DIGITAL PROJECTION

A Delta Associate Company

E-Vision Laser 13000 WU Series

High Brightness Digital Video Projector

INSTALLATION & QUICK START GUIDE
CONNECTION GUIDE
OPERATING GUIDE
REFERENCE GUIDE

About this document

Follow the instructions in this manual carefully to ensure safe and long-lasting use of the projector.

Symbols used in this document

Many pages in this document have a dedicated area for notes. The information in that area is accompanied by the following symbols:

WARNING: this symbol indicates that there is a danger of physical injury to yourself and/or damage to the equipment unless the instructions are closely followed.

ELECTRICAL WARNING: this symbol indicates that there is a danger of electrical shock unless the instructions are closely followed.

LASER WARNING: this symbol indicates that there is a potential hazard of eye exposure to laser radiation unless the instructions are closely followed.

NOTE: this symbol indicates that there is some important information that you should read.

Product revision

Because we at Digital Projection continually strive to improve our products, we may change specifications and designs, and add new features without prior notice.

Updates may be available online. Please visit the Digital Projection website for all latest documents.

Legal notice

Trademarks and trade names mentioned in this document remain the property of their respective owners. Digital Projection disclaims any proprietary interest in trademarks and trade names other than its own.

Notes

Laser information

Complies with FDA performance standards for laser products except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007

LASER RADIATION
AVOID DIRECT EYE EXPOSURE
CLASS 3R LASER PRODUCT
Emitted Wavelength : 450-460 nm (Blue)
max pulse energy : 0.45 mJ (Blue)
Pulse duration 0.87 ms (Blue)
Emitted Wavelength : 636-646 nm (Red)
max pulse energy : 0.72 mJ (Red)
Pulse duration : 1.6 ms (Red)

RAYONNEMENT LASER
EXPOSITION DIRECTE DANGEREUSE
POUR LES YEUX
APPAREIL À LASER DE CLASSE 3R
longueur d'onde : 450-460 (Bleu)
maximum énergie de impulsion : 0.45 mJ (Bleu)
durée de impulsion : 0.87 ms (Bleu)
longueur d'onde : 636-646 nm (Rouge)
maximum énergie de impulsion : 0.72 mJ (Rouge)
durée de impulsion : 1.6 ms (Rouge)

激光辐射
避免眼睛受到直接照射
3R类激光产品 波长 : 450-460 nm (蓝)
最大脉冲能量: 0.45 mJ (蓝),
脉冲时间: 0.87 ms (蓝)
3R类激光产品 波长 : 636-646 nm (红)
最大脉冲能量: 0.72 mJ (红),
脉冲时间: 1.6 ms (红)

雷射輻射
避免眼睛受到直接照射
3R類雷射產品 波長: 450-460 nm (藍)
最大脈衝能量: 0.45 mJ (藍),
脈衝時間: 0.87 ms (藍)
3R類雷射產品 波長: 636-646 nm (紅)
最大脈衝能量: 0.72 mJ (紅),
脈衝時間: 1.6 ms (紅)

GB 7247.1-2012 / IEC/EN 60825-1:2007

CLASS 1 LASER PRODUCT
一类激光产品
IEC/EN 60825-1:2014

PRODUIT LASER DE CLASSE 1
第一類雷射產品
IEC/EN 60825-1:2014

Warning ! Do not look into the beam. No direct eye exposure to the beam is permitted.
RG3
Hazard Distance : 3.5m

Avertissement ! Ne Pas Regarder Directement Dans Le Faisceau. L'exposition Directe Des Yeux Au Faisceau Est Interdite.
RG3
Distance À Risque : 3.5m

警告！请勿直视镜头。
眼睛不要直接暴露于光辐射。
RG3
危险距离: 3.5米

警告！ 請勿直視鏡頭。
眼睛不要直接暴露於光輻射。
RG3
危險距離: 3.5公尺

3264655900

Caution - use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Not for home use.

Optical radiation

DO NOT let a laser beam directly enter the projector lens.

Caution - possibly hazardous optical radiation emitted from this product. Do not stare at operating light source. May be harmful to eyes. This projector is tested according to IEC/EN62471-5:2015 (Photobiological safety of lamps and lamp systems – Part 5: Image projectors standard) and is Risk Group 3 (high risk).

Light Hazard Warning

The hazard distance is the distance measured from the projection lens at which the intensity or energy per unit of surface is lower than the applicable exposure limit on the cornea or skin. If the person is within the hazard distance, the beam is considered unsafe for exposure.
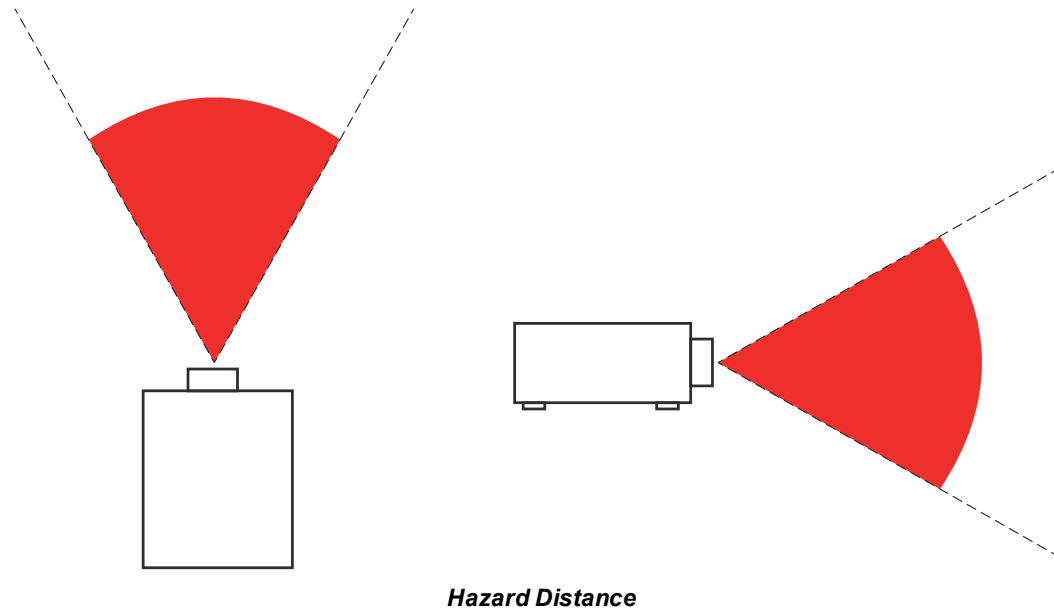
Hazard Distance

Light Hazard Distances

The hazard distance for this projector is 3.5 m.

Notes

No direct exposure to the beam is permitted, RG3 IEC 62471-5:2015.

Operators should control access to the beam within the hazard distance or install the projector at sufficient height to prevent exposures of spectators' eyes within the hazard distance.

