Installation Guide

SY-MUHD-44
and
SY-MUHD-88

4x4 HDMI 4K Matrix
8x8 HDMI 4K Matrix

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Thank you for purchasing this PRODUCT.

This PRODUCT is designed with the professional AV installers in mind. The many extensive features assist with system integration, validation and maintenance.

Installation precautions

This product has special circuitry to protect it against moderate surges and static discharges. However, to ensure reliable operation and long service life, it is important to take the necessary precautions against any spikes, surges and static discharges.

Place the units away from heat sources and allow adequate ventilation.

Shielded cable and in particular cat6, cat6a or cat7 is highly recommended. As much as possible signal cables should be routed away from any noisy sources and should avoid long runs in close proximity to AC mains cables.

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The SY-MUHD-44 and MUHD-88 are 4x4 and 8x8 true HDMI matrix switchers respectively. They both support HDMI1.4b up to 4K video resolution and HDCP 1.4 and HDCP2.2. It allows any source (BluRay player, HD DVD player, satellite receiver, game station, etc.) to be shown on the any of the displays simultaneously, no matter whether the source is HDCP compliant or not.

These matrix switchers equalize and amplify the output to ensure the HDMI signal can be transmitted through a long cable without loss of quality.

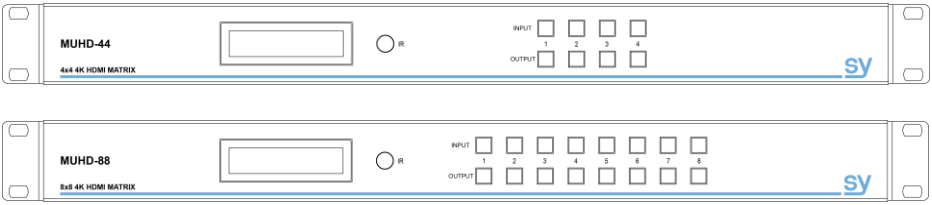
The SY-MUHD-44 and MUHD-88 offer solutions for digital entertainment centres, HDTV retail, show sites, data centre control, information distribution, conference room presentation, school and corporate training environments.

Features

- Supports HDMI 1.4b (10.2Gbps)
- Will accept all HDMI resolutions up to 4K60 4:2:0
- HDCP 1.4 and HDCP 2.2 compliant
- Easy to use: install in minutes, no need for special settings
- Allows up to 8 HDMI source devices to be independently switched to four HDMI monitors, HDTVs, or projectors
- The outputs can show the same or different sources at the same time no matter the source is HDCP compliant or not
- Supports high definition resolutions 4K60 4:2:0, 4K30, 1080p, 1080i, 720p and standard video format
- De-embedded L+R audio per output
- Four control mode options: front panel buttons and IR, RS232, LAN interface or ext. IR

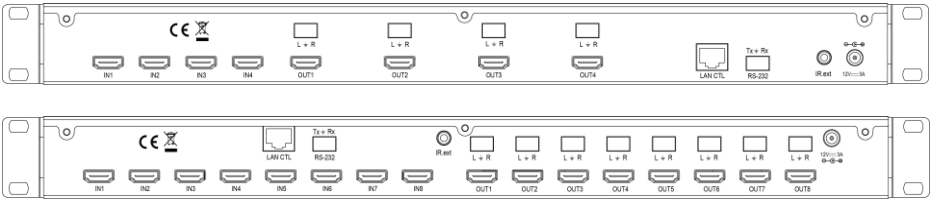
Connectors and Controls

Front



Name	Description
Display Panel	Displays the current signal routing or menu options
IR	IR sensor window
INPUT	Input selection buttons
OUTPUT	Output selection buttons

Rear



Name	Description
Audio	De-embedded analogue audio outputs (L + R)
Video Inputs	HDMI Input Ports
Video Outputs	HDMI Output Ports
IR ext.	Input for external IR Eye
RJ45	LAN WebGUI control port
RS232	RS232 control port (Tx & Rx only)
12V DC	12V DC PSU input

Installation

Connect the HDMI input sources into SY-MUHD-44/88
Connect the HDMI outputs into SY-MUHD-44/88
Power on the input sources you want to show
Connect the power supply into the SY-MUHD-44/88 and turn on the display you want to watch
Use the remote control or the front panel push buttons to choose input to output source selection

Insert and remove HDMI cables carefully to avoid damaging the HDMI connectors on the matrix switchers.

