

GefenPRO

1080P
PROGRESSIVE



16x16 3GSDI Matrix

GEF-3GSDI-16416

User Manual

www.gefenpro.com

ASKING FOR ASSISTANCE

Technical Support:

Telephone (818) 772-9100
(800) 545-6900

Fax (818) 772-9120

Technical Support Hours:

8:00 AM - 5:00 PM Monday - Friday, Pacific Time

For 24 / 7 support, see the back of the product for the support number

Write To:

Gefen LLC
c/o Customer Service
20600 Nordhoff St
Chatsworth, CA 91311

www.gefenpro.com
support@gefenpro.com

Notice

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INTRODUCTION

Congratulations on your purchase of the 16x16 3GSDI Matrix. Your complete satisfaction is very important to us.

Gefen

Gefen delivers innovative, progressive computer and electronics add-on solutions that harness integration, extension, distribution and conversion technologies. Gefen's reliable, plug-and-play products supplement cross-platform computer systems, professional audio/video environments and HDTV systems of all sizes with hard-working solutions that are easy to implement and simple to operate.

The Gefen 16x16 3GSDI Matrix

Now you can easily combine sixteen cross-platform computers and sixteen digital displays using the 16x16 3GSDI Matrix. The Matrix provides a simple, reliable and highly effective method of routing multiple computer workstations. Each 3GSDI source is capable of displaying video on any one of 16 3GSDI displays. The Matrix can be controlled by using either the buttons on the front panel, the built-in RS-232 interface, or the included IR remote.

How It Works

The 16x16 3GSDI Matrix has sixteen (16) inputs and sixteen (16) outputs. Connect up to sixteen (16) 3GSDI sources to the 3GSDI input ports. Connect up to sixteen (16) 3GSDI outputs to the displays. Plug in the power cord and power on the Matrix. The connected displays will show video according to the selection.

OPERATION NOTES

READ THESE NOTES BEFORE INSTALLING OR OPERATING THE 16X16 3GSDI MATRIX

- There is no internal scaling in the 16x16 3GSDI Matrix. All of the attached monitors must be able to display the resolutions output by the source devices. For maximum compatibility it is recommended that only one compatible/common resolution be used by all of the source devices.
- Routing features can be accessed using RS-232 or using IP control.
- **IMPORTANT:** If the unit is installed in a closed or multi-rack assembly, do not block the ventilation holes of the enclosure.

FEATURES

Features

- Increases productivity
- Supports resolutions up to 1080p, 1920x1200, and 2K.
- Front panel control buttons for local switching.
- Status LCD (shows routing status)
- Serial interface for remote control via a computer or control automation devices supports RS-232 and RS-485 protocols.
- IP Control
- Discrete IR remote control
- Output masking command
- Seamless switching using external Genlock
- Standby mode
- Grounding pin
- IR Sensor
- IR Extender
- Power On/Off switch
- Redundant Internal AC power supply
- Rack mountable

Package Includes

- (1) GefenPRO 16x16 3GSDI Matrix
- (1) IR Remote Control unit
- (1) AC Power Cord
- (1) Set of Rack Ears
- (1) User Manual

PANEL LAYOUT

Front Panel



PANEL DESCRIPTIONS

Front Panel

1 LCD Display

Displays the current routing status of the Matrix and is also used to manage source routing.

2 Power Switch

Turn the power ON or OFF using this switch.

3 Control Buttons

These buttons are used to navigate the LCD menu system. See pages 9 - 12 for more information.

- ◀ - Left
- ▶ - Right
- Select - Select

4 Cancel Button

This button is used to return the user to the main status screen once a routing change has been initiated and the user decides to not continue with the change.