Introduction

Congratulations on your purchase of this Digital Projection product. Your projector has the following key features:

- WUXGA projector.
- Support for Frame Sequential and Dual Pipe 3D formats.
- HDBaseT® for transmission of uncompressed High Definition Video up to 100 m from the source.
- 3G-SDI with loop-through.
- Edge Blend with black level correction.
- Red laser assist for enhanced color fidelity.
- Blanking control for custom input window sizing.
- Cornerstone, Vertical & Horizontal Keystone, Pincushion & Barrel, and Image Rotation.
- Control via LAN and RS232.
- Motorised lens mount.
- Separate control of screen and source aspect ratio.

A serial number is located on the side of the projector. Record it here:

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DIGITAL PROJECTION

A Delta Associate Company

E-Vision Laser 13000 WU Series

High Brightness Digital Video Projector

INSTALLATION & QUICK START GUIDE

What's in the box?

Projector
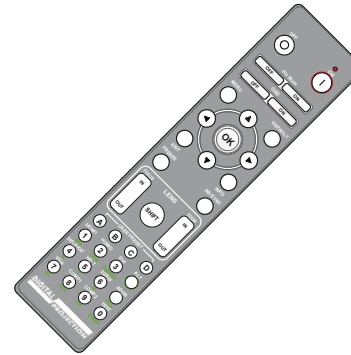
Remote Control
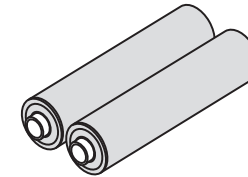
Security Screw

Batteries
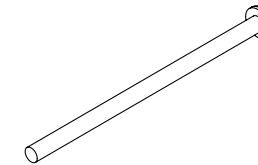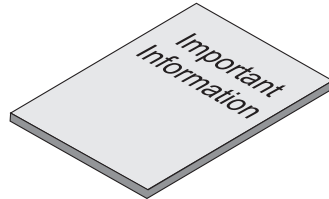
Important Information Book
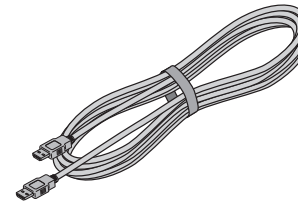
HDMI Cable
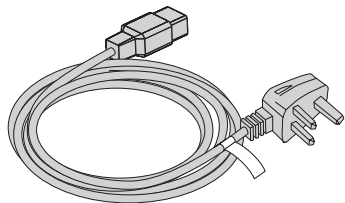
Power Cable, UK
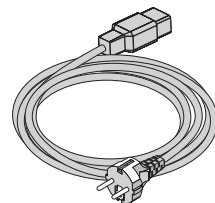
Power Cable, Europe
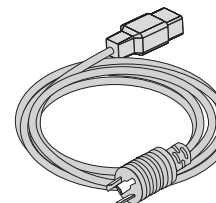
Power Cable, North America
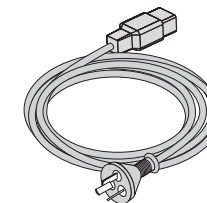
Power Cable, China

Connecting the power supply

1. Adjust the VOLTAGE SELECT switch to the required voltage **1**

2. Firmly push the mains connector into the socket **2**
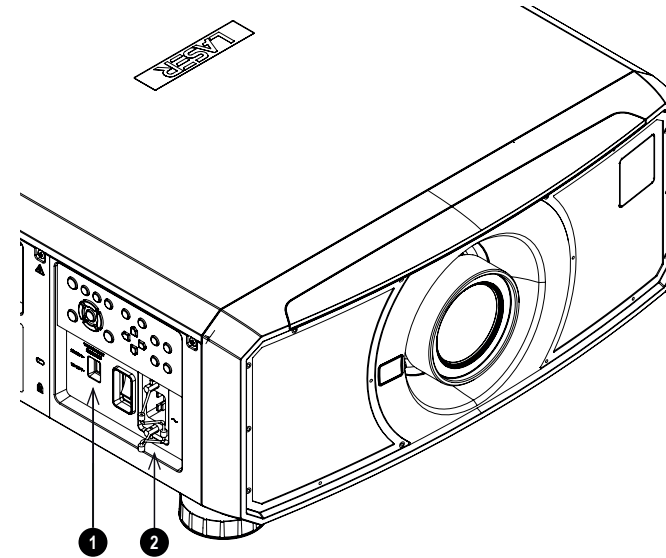
Voltage selection

The VOLTAGE SELECT switch must be set to match the power supply you are using:

Voltage of power supply used	Position of VOLTAGE SELECT switch
AC100-130V outlet	200 240V~ / 100 130V~
AC200-240V (single phase) outlet	200 240V~ / 100 130V~

Use only the power cable provided.

Ensure that the power outlet includes a ground connection as this equipment MUST be earthed.

Handle the power cable carefully and avoid sharp bends. Do not use a damaged power cable.

Projector overview

1. Air inlet
2. Front infrared window
3. Lens mount
4. Air inlet
5. Rear infrared window
6. Air outlet
7. Connections panel
8. Control panel
9. Adjustable feet
10. Voltage selector
11. Mains socket and switch
12. Air inlets
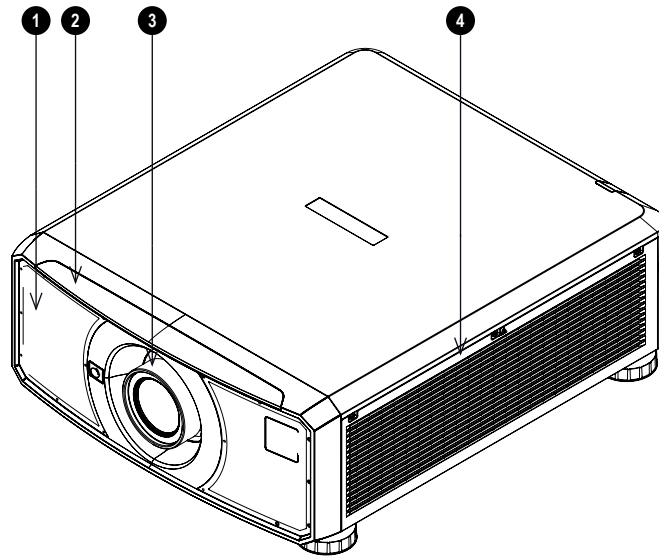
Front View
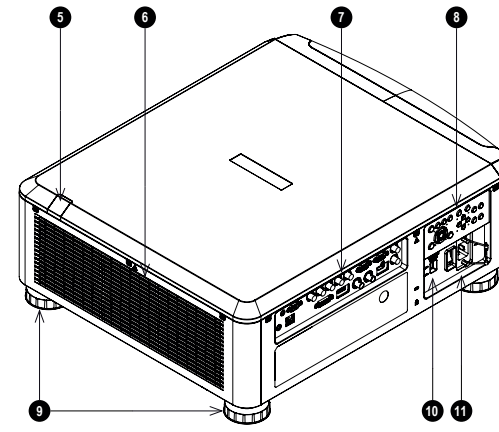
Rear View
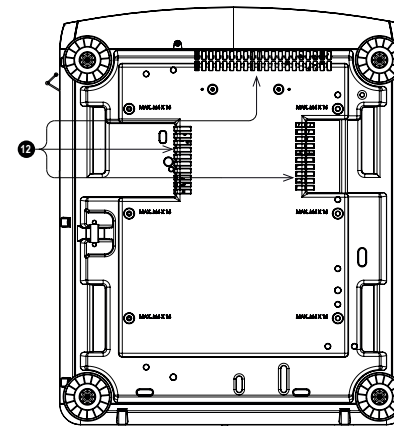
Bottom View

Control panel

1. **POWER**
   Switches the projector on and off (STANDBY).