Operation

Front Panel Control

The SY-MUHD-44 and SY-MUHD-88 front panel controls allow for the selection of the inputs to the various outputs. First press a button on the OUTPUT row to choose the output number the change, then press a button on the INPUT to select the input signal for the selected output.

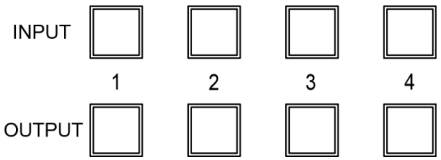


Figure 1- MUHD-44 Front Panel Controls

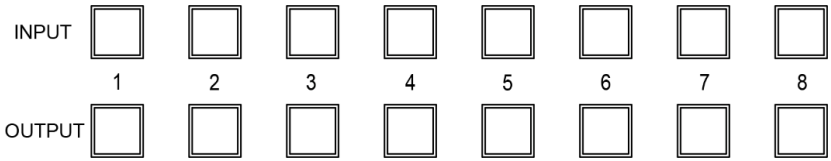


Figure 2 - MUHD-88 Front Panel Controls

Local IR Control



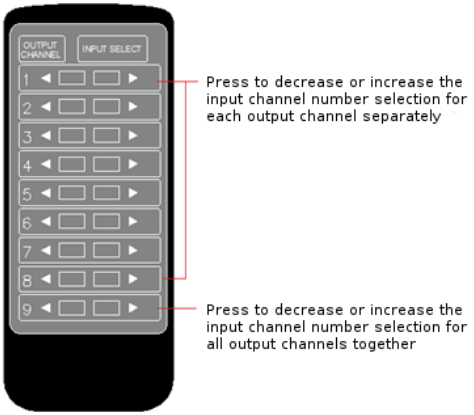


Figure 3 - MUHD-44 IR Control

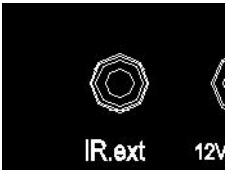
Figure 4 - MUHD-88 IR Control

The user can control the HDMI routing of the matrix by using the supplied IR remote.

The left arrow button selects the next lowest numbered input port, and the right arrow selects the next highest numbered input port.

The IR remote controller for the SY-MUDH-44 also allows direct selection of the inputs for each output.

The IR remote control for the SY-MUHD-88 allows the user to increase or decrease all eight of the inputs source selections simultaneously with a single button press.





The supplied IR receiver cable can be used to provide a different receiver position. Simply plug the cable into the IR Ext socket on the rear of the matrix switcher.

EDID Setting

The matrix switcher has 12 predefined EDID settings, and 3 user programmable EDID memories. The user EDID memories are independent to each input and can therefore be set differently for each input. The matrix switcher can also be set to use the EDID information from any of the output display devices.

To change the EDID setting, press and hold any INPUT button for 3 seconds and the LCD display will show the current EDID setting for that input channel.

