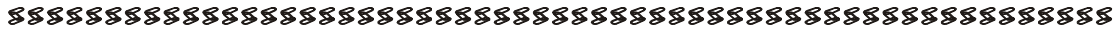# Professional HD Matrix Switch

User Manual

HD Matrix of HDMI series

HD Matrix of DVI series

HD Matrix of HVD series with Multiple Interfaces

Before using this system, please read this user manual thoroughly

⚠Guidance for Safe Operation

For ensuring the reliable performance of the equipment and the safety of the users, please follow below guidance when installing, using or maintaining the equipment:

① The system must has well grounding. Otherwise, there will be not only bad performance or physical damage of the equipment, but also dangers for people due to electric leakage. The ultimate grounding point of the matrix switch of HDMI, DVI and HVD series should be the genuine earth. And the grounding resistance should be less than 1Ω.

② It's forbidden to change the original design of the product. No revision is allowed for the mechanical and electrical design of the product. Additional components are not allowed also. Otherwise, the manufacturer won't be liable for any consequences caused by such changes.

③ Please do not use two-pin plug. Please make sure the power supply is AC 110V 60Hz.

④ As there are components inside with high voltage AC, please do not open the shell by yourself to avoid electric shock.

⑤ Please do not put the equipment at place where the temperature is not in accordance with the specification.

⑥ As the power supply will get heat when working, it's a must to keep well ventilation at the working location to avoid physical damage caused by overheat.

⑦ Please turn off the power switch of the equipment, if it's rainy and humid or the equipment will be idle for a long time.

⑧ It's a must to take off the power plug of the equipment from the AC socket before follow operations:
A． Disassemble or re-assemble any component of the equipment.
B． Disconnect or re-connect any electric plug or other connector.

⑨ Before permitted by professionals, please do not try to open the shell of the equipment and repair the equipment by yourself, as it may cause accidents or further damage to the equipment.

⑩ Please do not have any chemicals (solid or liquid) touching or nearing the equipment.

Contents

I. Description of the HDMI/DVI/HVD HD Matrix System

1.1　About the Matrix Switch

The HDMI/DVI HD Matrix Switch is a professional matrix switching equipment with high-performance for switching HD audio and video signals. It supports input and output of HD video signals (HDMI/DVI/HVD) and balanced/unbalanced audio signals. The product is designed for applications such as broadcasting and TV project, multimedia conference hall, display engineering with large screen, TV teaching, command and control center, etc. As approved by successful deployments in demanding applications such as military, power grid, traffic, public security, etc, the device features stable performance and good quality.

The good quality of the HDMI/DVI/HVD HD Matrix Switch is derived from our profound technology heritages. For assuring the good quality, we have adopted the best chips for the switches and cautiously designed every detail of the circle. As per strict test, the HDMI/DVI/HVD Switch features 4.5G bandwidth and supporting 1080p/720p HD video signal, which can be applied in various demanding applications.

The HDMI/DVI HD Matrix Switch provides convenient man-machine interfaces for the users. The HDMI/DVI/HVD HD Matrix Switch has monochrome or color LCD for Chinese information, RS232 communication interface, RJ45 networking control interface (optional), protection for power failure and special control software. Up to 100 user-defined scenarios can be stored and read. The matrix switch can cooperate with computer, remote control system or various remote control equipment (e.g., central control systems). The system has a set of commands for serial port communication which is compatible with popular matrices.

This user manual is applicable for all matrix switches of the mentioned series. Slight difference may exist as the matrices are of different scales.

1.2　The classification of the matrix systems

Based on the different applications and demands of different users, the matrix systems are classified as below models:

Technical Parameters Model	Input interface number	Output interface number	RS232 interface	LCD panel	Panel-controlled infrared remote controller	Case type	plug-in card available (Yes/No)
DVI-404	4	4/8	Yes	Yes	Yes	1.5U	No
DVI-8 series	8	4/8	Yes	Yes	Yes	2U	No
DVI-16 series	16	4/8/16	Yes	Yes	Yes	2U	No

DVI-24 series	24	4/8/16/24	Yes	Yes	Yes	6U	Yes
DVI-32 series	32	4/8/16/24/36	Yes	Yes	Yes	6U	Yes
HDMI-404	4	4	Yes	Yes	Yes	1.5U	No
HDMI-8 series	8	4/8	Yes	Yes	Yes	2U	No
HDMI-16 series	16	4/8/16	Yes	Yes	Yes	2U	No
HDMI-24 series	24	4/8/16/24/36	Yes	Yes	Yes	6U	Yes
HDMI-36 series	36	4/8/16/24/32/36	Yes	Yes	Yes	6U	Yes
HVD-24 series	24	8/16/24/32/36	Yes	Yes	Yes	6U	Yes
HVD-36 series	24	8/16/24/32/36	Yes	Yes	Yes	6U	Yes

Remarks: HVD series with multiple interfaces can accept video signals of different formats (HDMI, DVI, VGA (with audio signal), AV, SDI and Color Component) at the same time, while the output format is unified as DVI and HDMI. The number of input and output channels could be customized by inserting different cards for input and output according to the requirements of the customers. The maximum channel number of input and output channel is 36 respectively. Each card can provide 4 channels, while 18 cards in total are supportable for input and output.