2. **INPUT**
   Switches to the next input source.

3. **AUTO SYNC**
   Re-synchronises with the current input signal.

4. **ASPECT**
   Changes the aspect ratio.

5. **CENTER LENS**
   Centers the lens.

6. **PIC MUTE** Shows and hides the projected image. When muted, the light source is completely switched off and the screen is black.

7. **MENU**
   Displays and exits the OSD.

8. **Arrow buttons & ENTER**
   Navigation buttons used to highlight menu entries in the OSD. Press **ENTER** to open or execute the highlighted menu entry.

9. **EXIT**
   Exits the current OSD page and enters the level above.

10. **LENS SHIFT**
    Arrow buttons move the lens in the specified direction.

11. **FOCUS**
    Plus and minus buttons move the focus in and out.

12. **ZOOM**
    Plus and minus buttons zoom in and out.

Control Panel
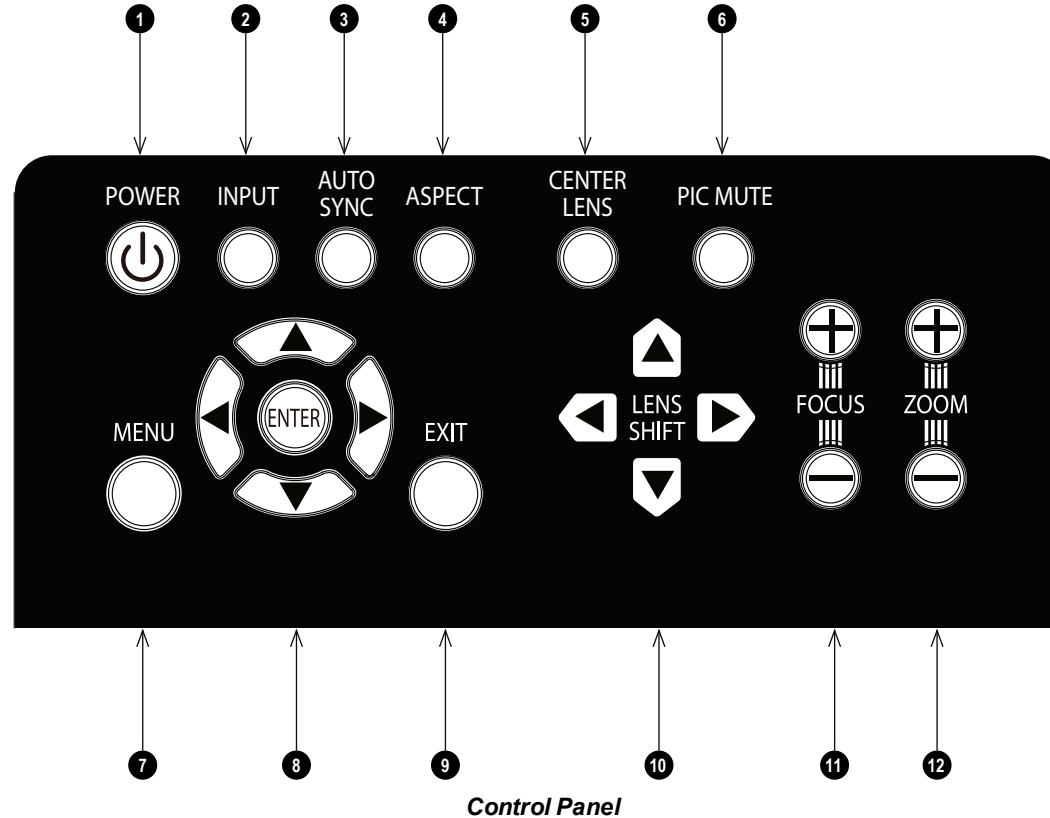
Projector indicators

TEMP.   Off = no problem

             Flashing red = temperature error

LIGHT   Off = light is switched off

             Flashing green = light is preparing to switch on

             Flashing red (cycles of six flashes) = light module failure

             On, red = light module has reached end of life

             On, green = light is switched on

STATUS Off = no problem

             Flashing red (continuously) = cover error

             Flashing red (cycles of four flashes) = fan error

             On, red = system error

POWER Off = the projector is switched off

             Flashing green = the projector is warming up

             Flashing amber = the projector is cooling down

             On, red = STANDBY mode

             On, green = the projector is switched on
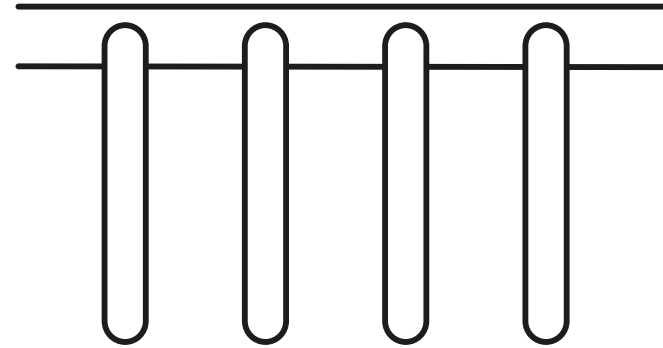
Notes

TEMP.   LIGHT   STATUS POWER

Indicators

Remote control

1. **Power ON / OFF**
   Turns power on and off.

2. **Pic Mute OPEN / CLOSE**
   Shows and hides the projected image.
   When OFF, the light source is completely switched off and the screen is black.

3. **OSD ON / OFF**
   Enable and disable screen timeout messages and control whether to show the OSD during projection.

4. **MENU**
   Access the OSD. If the OSD is open, press this button to go back to the previous menu.

5. **Navigation (arrows and OK)**
   Navigate through the menus with the arrows, confirm your choice with **OK**.
   In lens adjustment modes, the arrows are used to move, zoom or focus the lens.
   See **11** below. In lens adjustment modes, or when the OSD is not showing, the OK button switches between modes: **Shift Adjustment** and **Zoom / Focus Adjustment**.

