PureTools

User Manual

8K HDMI™ 4x1 Switcher with Audio De-embedding

Model PT-SW-HD41-48G

Designed in Germany

Version V1.0

Preface

Read this user manual carefully before using this product. Pictures shown in this manual are for reference only. Different model layouts and specifications are subject to the physical product.

This manual is for operation instructions only, not for any maintenance usage.

In the constant effort to improve our product, we reserve the right to make changes in functions or parameters without prior notice or obligation.

Trademarks

FCC Statement

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. It has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a commercial installation.

Operation of this equipment in a residential areais likely to cause interference, in which case the user at their own expense will be required to take whatever measures may be necessary to correct the interference.

Any changes or modifications not expressly approved by the manufacture would void the user's authority to operate the equipment.

REACH | 1907/2006/EU

ROHS | 2011/65/EU

PureLink hereby declares that this product PureTools PT-SW-HD41-48G complies with Directives 1907/2006/EU und 2011/65/EU.

EMC / LVD (Electro Magnetic Compatibility / Low Voltage Directive)

PureLink GmbH hereby declares that this product PureTools PT-SW-HD41-48G complies with Directives 2014/30/EU and 2014/35/EU. The full text of the EU Declaration of Conformity is available at the following Internet address:

http://www.purelink.de/ce/ 4251364745052_CE.pdf

SAFETY PRECAUTIONS

To ensure the best from the product, please read all instructions carefully before using the device. Save this manual for further reference.

- Unpack the equipment carefully and save the original box and packing material for possible future shipment.
- Follow basic safety precautions to reduce the risk of fire, electrical shock and injury to persons.
- Do not dismantle the housing or modify the module. It may result in electrical shock or burn.
- Using supplies or parts not meeting the products' specifications may cause damage, deterioration or malfunction.
- Refer all servicing to qualified service personnel.
- To prevent fire or shock hazard, do not expose the unit to rain, moisture or install this product near water.
- Do not put any heavy items on the extension cable in case of extrusion.
- Do not remove the housing of the device as opening or removing housing may expose you to dangerous voltage or other hazards.
- Install the device in a place with fine ventilation to avoid damage caused by overheat.
- Keep the module away from liquids.
- Spillage into the housing may result in fire, electrical shock, or equipment damage. If an object or liquid falls or spills on to the housing, unplug the module immediately.
- Do not twist or pull by force ends of the optical cable. It can cause malfunction.
- Do not use liquid or aerosol cleaners to clean this unit. Always unplug the power to the device before cleaning.
- Unplug the power cord when left unused for a long period of time.
- Information on disposal for scrapped devices: do not burn or mix with general household waste, please treat them as normal electrical wastes.

Content

1. Product Introduction

1.1 Introduction

This 8K HDMI 4×1 Switcher allows you to connect 4 HDMI sources to 1 TV to output. The video resolutions is up to 8K@60Hz 4:2:0 12bit or 4K@120Hz 4:4:4 12bit. Audio de-embedding is supported for an AV receiver or a soundbar, in audio format such as Dolby Atmos, DTS-HD. In addition, analog stereo sound or digital 2.0/5.1 audio can be transmitted to headphones or active speakers.

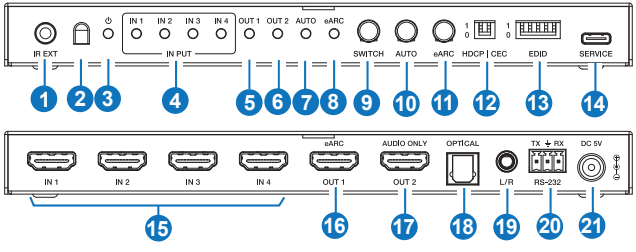
1.2 Features

- HDCP 2.3 compliant
- Supports 48Gbps FRL and 18Gbps TMDS video bandwidth
- Supports video resolution up to 8K@60Hz 4:2:0 12bit, 4K@120Hz 4:4:4 12bit, as specified in HDMI 2.1
- HDMI 2.1 protocols: VRR, ALLM, QMS, QFT, SBTM are supported
- Supports HDR, HDR10, HDR10+, Dolby Vision, HLG pass-through
- Supports audio formats: LPCM 7.1CH, Dolby TrueHD, Atmos, DTS-HD Master, DTS:X Audio pass-through
- Supports TV eARC audio and de-embedding audio from HDMI inputs to output HDMI, Optical and L/R audio
- Supports auto input switching
- Supports CEC control from TV at output to source at input
- Supports CEC volume control from TV to any HDMI sound system
- Advanced EDID management

