

manual ez-LINE VM16 FullHD 16x16 Matrix Router (SD/HD/3G-SDI)







ez-Line Manual

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Installation Precautions

This page states the safety measures the users must take to avoid circumstances where the system may occur physical damages or injuries. Please THOROUGHLY go over this page before the system installation/operation.

General Precautions

- Maintain dust FREE condition during and after System Installation/Operation.
- Please place the system cover in a safe location when opened.
- Securely stow tools and cables away from the passages.
- Avoid wearing loosened clothes or accessories during installation/Operation.
- Avoid any unnecessary actions that may damage/harm system or personnel.
- Do NOT open the system unless advised by Lumantek representative. Lumantek takes no responsibility on units with broken RMA seals.

Power Precautions

- Please check cable overload before connecting the system to the power supply.
- Avoid wearing metal accessories (Rings, Earrings) connecting system to the power source.
- Avoid operating on wet floors. Make sure power extension cables, floors, and instruments are grounded and in a safe operating condition.



- Please discharge static electricity by touching grounding metals before starting hardware installation.
- The grounding parts must be disassembled last.
- Manufacture takes no responsibilities on Direct/Indirect losses or damages due to use of inappropriate parts or services by unauthorized service provider
- Supplying power during the system installation may cause damages to the system and personnel.

AC Power Precautions

- This unit utilizes AC power, the cord comes with a grounding function.
- Please connect the system to the power socket with groundings.
- Use Green/Yellow 0.75mm2 (18AWG) or higher grade grounding cables.
- Do NOT block power sockets with tools or boxes. Please keep it clear at all times.





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1. VM16 (FullHD 16x16 Matrix Router) Introduction

ez-line (VM16) is a SDI Matrix Router which support SD/HD/3G-SDI. it consists of 16 Input and 16 Output Ports. This equipment can be controlled with USBS 2.0, RS422, Ethernet port via the communication protocol. Additional S/W is provided to control VM16 via USB2.0, RS422 and Ethernet. Moreover, RS422 communication protocol to support RCP(Remote Control Panel).

• Features

- ① Supports SD/HD/3G-SDI
- ② Video IN/OUT Port (IN 16, OUT 16 / BNC Connector)
- ③ Supports Reference Input Port (B.B, Tri-Level)
- ④ Supports USB2.0, RS422, Ethernet Port
- ⑤ Provides simple S/W UI for PC

16x16 Matrix Router ez-Line



3G/HD/SD-SDI, IN/OUT 16 Port Automatic Equalization

- Reference Input Port
- Remote Control Panel through RS-422 Port
- Ethernet Support







2. VM16 Interface

2.1 VM16 Main Frame Interface < Front >



① LED Status

- POWER : Indication of power input, Green light indicates power on.
- ALARM : Red light will turned on if there is error on internal communication.
- REF IN : Green light will turn on when Reference input is detected.
- COM : Green light will flash when it is controlled by RS422 and Ethernet Port.
- 2 Power Switch : AC Power ON/OFF Switch



- ③ AC Power : AC Power input (100 240V, 50/60Hz)
- ④ RS422 : RS422 communication Port for RCP and UI. communication protocol control (RJ45)
- ⑤ UPDATE : USB Port for UI. communication protocol control and firmware UPDATE (Micro USB)
- ⑥ ETHERNET : ETHERNET port. UI and communication protocol control (RJ45)
- ⑦ REF IN : Reference port. Support Black Burst, Tri-level (BNC Connector)
- 8 SDI IN : consist of 16 video input port (BNC Connector)
- (9) SDI OUT : consist of 16 video output port (BNC Connector)







- ① Status LED
 - POWER : Green light will turned on when the power is on.
 - ALARM : Red light will turned on if there is error on internal communication.
 - REF IN : Green light will turn on when Reference input is detected.
 - COM : Green light will flash when it is control by RS422 and Ethernet Port.
- ② SDI IN : 16 SDI Input control buttons.
- ③ SDI OUT : 16 SDI Out control buttons.
- ④ SHIFT : Use SHIFT button, if SDI input ports are more than 16 (Max in/output 32 port)
- ⑤ PANEL Lock : PANEL Lock button (LED ON : Panel Locked, LED OFF Status : Panel Unlocked)
- © LOAD/SAVE : When this button is pressed, 4 input and output buttons will turned on. 4 input button to saving the configuration and output button for load the configuration.