5 IR Window

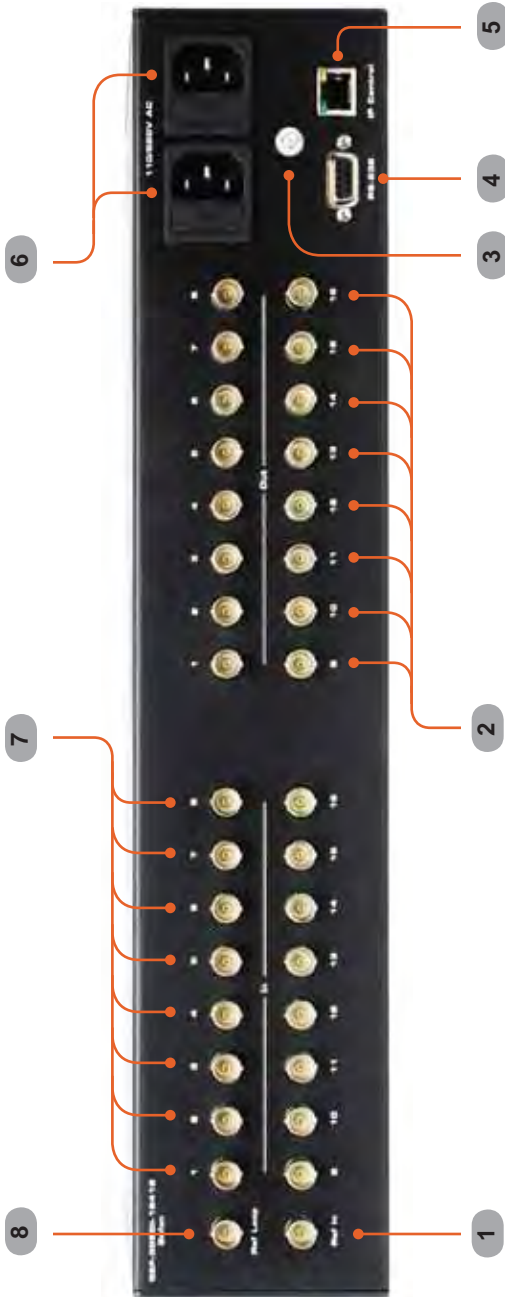
Receives signals from the IR Remote Control unit.

6 Power Indicator

This LED indicator will glow red when the power is turned on.

PANEL LAYOUT

Back Panel



PANEL DESCRIPTIONS

Back Panel

- 1 Reference In Connector**
Connect an external reference to this connector. Bi-level (black burst) and tri-level sync are supported.
- 2 3G-SDI Output Ports (1 - 16)**
Connect 3G-SDI monitors to these ports.
- 3 Grounding Terminal**
Provides a discharge path to ground in case a short circuit occurs between the "hot" lead of the power supply and the enclosure of the Matrix. The grounding wire should be attached from the grounding terminal to an approved ground path.
- 4 RS-232 Serial Port**
Connects to the RS-232 control device. The 16x16 3GSDI Matrix may be switched remotely using this port. See page 16 for more information.
- 5 IP Control Interface**
Connect the 16x16 3GSDI Matrix to a network in order to use IP control.
- 6 110/220 AC Power Receptacles**
Connect one power cord to both power receptacles. The redundant (secondary) power cable should be connected to an electrical outlet on a different circuit.
- 7 3G-SDI Input Ports (1 - 16)**
Connect 3G-SDI source devices to these ports.
- 8 Reference Loop Connector**
Reference Loop connector.