The EDID setting can be one of the following:

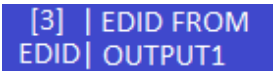
1：1080P 2CH (PCM)
2：1080P audio 5.1
3：1080P audio 7.1
4：1080P 3D 2CH (PCM)
5：1080P 3D audio 5.1
6：1080P 3D audio 7.1
7：4K30Hz 3D 2CH (PCM)
8：4K30Hz 3D audio 5.1
9：4K30Hz 3D audio 7.1
10：4K60Hz (Y420) 3D 2CH (PCM)
11：4K60Hz (Y420) 3D audio 5.1
12：4K60Hz (Y420) 3D audio 7.1
USER EDID 1
USER EDID 2
USER EDID 3
EDID from output 1
EDID from output 2
EDID from output 3
EDID from output 4

The first 12 EDID settings are factory set and cannot be altered. The 3 USER EDID memories can only be programmed using RS232 commands. The EDID from any output can be programmed either using the front panel controls as described below, or by using RS232 commands. Each input presents its currently selected EDID setting to the HDMI source device, therefore only one EDID setting is active at any instant, but this setting can be different for each input.

The following is an example of how to change the EDID setting for input 3:

User Action	LCD Text after User Action
Press and hold button 3 for 3 seconds.	[3] | 1080P EDID| 6CH
Click button 3 to step to the next EDID setting. (This step can be repeated until the desired EDID setting is displayed)	[3] | 1080P EDID| 8CH
Press and hold button 3 for 3 seconds to save the setting.	[3] | SETTING EDID| SUCCESS

When the LCD shows the following text, or similar:

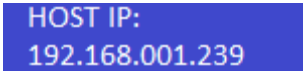


Then pressing and holding button 3 for three seconds will make the matrix switcher read the EDID from the display device connected to the selected HDMI output and save it to the input chosen as the first step in the above table.

Please always be aware that the EDID setting of each input is independent and that, therefore, each input may need to be programmed separately.

Display IP Information

Press and hold buttons 3 and 4 for three seconds to display the current IP settings. The screen will change every three seconds to display the next IP setting, but will always begin with the current IP address of the matrix:



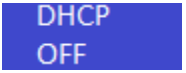
In order to prevent potential IP problems, most of the IP settings can only be programmed using RS232 commands.

Changing the DHCP Setting

Press and hold buttons 1 and 3 for three seconds to change the DHCP setting. The LCD will show the new DHCP setting:



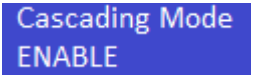
or



Setting the Cascading Mode

When the cascading mode is enabled, the matrix will not read the EDID or Hot Plug Status from any display device and will always output the HDMI signal. This mode should only be enabled if the installation is experiencing some HDMI problems and enabling this mode solves the problem. If the problems persist when the cascading mode is enabled, then there may be a handshaking issue between the matrix and the display device.

The cascade mode is enabled when the LCD shows the following:



RS232 Commands

The SY-MUHD-44 and SY-MUHD-88 4K switcher can also be controlled using RS232 commands. The following table lists all the available commands that can be used to control or configure these 4K switchers.

The baud rate settings are: 57600, 8 data bits, no parity, 1 stop bit and no handshaking.

In all the commands given in the tables below, all the indicated characters are required, but the ↵ character represents the carriage-return character, 0x0d.

Any command that is shown with brackets must include those brackets.

A number of commands given in the following tables, output a large amount of ASCII encoded information that can be too much for systems where there is only a small amount of available memory as this data can be several kilobytes long. The >@RH and >@RSTA commands should be avoided whenever possible as the Read Status Commands can provide the same information as >@RSTA, but only for a specific feature, and without any additional information to process that is not relevant to the status of the requested feature. The >@RH command merely provides a list of all the available commands with a brief description included for each one.