6. **EXIT**
   Go up one level in the OSD. When the top level is reached, press to close the OSD.

7. **FREEZE**
   Freeze the current frame.

8. **DEFAULT**
   When editing a parameter, press this button to restore the default value.

9. **INFO**
   Access information about the projector.

10. **RE-SYNC**
    Re-synchronise with the current input signal
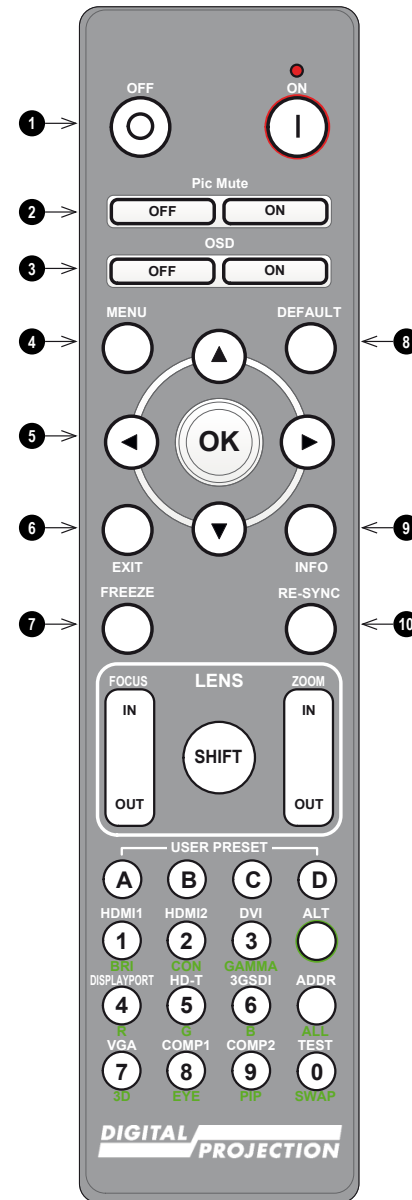
Remote Control

11. **LENS adjustment**
    - **FOCUS IN / OUT**: adjust focus.
    - **SHIFT**: press and hold this button, then use the Navigation arrow buttons to move the lens.
    - **ZOOM IN / OUT**: adjust zoom.

12. **USER PRESET A, B, C, D**
    Load user presets.

13. **ALT**
    Press and hold this button to access alternative functions for all buttons with a green label.

14. **DVI / GAMMA / numeric input 3**
    There is no DVI input on this projector.
    Use with ALT to switch to the next Gamma value:
    ...1.0, 1.8, 2.0, 2.2, 2.35, 2.5...

15. **HDMI 2 / CON / numeric input 2**
    Select the HDMI 2 input.
    Use with ALT to bring up the Contrast control, then adjust the value with the LEFT and RIGHT arrow buttons.

16. **HDMI 1 / BRI / numeric input 1**
    Select the HDMI 1 input.
    Use with ALT to bring up the Brightness control, then adjust the value with the LEFT and RIGHT arrow buttons.
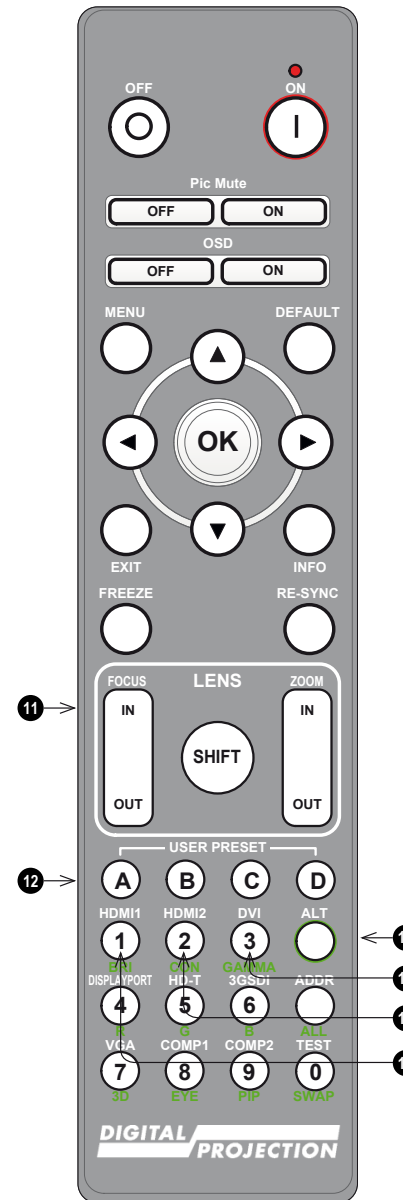
Remote Control

Notes

☞ *This projector does not use the following options on the remote: DVI, VGA, COMP 1 and COMP 2.*

17. **DISPLAYPORT 1 / R / numeric input 4**
Select DisplayPort 1 input.

18. **HD-T / G / numeric input 5**
Select the HDBaseT input.

19. **VGA / 3D / numeric input 7**
There is no VGA input on this projector.
Use with **ALT** to toggle the 3D Format setting between Off and Auto.

20. **COMP1 / EYE / numeric input 8**
There is no Component 1 input on this projector.
Use with **ALT** to switch between left and right eye 3D dominance.

21. **ADDR / ALL (with red indicator at the top)**
Assign and unassign an IR remote address.

- **To assign an IR remote address:**

    1. Press and hold this button until the red indicator starts flashing.

    2. Release this button and while the red indicator is still flashing, enter a two-digit address using the numeric input buttons. The indicator will flash three times quickly to confirm the change.

- **To unassign an address and return to the default address 00:**

    1. Press and hold ALT and this button simultaneously until the red indicator flashes to confirm the change.

22. **3GSDI / B / numeric input 6**
Select the 3G-SDI input.

23. **TEST / SWAP / numeric input 0**
Show a test pattern. Press again to show the next test pattern: *White, Black, Red, Green, Blue, Checkerboard, Crosshatch, V Burst, H Burst, Color Bar, Screen Layout, Off.*.
When **PIP** mode is on, use this button with **ALT** to swap the main and sub images.

