avgear

# USER MANUAL

## AVG-DMM1616

Modular Matrix Switcher 16x16



Version: DMM1616_2015V1.0

The AVG-DMM1616 is a high-performance video and audio modular matrix switcher supporting a maximum of 16 input signal sources and 16 output displays synchronously.

**Features**

- Modular chassis with configurable I/O slots, ranging from 4x4 to 16x16.
- Various I/O cards, includes HDMI, HDBaseT, SD/HD/3G-SDI, DVI and VGA cards (Compatible with YUV, YC & CVBS.) to configure any matrix.
- True cross-point switching, any input to any output, regardless of signal format.
- Supports HDMI1.4a, supports 3D.
- Supports 4K.
- Integrated HDBaseT technology.
- Controllable via button, RS232 & optional TCP/IP, also compatible with 3rd party control systems.
- HDCP compliant.
- LCD display.

**PLEASE READ THIS PRODUCT MANUAL CAREFULLY BEFORE USING THIS PRODUCT.**

This manual is only for operation instruction only, and is not to be used in a maintenance capacity. The functions described in this version are current as at March 2015. Any changes of functions and operational parameters will be updated in future manual versions. Please refer to your dealer for the latest product details.

Version 1.0 1/3/15

## SAFETY OPERATION GUIDE 

In order to guarantee the reliable operation of the equipment and safety of the user, please abide by the following procedures in installation, use and maintenance:

1. The system must be earthed properly. Please do not use two blade plugs and ensure the AC power supply ranges from 100v to 240v and from 50Hz to 60Hz.
2. Do not install the switcher in an environment where it will be exposed to extreme hot or cold temperatures.
3. This unit will generate heat during operation, please ensure that you allow adequate ventilation to ensure reliable operation.
4. Please disconnect the unit from mains power if it will be left unused for a long time.
5. Please DO NOT try to open the casing of the equipment, DO NOT attempt to repair the unit. Opening the unit will void the warranty. There are high voltage components in the unit and attempting to repair the unit could result in serious injury.
6. Do not allow the unit to come into contact with any liquid as that could result in personal injury and product failure.

## TABLE OF CONTENTS

# 1. Introduction

## 1.1. Introduction to the AVG-DMM1616

The AVG-DMM1616 is a high-performance video and audio modular matrix switcher from our Digital Media Matrix range. It supports a maximum of 16 input signal sources and 16 output displays synchronously. It supports different video signals with true cross-point switching. Every video and audio signal is transmitted and switched independently to decrease signal attenuation. The AVG-DMM1616 supports various interchangeable cards including HDMI, 4K, DVI, VGA, SDI, Fiber Optic and HDBaseT etc, and all the cards support hot plug & play. Users can choose to insert different signal cards for different applications.

The AVG-DMM1616 has a power fail memory function and audio can break away from or follow the video switched. It has an RS232 port for serial control and an optional IP port for TCP/IP control, it can also be easily controlled by third-party devices.
With its flexible design, the AVG-DMM1616 can be used for a range of projects and is capable of being an 'all-in-one solution'. It is the perfect solution for multimedia conference rooms, control rooms, broadcasting rooms, shopping centers etc. It is comfortable handling all the audiovisual management, including the switching, driving, scaling etc.

## 1.2. Features

- Modular chassis with configurable I/O slots, ranging from 4x4 to 16x16.
- Various I/O cards, includes HDMI, HDBaseT, SD/HD/3G-SDI, DVI and VGA cards (Compatible with YUV, YC & CVBS.) to configure any matrix.
- True cross-point switching, any input to any output, regardless of signal format.
- Supports HDMI1.4a, supports 3D, 4K cards available.
- Integrated HDBaseT technology.
- Controllable via button, RS232 & optional TCP/IP, also compatible with 3rd party controllers.
- HDCP compliant.
- LCD display.

### *1.2.1. MMX signal card (changeable cards)*

To suit different applications and users, the AVG-DMM1616 cards are classified into the following models:

| Spec / Models | Inputs | Signal Format |
|---|---|---|
| 4I-HD | 4 | HDMI |
| 4I-DV | 4 | DVI |
| 4I-DS | 4 | DVI, HDMI, VGA, AV, YPbPr |
| 4I-VG | 4 | VGA |
| 4I-VA | 4 | VGA& PCM audio |

| Spec / Models | Inputs | Signal Format |
|---|---|---|
| 4I-SD | 4 inputs & 4 LOOP outputs for each channel) | SDI |
| 4I-TP | 4 | HDMI TP, IR, RS232 |
| 4I-UH | 4 | HDMI& PCM Audio |
| 4I-UF | 4 | Optical Fiber |
| 4I-BT | 4 | HDBT, RS232, Audio |

**Input Cards**

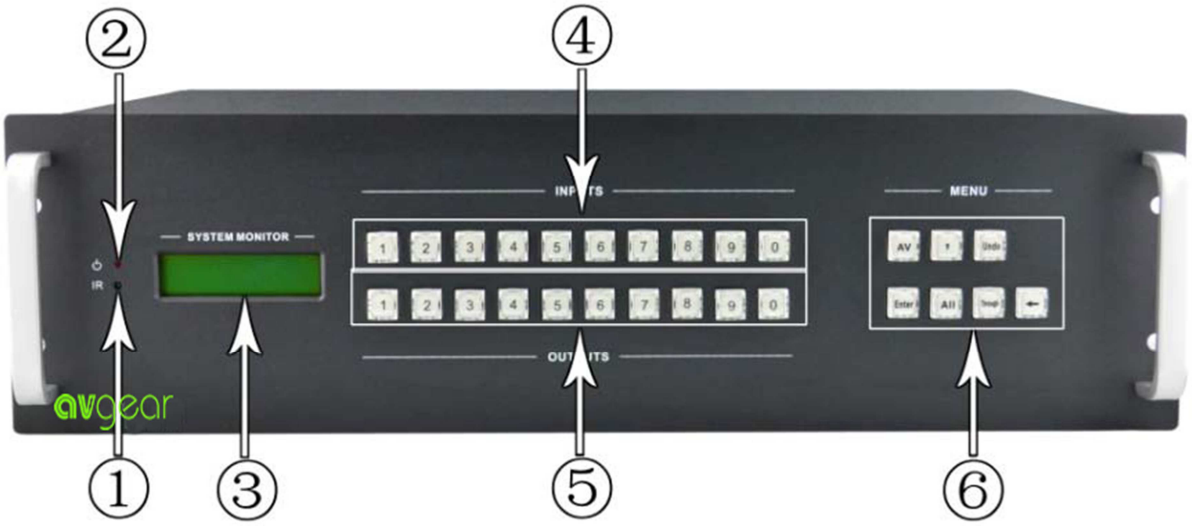
| Spec / Models | Outputs | Signal Format |
|---|---|---|
| 4O-HD | 4 | HDMI |
| 4O-DV | 4 | DVI |
| 4O-DS | 4 | DVI, HDMI, VGA, AV, YPbPr |
| 4O-VG | 4 VGA, 4 Stereo audio | VGA, analog audio |
| 4O-SD | 4 outputs & 4 LOOP outputs for each channel) | SDI |
| 4O-TP | 4 | HDMI TP, IR, RS232 |
| 4O-UH | 4 | HDMI& PCM Audio |
| 4O-UF | 4 | Optical Fiber |
| 4O-BT | 4 | HDBT, RS232, Audio |

## 2. Package List

- 1 x AVG-DMM1616
- 1 x RS232 cable
- 4 x Plastic cushions
- 1 x IR remote (The cell battery is not included)
- 1 x Power Cord
- 1 x User manual

**Note:** Please confirm if the product and the accessories are all included, if not, please contact your dealer.

## 3. Product Appearance of the AVG-DMM1616

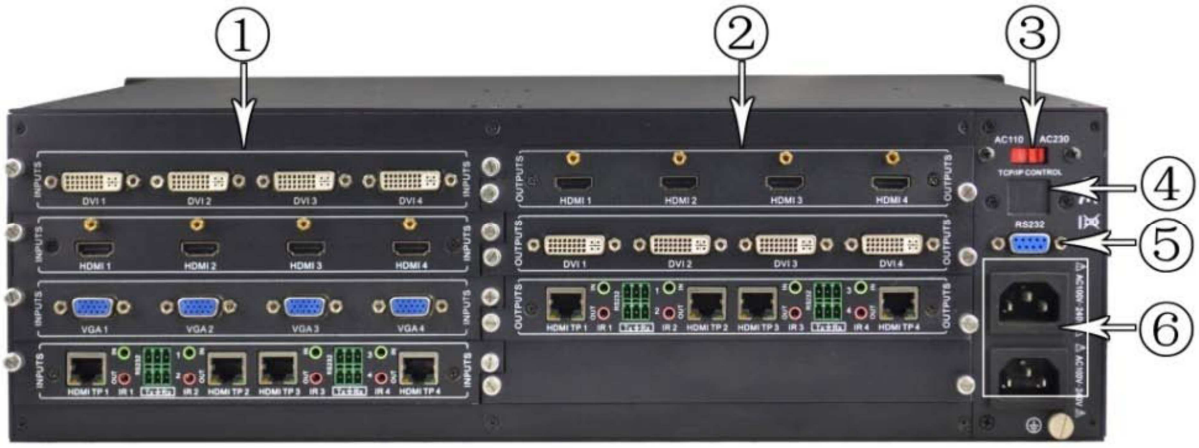



### 3.1. Front Panel

| No. | Name | Description |
|---|---|---|
| ① | IR | IR sensor, receives IR signal sent from IR remote |
| ② | Power indicator | Illuminates red once powered on |
| ③ | LCD screen | Displays real-time operation status |
| ④ | INPUTS | Buttons for input channels with green back-light indication, ranges from 0~ 9, 16 selectable channels in total. |
| ⑤ | OUTPUTS | Buttons for output channels with green back-light indication, ranges from 0 ~ 9, 16 selectable channels in total. |
| ⑥ | MENU | **AV**: transfer video and audio signal synchronously |
| | | **,**: division button, to divide the output channels when switching to more than one channel. |
| | | **UNDO**: Undo button, to resume to the status before the command just performed. |
| | | **ENTER**: confirm switching operation. Operation will not be executed by the matrix without confirmation. |
| | | **ALL:** select all input/output channel |
| | | **THROUGH**: To transfer the signals directly to the corresponding output channels. |
| | | ←💻 : Backspace button, to backspace the latest input button. |

**Note:** Pictures shown in this manual are for reference only.

### 3.2. Rear Panel




| No. | Name | Description |
|---|---|---|
| ① | INPUTS | Input signal card slots, 4 in total |
| ② | OUTPUTS | Output signal card slots, 4 in total |
| ③ | Power switch | Switch between AC110V and AC230V to access different power |
| ④ | TCP/IP | (Optional) Used for TCP/IP control port |
| ⑤ | RS232 | Serial control port, connect with RS232 port of control device. |
| ⑥ | Power ports | Connect with household alternating current power, including one redundant power. |

**Note**: There are only 4 input and 4 output slots for AVG-DMM1616, which enables only 4 input cards and 4 output cards to be installed on AVG-DMM1616. The input/output cards can be changed based on your requests and supports hot plug and play.

