

# **G901 Quick User Guide**

Input: up to 4096\*2160 @60Hz, 4080\*3840 @30Hz, 4:4:4 chroma sampling Output: up to 3840\*2400 @60Hz, 10 bits, RGB 4:4:4 True 10-bit color and up/down scaling Image any place cropping PIP/POP dual content display Image flip and rotation Multi-functions in one box, simple, easy-of-use





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This device is designed and tested to the highest standards and backed by two years' parts and labor warranty. Warranties are effective upon the first delivery date to the end customer and are non-transferable. Warranty related repairs include parts and labor, but do not include repair of faults resulting from user negligence, special modifications, abuse (mechanical damage), shipping damage, and/or other unusual damages. The customer shall pay shipping charges when the unit is returned for repair. Manufacturer will pay shipping charges for return shipments to customers.

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User can pay extension fee to extend the warranty period. Please contact us for more details. In the event that a product needs to be returned for repair, inform manufacturer and ask for a Return Material Authorization number.

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This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential / commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

## **Introduction**

G901 is multiple purpose video processor for video source switching, format conversion, scaling up and down, image flip/rotation, video wall and PIP/POP functions. It supports various input sources and input timings, including non-VESA standard input timings. It is an ideal front end processor for big display system required 4k/60 input and output.

5 input ports (3x HDMI, 2x DP) and 1x HDMI outputs are designed in G901. Input supports up to 4096\*2160 @60Hz, 4080\*3840 @30Hz with 4:4:4 chroma sampling. Output supports up to 3840\*2400 @60Hz. It is integrated with 10-bit high end processor, motion adaptive de-interlace, low angle smooth algorithm, 3:2/2:2 pull-down cadence. Programmable EDID up to 4080 x3840 can optimize input timing to get the best video result.

It can execute video adjustment in Brightness, Contrast, Hue, Saturation, Sharpness, color temperature and discrete RGB gain adjustment. User can select deep color mode with true 10-bit color output to get smooth gradient color.

Video wall function in G901 can crop specific location & resolution in source image for the output. Overlap function allows user to change image position, aspect ratio and cropping area up to +\_1800 pixels in each edge. User can also adjust image position freely without changing image size. Multiple units of G901 can build creative video wall with any LCD array at landscape and portrait directions.

PIP (picture in picture) and POP (side by side or top/bottom) are standard functions in G901. PIP image size can be from 320\*180 up to 1920x1200. It can be located at any location across entire display. Main and PIP images are swappable. Both PIP and POP are functional while image is at 90/180/270 degrees flip and rotation. Sub-image can be rotated and flipped independently. The cropping range and position in both main and sub-image are adjustable. Maximum signal source can be displayed in one G901 is two.

User can use IR controller, USB, Web Gui and Ethernet for system operation and setup. It is designed to work in 7/24 working environment and provides easy configuration, low entry barrier, cost effective, reliable and flexible solution.

	N	Q	UHD F In: L Ou De	FRONT END PROCESS JHD 4k/2k @60 4:4:4 rt: 4K/2K @60 4:4:4 fault IP: 192.168.0.100		•	•	GeoBox <sup>®</sup> <u>G901</u>
			IR		PWR	IN	OUT	
Ουτρυτ			INPUT			СО	NTROL	RS-232
OUTPUT HDMI-2.0	HDMI-1	HDMI-2	INPUT HDMI-3			со	NTROL	RS-232
OUTPUT HDMI-2.0	HDMI-1	HDMI-2	INPUT HDMI-3	DP-1	DP-2	CO		RS-232
OUTPUT HDMI-2.0	HDMI-1	HDMI-2	HDMI-3	DP-1	DP-2	CO Rese		RS-232 Ethernet DC IN 12V = 2.0A

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## **Quick User Guide**

## How to Use IR Remote Controller

- > IR remote controller has all the functions for the operation of G901.
- IR receiver is on Front Panel. One 3.5ø mm audio connector for IR extender is located at Back Panel of G901. 1.8m IR extension cable is equipped in the packing. User can add audio cable to extend the control distance up to 20 meters.