CONNECTING AND OPERATING THE 16X16 3GSDI MATRIX

How to Connect the 16x16 3GSDI Matrix

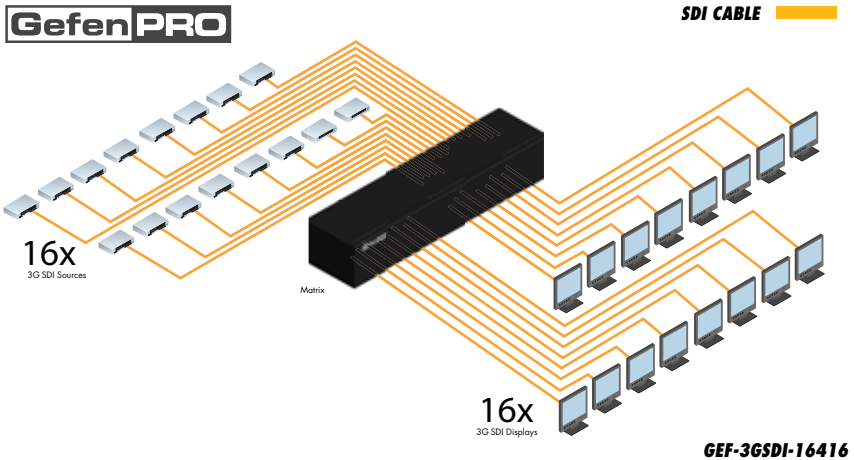
1. Connect up to 16 3G-SDI source devices to the 3G-SDI inputs on the rear panel of the 16x16 3GSDI Matrix using SDI cables.
2. Connect up to 16 3G-SDI displays to the 3G-SDI outputs on the rear panel of the 16x16 3GSDI Matrix.
3. Connect the included power cord to the power input receptacle on the rear panel of the 16x16 3GSDI Matrix. Connect the opposite end of the cable into a open wall power socket.

How to Operate the 16x16 3GSDI Matrix

The 16x16 3GSDI Matrix offers a number of control options. The following options can be used to control basic routing functions of the 16x16 3GSDI Matrix:

1. Front Panel Control Buttons - Pages 9 - 12.
2. IR Remote Control - Pages 13 - 15.
3. RS-232 Serial Control - Pages 16 -23.
4. IP Control - Pages 24 - 27.

Wiring Diagram for the GefenPRO 16x16 3GSDI Matrix

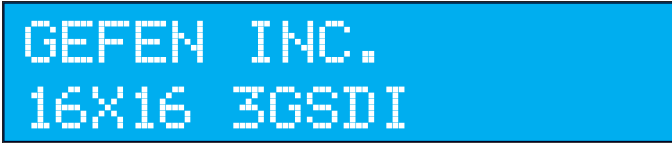


Attention: This product should always be connected to a grounded electrical socket.

CONNECTING AND OPERATING THE 16X16 3GSDI MATRIX

The Standby Screen

The front panel of the 16x16 3GSDI Matrix has a 16 character 2 line LCD display. This display will show the current routing status of the Matrix and will be used to perform routing commands and other operations. After the unit is powered on, the Standby Screen will be displayed:



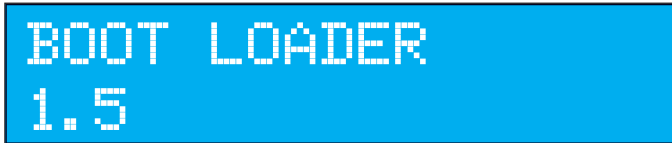
Displaying the Firmware Version

Press the ◀ button to display the firmware version:



Displaying the Boot Loader Version

Press the ◀ button again to display the boot loader version:



Press the ◀ button once more to return to the Standby Screen.

NOTE: The **Cancel** button can be pressed at any time to return to the Standby Screen.

CONNECTING AND OPERATING THE 16X16 3GSDI MATRIX

Switching between RS-232 and RS-485 Protocols

Press the ► button to display the serial interface selection screen:



Use the ◀ or ▶ buttons to switch between RS-232 and RS-485 serial protocols. The current selection is indicated by the cursor. In the example above, RS-232 is the currently selected protocol.

Once the protocol has been selected, press the **Select** button to save the changes.

RS-232

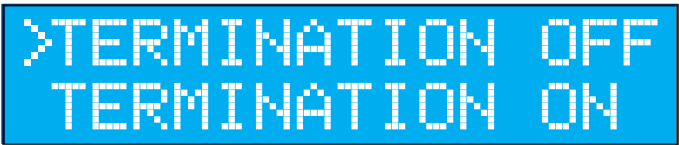
If the RS-232 protocol is selected, the LCD will show the following:



Press the **Cancel** button to return to the Standby Screen.