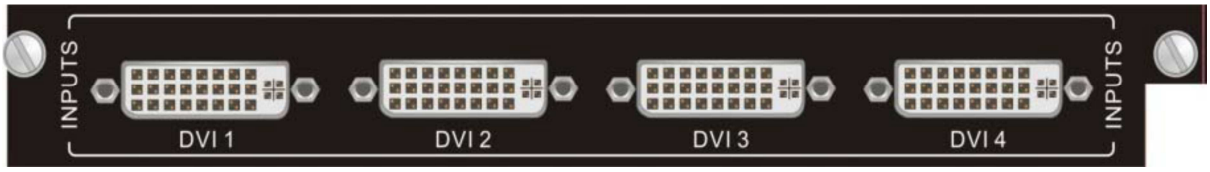
Pictures shown in this manual are for reference only.

### 3.3. Changeable Cards

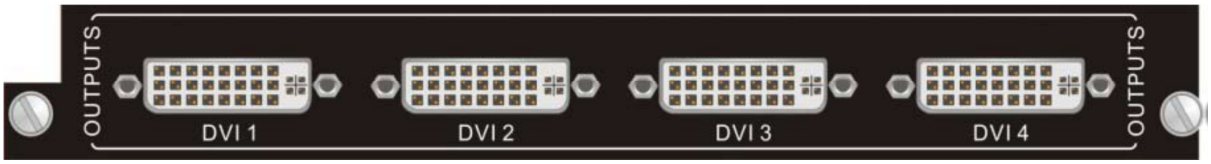
AVG-DMM1616 support expansion through various changeable input/ output cards of different signals including DVI, HDMI, VGA, twisted pair, SDI etc. Here is a brief introduction to the changeable cards.

### *3.3.1. 4I-DV & 4O-DV*

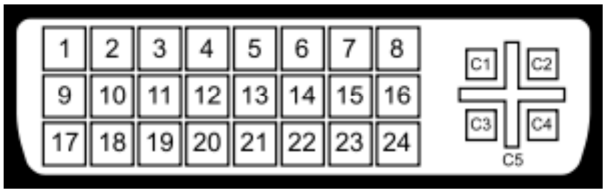
DVI signal card. (Please check the specification from 5*.2.1*) It is fully compatible with HDMI1.3 and HDCP, but not supporting analog signals. It uses embedded EDID management technology, supporting DDC. **4I-DV**: input card, maximum four input signals. Input signals can pass to an output device through 4O-DV, or pass through other series output cards.




**4O-DV**: output card, maximum four output signals, output signals from 4I-DV, or other series of input cards.




Pin Layout of the DVI-I connector (Dual-Link). (Female)



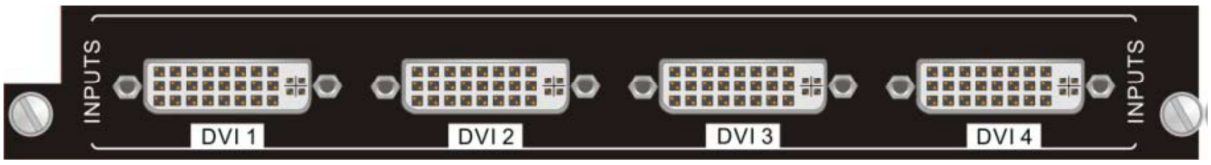

| PIN | Function | PIN | Function |
|---|---|---|---|
| 1 | T.M.D.S.Data2- | 13 | T.M.D.S.Data3+ |
| 2 | T.M.D.S.Data2+ | 14 | +5V Power |
| 3 | T.M.D.S. Data 2/4 Shield | 15 | Ground (return for +5V, Hsync and Vsync) |
| 4 | T.M.D.S. Data 4- | 16 | Hot Plug Detect |
| 5 | T.M.D.S. Data 4+ | 17 | T.M.D.S. Data 0- |
| 6 | DDC Clock | 18 | T.M.D.S. Data 0+ |
| 7 | DDC Data | 19 | T.M.D.S. Data 0/5 Shield |
| 8 | Analog Vertical Sync | 20 | T.M.D.S.Data5- |
| 9 | T.M.D.S.Data1- | 21 | T.M.D.S.Data5+ |
| 10 | T.M.D.S.Data1+ | 22 | T.M.D.S. Clock Shield |
| 11 | T.M.D.S.Data1/3 Shield | 23 | T.M.D. S. Clock + |
| 12 | T.M.D.S.Data3- | 24 | T.M.D.S .Clock- |

### *3.3.2. 4I-DS& 4O-DS*

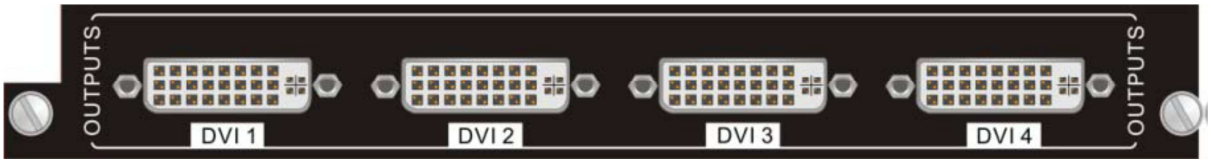
Seamless DVI signal card. (*Please check the specification from 5.2.2*)

It is fully compatible with HDMI1.3 and HDCP 1.2, and supports seamless transmission for high-definition DVI, HDMI, VGA, AV, YPbPr signals. It can automatically identify the format of the input signal, and the output resolution can be adjusted.

It uses embedded the EDID management technology, supporting DDC. **4I-DS**: seamless input card, maximum four input signals. Input signals can pass to output devices through 4O-DS, or pass through the other series of output cards.




**4O-DS**: seamless output card, maximum four output signals. Output signals can come from 4I-DS, or from the other series input cards. It supports memory off function for resolution, signal format and HDCP compliance status.



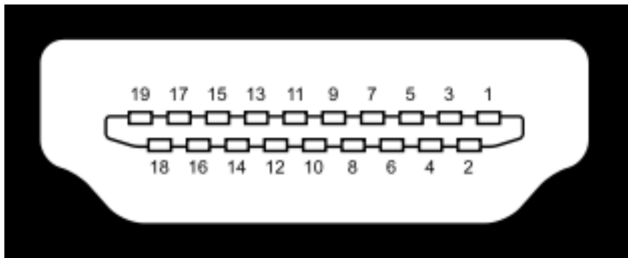

**Note:** When 4O-DS works with input cards except 4I-DS, adjust the 4 input signals to any one of the following 5 resolutions to enable seamless output: 1024x768, 1280x720, 1600x1200, 1920x1080, 1920x1200. DVI interfaces on the signal card are the same as the interfaces on 4I-DV& 4O-DV.

### *3.3.3. 4I-HD & 4O-HD*

HDMI signal card. (Please check the specification from 5*.2.3*) It uses embedded EDID management technology, supporting DDC. It is also compatible with DVI signal (HDCP required). **4I-HD**: input card, maximum four input signals. Input signals can pass to an output device through 4O-HD, or pass through other series output cards.

**4O-HD**: output card, maximum four output signals, output signals from 4I-HD, or other series input cards.


Pin layout of the HDMI connectors (female).



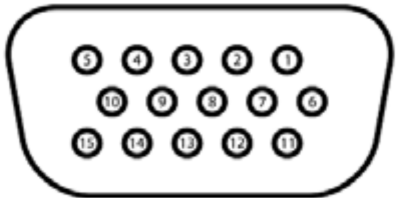

| No. | Signal Name | No. | Signal Name |
|---|---|---|---|
| **1** | TMDS Data 2+ | **20** | SHELL |
| **2** | TMDS Data 2 Shield | **19** | Hot Plug Detect |
| **3** | TMDS Data 2- | **18** | +5V Power |
| **4** | TMDS Data 1+ | **17** | Ground |
| **5** | TMDS Data 1 Shield | **16** | DDC Data |
| **6** | TMDS Data 1- | **15** | DDC Clock |
| **7** | TMDS Data 0+ | **14** | No Connect |
| **8** | TMDS Data 0 Shield | **13** | CEC |
| **9** | TMDS Data 0- | **12** | TMDS Clock- |
| **10** | TMDS Clock+ | **11** | TMDS Clock Shield |

### *3.3.4. 4I-VG & 4O-VG*

VGA signal card. (Please check the specification from 5.*2.4*) Scale all inputs to 1080p. Compatible with C-Video, YUV, YC (Factory preset function). The bandwidth is up to 350MHz (-3dB);
Supporting RGBHV, RGsB, RGBS, RsGsBs, YUV, YC and Composite video. **4I-VG**: input card, maximum four input signals. Input signals can pass to output devices through any series output cards.


**4O-VG**: output card, maximum four VGA output signals and 4 stereo audio outputs, output video signal from 4I-VG, or other series input cards, outputs audio signal from the audio of the input signal.