24. **COMP2 / PIP / numeric input 9**
There is no Component 2 input on this projector.
Use with **ALT** to switch on **Picture In Picture (PIP)** mode.
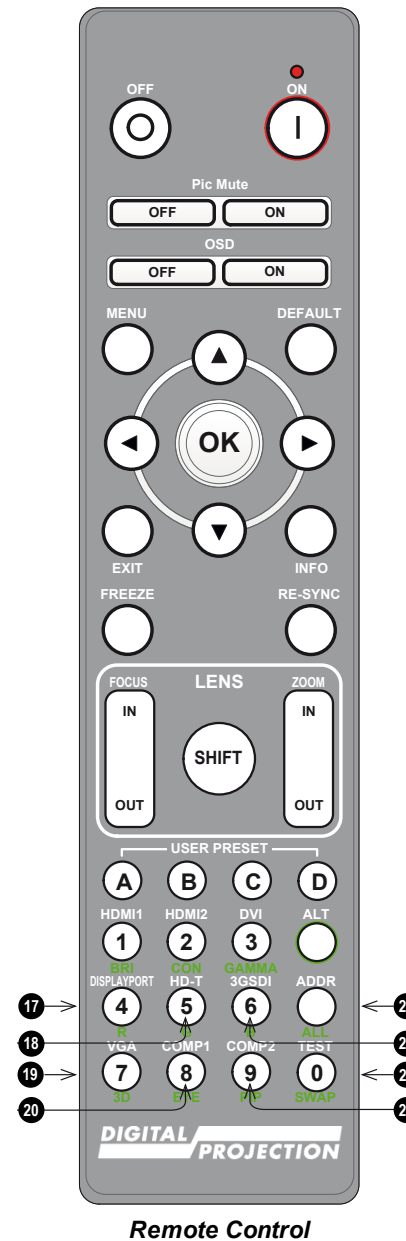
Remote Control

Notes

☞ *This projector does not use the following options on the remote: DVI, VGA, COMP 1 and COMP 2.*

Infrared reception

The projector has infrared sensors at the front and back.

The angle of acceptance is 40°. Make sure that the remote control is within the angle of acceptance when trying to control the projector.

40°

40°
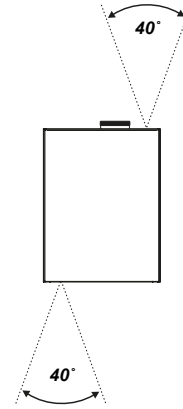
Positioning the screen and projector

1. Install the screen, ensuring that it is in the best position for viewing by your audience.
2. Mount the projector, ensuring that it is at a suitable distance from the screen for the image to fill the screen. Set the adjustable feet so that the projector is level, and perpendicular to the screen.

The drawing shows the positions of the feet for table mounting, and the fixing holes for ceiling mounting.

1. Four adjustable feet
2. **Six M4 holes for ceiling mount** The screws should not penetrate more than 15 mm into the body of the projector.
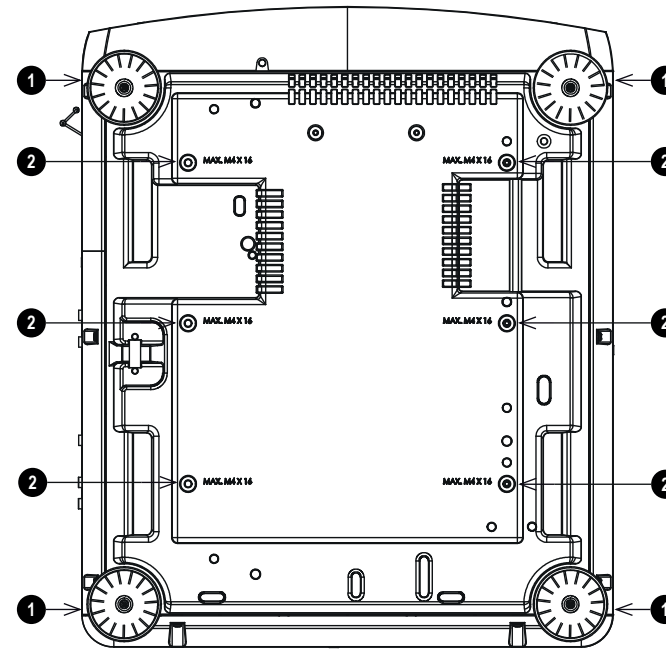
Notes

⚠ **Always allow the projector to cool for 5 minutes before disconnecting the power or moving the projector.**

⚠ **Ensure that there is at least 50 cm (19.7 in) of space between the ventilation outlets and any wall, and 30 cm (11.8 in) on all other sides.**

⚠ **Do not use the threaded holes for the adjustable feet to hang or mount the projector.**

Roll and pitch

The projector can be operated in numerous positions.

In portrait mode, it is recommended to position the projector with inputs facing upward, as shown in the diagram.

