see the Setting the Device Label section.

Command and Response

→ {LABEL}
← (LABEL=<DEVICE_LABEL>)CrLf

Example

→ {label}
← (LABEL=MMX_OFFICE)

6.3.4. Querying the Control Protocol

The device can be controlled with different control protocols. This command queries the active protocol of the currently used control interface.

Command and Response *#protocol*

→ {P_?}
← (CURRENT·PROTOCOL·=·#<protocol>)CrLf

Example

→ {p_?}
← (CURRENT PROTOCOL = #1)

'#1' means the device communicates with LW2 protocol.

6.3.5. Querying the Firmware Version of the CPU

View the CPU firmware version.

Command and Response *#firmwareversion*

→ {F}
← (FW:<FW_VER><s>)CrLf

Example

→ {f}
← (FW:1.6.0b13 r99)

<FW_VER> is the firmware version. It is followed by <s> string, which may indicate special versions.

6.3.6. Viewing Firmware for All Controllers

Shows the firmware versions of all installed controllers.

Command and Response

→ {FC}
← (CF·<DESC>)CrLf
← (CF·<DESC>)CrLf
← ...
← (CF END)CrLf

Example

→ {fc}
← (CF MMX4x2-HT200 1.3.4b3)
← (CF END)

The device has one control panel.

6.3.7. Viewing Installed Board

Shows the hardware name and revision of the installed cards.

Command and Response

→ {IS}
← (SL#·0·<MB_DESC>)CrLf
← (SL·END)CrLf

Example

→ {is}
← (SL# 0 MMX4x2-HT200 V12_DAA0)
← (SL END)

The device reports its motherboard (slot 0).

6.3.8. Connection Test

Simple test to see if the connection is established successfully.

Command and Response

→ {PING}
← (PONG!)CrLf

Example

→ {ping}
← (PONG!)

6.3.9. Restarting the Device

The device can be restarted without unplugging power.

Command and Response *#reboot #restart*

→ {RST}
←

Example

→ {rst}
←

The device reboots; no response is sent in this case.

6.3.10. Compile Time

Returns the date when the CPU firmware was compiled.

Command and Response

→ {CT}
← (Complied: <DATE&TIME>)CrLf

Example

→ {ct}
← (Compiled: Sep 30 2016 14:07:56)

6.3.11. Querying the Health Status

Internal voltages and measured temperature values are shown.

Command and Response *#status*

→ {ST}
← (ST·<DESC>)CrLf

Example

→ {st}
← (ST CPU 12.16V 5.03V 3.30V 3.33V 3.37V 1.30V 1.86V 1.00V 53.22C 53.26C)

6.3.12. Querying the Serial Number

The device responds its 8-digit serial number; see the structure in the About the Serial Number section.

Command and Response *#serialnumber*

→ {S}
← (SN:<SERIAL_N>)CrLf

Example

→ {s}
← (SN:5A004254)

6.3.13. Restoring the Factory Default Settings

Settings can be reset to factory default values as follows:

Command and Response *#factory*

→ {FACTORY=ALL}
← (FACTORY ALL…)CrLf

Example

→ {factory=all}
← (FACTORY ALL…).

All settings and parameters are reset to factory default, see the table in the Factory Default Settings section.

6.4. AV Port Settings

6.4.1. Switching an Input to the Outputs

Switching an input <in> to output <out>. The following commands with A, V, AV parameter value can take effect in multiple layers, according to their parameters. Depending on 'A' or 'V,' it can change only the Audio or only the Video layer; or 'AV' changes both. *#crosspoint* *#switch*

Command and Response

→ {<in>@<out>•<layer>}
← (O<out2>•I<in2>•<layer>)CrLf

Parameters

Parameter	Parameter description	Value	Value description
<layer>	Signal type of the layer	**A**	audio layer
		V	video layer
		AV	audio & video layer
<out>	Output port	**O1..O2**	
<in>	Input port	**I1..I4**	
		0	Using the '0' (zero) value, the input will be disconnected and no signal will appear on the output.

INFO: The <layer> parameter usually can be skipped for legacy purposes. In this case, the devices change all (Video & Audio) layers, but using status commands it displays information about only the Video layer. Please use the AV option when available.

Example 1

→ {2@1 AV}
← (O01 I02 AV)

I2 audio and I2 video input ports are switched to O1 output port.

Example 2

→ {0@1}
← (O01 I00)

ATTENTION: The response of this command does not show if the output is muted. To check the mute status a separate query has to be used like {VC}.

6.4.2. Muting an Output

Mute the <out> output. The output signal is turned off.

Command and Response *#mute* *#lock* *#unmute* *#unlock*

→ {#<out>•<layer>}
← (1MT<out2>•<layer>)CrLf

Example

→ {#01 A}
← (1MT01 A)

ATTENTION: Muting does not change the state of the crosspoint, but disables the output itself. This way the last connection can be easily restored with an unmute command. Switching a muted output does not unmute the output.

6.4.3. Unmuting an Output

Unmute the <out> output.

Command and Response

→ {+<out>•<layer>}
← (0MT<out2>•<layer>)CrLf

Example

→ {+01 V}
← (0MT01 V)

INFO: Unmuting an output makes the previous connection active, as the crosspoint state has not been changed by the muting command, only the output was disabled.

6.4.4. Locking an Output

Locking an output port. The output's state cannot be changed until unlocking.

Command and Response

→ {#><out>•<layer>}
← (1LO<out²>•<layer>)CrLf

Example

→ {#>01 A}
← (1LO01 A)

6.4.5. Unlocking an Output

Unlocking an output port. The connection on the output can be changed.

Command and Response

→ {+<<out>•<layer>}
← (0LO<out2>•<layer>)CrLf

Example

→ {+<01 V}
← (0LO01 V)

INFO: The device issues the response above regardless of the previous state of the output (whether it was locked or unlocked).

6.4.6. Viewing the Connection State on the Output

Viewing the crosspoint state of the device; showing the input port numbers connected to the outputs.

Command and Response *#crosspoint #switch*

→ {VC•<layer>}
← (ALL<layer>•<O01>•<O02>)CrLf

Parameters

O01 shows the corresponding output's connection state.

Parameter	Parameter description	Value	Value description
<layer>	Signal type of the layer	**A**	audio layer
		V	video layer
		AV	audio & video layer

State letters

Letter	State	Example
L	Output is locked	L01
M	Output is muted	M01
U	Output is locked and muted	U01

Example

→ {VC AV}
← (ALLV 01 02)
← (ALLA 02 02 02)

I1 video input port is connected to the O1 video output port; I2 video input port is connected to the O2 video output port; I2 audio input port is connected to all the audio output ports (O1, O2, O3).

6.4.7. Viewing the Crosspoint Size

Shows the physical crosspoint size.

Command and Response

→ {getsize•<layer>}
← (SIZE=<size>•<layer>)CrLf

Parameters

Parameter	Parameter description	Value	Value description
<size>	Crosspoint size	<number_of_inputs>**x**<number_of _outputs>	
<layer>	Signal type of the layer	**A**	audio layer
		V	video layer
		AV	audio & video layer

Example

→ {GETSIZE AV}
← (SIZE=4x2 V)
← (SIZE=3x3 A)

The device has a video crosspoint (4 inputs and 2 outputs) and an audio crosspoint (3 inputs and 3 outputs).

6.4.8. Setting the Video Autoselect Mode

The autoselect mode of the video outputs can be changed.

Command and Response *#autoselect*

→ {AS_V<out>=<state>;<mode>}
← (AS_V<out>=<state>;<mode>)CrLf

Parameters

Parameter	Parameter description	Value	Value description
<state>	Showing the Autoselect state	**E**	autoselect is enabled
		D	autoselect is disabled
<mode>	The autoselect mode setting	**F**	First detect mode
		L	Last detect mode
		P	Priority detect mode

The output port numbers are listed in Input/Output Port Numbering section.

Example

→ {as_v1=E;P}
← (AS_V1=E;P)
← (AS_V2=E;P)

The Autoselect mode of video output 1 and output 2 is enabled and set to Priority mode.

INFO: The Autoselect mode can be queried by typing the {as_v<out>=?} command.

6.4.9. Setting the Audio Autoselect Mode

The autoselect mode of the audio outputs can be changed.

Command and Response

→ {AS_A<out>=<state>;<mode>}
← (AS_A<out>=<state>;<mode>)CrLf

Parameters

See the previous section.

Example

→ {as_a1=E;P}
← (AS_A1=E;P)
← (AS_A2=E;P)

The Autoselect mode of audio output 1 and output 2 is enabled and set to Priority mode.

INFO: The Autoselect mode can be queried by typing the {as_a<out>=?} command.

6.4.10. Setting the Video Input Priorities

The settings of video input priority can be changed as follows.

Command and Response

→ {PRIO_V<out>=<in1_prio>;<in2_prio>;...;<inn_prio>}
← (PRIO_V<out>=<in1_prio>;<in2_prio>;...;<inn_prio>)CrLf

Parameters

Parameter	Parameter description	Value	Value description
<in1_prio> <in2_prio> <inn_prio>	Priority number of the input ports between 0 and 3	**0-3**	**0:** highest priority **3:** lowest priority

See more details about port numbering in the Input/Output Port Numbering section.

Example

→ {prio_v1=1;0;2;3}
← (PRIO_V1=1;0;2;3)

ATTENTION: Always set the priority for all the ports when changing, otherwise the change will not be executed and the response will be the current setting (like querying the priority setting).

INFO: The video priorities can be queried by typing the {prio_v<out>=?} command.

6.4.11. Setting the Audio Input Priorities

The settings of audio input priority can be changed as follows.

Command and Response

→ {PRIO_A<out>=<in1_prio>;<in2_prio>;...;<inn_prio>}
← (PRIO_A<out>=<in1_prio>;<in2_prio>;...;<inn_prio>)CrLf

Parameters

See the previous section.

Example

→ {prio_a1=1;0;2}
← (PRIO_A1=1;0;2)

Input 2 has the highest priority (0), Input 1 has the second highest (1). Input 3 has the lowest priority (2).

ATTENTION: Always set all the priority of the ports when changing, otherwise, the change will not be executed and the response will be the current setting (like querying the priority setting).

INFO: The audio priorities can be queried by typing the {prio_a<out>=?} command.

6.5. Network Configuration

6.5.1. Querying the Current IP Status

The IP address settings can be queried as follows. *#dhcp #ipaddress #network*

Command and Response

→ {IP_STAT=?}

← (IP_STAT=<type>;<ip_address>;<subnet_mask>;<gateway_addr>)CrLf

Parameters

Parameter	Parameter description	Value	Value description
<type>	Assignment of the IP address	**0**	static
		1	dynamic (DHCP)
<ip_addr>	IP address	(four decimal octets separated by dots)	
<subnet_mask>	Subnet mask	(four decimal octets separated by dots)	
<gateway_addr>	Gateway address	(four decimal octets separated by dots)	

Example

→ {ip_stat=?}

← (IP_STAT=0;192.168.0.100;255.255.255.0;192.168.0.1)

The device has a static (fix) IP address: 192.168.0.100; the subnet mask is 255.255.255.0, the gateway address is 192.168.0.1.

6.5.2. Setting the IP Address

IP address can be set as follows.

Command and Response

→ {IP_ADDRESS=<type>;<ip_address>}

← (IP_ADDRESS=<type>;<ip_address>)CrLf

Parameters

See the previous section.

Example

→ {ip_address=0;192.168.0.110}

← (IP_ADDRESS=0;192.168.0.110)

INFO: The IP address can be queried by typing the **{ip_address=?}** command. The response contains the fix IP address that is stored in the device even if DHCP is enabled; in this case, this IP address is not valid.

6.5.3. Setting the Subnet Mask

Subnet mask can be set as follows.

Command and Response

→ {IP_NETMASK=<subnet_mask>}

← (IP_NETMASK=<subnet_mask>)CrLf

Parameters

See the Querying the Current IP Status section.

Example

→ {ip_netmask=255.255.255.0}

← (IP_NETMASK=255.255.255.0)

INFO: The subnet mask can be queried by typing the {ip_address=?} command. The response contains the fix IP subnet mask that is stored in the device even if DHCP is enabled; in this case, this IP subnet mask is not valid.

6.5.4. Setting the Gateway Address

Gateway address can be set as follows.

Command and Response

→ {IP_GATEWAY=<gateway_addr>}

← (IP_GATEWAY=<gateway_addr>)CrLf

Parameters

See the Querying the Current IP Status section.

Example

→ {ip_gateway=192.168.0.50}

← (IP_GATEWAY=192.168.0.50)

INFO: The gateway address can be queried by typing the {ip_gateway=?} command. The response contains the static IP gateway address that is stored in the device even if DHCP is enabled. In that case, the latest valid gateway address (for static IP) is stored.

6.5.5. Applying the Network Settings

Apply the network settings and restart the network interface.

Command and Response

→ {ip_apply}

← (IP_APPLY)CrLf

Example

→ {ip_apply}

← (IP_APPLY)

6.5.6. Enabling/disabling the Ethernet Port

Command and Response

→ {ETH_ENABLE=<switch>}
← (ETH_ENABLE=<switch>)CrLf

Parameters

If the <switch> parameter is **0**, the port is **disabled**. If its value is **1**, the port is **enabled**.

Example

→ {ETH_ENABLE=1}
← (ETH_ENABLE=1)

6.6. Serial Port Configuration

6.6.1. Setting the Control Protocol

See more information about the RS-232 modes in the RS-232 Serial Interface section.

Command and Response

→ {RS232=<mode>}
← (RS232=<mode>)CrLf

Parameters

Parameter	Parameter description	Value	Value description
<mode>	The serial port working mode	**PASS**	Pass-through mode
		CONTROL	Control mode
		CI	Command Injection mode

The current setting can be queried by the **{RS232=?}** command.

Example

→ {RS232=CONTROL}
← (RS232=CONTROL)

6.6.2. Serial Port Format Setting (Local port)

This command sets the format of the local RS-232 port (Phoenix).

Command and Response

→ {RS232_LOCAL_FORMAT=<baud_rate>;<data_bit>;<parity>;<stop_bit>}
← (RS232_LOCAL_FORMAT=<baud_rate>;<data_bit>;<parity>;<stop_bit>)CrLf

Parameters

Parameter	Parameter description	Value	Value description
<baud_rate>	Baud rate setting (optional)	**4800; 7200; 9600; 14400; 19200; 38400; 57600; 115200**	
<data_bit>	Databit setting (optional)	**8; 9**	
<parity>	Parity setting (optional)	**N; E; O**	
<stop_bit>	Stop bit setting (optional)	**1; 1.5; 2**	

The current setting can be queried by the **{RS232_LOCAL_FORMAT=?}** command. Any parameter can be skipped by using '**X**' as a value, see the example.

Example

→ {RS232_LOCAL_FORMAT=57600;X;X;1}
← (RS232_LOCAL_FORMAT=57600;8;N;1)

The databit and parity settings have not been changed.

6.6.3. Serial Port Format Setting (Link port)

DIFFERENCE: This command is available for the MMX4x2-HT200 model only.

This command sets the format of the link RS-232 port (TPS port).

Command and Response

→ {RS232_LINK_FORMAT=<baud_rate>;<data_bit>;<parity>;<stop_bit>}
← (RS232_LINK_FORMAT=<baud_rate>;<data_bit>;<parity>;<stop_bit>)CrLf

Parameters

See the previous section.

Example

→ {RS232_LINK_FORMAT=38400;X;X;1}
← (RS232_LINK_FORMAT=38400;8;N;1)

The databit and parity settings have not been changed.

6.6.4. Serial Port Protocol Setting (Local port)

Command and Response

→ {RS232_LOCAL_PROT=<protocol>}
← (RS232_LOCAL_PROT=<protocol>)CrLf

Parameters

Parameter	Parameter description	Value	Value description
<protocol>	The applied protocol in the communication	**LW2**	Lightware 2 Protocol is active
		LW3	Lightware 3 Protocol is active

The current setting can be queried by the **{RS232_LOCAL_PROT=?}** command.

Example

→ {RS232_LOCAL_PROT=LW2}
← (RS232_LOCAL_PROT=LW2)

6.6.5. Serial Port Protocol Setting (Link port)

DIFFERENCE: This command is available for the MMX4x2-HT200 model only.

This command sets the communication protocol of the link RS-232 port (TPS port).

Command and Response

→ {RS232_LINK_PROT=<protocol>}
← (RS232_LINK_PROT=<protocol>)CrLf

Parameters

See the previous section.

Example

→ {RS232_LINK_PROT=LW2}
← (RS232_LINK_PROT=LW2)

6.7. GPIO Port Configuration

DIFFERENCE: This section refers to the MMX4x2-HDMI-USB20-L model only.

6.7.1. Setting the Level and Direction for Each Pin

GPIO pins can be configured as follows. See more details about the GPIO connector in the GPIO - General Purpose Input/Output Ports section and about the interface in the GPIO Interface section.

Command and Response *#gpio*

→ {GPIO<pin_nr>=<dir>;<level>}
← (GPIO<pin_nr>=<dir>;<level>)CrLf

Parameters

Parameter	Parameter description	Value	Value description
<pin_nr>	GPIO pin number	**0-6**	static
<dir>	The direction of the communication	**I**	Input
		O	Output
<level>	The level of the pin	**L**	Low
		H	High
		T	Toggle between low and high

Example

→ {gpio1=O;H}
← (GPIO1=O;H)

GPIO pin 1 is set to output with high level.

INFO: The current GPIO pin configuration can be queried by typing the {GPIO<pin_nr>=?} command.

6.8. LW2 Commands – Quick Summary

General LW2 Commands

Querying the Supported Commands
→ {LCMD}

Querying the Product Type
→ {i}

Querying the Device Label
→ {LABEL}

Querying the Control Protocol
→ {P_?}

Querying the Firmware Version of the CPU
→ {F}

Viewing Firmware for All Controllers
→ {FC}

Viewing Installed Board
→ {IS}

Connection Test
→ {PING}

Restarting the Device
→ {RST}

Compile Time
→ {CT}

Querying the Health Status
→ {ST}

Querying the Serial Number
→ {S}

Restoring the Factory Default Settings
→ {FACTORY=ALL}

AV Port Settings

Switching an Input to the Outputs
→ {<in>@<out>•<layer>}

Muting an Output
→ {#<out>•<layer>}

Unmuting an Output
→ {+<out>•<layer>}

Locking an Output
→ {#><out>•<layer>}

Unlocking an Output
→ {+<<out>•<layer>}

Viewing the Connection State on the Output
→ {VC•<layer>}

Viewing the Crosspoint Size
→ {getsize•<layer>}

Setting the Video Autoselect Mode
→ {AS_V<out>=<state>;<mode>}

Setting the Audio Autoselect Mode
→ {AS_A<out>=<state>;<mode>}

Setting the Video Input Priorities
→ {PRIO_V<out>=<in1_prio>;<in2_prio>;...;<inn_prio>}

Setting the Audio Input Priorities
→ {PRIO_A<out>=<in1_prio>;<in2_prio>;...;<inn_prio>}

Network Configuration

Querying the Current IP Status
→ {IP_STAT=?}

Setting the IP Address
→ {IP_ADDRESS=<type>;<ip_address>}

Setting the Subnet Mask
→ {IP_NETMASK=<subnet_mask>}

Setting the Gateway Address
→ {IP_GATEWAY=<gateway_addr>}

Applying the Network Settings
→ {ip_apply}

Enabling/disabling the Ethernet Port

→ {ETH_ENABLE=<switch>}

Serial Port Configuration

Setting the Control Protocol

→ {RS232=<mode>}

Serial Port Format Setting (Local port)

→ {RS232_LOCAL_FORMAT=<baud_rate>;<data_bit>;<parity>;<stop_bit>}

Serial Port Format Setting (Link port)

→ {RS232_LINK_FORMAT=<baud_rate>;<data_bit>;<parity>;<stop_bit>}

Serial Port Protocol Setting (Local port)

→ {RS232_LOCAL_PROT=<protocol>}

Serial Port Protocol Setting (Link port)

→ {RS232_LINK_PROT=<protocol>}

GPIO Port Configuration

Setting the Level and Direction for Each Pin

→ {GPIO<pin_nr>=<dir>;<level>}

7

LW3 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 88
- Instructions for the Terminal Application Usage 88
- Protocol Rules 88
- System Commands 91
- Cleartext Login Protection 93
- Video Port Settings 94
- Audio Port Settings from Firmware v1.2.0 100
- Audio Port Settings for Firmware v1.1.0 105
- Event Manager Basics 110
- Event Manager Tool Kit 111
- Variable-Management 114
- Ethernet Port Configuration 117
- Ethernet Tool Kit 118
- Ethernet Message Sending 119
- HTTP Messaging 121
- TCP Message Recognizer 122
- RS-232 Port Configuration 125
- RS-232 Message Sending 126
- RS-232 Message Recognizer 127
- CEC Command Sending 130
- Infrared Port Configuration 132
- Infrared Message Sending 133
- GPIO Port Configuration 134
- USB 2.0 Switch Configuration 135
- EDID Management 136
- LW3 Commands - Quick Summary 138

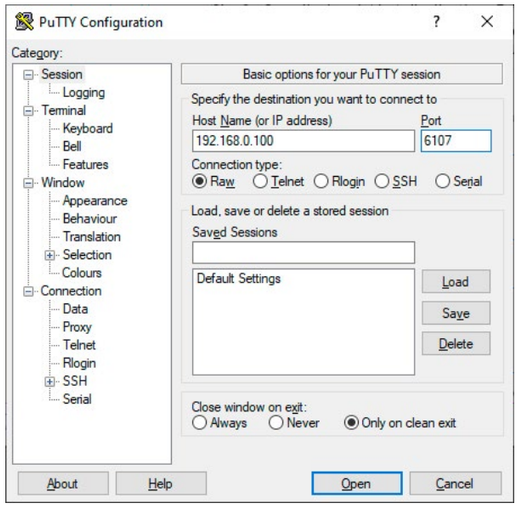
7.1. Overview

The Lightware Protocol #3 (LW3) is implemented in almost all new Lightware devices (matrix switchers, signal extenders and distribution amplifiers) since 2012. 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 and user-friendly handling with 'nodes', 'properties' and 'methods'. The **Advanced View** of the Lightware Device Controller software is the perfect tool for browsing and learning how the LW3 protocol can be used in practice.

7.2. Instructions for the Terminal Application Usage

Terminal Application

The LW3 protocol commands can be applied to the receiver using a terminal application. You need to install one of them on your control device, for example **Putty** or **CLI**. *#terminal*



Establishing Connection

Follow the steps for establishing connection to the receiver:

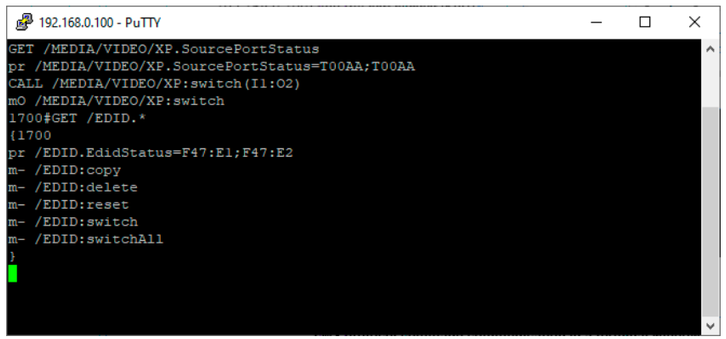
Step 1. Connect the receiver to a LAN over Ethernet.

Step 2. Open the terminal application (e.g. Putty).

Step 3. Add the **IP address** of the device (default: 192.168.0.100) and the **port number (6107)**.

Step 4. Select the **Raw** connection type, and open the connection.

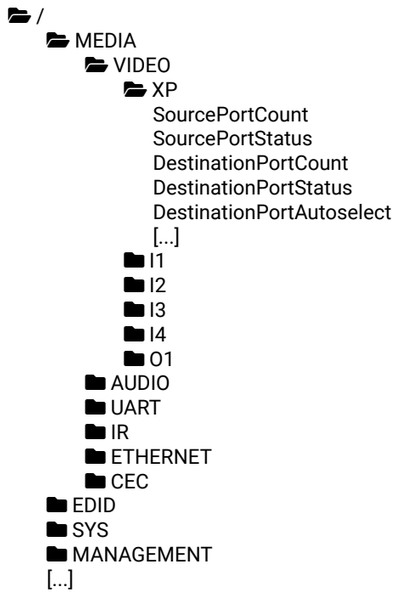
Once the terminal window is opened, you can enter the LW3 protocol commands, which are listed in the following sections.

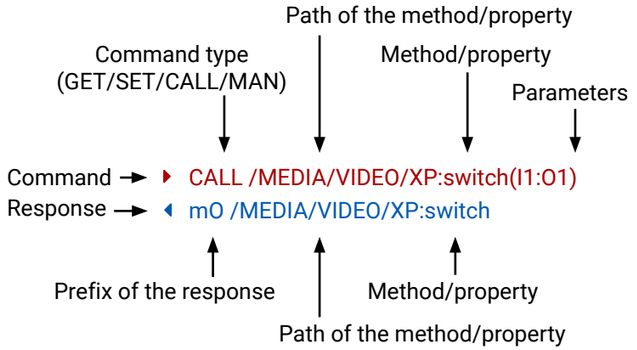


LW3 protocol command communication in a terminal window

7.3. Protocol Rules

7.3.1. LW3 Tree Structure and Command Structure (examples)





7.3.2. General Rules

- All names and parameters are **case-sensitive**.
- The nodes are separated by a slash ('/') character.
- The node name can contain the elements of the **English alphabet and numbers**.
- The command lines have to be closed by Carriage return and Line Feed (CrLf).
- Use the **TCP port no. 6107** when using LW3 protocol over Ethernet.
- The length of a line (command/response, command type / prefix, path, method/property and parameters together) can be **max. 800 bytes**.
- When a command is issued by the device, the received response cannot be processed by the CPU.
- The node paths describe the exact location of the node, listing each parent node up to the root.

7.3.3. Legend for the Control Commands

Command and Response – Example

- GET·/MEDIA/VIDEO/I2.SignalPresent
- pr·/MEDIA/VIDEO/I2.SignalPresent=<signal_present>

Format	Description
<in>	Input port number
<out>	Output port number
<port>	Input or output port number
<loc>	Location number
<parameter>	Specific property defined and described in the command
<expression>	Batched parameters: the underline means that more expressions or parameters can be placed by using a semicolon, e.g. **I2;I4;I5** or **F27:E1;F47:E2**
▸	Sent command
◂	Received response
·	Space character

Further not listed <parameters> are defined at each commands.

7.3.4. Command Types

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. Use the dot character (.) when addressing a property:

- GET /.SerialNumber
- pr /.SerialNumber=87654321

GETALL command

The **GETALL** command can be used to get all child nodes, properties and methods of a node with one command.

- GETALL /MEDIA/UART
- ns /MEDIA/UART/P1
- ns /MEDIA/UART/P2
- pr /MEDIA/UART.PortCount=2
- pr /MEDIA/UART.PortUi=P1:12209;P2:12224
- pr /MEDIA/UART.P1=Local RS-232
- pr /MEDIA/UART.P2=TPS out RS-232

SET command

The **SET** command can be used to modify the value of a property. Use the dot character (.) when addressing the property:

- SET /MEDIA/VIDEO/I1.ColorSpaceMode=0
- pw /MEDIA/VIDEO/I1.ColorSpaceMode=0

CALL command

A method can be invoked by the **CALL** command. Use the colon character (:) when addressing the method:

- CALL /MEDIA/VIDEO/XP:switch(I1:O1)
- mO /MEDIA/VIDEO/XP:switch

MAN command

The manual is a human readable text that describes the syntax and provides a hint on how to use the primitives. For every node, property and method in the tree there is a manual; type the MAN command to get the manual:

- MAN /MEDIA/VIDEO/O1.Pwr5vMode
- pm /MEDIA/VIDEO/O1.Pwr5vMode ["0" | "1" | "2"] 0 - Auto, 1 - Always On, 2 - Always Off

7.3.5. Prefix Summary

DEFINITION: The prefix is a 2-character-long code that describes the type of the response.

The following prefixes are defined in the LW3 protocol:

Prefix	Description
n-	a node
nE	an error for a node
nm	a manual for a node
ns	a child node of a node
pr	a read-only property
pw	read-write property
pE	an error for the property

Prefix	Description
pm	a manual for the property
m-	a method
mO	a response after a successful method execution
mF	a response after a failed method execution
mE	an error for a method
mm	a manual for a method

7.3.6. Error Messages

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

- CALL /MEDIA/VIDEO/XP:switch(IA:O1)
- mE /MEDIA/VIDEO/XP:switch %E004:Invalid value

7.3.7. Escaping

DEFINITION: An escape sequence is a sequence of characters that does not represent itself when used inside a character or string literally, but is translated into another character or a sequence of characters.

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 following: \ { } # % ( ) \r \n \t

The **original** message: **CALL /MEDIA/UART/P1:sendMessage(Set(01))**

The **escaped** message: **CALL /MEDIA/UART/P1:sendMessage(Set\(01\))**

7.3.8. Signature

DEFINITION: The signature is a 4-digit-long hexadecimal value that can be optionally placed before every command to keep a command and the corresponding responses together as a group.

Each line is terminated with 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 intends to receive 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 response to that particular command will also be preceded by the signature, and the corresponding lines will be between brackets:

- 1700#GET /EDID.*
- {1700
- pr /EDID.EdidStatus=F89:E1;D1:E2;D1:E3;D1:E4;F89:E5
- m- /EDID:copy
- m- /EDID:delete
- m- /EDID:reset
- m- /EDID:switch
- m- /EDID:switchAll
- }

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

7.3.9. Subscription

DEFINITION: Subscription to a node means that the user will get a notification if a property of the node changes.

A user can subscribe to any node. These notifications are asynchronous messages and are useful to keep the client application up to date, without having to periodically poll the node to detect a changed property. 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 reopening a connection all subscribe commands have to be sent in order to get the notifications of the changes on that connection.

Subscribe to a Node

- OPEN /MEDIA/VIDEO
- o- /MEDIA/VIDEO

Subscribe to Multiple Nodes

- OPEN /MEDIA/VIDEO/*
- o- /MEDIA/VIDEO/*

Unsubscribe from a Node

- CLOSE /MEDIA/VIDEO
- c- /MEDIA/VIDEO

Get the Active Subscriptions

- OPEN
- o- /MEDIA/VIDEO
- o- /EDID
- o- /DISCOVERY

Unsubscribe from Multiple Nodes

- CLOSE /MEDIA/VIDEO/*
- c- /MEDIA/VIDEO/*

7.3.10. Notifications about the Changes of the Properties

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

- CHG /EDID.EdidStatus=F48:E1

A Short Example of How to Use the Subscription

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.

OPEN /MEDIA/AUDIO/O3 o- /MEDIA/AUDIO/O3 GET /MEDIA/AUDIO/O3.VolumePercent pw /MEDIA/AUDIO/O3.VolumePercent=100.00	**connection #1**
GET /MEDIA/AUDIO/O3.VolumePercent pw /MEDIA/AUDIO/O3.VolumePercent=100.00 SET /MEDIA/AUDIO/O3.VolumePercent=50.00 pw /MEDIA/AUDIO/O3.VolumePercent=50.00	**connection #2**
CHG /MEDIA/AUDIO/O3.VolumePercent=50.00	**connection #1**

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

7.4. System Commands

7.4.1. Querying the Product Name

> INFO: The **ProductName** is a read-only property and cannot be changed. The **DeviceLabel** property can be changed to a custom text, see the next section.

Command and Response

- GET·/.ProductName
- pw·/.ProductName=<product_name>

Example

- GET /.ProductName
- pr /.ProductName=MMX4x2-HT200

7.4.2. Setting the Device Label

This property can be changed to a custom text. The default format of the device label is the following:

LW_<product_name>_<serial_no>

Command and Response *#devicelabel #label*

- SET·/MANAGEMENT/UID/DeviceLabel=<custom_name>
- pw·/MANAGEMENT/UID/DeviceLabel=<custom_name>

The Device Label can be 39 characters long and ASCII characters are allowed. Longer names are truncated.

Example

- SET /MANAGEMENT/UID.DeviceLabel=4x2_Conference1
- pw /MANAGEMENT/UID.DeviceLabel=4x2_Conference1

7.4.3. Resetting the Device

The receiver can be restarted – the current connections (LAN, RS-232, USB) will be terminated.

Command and Response *#reboot #restart*

- CALL·/SYS:reset()
- mO·/SYS:reset=

Example

- CALL /SYS:reset()
- mO /SYS:reset=

7.4.4. Restoring the Factory Default Settings

Command and Response

- CALL·/SYS:factoryDefaults()
- mO·/SYS:factoryDefaults=

Example

- CALL /SYS:factoryDefaults()
- mO /SYS:factoryDefaults=

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

> INFO: The login password is erased and the login is disabled when restoring the factory default values.

7.4.5. Querying the Package Version

This command shows the installed **firmware package** version.

Command and Response

- GET·/MANAGEMENT/UID.PackageVersion
- pr·/MANAGEMENT/UID.PackageVersion=<package_version>

Example

- GET /MANAGEMENT/UID.PackageVersion
- pr /MANAGEMENT/UID.PackageVersion=1.6.0b9 r61

7.4.6. Querying the CPU Firmware Version

Command and Response *#firmwareversion*

- GET·/SYS/MB.FirmwareVersion
- pr·/SYS/MB.FirmwareVersion=<firmware_version>

Example

- GET /SYS/MB.FirmwareVersion
- pr /SYS/MB.FirmwareVersion=1.2.0b3

7.4.7. Control Lock

Enable/disable the operation of the front panel buttons.

Command and Response *#lockbutton #buttonlock*

- SET·/MANAGEMENT/UI.ControlLock=<lock_status>
- pw·/MANAGEMENT/UI.ControlLock= <lock_status>

Parameters

Parameter	Parameter description	Values	Value description
<lock_status>	Front panel button locking status	**0**	**None:** all functions of the front panel button are enabled.
		1	The front panel buttons are locked but can be unlocked by a button combination. See the details in the Control Lock section.
		2	The front panel buttons are locked and cannot be unlocked by a button combination, only in LDC (on the Status tab) or using the LW3 command.

Example

- SET /MANAGEMENT/UI.ControlLock=1
- pw /MANAGEMENT/UI.ControlLock=1

7.4.8. Identifying the Device

Calling the method makes the status LEDs blink for 10 seconds. The feature helps to find the device physically.

Command and Response *#identifyme*

- CALL·/MANAGEMENT/UI:identifyMe()
- mO·/MANAGEMENT/UI:identifyMe

Example

- CALL /MANAGEMENT/UI:identifyMe()
- mO /MANAGEMENT/UI/identifyMe

7.4.9. Toggling the Dark Mode Setting

DIFFERENCE: This command is available from firmware v1.6.0b19.

The LEDs of the device can be switched off in case their light could be annoying. In Dark mode, all LEDs are switched off, except the LEDs of the RJ45 connectors (Ethernet and TPS in). *#darkmode*

Command and Response

- SET·/MANAGEMENT/UI/DARKMODE.DarkModeEnable=<mode_state>
- pw·/MANAGEMENT/UI/DARKMODE.DarkModeEnable=<mode_state>

Parameters

If the <mode_state> parameter is **true** (or **1**), the Dark mode function is **enabled**, if the parameter is **false** (or **0**), the function is **disabled**.

Example

- SET /MANAGEMENT/UI/DARKMODE.DarkModeEnable=true
- pw /MANAGEMENT/UI/DARKMODE.DarkModeEnable=true

7.4.10. Setting the Delay of the Dark Mode Setting

DIFFERENCE: This command is available from firmware v1.6.0b19.

The Dark mode can be enabled right away, or after a certain time. Thus the mode is enabled if no buttons are pressed for a while. Pressing any button brings back the status info on the LEDs without performing the function of the button itself. The delay time can be set by this command.

Command and Response

- SET·/MANAGEMENT/UI/DARKMODE.DarkModeDelay=<delay_time>
- pw·/MANAGEMENT/UI/DARKMODE.DarkModeDelay=<delay_time>

Parameters

The <delay_time> parameter means seconds, and the default value is 60. If set to 0, no delay is applied and the Dark mode can be enabled immediately by the **DarkModeEnable** property. This delay affects the **wakeFromDarkMode** method as well.