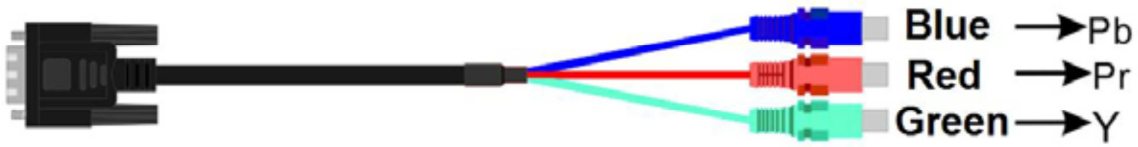

Pin layout of the VGA connectors (female):



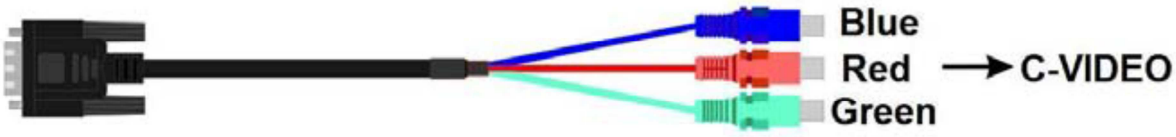
| Pin Number | Signal Name | Pin Number | Signal Name |
|---|---|---|---|
| Pin 1 | RED | Pin 9 | KEY/PWR |
| Pin 2 | GREEN | Pin 10 | GND |
| Pin 3 | BLUE | Pin 11 | ID0/RES |
| Pin 4 | ID2/RES | Pin 12 | ID1/SDA |
| Pin 5 | GND | Pin 13 | HSync |
| Pin 6 | RED_RTN | Pin 14 | VSync |
| Pin 7 | GREEN_RTN | Pin 15 | ID3/SCL |
| Pin 8 | BLUE_RTN | | |

Connect the devices via VGA converting cable as shown below:

- **Connect with Component Video (YPbPr) Source**



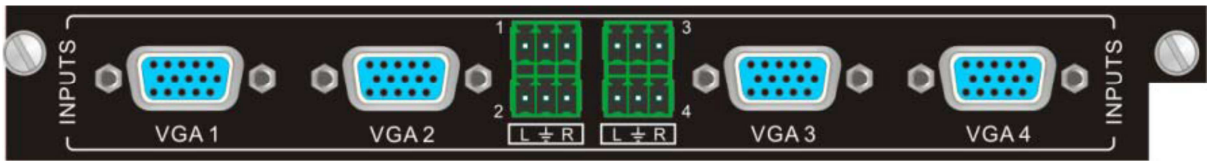

- **Connect with Composite Video (C-VIDEO) Source**



### *3.3.5. 4I-VA*

VGA signal card. (*Please check the specification from 5.2.5*) Scale all inputs to 1080p. Compatible with C-Video, YUV, YC (Factory preset function). Supporting RGBHV, RGsB, RGBS, RsGsBs, YUV, YC and Composite video.

**4I-VA**: input card, maximum four VGA inputs and four stereo audio inputs. Input signal can pass to output devices through any series of output cards.

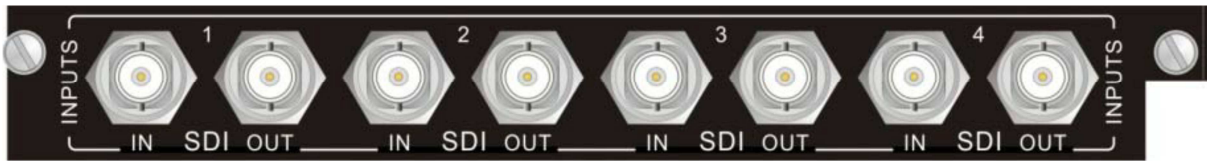



The VGA connector and source connection is same with the 4I-VG.

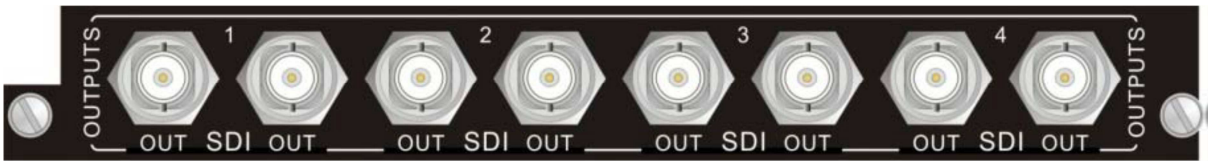
### *3.3.6. 4I-SD & 4O-SD*

SDI signal card. (Please check the specification from 5*.2.6*) It is compatible with different SDI signal formats, including SD/HD/3G-SDI (adaptive) Every port has a loop output for local monitoring.

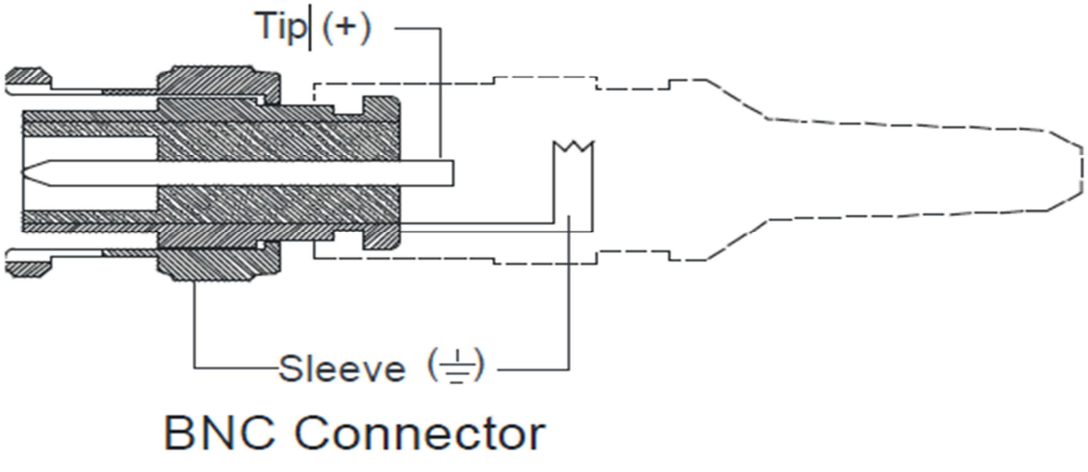
**4I-SD**: input card, maximum four input signals. Input signals can pass to output devices through 4O-SD, or pass through other series output cards.




**4O-SD**: output card, maximum four output signals, output signals from 4I-SD, or other series input cards.



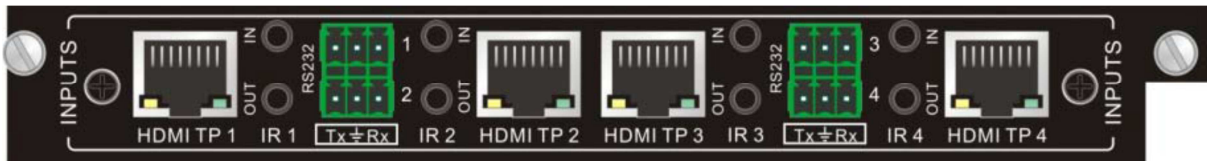

The BNC connector is shown as the figure below.




BNC Connector

### *3.3.7. 4I-TP & 4O-TP*

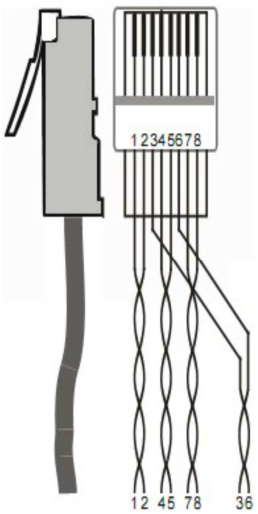
Twisted pair card (HDMI/DVI extender). (Please check the specification from 5.*2.7*) Supports HDTV, compatible with HDMI1.3 and HDCP **4I-TP**: input card, maximum input four HDMI TP signals. Input signals can pass to output devices through 4O-TP, or pass through other series output cards, designed to work with the AVG-TPHD402T.




**4O-TP**: output card, maximum output four HDMI TP signal, output signals from 4I-TP, or other kinds of input cards, designed to work with the AVG-TPHD402R.


Pin layout of the RJ45 connectors:
Two different connection standards can be chosen; the connectors of the same cable should use the same standard at each end.

| TIA/EIA T568A | | | TIA/EIA T568B | |
|---|---|---|---|---|
| | Cable color | | | Cable color |
| 1 | green white | | 1 | orange white |
| 2 | green | | 2 | orange |
| 3 | orange white | | 3 | green white |
| 4 | blue | | 4 | blue |
| 5 | blue white | | 5 | blue white |
| 6 | orange | | 6 | green |
| 7 | brown white | | 7 | brown white |
| 8 | brown | | 8 | brown |



**Note**: Cable connectors MUST be metal, and the shielded layer of the cable MUST be connected to the connector's metal shell, to ensure reliable grounding.

### *3.3.8. 4I-UH & 4O-UH*

4K HDMI signal card. (Please check the specification from 5*.2.8*) Supports hot-plugging, HDMI 1.4& HDCP 1.4 compliant; Compatible with DVI signal; Supports high-definition HDMI sources up to 4kx2k, 1080p 3D compliant; Provides auxiliary audio port to output the HDMI embedded audio. It uses embedded EDID management technology.

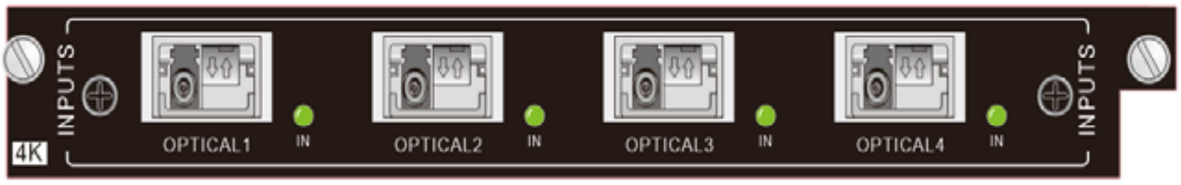
**4I-UH**: input card, maximum four input signals. Input signals can pass to output devices through 4O-UH, or pass through other series output cards.