1. Recommended positions: inputs side up
2. Also possible.

1 ➤ **30˚**

2 ➤ **360˚**

2 ➤ **330˚**

Roll

Pitch
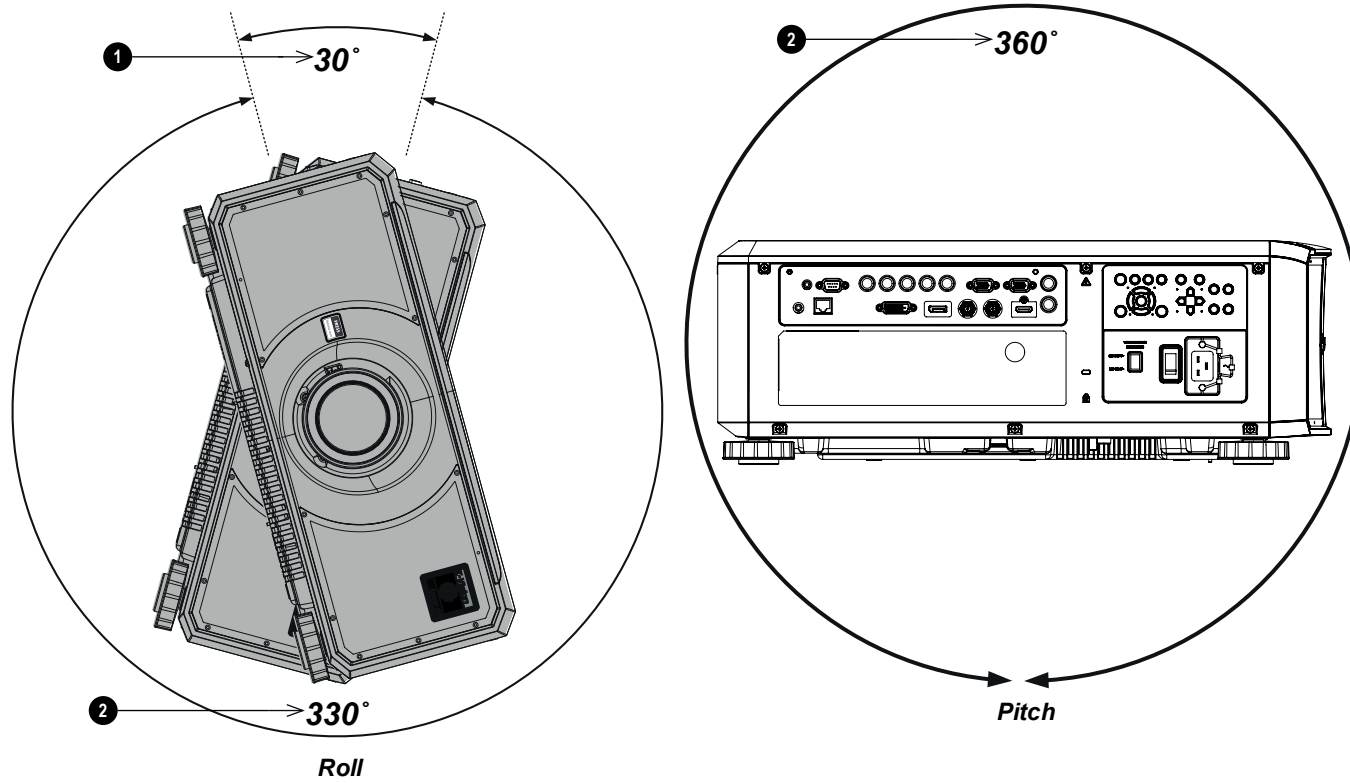
Changing the lens

Inserting a new lens

1. Remove the lens aperture cap from the projector.

2. Remove the front and rear lens caps from the lens.
3. Position the lens so that the labels are at the top, and gently insert it all the way into the lens mount.
4. Push the lens in firmly and turn it clockwise until it clicks into place.
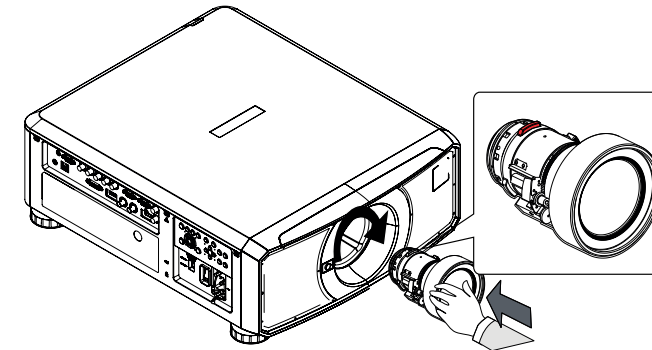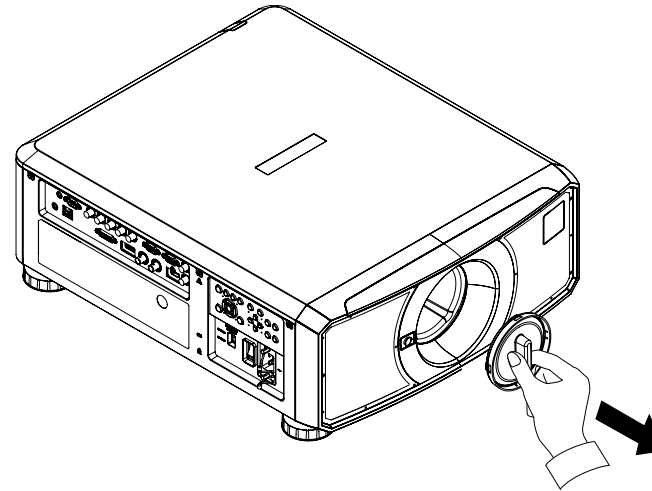
Notes

Before changing the lens, always make sure the projector is switched off and fully disconnected from its power supply.

When changing the lens, avoid using excessive force as this may damage the equipment.

Avoid touching the surface of the lens as this may result in image impairment.

The lens is shipped separately.

Take care to preserve the original lens packaging and protective caps for future use.

The projector will not power on without the lens fitted.

Removing the lens

1. Push the lens release button all the way in

2. Turn the lens anti-clockwise until it disengages

3. Slowly remove the lens.
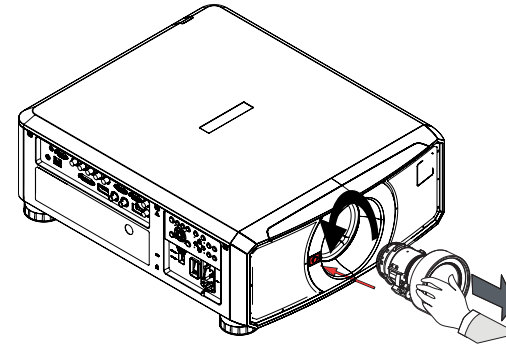
Notes

Operating the projector

Switching the projector on

1. Ensure a lens is fitted. Connect the power cable between the mains supply and the projector. (See Connecting the power supply above.) Switch on at the switch next to the power connector.
2. The **POWER** indicator lights red to signal that the projector is in STANDBY mode. Press one of the following buttons:
   - On the remote control, the **ON** button
   - On the projector control panel, the **POWER** button.

The fans begin working, then the **POWER** indicator begins flashing green. When the flashing stops, the **POWER** and **LIGHT** indicators both light steady green. The projector is switched on.

Switching the projector off

1. Press **OFF** on the remote control or **POWER** on the control panel, then press again to confirm your choice.
   The **POWER** indicator on the control panel will start flashing amber, the system will go out and the cooling fans will run for a short time until the **POWER** indicator goes steady red to indicate that the projector has entered STANDBY mode.
2. If you need to switch the projector off completely, switch off at the mains power switch next to the power connector and then disconnect the power cable from the projector.

Selecting an input signal

1. Connect one or more image sources to the projector.
2. Select the input you want to display:
   - Press one of the input buttons on the remote control.
   - Alternatively, open the On-screen display (OSD) by pressing **MENU**. Highlight **Input** from the main menu, press **ENTER/OK** and then select an input signal using the **UP** and **DOWN** arrow buttons. Press **ENTER/OK** to confirm your choice.

Selecting a test pattern

To display a test pattern:

- Press **TEST** on the remote control.
  Change the test pattern using the **LEFT** and **RIGHT** arrow buttons. The following test patterns are available: *White, Black, Red, Green, Blue, Checkerboard, Crosshatch, V Burst, H Burst, Color Bar, Screen Layout, Off.*
- Alternatively, open the OSD by pressing **MENU**. Highlight **Test Patterns** from the main menu, then select a test pattern using the **LEFT** and **RIGHT** arrow buttons.

After the final test pattern, the projector exits test pattern mode and returns to the main image. To view test patterns again, you need to press **TEST** again. If you wish to exit the test patterns before you reach the final one, press **TEST** or **EXIT** at any time.

Notes

See Connecting the power supply on page 11.

The self-test is running when all the LEDs on the control panel are lit.

⚠️ **Use only the power cable provided.**

⚠️ **Ensure that the power outlet includes a ground connection as this equipment MUST be earthed.**

⚠️ **Handle the power cable carefully and avoid sharp bends. Do not use a damaged power cable.**

See Using the menus on page 36 for full details of how to use the controls and the menu system.

Adjusting the lens

The lens can be adjusted using the Lens menu, or using the lens buttons on the remote control.

Lens menu

The **Lens** menu provides access to the **Lens Control** setting and the **Lens Center** command.