1.3 Package List

- 1× 8K HDMI 4x1 Switcher with audio de-embedding
- 1× 5V/2A Multinational Locking Power Supply with USB Plug
- 1× EU Conversion Plug
- 1× IR Remote
- 1× IR Receiver Cable (1.5m)
- 1× 3pin-3.5mm Phoenix Connector (male)
- 2× Mounting Ear
- 4× Machine Screw (KM3*4)
- 1× User Manual

2. Panel Description



No.	Name	Function Description
1	IR EXT	IR signal receiving port, connected with IR Receiver cable. If the IR signal receiving window of the unit is blocked or the unit is installed in a closed area out of infrared line of sight, the IR receiver cable can be inserted to the "IR EXT" port to receive the IR remote signal.
2	IR window	IR signal receiving window.

No.	Name	Function Description
3	Power LED	When the device is powered on, the power LED is green; When the device is standby, the power LED is red.
4	INPUT LED (1~4)	When IN 1/2/3/4 is selected as the input channel, the corresponding green LED is on.
5	OUT 1 LED	When a TV or displayer is connected to the OUT 1 port, the green LED will be on.
6	OUT 2 LED	When an audio device is connected to the OUT 2 port, the green LED will be on.
7	AUTO LED	When the auto switching is enabled, the LED will be on.
8	eARC LED	eARC status indicator. ▪ On: eARC function is working properly. ▪ Blinking: eARC function is not working properly. ▪ Off: eARC function is disabled.
9	SWITCH button	Press to switch IN 1/2/3/4 circularly as an input channel.
10	AUTO button	Press to enable or disable the auto switching function.
11	eARC button	Press to enable or disable the eARC function.
12	HDCP DIP switch	Use this DIP switch to set HDCP. 1 - Pass-through mode: The output HDCP follows the source. 0 - Managed mode: If the source has HDCP, the output will be set to HDCP 1.4; if the source has no HDCP, the output will be set to no HDCP.
	CEC DIP switch	Use this DIP switch to enable or disable CEC. 1 - CEC disabled: Prevent CEC communication between source and sink devices. 0 - CEC enabled: Allow CEC communication between source and sink devices.
12	EDID DIP switch	Use the DIP switch to set EDID. [DIP]=11111: Copy OUT1 port sink EDID [DIP]=11110: FRL12G_8K_HDR, 2.0CH [DIP]=11101: FRL12G_8K_HDR, 5.1CH [DIP]=11100: FRL12G_8K_HDR, 7.1CH

No.	Name	Function Description
13	EDID DIP switch	(Continued) [DIP]=11011: FRL10G_8K_HDR, 2.0CH [DIP]=11010: FRL10G_8K_HDR, 5.1CH [DIP]=11001: FRL10G_8K_HDR, 7.1CH [DIP]=11000: 5K60(444)_HDR, 2.0CH [DIP]=10111: 5K60(444)_HDR, 5.1CH [DIP]=10110: 5K60(444)_HDR, 7.1CH [DIP]=10101: 4K144(444), 2.0CH [DIP]=10100: 4K120(444), 2.0CH [DIP]=10011: 4K120(444), 5.1CH [DIP]=10010: 4K120(444), 7.1CH [DIP]=10001: 4K120(420)_HDR, 2.0CH [DIP]=10000: 4K120(420)_HDR, 5.1CH [DIP]=01111: 4K120(420)_HDR, 7.1CH [DIP]=01110: 4K60(444)_HDR, 2.0CH [DIP]=01101: 4K60(444)_HDR, 5.1CH [DIP]=01100: 4K60(444)_HDR, 7.1CH [DIP]=01011: UWQHD 120(444), 2.0CH [DIP]=01010: UWQHD 60(444), 2.0CH [DIP]=01001: 1440p120(444), 2.0CH [DIP]=01000: 1440p60(444), 2.0CH [DIP]=00111: 1080P240(444)_HDR, 2.0CH [DIP]=00110: 1080P144(444)_HDR, 2.0CH [DIP]=00101: 1080P120(444)_HDR, 2.0CH [DIP]=00100: 1080P60(444), 2.0CH [DIP]=00011: 1080P60(444), 5.1CH [DIP]=00010: 1080P60(444), 7.1CH [DIP]=00001: 1080P30(444), 2.0CH [DIP]=00000: Custom EDID Upload
14	SERVICE	Firmware update port.
15	IN port (1~4)	HDMI signal input port, connected to an HDMI source device such as PC or PS5 with HDMI cable.
16	OUT1 port (eARC)	HDMI output port, connected to an HDMI display device such as TV with eARC function.