**4O-UH**: output card, maximum four output signals, output signals from 4I-UH, or other series input cards, HDCP compliant status set via RS232 command.

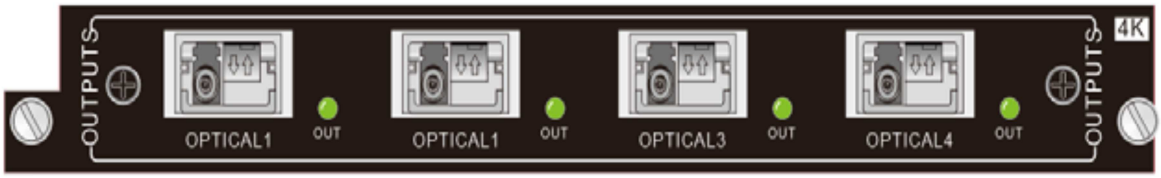

### *3.3.9. 4I-UF & 4O-UF*

4K optical signal card. (Please check the specification from 5*.2.9*) Supports hot-plugging; High bandwidth: 10.2Gbps; Compliant with HDMI 1.4, able to transmit 4K×2K& 1080P 3D (max) signals; Supports multi-mode transmission up to 300m and single mode transmission up to 1km.

**4I-UF**: input card with indicators, maximum four input signals, corresponding indicator illuminates green when there is an input signal. Input signals can pass to output devices through 4O-UF, or pass through other series output cards.



**4O-UF**: output card with indicators, maximum four output signals, output signals from 4I-UF, or other series input cards; corresponding indicator illuminates green when there is an output signal.




**Note:** Use the 4I-UF/ 4O-UF with optical fiber transmitter/ receiver.

### *3.3.10. 4I-BT & 4O-BT*

Twisted pair card (HDMI/DVI extender). (Please check the specification from 5*.2.10*) Supports hot-plug, supports HDTV, compatible with HDBT 1.0, HDMI1.4a& HDCP1.4; Wide resolution range from 480p to 4kx2k, 1080p 3D compliant; Extends HDBT signals up to 70m at 1080p or 40m at 4k; Bi-directional RS232 transmission on a single cable; Auxiliary audio ports support a stereo signal. It uses embedded EDID management technology.

**4I-BT**: input card, maximum input four HDMI TP signals. Input signals can pass to output devices through 4O-BT, or pass through other series output cards, designed to work with the HDBT transmitter AVG-TPHD402T.


**4O-BT**: output card, maximum output four HDBT signal, output signals from 4I-BT, or other series input cards, designed to work with the HDBT receiver AVG-TPHD402R.

# 4. System Connection

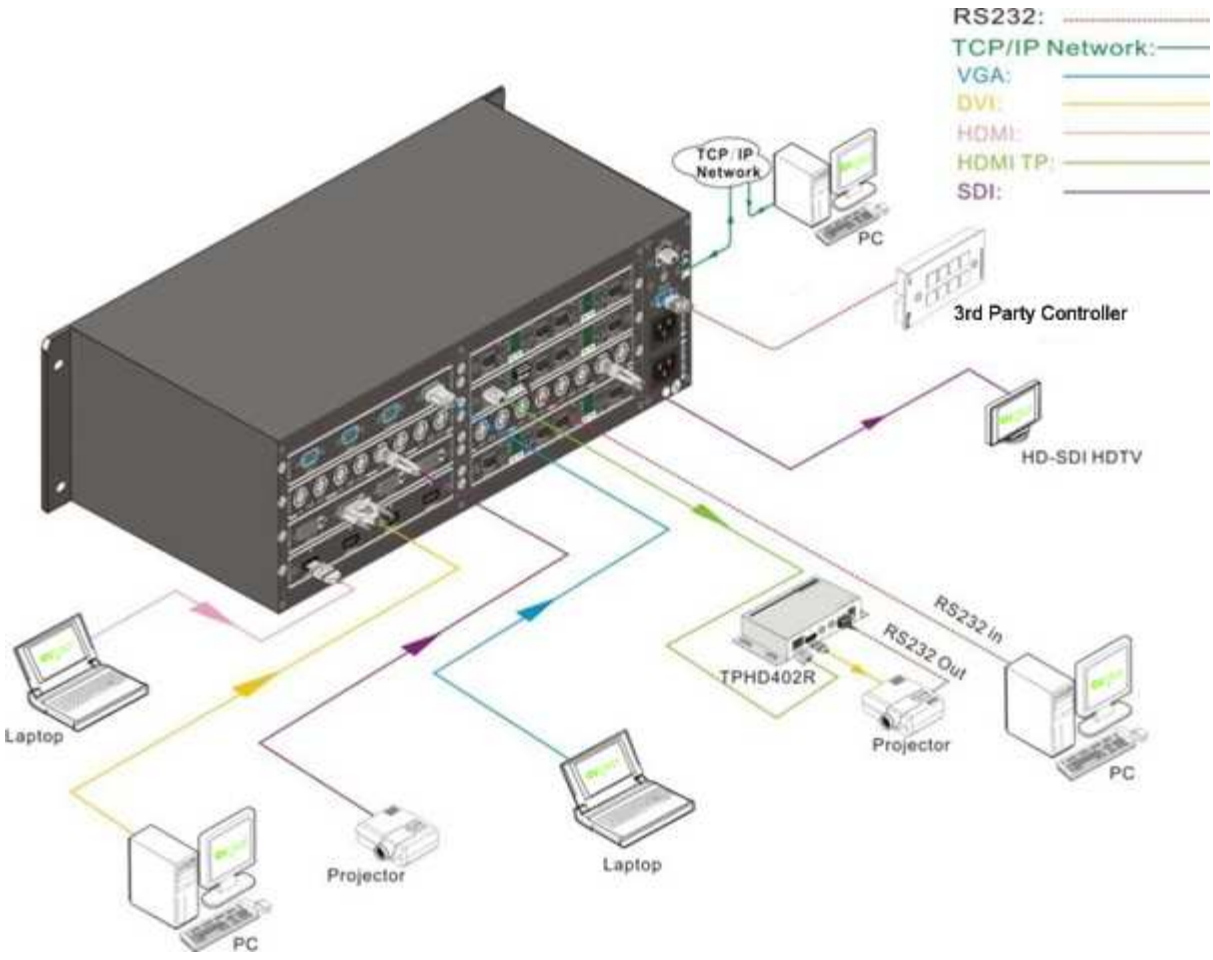
## 4.1. System Applications

Reliable performance for control and transmission makes the AVG-DMM1616 ideal in the IT computer space, signal monitoring, big screen displays, conference systems, television broadcast, education, banking and security institutions etc.

## 4.2. Usage Precautions

1. System should be installed in a clean environment with temperature and humidity maintained to within equipment specification.
2. All of the power switches, plugs, sockets and power cords should be insulated and safe.
3. All devices should be connected before power is turned on.

## 4.3. Connection Diagram



# 5. System Operations

## 5.1. Front Panel Button Control

Users can control the AVG-DMM1616 simply and directly with its front panel buttons. To switch AV/ and A/ V signal, please operate the buttons using the following format: Format: “Input Channel” + “AV” +“Output Channel “**+“**Enter**”**

**Note:**

**1)** “Switch Mode”: Audio & Video synchronous (AV) or break away switching mode (Audio/ Video)

**2)** “Input Channel”: Push the number of the input channel to be controlled,

**3)** “Output Channel”: Push the number of the output channels to be controlled. Press “All” to select all the outputs.

**4)** Use “**,**” button to separate multiple I/O channels, and press the “**ENTER**” button to confirm the operation.

**5)** The input/output channels on the rear panel are slotted from left to right, top to bottom.

**6)** The input delay time between two numbers of every input & output channel must be less than 5 seconds; otherwise the operation will be cancelled.

Example:

1. To transfer input 1 to output 11, press input “**1**”, output “**0**” “**1**” and “**Enter**”.
2. To transfer signals from input 1 to all output channels, press buttons in this order: “**1**”, “**All**”.