Lens Control allows **Zoom**, **Focus** and **Shift** adjustments using the arrow buttons. The setting operates in **Zoom/Focus Adjustment** and **Shift Adjustment** mode.

Press **ENTER/SELECT** to switch between the two modes.

Remote control

Use the remote control to adjust zoom, focus and shift directly, without opening a menu:

- **OK** enters lens control, then switches between Zoom/Focus Adjustment and Shift Adjustment.
- **EXIT** exits lens control and opens the Lens menu.
- **MENU** exits lens control and returns to the main image.
- The arrow buttons adjust zoom, focus and shift as indicated on the screen.

Adjusting the image

Orientation

This can be set from the **Setup** menu.

Highlight **Orientation** and choose from **Front Tabletop**, **Front Ceiling**, **Rear Tabletop**, **Rear Ceiling** and **Auto-front**.

Geometry

Settings such as **Keystone**, **Rotation**, **Pincushion / Barrel** and **Arc** can be set from the **Geometry** menu.

Picture

Settings such as **Gamma**, **Brightness**, **Contrast**, **Saturation**, **Hue** and **Sharpness** can be set from the **Image** menu.

DIGITAL PROJECTION

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E-Vision Laser 13000 WU Series

High Brightness Digital Video Projector

CONNECTION GUIDE

Signal inputs

Digital inputs and outputs

1. **HDBaseT**
   Receives digital signal from HDBaseT-compliant devices. Connect an HDBaseT cable.

2. **HDMI I**
   HDMI 1.4b input supporting **Frame Sequential** and **Dual Pipe** 3D with HDCP 1.4. Also supports the domestic Blu-Ray formats. See supported signal input modes on page 107. Connect an **HDMI** cable to the connector.

3. **DVI-D**
   This input can receive digital signal from a compatible source. Supports sources up to 1920 x 1200 resolution, 24-60 Hz. Supports HDCP.

4. **3G-SDI in**

5. **3G-SDI out**
   Connect a 3G-SDI cable to distribute the 3G-SDI signal to another projector.

6. **DisplayPort**
   DisplayPort 1.1a input. Connect a DisplayPort cable to the connector. Supports sources up to 1920 x 1200 resolution at 24 - 60 Hz. Supports HDCP.

7. **HDMI II**
   HDMI 1.4b input supporting **Frame Sequential** and **Dual Pipe** 3D with HDCP 1.4. Also supports the domestic Blu-Ray formats. See supported signal input modes on page 107. Connect an **HDMI** cable to the connector.

Analog inputs and outputs

1. Component
   RGBHV, RGsB or RGBS
   Set Color Space in the Color menu to Auto or RGB-Video.
   YPbPr or YCbCr
   Set Color Space in the Color menu to YPbPr or YCbCr.

2. **VGA**
   This input receives analog signals from a computer. When using this input, it is best to use a fully wired VGA cable to connect the source to the projector. This will allow the source to determine the projector's capabilities via DDC and show an optimized image.
   Such cables can be identified as they have a blue connector shell.

3. **Monitor Out**
   Connect an analog monitor (VGA) cable to the 15-pin D-type to output the signal received on the VGA input.

Notes

For simultaneous HDBaseT and LAN connectivity, a third-party distribution product can be utilised to combine HDBaseT video stream with LAN connection for delivery to the projector.
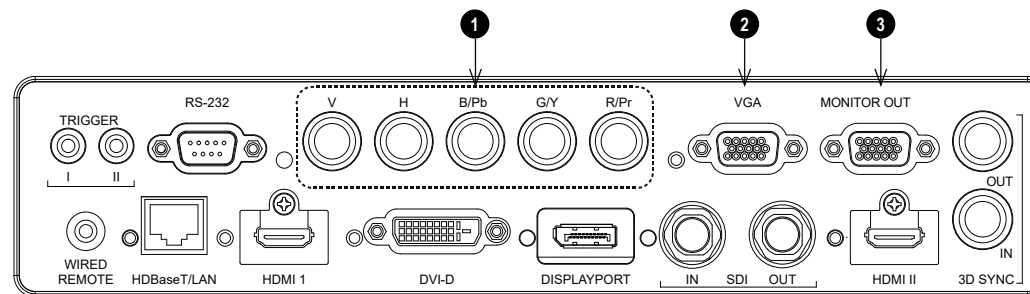
EDID on the DisplayPort, HDMI, and HDbaseT inputs

If you are using a computer graphics card or another source that obeys the EDID protocol, the source will automatically configure itself to suit the capability of the projector.

Otherwise refer to the documentation supplied with the source to manually set the resolution to the DMD™ resolution of the projector or the nearest suitable setting. Switch off the source, connect to the projector, then switch the source back on again.

Using DisplayPort/ HDMI/ HDBaseT switchers with the projector

When using a DisplayPort/HDMI/HDBaseT source switcher with the projector, it is important to set the switcher so that it passes the projector EDID through to the source devices.

If this is not done, the projector may not be able to lock to the source or display the source correctly as its video output timings may not be compatible with those of the projector. Sometimes this is called transparent, pass-through or clone mode. See your switcher's manual for information on how to set this mode.

1. Sources
2. Switcher
3. Projector
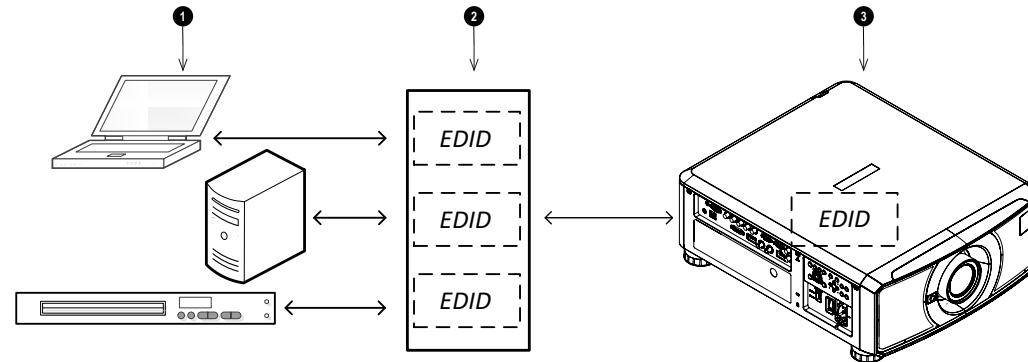
The EDIDs in the switcher should be the same as the one in the projector.

3D connections

1. **HDBaseT**
   Receives 3D signal from HDBaseT-compliant devices.
   Connect an HDBaseT cable.

2. **HDMI I / Dual Pipe Left**
   HDMI 1.4b input supporting **Frame Sequential** and
   Dual Pipe 3D with HDCP 1.4. Also supports the
   domestic Blu-Ray formats. See supported signal input
   modes on page 107. Connect an **HDMI** cable to the
   connector.