Profile recall shortcut key	
Power on/off	System Information
MUTE Back	OSD Menu operation keypads
	Activate OSD Menu, press 5 seconds
Input source selection	will execute OSD Lock function, press
Default at HDMI-1, ——> 🗰 🗰 🗰	another 5 seconds will unlock OSD
HDMI-3 and DP-2 shall	Output resolution selection, more
be selected from OSD	output resolution can be selected
4 5 6 (11.12)	from OSD
	Video Wall Menu shortcut key
TOP LIF TOP RI RATIO PATTERN ALL GAVE RST OVER	Video Wall Overlap setting
ALL SAVE RESET OVERLAN	shortcut key
Profile Save shortcut key	system Reset shortcut key

## System Setup

#### **1** Connecting the Inputs

User can connect signal source to any of the input ports for PIP/POP operation.



## 2 Connecting the Output



#### 3 System setting: Box ID, RS232, Ethernet

- 3.1 Box ID is required for the application with multiple units of GeoBox.
- 3.2 The setting for Box ID, RS232 and Ethernet can be executed via OSD, WebGui or UWM PC Tool.
- 3.3 User can control G901 directly from Ethernet. The default static IP address is 192.168.0.100.
- 3.4 User can set different IP address or Box ID for each unit so that user can execute independent control to each GeoBox without interrupt.
- 3.5 Box ID range is from #0 #99. When user uses remote controller to control the system through OSD, the maximum ID setting for remote controller is #0 #9.
- 3.6 Remote Controller:

- When all boxes or IR extender receivers are installed together, user can control individual unit through below method:
  - ✓ To Press 851 number keys on remote controller will control only ID #1 GeoBox and lock all others. User can see flashing LED on the Front Panel of the locked units.
  - ✓ To Press 853 will only unlock ID # 3 GeoBox for further OSD operation.
  - Press 850 will unlock all GeoBox OSD menu. Remote controller can access to all GeoBox simultaneously.

#### 3.7 RS232 Setting

- > RS232 interface is designed with DB-9 connector. User can select 11520 or 9600 baud rate.
- The UART Protocol between GeoBox and a Host computer can be provided. The protocol can be executed via RS-232, USB, Ethernet or other forthcoming communication methods.
- > Please execute RS232 setting through OSD, WebGui or UWM.

#### 3.8 Ethernet setting

- User needs to connect G901 to WiFi Router or switch/hub through RJ45 to LAN port. Then user can control the system through Ethernet.
- UTP cable can be used for direct connection between PC and GeoBox. User needs to set PC TCP/IPv4 with the same domain segment as GeoBox (for instance, to set IP address at (192.168.0.105) and subnet mask at (255.255.255.0).
- Open web browser (Google Chrome or Internet Explorer) and input G901 IP address (default is 192.168.0.100), user can see GeoBox WebGui and menu with virtual keys similar to OSD for further system operation. There is no additional software is required.
- If user can't connect the network, please power off/on G901 again to let PC detect G901 network system.
- User can set DHCP for the connection. If necessary, please [Renew] DHCP to get IP address before network connection.
- UWM PC Tool is another web tool that has full function for system setting and operation. It can also update Firmware or MCU code. UWM can be downloaded from VNS website.
- Each G901 can set different IP address for independent operation and control.
- Please use < > OSD keys to select OSD menu items and use ^ v OSD keys to change IP address.
- If G901 is connected with WiFi Router (through LAN port), user can control G901 through WiFi via PC, iPad or mobile phone.
- > Default Telnet port is 23 and TCP server port is 1266.