No.	Name	Function Description
17	OUT2 port (AUDIO ONLY)	HDMI audio output port, connected to an audio device such as soundbar or amplifier.
18	OPTICAL	Optical fiber audio output port, connected to an audio output device such amplifier.
19	L/R	Analog audio output port, connected to an audio output device such as speaker.
20	RS-232	3-pin phoenix connector, connected to a PC or control system for serial command control. Note: RS-232 control must add CR/LF.
21	DC 5V	DC 5V/2A power input port.

* **Restore Factory Defaults**

Press and hold the **Switch** and **eARC** buttons for 3 seconds simultaneously to reset this switcher. At this time, all LEDs (except for the power LED) on the front panel are flashing twice. After completed, all setting are restored to factory defaults.

* **Auto Switching**

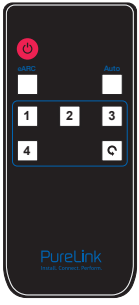
The auto switching function can be enabled/disabled via the AUTO button on the front panel, IR remote or the RS-232 commands. It is enabled by default.

There are two auto switching modes: TMDS detection and 5V detection. And the default is TMDS detection. It can be set via RS-232 commands.

1. TMDS detection
- If an IN port is connected, it will switch to the port when the TMDS/FRL signal is detected, and the corresponding LED will light up.
- If the current input port is disconnected or in standby mode, and no signal is detected, it will switch to the next active port automatically. If there are no other active ports, it will stay at the current port.

2. 5V detection
- If one IN port is connected, and the others are connected later. It will switch to the lastest one automatically (last in gets priority) as the input channel, and the corresponding LED will light up.
- If the four IN ports are connected meanwhile, when one of them is disconnected, it will switch to the next IN port automatically according to the order of IN 1~4.
- If only one IN port is connected, it will not automatically switch to the others when disconnected.

3. IR Remote



⏻:

Press this button to power on the switcher or set it to standby mode.

eARC:

Press this button to enable or disable the eARC function.

Auto:

Press this button to enable or disable the auto switching function.

1/2/3/4:

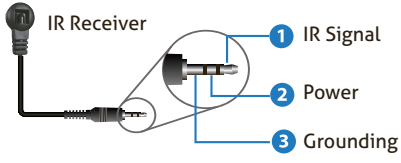
Press to switch the corresponding input channel.

:

Press this button to circularly switch the HDMI signal source from IN1 to IN4.

3.1 IR Receiver

IR RECEIVER



4. Specification

Technical	
HDMI Compliance	HDMI 2.1
HDCP Compliance	HDCP 2.3
Video Bandwidth	48Gbps
Video Resolution	Up to 8K@60Hz 4:2:0 12bit, 4K@120Hz 4:4:4 12bit
Color Depth	8/10/12-bit
Color Space	RGB, YCbCr_4:4:4, YCbCr_4:2:2, YCbCr_4:2:0
HDR	HDR, HDR10, HDR10+, Dolby Vision, HLG
IR Level	5Vp-p
IR Frequency	Fixed frequency 38KHz
Audio Latency	No Latency
Video Latency	No Latency
Audio Format	**HDMI input/output:** LPCM, Dolby Digital/Plus/EX, Dolby True HD, Dolby Atmos, DTS, DTS-EX, DTS-96/24, DTS High Res, DTS-HD Master Audio, DSD Audio, DSD **Audio de-embedding output:** Optical: LPCM/Dolby/DTS 5.1CH Analog: LPCM 2CH
ESD Protection	IEC 61000-4-2: ±8kV (air-gap discharge) & ±4kV (contact discharge)
Connection	
Input	4× IN [HDMI type A, 19-pin female]
Output	2× OUT [HDMI type A, 19-pin female] 1× OPTICAL [S/PDIF] 1× L/R [3.5mm stereo mini-jack]

Control	1× SERVICE [USB type C, upgrade port] 1× RS-232 [3pin-3.5mm phoenix connector]		
Mechanical			
Housing	Metal Enclosure		
Color	Black		
Dimensions	200mm [W] × 84mm [D] × 20mm [H]		
Weight	430g		
Power Supply	DC 5V/2A		
Power Consumption	3.15W (Max)		
Operation Temperature	32 ~ 104°F / 0 ~ 40°C		
Storage Temperature	-4 ~ 140°F / -20 ~ 60°C		
Operating Humidity	20%~80% relative humidity, non-condensing		
Storage Humidity	10%~90% relative humidity, non-condensing		
Recommended HDMI Cable			
Video Resolution	8K	4K60	1080P
HDMI Cable Length (HDMI IN / OUT)	2m/6.6ft (Ultra HDMI 2.1)	5m/16.4ft	10m/32.8ft
The use of "Premium High Speed HDMI" cable is highly recommended.			