Example

- SET /MANAGEMENT/UI/DARKMODE.DarkModeDelay=5
- pw /MANAGEMENT/UI/DARKMODE.DarkModeDelay=5

7.4.11. Running a Macro

DIFFERENCE: This command is available from firmware v1.6.0b19.

DEFINITION: Macro is a batch of pre-defined commands stored in the device. *#macro*

You can create your custom macros in a file, upload them to the device and run at any time. The uploading can be done over LDC, see the Macros section. The following LW3 command is suitable only for running a macro.

Command and Response

- CALL·/CTRL/MACROS:run(<macro_name>)
- mO·/CTRL/MACROS:run

Example

- CALL /CTRL/MACROS:run(Macro1)
- mO /CTRL/MACROS:run

7.5. Cleartext Login Protection

DIFFERENCE: This feature and commands below are available from firmware v1.6.0b19.

This cleartext login tool allows setting a password for login, thus any change in the device can be performed only after a successful login – coming from any control interface (RS-232, Ethernet, etc...). The login is valid until a TCP socket break in case of Ethernet connection. *#login*

INFO: The login password is erased and the login is disabled when restoring the factory default values.

The following can be queried without login:

- ProductName
- PartNumber
- SerialNumber
- FirmwareVersion
- PackageVersion
- MacAddress

7.5.1. Setting the Login Password

Command and Response

- CALL·/LOGIN:setPassword(<password>)
- mO·/LOGIN:setPassword

Example

- CALL /LOGIN:setPassword(pr0t3ctED)
- mO /LOGIN:setPassword

7.5.2. Logging Into the Device

Command and Response

- CALL·/LOGIN:login(<password>)
- mO·/LOGIN:login

Example

- CALL /LOGIN:login(pr0t3ctED)
- mO /LOGIN:login

After a successful login, the **LoggedIn** property becomes **true** and the LW3 tree is available.

7.5.3. Logging Out of the Device

Command and Response

- CALL·/LOGIN:logout(<password>)
- mO·/LOGIN:logout

Example

- CALL /LOGIN:logout(pr0t3ctED)
- mO /LOGIN:logout

After a successful logout, the **LoggedIn** property becomes **false** and the LW3 tree is protected.

7.5.4. Enabling/Disabling the Cleartext Login Function

ATTENTION: This property can be changed only if the **LoggedIn** property is **true**.

Command and Response

- SET·/LOGIN:LoginEnable=<login_state>
- pw·/LOGIN.LoginEnable=<login_state>

Parameters

If the <login_state> parameter is **true** (or **1**), the Cleartext login function is **enabled**, if the parameter is **false** (or **0**), the function is **disabled**. Please note that the function can be enabled without setting a password by the **setPassword** method.

Example

- SET /LOGIN.LoginEnable=true
- pw /LOGIN.LoginEnable=true

7.6. Video Port Settings

INFO: Video port numbering can be found in the Input/Output Port Numbering section.

7.6.1. Querying the Status of the Input Ports

Command and Response *#crosspoint #hdcp #portstatus #switch #portstatus*

- GET·/MEDIA/VIDEO/XP.SourcePortStatus
- pr·/MEDIA/VIDEO/XP.SourcePortStatus=<in1_state>;<in2_state>;<in3_state>; <in4_state>

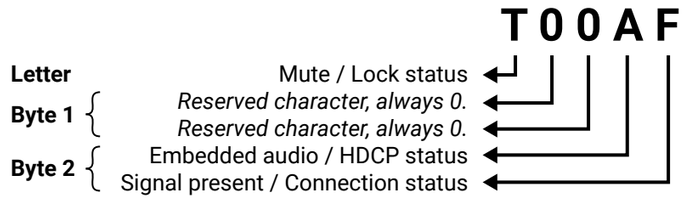
The response contains 5 ASCII characters for each port. The first character indicates the mute/lock state, the next four characters represent a 2-byte-long HEX code showing the current state of the input ports.

Example *#mute #lock #unmute #unlock*

- GET /MEDIA/VIDEO/XP.SourcePortStatus
- pr /MEDIA/VIDEO/XP.SourcePortStatus=T00AA;T00EF;T00AA;T00AA

Parameters

Letter (Character 1)		
	Mute state	**Lock state**
T	Unmuted	Unlocked
L	Unmuted	Locked
M	Muted	Unlocked
U	Muted	Locked



	Byte 1				**Byte 2**			
	Character 2		Character 3		Character 4		Character 5	
	BIT 7-6	BIT 5-4	BIT 3-2	BIT 1-0	BIT 7-6	BIT 5-4	BIT 3-2	BIT 1-0
	Reserved	**Reserved**	**Reserved**	**Reserved**	**Embedded audio status**	**HDCP status**	**Signal present status**	**Connection status**
0 0	Reserved	Reserved	Reserved	Reserved	Unknown			
0 1					Reserved			
1 0					No embedded audio	Not encrypted	No signal	Not connected
1 1					Embedded audio presents	Encrypted	Signal presents	Connected

Example and Explanation (for input 2, T00EF):

T	**0**		**0**		**E**		**F**	
Unlocked, Unmuted	0 0	0 0	0 0	0 0	1 1	1 0	1 1	1 1
	Reserved	Reserved	Reserved	Reserved	Emb. audio presents	Not encrypted	Signal presents	Connected

The Most Common Received Port Status Responses

	T	**0**		**0**		**A**		**A**	
T00AA	Unlocked, unmuted	0 0	0 0	0 0	0 0	1 0	1 0	1 0	1 0
		Reserved	Reserved	Reserved	Reserved	No emb. audio	Not encrypted	No signal	Not connected

	T	**0**		**0**		**A**		**B**	
T00AB	Unlocked, unmuted	0 0	0 0	0 0	0 0	1 0	1 0	1 0	1 1
		Reserved	Reserved	Reserved	Reserved	No emb. audio	Not encrypted	No signal	Connected

	T	**0**		**0**		**A**		**F**	
T00AF	Unlocked, unmuted	0 0	0 0	0 0	0 0	1 0	1 0	1 1	1 1
		Reserved	Reserved	Reserved	Reserved	No emb. audio	Not encrypted	Signal presents	Connected

	T	**0**		**0**		**E**		**F**	
T00EF	Unlocked, unmuted	0 0	0 0	0 0	0 0	1 1	1 0	1 1	1 1
		Reserved	Reserved	Reserved	Reserved	Emb. audio presents	Not encrypted	Signal presents	Connected

	T	**0**		**0**		**B**		**F**	
T00BF	Unlocked, unmuted	0 0	0 0	0 0	0 0	1 0	1 1	1 1	1 1
		Reserved	Reserved	Reserved	Reserved	No emb. audio	Encrypted	Signal presents	Connected

	T	**0**		**0**		**F**		**F**	
T00FF	Unlocked, unmuted	0 0	0 0	0 0	0 0	1 1	1 1	1 1	1 1
		Reserved	Reserved	Reserved	Reserved	Emb. audio presents	Encrypted	Signal presents	Connected

7.6.2. Querying the Connected Input Port Number

DIFFERENCE: This command is available from firmware v1.6.0b19.

The response of this command shows the input port that is connected to the queried output port.

Command and Response *#crosspoint*

- GET·/MEDIA/VIDEO/<out>.ConnectedSource
- pr·/MEDIA/VIDEO/<out>.ConnectedSource=<in>

Example

- GET /MEDIA/VIDEO/O1.ConnectedSource
- pr /MEDIA/VIDEO/O1.ConnectedSource=I1

7.6.3. Querying the Status of the Output Ports

Command and Response *#portstatus*

- GET·/MEDIA/VIDEO/XP.DestinationPortStatus
- pr·/MEDIA/VIDEO/XP.DestinationPortStatus=<out1_state>;<out2_state>

The response contains 5 ASCII characters for each output port. The first character indicates the mute/lock state, the next 2-byte-long HEX code shows the current state of the output ports. *#portstatus*

Parameters

The structure of the response <out#_state> is the same as the <in#_state> described in the previous section.

Example

- GET /MEDIA/VIDEO/XP.DestinationPortStatus
- pr /MEDIA/VIDEO/XP.DestinationPortStatus=M00BF;T00AE

M	0		0		B		F	
Unlocked, Muted	0 0	0 0	0 0	0 0	1 0	1 1	1 1	1 1
	Reserved	Reserved	Reserved	Reserved	No emb. audio	Encrypted	Signal presents	Connected

7.6.4. Querying the Video Crosspoint Setting

Command and Response *#crosspoint* *#switch*

- GET·/MEDIA/VIDEO/XP.DestinationConnectionList
- pr·/MEDIA/VIDEO/XP.DestinationConnectionList=<in>;<in>

The response shows the input ports connected to the output ports: first value is for O1, the second is for O2.

Example

- GET /MEDIA/VIDEO/XP.DestinationConnectionList
- pr /MEDIA/VIDEO/XP.DestinationConnectionList=I1;I3

I1 input port is connected to the O1 output port, I3 input port is connected to the O2 output port.

7.6.5. Switching Video Input

Command and Response

- CALL·/MEDIA/VIDEO/XP:switch(<in>:<out>)
- mO·/MEDIA/VIDEO/XP:switch

Example 1

- CALL /MEDIA/VIDEO/XP:switch(I2:O1)
- mO /MEDIA/VIDEO/XP:switch

Example 2

- CALL /MEDIA/VIDEO/XP:switch(0:O1)
- mO /MEDIA/VIDEO/XP:switch

When using 0 (zero) value as an input, the input will be disconnected and no signal will appear on the output.

7.6.6. Querying the Video Autoselect Settings

Command and Response *#autoselect*

- GET·/MEDIA/VIDEO/XP.DestinationPortAutoselect
- pr·/MEDIA/VIDEO/XP.DestinationPortAutoselect=<out1_set>;<out2_set>;<out3_set>

The response shows the settings of each output one by one. The structure of the response is the following:

<out#_set> = <state><mode>

Parameters

Parameter	Parameter description	Value	Value description
<state>	The state of the autoselect	**E**	The autoselect is **enabled**
		D	The autoselect is **disabled**
<mode>	The mode of the autoselect	**F**	**First** detect mode: the first active video input is selected.
		P	**Priority** detect mode: always the highest priority active video input will be selected.
		L	**Last** detect mode: always the last attached input is switched to the output automatically.

Example

- GET /MEDIA/VIDEO/XP.DestinationPortAutoselect
- pr /MEDIA/VIDEO/XP.DestinationPortAutoselect=EL;DP;DP

EL: the Autoselect is **Enabled** on the output 1, selected mode is **Last detect**.

DP: the Autoselect is **Disabled** on output 2 and output 3.

INFO: For more information about the Autoselect feature, see The Autoselect Feature section.

7.6.7. Changing the Autoselect Mode

Command and Response

- CALL·/MEDIA/VIDEO/XP:setDestinationPortAutoselect(<out>:<state><mode>)
- mO·/MEDIA/VIDEO/XP:setDestinationPortAutoselect

Parameters

See the previous section. Please note that the mode setting cannot be changed when **D** is sent to change the state to **Disabled**.

INFO: Both or just one parameter can be set as shown in the example below.

Examples

- CALL /MEDIA/VIDEO/XP:setDestinationPortAutoselect(O1:D;O2:EL)
- mO /MEDIA/VIDEO/XP:setDestinationPortAutoselect

The Autoselect is switched off on output1, the mode setting is not changed. The Autoselect is switched on on output2, Last detect mode is selected.

7.6.8. Querying the Input Port Priority

Command and Response

- GET·/MEDIA/VIDEO/XP.PortPriorityList
- pr·/MEDIA/VIDEO/XP.PortPrioirtyList=<out1_list>;<out2_list>

The response shows the priority of each output one after another. The priority number can be from 0 to 3; 0 is the highest- and 3 is the lowest priority.

Parameters

The <out#_list> parameters are the order of the input port priority numbers of the given output port. The structure of these groups is the following:

<out#_list> = <in1_prio>,<in2_prio>,<in3_prio>,<in4_prio>

Example

- GET /MEDIA/VIDEO/XP.PortPriorityList
- pr /MEDIA/VIDEO/XP.PortPriorityList=0,1,2,3;1,0,2,3

There are two outputs, so two groups are listed in the response (divided by semicolons) and each group (list) contains four priority numbers. The values show the priority order of the video input ports:

Output 1				Output 2			
<in1_prio>	<in2_prio>	<in3_prio>	<in4_prio>	<in1_prio>	<in2_prio>	<in3_prio>	<in4_prio>
0	1	2	3	1	0	2	3

In the example above, the input 1 has the highest priority on output 1 and input 4 has the lowest priority. On output 2: the highest priority is assigned to input 2 and the lowest is input 4.

ATTENTION: The same priority number can be set to different input ports. When the priority numbers match, the input port with the lowest port number will have the highest priority.

7.6.9. Changing the Input Port Priority

Command and Response

- CALL·/MEDIA/VIDEO/XP:setAutoselectionPriority(<in>(<out>):<prio>)
- mO·/MEDIA/VIDEO/XP:setAutoselectionPrioirty

Parameters

The <prio> parameter means the priority number from 0 to 3, equal numbers are allowed. An input port priority can be set on an output port. More parameters can be placed by using a semicolon (no space), see the example below.

Examples

- CALL /MEDIA/VIDEO/XP:setAutoselectionPriority(I1(O1):3;I2(O1):2)
- mO /MEDIA/VIDEO/XP:setAutoselectionPriority

The priority number of input 1 has been set to 3 on output 1; the priority number of input 2 has been set to 2 on output 1.

- CALL /MEDIA/VIDEO/XP:setAutoselectionPriority(I1\(O1\):3
- mO /MEDIA/VIDEO/XP:setAutoselectionPriority

The priority number of input 1 has been set to 3 on output 1. The example shows that certain control characters have been escaped: the backslash '\' character is inserted before the '(' and ')' characters. See more information about the escaping in the Escaping section.

7.6.10. Muting an Input Port

Command and Response

- CALL·/MEDIA/VIDEO/XP:muteSource(<in>)
- mO·/MEDIA/VIDEO/XP:muteSource

Example

- CALL /MEDIA/VIDEO/XP:muteSource(I1)
- mO /MEDIA/VIDEO/XP:muteSource

7.6.11. Unmuting an Input Port

Command and Response

- CALL·/MEDIA/VIDEO/XP:unmuteSource(<in>)
- mO·/MEDIA/VIDEO/XP:unmuteSource

Example

- CALL /MEDIA/VIDEO/XP:unmuteSource(I1)
- mO /MEDIA/VIDEO/XP:unmuteSource

7.6.12. Locking an Input Port

Command and Response *#lock #unlock #mute #unmute*

- CALL·/MEDIA/VIDEO/XP:lockSource(<in>)
- mO·/MEDIA/VIDEO/XP:lockSource

Example

- CALL /MEDIA/VIDEO/XP:lockSource(I1)
- mO /MEDIA/VIDEO/XP:lockSource

7.6.13. Unlocking an Input Port

Command and Response

- CALL·/MEDIA/VIDEO/XP:unlockSource(<in>)
- mO·/MEDIA/VIDEO/XP:unlockSource

Example

- CALL /MEDIA/VIDEO/XP:unlockSource(I1)
- mO /MEDIA/VIDEO/XP:unlockSource

7.6.14. Muting an Output Port

Command and Response

- CALL·/MEDIA/VIDEO/XP:muteDestination(<out>)
- mO·/MEDIA/VIDEO/XP:muteDestination

Example

- CALL /MEDIA/VIDEO/XP:muteDestination(O1)
- mO /MEDIA/VIDEO/XP:muteDestination

7.6.15. Unmuting an Output Port

Command and Response

- CALL·/MEDIA/VIDEO/XP:unmuteDestination(<out>)
- mO·/MEDIA/VIDEO/XP:unmuteDestination

Example

- CALL /MEDIA/VIDEO/XP:unmuteDestination(O1)
- mO /MEDIA/VIDEO/XP:unmuteDestination

7.6.16. Locking an Output Port

Command and Response

- CALL·/MEDIA/VIDEO/XP:lockDestination(<out>)
- mO·/MEDIA/VIDEO/XP:lockDestination

Example

- CALL /MEDIA/VIDEO/XP:lockDestination(O1)
- mO /MEDIA/VIDEO/XP:lockDestination

7.6.17. Unlocking an Output Port

Command and Response

- CALL·/MEDIA/VIDEO/XP:unlockDestination(<out>)
- mO·/MEDIA/VIDEO/XP:unlockDestination

Example

- CALL /MEDIA/VIDEO/XP:unlockDestination(O1)
- mO /MEDIA/VIDEO/XP:unlockDestination

7.6.18. HDCP Setting (Input Port)

HDCP capability can be enabled/disabled on the input ports, thus non-encrypted content can be seen on a non-HDCP compliant display. See more information in the HDCP Management section.

Command and Response *#hdcp*

- SET·/MEDIA/VIDEO/<in>.HdcpEnable=<hdcp_status>
- pw·/MEDIA/VIDEO/<in>.HdcpEnable=<hdcp_status>

Parameters

If the <hdcp_status> parameter is **true,** HDCP is enabled, if **false**, then HDCP is disabled.

Example

- SET /MEDIA/VIDEO/I2.HdcpEnable=true
- pw /MEDIA/VIDEO/I2.HdcpEnable=true

7.6.19. HDCP Setting (Output Port)

HDCP capability can be set to Auto/Always on the output ports, thus non-encrypted content can be transmitted to a non-HDCP compliant display. See more information in the HDCP Management section.

Command and Response *#hdcp*

- SET·/MEDIA/VIDEO/<out>.HdcpModeSetting=<hdcp_mode>
- pw·/MEDIA/VIDEO/<out>.HdcpModeSetting=<hdcp_mode>

Parameters

Parameter	Parameter description	Values	Value description
<hdcp_mode>	HDCP encryption setting on the output port	0	**Auto**: The encryption is enabled on the output port if the signal on the input port is encrypted.
		1	**Always**: The outgoing signal is HDCP-encrypted.

Example

- SET /MEDIA/VIDEO/O1.HdcpModeSetting=0
- pw /MEDIA/VIDEO/O1.HdcpModeSetting=0

7.6.20. Test Pattern Generator

The output ports can send a special image towards the sink devices for testing purposes. The setting is available on output ports with the parameters listed below. *#nosyncscreen #testpattern*

ATTENTION: The Mode can be set individually on each port, but the Clock source and the Pattern settings are common on the optical and HDMI output ports (O1 and O2).

7.6.20.1. Test Pattern Generator Mode Setting

Command and Response

- SET·/MEDIA/VIDEO/<out>.TpgMode=<tpg_mode>
- pw·/MEDIA/VIDEO/<out>.TpgMode=<tpg_mode>

Parameters

Parameter	Parameter description	Values	Value description
<tpg_mode>	Test pattern generator mode	0	**Disabled:** the test pattern is not displayed on the output.
		1	**Enabled**: the test pattern is displayed on the output.
		2	**No signal mode:** the test pattern is displayed if there is no signal on the output port.

Example

- SET /MEDIA/VIDEO/O1.TpgMode=2
- pw /MEDIA/VIDEO/O1.TpgMode=2

7.6.20.2. The Clock Frequency of the Test Pattern

Command and Response

- SET·/MEDIA/VIDEO/<out>.TpgClockSource=<tpg_clock>
- pw·/MEDIA/VIDEO/<out>.TpgClockSource=<tpg_clock>

Parameters

Parameter	Parameter description	Values	Value description
<tpg_clock>	Clock frequency of the test pattern signal	480	**480p**
		576	**576p**
		EXT	**External clock:** coming from the actual TMDS source.

Example

- SET /MEDIA/VIDEO/O1.TpgClockSource=576
- pw /MEDIA/VIDEO/O1.TpgClockSource=576

7.6.20.3. Test Pattern

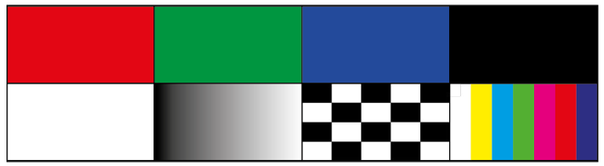
Command and Response

- SET·/MEDIA/VIDEO/<out>.TpgPattern=<pattern>
- pw·/MEDIA/VIDEO/<out>.TpgPattern=<pattern>

Parameters

The <pattern> can be: **RED; GREEN; BLUE; BLACK; WHITE; RAMP; CHESS; BAR; CYCLE**

Cycle setting means all the patterns are changed sequentially approx. every 2 seconds.



Example

- SET /MEDIA/VIDEO/O1.TpgPattern=GREEN
- pw /MEDIA/VIDEO/O1.TpgPattern=GREEN

7.6.21. HDMI Mode Settings (Output Port)

Command and Response *#signaltype*

- SET·/MEDIA/VIDEO/<out>.HdmiModeSetting=<hdmi_mode>
- pw·/MEDIA/VIDEO/<out>.HdmiModeSetting=<hdmi_mode>

Parameters

Parameter	Parameter description	Values	Value description
<hdmi_mode>	HDMI mode setting	**0**	**Auto:** the mode is determined automatically based on the EDID of the connected sink device.
		1	**DVI**: setting the outgoing signal type to DVI.
		2	**HDMI:** setting the outgoing signal type to HDMI.

Example

- SET /MEDIA/VIDEO/O1.HdmiModeSetting=2
- pw / MEDIA/VIDEO/O1.HdmiModeSetting=2

7.6.22. Querying the Recent TPS Mode

DIFFERENCE: The command is valid for the MMX4x2-HT200 model only.

Command and Response *#tpsmode*

- GET·/REMOTE/<tps_port>.tpsMode
- pr·/REMOTE/<tps_port>.tpsMode=<tps_mode>

Parameters

Parameter	Parameter description	Values	Value description
<tps_port>	Port number	**S1**	TPS input port number
<tps_mode>	TPS transmission mode	**A**	**Auto:** The TPS mode is determined automatically.
		H	**HDBaseT:** Ideal for high resolution signals up to 4K.
		L	**Long reach:** Ideal for big distances up to 1080p@60Hz with extended cable lengths.
		1	**LPPF1***: Only RS-232 communication is transmitted (@ 9600 baud)
		2	**LPPF2***: Only RS-232 (@ 9600 baud) and Ethernet communication are transmitted.

* LPPF: Low Power Partial Functionality.

Example

- GET /REMOTE/S1.tpsMode
- pr /REMOTE/S1.tpsMode=H

See more information about TPS modes in the Consumer Electronics Control (CEC) Interface section.

7.6.23. TPS Mode Settings

DIFFERENCE: The command is valid for MMX4x2-HT200 model only.

The TPS working mode between the transmitter and the receiver is determined by the mode set in them. Both devices TPS mode settings together determine the finally established TPS transmission mode.

Command and Response

- SET·/REMOTE/<tps_port>.tpsModeSetting=<tps_mode>
- pw·/REMOTE/<tps_port>.tpsModeSetting=<tps_mode>

Parameters

See the previous section.

Example

- SET /REMOTE/S1.tpsModeSetting=A
- pw /REMOTE/S1.tpsModeSetting=A

7.7. Audio Port Settings from Firmware v1.2.0

ATTENTION: The audio port setting commands depend on the installed firmware version of the device. If your device is installed with firmware v1.1.0, see the Audio Port Settings for Firmware v1.1.0 section. The following LW3 commands are related to firmware v1.2.0 and above. To query the firmware version of your device, see the Querying the Package Version section. You can find the complete list of the changes in the LW3 Command Changes in Firmware v1.2.0 section.

INFO: Audio port numbering can be found in the Input/Output Port Numbering section.

7.7.1. Querying the Status of Source Port

Command and Response *#portstatus*

- GET·/MEDIA/AUDIO/XP.SourcePortStatus
- pr·/MEDIA/AUDIO/XP.SourcePortStatus=<audio_in1_state>;<audio_in2_state>;<audio_in3_state>

Parameters

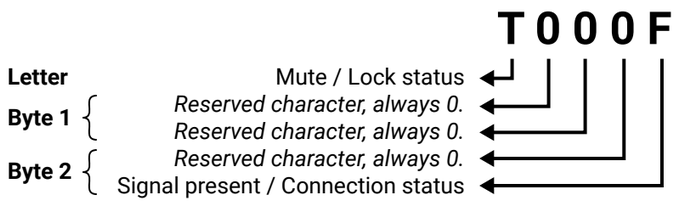
<audio_in#_state>: The response contains 5 ASCII characters for each port. The first character indicates the mute/lock state, the next four characters represent a 2-byte-long HEX code showing the current state of the input ports.

Example

- GET /MEDIA/AUDIO/XP.SourcePortStatus
- pr /MEDIA/AUDIO/XP.SourcePortStatus=T000C;T0008;M000F

Legend

Letter (Character 1)		
	Mute state	Lock state
T	Unmuted	Unlocked
L	Unmuted	Locked
M	Muted	Unlocked
U	Muted	Locked



	Byte 1				Byte 2			
	Character 2		Character 3		Character 4		Character 5	
	BIT 7-6	BIT 5-4	BIT 3-2	BIT 1-0	BIT 7-6	BIT 5-4	BIT 3-2	BIT 1-0
	Reserved	**Reserved**	**Reserved**	**Reserved**	**Reserved**	**Reserved**	**Signal present status**	**Connection status**
0 0	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Unknown	
0 1							Reserved	
1 0							No signal	Not connected
1 1							Signal presents	Connected

Example and Explanation (for input 3, M000F):

M	0		0		0		F	
Unlocked, Muted	0 0	0 0	0 0	0 0	0 0	0 0	1 1	1 1
	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Signal presents	Connected

The Most Common Received Port Status Responses

T000A	T	0		0		0		A	
	Unlocked, Unmuted	0 0	0 0	0 0	0 0	0 0	0 0	1 0	1 0
		Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	No signal	Not connected

T000B	T	0		0		0		B	
	Unlocked, Unmuted	0 0	0 0	0 0	0 0	0 0	0 0	1 0	1 1
		Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	No signal	Connected

T000F	T	0		0		0		F	
	Unlocked, Unmuted	0 0	0 0	0 0	0 0	0 0	0 0	1 1	1 1
		Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Signal presents	Connected

Only for A1 and A2 logical audio ports: If the character 5 is C (11 00), which means signal is present but the cable connection status is unknown - the explanation is a logical port has no pin that can indicate the connection status so this is always unknown. When the character 5 is 8 (10 00), that means there is no signal on the port.

T0008	T	0		0		0		8	
	Unlocked, Unmuted	0 0	0 0	0 0	0 0	0 0	0 0	1 0	0 0
		Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	No signal	Unknown

T000C	T	0		0		0		C	
	Unlocked, Unmuted	0 0	0 0	0 0	0 0	0 0	0 0	1 1	0 0
		Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Signal presents	Unknown

7.7.2. Querying the Status of Destination Port

Command and Response *#portstatus*

- GET·/MEDIA/AUDIO/XP.DestinationPortStatus
- pr·/MEDIA/AUDIO/XP.DestinationPortStatus=<a_out1_state>;<a_out2_state>;<a_out3_state>

The response contains 5 ASCII characters for each port. The first character indicates the mute/lock state, the next 2-byte-long HEX code showing the current state of the output port.

Parameters

See the previous section.

Legend (for output 2, M000F):

M	0		0		0		F	
Unlocked, Muted	0 0	0 0	0 0	0 0	0 0	0 0	1 1	1 1
	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Signal presents	Connected

Example

- GET /MEDIA/AUDIO/XP.DestinationPortStatus
- pr /MEDIA/AUDIO/XP.DestinationPortStatus=T000F;T000F;M000F

7.7.3. Querying the Audio Crosspoint State

Command and Response

- GET·/MEDIA/AUDIO/XP.DestinationConnectionList
- pr·/MEDIA/AUDIO/XP.DestinationConnectionList=<audio_in1>;<audio_in2>;<audio_in3>

Parameters

The <audio_in#> parameter means the audio input port number (A1-A3).

Example

- GET /MEDIA/AUDIO/XP.DestinationConnectionList
- pr /MEDIA/AUDIO/XP.DestinationConnectionList=A1;A2;A2

A1 input port is connected to output1, A2 input port is connected to output 2 and output3 ports.

7.7.4. Switching Audio Input

Command and Response

- CALL·/MEDIA/AUDIO/XP:switch(<audio_in>:<audio_out>)
- mO·/MEDIA/AUDIO/XP:switch

Parameters

Parameter	Parameter description	Values	Parameter values
<audio_in>	Audio input port	**A1-A3**	For inputs
<audio_out>	Audio output port	**O1-O3**	For outputs

Example

- CALL /MEDIA/AUDIO/XP:switch(A2:O1)
- mO /MEDIA/AUDIO/XP:switch

A2 port is connected to O1 port.

7.7.5. Querying the Audio Autoselect Settings

Command and Response *#autoselect*

- GET·/MEDIA/AUDIO/XP.DestinationPortAutoselect
- pr·/MEDIA/AUDIO/XP.DestinationPortAutoselect=<out1_set>;<out2_set>;<out3_set>

The response shows the settings of each output one by one. The structure of the response is the following:

<out#_set> = <state><mode>

Parameters

Parameter	Parameter description	Value	Value description
<state>	The state of the autoselect	**E**	The autoselect is **enabled**
		D	The aut oselect is **disabled**
<mode>	The mode of the autoselect	**F**	**First** detect mode: the first active video input is selected.
		P	**Priority** detect mode: always the highest priority active video input will be selected.
		L	**Last** detect mode: always the last attached input is switched to the output automatically.

Example

- GET /MEDIA/AUDIO/XP.DestinationPortAutoselect
- pr /MEDIA/AUDIO/XP.DestinationPortAutoselect=EL;DP;DP

EL: the Autoselect is Enabled on output1, selected mode is Last detect. The Autoselect is disabled on the other ports.

INFO: For more information about the Autoselect feature, see The Autoselect Feature section.

7.7.6. Changing the Autoselect Mode

Command and Response

- CALL·/MEDIA/AUDIO/XP:setDestinationPortAutoselect(<out>:<state><mode>)
- mO·/MEDIA/AUDIO/XP.setDestinationPortAutoselect

Parameters

See the previous section. Please note that the mode setting cannot be changed when **D** is sent to change the state to **Disabled**.

Example1

- CALL /MEDIA/AUDIO/XP:setDestinationPortAutoselect(O1:EP)
- mO /MEDIA/AUDIO/XP:setDestinationPortAutoselect

The setting is changed to **EP** at output1: Autoselect is enabled (E) and the mode is set to **priority detect** (P).

Example2

- CALL /MEDIA/AUDIO/XP:setDestinationPortAutoselect(O1:D)
- mO /MEDIA/AUDIO/XP:setDestinationPortAutoselect

The setting is changed to **D** at output1: Autoselect is disabled (D). The other settings remain unchanged.

INFO: For more information about the Autoselect feature, see The Autoselect Feature section.

7.7.7. Querying the Input Port Priority

Command and Response

- GET·/MEDIA/AUDIO/XP.PortPriorityList
- pr·/MEDIA/AUDIO/XP.PortPrioirtyList=<out1_list>;<out2_list>;<out3_list>

The response shows the priority of each output one after another. The priority number can be from 0 to 2; 0 is the highest- and 2 is the lowest priority.

Parameters

The <out#_list> parameters are the order of the input port priority numbers of the given output port. The structure of these groups is the following:

<out#_list> = <in1_prio>,<in2_prio>,<in3_prio>,<in4_prio>

Example

- GET /MEDIA/AUDIO/XP.PortPriorityList
- pr /MEDIA/AUDIO/XP.PortPriorityList=0,1,2;0,1,2;1,0,2

There are three outputs, so three groups are listed in the response (divided by semicolons) and each group (list) contains three priority numbers. The values show the priority order of the video input ports.

Output 1			Output 2			Output 3		
<in1_prio>	<in2_prio>	<in3_prio>	<in1_prio>	<in2_prio>	<in3_prio>	<in1_prio>	<in2_prio>	<in3_prio>
0	1	2	0	1	2	1	0	2

In the above example, the default setting can be seen at output 1 and output 2: input 1 has the highest priority. On output 3 the highest priority is assigned to input 2.

ATTENTION: The same priority number can be set to different input ports. When the priority numbers match, the input port with the lowest port number will have the highest priority.

7.7.8. Changing the Input Port Priority

Command and Response

- CALL·/MEDIA/AUDIO/XP:setAutoselectionPriority(<in>(<out>):<prio>)
- mO·/MEDIA/AUDIO/XP:setAutoselectionPrioirty

Parameters

The <prio> parameters means the priority number from 0 to 2, equal numbers are allowed. An input port priority can be set on an output port. More parameters can be placed by using a semicolon (no space), see the example below.

Examples

- CALL /MEDIA/AUDIO/XP:setAutoselectionPriority(A1(O1):2;A2(O1):1)
- mO /MEDIA/AUDIO/XP:setAutoselectionPriority

The priority number of input 1 has been set to 2 on output 1; the priority number of input 2 has been set to 1 on output 1.

- CALL /MEDIA/AUDIO/XP:setAutoselectionPriority(A1\(O1\):2
- mO /MEDIA/AUDIO/XP:setAutoselectionPriority

The priority number of input 1 has been set to 2 on output 1. The example shows that certain control characters have been escaped: the backslash '\' character is inserted before the '(' and ')' characters. See more information about the escaping in the Escaping section.

7.7.9. Muting an Audio Input

Command and Response *#lock #unlock #mute #unmute*

- CALL·/MEDIA/AUDIO/XP:muteSource(<audio_in>)
- mO·/MEDIA/AUDIO/XP:muteSource

Parameters

The <audio_in> parameter is the Audio input port number and can be A1, A2 or A3.

Example

- CALL /MEDIA/AUDIO/XP:muteSource(A1)
- mO /MEDIA/AUDIO/XP:muteSource

7.7.10. Unmuting an Audio Input

Command and Response

- CALL·/MEDIA/AUDIO/XP:unmuteSource(<audio_in>)
- mO·/MEDIA/AUDIO/XP:unmuteSource

Parameters

The <audio_in> parameter is the Audio input port number and can be A1, A2 or A3.

Example

- CALL /MEDIA/AUDIO/XP:unmuteSource(A1)
- mO /MEDIA/AUDIO/XP:unmuteSource

7.7.11. Locking an Input Port

Command and Response

- CALL·/MEDIA/AUDIO/XP:lockSource(<audio_in>)
- mO·/MEDIA/AUDIO/XP:lockSource

Parameters

The <audio_in> parameter is the Audio input port number and can be A1, A2 or A3.

Example

- CALL /MEDIA/AUDIO/XP:lockSource(A1)
- mO /MEDIA/AUDIO/XP:lockSource

7.7.12. Unlocking an Input Port

Command and Response

- CALL·/MEDIA/AUDIO/XP:unlockSource(<audio_in>)
- mO·/MEDIA/AUDIO/XP:unlockSource

Parameters

The <audio_in> parameter is the Audio input port number and can be A1, A2 or A3.

Example

- CALL /MEDIA/AUDIO/XP:unlockSource(A1)
- mO /MEDIA/AUDIO/XP:unlockSource

7.7.13. Muting an Audio Output Port

Command and Response

- CALL·/MEDIA/AUDIO/XP:muteDestination(<audio_out>)
- mO·/MEDIA/AUDIO/XP:muteDestination

Parameters

The <audio_out> parameter is the Audio output port number and can be O1, O2 or O3.

Example

- CALL /MEDIA/AUDIO/XP:muteDestination(O1)
- mO /MEDIA/AUDIO/XP:muteDestination

7.7.14. Unmuting an Audio Output Port

Command and Response

- CALL·/MEDIA/AUDIO/XP:unmuteDestination(<audio_out>)
- mO·/MEDIA/AUDIO/XP:unmuteDestination

Parameters

The <audio_out> parameter is the Audio output port number and can be O1, O2 or O3.

Example

- CALL /MEDIA/AUDIO/XP:unmuteDestination(O1)
- mO /MEDIA/AUDIO/XP:unmuteDestination

7.7.15. Locking an Audio Output Port

Command and Response

- CALL·/MEDIA/AUDIO/XP:lockDestination(<audio_out>)
- mO·/MEDIA/AUDIO/XP:lockDestination

Parameters

The <audio_out> parameter is the Audio output port number and can be O1, O2 or O3.