II. Packing Description of the Matrix System
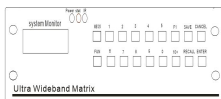
Main body of the matrix

RS232 communication cable

Power cord

Disk of test and application software for the matrix

User manual and quality certificate for the equipment

III. Installation of the Main Body of the Matrix

The main body of the matrix adopts a complete metal case as shell, which can be deployed nearby other equipment.

　　　　Additionally, standard installing brackets will be provided for the main body of the matrix. The user can install the matrix on standard 19" equipment cabinet.

IV. Sketch of Front and Rear Panel

4.1 Sketch of the panels
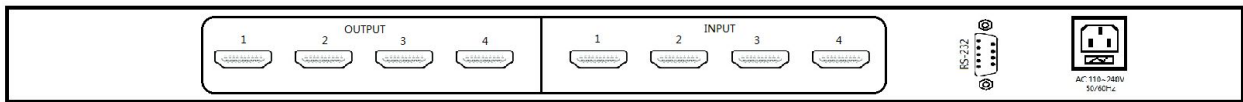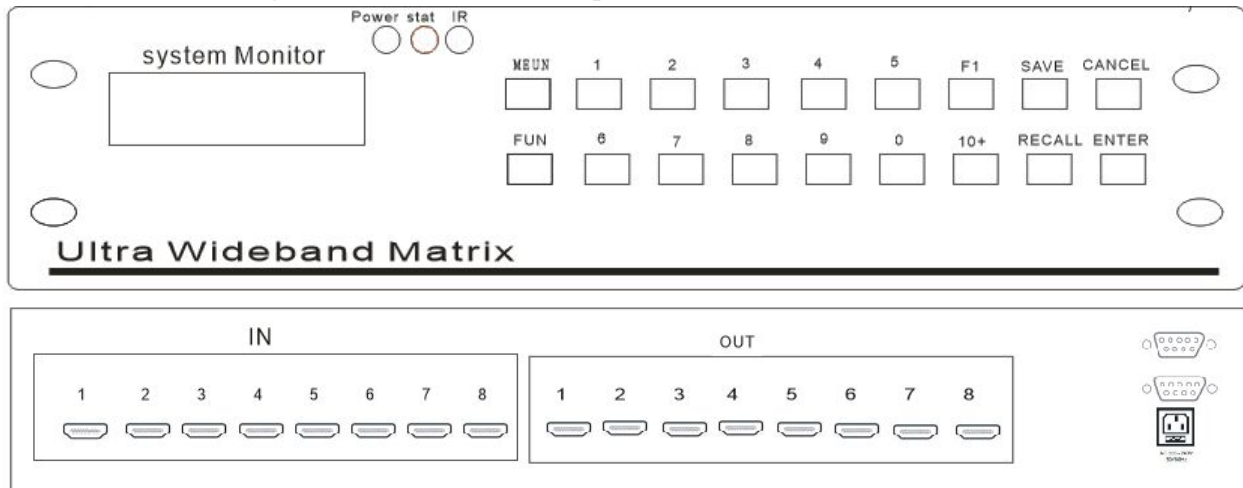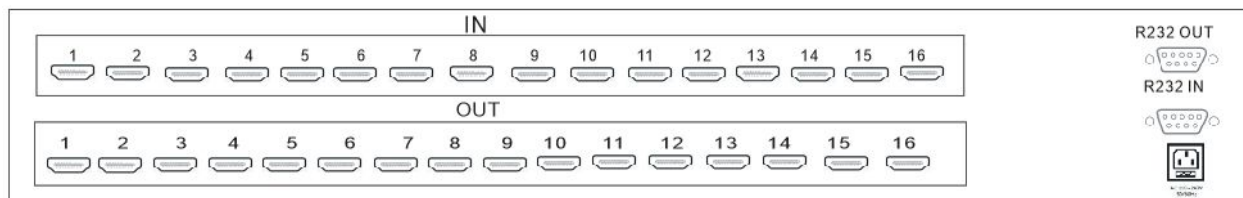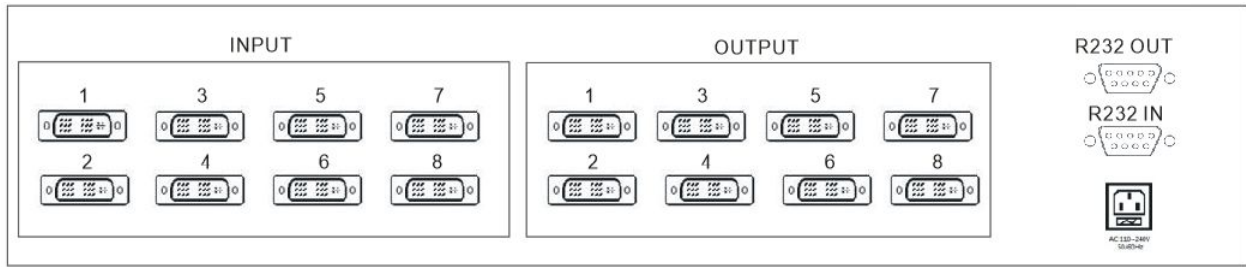