① RS422 : RS422 Communication Port





2.3 Product Components

- Basic Components



- Optional RCP



1 Remote Control Panel

2.4 Product Operation



1) UI connection using RS422 or USB2.0 Communication

1 Run EXE file -double click on " ezLineMatrix16x16.exe "

116 Client				Skin =
Current In-Dut Link	Preset 0 Preset 1 Prese	t 2 Preset 3		
-	Wire Table			
rmet RS 422	Input		Outp	ut
erial port COM9 Connect	Signal 1		1	Disconnect
vice information	Signal 2		2	Disconnect
	Signal 3		3	Disconned
ereion	Signal 4		4	Disconnec
	ss "Connect"		5	Disconnec
	Signal 6		6	Disconnec
vork setting	Signal 7		7	Disconnec
Current New	Signal 8		8	Disconnec
Address	Signal 9		9	Disconnec
ibnet Mask	Signal 10		10	Disconnec
teway	Signal 11		11	Disconnec
rt	Signal 12		12	Disconnec
Apply	Signal 13		13	Disconnec
	Signal 14		14	Disconnec
n	Signal 15		15	Disconnec
Show Logs	Signal 16		16	Disconnec

5 Device Information and Network Setting will be updated when communication is connected.

Q M16 Client		Skin 🗕 🗙
Setul Current In-Out Link	Preset 0 Preset 1 Preset 2 Preset 3	
Ensemet RS 422 Serial port (COM9 Disconnect Device information Model VM16 Referense Input	Wre Table Input Signal 1 Signal 2 Signal 3 Signal 4	Output Disconnect Disconnect Disconnect
Version ver 2.0.2 Mac address D8-80-39-66-57-EF	Signal 5 Signal 6 Signal 7	Disconnect Disconnect Disconnect
Current IP Address 192.168.10.199 Subnet Mask 255.255.255.0 Gateway 192.168.10.1 Not 50300 Apply	Signal 8 8 Signal 9 9 Signal 10 10 Signal 11 11 Signal 12 12 Signal 13 13	Disconnect Disconnect Disconnect Disconnect Disconnect Disconnect
Option Show Logs	Signal 14 Signal 15 Signal 16	Disconnect Disconnect Disconnect





2) UI connection using Ethernet Communication

1 Run EXE file -double click on " 🕰 ezLineMatrix16x16.exe"



(5) Device Information and Network Setting will be updated when communication is connected.

P Current In-Out Link	Preset 0 Preset 1 Pr	reset 2 Preset 3		
	Wire Table			
thernet RS 422	Input		OL	utput
IP Address 192.168.10.199 Port 50300 Disconnect	Signal 1		1	Disconnect
evice information	Signal 2	2 • / •	2	Disconnect
	Signal 3	3	3	Disconnect
Model VM16 Referense Input	Signal 4	4 •	4	Disconnect
Version Ver 2.0.2	Signal 5	5 • / _	5	Disconnect
	Signal 6	5 • •	6	Disconnect
twork setting	Signal 7		7	Disconnect
Current New	Signal 8		8	Disconnect
IP Address 192.168.10.199	Signal 9		9	Disconnect
Subnet Mask 255.255.0	Signal 10		10	Disconnect
Gateway 192.106.10.1	Signal 11	i 🔹 🔨 🗸	11	Disconnect
Port posso	Signal 12	2	12	Disconnect
Apply	Signal 13	3	13	Disconnect
	Signal 14		14	Disconnect
ption	Signal 15	5	15	Disconnect
Show Logs	Signal 16	5	16	Disconnect
	Ļ			
	Auto save			Save







6 Communication failure lead to "No response from device" message on screen.

Connect through RS422 communication check IP address and change to desired IP

VM16 Client					Skin —
up Current to-Out Link		Preset 0 Preset 1 Pre	set 2 Preset 3		
Ethannat BS 422		Wire Table			
		Input		Ou	tput
Senal port COM9	Connect	Signal 1		1	Disconnec
Device information		Signal 2		2	Disconnec
		Signal 3		3	Disconnec
	erense Input able	Signal 4		4	Disconneo
version		Signal 5		5	Disconnec
Mac address N/A	ezlinematrix	16x16 X		6	Disconneo
Network setting		7		7	Disconneo
Current New	No respons	e from device		8	Disconneo
IP Address		9		9	Disconnec
Subnet Mask		OK		10	Disconnec
Gateway				 11	Disconner
Port		Signal 12		 12	Disconner
	Apply	Cional 12		 12	Disconnec
		Signal 13	12	 1.5	Disconnec
		Signal 14		 14	Disconnec
Option		Signal 15		15	Disconnec
Show Logs		Signal 16	۰	16	Disconnec
		Auto save			Save

3) Changing IP address using RS422 Communication..