Example

- CALL /MEDIA/AUDIO/XP:lockDestination(O1)
- mO /MEDIA/AUDIO/XP:lockDestination

7.7.16. Unlocking an Audio Output Port

Command and Response

- CALL·/MEDIA/AUDIO/XP:unlockDestination(<audio_out>)
- mO·/MEDIA/AUDIO/XP:unlockDestination

Parameters

The <audio_out> parameter is the Audio output port number and can be O1, O2 or O3.

Example

- CALL /MEDIA/AUDIO/XP:unlockDestination(O1)
- mO /MEDIA/AUDIO/XP:unlockDestination

7.7.17. Analog Audio Input Gain Setting

Command and Response

- SET·/MEDIA/AUDIO/A3.Gain=<level>
- pw·/MEDIA/AUDIO/A3.Gain=<level>

Parameters

The <level> parameter sets the input gain between -12 dB and 6 dB in step of 3 dB. The value is rounded down if necessary, to match with the step value.

Example

- SET /MEDIA/AUDIO/A3.Gain=3
- pw /MEDIA/AUDIO/A3.Gain=3.00

7.7.18. Analog Audio Output Level Settings by Exact Values

7.7.18.1. Setting the Volume (dB)

Command and Response *#analogaudio #volume*

- SET·/MEDIA/AUDIO/O3.VolumedB=<level>
- pw·/MEDIA9/AUDIO/O3.VolumedB=<level>

Parameters

The <level> parameters sets the output volume (attenuation) between -57 dB and 0 dB in step of -0.375 dB. The value is rounded up if necessary, to match with the step value.

Example

- SET /MEDIA/AUDIO/O3.VolumedB=-15
- pw /MEDIA/AUDIO/O3.VolumedB=-15.00

7.7.18.2. Setting the Volume (Percent)

Command and Response

- SET·/MEDIA/AUDIO/O3.VolumePercent=<percent>
- pw·/MEDIA/AUDIO/O3.VolumePercent=<percent>

Parameters

The <percent> parameter sets the output volume (attenuation) between 100% and 0%, in step of 1%. The value is rounded up if necessary, to match with the step value.

Example

- SET /MEDIA/AUDIO/O3.VolumePercent=50
- pw /MEDIA/AUDIO/O3.VolumePercent=50.00

7.7.18.3. Setting the Balance

Command and Response *#balance*

- SET·/MEDIA/AUDIO/O3.Balance=<level>
- pw·/MEDIA/AUDIO/O3.Balance=<level>

Parameters

The <level> parameter sets the balance; -100 means left balance, 100 means right balance, step is 1. Center is 0 (default).

Example

- SET /MEDIA/AUDIO/O3.Balance=0
- pw /MEDIA/AUDIO/O3.Balance=0

7.7.19. Analog Audio Output Level Settings by Steps

7.7.19.1. Setting the Volume (dB)

Command and Response *#analogaudio #volume*

- CALL·/MEDIA/AUDIO/O3:stepVolumedB(<step>)
- m0·/MEDIA/AUDIO/O3:stepVolumedB

Parameters

The volume is increased or decreased with the given <step> value in dB.

Example

- CALL /MEDIA/AUDIO/O3:stepVolumedB(-1)
- m0 /MEDIA/AUDIO/O3:stepVolumedB

The volume is decreased with 1 dB, the current volume is -1.95 dB, which means 77.84% in percent.

7.7.19.2. Setting the Volume (Percentage)

Command and Response

- CALL·/MEDIA/AUDIO/O3:stepVolumePercent(<step>)
- m0·/MEDIA/AUDIO/O3:stepVolumePercent

Parameters

The volume is increased or decreased by the given <step> value in percent.

Example

- CALL /MEDIA/AUDIO/O3:stepVolumePercent(5)
- m0 /MEDIA/AUDIO/O3:stepVolumePercent

The volume is increased with 5%, the current volume is -1.52 dB, which means 82.84% in percent.

7.8. Audio Port Settings for Firmware v1.1.0

ATTENTION: The audio port setting commands depend on the installed firmware version of the device. If your device is installed with firmware v1.2.0, see the Audio Port Settings from Firmware v1.2.0 section. The following LW3 commands are related to firmware v1.1.0. To query the firmware version of your device, see the Querying the Package Version section. You can find the complete list of the changes in the LW3 Command Changes in Firmware v1.2.0 section.

INFO: Audio port numbering can be found in the Input/Output Port Numbering section.

7.8.1. Setting the Audio Source of HDMI Output 1

The HDMI out 1 port can transmit the original embedded audio line or the analog audio from the analog audio input line.

Command and Response

- SET·/SYS/MB/LEGACYAUDIOXP.EmbedAudioInputToHdmiOut1=<embed_audio>
- pw·/SYS/MB/LEGACYAUDIOXP.EmbedAudioInputToHdmiOut1=<embed_audio>

Parameters

Parameter	Parameter description	Value	Value description
<embed_audio>	Audio source of HDMI out 1 (O1)	**true**	Analog audio line from input port I5 is embedded to O1
		false	Original embedded HDMI audio is transmitted to O1

Example

- SET /SYS/MB/LEGACYAUDIOXP.EmbedAudioInputToHdmiOut1=false
- pw /SYS/MB/LEGACYAUDIOXP.EmbedAudioInputToHdmiOut1=false

HDMI out 1 transmits the original audio line of HDMI signal from the selected input port.

7.8.2. Setting the Audio Source of HDMI Output 2

The HDMI out 2 port can transmit the original embedded audio line or the analog audio from the analog audio input line.

Command and Response

- SET·/SYS/MB/LEGACYAUDIOXP.EmbedAudioInputToHdmiOut2=<embed_audio>
- pw·/SYS/MB/LEGACYAUDIOXP.EmbedAudioInputToHdmiOut2=<embed_audio>

Parameters

Parameter	Parameter description	Value	Value description
<embed_audio>	Audio source of HDMI out 2 (O2)	**true**	Analog audio line from input port I5 is embedded to O2
		false	Original embedded HDMI audio is transmitted to O2

Example

- SET /SYS/MB/LEGACYAUDIOXP.EmbedAudioInputToHdmiOut2=true
- pw /SYS/MB/LEGACYAUDIOXP.EmbedAudioInputToHdmiOut2=true

HDMI out 2 transmits the analog audio signal from input port I5, which is embedded to the HDMI signal.

7.8.3. Setting the Audio Source of Analog Audio Output

The Analog audio out port can transmit the analog audio from the analog audio input line or the de-embedded audio from the HDMI out 2.

Command and Response

- SET·/SYS/MB/LEGACYAUDIOXP.EnableAnalogPassthrough=<passthrough_status>
- pw·/SYS/MB/LEGACYAUDIOXP.EnableAnalogPassthrough=<passthrough_status>

Parameters

Parameter	Parameter description	Value	Value description
<passthrough_status>	Audio source of Analog audio out (O3)	**true**	Analog audio of Analog audio input is transmitted to Analog audio out.
		false	HDMI audio of HDMI out 2 is de-embedded to Analog Audio out.

Example

- SET /SYS/MB/LEGACYAUDIOXP.EnableAnalogPassthrough=false
- pw /SYS/MB/LEGACYAUDIOXP.EnableAnalogPassthrough=false

The digital audio that is selected to HDMI out 2 is de-embedded and transmitted to the Analog audio out port.

7.8.4. Muting/Unmuting Analog Audio Input

Command and Response

- SET·/MEDIA/AUDIO/<audio_in>.Mute=<mute_status>
- pw·/MEDIA/AUDIO/<audio_in>.Mute=<mute_status>

Parameters

Parameter	Parameter description	Value	Value description
<audio_in>	Audio input port number	**I1-I5**	
<mute_status>		**true**	The audio port is muted.
		false	The audio port is not muted.

Example

- SET /MEDIA/AUDIO/I5.Mute=false
- pw /MEDIA/AUDIO/I5.Mute=false

7.8.5. Muting/Unmuting Analog Audio Output

Command and Response

- SET·/MEDIA/AUDIO/<audio_out>.Mute=<mute_status>
- pw·/MEDIA/AUDIO/<audio_out>.Mute=<mute_status>

Parameters

Parameter	Parameter description	Value	Value description
<audio_out>	Audio output port number	**O1-O3**	
<mute_status>		**true**	The audio port is muted.
		false	The audio port is not muted.

Example

- SET /MEDIA/AUDIO/O3.Mute=false
- pw /MEDIA/AUDIO/O3.Mute=false

7.8.6. Analog Audio Input Level Settings by Exact Values

7.8.6.1. Setting the Volume (dB)

Command and Response *#analogaudio #volume*

- SET·/MEDIA/AUDIO/<audio_in>.VolumedB=<level>
- pw·/MEDIA/AUDIO/<audio_in>.VolumedB=<level>

Parameters

Parameter	Parameter description	Values	Value description
<audio_in>	Audio input port number	**I1-I5**	
<level>	The input volume (attenuation) in dB	Number between -95.625 and 0 in step of -0.375.	The value is rounded up if necessary, to match with the step value.

Example

- SET /MEDIA/AUDIO/I5.VolumedB=-15
- pw /MEDIA/AUDIO/I5.VolumedB=-15.00

7.8.6.2. Setting the Volume (Percent)

Command and Response

- SET·/MEDIA/AUDIO/<audio_in>.VolumePercent=<percent>
- pw·/MEDIA/AUDIO/<audio_in>.VolumePercent=<percent>

Parameters

Parameter	Parameter description	Values	Value description
<audio_in>	Audio input port number	**I1-I5**	
<percent>	The input volume (attenuation) in percent	Number between 0 and 100 in step of 1.	The value is rounded up if necessary, to match with the step value.

Example

- SET /MEDIA/AUDIO/I5.VolumePercent=50
- pw /MEDIA/AUDIO/I5.VolumePercent=50.00

7.8.6.3. Setting the Balance

Command and Response *#balance*

- SET·/MEDIA/AUDIO/<audio_in>.Balance=<level>
- pw·/MEDIA/AUDIO/<audio_in>.Balance=<level>

Parameters

Parameter	Parameter description	Values	Value description
<audio_in>	Audio input port number	**I1-I5**	
<level>	The input signal balance setting	Number between -100 and 100 in step of 1.	-100 means left balance, 100 means right balance. Center is 0 (default).

Example

- SET /MEDIA/AUDIO/I5.Balance=10
- pw /MEDIA/AUDIO/I5.Balance=10

7.8.6.4. Setting the Gain

Command and Response

- SET·/MEDIA/AUDIO/<audio_in>.Gain=<level>
- pw·/MEDIA/AUDIO/<audio_in>.Gain=<level>

Parameters

Parameter	Parameter description	Values	Value description
<audio_in>	Audio input port number	**I1-I5**	
<level>	The input signal gain in dB	Number between -12 and 6 in step of 3.	The value is rounded down if necessary, to match the step value.

Example

- SET /MEDIA/AUDIO/I5.Gain=3
- pw /MEDIA/AUDIO/I5.Gain=3.00

7.8.7. Analog Audio Input Level Settings by Steps

7.8.7.1. Setting the Volume (dB)

Command and Response *#analogaudio #volume*

- CALL·/MEDIA/AUDIO/<audio_in>:stepVolumedB(<step>)
- m0·/MEDIA/AUDIO/<audio_in>:stepVolumedB

Parameters

Parameter	Parameter description	Values	Parameter values
<audio_in>	Audio input port number	**I1-I5**	
<step>	Gain setting in dB		Volume is increased or decreased by the given value in dB.

Example

- CALL /MEDIA/AUDIO/I5:stepVolumedB(-1)
- m0 /MEDIA/AUDIO/I5:stepVolumedB

The volume is decreased with 1 dB, the current volume is -1 dB, which means 91.21% in percent.

7.8.7.2. Setting the Volume (in Percent)

Command and Response

- CALL·/MEDIA/AUDIO/<audio_in>:stepVolumePercent(<step>)
- m0·/MEDIA/AUDIO/<audio_in>:stepVolumePercent

Parameters

Parameter	Parameter description	Values	Parameter values
<audio_in>	Audio input port number	**I1-I5**	
<step>	The input volume (attenuation) in percent		Volume is increased or decreased by the given value in percent.

Example

- CALL /MEDIA/AUDIO/I5:stepVolumePercent(5)
- m0 /MEDIA/AUDIO/I5:stepVolumePercent

The volume is increased with 5%, the current volume is -0.83 dB, which means 95% in percent.

7.8.7.3. Setting the Balance

Command and Response *#balance*

- CALL·/MEDIA/AUDIO/<audio_in>:stepBalance(<step>)
- m0·/MEDIA/AUDIO/<audio_in>:stepBalance

Parameters

Parameter	Parameter description	Values	Value description
<audio_in>	Audio input port number	**I1-I5**	
<step>	The input signal balance setting	Number between -100 and 100 in step of 1.	Balance is shifted to left or right depending on the given value. -100 means left balance, 100 means right balance. Center is 0 (default).

Example

- CALL /MEDIA/AUDIO/I5:stepBalance(1)
- m0 /MEDIA/AUDIO/I5:stepBalance

The balance is shifted to right with 1 step.

7.8.8. Analog Audio Output Level Settings

7.8.8.1. Setting the Volume (dB)

Command and Response *#analogaudio #volume*

- SET·/MEDIA/AUDIO/<audio_out>.VolumedB=<level>
- pw·/MEDIA/AUDIO/<audio_out>.VolumedB=<level>

Parameters

Parameter	Parameter description	Values	Value description
<audio_out>	Audio output port number	**O1, O2, O3**	
<level>	The output volume (attenuation) in dB	Number between -57 and 0 in step of -0.375.	The value is rounded up if necessary, to match with the step value.

Example

- SET /MEDIA/AUDIO/O3.VolumedB=-15
- pw /MEDIA/AUDIO/O3.VolumedB=-15.00

7.8.8.2. Setting the Volume (Percent)

Command and Response *#volume*

- SET·/MEDIA/AUDIO/<audio_out>.VolumePercent=<percent>
- pw·/MEDIA/AUDIO/<audio_out>.VolumePercent=<percent>

Parameters

Parameter	Parameter description	Values	Value description
<audio_out>	Audio output port number	**O1, O2, O3**	
<percent>	The output volume (attenuation) in percent	Number between 0 and 100 in step of 1	The value is rounded up if necessary, to match with the step value.

Example

- SET /MEDIA/AUDIO/O3.VolumePercent=50
- pw /MEDIA/AUDIO/O3.VolumePercent=50.00

7.8.8.3. Setting the Balance

Command and Response *#balance*

- SET·/MEDIA/AUDIO/<audio_out>.Balance=<level>
- pw·/MEDIA/AUDIO/<audio_out>.Balance=<level>

Parameters

Parameter	Parameter description	Values	Value description
<audio_out>	Audio output port number	**O1, O2, O3**	
<level>	The output signal balance	Number between -100 and 100 in step of 1	Center setting is 0 (default).

Example

- SET /MEDIA/AUDIO/O3.Balance=0
- pw /MEDIA/AUDIO/O3.Balance=0

7.8.9. Analog Audio Output Level Settings by Steps

7.8.9.1. Setting the Volume (dB)

Command and Response *#analogaudio #volume*

- CALL·/MEDIA/AUDIO/<audio_out>:stepVolumedB(<step>)
- m0·/MEDIA/AUDIO/<audio_out>:stepVolumedB

Parameters

Parameter	Parameter description	Values	Value description
<audio_out>	Audio output port number	**O1, O2, O3**	
<step>	The output volume (attenuation) in dB		Volume is increased or decreased with the given value in dB.

Example

- CALL /MEDIA/AUDIO/O3:stepVolumedB(-1)
- m0 /MEDIA/AUDIO/O3:stepVolumedB

The volume is decreased with 1 dB, the current volume is -1.95 dB, which means 77.84% in percent.

7.8.9.2. Setting the Volume (Percent)

Command and Response

- CALL·/MEDIA/AUDIO/<audio_out>:stepVolumePercent(<step>)
- m0·/MEDIA/AUDIO/<audio_out>:stepVolumePercent

Parameters

Parameter	Parameter description	Values	Value description
<audio_out>	Audio output port number	**O1, O2, O3**	
<step>	The output volume (attenuation) in percent		Volume is increased or decreased with the given value in percent.

Example

- CALL /MEDIA/AUDIO/O3:stepVolumePercent(5)
- m0 /MEDIA/AUDIO/O3:stepVolumePercent

The volume is increased with 5%, the current volume is -1.52 dB, which means 82.84% in percent.

7.9. Event Manager Basics

The graphical interface of the Event Manager can be found in the LDC, which allows creating any kind of Event. In certain cases, the Events have to be arranged or modified by LW3 commands from another device.

7.9.1. How to arrange an Event?

The following are necessary to have a successful event:

- Defining the **Condition**
- Defining the **Action**
- Setting the **Delay** (optional)
- **Name** the Event and set to **Enabled**

INFO: Setting the Event to **Enabled** as the last step is recommended.

7.9.2. Setting a Condition by Specifying a Direct Path

Command and Response

- SET·/EVENTS/E<loc>.Condition=<expression>
- pw·/EVENTS/E<loc>.Condition=<expression>

Parameters

The structure of the <expression> is: <node_path>.<property>=<value>.

Example 1

- SET /EVENTS/E1.Condition=/MEDIA/VIDEO/I1.SignalPresent=1
- pw /EVENTS/E1.Condition=/MEDIA/VIDEO/I1.SignalPresent=1

The Condition is fulfilled if the **SignalPresent** property changes to '1'.

Example 2

In some cases, the opposite is necessary: when the property does **not** equal with the value. If you need so, the **ConditionInverted** property must be set to **true**:

- SET /EVENTS/E2.Condition=/MEDIA/VIDEO/O1.ConnectedSource=I1
- pw /EVENTS/E2.Condition=/MEDIA/VIDEO/O1.ConnectedSource=I1
- SET /EVENTS/E2.ConditionInverted=true
- pw /EVENTS/E2.ConditionInverted=true

The Condition is fulfilled if the **ConnectedSource** property does not equal with 'I1' (in other words: if other input port is connected to O1 than I1).

Example 3

Sometimes, it is enough if the value of a property changes to anything. In this case, just put a **?** to the end of the property:

- SET /EVENTS/E3.Condition=/MEDIA/VIDEO/O1.ConnectedSource?
- pw /EVENTS/E2.Condition=/MEDIA/VIDEO/O1.ConnectedSource?

7.9.3. Setting a Condition by Linking Another Condition

Command and Response

- SET·/EVENTS/E<loc>.Condition=<event_nr>
- pw·/EVENTS/E<loc>.Condition=<event_nr>

Parameters

The <event_nr> means the number (location) of the linked event without letter 'E'.

Example

- SET /EVENTS/E2.Condition=1
- pw /EVENTS/E2.Condition=1

The Condition of the E2 Event is set to be the same as set at E1 Event.

7.9.4. Setting a Condition by Linking More Conditions

DIFFERENCE: This command is available from firmware v1.6.0b19.

The first generation of the Event Manager is able to sense a change (one condition), but in some cases that is not enough. The practical experience has shown there is a need to examine more conditions (up to four) as follows: if one of the set conditions becomes true (while the other conditions are fulfilled), then the set Action is launched.

Command and Response

- SET·/EVENTS/E<loc>.Condition=<event_nr>&<event_nr>&<event_nr>&<event_nr>
- pw·/EVENTS/E<loc>.Condition=<event_nr>&<event_nr>&<event_nr>&<event_nr>

Parameters

The <event_nr> parameters mean the numbers (locations) of the linked Events without letter 'E'.

Example

- SET /EVENTS/E3.Condition=1&2&3
- pw /EVENTS/E3.Condition=1&2&3

If two Conditions exist and the third is detected (changes to true), the Condition of E4 will be fulfilled and the Action of E4 will be launched.

TIPS AND TRICKS: You do not have to define Actions for E1, E2 and E3 Events, and you can leave those **Disabled**.

7.9.5. Setting an Action by Specifying a Direct Path

Command and Response

- SET·/EVENTS/E<loc>.Action=<expression>
- pw·/EVENTS/E<loc>.Action=<expression>

Parameters

The structure of the <expression> is: <node_path>.<property_or_method>=<value>. Properties and methods are handled in the same way: dot (.) stands after the path in both cases, colon (:) is not used. Do not use brackets for methods. The <value> parameter is optional in case of certain methods.

Example

- SET /EVENTS/E1.Action=/MEDIA/VIDEO/XP.switch=I4:O1
- pw /EVENTS/E1.Action=/MEDIA/VIDEO/XP.switch=I4:O1

7.9.6. Setting an Action by Linking Another Action

Command and Response

- SET·/EVENTS/E<loc>.Action=<event_nr>
- pw·/EVENTS/E<loc>.Action=<event_nr>

Parameters

The <event_nr> means the number (location) of the linked event without letter 'E'.

Example

- SET /EVENTS/E2.Action=1
- pw /EVENTS/E2.Action=1

The Action of the E2 Event is set to be the same as set at E1 Event.

7.9.7. Setting an Action by Linking a Macro

DIFFERENCE: This command is available from FW package v1.6.0b19.

Command and Response

- SET·/EVENTS/E<loc>.Action=<macro_name>
- pw·/EVENTS/E<loc>.Action=<macro_name>

Parameters

The <macro_name> means the name of the macro that can be seen in LDC (see the Macros section) or can be queried by the **`GET /CTRL/MACROS.<id>`** command.

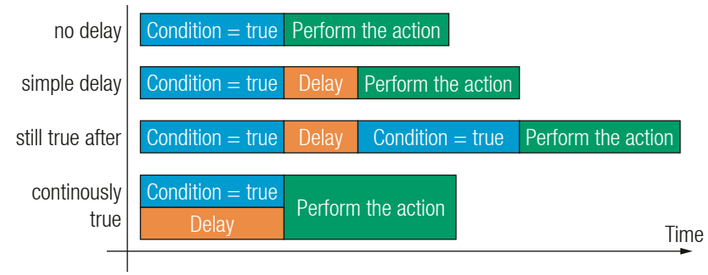
Example

- SET /EVENTS/E1.Action=Macro1
- pw /EVENTS/E1.Action=Macro1

7.10. Event Manager Tool Kit

7.10.1. Setting the Delay

In most cases, the Action is performed immediately after the Condition is detected. But sometimes a delay is necessary between the Condition and the Action, thus the following delay options are defined:



Command and Response (summary)

- SET·/EVENTS/E<loc>.ConditionTimeout=<time>
- pw·/EVENTS/E<loc>.ConditionTimeout=<time>
- SET·/EVENTS/E<loc>.ConditionEndCheck=<true/false>
- pw·/EVENTS/E<loc>.ConditionEndCheck=<true/false>
- SET·/EVENTS/E<loc>.ConditionTimeoutContinuous=<true/false>
- pw·/EVENTS/E<loc>.ConditionTimeoutContinuous=<true/false>

Parameters

The <time> parameter means seconds. Set the following properties for the desired delay type:

Delay type	Properties to set	Value	Result
no delay	/EVENTS/E<loc>.ConditionTimeout	**0**	The Action will be lanuched after the Condition is detected.
simple delay	/EVENTS/E<loc>.ConditionTimeout	<time>	If the Condition is detected, the action will be launched after the set time.
still true after	/EVENTS/E<loc>.ConditionTimeout	<time>	The Condition is fulfilled only if is detected after the set time **again**.
	/EVENTS/E<loc>.ConditionEndCheck	**true**	
continuously true	/EVENTS/E<loc>.ConditionTimeout	<time>	The Condition is fulfilled only if it is existing **continuously** during the set time.
	/EVENTS/E<loc>.ConditionEndCheck	**true**	
	/EVENTS/E<loc>.ConditionTimeoutContinuous	**true**	

Example 1 (simple delay)

- SET /EVENTS/E1.ConditionTimeout=10
- pw /EVENTS/E1.ConditionTimeout=10

If the Condition is detected (the **ConditionDetect** property becomes **true**), the **ConditionTimeoutPending** property becomes **true**. 10 seconds later the **ConditionTimeoutPending** property becomes **false** and the set Action is launched.

Example 2 ('still true after' delay type)

- SET /EVENTS/E1.ConditionTimeout=10
- pw /EVENTS/E1.ConditionTimeout=10
- SET /EVENTS/E1.ConditionTimeoutPending=true
- pw /EVENTS/E1.ConditionTimeoutPending=true

If the Condition is detected (the **ConditionDetect** property becomes **true**), the **ConditionTimeoutPending** property becomes **true**. 10 seconds later the Condition is checked again (the **ConditionTimeoutPending** property becomes **false**). If the Condition can be detected again (the **ConditionDetect** property becomes **true** again), the Condition is fulfilled and the set Action is launched.

Example 3 ('continuously true' delay type)

- SET /EVENTS/E1.ConditionTimeout=10
- pw /EVENTS/E1.ConditionTimeout=10
- SET /EVENTS/E1.ConditionTimeoutContinuous=true
- pw /EVENTS/E1.ConditionTimeoutContinuous=true

If the Condition is detected (the **ConditionDetect** property becomes **true**), the **ConditionTimeoutPending** property becomes **true**. If the Condition can be detected in the following 10 seconds continuously (the **ConditionDetect** property stays **true**), the Condition is fulfilled, the **ConditionTimeoutPending** property becomes **false**, and the set Action is launched.

7.10.2. Setting the Name of the Event

Command and Response

- SET·/EVENTS/E<loc>.Name=<string>
- pw·/EVENTS/E<loc>.Name=<string>

Parameters

The <string> may contain letters (A-Z) and (a-z), numbers (0-9), special characters: hyphen (-), underscore (_), and space ( ) up to 20 characters. Longer string results an error, unaccepted characters are skipped.

Example

- SET /EVENTS/E1.Name=Projector_ON
- pw /EVENTS/E1.Name=Projector_ON

7.10.3. Enabling/Disabling the Event

Command and Response

- SET·/EVENTS/E<loc>.Enabled=<true/false>
- pw·/EVENTS/E<loc>.Enabled=<true/false>

Parameters

When the property value is **true** (or **1**), the Action will be launched if the Condition is detected. If the property is **false** (or **0**), the Action will not run, however, the Condition counter will be increased when detected.

Example

- SET /EVENTS/E1.Enabled=true
- pw /EVENTS/E1.Enabled=true

7.10.4. Triggering a Condition

DIFFERENCE: This command is available from firmware v1.6.0b19.

This feature works like a condition is fulfilled. When a complex control system is built, a Condition may trigger numerous Actions. A typical example is when a system is powered on and the 'ready-to-use' state has to be loaded. In this case, there could be many actions which are based on the same condition. In order to reduce the number of the commands, you can trigger one 'key' condition, which starts the whole process.

Command and Response

- CALL·/EVENTS/E<loc>:triggerCondition(1)
- mO·/EVENTS/E<loc>:triggerCondition

Example

- CALL /EVENTS/E1:triggerCondition(1)
- mo /EVENTS/E1:triggerCondition

The Condition of Event1 is fulfilled, the set Action will be launched (after the delay if set).

7.10.5. Querying the Condition Counter

This property shows how many times the Condition has been detected and triggered altogether. The counter is reset at boot.

Command and Response

- GET·/EVENTS/E<loc>.ConditionCount
- pw·/EVENTS/E<loc>.ConditionCount=<num_value>

Example

- GET /EVENTS/E1.ConditionCount
- pw /EVENTS/E1>.ConditionCount=5

7.10.6. Querying the Condition Trigger Counter

DIFFERENCE: This command is available from firmware v1.6.0b19.

This property shows how many times the Condition has been triggered, but does not contain the number of real detections. The counter is reset at boot.

Command and Response

- GET·/EVENTS/E<loc>.ExternalConditionTriggerCount
- pw·/EVENTS/E<loc>.ExternalConditionTriggerCount=<num_value>

Example

- GET /EVENTS/E1.ExternalConditionTriggerCount
- pw /EVENTS/E1.ExternalConditionTriggerCount=2

7.10.7. Testing an Action

This tool is for launching the Action without detecting or triggering the Condition.

Command and Response

- CALL·/EVENTS/E<loc>:ActionTest(1)
- mO·/EVENTS/E<loc>:ActionTest

Example

- CALL /EVENTS/E1:ActionTest(1)
- mO /EVENTS/E1:ActionTest

7.11. Variable-Management

DIFFERENCE: This feature and the commands below are available from firmware v1.6.0b19.

Custom variables (30 pcs.) can be defined in number or text format, which are also available in the Event Manager. The maximum length of a variable can be 15 characters and they are stored in a non-volatile memory, thus the value is kept in case of a reboot. The type of the variable (text or string) is determined automatically based on the value. If an operation cannot be performed (e.g. adding number value to a string-type variable), error will be the response. #variables

7.11.1. Value Assignment

Command and Response

- SET·/CTRL/VARS/V<loc>.Value=<value>
- pw·/CTRL/VARS/V<loc>.Value=<value>

Parameters

Parameter	Parameter description	Value	Value description
<loc>	The location of the variable	**1-30**	
<value>	The value of the variable	**Custom**	Length can be max 15 characters. Numeric variable is defined between -2147483648 and 2147483647.

Example

- SET /CTRL/VARS/V1.Value=120
- pw /CTRL/VARS/V1.Value=120

7.11.2. Addition and Subtraction (Add Method)

The value of a numeric variable can be increased by adding a positive value or it can be decreased by adding a negative value. Minimum and maximum values can be defined as limits.

Command and Response

- CALL·/CTRL/VARS/V<loc>:add(<operand>;<min>;<max>)
- mO·/CTRL/VARS/V<loc>:add

Parameters

Parameter	Parameter description	Value	Value description
<loc>	The location of the variable	**1-30**	
<operand>	The value that is added to the variable	**Integer**	Negative value is also accepted
<min>	The lowest allowed value (optional)	**Integer**	Negative value is also accepted
<max>	The highest allowed value (optional)	**Integer**	Negative value is also accepted

If the value of the variable is higher or equals with <max>, the new value will be <max>. Likewise, in case of <min> setting: if the value of the variable is lower or equals with <min>, the new value will be <min>.

Examples

Change messages (CHG) can be seen after each response for the better understanding, which is not part of the command, but it can be set as described in the Subscription section.

Example 1 – addition

- GET /CTRL/VARS/V1.Value
- pw /CTRL/VARS/V1.Value=6
- CALL /CTRL/VARS/V1:add(1)
- mO /CTRL/VARS/V1:add
- CHG /CTRL/VARS/V1.Value=7
- CALL /CTRL/VARS/V1:add(1)
- mO /CTRL/VARS/V1:add
- CHG /CTRL/VARS/V1.Value=8
- CALL /CTRL/VARS/V1:add(2)
- mO /CTRL/VARS/V1:add
- CHG /CTRL/VARS/V1.Value=10

Example 2 – subtraction

- GET /CTRL/VARS/V1.Value
- pw /CTRL/VARS/V1.Value=10
- CALL /CTRL/VARS/V1:add(-2)
- mO /CTRL/VARS/V1:add
- CHG /CTRL/VARS/V1.Value=8
- CALL /CTRL/VARS/V1:add(-2)
- mO /CTRL/VARS/V1:add
- CHG /CTRL/VARS/V1.Value=6
- CALL /CTRL/VARS/V1:add(-10)
- mO /CTRL/VARS/V1:add
- CHG /CTRL/VARS/V1.Value=-4

Example 3 – addition with 'max' value

- GET /CTRL/VARS/V1.Value
- pw /CTRL/VARS/V1.Value=16
- CALL /CTRL/VARS/V1:add(2;10;20)
- mO /CTRL/VARS/V1:add
- CHG /CTRL/VARS/V1.Value=18
- CALL /CTRL/VARS/V1:add(2;10;20)
- mO /CTRL/VARS/V1:add
- CHG /CTRL/VARS/V1.Value=20
- CALL /CTRL/VARS/V1:add(2;10;20)
- mO /CTRL/VARS/V1:add
- CHG /CTRL/VARS/V1.Value=20

Example 4 – subtraction with 'min' value

- GET /CTRL/VARS/V1.Value
- pw /CTRL/VARS/V1.Value=14
- CALL /CTRL/VARS/V1:add(-2;10;20)
- mO /CTRL/VARS/V1:add
- CHG /CTRL/VARS/V1.Value=12
- CALL /CTRL/VARS/V1:add(-2;10;20)
- mO /CTRL/VARS/V1:add
- CHG /CTRL/VARS/V1.Value=10
- CALL /CTRL/VARS/V1:add(-2;10;20)
- mO /CTRL/VARS/V1:add
- CHG /CTRL/VARS/V1.Value=10

7.11.3. Addition and Subtraction (Cycle Method)

The value of a numeric variable can be increased by adding a positive value or it can be decreased by adding a negative value. Minimum and maximum values can be defined as limits. This method has the feature that if the value hits the limit (min/max), the value will be stepped to the other end of the interval.

Command and Response

- CALL·/CTRL/VARS/V<loc>:cycle(<operand>;<min>;<max>)
- mO·/CTRL/VARS/V<loc>:cycle

Parameters

Parameter	Parameter description	Value	Value description
<loc>	The location of the variable	**1-30**	
<operand>	The value that is added to the variable	**Integer**	Negative value is also accepted
<min>	The lowest allowed value (optional)	**Integer**	Negative value is also accepted
<max>	The highest allowed value (optional)	**Integer**	Negative value is also accepted

If the calculated value is beyond the limit (min/max), the value will be stepped to the other end of the interval.

Examples

Change messages (CHG) can be seen after each response for the better understanding, which is not part of the command, but it can be set as described in the Subscription section.

Example 1 – addition

- GET /CTRL/VARS/V1.Value
- pw /CTRL/VARS/V1.Value=18
- CALL /CTRL/VARS/V1:cycle(1;10;20)
- mO /CTRL/VARS/V1:cycle
- CHG /CTRL/VARS/V1.Value=19
- CALL /CTRL/VARS/V1:cycle(1;10;20)
- mO /CTRL/VARS/V1:cycle
- CHG /CTRL/VARS/V1.Value=20
- CALL /CTRL/VARS/V1:cycle(1;10;20)
- mO /CTRL/VARS/V1:cycle
- CHG /CTRL/VARS/V1.Value=10
- CALL /CTRL/VARS/V1:cycle(1;10;20)
- mO /CTRL/VARS/V1:cycle
- CHG /CTRL/VARS/V1.Value=11

Example 2 – subtraction

- GET /CTRL/VARS/V1.Value
- pw /CTRL/VARS/V1.Value=13
- CALL /CTRL/VARS/V1:cycle(-2;10;20)
- mO /CTRL/VARS/V1:cycle
- CHG /CTRL/VARS/V1.Value=11
- CALL /CTRL/VARS/V1:cycle(-2;10;20)
- mO /CTRL/VARS/V1:cycle
- CHG /CTRL/VARS/V1.Value=20
- CALL /CTRL/VARS/V1:cycle(-2;10;20)
- mO /CTRL/VARS/V1:cycle
- CHG /CTRL/VARS/V1.Value=18

7.11.4. Value Change with Intervals (Case)

This command can be used to change the value of a variable if it fits in any of the defined intervals.

Command and Response

- CALL·/CTRL/VARS/V<loc>:case(<min> <max> <val>;)
- mO·/CTRL/VARS/V<loc>:case

Parameters

Parameter	Parameter description	Value
<loc>	The location of the variable	**1-30**
<min>	The lowest value of the interval	**Integer**
<max>	The highest value of the interval	**Integer**
<val>	The new value that will be valid if the current value is in the interval	**Integer**

The parameters are divided by a space character, and the interval groups are divided by semicolon. Up to 16 cases can be defined.

Examples

- CALL /CTRL/VARS/V1:case(10 20 15)
- mO /CTRL/VARS/V1:case

A typical example when two different ranges of values have to meet:

Incoming values: between 0 and 255 (e.g. the slider of a controller can have these values).

Outgoing values: between 0 and 100 (e.g. the controlled device accepts these values).