Figure 4-1　　Rear panel of the case（HDMI0404）

Figure 4-2　　Front and rear panel of the case（HDMI/DVI-8/16）

Sketch of the interfaces on rear panel of HDMI0808

Sketch of the interfaces on rear panel of HDMI1616

Sketch of the interfaces on rear panel of DVI0808
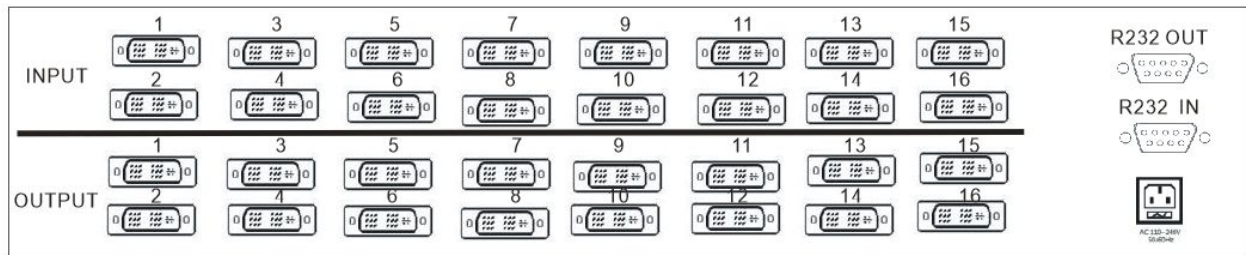
Sketch of the interfaces on rear panel of DVI1616

V. Connection between the Matrix and Auxiliary Equipment

5.1   Description of the input and output interfaces

According to the model of the matrix,

HDMI Matrix (with 1.5U case): There are 4 interfaces for input and output respectively, which are compatible with HDMI 1.3.

HDMI Matrix (with 2U case): There are 4, 8 or 16 interfaces for input and output respectively, which are compatible with HDMI 1.3.

DVI Matrix (with 2U case): There are 4, 8 or 16 interfaces for input and output respectively, which are compatible with DVI 1.3.

HVD Matrix: The input and output interfaces are HDMI and DVI/VGA ports on the card (each card has 4 interface). The maximum number of interfaces of a certain type is 36.

5.2   RS-232 communication port and connecting method

All the matrices have standard RS-232 serial communication port (Ethernet port is optional), which allows customers remotely control the system via various control systems or Ethernet, as an additional operating method from front panel operation.

Connecting method: cross connection with PC (pin connecting method: 2-3, 3-2, 5-5)

RS-232 port is a 9-pin connector. The pin definition is as blow:

Pin No	Definition	Description
1	N/u	null
2	Tx	Receive data
3	Rx	Send data

4	N/u	Null
5	Gnd	Common grounding
6	N/u	Null
7	N/u	Null
8	N/u	Null
9	N/u	Null

5.2.1 Connect matrix via network interface

The matrix could be controlled via LAN by TCP/IP network.

5.2.2 Connect matrix with controlling PC

Using RS-232 cable to connect the serial communication port of the PC (COM1 or COM2) with the RS-232 communication port of the matrix. Then the matrix could be controlled by the PC after installed the control software.

The users can use the attached software as the PC control software. They can also compile their own control software according to the file of "Communication Protocol and Command Codes".
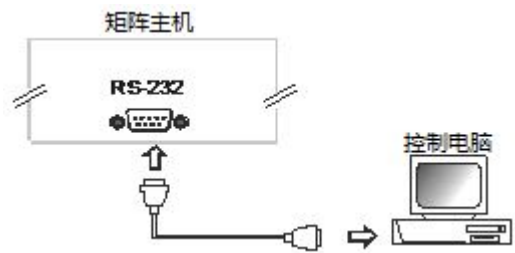
Figure 5-1   Connect the matrix with PC