In the majority of cases, the command response is simply the command received by the 4K Switcher with the first character changed to < (0x3c). Thus, the command to output 1 to show input 2:

>@WSVO[1]I[2]↵ will reply with <@WSVO[1]I[2]↵

System Information

The following provide basic system level control:

Command	Description
>@RH↵	Output help pages and command list
>@WSPF↵	Power off – turns the 4K switcher into standby mode
>@WSPN↵	Power on – sets the 4K switcher to normal operating mode
>@RSTA↵	Output the global system status information
>@WSDBGEN↵	Cascading mode enable
>@WSDBGDIS↵	Cascading mode disable

Video Settings

The following command provide selection of the video routing:

Command	Description
>@WVSO[x]I[y]↵	Set output x to input y
>@WVSOA[y] ↵	Set all outputs to input y
>@WVSO[x]ON↵	Enable video output x
>@WVSO[x]OFF↵	Disable video output x
>@WVSOAON↵	Enable all video outputs
>@WVSOAOFF↵	Disable all video outputs

Audio Settings

These commands enable or disable the de-embedded analogue audio outputs:

Command	Description
>@WASO[x]E EN↵	Enable audio output x
>@WASO[x]E DIS↵	Disable audio output x
>@WASOAE EN↵	Enable all audio outputs
>@WASOAE DIS↵	Disable all audio outputs

EDID Settings

When using these commands, please note that there are 12 default EDID settings, and 3 User programmable EDID memories per video input.
For the default EDID memories, the x value must be in the range 1 to 12 inclusive (leading zeros are not required).
For the User EDID memories, the value x must be one of 1, 2 or 3.

Command	Description
>@WECO[x]I[y]↵	Read display EDID connected to output x and copy it to input y
>@WECO[x]A↵	Read display EDID connected to output x and copy it to all inputs
>@WECD[x]I[y]↵	Read EDID from Default EDID x and copy it to input y
>@WECD[x]A↵	Read EDID from Default EDID x and copy it to all inputs
>@WECU[z]I[y]↵	Read EDID from User EDID z of input y and copy it to input y
>@WECU[z]A↵	Read EDID from User EDID z of input y and copy it to all inputs
>@WEWI[y]U[z]O[x]↵	Copy EDID from Output x to the User EDID memory z of Input y
>@WEWIAU[z]O[x]↵	Copy EDID from Output x to the User EDID memory z of all Inputs
>@WEWI[y]U[z]L[n]D{XX,…}↵	Copy EDID data {XX,…} of length n to the User EDID memory z of Input y
>@WEWIAU[z]L[n]D{XX,…}↵	Copy EDID data {XX,…} of length n to the User EDID memory z of all Inputs

The value n in the last two commands must be either 128 or 256 and the data block, {XX,…}, must contain 128 or 256 hexadecimal values respectively. Each of the hexadecimal values must be represented by two ASCII characters and separated by commas, for example:

```
>@WEWIAU[1]L[128]D{
    00,FF,FF,FF,FF,FF,FF,00,4C,2D,BE,0B,01,00,00,00,
    02,18,01,03,80,59,32,78,0A,EE,91,A3,54,4C,99,26,
    0F,50,54,BD,EF,80,71,4F,81,C0,81,00,81,80,95,00,
    A9,C0,B3,00,01,01,04,74,00,30,F2,70,5A,80,B0,58,
    8A,00,50,1D,74,00,00,1E,02,3A,80,18,71,38,2D,40,
    58,2C,45,00,50,1D,74,00,00,1E,00,00,00,FD,00,18,
    4B,0F,87,3C,00,0A,20,20,20,20,20,20,00,00,00,FC,
    00,53,41,4D,53,55,4E,47,0A,20,20,20,20,20,01,9A,
    02,03,3A,F1,57,61,10,1F,04,13,05,14,20,21,22,5D,
    5E,5F,60,65,66,62,63,64,07,16,03,12,23,09,07,07,
    83,01,00,00,E2,00,0F,6E,03,0C,00,40,00,88,1E,21,
    00,80,01,02,03,04,E3,0F,01,E0,01,1D,80,D0,72,1C,
    16,20,10,2C,25,80,50,1D,74,00,00,9E,66,21,56,AA,
    51,00,1E,30,46,8F,33,00,50,1D,74,00,00,1E,00,00,
    00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,
    00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,67}↵
```

Ideally, the proper EDID values should be placed into a text file as a single line and then sent to the matrix switcher using a serial emulator program. The data given above is only an example and may not be compatible with the display devices connected to the matrix switcher.