Defined cases:

	Min	Max	New value
Case 1	1	25	10
Case 2	26	50	20
Case 3	51	75	30
Case 4	76	100	40
Case 5	101	125	50
Case 6	126	150	60
Case 7	151	175	70
Case 8	176	200	80
Case 9	201	225	90
Case 10	226	255	100

The command looks like:

- CALL /CTRL/VARS/V1:case(1 25 10;26 50 20;51 75 30;76 100 40;101 125 50;126 150 60;151 175 70; 176 200 80; 201 225 90; 226 255 100)
- mO /CTRL/VARS/V1:case

7.11.5. Scanning and Storing

This command can be used to get the value (or a part of the value) of an LW3 property. The defined path will be scanned according to the pattern and the result will be the value of the variable (number or string type).

Command and Response

- CALL·/CTRL/VARS/V<loc>:scanf(<path>.<property>;<pattern>)
- mO·/CTRL/VARS/V<loc>:scanf

Parameters

Parameter	Parameter description	Value
<loc>	The location of the variable	**1-30**
<path>.<property>	The LW3 property with node	
<pattern>	The pattern that scans the property for the desired result	**see below**

Pattern options

Pattern	Pattern description
%s	String of characters stopping at the first whitespace character
%<number>s	The next <number> of characters (string) stopping at the first whitespace
%c	One character
%<number>c	The next <number> of characters
%[<characters>]	Defined characterset, specified between brackets
%[^<characters>]	Negated characterset, specified between brackets which will be skipped
%*	Ignored part
<custom_text>	User-defined text

The patterns can be combined to get the desired result as shown in the examples.

ATTENTION: Do not forget to escape the % character as shown in below example.

Examples

- CALL /CTRL/VARS/V1:scanf(/MEDIA/AUDIO/XP.SourcePortStatus;\%5c)
- mO /CTRL/VARS/V1:scanf
- GET /CTRL/VARS/V1.Value
- pw /CTRL/VARS/V1.Value=T00AA

A simple pattern has been applied: we need the first five characters from the property value.

Further Examples

<path>.<property>	Property Value	<pattern>	Scanned result
/MANAGEMENT/STATUS.CpuTemperature	42 C; 0;75; 0;7	%s	42
/MANAGEMENT/STATUS.CpuFirmware	1.6.0b10 r96	%12s	1.6.0b10
/MEDIA/VIDEO/XP.DestinationPortStatus	T00AA;T00AF	%6c	T00AA
/MEDIA/UART/P1.Rs232Configuration	57600, 8N1	%*[^,], %s	8N1
/MEDIA/AUDIO/XP.SourcePortStatus	T000A;T000B;T000F	%*6c%5c	T000B
/MANAGEMENT/NETWORK.HostName	lightware-00005031	lightware-%[0-9]	00005031

7.11.6. Reformatting a Value

The value of the variable can be changed by adding text as prefix and/or postfix.

ATTENTION: Think about the length of the value: 15 characters are allowed, the others are truncated.

Command and Response

- CALL·/CTRL/VARS/V<loc>:printf(<prefix>%s<postfix>)
- mO·/CTRL/VARS/V<loc>:printf

Parameters

Parameter	Parameter description	Value	Value description
<loc>	The location of the variable	**1-30**	
<prefix>	The text before the original value of the property (optional)	**Custom**	ASCII characters
%s	The original value of the variable		
<postfix>	The text following the original value of the property (optional)	**Custom**	ASCII characters

Example

- GET /CTRL/VARS/V1.Value
- pw /CTRL/VARS/V1.Value=01
- CALL /CTRL/VARS/V1:printf(PWR%s)
- mO /CTRL/VARS/V1:printf
- GET /CTRL/VARS/V1.Value
- pw /CTRL/VARS/V1.Value=PWR01

The 'PWR' string has been inserted before the original value.

7.12. Ethernet Port Configuration

7.12.1. Setting the DHCP State

> **ATTENTION:** When you change a network property, the new value is stored, but the **ApplySettings** method must always be called to apply the new settings. When two or more network parameters are changed, the **ApplySettings** method is enough to call once as a final step.

Command and Response *#dhcp #network #ipaddress*

- SET·/MANAGEMENT/NETWORK.DhcpEnabled=<dhcp_status>
- pw·/MANAGEMENT/NETWORK.DhcpEnabled=<dhcp_status>

Parameters

If the <dhcp_status> parameter is **true**, the current IP address setting is DHCP, if the parameter is **false**, the current IP address is static.

Example

- SET /MANAGEMENT/NETWORK.DhcpEnabled=true
- pw /MANAGEMENT/NETWORK.DhcpEnabled=true
- CALL /MANAGEMENT/NETWORK:ApplySettings()
- mO /MANAGEMENT/NETWORK:ApplySettings

> INFO: The **ApplySettings** method will save and apply the new value and will reboot the device.

> INFO: The current setting can be queried by the GET command.

7.12.2. Changing the IP Address (Static)

Command and Response

- SET·/MANAGEMENT/NETWORK.StaticIpAddress=<IP_address>
- pw·/MANAGEMENT/NETWORK.StaticIpAddress=<IP_address>

Example

- SET /MANAGEMENT/NETWORK.StaticIpAddress=192.168.0.85
- pw /MANAGEMENT/NETWORK.StaticIpAddress=192.168.0.85
- CALL /MANAGEMENT/NETWORK:ApplySettings()
- mO /MANAGEMENT/NETWORK:ApplySettings

> INFO: The **ApplySettings** method will save and apply the new value and will reboot the device.

> INFO: The current setting can be queried by the GET command.

7.12.3. Changing the Subnet Mask (Static)

Command and Response *#ipaddress*

- SET·/MANAGEMENT/NETWORK.StaticNetworkMask=<netmask>
- pw·/MANAGEMENT/NETWORK.StaticNetworkMask=<netmask>

Example

- SET /MANAGEMENT/NETWORK.StaticNetworkMask=255.255.255.0
- pw /MANAGEMENT/NETWORK.StaticNetworkMask=255.255.255.0
- CALL /MANAGEMENT/NETWORK:ApplySettings()
- mO /MANAGEMENT/NETWORK:ApplySettings

> INFO: The **ApplySettings** method will save and apply the new value and will reboot the device.

> INFO: The current setting can be queried by the GET command.

7.12.4. Changing the Gateway Address (Static)

Command and Response

- SET·/MANAGEMENT/NETWORK.StaticGatewayAddress=<gw_address>
- pw·/MANAGEMENT/NETWORK.StaticGatewayAddress=<gw_address>

Example

- SET /MANAGEMENT/NETWORK.StaticGatewayAddress=192.168.0.5
- pw /MANAGEMENT/NETWORK.StaticGatewayAddress=192.168.0.5
- CALL /MANAGEMENT/NETWORK:ApplySettings()
- mO /MANAGEMENT/NETWORK:ApplySettings

> INFO: The **ApplySettings** method will save and apply the new value and will reboot the device.

> INFO: The current setting can be queried by the GET command.

7.12.5. Applying Network Settings

Command and Response

- CALL·/MANAGEMENT/NETWORK:ApplySettings()
- m0·/MANAGEMENT/NETWORK:ApplySettings

Example

- CALL /MANAGEMENT/NETWORK:ApplySettings()
- m0 /MANAGEMENT/NETWORK:ApplySettings

All network settings that are changed are applied and network interface restarts.

7.13. Ethernet Tool Kit

DIFFERENCE: This feature and the commands below are available from firmware v1.6.0b19.

7.13.1. Device Filter Based on MAC Address

You can create a list of network devices based on the MAC address that are allowed controlling the device, or querying parameters to/from the Lightware device. *#macfilter*

ATTENTION: If the device is installed in a network where it gets IP address from a DHCP server and you plan to use the MAC filtering, make sure the MAC address of the DHCP server is added to the whitelist. Otherwise, the device will not got an IP address and will be unreachable.

Command and Response

- SET·/MANAGEMENT/MACFILTER.MACaddress<loc>=<MAC_address>;<receive>;<send>;<name>
- pw·/MANAGEMENT/MACFILTER.MACaddress<loc>=<MAC_address>;<receive>;<send>;<name>

The filter is disabled as default. Set the **FilterEnable** property to **true** as shown in the example.

Parameters

Parameter	Parameter description	Values	Value description
<loc>	Location of the address	**1-8**	The default values of **1, 2** and **3** ensure that address resolution and device discovery continue to work after enabling the MAC filter
<MAC_address>	The MAC address of the device	Unique value	Hexadecimal format, divided by a colon
<receive>	Enable/disable the parameter querying option	**false** (or **0**)	The device is **not allowed** to query parameters from the LW device
		true (or **1**)	The device is **allowed** to query parameters from the LW device
<send>	Enable/disable the parameter setting option	**false** (or **0**)	The device is **not allowed** to change parameters in the LW device
		true (or **1**)	The device is **allowed** to change parameters in the LW device
<name>	Unique name for the better identification (optional)	Any string	Up to 5 ASCII characters (longer names are truncated)

Example

- SET /MANAGEMENT/MACFILTER/MACaddress4=(04:D4:C4:4D:01:43;1;1;Tech)
- pw /MANAGEMENT/MACFILTER/MACaddress4=(04:D4:C4:4D:01:43;1;1;Tech)
- SET /MANAGEMENT/MACFILTER.FilterEnable=true
- pw /MANAGEMENT/MACFILTER.FilterEnable=true

The new MAC address is saved into the 4th property with name 'Tech', which may query/set parameters from/in the Lightware device. The **FilterEnable** property is set to **true**, thus the filter is enabled.

7.13.2. LW2 Control Port Blocking

This command is for blocking the LW2 control port; it is an additional protection for the Cleartext login function.

Command and Response *#portblock*

- SET·/MANAGEMENT/SERVICEFILTER.Lw2Enabled=<port_mode>
- pw·/MANAGEMENT/SERVICEFILTER.Lw2Enabled=<port_mode>

Example

- SET /MANAGEMENT/SERVICEFILTER.Lw2Enabled=false
- pw /MANAGEMENT/SERVICEFILTER.Lw2Enabled=false

7.13.3. HTTP Port Blocking

This command is for blocking the HTTP port (80); it is an additional protection for the Cleartext login function.

Command and Response

- SET·/MANAGEMENT/SERVICEFILTER.HttpEnabled=<port_mode>
- pw·/MANAGEMENT/SERVICEFILTER.HttpEnabled=<port_mode>

Example

- SET /MANAGEMENT/SERVICEFILTER.HttpEnabled=true
- pw /MANAGEMENT/SERVICEFILTER.HttpEnabled=true

7.13.4. HTTP Post Receiving Blocking

This command is for blocking HTTP posts; it is an additional protection for the Cleartext login function.

Command and Response

- SET·/MANAGEMENT/SERVICEFILTER.HttpEnabled=<port_mode>
- pw·/MANAGEMENT/SERVICEFILTER.HttpEnabled=<port_mode>

Example

- SET /MANAGEMENT/SERVICEFILTER.HttpEnabled=true
- pw /MANAGEMENT/SERVICEFILTER.HttpEnabled=true

7.13.5. Powering on a Computer over Ethernet (Wake-on-LAN)

The well-known wake-on-lan feature (sending magic Packet to the target PC) is available by the following command:

Command and Response

- CALL·/MEDIA/ETHERNET:wakeOnLan(MAC_address)
- mO·/MEDIA/ETHERNET:wakeOnLan

Example

- CALL /MEDIA/ETHERNET:wakeOnLan(AA:BB:CC:22:14:FF)
- mO /MEDIA/ETHERNET:wakeOnLan

Please make sure the feature is enabled in the target PC and it is powered (but switched off).

7.13.6. Setting the Hostname

DIFFERENCE: This command is available only from FW package v1.6.0b19.

The hostname is a property that can be used instead of the IP address when connecting to the device. It is also suitable for finding in the Device Discovery window of the LDC, see more details in the Add New Favorite Device section. Furthermore, it can be used to open the The Built-in Miniweb. If the IP address of the device is changing, the hostname can be used as a fixed property.

Command and Response

- SET·/MANAGEMENT/NETWORK.HostName=<unique_name>
- pw·/MANAGEMENT/NETWORK.HostName=<unique_name>

Parameters

The <unique_name> can be 1-64 characters long and the following are allowed for naming: the elements of the English alphabet and numbers. Hyphen (-) and dot (.) is also accepted, except as last character.

Example

- SET /MANAGEMENT/NETWORK.HostName=mtg-room1
- pw /MANAGEMENT/NETWORK.HostName=mtg-room1

7.14. Ethernet Message Sending

The device can be used for sending a message to a certain IP:port address. The three different commands allow controlling the connected (third-party) devices.

7.14.1. Sending a TCP Message (ASCII-format)

The command is for sending a command message in ASCII-format. This method allows escaping the control characters. For more information, see the Escaping section.

Command and Response

- CALL·/MEDIA/ETHERNET:tcpMessage(<IP_address>:<port_no>=<message>)
- mO·/MEDIA/ETHERNET:tcpMessage

Example

- CALL /MEDIA/ETHERNET:tcpMessage(192.168.0.103:6107=C00)
- mO /MEDIA/ETHERNET:tcpMessage

The 'C00' message is sent to the indicated IP:port address.

Example with HEX codes

- CALL /MEDIA/ETHERNET:tcpMessage(192.168.0.20:5555=C00\x0a\x0d)
- mO /MEDIA/ETHERNET:tcpMessage

The 'C00' message with CrLf (Carriage return and Line feed) is sent to the indicated IP:port address. The \x sequence indicates the HEX code; see more information in the Using Hexadecimal Codes section.

7.14.2. Sending a TCP Text (ASCII-format)

The command is for sending a text message in ASCII-format. This method **does not allow** escaping or inserting control characters.

Command and Response

- CALL·/MEDIA/ETHERNET:tcpText(<IP_address>:<port_no>=<text>)
- mO·/MEDIA/ETHERNET:tcpText

Example

- CALL /MEDIA/ETHERNET:tcpText(192.168.0.103:6107=pwr_on)
- mO /MEDIA/ETHERNET:tcpText

The 'pwr_on' text is sent to the indicated IP:port address.

7.14.3. Sending a TCP Binary Message (HEX-format)

The command is for sending a binary message in Hexadecimal format. This method **does not require** escaping the control and non-printable characters.

Command and Response

- CALL·/MEDIA/ETHERNET.tcpBinary(<IP_address>:<port_no>=<HEX_message>)
- mO·/MEDIA/ETHERNET:tcpBinary

Example

- CALL /MEDIA/ETHERNET:tcpBinary(192.168.0.103:6107=0100000061620000cdcc2c40)
- mO /MEDIA/ETHERNET:tcpBinary

The '0100000061620000cdcc2c40' message is sent to the indicated IP:port address.

INFO: There is no need to insert a space or other separator character between the binary messages.

7.14.4. Sending a UDP Message (ASCII-format)

The command is for sending a UDP message in ASCII-format. This method allows escaping the control characters. For more information, see the Escaping section.

Command and Response

- CALL·/MEDIA/ETHERNET:udpMessage(<IP_address>:<port_no>=<message>)
- mO·/MEDIA/ETHERNET:udpMessage

Example

- CALL /MEDIA/ETHERNET:udpMessage(192.168.0.103:6107=C00)
- mO /MEDIA/ETHERNET:udpMessage

The 'C00' message is sent to the indicated IP:port address.

Example with HEX codes

- CALL /MEDIA/ETHERNET:udpMessage(192.168.0.20:9988=C00\x0a\x0d)
- mO /MEDIA/ETHERNET:udpMessage

The 'C00' message with CrLf (Carriage return and Line feed) is sent to the indicated IP:port address. The \x sequence indicates the HEX code; see more information in the Using Hexadecimal Codes section.

7.14.5. Sending a UDP Text (ASCII-format)

The command is for sending a text message in ASCII-format via UDP-protocol. This method **does not allow** escaping or inserting control characters.

Command and Response

- CALL·/MEDIA/ETHERNET:udpText(<IP_address>:<port_no>=<text>)
- mO·/MEDIA/ETHERNET:udpText

Example

- CALL /MEDIA/ETHERNET:udpText(192.168.0.20:9988=open)
- mO /MEDIA/ETHERNET:udpText

The 'open' text is sent to the indicated IP:port address.

7.14.6. Sending a UDP Binary Message (HEX-format)

The command is for sending a binary message in Hexadecimal format. This method **does not require** escaping the control and non-printable characters.

Command and Response

- CALL·/MEDIA/ETHERNET:udpBinary(<IP_address>:<port_no>=<HEX_message>)
- mO·/MEDIA/ETHERNET:udpBinary

Example

- CALL /MEDIA/ETHERNET:udpBinary(192.168.0.20:9988=433030)
- mO /MEDIA/ETHERNET:udpBinary

The '433030' message is sent to the indicated IP:port address.

INFO: There is no need to insert a space or other separator character between the binary messages.

7.15. HTTP Messaging

DIFFERENCE: This feature and the commands below are available from firmware v1.6.0b19.

Http **post** and **put** messages can be sent from the Lightware device for more integration with third-party devices. *#http*

ATTENTION: This feature means posting or putting **HTTP** messages from the Lightware device to another device. Encrypted transmission (**HTTPS**) is not supported.

7.15.1. Setting the Target IP Address

Command and Response

- SET·/CTRL/HTTP/C1.ServerIP=<IP_address>
- pw·/CTRL/HTTP/C1.ServerIP=<IP_address>

Example

- SET /CTRL/HTTP/C1.ServerIP=192.168.0.220
- pw /CTRL/HTTP/C1.ServerIP=192.168.0.220

7.15.2. Setting the TCP Port

Command and Response

- SET·/CTRL/HTTP/C1.ServerPort=<port_no>
- pw·/CTRL/HTTP/C1.ServerPort=<port_no>

Example

- SET /CTRL/HTTP/C1.ServerPort=80
- pw /CTRL/HTTP/C1.ServerIP=80

7.15.3. Setting the Target Path

This property sets the path in the target device where the post/put message is to be sent.

Command and Response

- SET·/CTRL/HTTP/C1.File=<path>
- pw·/CTRL/HTTP/C1.File=<path>

Example

- SET /CTRL/HTTP/C1.File=/putxml
- pw /CTRL/HTTP/C1.File=/putxml

7.15.4. Setting the Message Header

Command and Response

- SET·/CTRL/HTTP/C1.Header=<header_text>
- pw·/CTRL/HTTP/C1.Header=<header_text>

Example

- SET /CTRL/HTTP/C1.Header=Host: 192.168.0.220\r\nContent-Type: text/xml\r\nAuthorization: Basic YWRtaW46TGlnaHR3YXJlMDE=
- pw /CTRL/HTTP/C1.Header=Host: 192.168.0.220\r\nContent-Type: text/xml\r\nAuthorization: Basic YWRtaW46TGlnaHR3YXJlMDE=

7.15.5. Sending a Post Message

Command and Response

- CALL·/CTRL/HTTP/C1:post(<body_text>)
- mO·/CTRL/HTTP/C1:post

Example

- CALL /CTRL/HTTP/C1:post(<Command><Message><Send><Text>LI1R_P</Text></Send></Message></Command>)
- mO /CTRL/HTTP/C1:post

7.15.6. Sending a Put Message

Command and Response

- CALL·/CTRL/HTTP/C1:put(<body_text>)
- mO·/CTRL/HTTP/C1:put

Example

- CALL /CTRL/HTTP/C1:put(<Command><Message><Send><Text>LI1R_P</Text></Send></Message></Command>)
- mO /CTRL/HTTP/C1:put

7.16. TCP Message Recognizer

DIFFERENCE: This feature and the commands below are available from firmware v1.6.0b19.

This tool can be used to recognize messages coming from a TCP server. You can link an immediate event Action that is run when a message is recognized, but you can also use it in Event Manager.
#tcprecognizer *#message*

Preparation

Step 1. Set a TCP client in the Lightware device (three TCP clients can be run at the same time), set the properties of the target TCP server.

Step 2. Set the **DelimiterHex** and the **TimeOut** settings for the proper message processing.

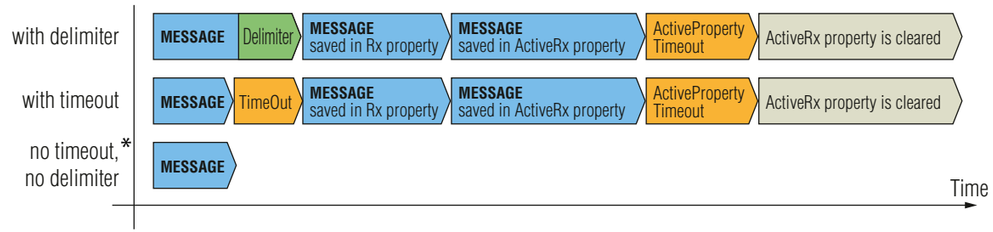
Step 3. Make sure the TCP/IP port is opened in the target device (think about Firewall settings in the network).

Step 4. Connect to the TCP server.

Working Method

A message got recognized from the incoming data if one of the following occurs:

- The set **DelimiterHex** is detected in the message, or
- The set **TimeOut** has passed since receiving the last data bit.



* In that case, the not-recognized data is kept in the memory (up to 128 bytes). If the **DelimiterHex** is detected later, or the **TimeOut** parameter is set meanwhile, the data appears in the **Rx**, **RxHex, Hash** and **ActiveRx**, **ActiveRxHex, ActiveRxHash** properties.

7.16.1. Setting the IP Address of the TCP Server

Command and Response

- SET·/CTRL/TCP/C<loc>.ServerIP(<IP_address>)
- pw·/CTRL/TCP/C<loc>.ServerIP(<IP_address>)

Parameters

The <loc> parameter can be 1, 2 or 3 as at most three TCP connections can be established at the same time.

Example

- SET /CTRL/TCP/C1.ServerIP(192.168.1.14)
- pw /CTRL/TCP/C1.ServerIP(192.168.1.14)

7.16.2. Setting the TCP/IP Port Number of the TCP Server

Command and Response

- SET·/CTRL/TCP/C<loc>.ServerPort(<port_no>)
- pw·/CTRL/TCP/C<loc>.ServerPort(<port_no>)

Example

- SET /CTRL/TCP/C1.ServerPort(4999)
- pw /CTRL/TCP/C1.ServerPort(4999)

7.16.3. Connecting to a TCP Server

Command and Response

- CALL·/CTRL/TCP/C<loc>:connect()
- mO·/CTRL/TCP/C<loc>:connect

Example

- CALL /CTRL/TCP/C1:connect()
- mO /CTRL/TCP/C1:connect

7.16.4. Disconnecting from a TCP Server

Command and Response

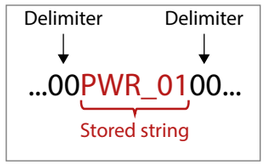
- CALL·/CTRL/TCP/C<loc>:disconnect()
- mO·/CTRL/TCP/C<loc>:disconnect

Example

- CALL /CTRL/TCP/C1:disconnect()
- mO /CTRL/TCP/C1:disconnect

7.16.5. Setting the Delimiter Hex

This property stores the delimiter that is between the messages (e.g. Cr, Lf, Space). The value has to be in hexadecimal format (e.g.0D, 0A, 20).



Command and Response

- SET·/CTRL/TCP/C<loc>.DelimiterHex=<delimiter>
- pw·/CTRL/TCP/C<loc>.DelimiterHex=<delimiter>

Parameters

The <delimiter> parameter can be max. 8-characters long (16 digits) in hexadecimal format.

Example

- SET /CTRL/TCP/C1.DelimiterHex=00
- pw /CTRL/TCP/C1.DelimiterHex=00

7.16.6. Setting the Timeout

When the set time passes after the last received message and delimiter was not detected, the device saves the data into the **Rx, RxHex, Hash** properties. The timeout setting is useful if there is no special or easily defined delimiter in the incoming data, but there is a time gap between the messages.

Command and Response

- SET·/CTRL/TCP/C<loc>.TimeOut=<timeout>
- pw·/CTRL/TCP/C<loc>.TimeOut=<timeout>

Parameters

The <timeout> parameter sets the time value in milliseconds: **0** means the timeout is disabled, min. value is 10.

Example

- SET /CTRL/TCP/C1.TimeOut=20
- pw /CTRL/TCP/C1.TimeOut=20

7.16.7. Querying the Last Recognized Message (String)

The recognized message is stored as a string in the property below until the next recognized message or until the **clear()** method is called.

> TIPS AND TRICKS: When this property is set as a condition in the Event Manager and the same strings follow each other, the action **will execute once**. (A Condition can be detected in Event Manager if a change happens. But if the same string is saved into the property after each other, it will not cause a change.)

Command and Response

- GET·/CTRL/TCP/C<loc>.Rx
- pr·/CTRL/TCP/C<loc>.Rx=<recognized_string>

Parameters

The <recognized_string> parameter can be max. 128 bytes long.

Example

- GET /CTRL/TCP/C1.Rx
- pr /CTRL/TCP/C1.Rx=PWR_off

7.16.8. Querying the Last Recognized Message (Hex)

The recognized message is stored as a hexadecimal message in the property below till the next recognized message or until the **clear()** method is called.

Command and Response

- GET·/CTRL/TCP/C<loc>.RxHex
- pr·/CTRL/TCP/C<loc>.RxHex=<recognized_hex_data>

Example

- GET /CTRL/TCP/C1.RxHex
- pr /CTRL/TCP/C1.RxHex=5057525F6F6666

7.16.9. Clearing the Last Recognized Stored Message

This method clears the stored recognized messages from **Rx**, **RxHex** and **Hash** properties.

Command and Response

- CALL·/CTRL/TCP/C<loc>:clear()
- mO·/CTRL/TCP/C<loc>:clear

Example

- CALL /CTRL/TCP/C1:clear()
- mO /CTRL/TCP/C1:clear

7.16.10. Querying the Last Recognized Active Message (String)

The recognized data is stored in string in the property below **temporary**. When the time set in the **ActiveTimeout** property passes, the property is cleared.

> TIPS AND TRICKS: When this property is set as a condition in the Event Manager and the same strings follow each other, the action **will execute every occasion.** (A Condition can be detected in Event Manager if a change happens. In this case, the string is stored in the property and after the **ActiveTimeout** it will be cleared. If the same string is saved into the (empty) property, it will cause a change.)

Command and Response

- GET·/CTRL/TCP/C<loc>.ActiveRx
- pr·/CTRL/TCP/C<loc>.ActiveRx=<recognized_string>

Parameters

The <recognized_string> parameter is a max. 12-byte-long recognized data string.

Example

- GET /CTRL/TCP/C1.ActiveRx
- pr /CTRL/TCP/C1.ActiveRx=AudOut+

> INFO: Please note that the property contains the string until the **ActivePropertyTimeout** passes only.

7.16.11. Querying the Last Recognized Active Message (Hex)

Command and Response

- GET·/CTRL/TCP/C<loc>.ActiveRxHex
- pr·/CTRL/TCP/C<loc>.ActiveRxHex=<recognized_hex>

Parameters

The <recognized_hex> parameter is the recognized data in hexadecimal format.

Example

- GET /CTRL/TCP/C1.ActiveRxHex
- pr /CTRL/TCP/C1.ActiveRxHex=4175644F75742B00

INFO: Please note that the property contains the data until the **ActivePropertyTimeout** passes only.

7.16.12. Setting the Active Timeout

This property is responsible for clearing the **ActiveRx**, **ActiveRxHex**, **ActiveHash** properties after the elapsed time. Default value is 50ms.

Command and Response

- SET·/CTRL/TCP/C<loc>.ActivePropertyTimeout=<a_timeout>
- pw·/CTRL/TCP/C<loc>.ActivePropertyTimeout=<a_timeout>

Parameters

The <a_timeout> parameter is the active timeout value (ms) between 0 and 255.

Example

- SET /CTRL/TCP/C1.ActivePropertyTimeout=255
- pw /CTRL/TCP/C1.ActivePropertyTimeout=255

7.16.13. Running an Immediate Event Action

When a message is recognized (DelimiterHex is detected in the message, or TimeOut has passed since receiving the last data bit) a specific Action of an Event can be run by the following command.

Command and Response

- SET·/CTRL/TCP/C<loc>.ActionTrigger=<event_nr>
- pw·/CTRL/TCP/C<loc>.ActionTrigger=<event_nr>

Parameters

The <event_nr> means the number (location) of the linked Event Action without letter 'E'. (There is no need to define a Condition in the linked Event.)

Example

- SET /CTRL/TCP/C1.ActivePropertyTimeout=255
- pw /CTRL/TCP/C1.ActivePropertyTimeout=255

7.17. RS-232 Port Configuration

INFO: Serial (local and link) port numbering can be found in the Input/Output Port Numbering section.

INFO: Only MMX4x2-HT200 model has TPS serial link.

7.17.1. Protocol Setting

Command and Response *#protocol #rs232 #rs-232 #serial*

- SET·/MEDIA/UART/<serial_port>.ControlProtocol=<ctrl_protocol>
- pw·/MEDIA/UART/<serial_port>.ControlProtocol=<ctrl_protocol>

Parameters

Parameter	Parameter description	Values	Value description
<serial_port>	Serial port number	**P1, P2**	
<ctrl_protocol>	RS-232 protocol mode	**0**	LW2
		1	LW3

Example

- SET /MEDIA/UART/P1.ControlProtocol=1
- pw /MEDIA/UART/P1.ControlProtocol=1

7.17.2. BAUD Rate Setting

Command and Response

- SET·/MEDIA/UART/<serial_port>.Baudrate=<baudrate>
- pw·/MEDIA/UART/<serial_port>.Baudrate=<baudrate>

Parameters

Parameter	Parameter description	Values	Value description
<serial_port>	Serial port number	**P1, P2**	
<baudrate>	Baud rate value	**0**	4800
		1	7200
		2	9600
		3	14400
		4	19200
		5	38400
		6	57600
		7	115200

Example

- SET /MEDIA/UART/P1.Baudrate=2
- pw /MEDIA/UART/P1.Baudrate=2

7.17.3. Stopbits Setting

Command and Response

- SET·/MEDIA/UART/<serial_port>.StopBits=<stopbit>
- pw·/MEDIA/UART/<serial_port>.StopBits=<stopbit>

Parameters

Parameter	Parameter description	Values	Value description
<serial_port>	Serial port number	**P1, P2**	
<stopbit>	Stopbit value	**0**	1
		1	1.5
		2	2

Example

- SET /MEDIA/UART/P1.StopBits=0
- pw /MEDIA/UART/P1.StopBits=0

7.17.4. Parity Setting

Command and Response

- SET·/MEDIA/UART/<serial_port>.Parity=<parity>
- pw·/MEDIA/UART/<serial_port>.Parity=<parity>

Parameters

Parameter	Parameter description	Values	Value description
<serial_port>	Serial port number	**P1, P2**	
<parity>	Parity value	**0**	no parity
		1	odd
		2	even

Example

- SET /MEDIA/UART/P1.Parity=0
- pw /MEDIA/UART/P1.Parity=0

7.17.5. Databit Setting

Command and Response

- SET·/MEDIA/UART/<serial_port>.DataBits=<databit>
- pw·/MEDIA/UART/<serial_port>.DataBits=<databit>

Parameters

Parameter	Parameter description	Values	Value description
<serial_port>	Serial port number	**P1, P2**	
<databit>	Databit value	**8, 9**	

Example

- SET /MEDIA/UART/P1.DataBits=8
- pw /MEDIA/UART/P1.DataBits=8

7.17.6. RS-232 Operation Mode

Command and Response *#commandinjection*

- SET·/MEDIA/UART/<serial_port>.Rs232Mode=<rs232_mode>
- pw·/MEDIA/UART/<serial_port>.Rs232Mode=<rs232_mode>

Parameters

Parameter	Parameter description	Values	Value description
<serial_port>	Serial port number	**P1, P2**	
<rs232_mode>	RS-232 operation mode	**0**	Pass-through
		1	Control
		2	Command Injection

Example

- SET /MEDIA/UART/P1.Rs232Mode=1
- pw /MEDIA/UART/P1.Rs232Mode=1

7.17.7. Enabling/Disabling Command Injection

Command and Response

- SET·/MEDIA/UART/<serial_port>.CommandInjectionEnable=<ci_enable>
- pw·/MEDIA/UART/<serial_port>.CommandInjectionEnable=<ci_enable>

Parameters

Parameter	Parameter description	Values	Value description
<serial_port>	Serial port number	**P1, P2**	
<ci_enable>	Command injection setting	**true**	Command Injection is enabled
		false	Command Injection is disabled

Example

- SET /MEDIA/UART/P1.CommandInjectionEnable=true
- pw /MEDIA/UART/P1.CommandInjectionEnable=true

INFO: The Command injection mode status is stored in the **CommandInjectionStatus** property.

7.18. RS-232 Message Sending

7.18.1. Sending a Message (ASCII-format) via RS-232

The command is for sending a command message in ASCII-format. This method **allows** escaping the control characters. For more information, see the Escaping section.

Command and Response *#message*

- CALL·/MEDIA/UART/P1:sendMessage(<message>)
- mO·/MEDIA/UART/P1:sendMessage

Example

- CALL /MEDIA/UART/P1:sendMessage(PWR0)
- mO /MEDIA/UART/P1:sendMessage

The 'PWR0' message is sent out via the P1 serial port.

7.18.2. Sending a Text (ASCII-format) via RS-232

The command is for sending a command message in ASCII-format. This method **does not require** escaping the control and non-printable characters.

Command and Response

- CALL·/MEDIA/UART/P1:sendText(<message>)
- mO·/MEDIA/UART/P1:sendText

Example

- CALL /MEDIA/UART/P1:sendText(open)
- mO /MEDIA/UART/P1:sendText

The 'open' text is sent out via the P1 serial port.

7.18.3. Sending a Binary Message (HEX-format) via RS-232

The command is for sending a binary message in Hexadecimal format. This method **does not require** escaping the control and non-printable characters.

Command and Response

- CALL·/MEDIA/UART/P1:sendBinaryMessage(<message>)
- mO·/MEDIA/UART/P1:sendBinaryMessage

Example

- CALL /MEDIA/UART/P1:sendBinaryMessage(433030)
- mO /MEDIA/UART/P1:sendBinaryMessage

The '433030' message is sent out via the P1 serial port.

7.18.4. Using Hexadecimal Codes

Hexadecimal codes can be inserted in the ASCII message when using:

sendMessage command: `CALL /MEDIA/UART/P1:sendMessage(C00\x0D)`

tcpMessage command: `CALL /MEDIA/ETHERNET:tcpMessage(C00\x0D)`

udpMessage command: `CALL /MEDIA/ETHERNET:udpMessage(C00\x0D)`

- **C00**: the message.
- **\x**: indicates that the following is a hexadecimal code.
- **0D**: the hexadecimal code (Carriage Return).

7.19. RS-232 Message Recognizer

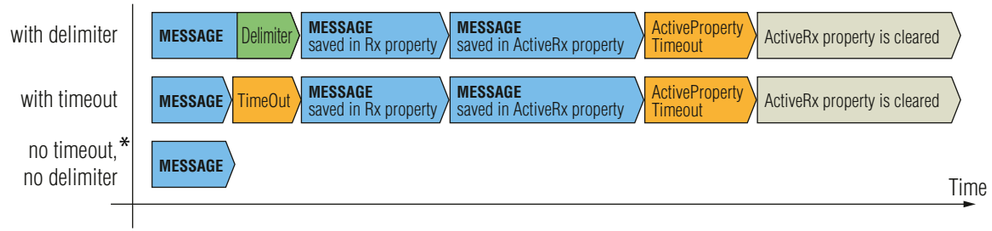
DIFFERENCE: This feature and the commands below are available from firmware v1.3.1.

This tool can be used to recognize messages coming from the RS-232 port. The message can be used as a Condition in Event Manager and an Action can be defined for it.

Working Method

A message got recognized from the incoming data if one of the following occurs:

- The set DelimiterHex is detected in the message, or
- The set TimeOut has passed since receiving the last data bit.



* In that case, the not-recognized data is kept in the memory (up to 128 bytes). If the **DelimiterHex** is detected later, or the **TimeOut** parameter is set in the meantime, the data appears in the **Rx**, **RxHex, Hash** and **ActiveRx**, **ActiveRxHex, ActiveRxHash** properties.