## 4 Step 6 - LED Indicators



- > Input LED will light up when G901 has detected input signal.
- > Output LED will light up when G901 has detected the monitor in each output.
- Power LED:
  - Red: Power connected and has been turned off by remote controller. Need to turn on by remote controller again.
  - ✓ Green: Power on
  - ✓ Green flashing at 1.0" interval: OSD lock through Menu key or Lock through remote controller 85x Box ID # control key. Hold Menu key for 5" to unlock if the system is locked by OSD Menu key. Press 850 on remote controller number keys if the system is locked by Box ID 85x key.

#### 5 Enable 10-bit deep color output

- ➤ User can select 10-bit deep color through OSD [Image Properties] → [ Output Mode] → [Deep Color] → On
- User can check the result through [INFO] hotkey on remote controller to understand input/output signal status.

## 6 System Information



## 7 Select input port and set output resolution

- > G901 has 5 input ports. System default input is HDMI-1.
- Remote control hotkeys can select only HDMI-1, HDMI-2 and DP-1 input ports. HDMI-3 and DP-2 shall be selected through OSD.
- > User can select output resolution by remote controller for XGA, WXGA & 1080p only.
- ➤ There are 17 preset output resolutions and user can get into OSD menu to selected desired output resolution through OSD: [Image Properties] → [ Output Mode] → Select output resolution
- > All default output resolution is 60Hz, RGB 4:4:4 format and progressive.
- > Input resolution is determined by signal source. G901 can support non-VESA standard input timing.
- > User can click [Info] key to get system information and see input & output signal status.
- The input refresh rate should be the same as output refresh rate so that the system can implement Frame Lock to synchronize all the outputs. If the input source is 50Hz with 60Hz output, then it is possible to see some synchronization issue among multiple displays and frame conversion artifact.



Select input port

Select output resolution and 10-bit deep color output

## 8 Image rotation and flip

- ✓ There are two image Orientation OSD menu. One for main input and the second is for second input for PIP/POP.
- ✓ Image can be rotated at 90/180/270 degrees and flipped at Right/Left, Top/Bottom or Front/Rear.
  This function can support up to 4k/60Hz input signal.
- ✓ Image 90/270 degrees rotation is for edge blending with projector at portrait position or video wall with monitor installed at portrait position. There is no need to rotate signal source.
- ✓ Image flip is for projector to project image from rear or top position.
- ✓ When main image is rotated or flipped, the OSD will be rotated together with main image.
- ✓ User can see the direction of the TEXT "R" to do image flip and rotation.
- ✓ Main image and PIP image can be rotated independently.



Rotation for main input

## Rotation for sub-input (PIP)

#### 9 PIP/POP setting



- PIP (Picture in Picture)
  - PIP image size is from 320\*180 to 1920\*1200.
  - Flexible position across entire video wall.
  - PIP image size and aspect ratio can be adjusted through [Overlap] function
  - Main & PIP input source is swappable
  - PIP image can be across entire video wall at any position

- > POP: Picture outside Picture (side by side)
  - POP to fit full screen or maintain original source aspect ratio
  - POP1: Two images are placed at side by side position.
  - POP2: Two images are at top/bottom position



#### > PIP [Size] and [Position]

- PIP image size is from 320\*180 to 1920\*1200
- It can be further adjusted through Overlap function to about 160\*90 image size.
- User can replace main image with PIP image on entire display under FHD output resolution.
- The PIP image position can be at any location in the display with pixel by pixel adjustment through [Overlap] function.
- > [Ratio]: Aspect Ratio of the display image. (Only apply to PIP function)
  - Full Screen: the same aspect ratio as main image or
  - Original AR: the same aspect ratio as PIP input source.
  - POP image aspect ratio:
    - ✓ Main Image: can be adjusted through [Scaling] under [Image Properties] and [Overlap] under [Video Wall] OSD menu.
    - ✓ Sub-Image: can be adjusted via [Overlap] function under [PIP Settings] menu.

#### [Source]:

- User can select the input source for PIP/POP image.
- Any two signals from input ports can be displayed on PIP/POP screen.