5.3 Connecting method for HD Matrix Switch

1. There are different numbers of input and output connectors for HDMI/DVI/HVD HD Matrix Systems of different models. The users can use them to connect the matrix with various HD display equipment which has HDMI interface such as HD DVD player, HD camera, laptop, etc. The output connector can be used to connect HD display terminals such as large screen projector, joint screen, etc. **(Remarks: If there is any change for the equipment, please connect the manufacturer)**
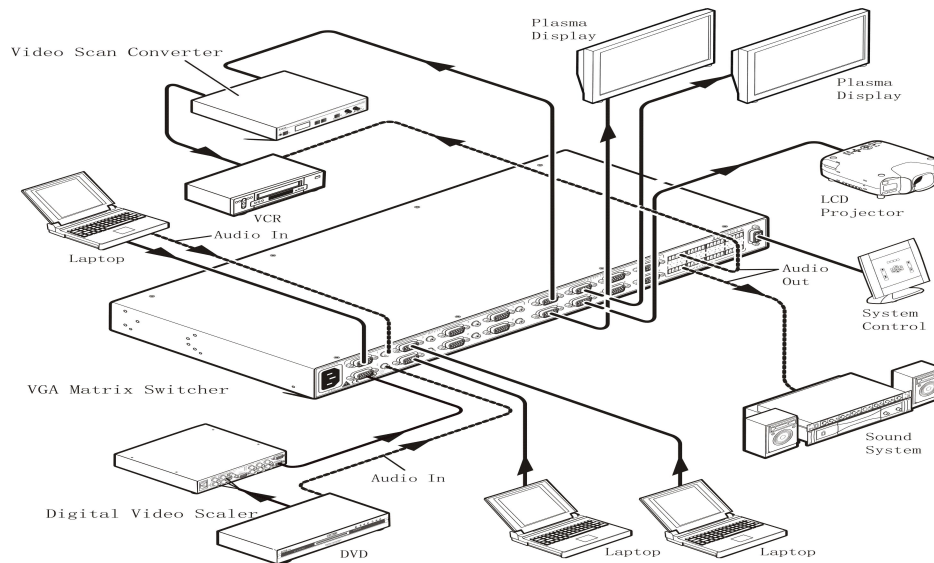
Figure 5-2   Wiring diagram of HD Matrix System

5.4   Description of the structure of the plug-in type HD matrix

The plug-in type HD matrix is composed by two major parts: the case and the plug-in card.

    1. The cards are classified as input card, output card, control card and power supply card.

        The input cards include: DVI input card, HDMI input card, VGA card with audio, SDI card, Color component card, and AV card.

        The output cards include: DVI output card, HDMI output card, and VGA output card.

VI. Instructions of the Control Panel

6.1   Description of the functions of the buttons on front panel

    "Function button"+"input channel"+"output channel"+"Enter", here:

"Function button" include:

    MENU**：**Press MENU button once is for switching audios or videos.

    FUN**：**   Function button, for inquiring ID, switching status, etc.

    SAVE**：**   Scenario setting.

    RECALL**：**   Recall scenario

    CANCEL: Clear

    ENTER: Confirm button

F1:   Shortcut button

"Output channel"

The channel on which there is the signal source needs to be switched. It is indicated by number buttons on the

panel "0-9", "10+", "20+", "30+".

"Input channel"

The channel on which there is the signal source needs to be switched. It is indicated by number buttons on the

panel "0-9", "10+", "20+", "30+".

"Enter"   for confirming the operation

Take matrix with 32 channels as sample:

Example 1: to switch audio/video signal from input channel 6 to output channel 8, the operation is as below:

"MENU"+"6"+"8"+"Enter"

Example 2:   to switch audio/video signal from input channel 10 to output channel 8, the operation is as below:

"MENU"+"10+"+"0"+"8"+"Enter"

Example 3: to switch audio/video signal from input channel 32 to output channel 8, the operation is as below:

"MENU"+"30+"+"2"+"8"+"Enter"

3.2 FUN: status inquiry, to inquire the current ID or current output and input status.

3.3 SAVE: to save current status. There is F1 storage unit,

For example: to save current status to F1, the operation is as below:

"SAVE"+"F1"+"Enter"

3.4 RECALL: Invoking

For example: to recall status saved in F1 as current status, the operation is as below:

"RECALL"+"F11"+"Enter"

3.5 CANCEL button

The button operation could be cleared by "**CANCEL**" button if there is any error for the input/output channel. Then input

the right input/output channel number.

6.2   Operational demonstration

Example 1: To switch signal of input channel 1 to output channel 3 (panel operation)
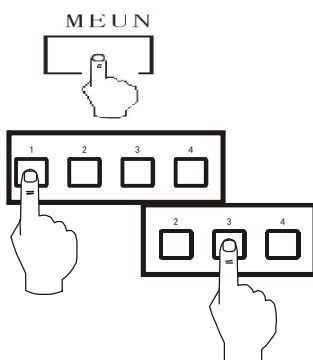
1. Press "MENU"

2. Press input channel number "1"

3. Press output channel number "3"

Display: signals on input channel 1 is switched to output channel 3

Example 2: To switch signal of input channel 10 to output channel 21 (panel operation)