Network Settings

Command	Description
>@WIPDP ON↵	Enable DHCP mode
>@WIPDP OFF↵	Disable DHCP mode
>@WIPH xxx.xxx.xxx.xxx↵	Set (4K Switcher) Host IP address to xxx.xxx.xxx.xxx
>@WIPN xxx.xxx.xxx.xxx↵	Set (4K Switcher) Subnet Mask to xxx.xxx.xxx.xxx
>@WIPR xxx.xxx.xxx.xxx↵	Set Default Gateway IP address to xxx.xxx.xxx.xxx
>@WIPP zzzz↵	Set TCP/IP port to zzzz

When shipped from SY, the default IP settings are:

DHCP	OFF
Host IP Address	192.168.001.239
Subnet Mask	255.255.255.0
Default Gateway IP Address	192.168.001.001
TCP/IP Port	23

Status Read Commands

Command	Description
>@R8001↵	Read the input link states, i.e. list all the inputs and show which ones have a signal connected to them.
>@R8002↵	Read output link states, i.e. list all the outputs and show which ones have a signal connected to them.
>@R8003↵	Read the input HDCP states, i.e. list all the inputs and show their HDCP status.
>@R8004↵	Read the output HDCP states, i.e. list all the outputs and show their HDCP status.
>@R8006↵	Read output channel set states
>@R8007↵	Read output On/Off states
>@R8008↵	Read external audio output enable states
>@R8009↵	Read input EDID states, i.e. List the EDID memory currently for each of the inputs
>@R8010[y]↵	Read the EDID data currently set for Input y
>@R8011[x]↵	Read the EDID data from Output x
>@R8012↵	Read network status
>@R8017↵	Read the Cascading Mode Enable/Disable status

Character Conversion Table

Standard ASCII characters are used for all RS232 commands, but the following table will be useful in coding the punctuation characters used in the above RS232 command tables.

ASCII	Hex	ASCII	Hex	ASCII	Hex	ASCII	Hex
↵	0x0d	<	0x3c	>	0x3e	@	0x40
[	0x5b	]	0x5d	{	0x7b	}	0x7d

Using the Built-In Web Interface

Both the MUHD-88 and MUHD-44 devices feature a built-in web interface that allows control of the matrix switcher from any web browser. The following factory default settings will access the web interface on a fresh product:

IP Address:	192.168.1.239
Subnet mask:	255.255.255.0
Gateway:	192.168.1.1
TCP Port:	23

If the above settings have been changed then you will need to use the new settings instead. If you do not know the current IP settings, use either the front panel LCD or send the RS232 command >@R8012↵ to the matrix switcher to determine the current IP settings.

After entering the IP settings into a web browser, the following screen should appear:

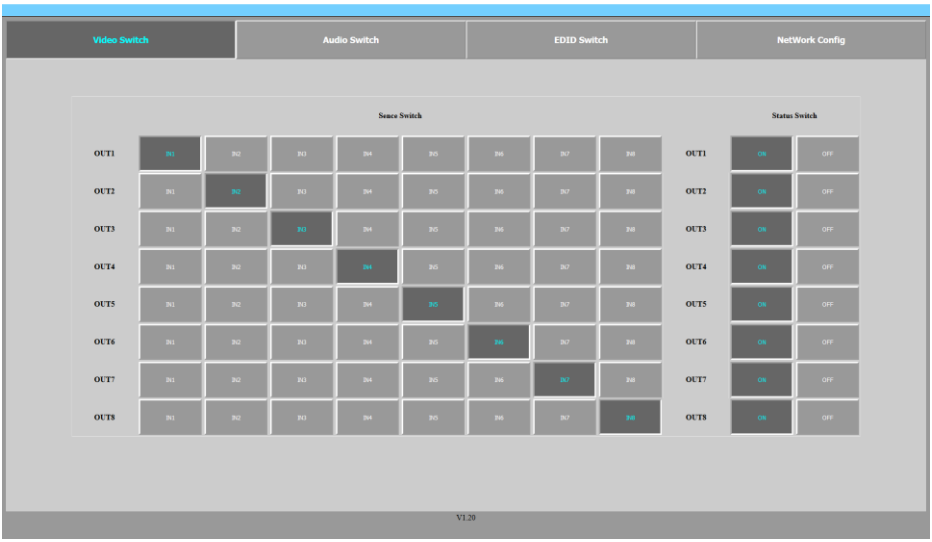


Figure 5 – Video Switch Web Interface Tab

This screen is for the MUHD-88, the MUHD-44 will look similar, just with fewer selection buttons. The actual positions of the darker buttons will always match with the current video selections of the matrix switcher and will look different to the image shown above.

Video switch Tab

The **Video Switch** tab allows the user the change the video selection status of the switcher.

Audio switch Tab

The **Audio Switch** tab, shown on the next page, allows the user to set the analogue audio outputs to ON or OFF.

EDID Switch Tab

The **EDID Switch** tab, shown on the next page, permits the selection of one of the 12 the built-In EDID options as detailed in the **EDID Setting** section above, copying from any of the available outputs or selecting one of the three pre-programmed User EDID memories for each input separately.



Figure 6 - Audio Switch Web Interface Tab



Figure 7 - EDID Settings Web Interface Tab

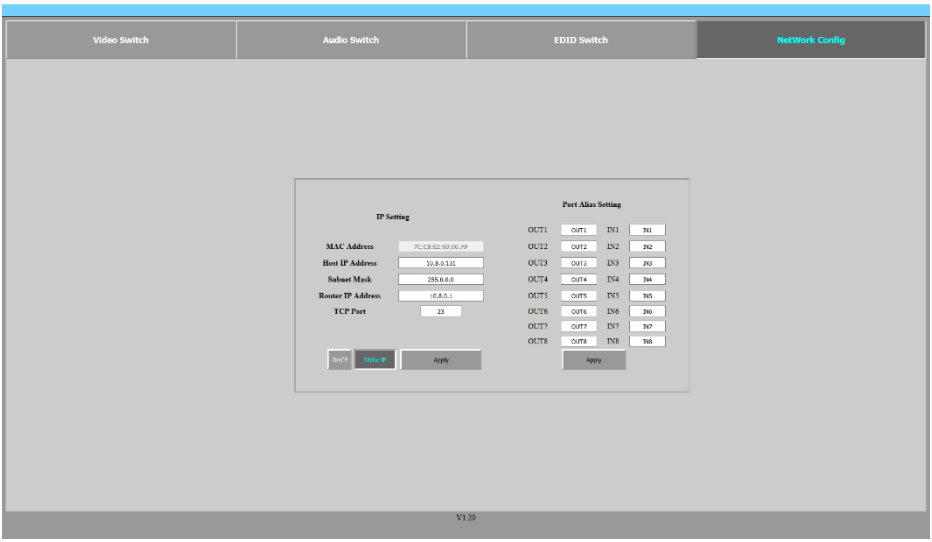


Figure 8 - Network Settings Web Interface Tab

Network Config Tab

The **Network Config** tab allows you to view and change the network settings. Whenever the settings are changed always keep a record of the new settings or use the `>@R8012↵` RS232 to view the current settings in a terminal emulation program.

The RS232 command give above will give the following single-line response:

```
IPH[010][008][000][131]    IPR[010][008][000][001]
IPN[255][000][000][000]    IPHW[7C][CB][E2][60][00][AF]    IPP[23]
IPDP[N]
```

Each number or setting is always enclosed in square brackets. The example above matches with the image shown above and is therefore different to the actual unit in use.