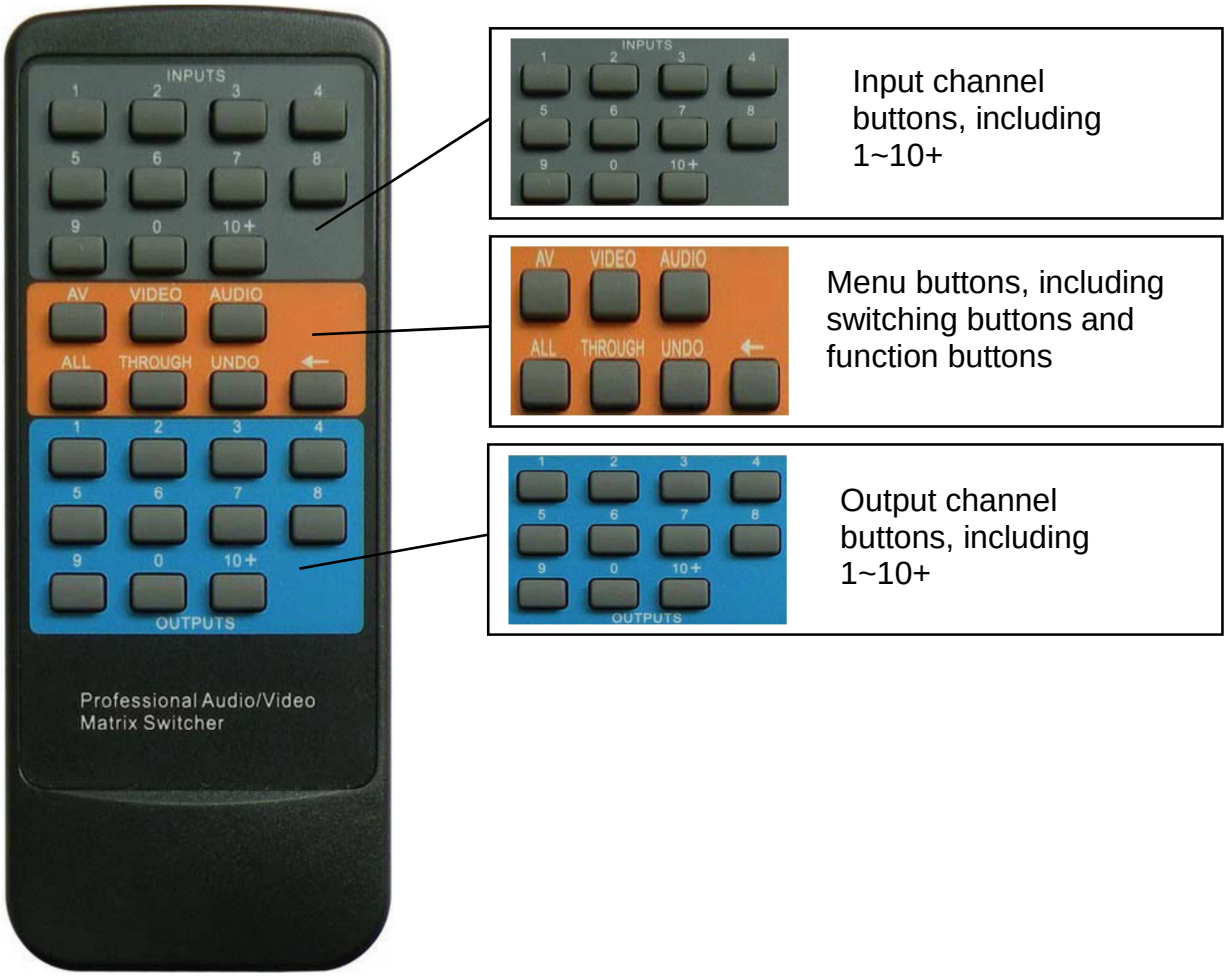
**Other Functional Buttons:**

| Buttons | Description | Operation |
|---|---|---|
| **UNDO** | Returns to the previous status | State 1: Input 6 -> output 6 Press input “6” + “AV”+ output 4 to change the connection. Press “Undo” to return to State 1. |
| ← | Backspace the last operation | If you press buttons “1”, “AV”, “2”, “□” in order, then “2” will be canceled. |
| **THROUGH** | Get one to one I/O connection, e.g. input 1-> output 1, input 2-> output 2. | Format: “Input Channel”+”Through” If you press buttons “ALL”, “THROUGH” in order, then the result will be like input 1□ output 1, input 2□output 2, input 3□output 3 … input 16□output 16. |

## 5.2. IR Control

With the IR remote, the AVG-DMM1616 can be controlled remotely. As the function buttons on the IR remote are the same as the ones on the front panel, the IR remote shares the same operations and commands with the control panel. Press the buttons in below format:

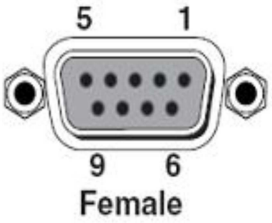
"**Input Channel**" + "**Switch Mode**" +"**Output Channel**"



## 5.3. RS232 Control

### *5.3.1. Connection of the RS232 Communication Port*

In addition to the front control panel and IR remote, the AVG-DMM1616 can be controlled by a far-end control system using the Ethernet port or via the RS-232 communication port. This RS-232 communication port is a female 9- D connector. The definition of its pin layout is shown in the table below.




| No. | | Function |
|---|---|---|
| 1 | N/C | Unused |
| 2 | Tx | Transmit |
| 3 | Rx | Receive |
| 4 | N/C | Unused |
| 5 | Gnd | Ground |
| 6 | N/C | Unused |
| 7 | N/C | Unused |
| 8 | N/C | Unused |
| 9 | N/C | Unused |

### *5.3.2. RS232 Communication Commands*

Baud rate: 9600 Data bit: 8 Stop bit: 1 Parity bit: none

| Type | Command | Description |
|---|---|---|
| Commands for Main Unit | /*Type; | Query the models information. |
| | /%Lock; | Lock the keyboard of the control panel on the Matrix. |
| | /%Unlock; | Unlock the keyboard of the control panel on the Matrix. |
| | /^Version; | Query the version of firmware |
| | /:MessageOff; | Turn off the feedback command from the com port. It will only show the “switcher OK”. |
| | /:MessageOn; | Turn on the feedback command from the com port. |
| | Undo. | To cancel the previous operation. |
| | Demo. | Switch to the “demo” mode, 1->1, 2->2, 3->3 … and so on. |
| | [x]All. | Transfer signals from the input channel [x] to all output channels |
| | All#. | Transfer all input signals to the corresponding output channels respectively. |
| | All$. | Switch off all the output channels. |
| | [x]#. | Transfer signals from the input channel [x] to the output channel [x]. |
| | [x]$. | Switch off the output channel [x]. |
| | All@. | Switch on all the output. |
| | [x]@. | Switch on output [x]. |
| | [x1]V[x2]. | Transfer the video signals from the input channel [x1] to the output channel [x2]. |
| | [x1]A[x2]. | Transfer the audio signals from the input channel [x1] to the output channel [x2]. |
| | [x1]B[x2]. | Transfer signal from the input channel [x1] to the output channel [x2]. |
| | Status[x]. | Query the input channel to the output channel [x]. |
| | Status. | Query the input channel to the output channels one by one. |
| | Save[Y]. | Save the present operation to the preset command [Y]. [Y] ranges from 0 to 9. |
| | Recall[Y]. | Recall the preset command [Y]. |
| | Clear[Y]. | Clear the preset command [Y]. |
| | PWON. | Power ON. |
| | PWOFF. | Enter into standby mode. |
| | HDCPON. | Turn on the HDCP output. |
| | HDCPOFF. | Turn off the HDCP output. |
| | /V00. | Query the version of backboard software. |

| Type | Command | Description |
|---|---|---|
| | UpgradeIntEDID[x]. | Upgrade built-in EDID data. Supports 6 types of EDID data (see *Note 6*). When the switcher gets the command, it will show a message to send EDID file (.bin file). |
| | EDIDUpgrade[x]. | Upgrade EDID data of input ports When the switcher gets the command, it will show a message to send EDID file (.bin file). Operations will be canceled after 10 seconds. |
| | EDID/[x]/[y]. | Set the EDID data of input port [x] to built-in EDID data of type [y]. The value of [y] varies from 1~6. The EDID data types are same as mentioned above. |
| | EDIDG[x]. | Get EDID data from output channel X and display the data on serial port control software. [x] is the output port number. |
| | EDIDMInit. | Recover the factory default EDID data for every input channel. |
| | EDIDM[X]B[Y]. | Manual EDID switching. Enable input [Y] to learn the EDID data of output[X]. If there is problem learning the EDID data, it will automatically set the default EDID data for input [Y]. |
| | USER/[Y]/[X]:*****; | Custom command for signal cards, [Y]=I/O; [X]= port number; *****: User-definable command, e.g. 0623% |
| | 0911%. | Restore factory default. |
| **4I-VA** | | |
| Commands for Main Unit | USER/I/[x]:0622%; | Set the signal of input channel [x] to VGA. |
| | USER/I/[x]:0623%; | Set the signal of input channel [x] to YCBCR. |
| | USER/I/[x]:0624%; | Set the signal of input channel [x] to SVIDEO. |
| | USER/I/[x]:0625%; | Set the signal of input channel [x] to CVIDEO. |
| | USER/I/[x]:0626%; | Set the resolution of input [x] to 1024x768@60Hz. |
| | USER/I/[x]:0627%; | Set the resolution of input [x] to 1280X720@60Hz. |
| | USER/I/[x]:0628%; | Set the resolution of input [x] to 1280X800@60Hz. |
| | USER/I/[x]:0619%; | Set the resolution of input [x] to 1360X768@60Hz. |
| | USER/I/[x]:0621%; | Set the resolution of input [x] to 1600X1200@60Hz. |
| | USER/I/[x]:0629%; | Set the resolution of input [x] to 1920X1080@60Hz. |
| | USER/I/[x]:0620%; | Set the resolution of input [x] to 1920X1200@60Hz. |
| | USER/I/[x]:0617%; | Restore to factory default. |
| | USER/I/[x]:0606%; | Auto-adjust VGA signal |
| | USER/I/[x]:0698%; | Update software |

| Type | Command | Description |
|---|---|---|
| | **4I-VG** | |
| | USER/I/[x]:0698%; | Update software |
| | USER/I/[x]:0622%; | Set the signal of input channel [x] to VGA. |
| | USER/I/[x]:0623%; | Set the signal of input channel [x] to YCBCR. |
| | USER/I/[x]:0624%; | Set the signal of input channel [x] to SVIDEO. |
| | USER/I/[x]:0625%; | Set the signal of input channel [x] to CVIDEO. |
| | USER/I/[x]:0626%; | Set the resolution of input [x] to 1024x768@60Hz. |
| | USER/I/[x]:0627%; | Set the resolution of input [x] to 1280X720@60Hz. |
| | USER/I/[x]:0628%; | Set the resolution of input [x] to 1280X800@60Hz. |
| | USER/I/[x]:0629%; | Set the resolution of input [x] to 1920X1080@60Hz. |
| | **4I-DS** | |
| | USER/I/[x]:02xx%; | Set the brightness of input [x] to xx, xx=00~99 |
| | USER/I/[x]:03xx%; | Set the contrast of input [x] to xx, xx=00~99 |
| | USER/I/[x]:04xx%; | Set the saturation of input [x] to xx, xx=00~99 |
| | USER/I/[x]:05xx%; | Set the sharpness of input [x] to xx, xx=00~99 |
| | USER/I/[x]:0606%; | (For 4I-DS/ VA) Auto-adjust VGA input signal |
| | USER/I/[x]:0607%; | Set picture's color temperature |
| | USER/I/[x]:0608%; | Configure image scale |
| | USER/I/[x]:0614%; | Configure picture mode |
| | USER/I/[x]:0617%; | Restore to factory default. |
| | USER/I/[x]:0619%; | Set the resolution of input [x] to 1360x768, HD |
| | USER/I/[x]:0626%; | Set the resolution of input [x] to 1024x768, XGA |
| | USER/I/[x]:0627%; | Set the resolution of input [x] to 1280x720, 720P |
| | USER/I/[x]:0628%; | Set the resolution of input [x] to 1280x800, WXGA |
| | USER/I/[x]:0629%; | Set the resolution of input [x] to 1920x1080, 1080P |
| | USER/I/[x]:0620%; | Set the resolution of input [x] to 1920x1200, WUXGA |
| | USER/I/[x]:0621%; | Set the resolution of input [x] to 1600x1200, UXGA |
| | USER/I/[x]:0698%; | Software update |
| | USER/I/[x]:0686%; | Set the output signal of input [x] to HDMI |
| | USER/I/[x]:0687%; | Set the output signal of input [x] to DVI |
| | **4O-DS** | |
| | USER/O/[x]:0201%; | Set the input source of output [x] to YPbPr |
| | USER/O/[x]:0202%; | Set the input source of output [x] to VGA |
| | USER/O/[x]:0203%; | Set the input source of output [x] to C-VIDEO |