5. API Commands

The product also supports RS-232 command control. Connect the RS-232 port of the PT-SW-HD41-48G to the appropriate cable and your control device. Then open a Serial Command tool on PC to send ASCII commands to control the product. The ASCII command list of the product is shown below.
(Note: RS-232 control must add CR/LF.)

ASCII Command				
Serial port protocol: baud rate: 115200(default) Data bits: 8 Stop bits: 1 Check bit: 0				
x - Parameter 1. y - Parameter				
Command	**Function**	**Example**	**Feedback**	**Default**
System Setting				
help!	List all commands	help!		
r type!	Get device model	r type!	8K 4x1 HDMI switcher	
r info!	Get device current status	r info!	current unit status: mcu fw version: Vx.xx.xx power status: on hdmi input1: disconnect hdmi input2: disconnect hdmi input3: disconnect hdmi input4: disconnect hdmi output1: disconnect hdmi output2: disconnect connection route: input1->output1 output 1 hdcp: user mode on hdcp dip mode: hdcp follow source cec dip mode: cec off auto switch: on earc mode: off auto switch mode: TMDS mode input edid mode: copy from output	

Command	Function	Example	Feedback	Default
System Setting				
r fw version!	Get Firmware version	r fw version!	MCU FW version x.xx.xx	
power z!	Power on/off the device, z=0~1 (z=0 power off, z=1 power on)	power 1!	power on System Initializing... Initialization Finished! MCU FW version x.xx.xx	
r power!	Get current power state	r power!	power on /power off	
r temperature!	get temperature	r temperature!	gsv chip temperature: 47	
reboot!	Reboot the device	reboot!	Reboot... System Initializing... Initialization Finished! MCU FW version x.xx.xx	
reset!	Reset to factory defaults	reset!	Reset to factory defaults System Initializing... Initialization Finished! MCU FW version x.xx.xx	
Input/Output Setting				
s user edid!	Upload local edid	s user edid!	Please send the edid file...	edid: 1080P60, Audio 2.0CH
r input edid!	Get input edid mode	r input edid!	input edid: 4K2K60_444, Stereo Audio 2.0	
s auto switch x!	Enable/disable auto switch feature (x=0~1) 0. Disable auto switch 1. Enable auto switch	s auto switch 0!	auto switch off	auto switch: on

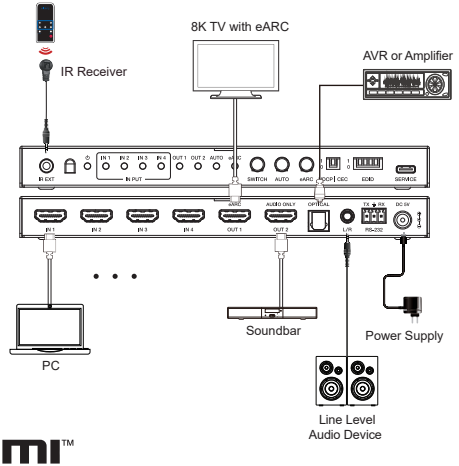
Command	Function	Example	Feedback	Default
Input/Output Setting				
r auto switch!	Get auto switch feature	r auto switch!	auto switch: on	
s auto mode x!	set auto switch mode(x=0~1) 0.TMDS mode 1.5V mode	s auto mode 1!	auto switch mode: 5v mode	auto switch mode: TMDS mode!
r auto mode!	get auto switch mode	r auto switch!	auto switch mode: TMDS mode	
s earc x!	Enable/disable Earc function (x=0~1) 0. earc off 1. earc on	s earc 0!	earc off	earc off
r earc!	Get earc feature	r earc!	earc off	
s in source x!	Route input source to output (1~4) 1. HDMI 1 2. HDMI 2 3. HDMI 3 4. HDMI 4	s in source 1!	output->input1	input 1
r in source!	Get output selected input source	r in source!	output->input1	
s output hdcp x!	set user mode on/off (x=0~1)	s output hdcp 0!	output: user mode on	user mode off
r output hdcp!	get output hdcp status	r output hdcp!	output: user mode off	
s baud rate z!	set rs232 serial port baud rate (z=115200, 57600, 38400, 19200, 9600, 4800, 2400)	s baud rate 115200!	set the baud rate to 115200	baud rate: 115200