RS-485

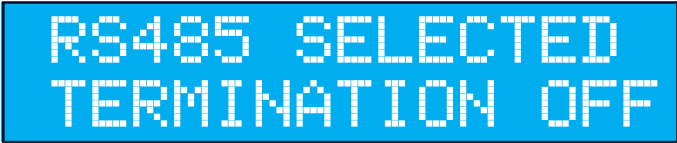
If the RS-485 protocol is selected, another screen will be displayed asking to specify whether or not the cable is terminated:



Use the ◀ or ▶ buttons to switch between TERMINATION Off and TERMINATION On, then press the **Select** button to save the changes.

CONNECTING AND OPERATING THE 16X16 3GSDI MATRIX

In the example below, TERMINATION Off has been selected. The LCD will now show that the RS-485 protocol has been selected, along with the termination-type:

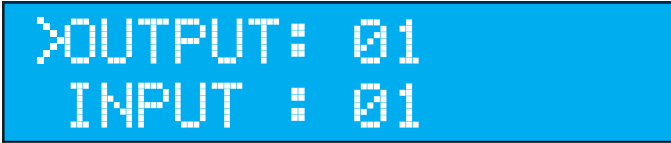


Press the **Cancel** button to return to the Standby Screen.

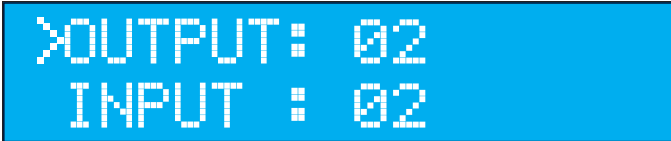
CONNECTING AND OPERATING THE 16X16 3GSDI MATRIX

Displaying the Routing Status

From the main screen, press the **Select** button. When the arrow cursor is next to OUTPUT, pressing the ◀ or ▶ buttons on the front panel will show the current routing state of each input and output. The example below shows that Input 1 is routed to Output 1.



Pressing the ▶ button again will display the routing state of output 2 and so on.



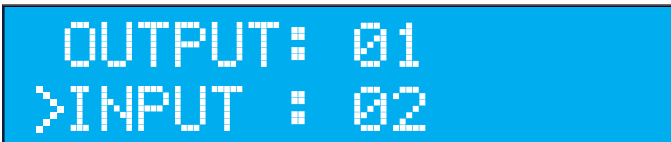
Note that the number displayed next to INPUT may be different than the example above, depending upon the current routing state.

Routing Sources

Example:

Route the source device connected to In 2 to the display connected to Out 1.

1. From the Standby Screen, press the **Select** button on the front panel to display the routing status screen.
2. Press the **Select** button again to move the cursor to INPUT.
3. Press the ▶ button to set the source to Input 2. The source device connected to In 2 is now routed to the monitor connected to Out 1.



4. Press the **Cancel** button to return to the standby screen.

NOTE: The **Cancel** button can be used to return to the standby screen at any time.

IR REMOTE DESCRIPTION

RMT-16416IR Remote Control Unit



1 **Activity Indicator**

This LED will be activated momentarily each time a button is pressed.

2 **Display and Source Selection Buttons (1 - 16)**

These buttons are used to select which source is routed to a monitor.

Routing sources using the Remote Control unit

Issuing a routing command is a two step process. The first step is to select the monitor (1-16) to which the source will be routed. The second step is to select the source (1-16).

Example:

Route the source device connected to In 6 to the monitor connected to Out 4.

1. Press button 4 (Out 4) on the IR remote control unit.
2. Press button 6 (In 6) on the IR remote control unit.

The source connected to In 6 will be routed to the monitor connected to Out 4.

IR REMOTE INSTALLATION

Installing the RMT-16416IR Battery

1. Remove the battery cover on the back of the IR Remote Control unit.
2. Insert the included battery into the open battery slot. The positive (+) side of the battery should be facing up.
3. Replace the battery cover.

The Remote Control unit ships with two batteries. One battery is required for operation and the other battery is a spare.