7.19.1. Enabling/Disabling the Recognizer

Command and Response

- SET·/MEDIA/UART/<serial_port>.RecognizerEnable=<recognizer_enable>
- pw·/MEDIA/UART/<serial_port>.RecognizerEnable=<recognizer_enable>

Parameters

Parameter	Parameter description	Values	Value description
<serial_port>	Serial port number	**P1, P2**	
<recognizer_enable>	Recognizer mode	**true**	Recognizer is enabled
		false	Recognizer is disabled

Example

- SET /MEDIA/UART/P1.RecognizerEnable=true
- pw /MEDIA/UART/P1.RecognizerEnable=true

#recognizer #rs232recognizer #rs-232recognizer

7.19.2. Setting the Delimiter Hex

This property stores the delimiter that is between the messages (e.g. Cr, Lf, Space). The value has to be in hexadecimal format (e.g.0D, 0A, 20).



Command and Response

- SET·/MEDIA/UART/RECOGNIZER.DelimiterHex=<delimiter>
- pw·/MEDIA/UART/RECOGNIZER.DelimiterHex=<delimiter>

Parameters

The <delimiter> parameter can be max. 8 characters long (or 16 digits) in **hexadecimal** format.

Example

- SET /MEDIA/UART/RECOGNIZER.DelimiterHex=3a
- pw /MEDIA/UART/RECOGNIZER.DelimiterHex=3a

7.19.3. Setting the Timeout

When the set time passed after the last received message and delimiter was not detected, the device saves the data into the **Rx, RxHex, Hash** properties. The timeout setting is useful if there is no special or easily defined delimiter in the incoming data, but there is a time gap between the messages.

Command and Response

- SET·/MEDIA/UART/RECOGNIZER.TimeOut=<timeout>
- pw·/MEDIA/UART/RECOGNIZER.TimeOut=<timeout>

Parameters

The <timeout> parameter sets the timeout value in milliseconds: **0** means the timeout is disabled, min. value is 10.

Example

- SET /MEDIA/UART/RECOGNIZER.TimeOut=20
- pw /MEDIA/UART/RECOGNIZER.TimeOut=20

7.19.4. Querying the Last Recognized Message (String)

The recognized message is stored as a string in the property below until the next recognized message or until the **RECOGNIZER.clear()** method is called.

> TIPS AND TRICKS: When this property is set as a condition in the Event Manager and the same strings follow each other, the action **will execute once**. (A Condition can be detected in Event Manager if a change happens. But if the same string is saved into the property after each other, it will not cause a change.)

Command and Response

- GET·/MEDIA/UART/RECOGNIZER.Rx
- pr·/MEDIA/UART/RECOGNIZER.Rx=<recognized_string>

Parameters

The <recognized_string> parameter can be max. 12-byte-long recognized data string.

Example

- GET /MEDIA/UART/RECOGNIZER.Rx
- pr /MEDIA/UART/RECOGNIZER.Rx=Login:

7.19.5. Querying the Last Recognized Message(Hex)

Command and Response

- GET·/MEDIA/UART/RECOGNIZER.RxHex
- pr·/MEDIA/UART/RECOGNIZER.RxHex=<recognized_hex>

Parameters

The <recognized_hex> parameter is the recognized data in hexadecimal format.

Example

- GET /MEDIA/UART/RECOGNIZER.RxHex
- pr /MEDIA/UART/RECOGNIZER.RxHex=FF1F4C6F67696E3A

7.19.6. Clearing the Last Recognized Stored Message

This method deletes all stored received serial messages.

Command and Response

- CALL·/MEDIA/UART/RECOGNIZER:clear()
- mO·/MEDIA/UART/RECOGNIZER:clear

Example

- CALL /MEDIA/UART/RECOGNIZER:clear()
- mO /MEDIA/UART/RECOGNIZER:clear

7.19.7. Querying the Last Recognized Active Message (String)

The recognized data is stored in string in the property below **temporary**. When the time set in the **ActiveTimeout** property passes, the property is cleared.

> TIPS AND TRICKS: When this property is set as a condition in the Event Manager and the same strings follow each other, the action **will execute every occasion.** (A Condition can be detected in Event Manager if a change happens. In this case, the string is stored in the property and after the **ActiveTimeout** it will be cleared. If the same string is saved into the (empty) property, it will cause a change.)

Command and Response

- GET·/MEDIA/UART/RECOGNIZER.ActiveRx
- pr·/MEDIA/UART/RECOGNIZER.ActiveRx=<recognized_string>

Parameters

The <recognized_string> parameter is a max. 12-byte-long recognized data string.

Example

- GET /MEDIA/UART/RECOGNIZER.ActiveRx
- pr /MEDIA/UART/RECOGNIZER.ActiveRx=Login:

7.19.8. Querying the Last Recognized Active Message (Hex)

Command and Response

- GET·/MEDIA/UART/RECOGNIZER.ActiveRxHex
- pr·/MEDIA/UART/RECOGNIZER.ActiveRxHex=<recognized_hex>

Parameters

The <recognized_hex> parameter is the recognized data in hexadecimal format.

Example

- GET /MEDIA/UART/RECOGNIZER.ActiveRxHex
- pr /MEDIA/UART/RECOGNIZER.ActiveRxHex= 4C6F67696E3A

7.19.9. Setting the Active Timeout

This property is responsible for clearing the **ActiveRx**, **ActiveRxHex**, **ActiveHash** properties after the elapsed time. Default value is 50ms.

Command and Response

- SET·/MEDIA/UART/RECOGNIZER.ActivePropertyTimeout=<a_timeout>
- pw·/MEDIA/UART/RECOGNIZER.ActivePropertyTimeout=<a_timeout>

Parameters

The <a_timeout> parameter is the active timeout value (ms) between 0 and 255.

Example

- SET /MEDIA/UART/RECOGNIZER.ActivePropertyTimeout=255
- pw /MEDIA/UART/RECOGNIZER.ActivePropertyTimeout=255

7.19.10. Running an Immediate Event Action

DIFFERENCE: This command is available from firmware v1.6.0b19.

When a message is recognized (DelimiterHex is detected in the message, or TimeOut has passed since receiving the last data bit), a specific Action of an Event can be run by the following command.

Command and Response

- SET·/CTRL/TCP/C<loc>.ActionTrigger=<event_nr>
- pw·/CTRL/TCP/C<loc>.ActionTrigger=<event_nr>

Parameters

The <event_nr> means the number (location) of the linked Event Action without letter 'E'. (There is no need to define a Condition in the linked Event.)

Example

- SET /CTRL/TCP/C1.ActivePropertyTimeout=255
- pw /CTRL/TCP/C1.ActivePropertyTimeout=255

7.20. CEC Command Sending

DIFFERENCE: This feature is available from firmware v1.3.1.

The device is able to send and receive Consumer Electronics Control (CEC) commands. This feature is for remote controlling the source or sink device. CEC is a bi-directional communication via HDMI cable.

INFO: The hidden first 2 bytes of the CEC command is static, it refers to the logical address of the sender and the addressee. When the port is input, it is always 04 (from TV to Playback device 1.); when the port is output, it is always 40 (from Playback device 1. to TV). Broadcast addressing is also possible (in this case it is 0F or 4F). *#cec*

7.20.1. Press&Release Commands

DIFFERENCE: This command is available from firmware v1.6.0b19.

The CEC commands below are called 'push-button commands' like a button in a remote controller, e.g. volume up/down. When the CEC command is sent, the 'release' command is also sent in the background. Certain devices require this feature for the proper working, but this is necessary only for push-button commands.

Command and Response

- CALL·/MEDIA/CEC/<port>:sendClick(<command>)
- mO·/MEDIA/CEC/<port>:sendClick

Parameters

The <port> parameter means the video input (I1-I4) or video output (O1-O2) port. The following are accepted as a <command>:

ok	number_2	input_select	rewind	select_media_4
back	number_3	display_info	fast_forward	select_media_5
up	number_4	power_legacy	eject	power_toggle
down	number_5	page_up	skip_forward	power_on
left	number_6	page_down	skip_backward	power_off
right	number_7	volume_up	3d_mode	stop_function
root_menu	number_8	volume_down	stop_record	f1
setup_menu	number_9	mute_toggle	pause_record	f2
contents_menu	dot	mute	play_forward	f3
favorite_menu	enter	unmute	play_reverse	f4
media_top_menu	clear	play	select_next_media	
media_context_menu	channel_up	stop	select_media_1	
number_0	channel_down	pause	select_media_2	
number_1	sound_select	record	select_media_3	

Example

- CALL /MEDIA/CEC/I2:sendClick(play)
- mO /MEDIA/CEC/I2:sendClick

7.20.2. Further Commands

Command and Response

- CALL·/MEDIA/CEC/<port>:send(<command>)
- mO·/MEDIA/CEC/<port>:send

Parameters

The <port> parameter means the video input (I1-I4) or video output (O1-O2) port. The following are accepted as a <command>:

image_view_on	standby	text_view_on	active_source	give_power_status
standby	get_cec_version	set_osd	clear_osd	

The **set_osd** command requires sending another command as well, see the following section.

Example

- CALL /MEDIA/CEC/I2:send(standby)
- mO /MEDIA/CEC/I2:send

7.20.3. Sending an OSD String

The OSD string sending consists of two steps. First, set the **OsdString** property with the desired text, then call the **send** method.

Command and Response

- SET·/MEDIA/CEC/<port>.OsdString=<text>
- pw·/MEDIA/CEC/<port>.OsdString=<text>
- CALL·/MEDIA/CEC/<port>:send(set_osd)
- mO·/MEDIA/CEC/I2:send

Parameters

Parameter	Parameter description	Values	Value description
<port>	Video input or video output port	**I1-I4**	Video inputs
		O1-O2	Video outputs
<text>	The desired OSD string		Letters (A-Z) and (a-z), hyphen (-), underscore (_), numbers (0-9), and dot (.). Max length: 14 characters.

Example

- SET /MEDIA/CEC/I2.OsdString=Lightware
- pw /MEDIA/CEC/I2.OsdString=Lightware
- CALL /MEDIA/CEC/I2:send(set_osd)
- mO /MEDIA/CEC/I2:send

7.20.4. Sending CEC Commands in Hex Format

- CALL·/MEDIA/CEC/<port>:sendHex(<hex_code>)
- mO·/MEDIA/CEC/<port>:sendHex

Parameters

Parameter	Parameter description	Values	Value description
<port>	Video input or video output port	**I1-I4**	Video inputs
		O1-O2	Video outputs
<hex_code>	The desired CEC command		Max. 30 characters (15 bytes) in hexadecimal format.

Example

- CALL /MEDIA/CEC/I2:sendHex(8700E091)
- mO /MEDIA/CEC/I2:sendHex

7.20.5. Querying the Last Received CEC Message

- GET /MEDIA/CEC/<port>.LastReceivedMessage
- pr /MEDIA/CEC/<port>.LastReceivedMessage=<CEC_message>

Parameters

Parameter	Parameter description	Values	Value description
<port>	Video port	**I1-I4** or **O1-O2**	
<CEC_message>	The last incoming CEC message from the connected device.		

Example

- GET /MEDIA/CEC/I2.LastReceivedMessage
- pr /MEDIA/CEC/I2.LastReceivedMessage=give_power_status

TIPS AND TRICKS: This property can be a condition in the Event Manager. When the connected device sends status information via CEC, it could be a trigger for an action.

7.21. Infrared Port Configuration

INFO: Infrared (local and link) port numbering can be found in the Input/Output Port Numbering section.

INFO: Only MMX4x2-HT200 model has TPS IR link.

7.21.1. Enabling/Disabling Command Injection Mode

Command and Response *#infra #infrared*

- SET·/MEDIA/IR/<ir_port>.CommandInjectionEnable=<ci_status>
- pw·/MEDIA/IR/<ir_port>.CommandInjectionEnable=<ci_status>

Parameters

Parameter	Parameter description	Values	Value description
<ir_port>	IR port number	**S1, S2**	IR inputs
		D1, D2	IR outputs
<ci_status>	Recognizer mode	**true**	Command injection mode is enabled
		false	Command injection mode is disabled

Example

- SET /MEDIA/IR/S1.CommandInjectionEnable=true
- pw /MEDIA/IR/S1.CommandInjectionEnable=true

7.21.2. Changing Command Injection Port Number

Command and Response

- SET·/MEDIA/IR/<ir_port>.CommandInjectionPort=<port_no>
- pw·/MEDIA/IR/<ir_port>.CommandInjectionPort=<port_no>

Parameters

Parameter	Parameter description	Values	Value description
<ir_port>	IR port number	**S1, S2**	IR inputs
		D1, D2	IR outputs
<port_no>	TCP port number for Command injection mode		

Example

- SET /MEDIA/IR/S1.CommandInjectionPort=9001
- pw /MEDIA/IR/S1.CommandInjectionPort=9001

7.21.3. Enabling/Disabling Output Signal Modulation

Command and Response

- SET·/MEDIA/IR/<ir_out>.EnableModulation=<modulation>
- pw·/MEDIA/IR/<ir_out>.EnableModulation=<modulation>

Parameters

Parameter	Parameter description	Values	Value description
<ir_out>	IR port number	**D1, D2**	IR outputs
<modulation>	IR signal modulation state	**true**	Signal modulation is enabled
		false	Signal modulation is disabled

Example

- SET /MEDIA/IR/D1.EnableModulation=false
- pw /MEDIA/IR/D1.EnableModulation=false

Signal modulation is turned off on IR output (D1).

INFO: The default setting value is **true** (enabled).

7.22. Infrared Message Sending

DIFFERENCE: This feature and the commands below are available from firmware v1.3.1.

7.22.1. Sending Pronto Hex Codes in Little-endian Format via IR Port

Command and Response

- CALL·/MEDIA/IR/D1:sendProntoHex(<hex_code>)
- mO·/MEDIA/IR/D1:sendProntoHex

Parameters

Parameter	Parameter description	Values	Value description
<hex_code>	IR code in Pronto hex format		Accepts a maximum 765-character-long code in hexadecimal format (0-9; A-F; a-f) without space character in little-endian system.

INFO: This command can send exactly one pronto hex message. The header of the IR code contains the length of the whole code in hexadecimal format. If the code is deficient or duplicated, it causes syntax error.

For more details about the pronto hex codes, see the Messaging Options section.

Example

- CALL /MEDIA/IR/D1:sendProntoHex(00006D0025000300A900A80015 003F0015003F0015003F0015 0015001500150015001500150015001500150015003F0015003F0015003F0015 0015001500150015001500150015001500150015003F0015003F001503F0015 0015001500150015001500150015001500150015001500150015 0015001500150015001500150015001500150015003F0015003F0015003F0015 0015001500150015001500150015003F0015003F0015003F0015003F0015000207A900A80 01500150015006E0E)
- mO /MEDIA/IR/D1:sendProntoHex

TIPS AND TRICKS: Download a code that belongs to your controlled device from a web database from the Internet. The downloaded codes are mostly in little-endian format.

7.22.2. Sending Pronto Hex Codes in Big-endian Format via IR Port

Command and Response

- CALL·/MEDIA/IR/D1:sendProntoHexBigEndian(<hex_code>)
- mO·/MEDIA/IR/D1:sendProntoHexBigEndian

Parameters

Parameter	Parameter description	Values	Value description
<hex_code>	IR code in Pronto hex format		Accepts a maximum 765-character-long code in hexadecimal format (0-9; A-F; a-f) without space character in big-endian system.

INFO: This command can send exactly one pronto hex message. The header of the IR code contains the length of the whole code in hexadecimal format. If the code is deficient or duplicated, it causes syntax error.

For more details about the pronto hex codes, see the Messaging Options section.

Example

- CALL /MEDIA/IR/D1:sendProntoHexBigEndian(0000006d0025000300a900a80015 003f0015003f0015 003f0015001500150015001500150015001500150015003f0015003f0015003f0015001500150015001500150015 0015001500150015001500150015003f0015003f0015003f0015003f0015003f0015070200a9 00a80015001500150e6e)
- mO /MEDIA/IR/D1:sendProntoHexBigEndian

IR code Learning with a terminal program

Step 1. Connect an IR detector to the IR input port.

Step 1. Connect to the MMX-4x2 series device with a terminal program.

Step 2. Push the desired button of the remote control to scan the raw IR code.

Step 3. Remove all the non-hexadecimal characters (e.g. spaces, h characters etc.) from the code.

The pronto hex code learned by the Lightware device is in **big-endian** format.

7.23. GPIO Port Configuration

DIFFERENCE: This section refers to the MMX4x2-HDMI20-USB-L model only.

7.23.1. Querying the Direction of a GPIO Pin

Command and Response *#gpio*

- GET·/MEDIA/GPIO/<port>.Direction
- pw·/MEDIA/GPIO/<port>.Direction(<dir>)

Parameters

Parameter	Parameter description	Value	Value description
<dir>	The direction of the GPIO pin.	**I**	input
		O	output

Example

- GET /MEDIA/GPIO/P1.Direction
- pw /MEDIA/GPIO/P1.Direction=I

7.23.2. Setting the Direction of a GPIO Pin

Command and Response

- SET·/MEDIA/GPIO/<port>.Direction(<dir>)
- pw·/MEDIA/GPIO/<port>.Direction(<dir>)

Parameters

See the previous section.

Example

- SET /MEDIA/GPIO/P1.Direction=I
- pw /MEDIA/GPIO/P1.Direction=I

7.23.3. Querying the Output Level of a GPIO Pin

Command and Response

- GET·/MEDIA/GPIO/<port>.Output
- pw·/MEDIA/GPIO/<port>.Output(<value>)

Parameters

Parameter	Parameter description	Value	Value description
<value>	The output value of the GPIO pin.	**H**	high level
		L	low level

Example

- GET /MEDIA/GPIO/P1.Direction
- pw /MEDIA/GPIO/P1.Direction=I

7.23.4. Setting the Output Level of a GPIO Pin

Command and Response

- SET·/MEDIA/GPIO/<port>.Output(<value>)
- pw·/MEDIA/GPIO/<port>.Output(<value>)

Parameters

See the previous section.

Example

- SET /MEDIA/GPIO/P1.Direction=I
- pw /MEDIA/GPIO/P1.Direction=I

7.23.5. Toggling the Level of a GPIO Pin

The output level can be changed from high to low and from low to high by the command below.

Command and Response

- CALL·/MEDIA/GPIO/<port>:toggle()
- mO·/MEDIA/GPIO/<port>:toggle

Example

- CALL /MEDIA/GPIO/P1:toggle()
- mO /MEDIA/GPIO/P1:toggle

7.24. USB 2.0 Switch Configuration

DIFFERENCE: This section refers to the MMX4x2-HDMI20-USB-L model only.

7.24.1. Setting the Active USB Host

The command below is for selecting a USB B-type port (host computer) that will be connected to the USB peripherals (USB A-type ports).

Command and Response *#usb*

- SET·/MEDIA/USB/USBSWITCH.HostSelect=<host_nr>
- pw·/MEDIA/USB/USBSWITCH.HostSelect=<host_nr>

Parameters

Parameter	Parameter description	Value	Value description
<host_nr>	USB B-type port number.	**1-4**	port number
		0	off state

Example

- SET /MEDIA/USB/USBSWITCH.HostSelect=2
- pw /MEDIA/USB/USBSWITCH.HostSelect=2

7.24.2. Power Switch Delay

After switching between the hosts, certain connected USB peripherals need to be reset to operate properly. Enable the power switch delay function, then the 5V power of all the devices is off for 2 seconds. This forces the devices to restart, thus you do not have to physically unplug/re-plug the connected USB device.

Command and Response

- SET·/MEDIA/USB/USBSWITCH.DelayedSwitch=<delay_state>
- pw·/MEDIA/USB/USBSWITCH.DelayedSwitch=<delay_state>

Parameters

Parameter	Parameter description	Value	Value description
<delay_state>	2 sec power-cut towards the devices if host is changed	**true**	power cut-off is active
		false	power cut-off is inactive

Example

- SET /MEDIA/USB/USBSWITCH.DelayedSwitch=2
- pw /MEDIA/USB/USBSWITCH.DelayedSwitch=2

7.24.3. Querying the Host Presence

The USB B-type ports can be queried to check if there is a USB host device connected to a port. The 5V signal presence of a connected USB host device can be queried as follows:

Command and Response

- GET·/MEDIA/USB/USBSWITCH.<host_pc>
- pr·/MEDIA/USB/USBSWITCH.<host_pc>=<status>

Parameters

Parameter	Parameter description	Value	Value description
<host_pc>	The ID of the host PC	**Host5vSensePc1**	
		Host5vSensePc2	
		Host5vSensePc3	
		Host5vSensePc4	
<status>	5V signal presence of the connected host	**true**	5V is detected
		false	5V is not detected

Example

- GET /MEDIA/USB/USBSWITCH.Host5VSensePc1
- pr /MEDIA/USB/USBSWITCH.Host5VSensePc1=true

7.24.4. Setting the 5V Sending to the USB Peripherals

The 5V power towards the USB A-type ports can be enabled or disabled as follows:

Command and Response

- SET·/MEDIA/USB/USBSWITCH.<device_pwr>
- pw·/MEDIA/USB/USBSWITCH.<device_pwr>=<status>

Parameters

Parameter	Parameter description	Value	Value description
<device_pwr>	5V output parameter of the USB A-type port	**Device5vEnable1**	
		Device5vEnable2	
		Device5vEnable3	
		Device5vEnable4	
<status>	5V power towards the USB peripheral	**true**	5V is sent
		false	5V is not sent

Example

- SET /MEDIA/USB/USBSWITCH.Device5vEnable1=false
- pw /MEDIA/USB/USBSWITCH.Device5vEnable1=false

7.24.5. Querying the 5V Overcurrent State of a USB Peripheral

When a connected USB peripheral needs more current via the USB A-type port than allowed (e.g. because of a malfunction or a hardware-error), certain integrated circuits may got damaged. At this time, a special property is changed in the LW3 tree to avoid such situations:

INFO: The limit of the overcurrent is 1A.

Command and Response

- GET·/MEDIA/USB/USBSWITCH.<device_cur>
- pr·/MEDIA/USB/USBSWITCH.<device_cur>=<status>

Parameters

Parameter	Parameter description	Value	Value description
<device_cur>	The overcurrent property of the USB port	**Device5vOverCurrent1**	
		Device5vOverCurrent2	
		Device5vOverCurrent3	
		Device5vOverCurrent4	
<status>	The overcurrent state of the USB peripheral	**true**	Overcurrent is detected
		false	Overcurrent is not detected

Example

- GET /MEDIA/USB/USBSWITCH.Device5vOverCurrent2
- pr /MEDIA/USB/USBSWITCH.Device5vOverCurrent2=false

7.25. EDID Management

7.25.1. Querying the Emulated EDIDs

Command and Response *#edid*

- GET·/EDID.EdidStatus
- pr·/EDID.EdidStatus=<source>:E1;<source>:E2; <source>:E3;<source>:E4

Parameters

Parameter	Parameter description	Values	Value description
<source>	Source EDID memory place	**F1-F120**	Factory EDIDs
		U1-U14	User EDIDs
		D1-D2	Dynamic EDIDs

Example

- GET /EDID.EdidStatus
- pr /EDID.EdidStatus=F89:E1;D1:E2;D1:E3;D1:E4

The emulated EDID memory for the input port is listed with the EDID number currently emulated on the input.

7.25.2. Querying the Validity of a Dynamic EDID

Command and Response

- GET·/EDID/D/D1.Validity
- pr·/EDID/D/D1.Validity=<validity>

Parameters

If the <validity> parameter is **true**, the EDID is valid. If the parameter is **false**, the EDID is invalid.

Example

- GET /EDID/D/D1.Validity
- pr /EDID/D/D1.Validity=true

The 'Validity' property is true, valid EDID is stored in D1 memory place.

7.25.3. Querying the Preferred Resolution of a User EDID

Command and Response

- GET·/EDID/U/<user_edid>.PreferredResolution
- pr·/EDID/U/<user_edid>.PreferredResolution=<preferred_resolution>

Example

- GET /EDID/U/U2.PreferredResolution
- pr /EDID/U/U2.PreferredResolution=1920x1080p60.00Hz

INFO: Use the **Manufacturer** and **MonitorName** properties to query further information.

7.25.4. Emulating an EDID to an Input Port

Command and Response

- CALL·/EDID:switch(<source>:<destination>)
- mO·/EDID:switch

Parameters

Parameter	Parameter description	Values	Value description
<source>	Source EDID memory place	**F1-F120**	Factory EDIDs
		U1-U14	User EDIDs
		D1-D2	Dynamic EDIDs
<destination>	The emulated EDID memory of the desired input port	**U1-U14**	User EDIDs

Example

- CALL /EDID:switch(F49:E2)
- mO /EDID:switch

7.25.5. Emulating an EDID to All Input Ports

Command and Response

- CALL·/EDID:switchAll(<source>)
- mO·/EDID:switchAll

Parameters

Parameter	Parameter description	Values	Value description
<source>	Source EDID memory place	**F1-F120**	Factory EDIDs
		U1-U14	User EDIDs
		D1-D2	Dynamic EDIDs

Example

- CALL /EDID:switchAll(F47)
- mO /EDID:switchAll

7.25.6. Copying an EDID to User Memory

Command and Response

- CALL·/EDID:copy(<source>:<destination>)
- mO·/EDID:copy

Parameters

Parameter	Parameter description	Values	Value description
<source>	Source EDID memory place	**F1-F120**	Factory EDIDs
		U1-U14	User EDIDs
		D1-D2	Dynamic EDIDs
<destination>	The emulated EDID memory of the desired input port	**U1-U14**	User EDIDs

Example

- CALL /EDID:copy(F1:U2)
- mO /EDID:copy

7.25.7. Deleting an EDID from User Memory

Command and Response

- CALL·/EDID:delete(<user_edid>)
- mO·/EDID:delete

Parameters

Parameter	Parameter description	Values	Value description
<user_edid>	The emulated EDID memory of the desired input port.	**U1-U14**	User EDIDs

Example

- CALL /EDID:delete(U2)
- mO /EDID:delete

7.25.8. Resetting the Emulated EDIDs

Command and Response

- CALL·/EDID:reset()
- mO·/EDID:reset

Parameters

Parameter	Parameter description	Values	Value description
<user_edid>	The emulated EDID memory of the desired input port.	**U1-U14**	User EDIDs

Example

- CALL /EDID:reset()
- mO /EDID:reset

Calling this method switches all emulated EDIDs to a factory default one. See the table in the Factory EDID List section.

7.26. LW3 Commands - Quick Summary

System Commands

Querying the Product Name
- GET·/.ProductName

Setting the Device Label
- SET·/MANAGEMENT/UID/DeviceLabel=<custom_name>

Resetting the Device
- CALL·/SYS:reset()

Restoring the Factory Default Settings
- CALL·/SYS:factoryDefaults()

Querying the Package Version
- GET·/MANAGEMENT/UID.PackageVersion

Querying the CPU Firmware Version
- GET·/SYS/MB.FirmwareVersion

Control Lock
- SET·/MANAGEMENT/UI.ControlLock=<lock_status>

Identifying the Device
- CALL·/MANAGEMENT/UI:identifyMe()

Toggling the Dark Mode Setting
- SET·/MANAGEMENT/UI/DARKMODE.DarkModeEnable=<mode_state>

Setting the Delay of the Dark Mode Setting
- SET·/MANAGEMENT/UI/DARKMODE.DarkModeDelay=<delay_time>

Running a Macro
- CALL·/CTRL/MACROS:run(<macro_name>)

Cleartext Login Protection

Setting the Login Password
- CALL·/LOGIN:setPassword(<password>)

Logging Into the Device
- CALL·/LOGIN:login(<password>)

Logging Out of the Device
- CALL·/LOGIN:logout(<password>)

Enabling/Disabling the Cleartext Login Function
- SET·/LOGIN:LoginEnable=<login_state>

Video Port Settings

Querying the Status of the Input Ports
- GET·/MEDIA/VIDEO/XP.SourcePortStatus

Querying the Connected Input Port Number
- GET·/MEDIA/VIDEO/<out>.ConnectedSource

Querying the Status of the Output Ports
- GET·/MEDIA/VIDEO/XP.DestinationPortStatus

Querying the Video Crosspoint Setting
- GET·/MEDIA/VIDEO/XP.DestinationConnectionList

Switching Video Input
- CALL·/MEDIA/VIDEO/XP:switch(<in>:<out>)

Querying the Video Autoselect Settings
- GET·/MEDIA/VIDEO/XP.DestinationPortAutoselect

Changing the Autoselect Mode
- CALL·/MEDIA/VIDEO/XP:setDestinationPortAutoselect(<out>:<state><mode>)

Querying the Input Port Priority
- GET·/MEDIA/VIDEO/XP.PortPriorityList

Changing the Input Port Priority
- CALL·/MEDIA/VIDEO/XP:setAutoselectionPriority(<in>(<out>):<prio>)

Muting an Input Port
- CALL·/MEDIA/VIDEO/XP:muteSource(<in>)

Unmuting an Input Port
- CALL·/MEDIA/VIDEO/XP:unmuteSource(<in>)

Locking an Input Port
- CALL·/MEDIA/VIDEO/XP:lockSource(<in>)

Unlocking an Input Port
- CALL·/MEDIA/VIDEO/XP:unlockSource(<in>)

Muting an Output Port
- CALL·/MEDIA/VIDEO/XP:muteDestination(<out>)

Unmuting an Output Port

- CALL·/MEDIA/VIDEO/XP:unmuteDestination(<out>)

Locking an Output Port

- CALL·/MEDIA/VIDEO/XP:lockDestination(<out>)

Unlocking an Output Port

- CALL·/MEDIA/VIDEO/XP:unlockDestination(<out>)

HDCP Setting (Input Port)

- SET·/MEDIA/VIDEO/<in>.HdcpEnable=<hdcp_status>

HDCP Setting (Output Port)

- SET·/MEDIA/VIDEO/<out>.HdcpModeSetting=<hdcp_mode>

Test Pattern Generator

Test Pattern Generator Mode Setting

- SET·/MEDIA/VIDEO/<out>.TpgMode=<tpg_mode>

The Clock Frequency of the Test Pattern

- SET·/MEDIA/VIDEO/<out>.TpgClockSource=<tpg_clock>

Test Pattern

- SET·/MEDIA/VIDEO/<out>.TpgPattern=<pattern>

HDMI Mode Settings (Output Port)

- SET·/MEDIA/VIDEO/<out>.HdmiModeSetting=<hdmi_mode>

Querying the Recent TPS Mode

- GET·/REMOTE/<tps_port>.tpsMode

TPS Mode Settings

- SET·/REMOTE/<tps_port>.tpsModeSetting=<tps_mode>

Audio Port Settings from Firmware v1.2.0

Querying the Status of Source Port

- GET·/MEDIA/AUDIO/XP.SourcePortStatus

Querying the Status of Destination Port

- GET·/MEDIA/AUDIO/XP.DestinationPortStatus

Querying the Audio Crosspoint State

- GET·/MEDIA/AUDIO/XP.DestinationConnectionList

Switching Audio Input

- CALL·/MEDIA/AUDIO/XP:switch(<audio_in>:<audio_out>)

Querying the Audio Autoselect Settings

- GET·/MEDIA/AUDIO/XP.DestinationPortAutoselect

Changing the Autoselect Mode

- CALL·/MEDIA/AUDIO/XP:setDestinationPortAutoselect(<out>:<state><mode>)

Querying the Input Port Priority

- GET·/MEDIA/AUDIO/XP.PortPriorityList

Changing the Input Port Priority

- CALL·/MEDIA/AUDIO/XP:setAutoselectionPriority(<in>(<out>):<prio>)

Muting an Audio Input

- CALL·/MEDIA/AUDIO/XP:muteSource(<audio_in>)

Unmuting an Audio Input

- CALL·/MEDIA/AUDIO/XP:unmuteSource(<audio_in>)

Locking an Input Port

- CALL·/MEDIA/AUDIO/XP:lockSource(<audio_in>)

Unlocking an Input Port

- CALL·/MEDIA/AUDIO/XP:unlockSource(<audio_in>)

Muting an Audio Output Port

- CALL·/MEDIA/AUDIO/XP:muteDestination(<audio_out>)

Unmuting an Audio Output Port

- CALL·/MEDIA/AUDIO/XP:unmuteDestination(<audio_out>)

Locking an Audio Output Port

- CALL·/MEDIA/AUDIO/XP:lockDestination(<audio_out>)

Unlocking an Audio Output Port

- CALL·/MEDIA/AUDIO/XP:unlockDestination(<audio_out>)

Analog Audio Input Gain Setting

- SET·/MEDIA/AUDIO/A3.Gain=<level>

Analog Audio Output Level Settings by Exact Values

Setting the Volume (dB)

- SET·/MEDIA/AUDIO/O3.VolumedB=<level>

Setting the Volume (Percent)

- SET·/MEDIA/AUDIO/O3.VolumePercent=<percent>

Setting the Balance

- SET·/MEDIA/AUDIO/O3.Balance=<level>

Analog Audio Output Level Settings by Steps

Setting the Volume (dB)

- CALL·/MEDIA/AUDIO/O3:stepVolumedB(<step>)

Setting the Volume (Percentage)

- CALL·/MEDIA/AUDIO/O3:stepVolumePercent(<step>)

Audio Port Settings for Firmware v1.1.0

Setting the Audio Source of HDMI Output 1

- SET·/SYS/MB/LEGACYAUDIOXP.EmbedAudioInputToHdmiOut1=<embed_audio>

Setting the Audio Source of HDMI Output 2

- SET·/SYS/MB/LEGACYAUDIOXP.EmbedAudioInputToHdmiOut2=<embed_audio>

Setting the Audio Source of Analog Audio Output

- SET·/SYS/MB/LEGACYAUDIOXP.EnableAnalogPassthrough=<passthrough_status>

Muting/Unmuting Analog Audio Input

- SET·/MEDIA/AUDIO/<audio_in>.Mute=<mute_status>

Muting/Unmuting Analog Audio Output

- SET·/MEDIA/AUDIO/<audio_out>.Mute=<mute_status>

Analog Audio Input Level Settings by Exact Values

Setting the Volume (dB)

- SET·/MEDIA/AUDIO/<audio_in>.VolumedB=<level>

Setting the Volume (Percent)

- SET·/MEDIA/AUDIO/<audio_in>.VolumePercent=<percent>

Setting the Balance

- SET·/MEDIA/AUDIO/<audio_in>.Balance=<level>

Setting the Gain

- SET·/MEDIA/AUDIO/<audio_in>.Gain=<level>

Analog Audio Input Level Settings by Steps

Setting the Volume (dB)

- CALL·/MEDIA/AUDIO/<audio_in>:stepVolumedB(<step>)

Setting the Volume (in Percent)

- CALL·/MEDIA/AUDIO/<audio_in>:stepVolumePercent(<step>)

Setting the Balance

- CALL·/MEDIA/AUDIO/<audio_in>:stepBalance(<step>)

Analog Audio Output Level Settings

Setting the Volume (dB)

- SET·/MEDIA/AUDIO/<audio_out>.VolumedB=<level>

Setting the Volume (Percent)

- SET·/MEDIA/AUDIO/<audio_out>.VolumePercent=<percent>

Setting the Balance

- SET·/MEDIA/AUDIO/<audio_out>.Balance=<level>

Analog Audio Output Level Settings by Steps

Setting the Volume (dB)

- CALL·/MEDIA/AUDIO/<audio_out>:stepVolumedB(<step>)

Setting the Volume (Percent)

- CALL·/MEDIA/AUDIO/<audio_out>:stepVolumePercent(<step>)

Event Manager Basics

Setting a Condition by Specifying a Direct Path

- SET·/EVENTS/E<loc>.Condition=<expression>

Setting a Condition by Linking Another Condition

- SET·/EVENTS/E<loc>.Condition=<event_nr>

Setting a Condition by Linking More Conditions

- SET·/EVENTS/E<loc>.Condition=<event_nr>&<event_nr>&<event_nr>&<event_nr>

Setting an Action by Specifying a Direct Path

- SET·/EVENTS/E<loc>.Action=<expression>

Setting an Action by Linking Another Action

- SET·/EVENTS/E<loc>.Action=<event_nr>

Setting an Action by Linking a Macro

- SET·/EVENTS/E<loc>.Action=<macro_name>

Event Manager Tool Kit

Setting the Delay
- SET·/EVENTS/E<loc>.ConditionTimeout=<time>
- SET·/EVENTS/E<loc>.ConditionEndCheck=<true/false>
- SET·/EVENTS/E<loc>.ConditionTimeoutContinuous=<true/false>