输入10操作
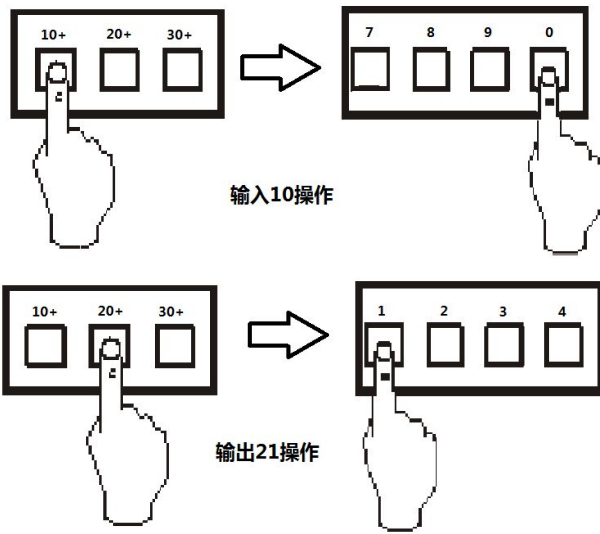
1. Button operation for input channel number 10: 10+, 0

输出21操作

2.Button operation for output channel number 21: 20+, 1

Example 3: To switch signal of input channel 1 to all the output channels (panel operation)

1. Press "MENU"

2. Press input channel number "1"

3. Press "0", then press **"Enter"**

VII. Instructions of Remote Controller
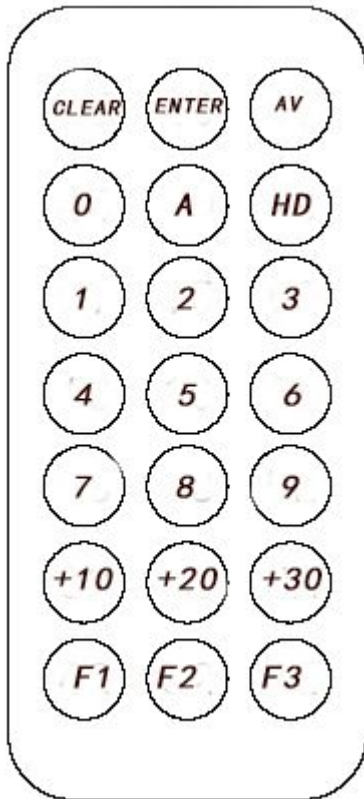
Instructions of button operation:

The matrix system can be controlled by remote controller for fast switch. The function of each button is the same as which on the panel (Please refer to "Instructions of Control Panel" for the detailed function description of the buttons).

This remote controller is applicable for HDMI, DVI and HVD matrix.
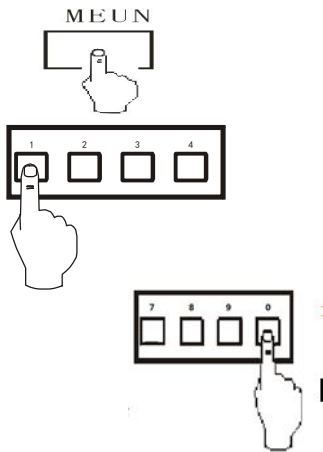
The "Function Button" include:

AV: To switch audio and video signals at the same time

HD:**switching trigger (same function as MENU on panel)**

A: switch audio signal only

"1、2、3……": To select output and input channel

"CANCEL": to cancel the operation

"ENTER": means to execute the button operation

"F1.....": shortcut button

The standard operation is same as the panel operation

"0" means switch signal to all the output channels

VIII. Select the Language (Chinese/English)

Text11

⊙ 中文   ○ English

8.1. Instructions of software installation:

Running environment of the software:

Window98/2000/NT/XP

Available memory is larger than 32M

Available disk space is larger than 10M

CD-ROM1

One serial communication port available at least

8.2．Install the control software

The attached disk with the matrix contains test and application software. The users can use the software to

control the matrix.

Put the attached disk into the CD driver of the PC, then run the EXE file:

X:\Matrix software \SETUP.EXE

Then the software will be installed.

8.3 Launch the software

First, power off the matrix and the PC, then connect the RS232 interfaces of the matrix and the PC with communication cable (an attachment of the matrix);

Power on the matrix and the PC;

On the controlling PC, click in sequences "Start" ➔ "Programs" ➔ "Project"

Then the control software will be launched. The matching status of the matrix will be displayed after set the serial port, matrix ID and matrix type.

8.4 Function instructions of the software

According to actual demand, the operating method could be set as automatic switch, keyboard control, etc. Before setting the equipment type, please set the serial port of the PC and the matrix ID (default ID is 00).

Main operating interface is as below:

Figure 0-1   User interface of the "setup" segment of control software

8.5 Function instructions of the main operating interface

Block for input/output channel: for selecting channels. Click numbers to select the channels need to

be switched.