Battery Slot



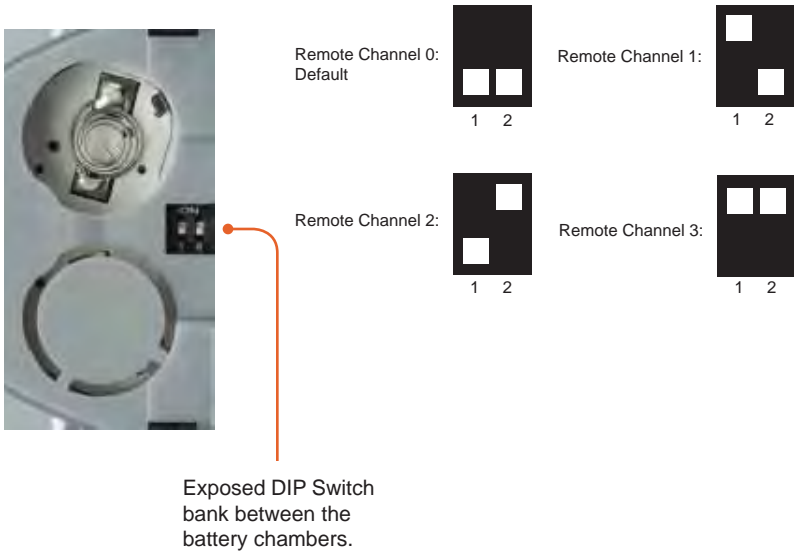
CAUTION: Risk of explosion if battery is replaced by an incorrect type. Dispose of used batteries according to the instructions.

IR REMOTE CONFIGURATION

How to Resolve IR Code Conflicts

In the event that IR commands from other remote controls interfere with the supplied IR Remote Control unit, changing the IR channel on the IR Remote Control unit will fix the problem. The IR Remote Control unit has a bank of DIP switches used for setting the IR channel.

The DIP switch bank is located underneath the battery cover.



It is important that the IR channel on the Remote Control unit, matches the IR channel set on the 16x16 3GSDI Matrix. For example, if both DIP switches on the IR Remote Control unit are set to IR channel 0 (both DIP switches down), then the 16x16 3GSDI Matrix must also be set to IR channel 0. See page 22 on how to change the IR channel on the 16x16 3GSDI Matrix.

RS-232 SERIAL INTERFACE

What features are available via the RS-232 serial communications port?

The 16x16 3GSDI Matrix can accept commands through the RS-232 serial communications port located on the rear panel. The current RS-232 control features are:

- Switching/routing of inputs to outputs without the RMT-16416IR remote control.

How do I use these features?

These features were initially intended for utilization by custom installers in automated setups. However, these features can be tested and used by using any Windows-based PC with a terminal program.

What pins are used for communication with the 16x16 3GSDI Matrix?

Only pins 2 (Receive), 3 (Transmit), and 5 (Ground) are used for communication. A null-modem adapter should not be used with this product.



Only Pins 2 (RX), 3 (TX), and 5 (Ground) are used on the RS-232 serial interface

What are the communication port settings?

Bits per second	19200
Data bits	8
Parity	None
Stop bits	1
Flow Control	None

RS-232 SERIAL CONTROL

RS-232 Features

RS-232 remote functions are used to control this product's features. Features include input / output routing and reference signal functions . These features are available only through the use of the serial port.

Functions Syntax

The syntax for each function is always the same:

#Function name → Space (_) as function name end flag → Parameter 1 → Space → Parameter 2 → Parameter n → Carriage Return (\r) →

Sample:

#FunctionName_param1_param2_param3_param4...\r

Syntax is NOT case sensitive.

Reference Signal Functions

Function	Description
#CHECKREF	Display the Reference In signal
#PRREFTABLE	Display the table data

#CHECKREF Function

The #CHECKREF function detects the Reference In signal and displays the data according to the Reference table.

Syntax:

#CHECKREF

Parameters:

None

#PRREFTABLE Function

The #PRREFTABLE function displays the Reference In data table (timings) which are recognized by the 16x16 3GSDI Matrix.