- User can swap the position in Main and PIP image--to select main image from [Input Signal] Menu and PIP image from [Source] under [PIP Settings] menu.
- User can save different settings into [Profile] under [Options] menu and recall at any time.
- ➤ [Orientation]:
  - to rotate and flip sub-image (PIP) display direction at 90/180/270. It is independent from main image display direction.
- > [Overlap]:
  - Overlap function under [PIP Settings] will only be functional for sub-image. The function is the same as [Overlap] function under [Video Wall] for main image.
  - It can change sub-image position, size and cropping area pixel by pixel.
  - Through Overlap function, main image and sub-image can be displayed with various size and aspect ratio as show below.



## **10 Video Wall applications**

- User can add one HDMI splitter before G901 and build creative 4k video wall. If add HDMI matrix switcher, user can build 4k video wall with one big content across entire video wall or some monitors display discrete content with true 4k quality. Each monitor can be at landscape or portrait direction with PIP/POP image inside.
- Signal source shall be connected before video wall settings. The setting parameters inside GeoBox will automatically change according to different input resolution once the setting is finished. If no signal source is connected during video wall setting, it will assume the input resolution is the same as output resolution.
- Press [V. Wall] hotkey on Remote Controller to activate [Video Wall] menu. WebGui and UWM PC tool are available for Ethernet configuration. USB can also be used together with UWM tool.



#### 10.1 [Zoom]

Use [Zoom] to split the display in horizontal and vertical directions. GeoBox will cut the image into different sections. Maximum split image is 15 in both horizontal and vertical directions.



#### 10.2 [Pan]

[Pan] will assign the location of each split image in the display in both horizontal and vertical directions. Horizontal direction is counted from Left to Right and Vertical direction is counted from Top to Bottom.



In the case of 3x3 video wall display, Pan settings are as below:

0	0	€	
4	6	6	
Ø	8	0	

For No. 🕄 monitor:	For No. 🌀 monitor:
Horizontal Pan = 3	Horizontal Pan = 3
Vertical Pan = 1	Vertical Pan = 2

#### 10.3 [Overlap] – Bezel Compensation and Position Alignment

[Overlap] adjustment changes the cropping area of the image so that image position in each monitor will be shifted. It can compensate Bezel Size of the monitor and correct misalignment in monitor installation. If overlap value is decreased, each monitor will crop less image area and cause [zoom in] (enlarged) effect. If overlap value is increased, each monitor will crop more image area and cause [zoom out] (shrunk) effect. User can also use this function to shift the whole image location for irregular video wall and set overlap area for projector edge blending application.



- Maximum [Overlap] adjustment value is +\_1800 pixels in all directions.
- > User can see the image and select Edge to adjust [Overlap] value for Bezel compensation.
- [Overlap] adjustment can also compensate the position mis-alignment while monitor installation.
- User can reduce [Overlap] value to stretch the image outside video wall (some image will be missing) or draw image inside video wall with Black or Blue blanking area at the edge through increase [Overlap] value. This function can adjust the aspect ratio of the content to match required aspect ratio of the video wall. Please see more details in [Flexible Aspect Ratio Adjustment] section.

#### 11 Flexible Aspect Ratio Adjustment



User can use Video Wall [Overlap] function to change the aspect ratio of the image with black or Blue borders or to stretch the image in specific direction to compensate the aspect ratio difference between video wall and the content. The Maximum adjustment range is 1800 pixels in each edge.



## 12 Save System Settings through Remote Controller

- After finishing system settings, user can save the setting by OSD menu through [Menu]→
  [Options]→ [Setting]→ [Profile]→ [Save]→ [Index 1-5].
- > User can use [Save] hotkey + Number key on remote controller to save settings directly.
- Five different display settings can be saved to [Profile]. The data stored in Profile include
  EDID setting, input source, output resolution, color settings and all user customized settings.



- When user power off the system, G901 will save user setting without loss even the setting is not saved into Profile Index, unless someone to change the setting.
- When system has been reset from OSD menu or update new Firmware, Profile data will still be kept inside G901.