   Click the number icon directly for input number 1-9. If the number is larger than 9, please do as following example. Example: to switch signal of input channel 36 to output channel 32, click "30+" and "6" to set the input channel, then click "30+" and "2" to set the output channel, thus the signal will be switched accordingly.
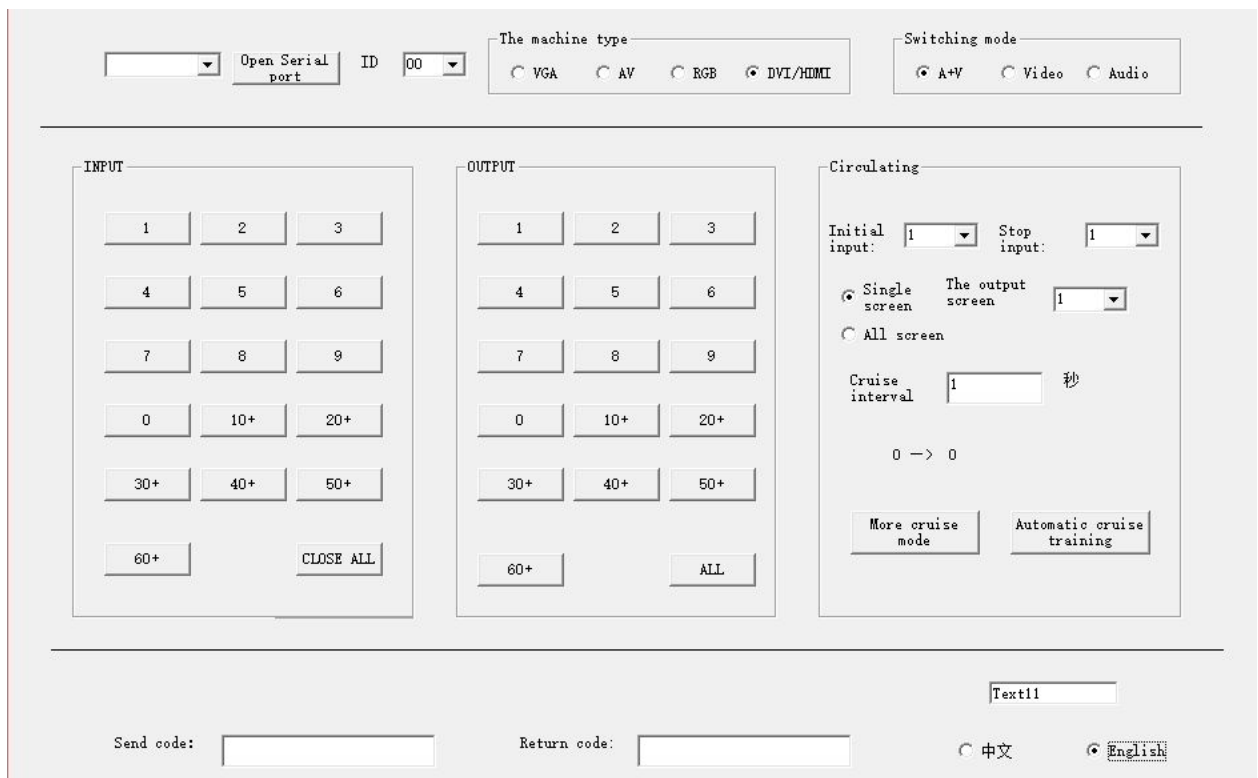
   In right block, a circulating display could be set by directly selecting the start channel and end channel, which can appoint one of the screens to display images of selected channels in turns with a regular time interval.

8.6 Further settings for automatic switching:
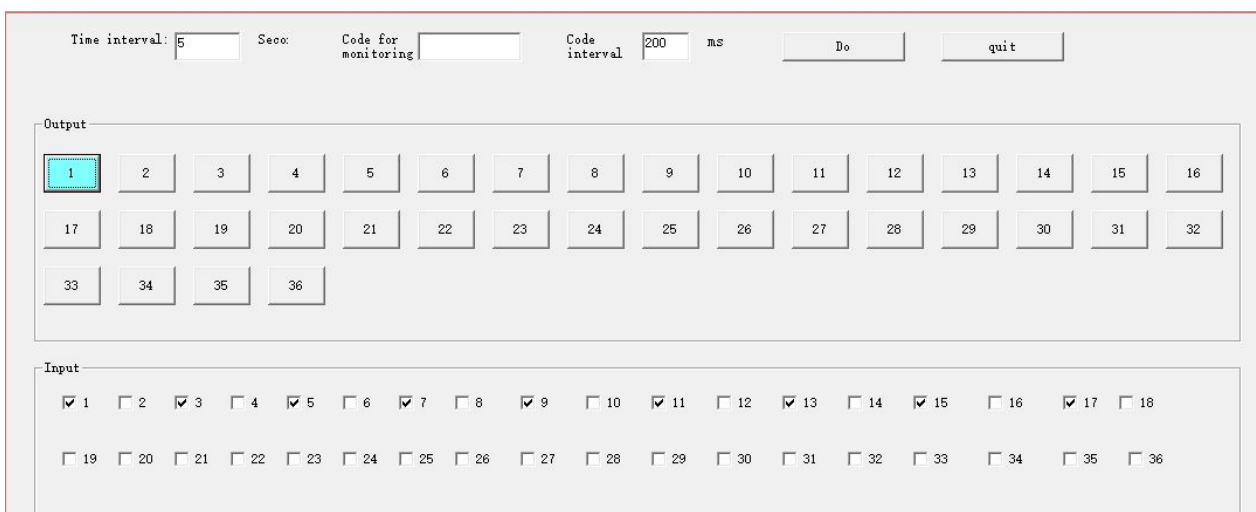
Figure 0-2   User interface of "Automatic Switching Mode" segment of control software

   Set the time interval of the automatic switching: set the switching time interval according to the actual demand.