IPH	is the IP address of the matrix switcher (Host IP)
IPR	is the IP address for the network router (gateway)
IPN	is the network subnet mask
IPHW	is the MAC address
IPP	is the TCP/IP port
IPDP	indicates whether the DHCP mode is enabled or not

If you change the network settings, click the apply button and wait for five seconds before entering the new settings into your browser. If you use the DHCP mode, then the RS232 command given above will reveal the new network settings.

The Port Alias Setting section allows for renaming the inputs and outputs shown on the **Video Switch**, **Audio Switch** and **EDID Switch** tabs. However, please note that there is a maximum limit of seven characters for each name entry. After changing the names and clicking the **Apply** button below the edit boxes, you will need to refresh the browser to see new changes.

Specifications

General

Parameter	SY-MUHD-44	SY-MUHD-88
HDMI Inputs	4	8
HDMI Outputs	4	8
Analogue audio outputs (Stereo)	4	8
Video Format Supported	Supports all HDMI resolutions up to 4K30 4:4:4 and 4K60 4:2:0	
Output Video	HDMI2.0 and HDMI 1.4b	
Audio Formats Supported	L-PCM, DTS-HD, Dolby TrueHD	
Maximum Transmission Distance	Less than 15m	
Audio output	L+R 0.7 rms (20Hz to 20KHz)	
Communication Ports	RS232, IR, Ethernet	
RS232 Settings	Baud rate: 57600,n,8,1	
Default IP Settings	IP Address: 192.168.1.239 Subnet: 255.255.255.0	
Supply Voltage	12V DC	
Power Consumption	15W (max.)	

Environmental

Operating Temperature Range	0 to +35°C (32 to +95°F)
Operating Humidity Range	10 to 90% RH (non-condensing)

Physical

Dimensions	L 440 x W 256 x H 42 mm 19” Rack height: 1U	
Weight	2.1 kg	2.4 kg

Package Contents

1x Main unit
1x 12V DC PSU
1x User manual
1x UK or EU to IEC 60320 Type C7 (figure-of-eight) cable
1x IR remote control
1x IR receiver (eye) with self-adhesive pad
1x Pair 19” rack mounting brackets
6x M3 x 8 screws for the mounting brackets
SY-MUHD-44 – 5x Three-Way pluggable screw terminal connectors
SY-MUHD-88 – 9x Three-Way pluggable screw terminal connectors

Safety Instructions

To ensure reliable operation of these products as well as protecting the safety of any person using or handling these devices while powered, please observe the following instructions:

1. Use the power supply provided. If an alternate supply is required, check Voltage, polarity and that it has sufficient wattage to power the device it is connected to.
2. Do not operate either of these products outside the specified temperature and humidity range given in the above specifications.
3. Ensure there is adequate ventilation to allow this product to operate efficiently.
4. Repair of the equipment should only be carried out by qualified professionals as these products contain sensitive devices that may be damaged by any mistreatment.
5. Only use these products in a dry environment. Do not allow any liquids or harmful chemicals to come into contact with these products.
6. Due to the weight and physical size of some of these matrix switchers, correct Manual Handling and Lifting procedures should be observed at all times while handling these products in order to minimise the risk of injury.

After Sales Service

1. Should you experience any problems while using this product, firstly refer to the Troubleshooting section in this manual before contacting SY Technical Support.

2. When calling SY Technical Support, the following information should be provided:
    - Product name and model number
    - Product serial number
    - Details of the fault and any conditions under which the fault occurs.

3. This product has a two year standard warranty, beginning from the date of purchase as stated on the sales invoice. Online registration of this product is required to activate the full three year extended warranty. For full details please refer to our Terms and Conditions.

4. SY Product warranty is automatically void under any of the following conditions:
    - The product is already outside of its warranty period
    - Damage to the product due to incorrect usage or storage
    - Damage caused by unauthorised repairs
    - Damage caused by mistreatment of the product

5. Please direct any questions or problems you may have to your local dealer before contacting SY Electronics.

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