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## 13 Load Profile Index through Remote controller

▶ Press [Profile] shortcut key  $\rightarrow$  Select number keys 1-5 to recall Index 1 – Index 5.



#### 14 OSD Lock and Unlock

To press MENU on remote controller for 5 seconds will LOCK the OSD. To press another 5 seconds on MENU key will UNLOCK OSD.

#### 15 System setup

#### 15.1 Setup by Remote Controller

- ✓ If multiple units are used, user can set different [Box ID] (#1 #99) to each GeoBox in control system. For IR control, the number range is #1 #9.
- User can control individual GeoBox through below method when all boxes or IR extender receivers are installed together.
  - ✓ Press 851 number key on remote controller will lock all other GeoBox OSD menu except ID #1 GeoBox. User can see flashing Power LED for the units with OSD locked.
  - ✓ Press 853 will only unlock ID # 3 GeoBox for further OSD operation.
  - ✓ Press 850 will unlock all GeoBox OSD menu. Remote controller can access to all box simultaneously.

#### 15.2 Setup by Ethernet

User can connect all G901 in one Ethernet (or WiFi) Router (or switch hub) LAN ports and set different Static IP address for each Box, then use WebGui virtual keys or UHDWall Manager (UWM) PC tool to control each G901 independently. If user connects PC to the same Router and set Router with DHCP mode, PC can access to G901 directly. If PC is not connected with the same Router, user needs to set PC with the same Domain Segment as G901 for Ethernet connection. Default IP address is 192.168.0.100. Telnet port is 23 and TCP server port is 1266.

#### 15.2.1 WebGui

WebGui is embedded inside G901. Once user connects G901 with PC through Ethernet, user can access WebGui and execute all operations similar to OSD menu via Virtual Keys and OSD Menu.

- ✓ The connection can go through Ethernet router LAN port, WiFi Router or Cross Over Cat 5/6 cable. User can set each unit of G901 with different static IP address in the same domain, then open Google Chrome or Microsoft Explorer with IP address to access each unit of G901 for independent operation. There is no limitation in the number of G901 that can be controlled at the same time.
- ✓ User can turn on/off the system through WebGui and see the status through power indicator.



#### 15.2.2 UHDWall Manager (UWM) PC Tool

- UWM is a PC tool executed through PC. User needs to download this tool from VNS website. Once user connects G901 with PC through Ethernet or USB and open UWM, user can access UWM and execute all operation similar to OSD menu through PC keyboard and mouse. User can also backup system setting in PC and restore/copy to other units.
- ✓ UWM is for system setup and can't read back the settings parameters from GeoBox.
- ✓ UWM PC tool is designed for G400/G900 series products.
- ✓ User can execute full operation functions and also update Firmware and MCU code through UWM. User can control multiple units at the same time through change IP address.

UHDWall Manager V1.036.190328	_		×
Connect To			
C IP Address 192 . 168 . 0 . 100 C USB Disconnect			5
Video Wall Image System EDID Firmware Update	English	1	-
Reset		/e Settir	ng j
HZoom • 1 VZoom • 1	Loa	ad Settir	ig
HPAN ( ) 1 VPAN ( ) 1			
Left -900	1		2
Right • -900			
Top • -900			
Bottom -900			
Orientation			
• R • 20 • CC • 3 • R • 3			

(PS. UWM has not yet been modified for G901. Some functions are still pending)

#### 15.3 System Standby and automatically turn off output signal

- ✓ [Options] → [Accessibility] → [Standby Time]
- ✓ If set [Standby Time] at 60, the system will get into Standby Mode after 60 seconds when no input signal is detected. The output signals from G901 will also be terminated at the same time. If G901 detects input signal again, it will automatically turn on the system again. During Standby period, G901 will be still in ON status.
- ✓ If the monitor can automatically turn off/on function by detecting input signal, user can control signal source to execute entire system on/off control.