Setting the Name of the Event
- SET·/EVENTS/E<loc>.Name=<string>

Enabling/Disabling the Event
- SET·/EVENTS/E<loc>.Enabled=<true/false>

Triggering a Condition
- CALL·/EVENTS/E<loc>:triggerCondition(1)

Querying the Condition Counter
- GET·/EVENTS/E<loc>.ConditionCount

Querying the Condition Trigger Counter
- GET·/EVENTS/E<loc>.ExternalConditionTriggerCount

Testing an Action
- CALL·/EVENTS/E<loc>:ActionTest(1)

Variable-Management

Value Assignment
- SET·/CTRL/VARS/V<loc>.Value=<value>

Addition and Subtraction (Add Method)
- CALL·/CTRL/VARS/V<loc>:add(<operand>;<min>;<max>)

Addition and Subtraction (Cycle Method)
- CALL·/CTRL/VARS/V<loc>:cycle(<operand>;<min>;<max>)

Value Change with Intervals (Case)
- CALL·/CTRL/VARS/V<loc>:case(<min> <max> <val>;)

Scanning and Storing
- CALL·/CTRL/VARS/V<loc>:scanf(<path>.<property>;<pattern>)

Reformatting a Value
- CALL·/CTRL/VARS/V<loc>:printf(<prefix>%s<postfix>)

Ethernet Port Configuration

Setting the DHCP State
- SET·/MANAGEMENT/NETWORK.DhcpEnabled=<dhcp_status>

Changing the IP Address (Static)
- SET·/MANAGEMENT/NETWORK.StaticIpAddress=<IP_address>

Changing the Subnet Mask (Static)
- SET·/MANAGEMENT/NETWORK.StaticNetworkMask=<netmask>

Changing the Gateway Address (Static)
- SET·/MANAGEMENT/NETWORK.StaticGatewayAddress=<gw_address>

Applying Network Settings
- CALL·/MANAGEMENT/NETWORK:ApplySettings()

Ethernet Tool Kit

Device Filter Based on MAC Address
- SET·/MANAGEMENT/MACFILTER.MACaddress<loc>=<MAC_address>;<receive>;<send>;<name>

LW2 Control Port Blocking
- SET·/MANAGEMENT/SERVICEFILTER.Lw2Enabled=<port_mode>

HTTP Port Blocking
- SET·/MANAGEMENT/SERVICEFILTER.HttpEnabled=<port_mode>

HTTP Post Receiving Blocking
- SET·/MANAGEMENT/SERVICEFILTER.HttpEnabled=<port_mode>

Powering on a Computer over Ethernet (Wake-on-LAN)
- CALL·/MEDIA/ETHERNET:wakeOnLan(MAC_address)

Setting the Hostname
- SET·/MANAGEMENT/NETWORK.HostName=<unique_name>

Ethernet Message Sending

Sending a TCP Message (ASCII-format)
- CALL·/MEDIA/ETHERNET:tcpMessage(<IP_address>:<port_no>=<message>)

Sending a TCP Text (ASCII-format)
- CALL·/MEDIA/ETHERNET:tcpText(<IP_address>:<port_no>=<text>)

Sending a TCP Binary Message (HEX-format)
- CALL·/MEDIA/ETHERNET.tcpBinary(<IP_address>:<port_no>=<HEX_message>)

Sending a UDP Message (ASCII-format)

- CALL·/MEDIA/ETHERNET:udpMessage(<IP_address>:<port_no>=<message>)

Sending a UDP Text (ASCII-format)

- CALL·/MEDIA/ETHERNET:udpText(<IP_address>:<port_no>=<text>)

Sending a UDP Binary Message (HEX-format)

- CALL·/MEDIA/ETHERNET:udpBinary(<IP_address>:<port_no>=<HEX_message>)

HTTP Messaging

Setting the Target IP Address

- SET·/CTRL/HTTP/C1.ServerIP=<IP_address>

Setting the TCP Port

- SET·/CTRL/HTTP/C1.ServerPort=<port_no>

Setting the Target Path

- SET·/CTRL/HTTP/C1.File=<path>

Setting the Message Header

- SET·/CTRL/HTTP/C1.Header=<header_text>

Sending a Post Message

- CALL·/CTRL/HTTP/C1:post(<body_text>)

Sending a Put Message

- CALL·/CTRL/HTTP/C1:put(<body_text>)

TCP Message Recognizer

Setting the IP Address of the TCP Server

- SET·/CTRL/TCP/C<loc>.ServerIP(<IP_address>)

Setting the TCP/IP Port Number of the TCP Server

- SET·/CTRL/TCP/C<loc>.ServerPort(<port_no>)

Connecting to a TCP Server

- CALL·/CTRL/TCP/C<loc>:connect()

Disconnecting from a TCP Server

- CALL·/CTRL/TCP/C<loc>:disconnect()

Setting the Delimiter Hex

- SET·/CTRL/TCP/C<loc>.DelimiterHex=<delimiter>

Setting the Timeout

- SET·/CTRL/TCP/C<loc>.TimeOut=<timeout>

Querying the Last Recognized Message (String)

- GET·/CTRL/TCP/C<loc>.Rx

Querying the Last Recognized Message (Hex)

- GET·/CTRL/TCP/C<loc>.RxHex

Clearing the Last Recognized Stored Message

- CALL·/CTRL/TCP/C<loc>:clear()

Querying the Last Recognized Active Message (String)

- GET·/CTRL/TCP/C<loc>.ActiveRx

Querying the Last Recognized Active Message (Hex)

- GET·/CTRL/TCP/C<loc>.ActiveRxHex

Setting the Active Timeout

- SET·/CTRL/TCP/C<loc>.ActivePropertyTimeout=<a_timeout>

Running an Immediate Event Action

- SET·/CTRL/TCP/C<loc>.ActionTrigger=<event_nr>

RS-232 Port Configuration

Protocol Setting

- SET·/MEDIA/UART/<serial_port>.ControlProtocol=<ctrl_protocol>

BAUD Rate Setting

- SET·/MEDIA/UART/<serial_port>.Baudrate=<baudrate>

Stopbits Setting

- SET·/MEDIA/UART/<serial_port>.StopBits=<stopbit>

Parity Setting

- SET·/MEDIA/UART/<serial_port>.Parity=<parity>

Databit Setting

- SET·/MEDIA/UART/<serial_port>.DataBits=<databit>

RS-232 Operation Mode

- SET·/MEDIA/UART/<serial_port>.Rs232Mode=<rs232_mode>

Enabling/Disabling Command Injection

- SET·/MEDIA/UART/<serial_port>.CommandInjectionEnable=<ci_enable>

RS-232 Message Sending

Sending a Message (ASCII-format) via RS-232

- CALL·/MEDIA/UART/P1:sendMessage(<message>)

Sending a Text (ASCII-format) via RS-232

- CALL·/MEDIA/UART/P1:sendText(<message>)

Sending a Binary Message (HEX-format) via RS-232

- CALL·/MEDIA/UART/P1:sendBinaryMessage(<message>)

Using Hexadecimal Codes

RS-232 Message Recognizer

Enabling/Disabling the Recognizer

- SET·/MEDIA/UART/<serial_port>.RecognizerEnable=<recognizer_enable>

Setting the Delimiter Hex

- SET·/MEDIA/UART/RECOGNIZER.DelimiterHex=<delimiter>

Setting the Timeout

- SET·/MEDIA/UART/RECOGNIZER.TimeOut=<timeout>

Querying the Last Recognized Message (String)

- GET·/MEDIA/UART/RECOGNIZER.Rx

Querying the Last Recognized Message(Hex)

- GET·/MEDIA/UART/RECOGNIZER.RxHex

Clearing the Last Recognized Stored Message

- CALL·/MEDIA/UART/RECOGNIZER:clear()

Querying the Last Recognized Active Message (String)

- GET·/MEDIA/UART/RECOGNIZER.ActiveRx

Querying the Last Recognized Active Message (Hex)

- GET·/MEDIA/UART/RECOGNIZER.ActiveRxHex

Setting the Active Timeout

- SET·/MEDIA/UART/RECOGNIZER.ActivePropertyTimeout=<a_timeout>

Running an Immediate Event Action

- SET·/CTRL/TCP/C<loc>.ActionTrigger=<event_nr>

CEC Command Sending

Press&Release Commands

- CALL·/MEDIA/CEC/<port>:sendClick(<command>)

Further Commands

- CALL·/MEDIA/CEC/<port>:send(<command>)

Sending an OSD String

- SET·/MEDIA/CEC/<port>.OsdString=<text>
- CALL·/MEDIA/CEC/<port>:send(set_osd)

Sending CEC Commands in Hex Format

- CALL·/MEDIA/CEC/<port>:sendHex(<hex_code>)

Querying the Last Received CEC Message

- GET /MEDIA/CEC/<port>.LastReceivedMessage

Infrared Port Configuration

Enabling/Disabling Command Injection Mode

- SET·/MEDIA/IR/<ir_port>.CommandInjectionEnable=<ci_status>

Changing Command Injection Port Number

- SET·/MEDIA/IR/<ir_port>.CommandInjectionPort=<port_no>

Enabling/Disabling Output Signal Modulation

- SET·/MEDIA/IR/<ir_out>.EnableModulation=<modulation>

Infrared Message Sending

Sending Pronto Hex Codes in Little-endian Format via IR Port

- CALL·/MEDIA/IR/D1:sendProntoHex(<hex_code>)

Sending Pronto Hex Codes in Big-endian Format via IR Port

- CALL·/MEDIA/IR/D1:sendProntoHexBigEndian(<hex_code>)

GPIO Port Configuration

Querying the Direction of a GPIO Pin

- GET·/MEDIA/GPIO/<port>.Direction

Setting the Direction of a GPIO Pin

- SET·/MEDIA/GPIO/<port>.Direction(<dir>)

Querying the Output Level of a GPIO Pin

- GET·/MEDIA/GPIO/<port>.Output

Setting the Output Level of a GPIO Pin

- SET·/MEDIA/GPIO/<port>.Output(<value>)

Toggling the Level of a GPIO Pin

- CALL·/MEDIA/GPIO/<port>:toggle()

USB 2.0 Switch Configuration

Setting the Active USB Host

- SET·/MEDIA/USB/USBSWITCH.HostSelect=<host_nr>

Power Switch Delay

- SET·/MEDIA/USB/USBSWITCH.DelayedSwitch=<delay_state>

Querying the Host Presence

- GET·/MEDIA/USB/USBSWITCH.<host_pc>

Setting the 5V Sending to the USB Peripherals

- SET·/MEDIA/USB/USBSWITCH.<device_pwr>

Querying the 5V Overcurrent State of a USB Peripheral

- GET·/MEDIA/USB/USBSWITCH.<device_cur>

EDID Management

Querying the Emulated EDIDs

- GET·/EDID.EdidStatus

Querying the Validity of a Dynamic EDID

- GET·/EDID/D/D1.Validity

Querying the Preferred Resolution of a User EDID

- GET·/EDID/U/<user_edid>.PreferredResolution

Emulating an EDID to an Input Port

- CALL·/EDID:switch(<source>:<destination>)

Emulating an EDID to All Input Ports

- CALL·/EDID:switchAll(<source>)

Copying an EDID to User Memory

- CALL·/EDID:copy(<source>:<destination>)

Deleting an EDID from User Memory

- CALL·/EDID:delete(<user_edid>)

Resetting the Emulated EDIDs

- CALL·/EDID:reset()

8

Firmware Update

This chapter is meant to help customers perform firmware updates on our products by giving a few tips on how to start and by explaining the features of the Lightware Device Updater v2 (LDU2) software. The latest software and firmware pack can be downloaded from www.lightware.com.

- Introduction **146**
- Preparation **146**
- Running the Software **147**
- Updating via GUI **148**
- Command Line Interface (CLI) **151**
- CLI Commands **151**
- If the Update is not successful **156**

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

8.1. Introduction

Lightware Device Updater v2 (LDU2) software is the second generation of the LFP-based (Lightware Firmware Package) firmware update process.

DIFFERENCE: This software can be used for uploading the packages with LFP2 extension only. LDU2 is not suitable for using LFP files, please use the LDU software for that firmware update.



LDU LDU2

8.2. Preparation

Most Lightware devices can be controlled over several interfaces (e.g. Ethernet, USB, RS-232). But the firmware can be updated usually over one dedicated interface, which is the Ethernet in most cases.

If you want to update the firmware of one or more devices, you need the following:

- **LFP2 file**,
- **LDU2 software** installed on your PC or Mac.

Both can be downloaded from www.lightware.com.

Optionally, you can download the **release notes** file in HTML format.

8.2.1. About the Firmware Package (LFP2 File)

All the necessary tools and binary files are packed into the LFP2 package file. You only need this file to do the update on your device.

- This allows the use of the same LFP2 package for different devices.
- The package contains all the necessary components, binary, and other files.
- The release notes is included in the LFP2 file, which is displayed in the window where you select the firmware package file in LDU2.

8.2.2. LDU2 Installation

ATTENTION: Minimum system requirement: 2 GB RAM.

INFO: The Windows and the Mac applications have the same look and functionality.

Download the software from www.lightware.com.

Installation Modes

Normal install	Snapshot install
Available for Windows, macOS and Linux	Available for Windows only
The installer can update only this instance	Cannot be updated
One updateable instance may exist for all users	Many different versions can be installed for all users

ATTENTION: Using the default Normal install is highly recommended.

INFO: If you have a previously installed version, you will be prompted to remove the old version before installing the new one.

Installation in case of Windows OS

Run the installer. If the User Account Control displays a pop-up message, click **Yes**.

Using the **Normal install** (default setting) is highly recommended.

Installation in case of macOS

Mount the DMG file by double clicking on it, and drag the LDU2 icon over the Applications icon to copy the program into the Applications folder. If you want to copy LDU2 into another location, just drag the icon over the desired folder.

INFO: This type of installer is equal to the **Normal install** of Windows.

ATTENTION: Please check the firewall settings on the macOS device. LDU2 needs to be added to the exeptions of the blocked softwares for proper operation.

Installation in case of Linux

Step 1. Download the **archive file** (tar.gz) from www.lightware.com and unpack it to a temp folder.

Step 2. Run the **install_ldu2.sh** file in the temp folder. The script will install LDU2 into the following folder: HOME/.local/share/lightware/ldu2.

Step 3. Above folder will contain this file: **LightwareDeviceUpdaterV2.sh** that can be used to start LDU2.

8.3. Running the Software

DIFFERENCE: Added support for firmware update from a host PC which is in another subnet as the device. The feature is available only **from firmware package v1.6.4b2**.

You have two options:

- **Starting the LDU2** by double-clicking on the shortcut/program file, or
- Double-clicking on an **LFP2 file**.

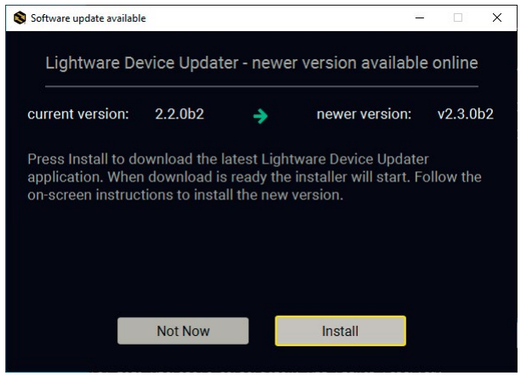
LDU2 Interfaces

The software can be used over:

- The Graphical User Interface (GUI), or by
- The Command Line Interface (CLI).

LDU2 Auto-Update

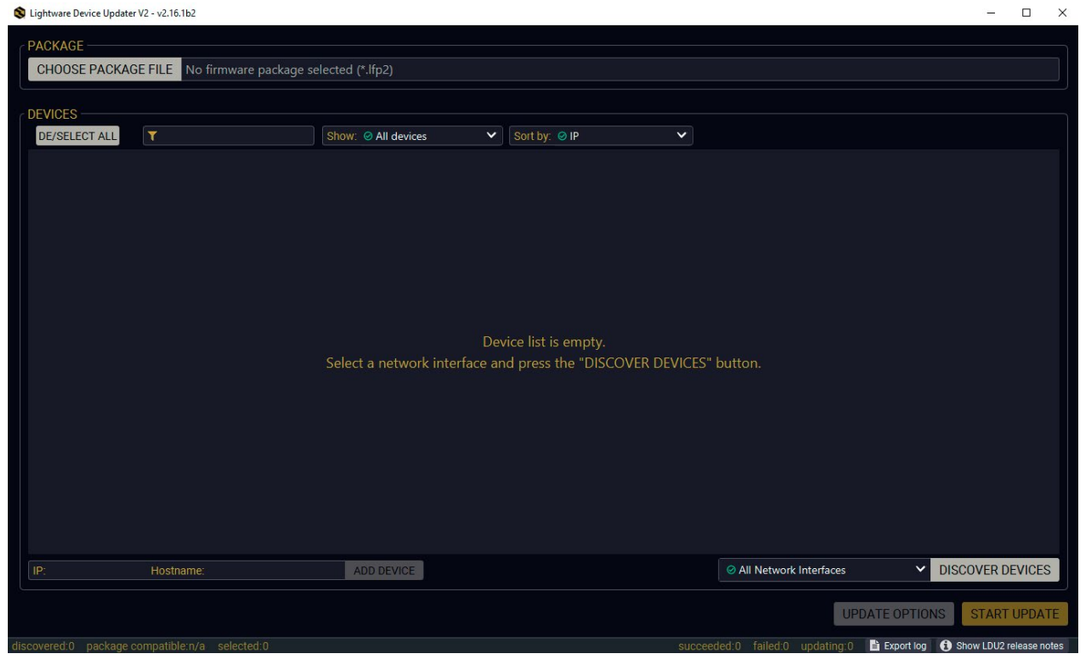
At startup, the software checks whether a newer version is available on the web.



Main Screen

When the software is started by the shortcut, the device discovery screen appears. Press the **Search for devices** button to start finding the Lightware devices:





Devices may also be added manually by typing the IP address in the box near the bottomof the screen. From LDU2 version v2.16.1, manual addition of devices can also be done using the hostname.

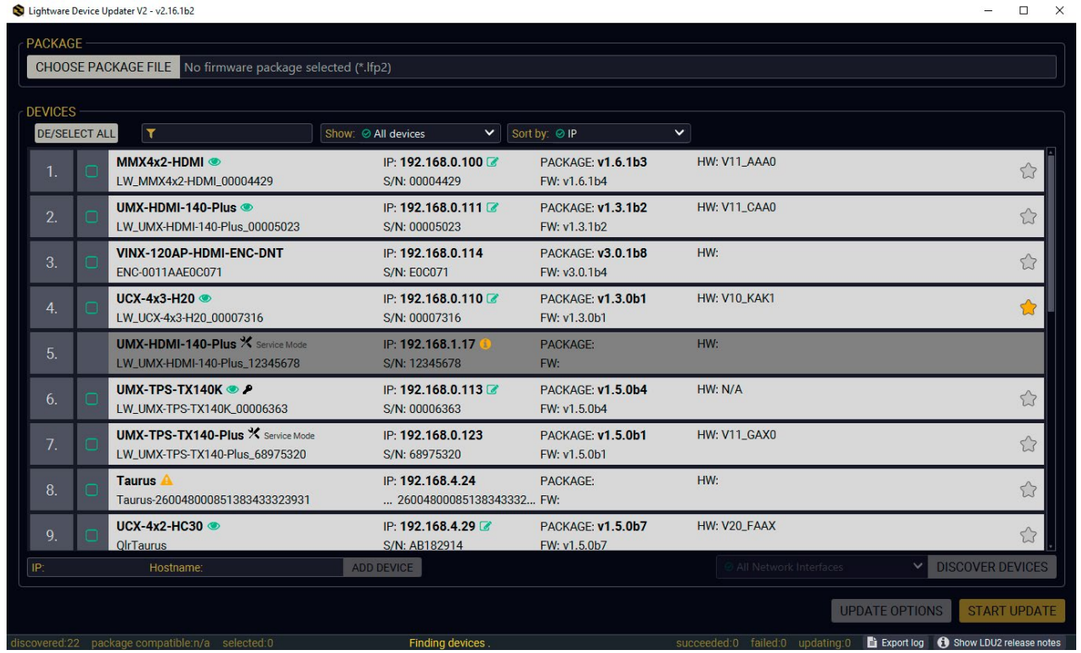
ATTENTION: If the device cannot be added by the hostname, please use the IP address.

If you start the software by double-clicking on the LFP2 file, the firmware will be loaded. Press the **Search for devices** button; all the devices will be listed that are compatible with the selected firmware pack.

INFO: If you press the **Select firmware package** button, the release notes of the LFP2 file will be displayed in the right panel; see the Step 1. Select the Firmware Package. section.

Device List

When the discovery has completed, the devices available on the network are listed in the application.



Legend of the Icons

	IP address editor	The IP address of the device can be changed in the pop-up window.
	Identify me	Clicking on the icon results in the front panel LEDs blinking for 10 seconds, which helps identify the device physically.
	Favorite device	The device has been marked, thus the IP address is stored. When a device is connected with that IP address, the star will be highlighted in that line.
	Further information available	Device is unreachable. Change the IP address by pressing the **IP address editor** icon or use the front panel buttons (if available).
	Cleartext login enabled	The password-protection is enabled. You have to enter the password to perform the firmware update in the **Parameters** window or in the appearing window in the beginning of the update.
	Service mode	The device is in bootload mode. Backup and restore cannot be performed in this case.

8.4. Updating via GUI

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

Keeping the Configuration Settings

By default, device configuration settings are restored when the firmware update is finished. If factory reset has been chosen in the parameters window, all device settings will be erased. In the case of factory reset, you can save the settings of the device in the Lightware Device Controller software and restore it later.

The following flow chart demonstrates how this function works in the background.

Step 1. Create a backup

The current configuration of the device is being saved into a configuration backup file on your computer.

Step 2. Start the Update

The device reboots and starts in bootload mode (firmware update mode).

Step 3. Update

The CPU firmware is changed to the new one.

Step 4. Factory reset

All configuration settings are restored to the factory default values.

Step 5. Conversion / Restore

The firmware package checks the backup data before the restoration procedure, and if it is necessary, a conversion is applied to avoid incompatibility problems between the firmware versions. All configuration settings are restored to the device after the conversion.

If the factory default option is selected in the Parameters window, the conversion / restoration procedure will not be performed!

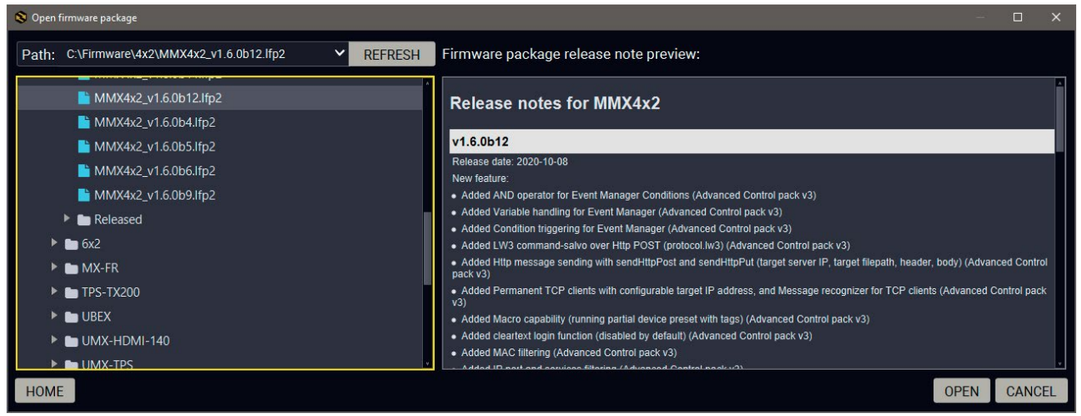
Step 6. Finish

Once the firmware update procedure is finished, the device reboots and is ready for use.

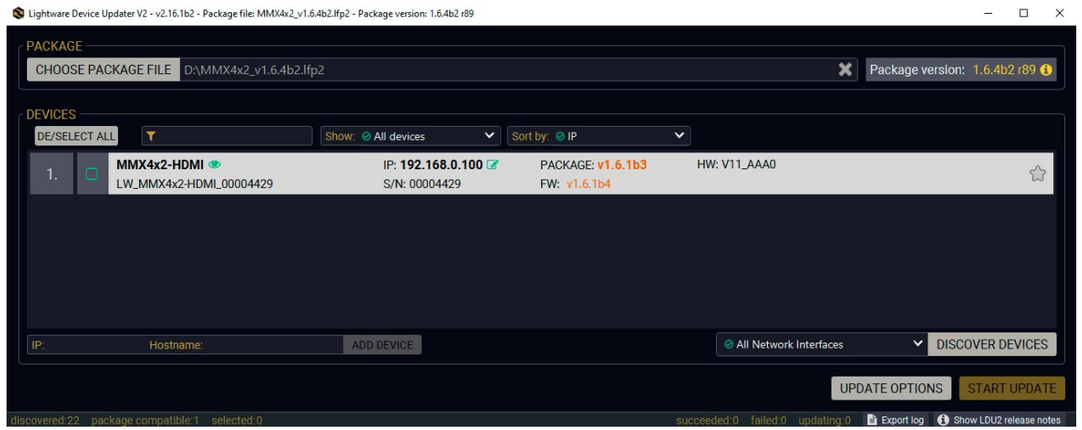
Step 1. Select the Firmware Package.

Click on the **Select Firmware Package** button and navigate to the location where the LFP2 file was saved. When you click on the name of package, the preview of the release notes are displayed in the right panel.

SELECT FIRMWARE PACKAGE



After the package file is loaded, the list is filtered to show the compatible devices only. The current firmware version of the device is highlighted in orange if it is different from the version of the package loaded.



INFO: If you start the update by double-clicking on the LFP file, the screen above will be loaded right away.

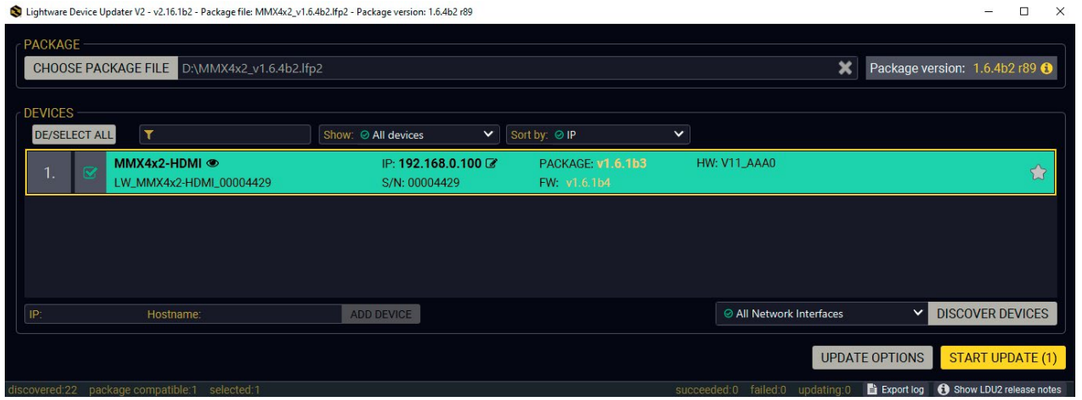
The Meaning of the Symbols

Show details	The log about the updating process of the device can be displayed in a new window.
Service mode	The device is in bootload mode. Backup and restore cannot be performed in this case.

Step 2. Select the desired devices for updating.

Select the devices for updating; the selected line will be highlighted in green.

If you are not sure which device to select, press the **Identify me** button. It makes the front panel LEDs blink for 10 seconds. The feature helps to find the device physically.



Step 3. Check the update parameters.

DIFFERENCE: The appearing settings are device-dependent and can be different from device to device.

Clicking on the **Parameters** button, special settings will be available, like:

PARAMETERS

- Creating a backup about the configuration,
- Restoring the configuration or reloading the factory default settings after the firmware update,
- Uploading the default control page (Miniweb) (if available)
- Enter the password for the Cleartext login. *#builtinweb #miniweb #web*

INFO: The password entered here will be used for all the selected devices where the Cleartext login is enabled. If the password is incorrect, a window will appear to get the correct one for each device during the update.

Please arrange the settings carefully.

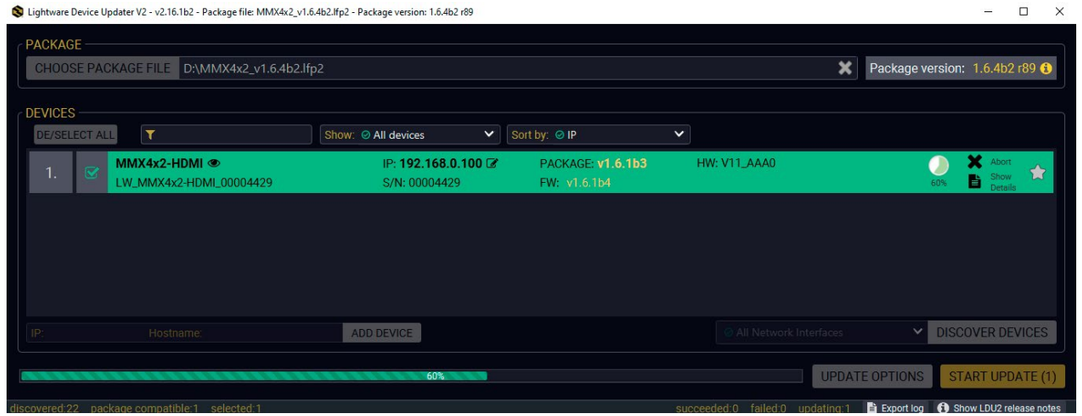
Step 4. Start the update and wait until it is finished.

Click on the **Start Update** button to start the procedure. The status is shown in percent in the right side of the device line and the overall process in the bottom progress bar.

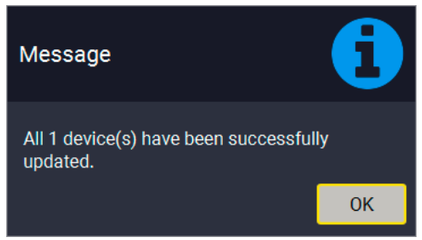
START UPDATE

If the Cleartext login is enabled and you did not enter the password in the **Parameters** window (or it is incorrect), a window will appear to get the password for each device.

INFO: The device might reboot during the firmware update procedure.



When the progress bar reaches 100% (**Done** is displayed at all devices), the update of all devices is finished successfully and a message appears; you can close the software.



Step 5. Wait until the unit reboots with the new firmware.

Once the firmware update procedure is completed, the device is rebooted with the new firmware. Shutting down and restarting the device is recommended.

8.5. Command Line Interface (CLI)

DIFFERENCE: The Command Line Interface is available from LDU2 v2.9.0b9.

The CLI of the LDU2 software is a simple tool for creating scriptable device updates without the need for human interactions. It allows batch updating with the same features that are available in case of GUI usage.

8.5.1. How to Run

Running under Windows® OS

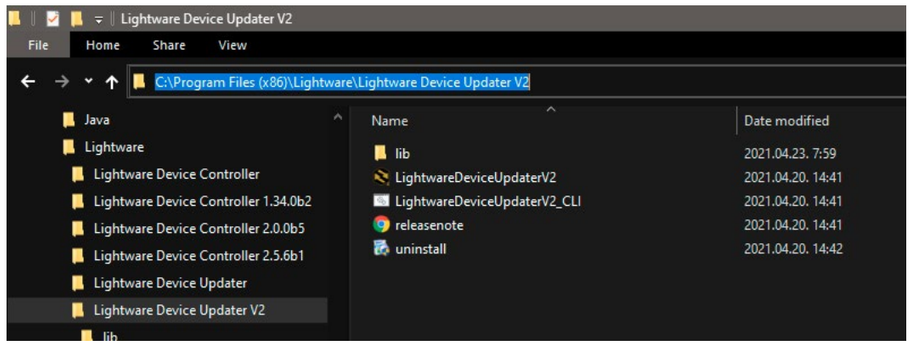
The installer of LDU2 puts the following file into the installation folder:

`LightwareDeviceUpdaterV2_CLI.cmd`

CLI is available by this file, the exe is not suitable for that purpose. Open a command line window to execute or test the features directly.

Step 1. Open an Explorer window where the cmd file is located, the default is:
`c:\Program Files (x86)\Lightware\Lightware Device Updater V2\LightwareDeviceUpdaterV2_CLI.cmd`.

Step 2. Click on the address line (highlighed with blue in the picture), type **`cmd.exe`** and press enter. The command interpreter window of Windows is opened at the path of the LDU2 install folder.



Step 3. Now you can use the `LightwareDeviceUpdaterV2_CLI.cmd` file with the commands and options that are described in the coming sections:

Running under Linux

The Command Line Interface under Linux Operating Systems can be run by the following:

`LightwareDeviceUpdaterV2.sh.`

Running an update:

```
bash LightwareDeviceUpdaterV2.sh update --ip 192.168.0.115 --package ~/Downloads/tps-
tx200_1.6.4b2.lfp2
```

The commands and options are the same under Windows® and Linux, too. The following sections contain examples with **LightwareDeviceUpdaterV2_CLI.cmd**.

8.5.2. How to Use

Command Structure

The commands can be run over CLI in the following way:

`LightwareDeviceUpdaterV2_CLI.cmd [command] [options]`

`[Command]`: a certain command described in the coming sections; only one command can be run at a time

`[Options]:` mandatory and/or optional parameters of the command, if any. Optional parameters have a default value, which can be found at each affected command. You only have to define the parameter if you want to apply a different value. The **order of the options** is arbitrary.

Important Notes

- CLI is **case-sensitive** (including commands, options and other parameters).
- There is **no limit** regarding the number of the devices to update. At most 20 devices are updated simoultaneously, when one of them is finished, the following (21st) will be started automatically.
- If an update is failed, the IP address of the affected device(s) are listed at the end.

8.6. CLI Commands

INFO: The commands and options described in the following sections are the same under Windows® and Linux, too. The examples contain **LightwareDeviceUpdaterV2_CLI.cmd**.

About the Examples

- Sent command is in **blue**, response is in **grey**.
- If the response in practice is **longer than listed** in the example, this symbol can be seen: **`[...]`**.

8.6.1. LDU2 Version

The response shows the version of the LDU2 and the version of the Script API (the Application Programming Interface that is used by the LDU2 and the script).

Command

`LightwareDeviceUpdaterV2_CLI.cmd version`

Example

```
C:\Program Files (x86)\Lightware\Lightware Device Updater V2>LightwareDeviceUpdaterV2_CLI.cmd
version

c:\Program Files (x86)\Lightware\Lightware Device Updater V2>lib\jre\bin\java.exe -jar lib\
ldu2.jar version
LDU2 version: 2.13.1b2
Script API version: 1.3.12
```

8.6.2. Check For New LDU2 Version

The following command can be used to check if an update of LDU2 is available. This is just a request, since the CLI is not suitable for handling the complete installer of the software.

Command

`LightwareDeviceUpdaterV2_CLI.cmd checkForUpdates`

Example 1

```
c:\Program Files (x86)\Lightware\Lightware Device Updater V2>LightwareDeviceUpdaterV2_CLI.cmd
checkForUpdates

c:\Program Files (x86)\Lightware\Lightware Device Updater V2>lib\jre\bin\java.exe -jar lib\
ldu2.jar checkForUpdates
Current LDU2 version: 2.13.1b2
LDU2 is up-to-date
```

Example 2

```
c:\Program Files (x86)\Lightware\Lightware Device Updater V2>LightwareDeviceUpdaterV2_CLI.cmd
checkForUpdates

c:\Program Files (x86)\Lightware\Lightware Device Updater V2>lib\jre\bin\java.exe -jar lib\
ldu2.jar checkForUpdates
Current LDU2 version: 2.9.1b1
New version is available online: v2.13.1b2
Download URL: http://update.lightware.hu/ldu2/lwr/v2.13.1b2/install_LDU2_v2.13.1b2.exe
```

8.6.3. Help

The defined commands and options can be listed by the **help** command.