| Type | Command | Description |
|---|---|---|
| | USER/O/[x]:0804%; | Set the resolution of output [x] to 1280x720P @60Hz |
| | USER/O/[x]:0813%; | Set the resolution of output [x] to 1280x1080P @60Hz |
| | USER/O/[x]:0824%; | Set the resolution of output [x] to 1024x768 @60Hz |
| | USER/O/[x]:0826%; | Set the resolution of output [x] to 1280x1024 @60Hz |
| | USER/O/[x]:0837%; | Set the resolution of output [x] to 1920x1200 @60Hz |
| | USER/O/[x]:0106%; | Switch on the HDCP compliance of output [x] |
| | USER/O/[x]:0107%; | Switch off the HDCP compliance of output [x] |
| | GetResolution[x]. | Capture output resolution of output [x] |
| | GetVGAPortMode[x]. | Query the output status of VGA port [x] |
| | **4I-UH/BT** | |
| | AUDIO[X]I[Z]. | Select audio source from audio inputs or AV signal inputs |

**Notes:**

**1.** Please disconnect all the twisted pairs before sending command EDIDUpgrade[X].

**2.** In above commands, “[”and “]” are symbols for easy reading and do not need to be typed in actual operation.

**3.** Please remember to end the commands with the ending symbols “.” or “;”.

**4.** Type the command carefully, it is case-sensitive.

**5.** Commands pertaining to EDID only available for signal cards that support EDID management.

**6.** The switcher boasts 6 in-built EDID data memories, the chart below illustrates the detailed information:

| No. | Detailed Information |
|---|---|
| 1 | 1080p 2D 5.1CH |
| 2 | 1080p 2D 2.0CH |
| 3 | 720p 2D 5.1CH |
| 4 | 720p 2D 2.0CH |
| 5 | 4kx2k 2D 5.1CH |
| 6 | 4kx2k 2D 2.0CH |

Update in-built EDID data by sending command **UpgradeIntEDID[x].**

**Examples:**

1. **Transfer signals from an input channel to all output channels: [x]All.**

Example: Send “3All.” to transfer signals from the input 3 to all output channels.

2. **Transfer all input signals to corresponding output channels respectively: All#.**

Example: If this command is carried out, the status of matrix will be: 1->1, 2->2, 3->3, 4->4…… 8->8….

3. **Switch off all the output channels: All$.**

Example: After running this command, there will be no signals on all the outputs.

4. **Switch off the detail feedback command from the COM port: /:MessageOff;**

But, it will leave the “switch OK” as the feedback, when you switch the matrix.

5. **Switch on the detail feedback command from the COM port: /:MessageOn;**

It will show the detail switch information when it switch. Example: when switch 1->2, it will feedback “AV01 to 02”.

6. **Transfer signals from an input channel to corresponding output channel: [x]#.**

Example: “5#.” to transfer signals from the input5 to the output5.

7. **Switch off an output channel: [x]$.**

Example: “5$.” to switch off the output 5.

**8. Switch signal: [x1] B[x2].**

Example: “12B12,13,15.” to transfer signal from input12 to output No.12,13,15.

**9. Query the input channel to the output channel [x]: Status[x].**

Example: Send “Status3.” to Query the input channel to the output 3.

**10**. **Query the input channel to the output channels one by one: Status.**
Example: “Status.” to Query the input channel to the output channels one by one.

**11. Save the present operation to the preset command [Y]: Save[Y].**

Example: “Save7.” to save the present operation to the preset command No.7.

**12. Recall the preset command [Y]: Recall[Y].** Example: “Recall5.” to recall the preset command No.5.

**13. Clear the preset command [Y]: Clear[Y].** Example: “Clear5.” to clear the preset command No.5.

**14**. **EDID management command:. EDIDM[X]B[Y].** Example: “EDIDM5B3.” to enable input 3 to learn the EDID data of output 5.

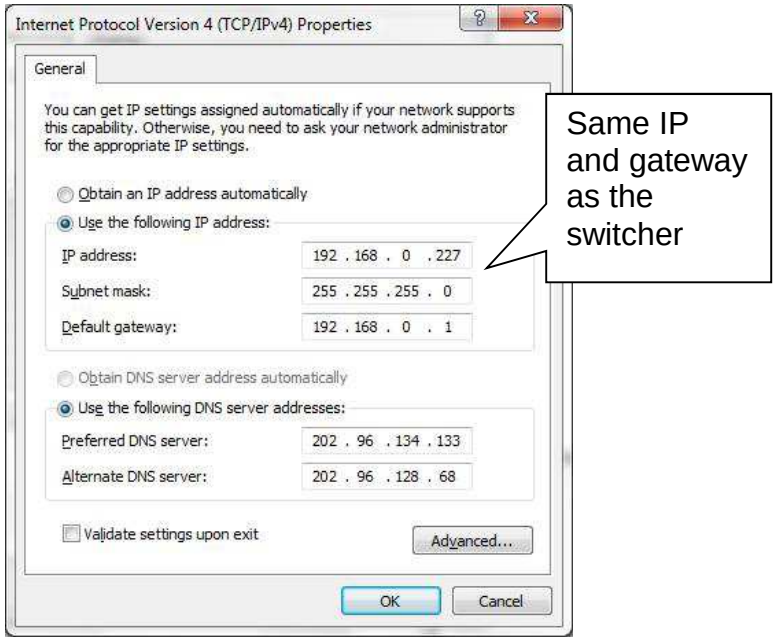
**15**. **Command for signal cards: USER/[Y]/[X]*****.** Example: “USER/I/7:0623%;” to set the input 7 to support YPbPr signal, the card is plugged in the second input slot of the matrix.

## 5.4. TCP/IP Control

### *5.4.1. Control Modes*

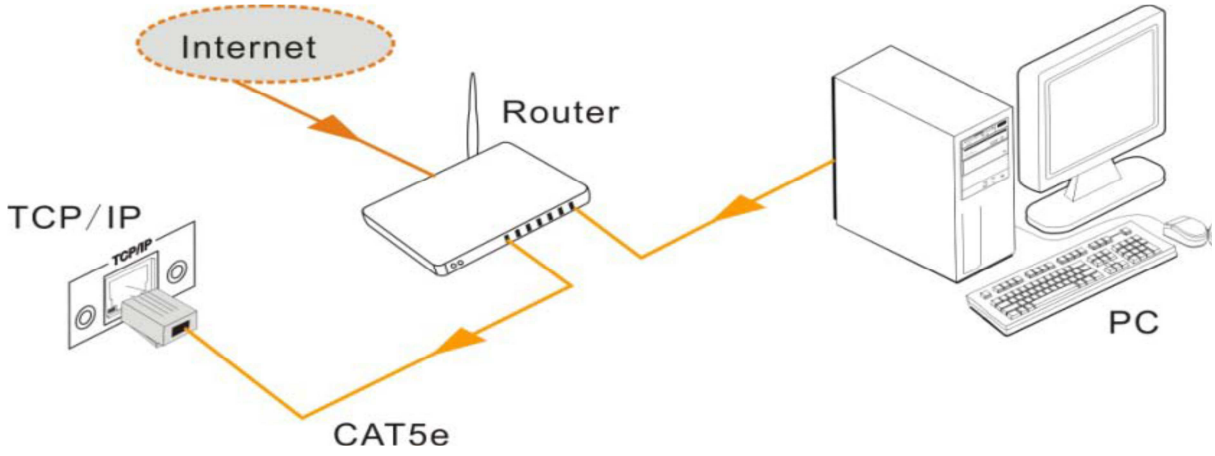
***TCP/IP default settings: IP is 192.168.0.178, Gateway is 192.168.0.1, and Serial Port is 4001. IP & Gateway can be changed as you need, Serial Port cannot be changed.***

- **Controlled by Single PC**
  Connect a computer to the TP port of the AVG-DMM1616, and set its IP address and gateway to the same IP and gateway as the AVG-DMM1616's (Default: 192.168.0.178).



- **Controlled by PC(s) in LAN**
  Connect the AVG-DMM1616, a router and several PCs to setup a LAN (as shown in the following figure). Set the IP Subnet and gateway of the AVG-DMM1616 to the same as the routers to allow PC's system control over the LAN.

Follow these steps to connect the devices:




**Step 1.** Connect the TCP/IP port of the AVG-DMM1616 to Ethernet port of PC with twisted pair.

**Step 2.** Set the PC's IP address and gateway to the same as the AVG-DMM1616's. Do please remember the PC's original IP address and gateway.

**Step 3.** Set the AVG-DMM1616's IP address and gateway to the same IP subnet as the router.

**Step 4.** Set the PC's IP address and gateway the same as the original settings.

**Step 5.** Connect the AVG-DMM1616 and PC(s) to the router. PC(s) within the LAN are able to control the AVG-DMM1616 asynchronously.