OUTPUT: Select the output screen. Select the screen according to the actual demand, then as shown as above picture, select input channel number 1, 3, 4, 5, 7, 9, 11, 13, 17 first, then confirm the operation for automatic switching. Few output channels can be selected for different input signal sources.

Allocating/switching mode: Allocating mode -- After selected input channel, then allocate its signal to few output channels by clicking according icons in output block.

Switching mode -- After selected output channel, then select different input signals in input block to the selected output channel.

IX. Communication Protocol and Command Codes

9.1 RS232 communication protocol

Communication format: 1 start bit, 8 data bit, 1 stop bit, no no parity bit

Baud rate:9600Bps

Communication mode: Asynchronous half-duplex serial communication

Overview: All the DVI matrix, HDMI matrix and Audio/Video matrix have RS232 control interfaces which can be cascading connected. They can be controlled by the RS232 interface of one PC or central control device with same protocol. The matrices can be distinguished from each other by the head and the ID code.

Command format:

Head	Device ID	Command String	Data 1	Data 2	End String
PV	00－99	CMD	DATA1	DATA2	NT

Supported command list:

Command String	Data 1	Data 2	Description
SW	Input channel number	Output channel number	Switch the video and audio at the same time
SA	Input channel number	Output channel number	Switch the audio
SV	Input channel number	Output channel number	Switch the video
VW	00	Output channel number	Inquire the status of appointed output channel
VW	00	00	Inquire the status of all output channel
SF	preset status number	00	Save current status in appointed preset storage unit
RF	preset status number	00	Resume the appointed preset status
ID	Appointed ID	00	Change the ID code of the device to the appointed ID

Expanded commands:

Command format:

Head	Device ID	Command string	Data 1	Data 2	Data 3

PV	00 − 99	CMD	DATA1	DATA2	DATA3

Command string	Data 1	Data 2	Data 3	Description
MW	Input channel number	Initial output channel number	Final output channel number	Switch few channels of video and audio at the same time
MA	Input channel number	Initial output channel number	Final output channel number	Switch few channels of video and audio at the same time
MV	Input channel number	Initial output channel number	Final output channel number	Switch few channels of video and audio at the same time

Head:

PV: refers to DVI and HDMI matrix

Input channel number: 01 - the largest input channel number. It refers to actual input channel.

00: Close the appointed output channel.

>the largest input channel number: Invalid command, an error message will be returned.

Output channel number: 01 - the largest output channel number. It refers to the actual output channel.

00: Switch signals on appointed input channel to all the output channels.

>the largest output channel number: Invalid command, an error message will be returned.

Preset status number: 01 - 15. The device can save 15 preset statuses which can store video and audio at the same time.

Device ID: 00. It's common ID for all the devices. When two or more devices are controlled by the same serial port, please do not use this ID. If the ID of current device is unknown, connect this device with PC via serial port alone, then using the common ID (00) to change the ID of this device to appointed ID.

01~99: Valid ID number for the device.

Appointed ID: 01 - 99.

Returned data from the device: Except VW (Inquiring status) command, all the correct commands will get returned message "OK" from the device. In case the command is wrong, there will be a returned message "Err";

DVI/HDMI matrix: PV)+input channel number+output channel number+video input channel of the 1st output channel+audio input channel of the 1st output channel+video input channel of 2nd output channel+audio input channel of 2nd output channel+......+video input channel of the maximum output channel+audio input channel of the maximum output channel+OK.

If the ID code of one DVI/HDMI matrix is 08, to switch the signal of input channel 2 to output channel 5, the command is PV08SV0205NT. For one DVI/HDMI matrix with ID code 26, to switch the signal of input channel 5 to output channel 1-9, the command is PV26SV050109. This is a command to switch the signal of one input channel to several output channels. To switch the signal of input channel 3 to all the output channels, the command is PV26SV0300NT.