Command

`LightwareDeviceUpdaterV2_CLI.cmd help`

Example

```
C:\Program Files (x86)\Lightware\Lightware Device Updater V2>LightwareDeviceUpdaterV2_CLI.cmd
help

C:\Program Files (x86)\Lightware\Lightware Device Updater V2>lib\jre\bin\java.exe -jar lib\
ldu2.jar help
Command line usage:
    Win: LightwareDeviceUpdaterV2_CLI.cmd [command] [options]
    Linux: LightwareDeviceUpdaterV2.sh [command] [options]

    Commands:
        * help
        * version
        * update
        * deviceInfo
        * restore
        * packageOptions
[...]
```

8.6.4. Device Info

The most important information about the selected device is displayed; see the example for more details.

Command

`LightwareDeviceUpdaterV2_CLI.cmd deviceInfo [options]`

Options

Option	Description	Required?
-i or --ip	List of IP addresses of devices to be updated	one of them is mandatory
-n or --hostName	List of hostnames of devices to be updated	
-v or --packageVersion	Shows installed package version only	optional

Example 1

```
C:\Program Files (x86)\Lightware\Lightware Device Updater V2>LightwareDeviceUpdaterV2_CLI.cmd
deviceInfo --ip 192.168.0.115

c:\Program Files (x86)\Lightware\Lightware Device Updater V2>lib\jre\bin\java.exe -jar lib\
ldu2.jar deviceInfo --ip 192.168.0.115
Product name:    MMX4x2-HT200
IP address:      192.168.0.115
Serial number:   00004302
MAC address:     a8:d2:36:00:43:02
Part number:     91310035
Device label:    MMX4x2-HT200
Package version: v1.6.4b2
CPU FW version:  v1.6.4b2
HW version:      V11_BAA0
Operation mode:  Application mode
```

Example 2

```
C:\Program Files (x86)\Lightware\Lightware Device Updater V2>LightwareDeviceUpdaterV2_CLI.cmd
deviceInfo --ip 192.168.0.112 --packageVersion

c:\Program Files (x86)\Lightware\Lightware Device Updater V2>lib\jre\bin\java.exe -jar lib\
ldu2.jar deviceInfo --ip 192.168.0.115 --packageVersion
v1.6.4b2
```

8.6.5. Update

This command can be used to update the firmware of the devices.

Command

```
LightwareDeviceUpdaterV2_CLI.cmd update [options]
```

Options

Option	Description	Required?
-p or --package	The path of the firmware package file	yes
-i or --ip	List of IP addresses of devices to be updated	one of them is mandatory
-n or --hostName	List of hostnames of devices to be updated	
-b or --backupFolder	Folder to create device configuration backup at. Default: USER_HOME/.ldu2/backup	optional
-f or --factoryDefault	Apply factory reset during device update. Default: false	optional
-r or --reportProgress	Report update progress in percentage form. Default: false	optional
Package-specific options	Certain LFP2 packages have features which can be applied at this command; see the The Built-in Miniweb section.	optional

ATTENTION: The configuration is restored automatically if the factory default option is not applied in the **update** command. In that case, there is no need to run the **restore** command after the update.

Example

```
C:\Program Files (x86)\Lightware\Lightware Device Updater V2>LightwareDeviceUpdaterV2_CLI.cmd
update --ip 192.168.0.115 --package C:\Firmwares\tps-tx200_v1.6.4b2.lfp2 --reportProgress

c:\Program Files (x86)\Lightware\Lightware Device Updater V2>lib\jre\bin\java.exe -jar lib\
ldu2.jar update --ip 192.168.0.115 --package d:\Firmware\4x2\Released\MMX4x2_v1.6.4b2.lfp2
--reportProgress
[2022-03-08 12:50:23.082] [ INFO] [            main] - Device IPs: [192.168.0.115]
[2022-03-08 12:50:26.591] [ INFO] [            main] - All selected devices are available over
the network.
[2022-03-08 12:50:26.838] [ INFO] [            main] - All the selected devices are compatible
with the specified package.
[2022-03-08 12:50:27.662] [ INFO] [   192.168.0.115] - Script parameters: deviceIp:
192.168.0.115, forceNoBackup: false, factoryDefault: false, restoreFromBackup: true,
backupFolder: C:/Users/laszlo.zsedenyi/.ldu2/backup, skipPresetsAtRestore: false,
ciscoRoomIntegration: false, updateVs100: false, uploadDefaultMiniWeb: false
[2022-03-08 12:50:27.670] [ INFO] [   192.168.0.115] - Package version: 1.6.4b2
[2022-03-08 12:50:27.729] [ INFO] [   192.168.0.115] - Login functionality is currently not
enabled.
[2022-03-08 12:50:27.761] [ INFO] [   192.168.0.115] - Creating backup of device settings...
[2022-03-08 12:50:30.646] [ INFO] [   192.168.0.115] - Backup HTTP enable properties
[2022-03-08 12:50:31.860] [ INFO] [ProgressReporter] - Progress: 2%
[2022-03-08 12:50:32.739] [ INFO] [   192.168.0.115] - HTTP and HTTP post have got enabled on
port 80
[2022-03-08 12:50:32.950] [ INFO] [   192.168.0.115] - No miniweb file is found on the device.
[2022-03-08 12:50:35.060] [ INFO] [   192.168.0.115] - HTTP and HTTP post properties have got
restored on port 80
[2022-03-08 12:50:36.862] [ INFO] [ProgressReporter] - Progress: 5%
[...]
```

The lines containing "ProgressReporter" can be enabled optionally. If it is enabled, the current state is displayed in every 5 seconds.

8.6.6. Restore

Restores device configuration from a backup file.

TIPS AND TRICKS: This command can be used for uploading a configuration to numerous devices (aka Configuration cloning by CLI).

Command

```
LightwareDeviceUpdaterV2_CLI.cmd restore [options]
```

Options

Option	Description	Required?
-i or --ip	List of IP addresses of devices to be updated	one of them is mandatory
-n or --hostName	List of hostnames of devices to be updated	
-b or --backupFile	The path of the configuration backup file	yes
-k or --keepOriginalIp	Do not override the network settings of the device with the ones in the backup file. It comes in handy when multiple devices' configuration is being restored from a single backup file. Default: false	optional

ATTENTION: The configuration is restored automatically if the factory default option is not applied in the **update** command. In that case, there is no need to run the **restore** command after the update.

Example

```
C:\Program Files (x86)\Lightware\Lightware Device Updater V2>LightwareDeviceUpdaterV2_CLI.cmd
restore --ip 192.168.0.115 --backupFile C:\mybackup.lw3 --keepOriginalIp

C:\Program Files (x86)\Lightware\Lightware Device Updater V2>lib\jre\bin\java.exe -jar lib\
ldu2.jar restore --ip 192.168.0.115 --backupFile C:\mybackup.lw3 --keepOriginalIp
[2022-02-10 10:49:36.412] [ INFO] [           main] - Executing configuration restore...
[2021-02-10 10:49:36.425] [ INFO] [           main] - Device IPs: [192.168.1.12]
```

INFO: The firmware package checks the backup data before the restoration procedure and if it is necessary, a conversion is applied to avoid incompatibility problems between the firmware versions. In that case, two backup files are created: the original and a new one with "_converted" suffix. Using the last one for restoring is recommended.

8.6.7. Package Options

Shows package-specific update options.

Command

```
LightwareDeviceUpdaterV2_CLI.cmd packageOptions [options]
```

Options

Option	Description	Required?
-p or --package	The path of the firmware package file	yes

Example

```
c:\Program Files (x86)\Lightware\Lightware Device Updater V2>LightwareDeviceUpdaterV2_CLI.cmd
packageOptions --package d:\Firmware\4x2\Released\MMX4x2_v1.6.4b2.lfp2

c:\Program Files (x86)\Lightware\Lightware Device Updater V2>lib\jre\bin\java.exe -jar lib\
ldu2.jar packageOptions --package d:\Firmware\4x2\Released\MMX4x2_v1.6.4b2.lfp2
Backup and restore options:

        factoryDefault:  if set to true device will reset to factory default settings after the
upgrade process is finished, default: false
        restoreFromBackup:       if true, no device configuration is restored from the backup
created at the begininning of upgrade process (default: true)
        skipPresetsAtRestore:    If true, Device presets will be skipped at restore. (default:
false)
        backupFolder:    folder to create configuration backup into
        ciscoRoomIntegration:    if true, special configuration is uploaded to the device for
Cisco room integration (default: false)

Advanced backup and restore options:

        forceNoBackup:   if true, no backup file will be created (default: false)
        uploadDefaultMiniWeb:    If true, and no custom miniweb is present on the device, the
default miniweb file will be uploaded. (default: false)

Login options:

        clearTextLoginPw:        The login password used when updating devices. (It's cleartext
password!)

Advanced (developer) options:

        updateVs100: If true, the VS100 Rx firmware will also be updated. (default: false)
```

Package option example can be seen in the following section.

8.6.8. Complex Examples

Example 1

The following options are applied:

- Firmware is updated
- Factory default settings are restored

```
c:\Program Files (x86)\Lightware\Lightware Device Updater V2>LightwareDeviceUpdaterV2_CLI.cmd
update --ip 192.168.0.115 --factoryDefault --package d:\Firmware\4x2\Released\MMX4x2_v1.6.4b2.
lfp2

c:\Program Files (x86)\Lightware\Lightware Device Updater V2>lib\jre\bin\java.exe -jar lib\
ldu2.jar update --ip 192.168.0.115 --factoryDefault --package d:\Firmware\4x2\Released\MMX4x2_
v1.6.4b2.lfp2
[2022-03-08 13:12:09.611] [ INFO] [            main] - Device IPs: [192.168.0.115]
[2022-03-08 13:12:13.124] [ INFO] [            main] - All selected devices are available over
the network.
[2022-03-08 13:12:13.387] [ INFO] [            main] - All the selected devices are compatible
with the specified package.
[2022-03-08 13:12:14.099] [ INFO] [   192.168.0.115] - Script parameters: deviceIp:
192.168.0.115, forceNoBackup: false, factoryDefault: true, restoreFromBackup: false,
backupFolder: C:/Users/laszlo.zsedenyi/.ldu2/backup, skipPresetsAtRestore: false,
ciscoRoomIntegration: false, updateVs100: false, uploadDefaultMiniWeb: false
[2022-03-08 13:12:14.108] [ INFO] [   192.168.0.115] - Package version: 1.6.4b2
[2022-03-08 13:12:14.176] [ INFO] [   192.168.0.115] - Login functionality is currently not
enabled.
[2022-03-08 13:12:16.324] [ INFO] [   192.168.0.115] - HTTP and HTTP post have got enabled on
port 80
[2022-03-08 13:12:16.386] [ INFO] [   192.168.0.115] - Switching device into bootload mode...
[2022-03-08 13:12:34.291] [ INFO] [   192.168.0.115] - Gathering UID information from device...
[2022-03-08 13:12:34.553] [ INFO] [   192.168.0.115] - UID info - Device IP: 192.168.0.115
Product name: MMX4x2-HT200 Product part number: 91310035 Serial number: 00004302 Hardware
version: V11_BAA0 MAC address: A8:D2:36:00:43:02
[2022-03-08 13:12:34.799] [ INFO] [   192.168.0.115] - Package version on device: 1.6.4b2 r89
[2022-03-08 13:12:34.817] [ INFO] [   192.168.0.115] - Updating Firmware of the MCU...
[2022-03-08 13:12:35.074] [ INFO] [   192.168.0.115] -  [tps_rx200.bin]'s current version on
device: 1.6.4b2 r120
[2022-03-08 13:12:35.075] [ INFO] [   192.168.0.115] -  [tps_rx200.bin]'s version in the
package: 1.6.4b2 r120
[2022-03-08 13:12:59.213] [ INFO] [   192.168.0.115] -  [tps_rx200.bin]'s firmware version
updated in FVS EEPROM.
[2022-03-08 13:13:04.981] [ INFO] [   192.168.0.115] - Setting system information...
[2022-03-08 13:13:10.742] [ INFO] [   192.168.0.115] - Starting application...
[2022-03-08 13:14:43.792] [ INFO] [   192.168.0.115] - Done

All 1 update(s) finished successfully.
```

Example 2

The following options are applied:

- Cleartext login password is applied
- Custom backup folder is set
- Current configuration is saved
- Firmware is updated
- Saved configuration is restored

```
c:\Program Files (x86)\Lightware\Lightware Device Updater V2>LightwareDeviceUpdaterV2_CLI.cmd
update --ip 192.168.0.115 --package d:\Firmware\4x2\Released\MMX4x2_v1.6.4b2.lfp2 --backupFolder
d:\My_backup --clearTextLoginPw qwer1234

c:\Program Files (x86)\Lightware\Lightware Device Updater V2>lib\jre\bin\java.exe -jar lib\
ldu2.jar update --ip 192.168.0.115 --package d:\Firmware\4x2\Released\MMX4x2_v1.6.4b2.lfp2
--backupFolder d:\My_backup --clearTextLoginPw qwer1234
[2022-03-08 13:48:10.311] [ INFO] [            main] - Device IPs: [192.168.0.115]
[2022-03-08 13:48:13.737] [ WARN] [ pool-2-thread-1] - NetworkMask property is not available.
Cannot determine whether the device is on the same network or not. Device IP: 192.168.0.115
[2022-03-08 13:48:13.793] [ WARN] [ pool-2-thread-1] - Bonjour device builder error messages:
[object Array]
[2022-03-08 13:48:13.846] [ INFO] [            main] - All selected devices are available over
the network.
[2022-03-08 13:48:14.125] [ INFO] [            main] - All the selected devices are compatible
with the specified package.
[2022-03-08 13:48:14.900] [ INFO] [   192.168.0.115] - Script parameters: deviceIp:
192.168.0.115, forceNoBackup: false, factoryDefault: false, restoreFromBackup: true,
backupFolder: d:\My_backup, skipPresetsAtRestore: false, ciscoRoomIntegration: false,
updateVs100: false, uploadDefaultMiniWeb: false
[2022-03-08 13:48:14.907] [ INFO] [   192.168.0.115] - Package version: 1.6.4b2
[2022-03-08 13:48:15.023] [ INFO] [   192.168.0.115] - Logged in successfully.
[2022-03-08 13:48:15.058] [ INFO] [   192.168.0.115] - Creating backup of device settings...
[2022-03-08 13:48:17.969] [ INFO] [   192.168.0.115] - Backup HTTP enable properties
[2022-03-08 13:48:20.095] [ INFO] [   192.168.0.115] - HTTP and HTTP post have got enabled on
port 80
[2022-03-08 13:48:20.369] [ INFO] [   192.168.0.115] - No miniweb file is found on the device.
[2022-03-08 13:48:22.466] [ INFO] [   192.168.0.115] - HTTP and HTTP post properties have got
restored on port 80
[2022-03-08 13:48:24.596] [ INFO] [   192.168.0.115] - HTTP and HTTP post have got enabled on
port 80
[2022-03-08 13:48:24.632] [ INFO] [   192.168.0.115] - Switching device into bootload mode...
[2022-03-08 13:48:42.788] [ INFO] [   192.168.0.115] - Gathering UID information from device...
[2022-03-08 13:48:43.052] [ INFO] [   192.168.0.115] - UID info - Device IP: 192.168.0.115
Product name: MMX4x2-HT200 Product part number: 91310035 Serial number: 00004302 Hardware
version: V11_BAA0 MAC address: A8:D2:36:00:43:02
[2022-03-08 13:48:43.306] [ INFO] [   192.168.0.115] - Package version on device: 1.6.4b2 r89
[2022-03-08 13:48:43.572] [ INFO] [   192.168.0.115] - Updating Firmware of the MCU...
[2022-03-08 13:48:43.812] [ INFO] [   192.168.0.115] -  [tps_rx200.bin]'s current version on
device: 1.6.4b2 r120
[2022-03-08 13:48:43.813] [ INFO] [   192.168.0.115] -  [tps_rx200.bin]'s version in the
package: 1.6.4b2 r120
[2022-03-08 13:49:07.834] [ INFO] [   192.168.0.115] -  [tps_rx200.bin]'s firmware version
updated in FVS EEPROM.
[2022-03-08 13:49:13.614] [ INFO] [   192.168.0.115] - Setting system information...
[2022-03-08 13:49:19.389] [ INFO] [   192.168.0.115] - Starting application...
```

```
[2022-03-08 13:50:53.945] [ INFO] [   192.168.0.115] - Restoring device settings from the
following backup file: d:\My_backup\backup_91310035_00004302_2022-03-08_13-48-15_converted.lw3
...
[2022-03-08 13:50:57.933] [ INFO] [   192.168.0.115] - Device settings have been restored
[2022-03-08 13:50:57.956] [ INFO] [   192.168.0.115] - Resetting device...
[2022-03-08 13:51:02.224] [ INFO] [   192.168.0.115] - Done

All 1 update(s) finished successfully.
```

8.6.9. Exit Codes

There is a return value in all cases when a command run is finished. Currently, three codes are defined:

Code	Displayed text	Description
0	N/A	The update performed successfully
1	Update error (ErrorCode:1)	The error happened during the update
2	CLI error (ErrorCode:2	The error happened before starting the update

The error line contains further information about the error.

Querying the Exit Code under Windows®

```
c:\Program Files (x86)\Lightware\Lightware Device Updater V2\echo %errorlevel%
0
```

Querying the Exit Code under Linux

```
echo $?
0
```

If this value is queried after the update and it is 0, the update performed successfully.

8.7. If the Update is not successful

- Restart the process and try the update again.
- If the device cannot be switched to bootload (firmware update) mode, you can do that manually as written in the User manual of the device. Please note that backup and restore cannot be performed in this case.
- If the backup cannot be created for some reason, you will get a message to continue the process without backup or stop the update. A root cause can be that the desired device is already in bootload (firmware update) mode, thus the normal operation mode is suspended and backup cannot be made.
- If an update is not successful, the **Export log** button becomes red. If you press the button, you can download the log file as a ZIP package, which can be sent to Lightware Support if needed. The log files contain useful information about the circumstances to find the root cause. *#bootload*

9

Troubleshooting

Usually, if the system seems not to transport the signal as expected, the best strategy for troubleshooting is to check signal integrity through the whole signal chain starting from source side and moving forward to receiver end.

- Use Cases **158**
- How to Speed Up the Troubleshooting Process **159**

9.1. Use Cases

At first, check front panel LEDs and take the necessary steps according to their states. For more information about status LEDs, refer to the Front Panel LEDs and Rear Panel LEDs sections.

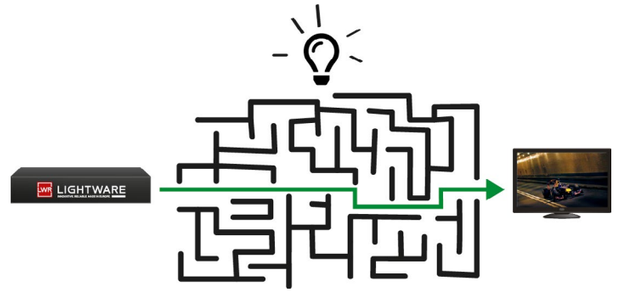
Legend

- Link to the section of connections/cabling.
- Link to the section of front panel operation.
- Link to the section of LDC software.
- LW2 Link to the section of LW2 protocol commands.
- LW3 Link to the section of LW3 protocol commands.

Symptom	Root cause	Action	Refer to
Video signal			
No picture on the video output	Device or devices are not powered properly	Check the matrix and the other devices if they are properly powered; try to unplug and reconnect them.	3.3
	Cable connection problem	Cables must fit very well, check all the connectors (video and TPS cables).	3.2
	No incoming signal	If the SIGNAL LED of the input port does not light, no signal is present. Check the source device(s) and the HDMI/CATx cable(s).	2.4 2.5
	TPS mode problem	Check the actual TPS mode and the selected modes of the devices.	5.6.1 LW3 7.6.22
	Not the proper video port is the active one	Check the video crosspoint settings.	2.4 5.4 LW2 6.4.6 LW3 7.6.4
	The output is muted	Check the mute state of output port.	5.5.2 LW2 6.4.2 LW3 7.6.3
	Display is not able to receive the video format	Check the emulated EDID; select another (e.g. emulate the EDID of the display on the input port).	5.9 LW3 7.25.1
	HDCP is disabled	Enable HDCP on the input and output port.	5.6 LW3 7.6.18 LW3 7.6.19
Not the desired picture displayed on the video output	Video output is set to test pattern (no sync screen) statically	Check Test Pattern settings in the HDMI output properties.	5.9 LW3 7.6.20
	Video output is set to test pattern (no sync screen) as there is no picture on video source	Check video settings of the source.	LW3 7.6.20
Audio signal			
No audio is present on output	Source audio volume is low or muted	Check the audio settings of the source.	
	Not the proper audio port is the active one	Check the audio crosspoint settings.	5.4 LW2 6.4.6 LW3 7.8.1 7.8.2
	Input port is muted	Check the input port properties.	5.6.2 LW3 7.7.1
	Output port is muted	Check the output port properties.	5.6.3 LW2 6.4.3 LW3 7.6.3
	Analog audio volume is set low	Check the Analog audio output port settings (volume).	5.6.6 LW3 7.8.8
HDMI output signal contains no audio	HDMI mode was set to DVI	Check the properties of the output port and set to HDMI or Auto.	5.6.3 LW3 7.6.21
	DVI EDID is emulated	Check the EDID and select an HDMI EDID to emulate.	5.9 LW3 7.25.1

Symptom	Root cause	Action	Refer to
RS-232 signal			
Connected serial device does not respond	Cable connection problem	Check the connectors to fit well; check the wiring of the plugs.	11.8
	RS-232 settings are different	Check the port settings of the transmitter and/or the matrix and the connected serial device(s). Pay attention to Link and/or Local ports.	5.10.1 7.17
	RS-232 mode is not right	Check the RS-232 mode settings (control, command injection, or disconnected)	5.10.1 7.17
	Messaging via serial port is not working	Check the serial messaging rules and/or apply escaping in the message.	7.18
Network			
No LAN connection can be established	Incorrect IP address is set (fix IP)	Use dynamic IP address by enabling DHCP option.	2.6.3 5.12 6.5.2 7.12.1
		Restore the factory default settings (with fix IP).	2.6.4 5.12 6.3.13 7.4.4
	IP address conflict	Check the IP address of the other devices, too.	
	TCP/IP or UDP messaging via LAN port is not working	Check the TCP/IP / UDP messaging rules and/or apply escaping in the message.	7.14
Miscellaneous			
Front panel buttons are out of operation	The buttons are locked	Disable control lock.	2.6.6 5.12.1 7.4.7
Always receiving error messages	Different protocol is set	Check the protocol settings (LW2 / LW3) and use the proper protocol commands.	5.10
CEC message sending does not work	The CEC feature is not enabled in the connected (third-party) device	Check the device and/or its documentation to enable the feature.	

9.2. How to Speed Up the Troubleshooting Process



Lightware's technical support team is always working hard to provide the fastest support possible. Our team's response time is one of the best in the industry, and in the toughest of cases we can directly consult with the hardware or software engineer who designed the product to get the information from the most reliable source.

However, the troubleshooting process can be even faster... with your help.

There are certain pieces of information that push us in the right direction to find the root cause of the problem. If we receive most of this information in the first e-mail, or it is gathered at the time when you call us, then there is a pretty high chance that we will be able to respond with the final solution right away.

This information is the following:

- Schematic (a pdf version is preferred, but a hand drawing is sufficient).
- Serial number(s) of the device(s) (it is either printed somewhere on the box or you can query it in the Device Controller software or on the built-in website).
- Firmware versions of the devices (please note that there may be multiple CPUs or controllers in the device and we need to know all of their firmware versions, a screenshot is the best option).
- Cable lengths and types (in our experience, it's usually the cable).
- Patch panels, gender changers or anything else in the signal path that can affect the transmission.
- Signal type (resolution, refresh rate, color space, deep color).
- Emulated EDID(s) (please save them as a file and send it to us).
- Actions to take in order to re-create the problem (if we cannot reproduce the problem, it is hard for us to find the cause).
- Photo or video about the problem ('image noise' can mean many different things, it's better if we see it too).
- Error logs from the Device Controller software.
- In the case of an Event Manager issue, the event file and/or backup file from the Device Controller software.

The more of the information above you can give us, the better. Please send this information to the Lightware Support Team (support@lightware.com) to speed up the troubleshooting process.

10

Technologies

The following sections contain descriptions and useful technical information on 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.

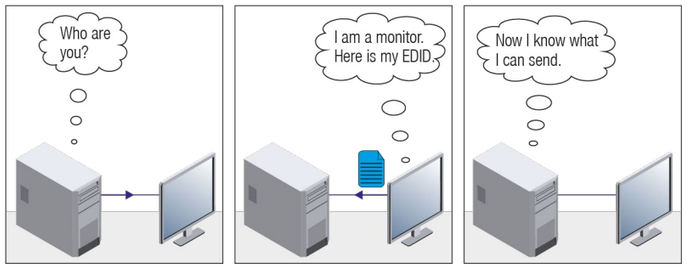
- EDID Management **161**
- HDCP Management **162**
- Pixel Accurate Reclocking **163**

10.1. EDID Management

10.1.1. 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 is 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 CEA extension 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 the EDID has been changed. You need to restart your source to make it read out the EDID again.

10.1.2. 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.

Any EDID can be emulated on any input. An emulated EDID can be copied from the EDID router's memory (static EDID emulation), or from the last attached monitor's memory (dynamic EDID emulation). For example, the Lightware device can be set up to emulate a sink device, which is connected to one of the outputs. In this case, the EDID automatically changes, if the monitor is replaced with another display device (as long as it has a valid EDID).

EDID is independently programmable for all inputs without affecting each other. All inputs have their own EDID circuit.

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.

10.2. HDCP Management

Lightware Visual Engineering is a legal HDCP adopter. Several functions have been developed that help 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.

10.2.1. 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. Even though, 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.

10.2.2. 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.

Not-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 screen is shown. 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 with an HDCP-capable one.

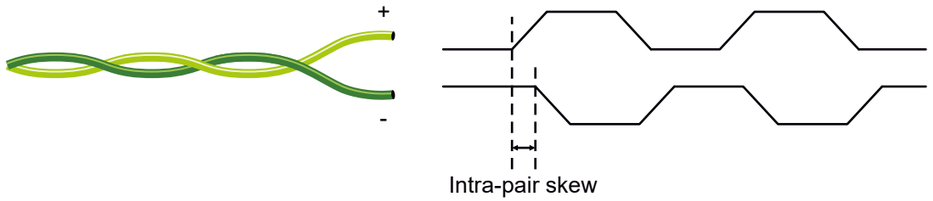
10.3. Pixel Accurate Reclocking

Signal reclocking is an essential procedure in digital signal transmission. After passing the reclocking circuit, the signal becomes stable, jitter-free, and can be transmitted over more equipment like processors, or event controllers. Without reclocking, sparkles, noise, and jaggies appear on the image.

Lightware's sophisticated Pixel Accurate Reclocking technology fixes more problems than general TMDS reclocking. It removes not only intra-pair skew, but inter-pair skew as well. The Pixel Accurate Reclocking circuit eliminates the following errors:

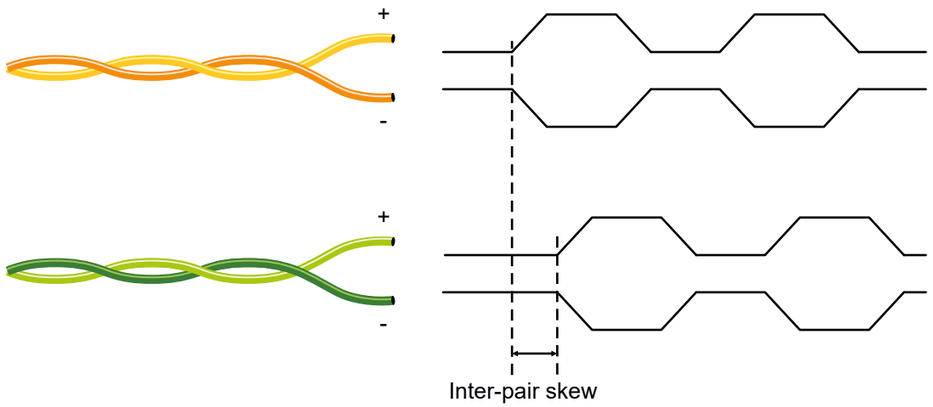
Intra-pair skew

Skew between the + and - wires within a differential wire pair (e.g. Data2- and Data2+). It's caused by different wire lengths or slightly different wire construction (impedance mismatch) in the DVI cable. It results in jitter.



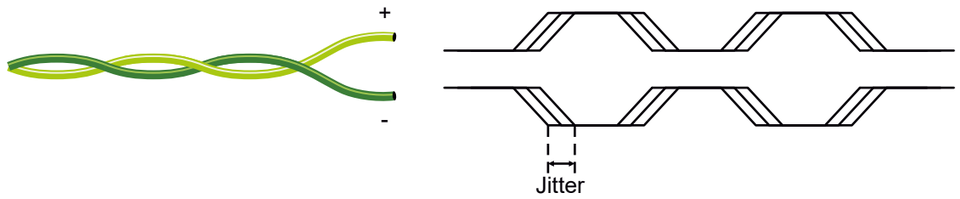
Inter-pair skew

Skew between two differential wire pairs in a cable. It is caused by different wire pair lengths or different number of twists in the DVI cable. Too much inter-pair skew results in color shift in the picture or sync loss.



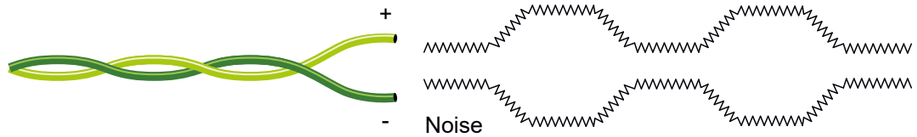
Jitter

Signal instability in the time domain. The time difference between two signal transitions should be a fixed value, but noise and other effects cause variations.



Noise

Electromagnetic interference between other electronic devices such as mobile phones, motors, etc. and the DVI cable are coupled onto the signal. Too much noise results in increased jitter.



11

Appendix

Tables, drawings, guides, technical details and the hashtag keyword list as follows:

- Specifications **165**
- Maximum Extension Distances **167**
- Input/Output Port Numbering **167**
- Content of Backup File **168**
- Factory Default Settings **168**
- Applied Ports (Network Settings) **169**
- Mechanical Drawings **170**
- Cable Wiring Guide **171**
- Factory EDID List **172**
- Firmware Release Notes **174**
- LW3 Command Changes in Firmware v1.2.0 **175**
- Hashtag Keyword List **177**
- Further Document Information **179**
- Limited Warranty Statement **179**

11.1. Specifications

INFO: Specifications are subject to change without notice.

General

Compliance	CE, UKCA
Safety	EN 62368-1:2020
EMC compliance (emission)	EN 55032:2015+A1:2020
EMC compliance (immunity)	EN 55035:2017+A11:2020
RoHS compliance	EN 63000:2018
Warranty	3 years
Operating temperature	0 to +50˚C (+32 to +122˚F)
Operating humidity	10-90%, non-condensing
Cooling	passive

Power

Power supply option	external power adaptor

MMX4x2-HDMI

Power consumption (min/max)	2 W / 4.6 W
Heat dissipation (min/max)	7 BTU/h / 16 BTU/h

MMX4x2-HT200

Power consumption (min/max)	3.6 W / 9.6W
Heat dissipation (min/max)	12 BTU/h / 33 BTU/h

MMX4x2-HDMI-USB20-L

Power consumption (min/max)	2 W / 16.8 W
Heat dissipation (min/max)	7 BTU/h / 57 BTU/h

Power Adaptor

Supported power source	100-240 V AC; 50/60 Hz
Supplied power	12 V 2 A DC
AC power plug	interchangable (EU, UK, JP/US, AUS/NZ)
DC power plug	locking DC connector (2.1/5.5 mm pin)

Enclosure

Enclosure material	1 mm steel

MMX4x2-HDMI and MMX4x2-HT200

Dimensions in mm	221 W x 100.4 D x 26 H
Dimensions in inch	8.7 W x 3.95 D x 1.02 H
Weight (MMX4x2-HDMI and HT200)	625 g

MMX4x2-HDMI-USB20-L

Dimensions in mm	221 W x 100.4 D x 42.5 H
Dimensions in inch	8.7 W x 3.95 D x 1.68 H
Weight (MMX4x2-HDMI-USB20-L)	703 g

Video Inputs

HDMI Input

Connector type	19-pole HDMI Type A receptacle
AV standard	DVI 1.0, HDMI 1.4
HDCP compliance	HDCP 1.4
Color space	RGB, YCbCr
Video delay	0 frame
Supported resolutions at 8 bits/color *	up to 4096x2048@30Hz (4:4:4) or 4096x2048@60Hz (4:2:0); up to 3840x2160@30Hz (4:4:4) or 3840x2160@60Hz (4:2:0); up to 1920x1080@60Hz (4:4:4) up to 12 bits/color
Reclocking	Pixel Accurate Reclocking
3D support	yes
Audio formats	8 channel PCM; Dolby TrueHD, DTS-HD Master Audio 7.1

* All standard VESA, CEA and other custom resolutions up to 300 MHz (HDMI 1.4) are supported.

TPS Input Port (MMX4x2-HT200)

Connector type	RJ45 connector
Compliance	HDBaseT™
HDCP compliance	HDCP 1.4
Transferred signals	Video, Audio, RS-232, Infrared, Ethernet
Color space	RGB, YCbCr
Video delay	0 frame

Supported resolutions at 8 bits/color *	up to 4096x2048@30Hz (4:4:4) or 4096x2048@60Hz (4:2:0); up to 3840x2160@30Hz (4:4:4) or 3840x2160@60Hz (4:2:0); 1920x1080@60Hz (4:4:4) up to 12 bits/color
Audio formats	8 channel PCM; Dolby TrueHD, DTS-HD Master Audio 7.1

* All standard VESA, CEA and other custom resolutions up to 300 MHz (HDMI 1.4) are supported.

HDMI Output Ports

The specifications of the output port are the same as in case of the input port.

Audio Ports

Analog Audio Input

Connector type	5-pole Phoenix connector
Audio formats	2-ch PCM
Sampling frequency	48 kHz
Signal transmission	balanced / unbalanced signal
Gain	-12 dB – +6 dB

Analog Audio Output

Connector type	5-pole Phoenix connector
Audio formats	2-ch PCM
Sampling frequency	48 kHz
Signal transmission	balanced / unbalanced signal
Balance	0 - 100 (50 = center)
Volume	-57 dB – 0 dB

USB 2.0 Ports (MMX4x2-HDMI-USB20-L)

Connector type	A-type receptacle (4x), B-type receptacle (4x)
USB compliance	USB 2.0
Output power over USB-A ports	max. 500 mA*
* USB port 1 can supply up to 1000 mA.	

ATTENTION: The sum of the current that the GPIO and the USB-A ports can supply together is max. 2 A.

Control Ports

RS-232 Serial Port *

Connector type	3-pole Phoenix connector
Baud rates	Between 4800 and 115200 Baud
Data bits	8 or 9
Parity	None / Odd / Even
Stop bits	1 / 1.5 / 2

* MMX4x2-HDMI-USB20-L model is assembled with two RS-232 ports.

USB Control Port (Front Panel)

Connector type	mini-B type

Infrared Port

Input connector type	3.5 mm TRS (approx. 1/8" jack)
Output connector type	3.5 mm TS (approx. 1/8" jack)
Input carrier frequency	38 kHz
Output signal	modulated (38 kHz)

Ethernet

Ethernet port	
Connector type	EtherCON, RJ45 female connector
Ethernet data rate	10/100Base-T, full duplex with autodetect
Power over Ethernet (PoE)	Not supported

GPIO Port (MMX4x2-HDMI-USB20-L)

Connector type	8-pole Phoenix connector
Number of configurable pins	6
Port direction	Input or output
Function of the 6th pin	supplying constant 5V

ATTENTION: The sum of the current that the GPIO and the USB-A ports can supply together is max. 2 A.

INFO: Specifications subject to change without notice.