Syntax:

#PRREFTABLE

Parameters:

None

IP Configuration Functions

Function	Description
#ISPADD	Sets the IP Address
#SNETMASK	Sets the Net Mask
#SGATEWAY	Sets the Gateway
#SPORT	Sets the Port
#PRWEBADD	Displays the current IP configuration
#RSTIP	Set IP configurations to default settings

#ISPADD Function

The #ISPADD function specifies a new IP address.

Syntax:

#ISPADD param1 param2 param3 param4

Parameters:

<i>param1</i>	IP address	[0 - 255]
<i>param2</i>	IP address	[0 - 255]
<i>param3</i>	IP address	[0 - 255]
<i>param4</i>	IP address	[0 - 255]

Notes:

A reboot is required after using this function.

#SNETMASK Function

The #SNETMASK function specifies a new net mask.

Syntax:

```
#SNETMASK param1 param2 param3 param4
```

Parameters:

<i>param1</i>	Net mask	[0 - 255]
<i>param2</i>	Net mask	[0 - 255]
<i>param3</i>	Net mask	[0 - 255]
<i>param4</i>	Net mask	[0 - 255]

Notes:

A reboot is required after using this function.

#SGATEWAY Function

Specifies the new IP gateway.

Syntax:

```
#SGATEWAY param1 param2 param3 param4
```

Parameters:

<i>param1</i>	IP address	[0 - 255]
<i>param2</i>	IP address	[0 - 255]
<i>param3</i>	IP address	[0 - 255]
<i>param4</i>	IP address	[0 - 255]

Notes:

A reboot is required after using this function.

#SPORT Function

Specifies a new port for a Web server.

Syntax:

```
#SPORT param1
```

Parameters:

<i>param1</i>	Port	[0 - 255]
---------------	------	-----------

Notes:

A reboot is required after using this function.

#PRWEBADD Function

Prints the current IP configuration on the screen.

Syntax:

```
#PRWEBADD
```

Parameters:

None

RS-232 SERIAL CONTROL

General Functions

Function	Description
#ACTIVEBOLO	Enables the boot loader
#FADEFAULT	Sets IP Configurations to default settings
#RMTIRADD	Set the remote IR channel
#RSTIP	Sets IP configuration to default

#ACTIVEBOLO Function

The #ACTIVEBOLO function enables the boot loader. See the boot loader instructions on page 28.

Syntax:

#ACTIVEBOLO

Parameters:

None

Notes:

This command must be typed twice in order to activate the boot loader.

#FADEFAULT Function

The #FADEFAULT function sets all inputs and outputs to factory (default) settings.

Syntax:

#FADEFAULT

Parameters:

None

Notes:

The #FADEFAULT function will set the default routing state: Input 1 - Output 1, Input 2 - Output 2, Input 3 - Output 3, and so on.

#RMTIRADD Function

The #RMTIRADD function set the remote IR channel.

Syntax:

```
#RMTIRADD param1
```

Parameters:

<i>param1</i>	IR channel	[0 - 3]
---------------	------------	---------

#RSTIP Function

Sets IP configuration to default (192.168.0.70)

Syntax:

```
#RSTIP
```

Parameters:

None

Notes:

This command requires the unit to be rebooted in order to take effect.

Commands

Command	Description
<i>M</i>	Returns the current routing status of matrix
<i>R</i>	Routing command
<i>S</i>	Routes a single input to all outputs

M Command

The M command displays the current routing status of the matrix.

Syntax:

m

Parameters:

None

R Command

The R command allows specific routing of inputs and outputs.

Syntax:

r param1 param2

Parameters:

param1 Output [1 - 16]

param2 Input [1 - 16]

S Command

The S command routes a single input to all 16 3GSDI outputs.

Syntax:

```
s param1
```

Parameters:

<i>param1</i>	Input	[1 - 16]
---------------	-------	----------

Notes:

Setting *param1* to a value of 0 will place the matrix in *one-to-one mode*. This means that Input 1 will be routed to Output 1, Input 2 will be routed to Output 2, and so on.