#### 15.4 Change Background Color in Blue or Black

- When no signal input, user can select either blue color background with [Power Saving Mode] message on the screen or black background color without message.
- > The function will apply to aspect ratio adjustment and PIP/POP function with blanking borders.
- > User can change background color from the OSD menu as below.



#### 15.5 System Reset:

- After FW update, please insert small pin into RESET hole on back panel for 5 seconds to reset the system to default to eliminate unnecessary settings. Profile Index data will be erased at the same time.
- > After Reset, user will see "Reset to Default" message.
- User can use RESET hotkey in remote controller to reset the settings. The data stored in Profile Index will be kept without change. It is the same function as reset from OSD menu.

#### **16 Trouble Shooting**

#### 16.1 Abnormal display in Front Panel LED indicators

- User should see Input / Output LED light. If no LED light, please check Input / Output connecting cables, signal source & monitor.
- If continuous flushing in Power LED indicator, the OSD menu has been locked. Please press
  850 number keys in remote controller to disabled it.
- > If Power LED turns to Red, please open the system through remote controller POWER key.

#### 16.2 Synchronization issue in the outputs

- While using multiple units for video wall applications, please enable [Frame Sync] menu under [Options]→ [Setting]→ [Frame Sync] → [Normal].
- The input refresh rate should be the same as output refresh rate so that the system can implement Frame Lock to synchronize all the outputs from multiple units. If the input source is 50Hz with 60Hz output, it is possible to see some synchronization issue.

## **Specifications**

- Input: 3x HDMI 2.0b, 2x DP1.4, Max. input: 4096x2160 60fps, 4080\*3840 30Hz, supports interleaved and progressive input signals with 4:4:4 10-bit color
- ♦ Support non-VESA standard input timings
- Output: 1x HDMI up to 3840\*2400/60,
  Progressive output up to 10-bit RGB 4:4:4
  color
- Preset 17 output timing modes including 3200\*1800 and 2560\*1440 with selectable 8bit/10-bit deep color and 30/50/60Hz refresh rate
- ♦ HDCP: HDMI V2.2/V1.4, DP: HDCP: V2.2/V1.4
- Embedded video wall function for image split, cropping, location assignment and position shift.
- Flexible aspect ratio adjustment in each edge up to +\_ 1800 pixels.
- 30Hz/50Hz/60Hz in/out & frame rate conversion.
- PIP/POP function with PIP image size from 320\*180 up to 1920\*1200 resolution with flexible position and selectable aspect ratio.
- PIP/POP signal sources can be from two HDMI or two DP or HDMI+DP to get the most flexibility.
- ♦ Frame lock for multiple unit synchronization.

- ♦ 10-bit processor, 3:2/2:2 cadence, low angle smooth algorithm
- High quality scaling engine for image scaling up and down among XGA to UHD
- ♦ 4:4:4 Chroma sampling, 30 Color bits
- Support xvYCC color processing & 8/10/12-bit deep color input signal.
- 3D motion adaptive de-interlace for interleaved input
- High Dynamic Range (HDR) support: SMPTE ST-2084, SMPTE ST-2086 and HDR 10
- Individual 90/180/270 rotation, flip, cropping, scaling & color adjustment up to 4k/60 input.
- ♦ Embedded HDMI audio output
- ♦ Selectable and programmable EDID
- ESD Protection: ±8kV (Air-gap discharge), ±4kV (Contact discharge)
- ♦ DC power supply: DC adapter: 12V 2A (100V-240V)
- ♦ Max. Power consumption: 10w
- ♦ Working environment: 45 °C, 10-90% RH
- ♦ Control: IR, RS232, USB, Ethernet
- ♦ System settings can be stored and backup.
- Dimensions: 220mm\*160mm\*40mm
- ♦ weight: 0.75kg
- ♦ CE/FCC/RoHS/Green Certified
- 2 Year Warranty, paid extension available up to 5 years

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## **Revision History**

Revision	Date	Originator	Comments
V1.0	2019-11-15	Steve Wang	First version

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