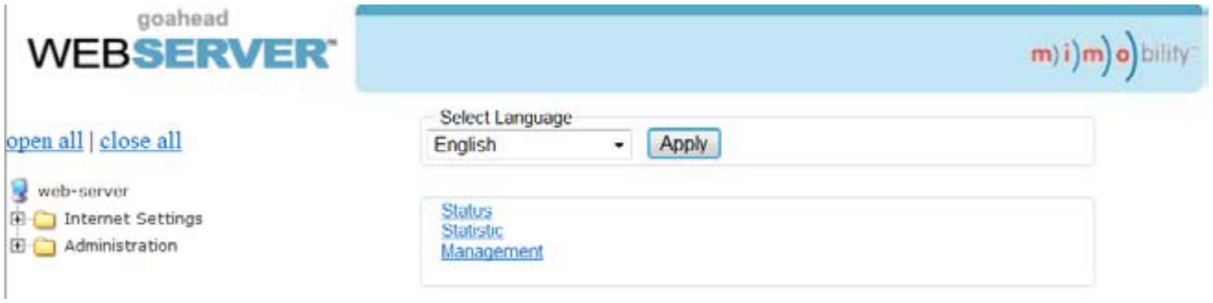
### *5.4.2. TCP/IP Settings*

**Step 1.** Connect the TCP/IP port of the AVG-DMM1616 to Ethernet port of a PC with twisted pair.

**Step 2.** Set the PC's IP and gateway to the same IP subnet as the default IP of the AVG-DMM1616 (192.168.0.178).

**Step 3.** Enter the http://192.168.0.178:100 into an Internet Explorer browser, you will see the LOGIN page.

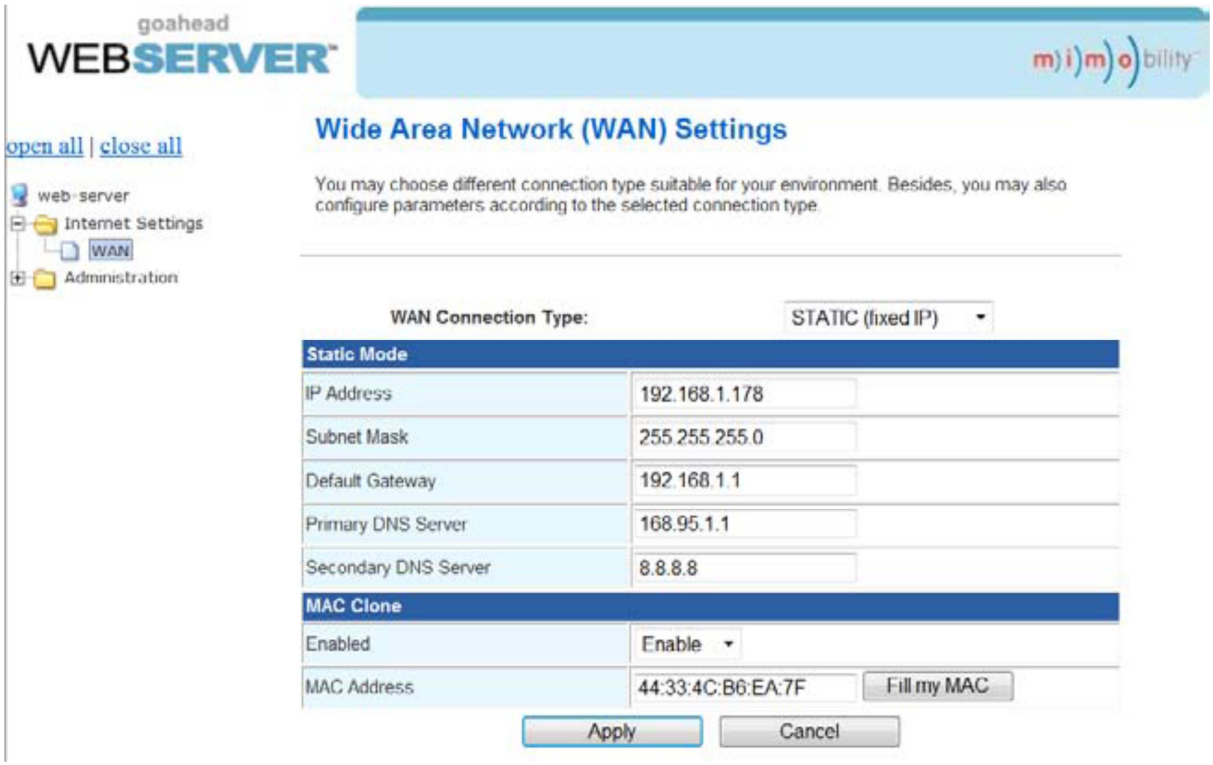
**Step 4.** Enter user name "admin" and password "admin", then press the **Enter** button. (Not the Enter key on your keyboard.) Then you can enter the configuration page to configure the IP port, including the IP reset, Serial reset and password reset etc. As picture below:




**Step 5.** Change IP/Serial Port

- Change IP

a) Select the tab "**system info**" and then you are able to change the IP.




b) Press the button **Apply** to save your settings. Then the PC(s) in this LAN (connected with this router) will be able to control the matrix switcher.

- **Change Serial Port**

a) Select the tab "**serial info**", and then you are able to change the serial port.

b) Set the port number to 4001 (unique, other numbers are unavailable).

c) Press the button **Apply** on present page to save your settings.

**Step 6.** Select the tab "**reset device**", then your settings will be loaded to the AVG-DMM1616.

# 6. Specifications

## 6.1. Main Unit

| Control | | | |
|---|---|---|---|
| Serial control port | RS-232, 9- female D connector | Configurations | 2 = TX, 3 = RX, 5 = GND |
| TCP/IP control | RJ45 Port | | |
| Front Panel | Push Button control | | |
| **General** | | | |
| Power Supply | 100VAC ~ 240VAC, | Power | 84W (Max) |
| | 50/60Hz | Consumption | |
| Temperature | -10 ~ +40℃ | Humidity | 10% ~ 90% |
| Dimension W (*H*D) | 483 x 133x 320mm (3U high) | Weight | 3.5Kg |

## 6.2. Changeable Cards

### *6.2.1. 4I-DV & 4O-DV*

| Input | | Output | |
|---|---|---|---|
| Input | 4 DVI | Output | 4 DVI |
| Input Connector | Female DB24+5 | Output Connector | Female DB24+5 |
| Input Level | T.M.D.S. 2.9V~3.3V | output Level | T.M.D.S. 2.9V~3.3V |
| Input Impedance | 75Ω | Output Impedance | 75Ω |
| **General** | | | |
| Gain | 0 dB | Bandwidth | 340 MHz (10.2 Gbit/s) |
| Video Signal | DVI 1.0/HDMI 1.3 full digital T.M.D.S signal | Switching Speed | 200ns (Max.) |
| Max Time-delay | 5nS (±1nS) | Crosstalk | <-50dB@5MHz |
| EDID and DDC | Supports Extended Display Identification Data (EDID) and Display Data Channel (DDC) data using DVI and HDMI standards. EDID and DDC signals are actively buffered | | |
| HDCP | Compliant with HDCP using DVI and HDMI 1.3 standards | | |

### *6.2.2. 4I-DS & 4O-DS*

| Input | | Output | |
|---|---|---|---|
| Input | 4 DVI | Output | 4 DVI |
| Input Connector | Female DB24+5 | Output Connector | Female DB24+5 |
| Input Level | T.M.D.S. 2.9V~3.3V | output Level | T.M.D.S. 2.9V~3.3V |
| Input Impedance | 75Ω | Output Impedance | 75Ω |
| **General** | | | |
| Gain | 0 dB | Bandwidth | 340 MHz (10.2 Gbit/s) |
| Video Signal | DVI,HDMI,VGA,C-VIDEO,YPbPr | Switching Speed | 200ns (Max.) |
| Max Time-delay | 5nS (±1nS) | Crosstalk | <-50dB@5MHz |
| EDID and DDC | Supports Extended Display Identification Data (EDID) and Display Data Channel (DDC) data using DVI and HDMI standards. EDID and DDC signals are actively buffered | | |
| HDCP | Compliant with HDCP using DVI and HDMI 1.3 standards | | |

### *6.2.3. 4I-HD & 4O-HD*

| Input | | Output | |
|---|---|---|---|
| Input | 4 HDMI | Output | 4 HDMI |
| Input Connector | Female HDMI | Output Connector | Female HDMI |
| Input Level | T.M.D.S. 2.9V/3.3V | output Level | T.M.D.S. 2.9V/3.3V |
| Input Impedance | 75Ω | Output Impedance | 75Ω |
| **General** | | | |
| Gain | 0 dB | Bandwidth | 6.75Gbit/s |
| Video Signal | DVI 1.0/HDMI 1.4a full digital T.M.D.S signal | Max Time-delay | 5nS (±1nS) |
| Switching Speed | 200ns (Max.) | Crosstalk | <-50dB@5MHz |
| EDID and DDC | Supports Extended Display Identification Data (EDID) and Display Data Channel (DDC) data using DVI and HDMI standards. EDID and DDC signals are actively buffered | | |
| HDCP | Compliant with HDCP using DVI and HDMI 1.4a standards | | |

### *6.2.4. 4I-VG & 4O-VG*

| **Input** | | **Output** | |
|---|---|---|---|
| Input | 4 VGA | Output | 4 VGA |
| Input Connector | Female 15 pin HD | Output Connector | Female 15 pin HD |
| Input Level | 0.5 ~ 2.0Vp-p | Output Level | 0.5 ~ 2.0Vp-p |
| Input Impedance | 75Ω | Output Impedance | 75Ω |
| **General** | | | |
| Gain | 0 dB | Bandwidth | 350MHz (-3dB), fully load |
| Video Signal | VGA-UXGA, RGBHV, RGBS, RGsB, RsGsBs, component video, S-video & C-video. | | |
| Switching Speed | 200ns (Max.) | Crosstalk | <-50dB@5MHz |