IP CONTROL

The GefenPRO 16x16 3GSDI Matrix supports IP-based control using an integrated Web interface. To access this feature, an IP address, subnet, gateway, and port number need to be set on the 16x16 3GSDI Matrix (**Default IP: 192.168.0.70 Subnet: 255.255.255.0 Gateway: 192.168.0.1 Port: 80**). Consult the network administrator to obtain the proper IP address and settings for this product to properly communicate on the network.

The IP control setting can be configured via the RS-232 control interface. Once this has been accomplished, access to the Web Interface is possible. Simply type the IP address that was assigned to the product in a web browser to access the **View Matrix Status** page.

View Matrix Status

The **Main Page** will display the current status and can also be used to create routes.



To create a new route, follow the steps below:

1. Select which outputs will display the source by clicking on each check box.
2. Select the radio button of the input that will be routed to each output.
3. Click the SWITCH button to update the new routing configuration.

This page will automatically refresh every minute. However, at anytime the "Refresh" button can be pressed to refresh the status of the Matrix.

Masking

The **Masking** page is used to hide an output from displaying any video. From this page, all outputs can be set to “Active” or “Mask”. When an output is set to “Active”, it will function normally. When an output is set to “Mask”, it will not output any video. To set the “Active” or “Mask” mode, follow the steps below.



1. Select either “Active” or “Mask” for any number of desired outputs.
2. Press the “Submit” button to initiate the change(s).

After this command is complete the user will be returned to the **Main Page**.

This page will automatically refresh every minute, however, at anytime the “Refresh” button can be pressed to refresh the status of the matrix.

NOTE: All masked outputs will become active if the unit is power-cycled.

IP CONTROL

IP Configuration

The **IP Configuration** page is used to set the IP settings that will be used to access the Web interface. The following items can be configured from this menu.

- IP Address (Default: 192.168.0.70)
- Subnet (Default: 255.255.255.0)
- Gateway (192.168.0.1)
- Port (Default: 80)

The screenshot displays the 'Gefen 3GSDI 16x16 Manager' interface. At the top, there are navigation buttons: 'VIEW MATRIX STATUS', 'MASKING', 'IP Configuration', and 'BACKUP/RESTORE'. Below these is a table with the following data:

MAC Address	IP Address	Subnet	Gateway	Port
1C:91:1:30:2F	192.168.2.23E	255.255.252.0	192.168.0.1	80

Below the table is a 'Refresh' button. The main section is titled 'Change IP Settings' and contains the following fields:

- IP Address: (default: 192.168.0.70)
- Subnet: (default: 255.255.255.0)
- Gateway: (default: 192.168.0.1)
- Port: (default: 80)

At the bottom of the form are 'Save' and 'Reset IP Configuration to Defaults' buttons.

To change these settings follow the steps below.

1. Enter the desired network information into the fields provided.
2. Press the “Save” button to initiate the change(s).

Note: After this command is complete the user will be returned to the **View Matrix Status** page. Settings made on this page will not take effect until the unit is restarted. Disconnect the power from the unit and reconnect power for changes to take effect.

At anytime, the “Reset” button can be pressed to return the IP settings to their defaults.

Backup / Restore

The **Backup/Restore** page is used to backup and restore complete setup configurations.



Note: This feature will be implemented in a future release.

FIRMWARE UPDATE

Firmware Update Procedure

To Begin the update procedure the unit's Boot Loader must be activated. To activate the Boot Loader please follow the procedure below:

If the unit is already powered on, the following RS-232 command can be used to activate the Boot Loader:

1. Connect RS-232 cable to PC and activate a terminal program.
2. Type the command: #ACTIVEBOLO followed by the ENTER key.
3. Re-type the command: #ACTIVEBOLO and press the ENTER key.