- 1) Run EXE file -double click on "
- ezLineMatrix16x16.exe





4) Setting for Input/Output S/W UI

- ① Using RS422 or Ethernet communication, connect to device UI.
- ② Select Current In-out Link Tab.
- 3 Input/Output setting is set by dragging mouse from input to output or output to input.
- ④ Input window displays the signal information. X will display on the box If there is no signal input.
- (5) If user click 'Auto apply' box , any changes on input/output setting will be applied immediately.
- 6 if user left 'Auto apply' box unchecked , then user must press ' Apply' button manually after changing input/output setting to apply it.

VM16 Client						L
Setup Current In-Out Link		Preset 0	Preset 1 Pres	et 2 Preset 3		
Wire Table	3	Wire	Table			
Input	Output		Input		Output	t
Loss 🗌 1 🔹	1 Disconnec		1		1 [Disconnect
Loss 🕱 🛛 2	2 Disconnec		2		2	Disconnect
Loss 🕱 3 🔴	3 Disconnec		3		3	Disconnect
Loss 🕱 4 🔴	e 4 Disconnec		4	• •	4	Disconnect
Loss 🕱 5	5 Disconnec		5		5	Disconnect
	6 Disconnec		6		6	Disconnect
(4) 7	7 Disconnect		7	• •	7	Disconnect
8	8 Disconnect		8		8	Disconnect
9	9 Disconnec		9		9	Disconnect
10	10 Disconnec		10		10	Disconnect
11	11 Disconnection		11		11	Disconnect
12	12 Disconnect		12	• •	12	Disconnect
13	13 Disconnection		13	• •	13	Disconnect
14	14 Disconnection		14	• •	14	Disconnect
15	15 Disconnect		15		15	Disconnect
16	16 Disconnection		16		16	Disconnect
6	G					
Auto apply	App		uto save			Save

O Can use this device as a SDI distributor, set a single input to multiple outputs.

tup Current In-Out Link		Preset 0 Preset 1 Preset 2 Pre	set 3
Wire Table		Wire Table	
Input	Output	Input	Output
	1 Disconnect	1	I Disconnect
2	Disconnect	2	2 Disconnect
3	Disconnect	3	3 Disconnect
4	9 4 Disconnect	4	4 Disconnect
5	Disconnect	5	5 Disconnect
6	6 Disconnect	6	6 Disconnect
7	Disconnect	7	7 Disconnect
8	B Disconnect	8	8 Disconnect
9 0	9 Disconnect	9	9 Disconnect
10	Disconnect	10	I0 Disconnect
11	11 Disconnect	11	I1 Disconnect
12	12 Disconnect	12	I2 Disconnect
13	13 Disconnect	13	I3 Disconnect
14	14 Disconnect	14	14 Disconnect
15	15 Disconnect	15	I5 Disconnect
16	16 Disconnect	16	16 Disconnect
🕱 Auto apply	Apply	Auto save	Save

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5) Load and Save feature for input/output settings

- 1 Use RS422 or Ethernet communication to connect the equipment and S/W UI
- ② Support up to 4 Preset settings. (below showing Preset 0 setting)
- ③ Input/output setting is set by dragging mouse from input to output or output to input.
- ④ When you press 'Save' button, the setting will be saved on Preset 0, but current input and output is not applied. (if 'Auto save' box is clicked then the setting is saved automatically)
- (5) Current input/output settings.



6 Click arrow button to apply Preset 0 Setting to current setting.

🛛 VM16 Client									
Setup Current In-Out I	Link				Preset 0	Preset 1 Pres	et 2 Preset 3		
Wire Table					Wire	Table			
Input		Outp	out			Input		Out	tput
Loss 🗶 1	••	1	Disconnect			1	• •	1	Disconnect
Loss 🗶 2	••	2	Disconnect			2	••	2	Disconnect
Loss 🗶 3	••	3	Disconnect			3	••	3	Disconnect
Loss 🗶 4	•	4	Disconnect			4		4	Disconnect
Loss 🗶 5	•	5	Disconnect			5	•	5	Disconnect
Loss 🗶 6	••	6	Disconnect	~		6	••	6	Disconnect
Loss 🗶 7	••	7	Disconnect	6		7	••	7	Disconnect
Loss 🗶 8	• • •	8	Disconnect			8	•	8	Disconnect
Loss 🗶 9	••	9	Disconnect	\square		9	••	9	Disconnect
Loss 🗶 10	••	10	Disconnect			10	••	10	Disconnect
Loss 🗶 11	••	11	Disconnect			11	••	11	Disconnect
Loss 🗶 12	••	12	Disconnect			12	••	12	Disconnect
13	• •	13	Disconnect			13	• •	13	Disconnect
14	• •	14	Disconnect			14	• •	14	Disconnect
15	• •	15	Disconnect			15	• •	15	Disconnect
16	• •	16	Disconnect			16	• •	16	Disconnect
X Auto apply			Apply		XA	uto save			Save