### *6.2.5. 4I-VA*

| **Input** | | | |
|---|---|---|---|
| **Video** | | **Audio** | |
| Input | 4 VGA | Input | 4 Stereo Audio |
| Input Connector | Female 15 pin HD | Input Connector | 3P Captive connector |
| Input Level | 0.5 ~ 2.0Vp-p | CMRR | >90dB @20Hz ~ 20KHz |
| Input Impedance | 75Ω | Input Impedance | >10KΩ |
| **General** | | | |
| Gain | 0 dB | Bandwidth | YPbPr:170MHz; C-video:150MHz; VGA:170MHz |
| Video Signal | VGA-UXGA, RGBHV, RGBS, RGsB, RsGsBs, component video, S-video& composite video. | | |
| Switching Speed | 200ns (Max.) | Crosstalk | <-50dB@5MHz |

### *6.2.6. 4I-SD & 4O-SD*

| Input | | Output | |
|---|---|---|---|
| Input | 4 SDI | Output | 4 SDI |
| Input Connector | Female BNC | Output Connector | Female BNC |
| Input Level | 0.8Vp-p ± 10% | output Level | 0.8Vp-p ± 10% |
| Input Impedance | 75Ω | Output Impedance | 75Ω |
| **General** | | | |
| Gain | Unity | Maximum Data Rate | 2.97 Gbps |
| Transmission Distance | 300M (Max.) | Data rate Lock | Auto |
| Input Return Loss | <-14 dB @ 1 MHz ~ 1.5 GHz | Input Return Loss | <-14 dB @ 1 MHz ~ 1.5 GHz |
| Video Standard | SMPTE 292M, SMPTE 259M, SMPTE 424M, ITU-RBT.601, ITU-RBT.1120 | Data Type | 8bit, 10bit |
| Audio Bits per Sample | 18 bits per channel, 2 channels (L, R) | | |

### *6.2.7. 4I-TP & 4O-TP*

| **Video Input** | | **Video Output** | |
|---|---|---|---|
| Input | 4 RJ45 | Output | 4 RJ45 |
| Input Connector | Female RJ45 3.5mm mini jack for IR 3 poles captive screw connector for RS232 | Output Connector | Female RJ45 3.5mm mini jack for IR 3 poles captive screw connector for RS232 |
| Input Impedance | 75Ω | Output Impedance | 75Ω |
| **Video General** | | | |
| Gain | 0dB ~ 10dB@100MHz | Bandwidth | 6.75Gbps |
| Resolution range | 800x600 ~ 1920x1200 | Transmission Distance | 70M(Max) |
| SNR | >70dB@ 100MHz-100M | Return Loss | <-30dB@ 5KHz |

| | | | |
|---|---|---|---|
| THD | ＜0.005%@1KHz | Min.～Max. Level | ＜0.3V ~ 1.45Vp-p |
| HDMI Standard | Support HDMI1.4a and HDCP | Differential Phase Error | ±10°@ 135MHz_100M |

### *6.2.8. 4I-UH & 4O-UH*

| | | | |
|---|---|---|---|
| **Input** | | | |
| **Video Input** | | **Video Output** | |
| Input | 4 HDMI | Input | 4 Analog |
| Input Connector | Female HDMI | Input Connector | 3.5mm pluggable terminal block |
| Min.～Max. Level | T.M.D.S. 2.9V~3.3V | Input Impedance | 75Ω |
| Input Impedance | 100Ω (Differential) | Frequency Response | 20Hz～20K Hz |
| **Output** | | | |
| **Video Output** | | **Audio Output** | |
| Output | 4 HDMI | Output | 4 Stereo |
| Output Connector | Female HDMI | Output Connector | 3.5mm Stereo audio connector |
| Min.～Max. Level | T.M.D.S. 2.9V~3.3V | Output Impedance | 75Ω |
| Output Impedance | 100Ω (Differential) | Frequency Response | 20Hz～20K Hz |
| **General** | | | |
| Gain | 0dB | Bandwidth | 6.75Gbps |
| Max Resolution | 4Kx2K | Crosstalk | <-50dB@5MHz |
| Transmission Distance | 1080P≤70m 4Kx2K ≤ 40m | Switching Speed | 200ns (Max.) |
| Work Temperature | -10℃～+40℃ | Reference Humility | 10%～90% |
| SNR | >70dB@ 100MHz-100M | Return Loss | <-30dB@ 5KHz |
| Supported Audio Format | Embedded HDMI audio: PCM, Dobly Digital, DTS, DTS-HD Analog audio: PCM | | |
| HDMI Standard | Supports HDMI1.4& DVI1.0 | | |
| EDID& HDCP Management | Compliant with HDCP 1.4; Supports manual EDID management | | |

### *6.2.9. 4I-UF & 4O-UF*

| **Input** | | **Output** | |
|---|---|---|---|
| Input | 4 Fiber Optical | Output | 4 Fiber Optical |
| Input Connector | SPF Fiber Optical Connector | Output Connector | SPF Fiber Optical Connector |
| Fiber Type | Multi-mode, Single mode | Fiber Type | Multi-mode, Single |
| **General** | | | |
| Data Rate | 10.2 Gbps | Color Depth | 8bit, 10bit, 12bit, 16bit |
| Work Temperature | 0～55℃ | Reference Humility | 10%～90% |
| **Optical Fiber Mode** | | | |
| Connector | LC connector | | |
| Resolution | Up to 4Kx2K | | |
| Transmission Distance | 1km (Single mode transmission, using Single Mode Optical Module and OS1 Single Mode Fiber Cable) 300m (Multi-mode transmission, using Single/ Multi mode Optical Module and OM3 Multi-Mode Fiber Cable) | | |
| Data Rate | 10.2Gbit/s | | |

### *6.2.10. 4I-BT & 4O-BT*

| **Input** | | | |
|---|---|---|---|
| **Video Input** | | **Audio Input** | |
| Input | 4 HDBT | Input | 4 Stereo |
| Input | 4 Female RJ45 (with | Input | 3.5mm Stereo audio |
| Connector | dual-color indicator) | Connector | connector |
| Min.～Max. Level | T.M.D.S 2.9V～3.3V | Input Impedance | 75Ω |
| Input Impedance | 100Ω (Differential) | Frequency Response | 20Hz～20K Hz |

| **Output** | | | |
|---|---|---|---|
| **Video Output** | | **Audio Output** | |
| Output | 4 HDBT | Output | 4 Stereo |
| Output Connector | 4 Female RJ45 (with dual-color | Output Connector | 3.5mm Stereo audio connector |

| | | | |
|---|---|---|---|
| | indicator) | | |
| Min.～Max. Level | T.M.D.S 2.9V～3.3V | Output Impedance | 75Ω |
| Output Impedance | 100Ω (Differential) | Frequency Response | 20Hz～20K Hz |
| **Control Part** | | | |
| Control Signal | 4 RS232 | Control Connector | 3-pin pluggable terminal block |
| Protocol | TCP/IP | | |
| **General** | | | |
| Gain | 0dB | Bandwidth | 6.75Gbps |
| Max Resolution | 4Kx2K | Crosstalk | <-50dB@5MHz |
| Transmission Distance | 1080P≤70m<br>4Kx2K ≤ 40m | Switching Speed | 200ns (Max.) |
| Work Temperature | -10℃～+40℃ | Reference Humility | 10%～90% |
| SNR | >70dB@ 100MHz-100M | Return Loss | <-30dB@ 5KHz |
| Supported Audio Format | Embedded HDMI audio: PCM, Dobly Digital, DTS, DTS-HD<br>Analog audio: PCM | | |
| HDMI Standard | Supports HDMI1.4 | | |
| EDID& HDCP Management | Compliant with HDCP 1.4; Supports manual EDID management | | |

## 7. Troubleshooting & Maintenance

| Problems | Causes | Solutions |
|---|---|---|
| Color loss or no video signal output | The Connection of the cabling may be incorrect or faulty | Check whether the cables are connected correctly and in working condition. |
| | Failed or loose connection | Make sure the connection is good |
| No Video output when switching | No signal at the input / output end | Check with oscilloscope or multimeter if there is any signal at the input/ output end. |
| | Failed or loose connection | Make sure the connection is good |
| | Input source is with HDCP while the HDCP compliance is switched off. | Send command /%[Y]/[X]:1. or change HDCP compliance status in GUI. |
| | The display doesn't support the input resolution. | Switch for another input source or enable the display to learn the EDID data of the input. |
| Cannot control the device via front panel buttons | Front panel buttons are locked. | Send command /%Unlock; or select unlock in GUI interface to unlock |
| Cannot control the device via IR remote | Flat Remote Battery | Change battery. |
| | Faulty Remote | Send it to authorized dealer for repairing. |
| | Beyond the effective range of the IR signal or not pointing at the IR receiver | Adjust the distance and angle and point right at the IR receiver. |
| | The IR receiver connected to IR IN/ IR ALL IN port is without carrier | Change for an IR receiver with carrier. |
| Power Indicator remains off when powered on | Failed or loose power connection | Check whether the cables are connected correctly |
| EDID management does not work normally | Faulty HDMI Cable | Change for another HDMI cable which is in good working condition. |
| There is a blank screen on the display when switching | The display does not support the resolution of the video source. | Switch again. |
| | | Manage the EDID data manually to make the resolution of the video source automatically compliant with the output resolution. |

| Problems | Causes | Solutions |
|---|---|---|
| Cannot control the device by control device (e.g. a PC) through RS232 port | Wrong connection | Check to ensure the connection between the control device and the unit |
| | Wrong RS232 communication parameters | Type in correct RS232 communication parameters: Baud rate:600; Data bit: 8; Stop bit: 1; Parity bit: none |
| | Broken RS232 port | Send it to an authorized dealer for checking. |
| Static becomes stronger when connecting the video connectors | Bad grounding | Check the grounding and make sure it is connected well. |
| Cannot control the device by RS232 / IR remote / front panel buttons | The device has a previous fault | Send it to an authorized dealer for repairing. |