If the unit is not powered on, follow the instructions below to activate the Boot Loader:

1. Connect RS-232 cable to PC and activate a terminal program.
2. Make sure the terminal program is set to the following:
 - a. Baud rate = 19200
 - b. Stop bits = 1
 - c. Data bits = 8
 - d. Flow control = None
3. Press the following three buttons on the front panel of the 16x16 simultaneously, while powering-on the unit:
 - a. select
 - b. < (left cursor)
 - c. > (right cursor)

Once the Boot Loader is activated the following message should appear:

```
16x16 Boot Loading
===== Main Menu =====
Download new program ----- 1
Cancel ----- 2
=====
```


FIRMWARE UPDATE

Follow the on-screen instructions to complete the firmware update process:

1. Press [1] on the computer keyboard to begin downloading program to the temporary memory.
2. A message will appear in Hyperterminal:
Waiting for the file to be sent ... (press 'a' to abort)
3. In Hyperterminal, click Transfer > Send File...
4. Click Browse... and select the .BIN file you wish to upload.
5. Select Ymodem for the protocol.
6. Press Send on the Send File dialog box.
7. Wait until the download process is finished. The next text will appear on the screen:

```
Download Completed Successfully!
```

```
-----  
Name:      3GSDI16x16_e_1_6.bin
```

```
Size:      200416          Bytes
```

```
-----  
Memory copy, please wait.....Finished to copy
```

```
Execute the new version
```

```
GEFEN  
16x16 3GSDI MATRIX
```

8. The updated process is now complete.

WARNING MESSAGES

System Failure

In the case of a critical malfunction, the following warning message will be displayed on the Main Display:



If the 16x16 3GSDI Matrix is connected to a PC using a terminal program, the following message will appear on the display:

`system failure !!!`

Power-down the Matrix immediately and contact Gefen Technical Support. See **Asking for Assistance** at the beginning of this manual.

RACK MOUNT SAFETY INFORMATION

- a. Maximum recommended ambient temperature: 45 °C
- b. Increase the air flow to maintain the temperature inside the rack.
- c. Install the product evenly to avoid mechanical overload.
- d. Connect an earthing wire between the an earthing stud and the grounding pin on the chassis.

SPECIFICATIONS

Input / Output

- SDI (SMPTE 259M up to 360 Mbps)
- HD-SDI (SMPTE 292M up to 1.485 Gbps)
- 3G-SDI (SMPTE 424M/425M up to 3.0 Gbps)

Supported Formats.....All SD, HD, and 3G formats

Maximum Resolution.....1080p, 1920x1200, 2K

Input / Output Connector-type.....BNC

Input / Output Impedance.....75 Ω

Reference (Sync).....NTSC, PAL, and Tri-Level

RS-232 Interface.....DB-9, female

Power Supply.....100 ~ 240 V AC (x2 for redundancy)

Power Consumption.....30 W

Operating Temperature.....0 $^{\circ}$ C ~ 45 $^{\circ}$ C / 32 $^{\circ}$ F ~ 104 $^{\circ}$ F

Storage Temperature.....-20 $^{\circ}$ C ~ 60 $^{\circ}$ C / -4 $^{\circ}$ F ~ 140 $^{\circ}$ F

Relative Humidity.....20% ~ 90% RH (no condensation)

Rack mountable..... 2U rack space, rack ears included

Dimensions..... 19" W x 2U H x 7" D

Shipping Weight..... 29 lbs.

WARRANTY

Gefen warrants the equipment it manufactures to be free from defects in material and workmanship.

If equipment fails because of such defects and Gefen is notified within two (2) years from the date of shipment, Gefen will, at its option, repair or replace the equipment, provided that the equipment has not been subjected to mechanical, electrical, or other abuse or modifications. Equipment that fails under conditions other than those covered will be repaired at the current price of parts and labor in effect at the time of repair. Such repairs are warranted for ninety (90) days from the day of reshipment to the Buyer.

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20600 Nordhoff St., Chatsworth CA 91311
1-800-545-6900 818-772-9100 fax: 818-772-9120
www.gefenpro.com support@gefenpro.com