6. System Diagram

Usage Precaution

- Make sure all components and accessories included before installation.
- System should be installed in a clean environment with proper temperature and humidity.
- All of the power switches, plugs, sockets, and power cords should be insulated and safe.
- All devices should be connected before power on.

The following diagrams illustrate typical input and output connections that can be utilized with this device:

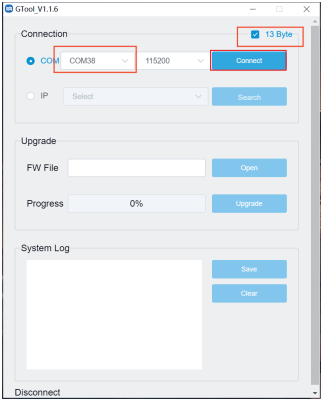


7. Firmware Upgrade

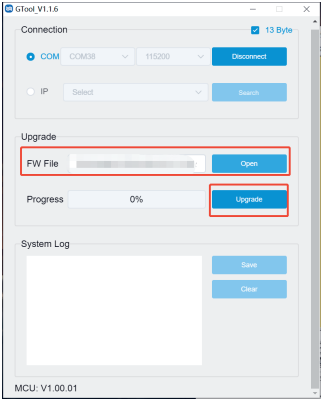
Please follow the steps as below to upgrade firmware by the Service port on the front panel:

1. Prepare the PC tool (.exe) and the latest upgrade file (.bin) on PC. Rename the upgrade file as "MCU_MAIN_PT-SW-HD41-48G_Vxx.xx.xx.bin" .
2. Connect the Service port on the splitter to the PC with USB cable.
3. Connect the power supply to the splitter and power on.

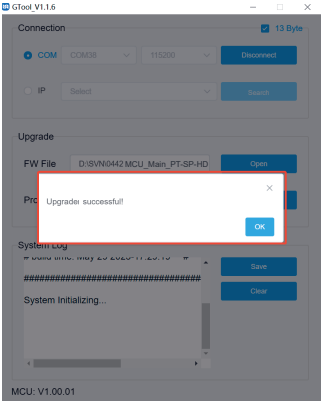
4. Click the channel on PC, check "13 Byte", and then click "Connect".



5. Click "Open" to select the upgrade file MCU_Main_PT-SW-HD41-48G_ Vxx.xx.xx.bin, then click "Upgrade".



6. When the upgrade is completed, it will pop up "Upgrade successful!". If the firmware updating is fail, the name of upgrade file (.bin) should be confirmed, and then follow the above steps to update again.



7. Remove the USB cable after firmware upgrade.

8. After-Sales Service

If there appear some problems when running the product, please check and deal with the problems referring to this user manual. Any transport costs are borne by the users during the warranty.

1) Product Limited Warranty: This product will be free from defects in materials and workmanship for three years (The purchase invoice shall prevail).
Proof of purchase in the form of a bill of sale or receipted invoice which is evidence that the unit is within the Warranty period must be presented to obtain warranty service.

2) What the warranty does not cover (servicing available for a fee):

- Warranty expiration.
- Factory applied serial number has been altered or removed from the product.
- Damage, deterioration or malfunction caused by:
  - Normal wear and tear.
  - Use of supplies or parts not meeting our specifications.
  - No certificate or invoice as the proof of warranty.
  - The product model showed on the warranty card does not match with the model of the product for repairing or had been altered.
  - Damage caused by force majeure.
  - Servicing not authorized by distributor.
  - Any other causes which does not relate to a product defect.
  - Delivery, installation or labor charges for installation or setup of the product.

3) Technical Support: For any questions or problems, contact your distributor or reseller and tell them the respective product name and version, the detailed failure situation as well as the formation of the cases.

Asking for Assistance

Technical Support:

Phone: +49 5971 800299 - 0
Fax: +49 5971 800299 – 99

Technical Support Hours:

8:30 AM to 5:00 PM Monday thru Thursday
8:30 AM to 4:00 PM Friday

Write to:

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info@purelink.de