11.2. Maximum Extension Distances

DIFFERENCE: This section refers to the MMX4x2-HT200 model only.

Resolution	Pixel clock rate	Cable lengths (Auto / Longreach TPS mode)		
		CAT5e AWG24	CAT7 AWG26**	CAT7 AWG23
1024x768@60Hz	65 MHz	100 m / 130 m*	90 m / 120 m*	120 m / 170 m*
1280x720p@60Hz	73.8 MHz	100 m / 130 m*	90 m / 120 m*	120 m / 170 m*
1920x1080p@60Hz / 24bpp	148.5 MHz	100 m / 130 m*	90 m / 120 m*	120 m / 170 m*
1920x1200@60Hz	152.9 MHz	100 m / NA	90 m / NA	120 m / NA
1600x1200@60Hz	162 MHz	100 m / NA	90 m / NA	120 m / NA
1920x1080@60Hz / 36bpp	223.6 MHz	70 m / NA	70 m / NA	100 m / NA
3840x2160@30Hz UHD	297 MHz	70 m / NA	70 m / NA	100 m / NA
4096x2160@30Hz 4K	297 MHz	70 m / NA	70 m / NA	100 m / NA

* With Long reach operation mode which supports pixel clock frequencies up to 148.5 MHz.

** When remote powering is used with AWG26 cables, distances are 20% shorter.

To specify the accurate extension distances, please also check the documentation of the connected HDBaseT-compatible device.

11.3. Input/Output Port Numbering

MMX4x2-HDMI and MMX4x2-HDMI-USB20-L

Audio/Video Ports

Port name		Video port nr. (LW2)	Video port nr. (LW3)	Audio port nr. (LW2)	Audio port nr. (LW3)	
					Till fw v1.1.0	From fw v1.2.0
Inputs	HDMI in 1	1	I1	1	I1	A1 / A2 (depends on the selected video output)
	HDMI in 2	2	I2	2	I2	
	HDMI in 3	3	I3	3	I3	
	HDMI in 4	4	I4	4	I4	
	Analog audio in	-	-	5	I5	A3
Outputs	**HDMI out 1**	1	O1	1	O1	O1
	HDMI out 2	2	O2	2	O2	O2
	Analog audio out	-	-	3	O3	O3

IR and RS-232 Ports

Port name	Port nr. (LW3)
Local IR input	S1
Local IR output	D1

Port name	Port nr. (LW3)
Local serial port	P1
Local serial port #2 *	P2

* Only in case of MMX4x2-HDMI-USB20-L model.

MMX4x2-HT200

Audio/Video Ports

Port name		Video port nr. (LW2)	Video port nr. (LW3)	Audio port nr. (LW2)	Audio port nr. (LW3)	
					Till fw v1.1.0	From fw v1.2.0
Inputs	TPS in 1	1	I1	1	I1	A1 / A2 (depends on the selected HDMI output)
	HDMI in 2	2	I2	2	I2	
	HDMI in 3	3	I3	3	I3	
	HDMI in 4	4	I4	4	I4	
	Analog audio in	-	-	5	I5	A3
Outputs	**HDMI out 1**	1	O1	1	O1	O1
	HDMI out 2	2	O2	2	O2	O2
	Analog audio out	-	-	3	O3	O3

IR and RS-232 Ports

Port name	Port nr. (LW3)
Local IR input	S1
Local IR output	D1
TPS IR input	S2
TPS IR output	D2

Port name	Port nr. (LW3)
Local serial port	P1
TPS serial link	P2

11.4. Content of Backup File

The backup file contains numerous settings and parameters saved from the device. When the file is uploaded to a device, the following will be overwritten:

Audio / Video crosspoint settings
Mute state, Lock state, Crosspoint state
Autoselection (mode, port priority, delay)
TPS / HDMI input ports
Video port name, Audio port name, HDCP setting
HDMI output ports
Port name, HDCP mode, HDMI mode, Power +5V mode
Test pattern mode, clock source, and type
Audio port name, Audio output enabled, S/PDIF mode
Analog audio ports
Port name, Volume, Balance, Gain
Local and TPS serial port
RS-232 mode, Control protocol, Baud rate, Data bits, Stop bits, Parity
Port name and CI (Command Injection) port number
Local and TPS IR port
Port status (enable / disable), Code length, Repetition code, Enable modulation
Input port name, Output port name
CI status (enable / disable), CI port number
Saved IR codes, names
Network settings
DHCP status (enable / disable)
Static IP address, Network mask, Gateway address
MAC filter allowlist, Port blocking settings
TCP client settings (/CTRL/TCP)
Further settings
RS-232 recognizer settings
Control lock status, Device label, Dark mode state
User EDID data (U1-U14), Emulated EDIDs by ports
Crosspoint presets (1-4)
Event Manager: settings of all Events (E1-E100)
Values of the variables

11.5. Factory Default Settings

Parameter	Setting/Value
Video crosspoint settings	
O1 (HDMI out 1) - MMX4x2-HDMI	I1 (HDMI in 1)
O1 (HDMI out 1) - MMX4x2-HT200	I1 (TPS in 1)
O2 (HDMI out 2) - for both models	I2 (HDMI in 2)
Audio crosspoint settings	
O1 (HDMI out 1)	A1 (original HDMI embedded audio)
O1 (HDMI out 1)	A2 (original HDMI embedded audio)
O3 (Audio out)	A3 (analog audio input)
Video input port settings	
TPS mode *	Auto
HDCP	Enabled
Test pattern mode	Disabled
Test pattern clock source	480p
Test pattern	Bar
Video output port settings	
Autoselect feature	Disabled
Autoselect mode	Priority detect
Signal type	Auto
HDCP mode	Auto
Power 5V mode	Always on
Emulated EDID on all four inputs	Factory #47: Universal HDMI PCM
Analog audio input port settings	
Volume	0.00 dB (100%)
Balance	0 (center)
Gain	0.00 dB
Analog audio output port settings	
Volume	0.00 dB (100%)
Balance	0 (center)
Network settings	
IP address	192.168.0.100
Subnet mask	255.255.255.0
Static gateway	192.168.0.1
DHCP	Disabled

Parameter	Setting/Value
LW2 port number	10001
LW3 port number	6107
HTTP port number	80
TPS Ethernet status	Enabled
RS-232 settings	
Control protocol	LW2
Baud rate	57600
Databits	8
Parity	No
Stopbits	1
Operation mode (Link and Local)	Control
Command injection port nr. - Local	8001
Command injection port nr. - TPS *	8002
IR port settings	
Command injection status	Enabled
Comm. inj. input port nr. - Local	9001
Comm. inj. input port nr. - TPS *	9002
Comm. inj. output port nr. - Local	9003
Comm. inj. output port nr. - TPS *	9003
Miscellaneous	
Unique port names	Cleared
Unique device label	Cleared
User EDIDs	Not cleared
Events	Cleared
IR codes	Cleared
Presets	Cleared
Unprotected backups	Cleared
Protected backups	Not cleared
USB 2.0 switch state	USB-A ports switched to PC1 port
Variables and macros	Cleared
Login settings	Cleared (no password, login is disabled)

* Only in case of MMX4x2-HT200 model.

11.6. Applied Ports (Network Settings)

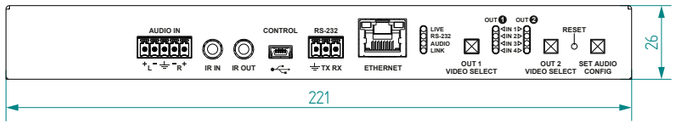
The following ports are necessary to pass via a network switch/firewall for a proper working between the device and the softwares:

Purpose/function	Affected software	Protocol	Port nr.
Firmware update TFTP	LDU2	UDP	69
		UDP	49990
		UDP	49995
Device Discovery	LDC	UDP	224.0.0.251:5353
Remote IP	LDC	UDP	230.76.87.82:37421
Find me (LMDMP)	-	UDP	230.76.87.82:37422
LW2 protocol	-	TCP	10001
LW3 protocol	-	TCP	6107
HTTP port	-	TCP	80
RS-232 command injection	-	TCP	8001, 8002
IR command injection	-	TCP	9001, 9002, 9003, 9004

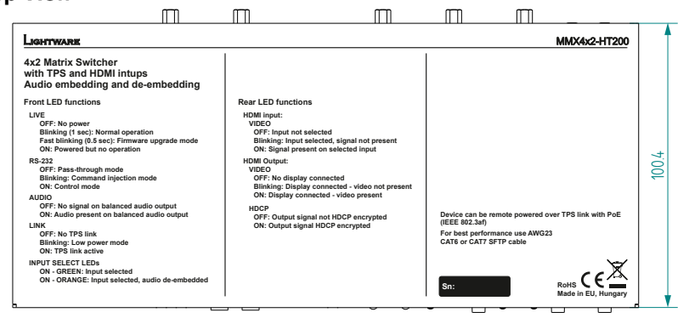
11.7. Mechanical Drawings

MMX4x2-HT200 and MMX4x2-HDMI Devices

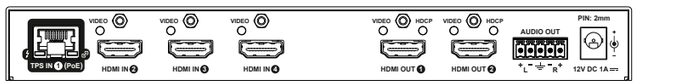
Front View



Top View



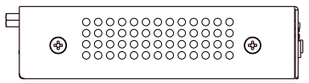
Rear View



Bottom View

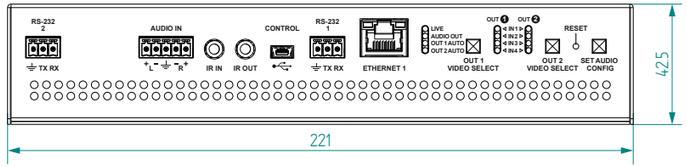


Side View

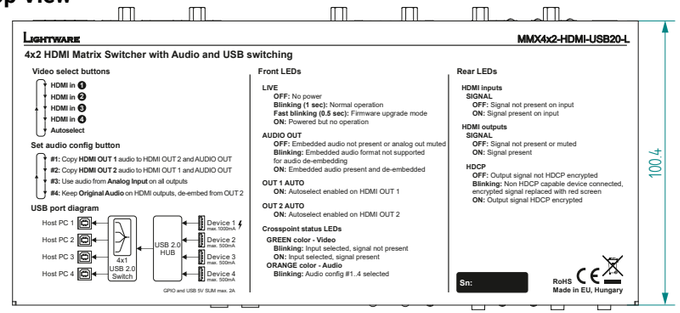


MMX4x2-HDMI-USB20-L

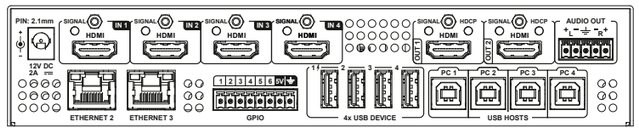
Front View



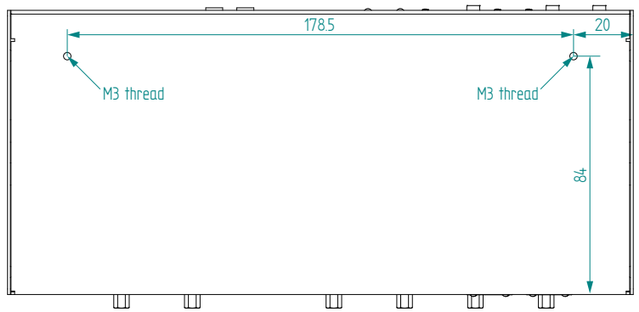
Top View



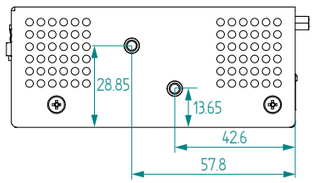
Rear View



Bottom View



Side View



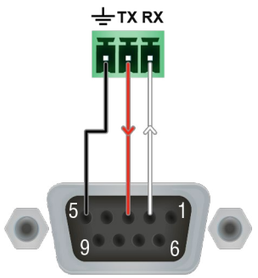
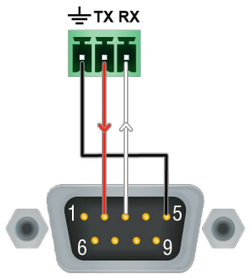
11.8. Cable Wiring Guide

Inputs and outputs of audio devices are symmetric or asymmetric. The main advantage of the symmetric lines is the better protection against the noise, therefore they are widely used in the professional audio industry. Symmetric audio is most often referred to as balanced audio, as opposed to asymmetric, which is referred to as unbalanced audio. Ligthware products are usually built with 5-pole Phoenix connectors, so we would like to help users assemble their own audio cables. See the most common cases below.

- Symmetric and asymmetric lines can be **linked with passive accessories** (e.g. special cables), but in this case half of the line level is lost.
- There are numerous types of regularly used connector and cable types to connect audio devices. Please always make sure that a **connector or cable fits your system** before use.
- Never join the **phase-inverted** (negative, cold or -) poles (either right or left) to the ground or to each other on the output side, as this can damage the unit.
- Use a **galvanic isolation** in case of a ground loop.

11.8.1. Serial Ports

The device is built with a 3-pole Phoenix connector. See the examples below of connecting to a DCE (Data Circuit-terminating Equipment) or a DTE (Data Terminal Equipment) type device:

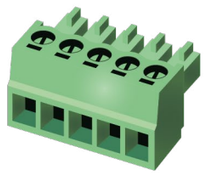
Lightware device and a DCE D-SUB 9 and Phoenix	Lightware device and a DTE D-SUB 9 and Phoenix
 2: TX data 3: RX data 5: Ground	 2: RX data 3: TX data 5: Ground

11.8.2. Audio Ports

The Pinout of the 5-pole Phoenix Connector

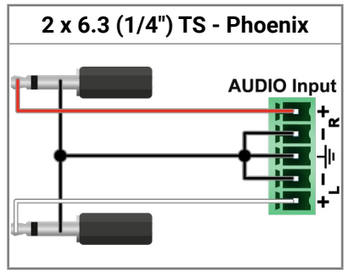


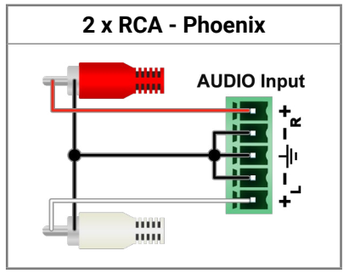
Pin nr.	Signal
1	Left+
2	Left-
3	Ground
4	Right-
5	Right+

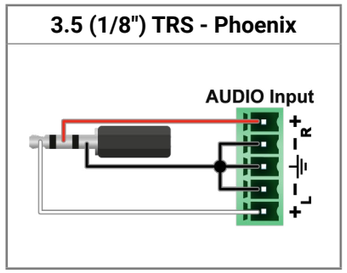


Compatible Plug Type: Phoenix® Combicon series (3.5mm pitch, 5-pole), type: MC 1.5/5-ST-3.5.

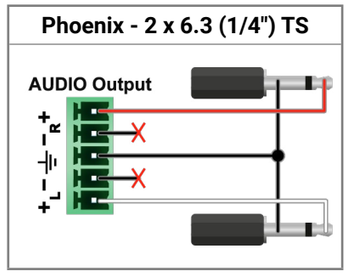
From Unbalanced Output to Balanced Input

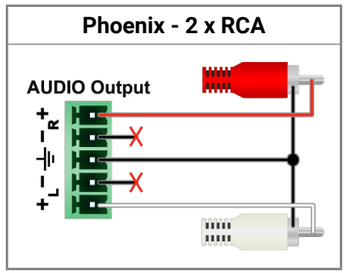


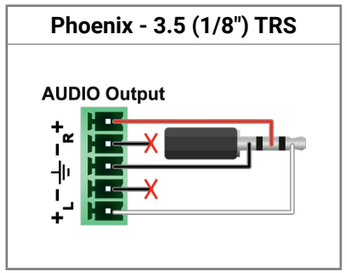




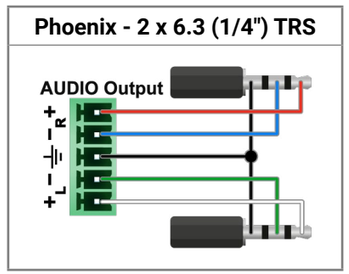
From Balanced Output to Unbalanced Input

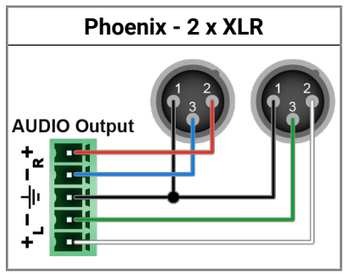


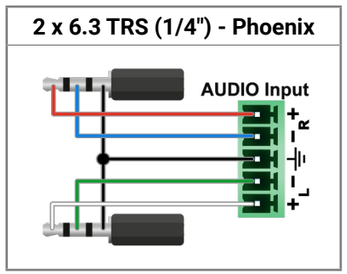


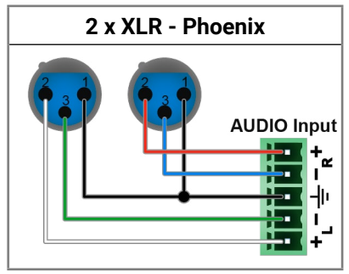


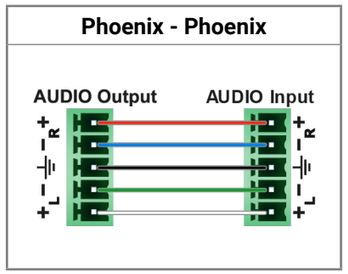
From Balanced Output to Balanced Input











11.9. Factory EDID List

Mem	Resolution	Type	EDID features
F1	640 x 480p @ 60.00 Hz	D	
F2	848 x 480p @ 60.00 Hz	D	
F3	800 x 600p @ 60.32 Hz	D	
F4	1024 x 768p @ 60.00 Hz	D	
F5	1280 x 768p @ 50.00 Hz	D	
F6	1280 x 768p @ 59.94 Hz	D	
F7	1280 x 768p @ 75.00 Hz	D	
F8	1360 x 768p @ 60.02 Hz	D	
F9	1280 x 1024p @ 50.00 Hz	D	
F10	1280 x 1024p @ 60.02 Hz	D	
F11	1280 x 1024p @ 75.02 Hz	D	
F12	1400 x 1050p @ 50.00 Hz	D	
F13	1400 x 1050p @ 60.00 Hz	D	
F14	1400 x 1050p @ 75.00 Hz	D	
F15	1680 x 1050p @ 60.00 Hz	D	
F16	1920 x 1080p @ 50.00 Hz	D	
F17	1920 x 1080p @ 60.00 Hz	D	
F18	2048 x 1080p @ 50.00 Hz	D	
F19	2048 x 1080p @ 60.00 Hz	D	
F20	1600 x 1200p @ 50.00 Hz	D	
F21	1600 x 1200p @ 60.00 Hz	D	
F22	1920 x 1200p @ 50.00 Hz	D	
F23	1920 x 1200p @ 59.56 Hz	D	
F24	2048 x 1200p @ 59.96 Hz	D	
F29	1920 x 1080p @ 60.00 Hz	U	
F30	1440 x 480i @ 60.05 Hz	H	2chLPCM
F31	1440 x 576i @ 50.08 Hz	H	2chLPCM
F32	640 x 480p @ 59.95 Hz	H	2chLPCM
F33	720 x 480p @ 59.94 Hz	H	2chLPCM
F34	720 x 576p @ 50.00 Hz	H	2chLPCM
F35	1280 x 720p @ 50.00 Hz	H	2chLPCM
F36	1280 x 720p @ 60.00 Hz	H	2chLPCM
F37	1920 x 1080i @ 50.04 Hz	H	2chLPCM
F38	1920 x 1080i @ 50.00 Hz	H	2chLPCM
F39	1920 x 1080i @ 60.05 Hz	H	2chLPCM
F40	1920 x 1080i @ 60.05 Hz	H	2chLPCM
F41	1920 x 1080p @ 24.00 Hz	H	2chLPCM
F42	1920 x 1080p @ 25.00 Hz	H	2chLPCM
F43	1920 x 1080p @ 30.00 Hz	H	2chLPCM
F44	1920 x 1080p @ 50.00 Hz	H	2chLPCM
F45	1920 x 1080p @ 59.94 Hz	H	2chLPCM
F46	1920 x 1080p @ 60.00 Hz	H	2chLPCM
F47	1920 x 1080p @ 60.00 Hz	U	2chLPCM
F48	1920 x 1080p @ 60.00 Hz	U	2chLPCM, 8chLPCM, DD, DTS, AAC, DD+, DTS-HD, MLP, DST, WMAP
F49	1920 x 1080p @ 60.00 Hz	U	2chLPCM, 8chLPCM, DD, DTS, AAC, DD+, DTS-HD, MLP, DST, WMAP
F90	1920 x 2160p @ 59.99 Hz	D	
F91	1024 x 2400p @ 60.01 Hz	D	
F94	2048 x 1536p @ 60.00 Hz	D	
F96	2560 x 1600p @ 59.86 Hz	D	
F97	3840 x 2400p @ 24.00 Hz	D	
F98	1280 x 720p @ 60.00 Hz	H	2chLPCM
F99	1920 x 1080p @ 60.00 Hz	H	2chLPCM
F100	1024 x 768p @ 60.00 Hz	H	2chLPCM
F101	1280 x 1024p @ 50.00 Hz	H	2chLPCM
F102	1280 x 1024p @ 60.02 Hz	H	2chLPCM
F103	1280 x 1024p @ 75.02 Hz	H	2chLPCM
F104	1600 x 1200p @ 50.00 Hz	H	2chLPCM
F105	1600 x 1200p @ 60.00 Hz	H	2chLPCM
F106	1920 x 1200p @ 59.56 Hz	H	2chLPCM
F107	2560 x 1440p @ 59.95 Hz	H	2chLPCM

Mem	Resolution	Type	EDID features
F108	2560 x 1600p @ 59.86 Hz	H	2chLPCM
F109	3840 x 2400p @ 24.00 Hz	H	2chLPCM
F110	3840 x 2160p @ 24.00 Hz	H	2chLPCM
F111	3840 x 2160p @ 25.00 Hz	H	2chLPCM
F112	3840 x 2160p @ 30.00 Hz	H	2chLPCM
F118	3840 x 2160p @ 30.00 Hz	U	2chLPCM
F119	3840 x 2160p @ 30.00 Hz	U	2chLPCM, 8chLPCM, DD, DTS, AAC, DD+, DTS-HD, MLP, DST, WMAP
F120	3840 x 2160p @ 60.00 Hz	H	2chLPCM

Legend

D: DVI EDID

H: HDMI EDID

U: Universal EDID, supporting many standard resolutions:

- **F29:** Universal EDID for DVI signals (no audio support).
- **F47:** HDMI EDID supporting PCM audio.
- **F48:** HDMI EDID supporting all type of audio.
- **F49:** HDMI EDID supporting all type of audio and deep color.
- **F89:** Universal EDID for analog signals (no audio support).
- **F118:** HDMI EDID supporting PCM audio and 4K@30 Hz signals.
- **F119:** HDMI EDID supporting all type of audio and 4K@30 Hz signals.

DiD (in column EDID features): with Display ID support

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

11.10. Firmware Release Notes

The list below shows the released firmware packages with important notes.

v1.6.4b2

Release date: 2022-02-01

New feature:

- Added support for firmware update from a host PC which is in another subnet as the device.

Bugfix:

- Configuration backup and restore convert script fixed to handle uncommon Event Actions.

v1.6.2b6

Release date: 2021-08-06

New feature:

- Manufacturing support

v1.6.1b3

Release date: 2021-03-30

Bugfix:

- Fixed GPIO handling bug (only for MMX4x2-HDMI-USB20)
- Update Control USB interface driver.

v1.6.0b19

Release date: 2020-11-09

New feature:

- Added AND operator for Event Manager Conditions (Advanced Control pack v3)
- Added Variable handling for Event Manager (Advanced Control pack v3)
- Added Condition triggering for Event Manager (Advanced Control pack v3)
- Added LW3 command-salvo over Http POST (protocol.lw3) (Advanced Control pack v3)
- Added Http message sending with sendHttpPost and sendHttpPut (target server IP, target filepath, header, body) (Advanced Control pack v3)
- Added Permanent TCP clients with configurable target IP address, and Message recognizer for TCP clients (Advanced Control pack v3)
- Added Macro capability (running partial device preset with tags) (Advanced Control pack v3)
- Added cleartext login function (disabled by default) (Advanced Control pack v3)
- Added MAC filtering (Advanced Control pack v3)
- Added IP port and services filtering (Advanced Control pack v3)
- Added new method for CEC control button sendClick (Advanced Control pack v3)
- Added property to indicate FeaturePackVersion (Advanced Control pack v3)
- Added LMDMP (Lightware Multicast Device Management Protocol) feature.
- Modified DeviceLabel property default text to LW_<productname>_<serialnum>
- Added method to send Wake On LAN packet (Advanced Control pack v3)
- Added properties in root node: FirmwareVersion, PackageVersion, MacAddress.
- Added new ConnectedSource property for media output nodes.
- Added Network HostName property (default: lightware-<serialnum>).

Bugfix:

- Fixed event condition detection for floating point number properties like volume percent.
- Improved network compatibility with 10.x.x.x IP address range.
- Fixed GPIO handling bug (only in MMX4x2-HDMI-USB20)
- Minor performance improvements and modifications.

v1.5.1b2

Release date: 2020-07-20

Bugfix:

- Improved the software update functionality.

v1.5.0b8

Release date: 2020-07-09

New feature:

- Support new products: MMX4x2-HDMI-USB20-L, MMX4x2-HDMI-USB20-Slim

Bugfix:

- Fixed issue with tick counter when the device is continuously operating for a very long time.

v1.3.4b3

Release date: 2019-05-24

Bugfix:

- Notification the user needs to update for the latest LDU2 version.
- Condition link was broken is fixed.

v1.3.1b6

Release date: 2019-02-06

New feature:

- CEC - sendCEC command (e.g. turn on the TV with Event Actions)
- Sending IR codes (SendProntoHex e.g. send max. 200 Byte IR code with Event Actions)

v1.1.0b3

Release date: 2019-01-29

Bugfix:

- Fixed a bug that caused the RS232 ports didn't accept "00" as parameter of sendBinaryMessage

11.11. LW3 Command Changes in Firmware v1.2.0

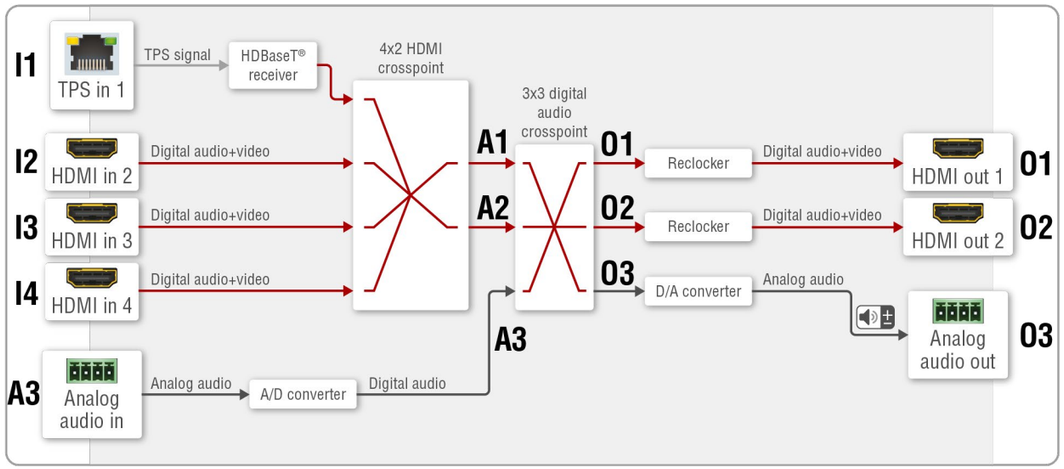
If your MMX4x2 series matrix is built in to an AV system and controlled by a system controller over LW3 commands, please note that the audio LW3 paths and nodes are changed in the firmware v1.2.0. The following tables summarizes the more important changes by categories.

The installed firmware version of the device can be seen in LDC software on the Status tab or can be queried by an LW3 protocol command, see the Querying the Package Version section.

Paths

Description	Ceased Path (till firmware v1.1.0)	New Path (from firmware v1.2.0)
TPS input 1 / HDMI input 1	/MEDIA/AUDIO/I1	/MEDIA/AUDIO/A1 or /MEDIA/AUDIO/A2 (depends on the selected video output)
HDMI input port 2	/MEDIA/AUDIO/I2	
HDMI input port 3	/MEDIA/AUDIO/I3	
HDMI input port 4	/MEDIA/AUDIO/I4	
Analog audio input	/MEDIA/AUDIO/I5	/MEDIA/AUDIO/A3
Audio crosspoint	-	/MEDIA/AUDIO/XP

Port Diagram



Port diagram of MMX4x2-HT200 for firmware v1.2.0

Commands

Embed analog audio input to O1	
Ceased	SET /SYS/MB/LEGACYAUDIOXP.EmbedAudioInputToHdmiOut1=true
Valid	CALL /MEDIA/AUDIO/XP:switch(A3:O1)
Transmit original HDMI audio on O1	
Ceased	SET /SYS/MB/LEGACYAUDIOXP.EmbedAudioInputToHdmiOut1=false
Valid	CALL /MEDIA/AUDIO/XP:switch(A1:O1)
Embed analog audio input to O2	
Ceased	SET /SYS/MB/LEGACYAUDIOXP.EmbedAudioInputToHdmiOut2=true
Valid	CALL /MEDIA/AUDIO/XP:switch(A3:O2)
Transmit original HDMI audio on O2	
Ceased	SET /SYS/MB/LEGACYAUDIOXP.EmbedAudioInputToHdmiOut2=false
Valid	CALL /MEDIA/AUDIO/XP:switch(A2:O2)
Transmit analog audio input to analog audio output	
Ceased	SET /SYS/MB/LEGACYAUDIOXP.EnableAnalogPassthrough=true
Valid	CALL /MEDIA/AUDIO/XP:switch(A3:O3)
De-embed HDMI audio of O2 to analog audio out	
Ceased	SET /SYS/MB/LEGACYAUDIOXP.EnableAnalogPassthrough=false
Valid	CALL /MEDIA/AUDIO/XP:switch(A2:O3)
Mute analog audio input	
Ceased	SET /MEDIA/AUDIO/I5.Mute=true
Valid	CALL /MEDIA/AUDIO/XP:muteSource(A3)
Unmute analog audio input	
Ceased	SET /MEDIA/AUDIO/I5.Mute=false
Valid	CALL /MEDIA/AUDIO/XP:unmuteSource(A3)
Mute analog audio output	
Ceased	SET /MEDIA/AUDIO/O3.Mute=true
Valid	CALL /MEDIA/AUDIO/XP:muteDestination(O3)
Unmute analog audio output	
Ceased	SET /MEDIA/AUDIO/O3.Mute=false
Valid	CALL /MEDIA/AUDIO/XP:unmuteDestination(O3)
Set gain on analog audio input	
Ceased	SET /MEDIA/AUDIO/I5.Gain=<value>
Valid	SET /MEDIA/AUDIO/A3.Gain=<value>

11.12. Hashtag Keyword List

This user manual contains keywords with hashtags (#) to help you find the relevant information as quick as possible.

The format of the keywords is the following:

#<keyword>

The usage of the keywords: use the **Search** function (Ctrl+F / Cmd+F) of your PDF reader application, type the **#** (hashtag) character and the wished keyword.

The **#new** special keyword indicates a new feature/function that has just appeared in the latest firmware or software version.

Example

#dhcp

This keyword is placed at the DHCP (dynamic IP address) setting in the front panel operation, the Lightware Device Controller (LDC) and the LW3 programmer's reference section.

The following list contains all hashtag keywords placed in the document with a short description belonging to them. The list is in **alphabetical order** by the hashtag keywords.

Hashtag Keyword	Description
#advancedview	Advanced view / Terminal window
#analogaudio	Analog audio related settings
#autoselect	Autoselect feature settings
#backup	Configuration cloning (backup)
#balance	Balance (for analog audio) setting
#builtinweb	Built-in Miniweb
#buttonlock	Front panel button lock setting
#cablediagnostics	Cable diagnostics tool in LDC
#cec	CEC related settings
#commandinjection	RS-232 command injection settings
#configurationcloning	Configuration cloning (backup)
#crosspoint	Crosspoint switch setting
#darkmode	Dark mode setting
#devicelabel	Device label
#dhcp	Dynamic IP address (DHCP) setting
#diagnostic	Failure diagnostic related tool/information
#edid	EDID related settings
#eventmanager	Event Manager
#factory	Factory default settings
#firmwareversion	Firmware version query
#framedetector	Frame detector in LDC
#gpio	GPIO-related settings
#hdcp	HDCP-encryption related setting
#http	Http post/put messaging, salvo commands
#identifyme	Identify me (identify the device) feature
#infra	Infrared port related settings
#infrared	Infrared port related settings
#ipaddress	IP address related settings
#label	Device label
#lock	Port lock setting
#lockbutton	Front panel button lock setting
#log	System log
#login	Cleartext login feature
#macfilter	MAC filtering (IT security)
#macro	Macro-handling
#message	Message sending via communication ports
#miniweb	Built-in Miniweb
#mute	Port mute setting
#network	Network (IP address) related settings
#nosyncscreen	Test pattern (no sync screen) settings
#portblock	IP port blocking (IT security)
#portstatus	Source/destination port status query
#producttype	Product type query
#protocol	RS-232 protocol setting
#reboot	Restarting the device
#recognizer	RS-232 recognizer related settings
#restart	Restarting the device
#rs232	RS-232 related settings
#rs-232	RS-232 related settings
#rs232recognizer	RS-232 recognizer related settings
#rs-232recognizer	RS-232 recognizer related settings
#serial	RS-232 related settings

Hashtag Keyword	Description
#serialnumber	Serial number query
#signaltype	HDMI/DVI signal type setting
#status	Status query
#switch	Crosspoint switch setting
#systemlog	System log
#tcprecognizer	TCP message recognizer-related settings
#terminal	Advanced view / Terminal window
#testpattern	Test pattern (no sync screen) settings
#tpsmode	TPS (HDBaseT) mode setting
#unlock	Port unlock setting
#unmute	Port unmute setting
#usb	USB 2.0 interface-related settings
#variables	Variable-management
#volume	Volume (for analog audio) setting
#web	Built-in Miniweb

11.13. Further Document Information

Symbol Legend

The following symbols and markings are used in the document:

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

ATTENTION: Useful information for performing a successful procedure; it is recommended to read.

DIFFERENCE: Feature or function that is available with a specific firmware/hardware version or product variant.

INFO: A notice, which contains additional information. Procedure can be successful without reading it.

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

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

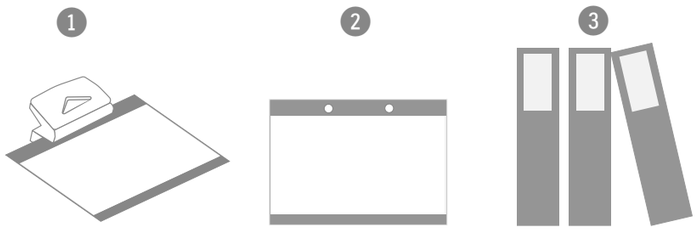
Navigation Buttons

Buttons in the PDF version		Buttons in the HTML version	
	Navigate to the **Table of Contents**.		Open the main **Table of Contents**.
	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 **Online User Manuals** webpage.
	Navigate to the **Bookmark page**.		Navigate to the **Bookmark page** in this User Manual.
	Visit www.lightware.com.		Download the **PDF version** of the User Manual.

About Printing

Lightware Visual Engineering supports green technologies and eco-friendly mentality. Thus, this document is made primarily for digital usage.
If you need to print out a few pages for any reason, follow the recommended printing settings:

- Page size: A4
- Output size: Fit to page or Match page size
- Orientation: Landscape



TIPS AND TRICKS: Thanks to the size of the original page, a border around the content (gray on the second picture below) makes it possible to organize the pages better. After punching holes in the printed pages, they can easily be placed into a ring folder.

11.14. Limited Warranty Statement

1. Lightware Visual Engineering PLC (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 categories above (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 product's warranty period.