6) RCP Connection Using RS422 or Update Port









3 VM16 Main Frame and RCP are connected by Direct Cable.









3. Specification

Data Input

SDI Video Input: SD/HD/3G-SDI (BNC 75Ω) x16

Reference Input: B.B , TRI (BNC 75Ω) x1

Data Output

SDI Video Input: SD/HD/3G-SDI (BNC 75Ω) x16

Connections

Remote Control: RS-422 (RJ45)x1

Ethernet: Ethernet Support (RJ45)x1

Update: Debug (Micro-USB)x1

Electrical

Power Input: 100~240VAC @ 50/60Hz

Power Consumption: 18W(max.)

Operation Temperature: 0~40 ℃

Physical

Dimension: 44(H) X 483(W) X 240(D)

Weight: 2.0 kg



4. Communication Protocol

4.1 Transmission Packet Structure

► It can communicated with common serial terminal software and Command based communication, also using checksum to allow error detection.

Index Header	Index	Space	Command/ Response/ Notification	Space	Parameters	Space	Check sum	Carriage Return
#(0x23) \$(0x24)	0~ 65535	, , (0x20)	_`a~z (0x5F~0x7A)	, , (0x20)	0~9 (0x30~0x39) ''(0x20)	, , (0x20)	A~P (0x41~ 0x50)	'/r' (0x0D)

▶ Index Header: Command and Response '#', Notification '\$'. If command line does not start with #, it will consider to not having Index.

▶ Index: Command Response Notification indexing number (10) decimal 1~5 digits (0~65535)

► Command/Response/Notification: ASCII code consist of 2 special characters and small letters, between 0x5F~0x7A, See Command and Response/Notification list

► Parameter: determined by number of Command/Response/Notification, each parameter is separated by space

• Checksum: displayed in hexadecimal with capital A~P. Add byte from Index header to Checksum in 2 byte size. expressed in 4 digits hexadecimal. Simplified hexadecimal so that doesn't use (0~9)(A~F). Use continues A~P, take 4 bits from each checksum byte and add A to convert it. (see Appendix 1 -example)

► Carriage Return: '/r' text sent as a packet terminal indication, see Terminal settings.

4.2 Transfer Procedure

- Transferring side: Command
- Reception Side: Reception Command/ execution and then transfer /execution results Response
- ► After sending Command if there is no response for 10ms, then Time-Out.
- ► Time-Out or error responses, 3 times further repeated transfer and then give up. Communication error .
- ► Notification is sent to indicate a state changes from device to the host.

Serial Option	ıs		
P <u>o</u> rt: <u>B</u> aud rate:	COM - 115200 -	Flow Control	
<u>D</u> ata bits:	8 🔹	<u> </u>	
P <u>a</u> rity:	None 👻		
<u>S</u> top bits:	1 •		







4.3 Parameter List

Category	Parameter List
# Input Channel Category	0: SDI Input 1 1: SDI Input 2 2: SDI Input 3 3: SDI Input 4 4: SDI Input 5 5: SDI Input 6 6: SDI Input 7 7: SDI Input 8 8: SDI Input 9 9: SDI Input 10 10: SDI Input 10 10: SDI Input 11 11: SDI Input 12 12: SDI Input 13 13: SDI Input 14 14: SDI Input 15 15: SDI Input 16 31: No Connect
# Output Channel Category	0: SDI Output 1 1: SDI Output 2 2: SDI Output 3 3: SDI Output 4 4: SDI Output 5 5: SDI Output 6 6: SDI Output 7 7: SDI Output 8 8: SDI Output 9 9: SDI Output 10 10: SDI Output 11 11: SDI Output 12 12: SDI Output 13 13: SDI Output 15 15: SDI Output 16
# Preset Category	0: Preset 1 1: Preset 2 2: Preset 3 3: Preset 4
# Loss Category	0: Signal is not loss 1: Signal is loss