X. Technical Parameters of the Matrix System

10.1 Technical parameters:

Video	Protocol	HDCP 1.3 protocol and HDMI 1.3 protocol are supported, compatible with DVI 1.0 protocol.
	Gain	0 dB
	Pixel Bandwidth	165MHz, 全数字 full-digital
	Interface bandwidth	2.25Gbps, full-digital
	Maximum resolution	Normal-PC:1600x1200@60_24bit, HDPC: 1920x1200P@ 60_24bit, HDTV:1920x1080P@60 36bit
	Clock dither	<0.15 Tbit
	Rise-time	<0.3Tbit (20%--80%)
	Fall time	<0.3Tbit (20%--80%)
	Maximum delay of transfer	5nS(±1nS)
	Switch speed	200 ns(Maximum time)
	Signal type	HDMI-A full-digital T.M.D.S signal as specified in HDMI 1.3 standard. .
Video input	Connector	HDMI-A type, 19 pins, female connector
	Signal strength	T.M.D.S +/- 0.4Vpp
	Min/Max electrical level	T.M.D.S 2.9V/3.3V
	Input EDID	Standard EDID
	Impedance	<75Ω
	Maximum DC biased offset	15mV
	Suggested maximum length of the input cable	Less than 20m for resolution of 1920x1200@60Hz (Approved HDMI cables are recommended, such as the cable of Molex TM)
Video output	Connector	HDMI connector, 19 pins, female connector
	Min/Max electrical level	T.M.D.S. 2.9V/3.3V
	Impedance	<75Ω
	Suggested maximum length of the output	Less than 15m for resolution of 1920x1200@60Hz (Approved HDMI cables are recommended, such as the cable of Molex TM)

	cable	
RS232	RS232IN	RS232 male connector (connecting method: 2--3, 3--2, 5--5, isolate other pins)
	RS232OUT	RS232 male connector (connecting method: 2-2, 3-3, 5--5, isolate other pins)
Specification of the device	Power supply /power	100VAC ~ 240VAC, 50/60 Hz, standard adaptive power supply; Power: determined by the size of the case and the channel numbers of the equipment
	Temperature/ Humidity	Storage and using temperature: -20°~ +70°C; Humidity:10%~90%
	Specification of the case/Weight	Standard case: 1.5U,2U,6U; Weight: determined by the size of the case and the channel numbers of the equipment.

10.2 Specification and weight of the production line

Specification of the matrix	Volume	Package volume	Net weight	Gross weight
4 channels for input and output respectively	480mmX265mmX47mm	520mmX340mmX120mm	3kg	4kg
8 channels for input and output	480mmx 310mm x90mm	565mmX455mmX195mm	6kg	8kg
16 channels for input and output	480mmx 310cmm x90mm	565mmX455mmX195mm	8kg	10kg
36 channels for input and output	-	-	-	-

XI. Common Faults and Maintenance

1) When there is double image output by the display device connected with the matrix, for example, double image from the projector, generally it's not caused by the matrix.
   A. The projector may not be correctly set or the cable is disqualified. Please adjust the projector or change the cable.
   B. Signal attenuation caused by long cable. Please add a signal driver for long cable.
   C. Connected with heavy current.
2) If there is color missing or no video signal, the video connector may be poorly contacted or disconnected.
3) When the remote controller loses the control for the matrix:
   A. The battery is run out of power. Please replace with new battery.

B.   The remote controller is broken, please repair it.

4)   When the serial port (generally it's the serial port of the PC) is failed to control the matrix, please check if the preset communication port of the software is correct, and if the communication port of the PC is of good condition.

5)   When there is no image output after switching,

A.   Please check if there is signal at the input port. (Using an oscilloscope or universal meter to check) if there is no signal, the reason may be the wire is broken or the connector is loosing. Please replace the connection cable.

B.   Please check if there is signal at the output port. (Using an oscilloscope or universal meter to check) if there is no signal, the reason may be the wire is broken or the connector is loosing. Please replace the connection cable.

C.   Please check if the output port number is in accordance with the controlled one.

D.   If the reason is not any one of the above, the matrix may has internal fault, please send it to professionals for repair.

6)   If there is not output on the LCD, and it's failed to respond to command, please check the power supply, and check if the fuse is burned.

7)   If the output images are interfered, please check if there is well grounding for the input and output devices.

8)   If there are no signal input or output from some ports, it may be caused by bad contact or ports been burned. For plug-in type matrix, please just replace the cards, then debugging again.

9)   If there is screen mess, the reason may be the overlarge resolution or frequency.

10) If you felt strong static electricity when pull out or plug in the audio/video connectors, it indicates that the device is not well grounded. Please correctly ground the matrix, otherwise, the matrix has danger of damage by static electricity, and it won't be able to meet the designed lifetime as well.

11) If there is output on the LCD and returned message from the communication port, but no image or audio output,

A.   The audio/video connector is loosing, please replace it.

B.   There is short out in the wire, please replace the wire.

C.   The wire is broken, please replace it.

If the matrix couldn't respond to commands sent from panel operation, communication port or remote controller, it may be broken, please send it to professionals for repair.

Instructions of the User Manual

The "User Manual for HD Matrix Switch" is an operational guidance for the users. Due to continuous upgrade of the product, the actual operation for the matrices may has some differences from this user manual, for which we will give written explanation based on the actual situation, and it's not a mistake or omission.

For other information, please contact us directly or the dealers nearby.

All rights of the "User Manual for HD Matrix Switch" are reserved. Without our permit, no organization or personal is allowed to use full or part of this manual for commercial purpose.