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4.4 Command List

Command	NOP	Description
cot cfa all	16	Set command for 16 outport associated 16 inport
set_cig_all	10	Param1~Param16, refer to Input Channel List
get_cfg_all	0	Get command for 16 outport associated 16 inport
		Set command for specified 1 outport associated 1 inport
set_cfg_one	2	Param1: see Output Channel List
_		Param2: see Input Channel List
act of a one	1	Get command for specified 1 outport associated 1inport
get_cig_one	L L	Param1: see Output Channel List
get_inloss_all	0	Get command for 16 inport associated Loss [off/on] information
act inlace one	1	Get command for specified 1 inport signal Loss [off/on] information
get_inioss_one	L L	Param1: See Input Channel List
set_ipaddr	4	command to set for IP address
get_ipaddr	0	command to get the IP address
set_subnetmask	4	command to set subnet mask
get_subnetmask	0	command to get the subnet mask
set_gateway	4	Command to set the default gateway
get_gateway	0	Command to get the default gateway
set_port	1	Command to set the port number
get_port	0	Command to get the port number
get_macaddr	0	Command to get the Mac address
set_default	0	Load to default value and save to EEPROM
get_refinled	0	Command to get REF IN LED on/off status
	16	Command to save 16 outport associated with 16 inport information
set_save_preset0		on to EEPROM(Preset)
		Param1: See Input Channel List
ant procet0	0	Command to get 16 outport associated with 16 inport information
get_preseto	0	(Preset)
		Command to save 16 outport associated with 16 inport information
set_save_preset1	16	on EEPROM (Preset)
		Param1: See Input Channel List
get_preset1	0	Command to get 16 outport associated with 16 inport (Preset)
set save preset?	16	Command to save 16 outport associated with 16 inport on EEPROM (Preset)
	10	Paramil: See Input Channel List
get_preset2	0	(Preset)
		Command to save 16 outport associated with 16 inport information on EEPROM (
set_save_preset3	16	Preset)
		Command to get 16 outport associated with 16 inport information
get_preset3	0	(Preset)
cat apply procet	1	Command to read and apply from Preset 0/1/2/3 EEPROM
set_apply_preset	T	Param1: See Preset List
get_rcpll	0	Command to get the information of RCP Lock LED Off/On
checksum_en	0	Enable checksum
checksum_dis	0	Disable checksum
get_model	0	Model Name output
get ver	0	Version information output

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4.5 Response/ Notification List

Response/ Notification	NOD	Description						
ok	0	Communication success						
error_too_short	0	Communication failure: checksum digit is short						
error had checksum	0	Communication failure: checksum parameter is not right,						
enor_bad_checksum	0	checksum digit is too long.						
error_checksum	0	Communication failure: checksum value is not right						
error_invalid_param	0	Communication failure: invalid parameter						
error_invalid_comman d	0	Communication failure: invalid command						
state_model	1	Model name output Data1: Model name (VM16, VS6, VM6, VM4,)						
state_ver	3	Version information Data1: Major Version Data2: Minor Version Data3: Revision						
state_cfg_all	16	Information status of 16 outport associated 16 inport Data1 ~ Data16 : See Input Channel List						
state_cfg_one	2	Information status of specified 1 outport Data1: See Output Channel List Data2: See Input Channel List						
state_inloss_all	16	Information status of Signal Loss [off/on] for 16 inport Data1 ~ Data16: See Loss List						
state_inloss_one	2	Information status of signal Loss [off/on] for specified inport Data1: Input Channel loss List Data2: See Loss List						
state_ipaddr	4	IP address status Data1~ Data4 : IP address						
state_subnetmask	4	Subnet mask status Data1~ Data4 : Subnet mask address						
state_gateway	4	Gateway status Data1~ Data4 : Gateway address						
state_port	1	Port number status Data1: Port number						
state_macaddr	6	Mac address status Data1~ Data6 : Mac address						
state_refinled	1	REF IN LED status Data1: 0/1 = led off/led on						
state_preset0	16	Information status for 16 outport associated with 16 inport (preset) Data1 ~ Data16 : See Input Channel List						
state_preset1	16	Information status for 16 outport associated with 16 inport (preset) Data1 ~ Data16 : See Input Channel List						
state_preset2	16	Information status for 16 outport associated with 16 inport (preset) Data1 ~ Data16 : See Input Channel List						
state_preset3	16	Information status for 16 outport associated with 16 inport (preset) Data1 ~ Data16 : See Input Channel List						
state_rcpll	1	KCP LOCK LED Status [U/1=off/on], U respresent KCP controling Data1: $0/1 = \text{led off/led on}$						





5. Appendix

Appendix A

checksum_dis AFBC

с	h	е	c	k	s	u	m	-	d	i	S		tot al	he x					che cks um			
99	10 4	10 1	99	107	11 5	11 7	10 9	95	10 0	105	11 5	32	129 8	05 12	0	5	1	2	A	F	В	С

Decimal : 1298 = hexadecimal 0x0512

- 0 + A = A5 + A = F1 + A = B
- 2 + A = C