3. **DVI-D**
   Single Link DVI-D input supporting 3D Frame
   Sequential up to 30Hz per eye. Also supports the
   domestic Blu-Ray formats. See supported signal input modes on page 107.

4. **DisplayPort**
   DisplayPort 1.1a input supporting **Frame Sequential** 3D source up to 120Hz. Connect a **DisplayPort** cable to the connector.

5. **HDMI II / Dual Pipe Right**
   HDMI 1.4b input supporting **Frame Sequential** and **Dual Pipe** 3D with HDCP 1.4. Also supports the domestic Blu-Ray formats. See supported signal input
   modes on page 107. Connect an **HDMI** cable to the connector.

6. **Sync In / Sync Out**
   Sync In is the 3D sync input signal. Connect the 3D sync from your graphics card or server.
   Sync Out is the 3D sync output signal. This is affected by settings in the 3D menu such as Dark Time and 3D Sync Offset. Connect this to an IR emitter or
   ZScreen.
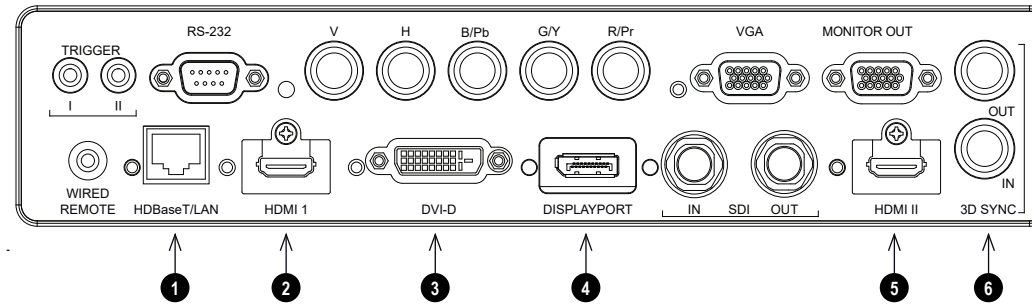
Notes

3D sources up to 60Hz requiring frame doubling and left/right interleaving

1. Connect to one of the following inputs on the connection panel:
   - HDMI I
   - HDMI II
   - HDBaseT
2. Set 3D Format in the 3D menu to match the format of the incoming signal. Choose from Auto, Side by Side (Half) and Top and Bottom. The Frame Packing format is automatically detected by the projector.

Frame sequential 3D sources up to 120Hz

Connect to the DisplayPort input.

The **Frame Sequential** format is automatically detected by the projector and is supported on the DisplayPort input only.

Dual Pipe 3D

1. Connect the left eye output to the **HDMI I** socket and the right eye output to the **HDMI II** socket.
2. Set **3D Format** in the **3D** menu to **Dual-Pipe**.

While the projector can receive 100/120Hz and display 3D at 100/120Hz, video processing is limited to 60Hz.

Notes

3D Sync

1. 3D Input
2. 3D Sync In
3. 3D Sync Out
4. IR emitter or Zscreen
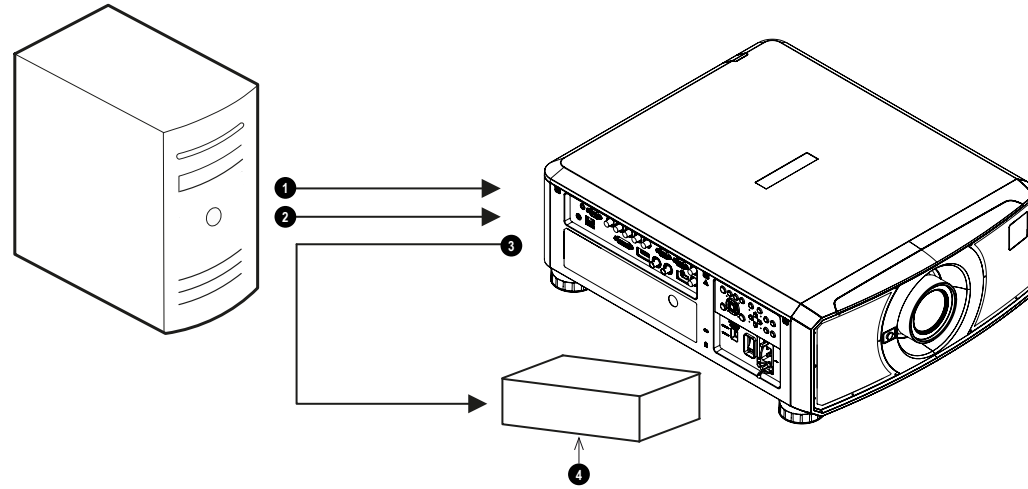
Control connections

1. **Trigger 1 & Trigger 2**
   The Trigger outputs are defined in the **Setup** menu. Each ouput can be triggered by one of the following conditions:
   - **Screen trigger**. A trigger output can be used to control an electrically operated screen. The screen will be automatically deployed when the projector starts up and retracted when the projector shuts down.
   - **Aspect ratio trigger**. A trigger output can be used to control screen shuttering for different aspect ratios.
   - **RS232 trigger**. A trigger output can be used to control the screen or screen shuttering on receipt of an RS232 command.
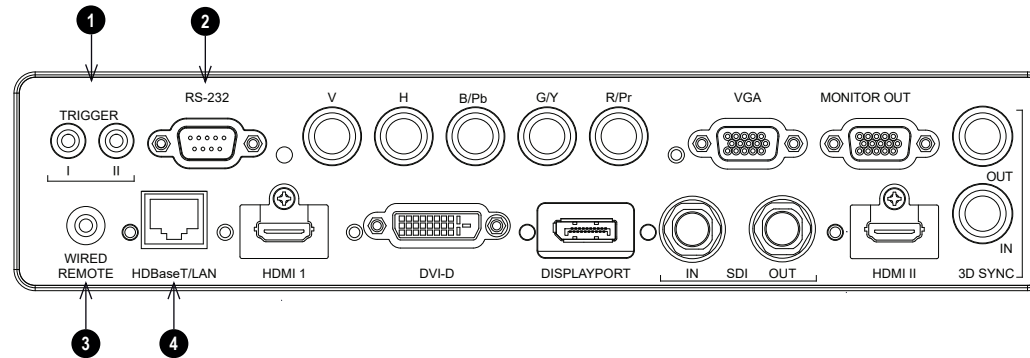
2. **RS232**
   All of the projector's features can be controlled via a serial connection, using commands described in the **Protocol Guide**.Use a straight-through cable to connect directly to a computer.

3. **Wired Remote**
   The remote control can be connected using a standard 3.5 mm mini jack cable (tip-ring-sleeve, or TRS).

4. **HDBaseT/LAN**
   The projector's features can be controlled via a LAN connection, using Digital Projection's **Projector Controller** application or a terminal-emulation program.

LAN connection examples

The projector's features can be controlled via a LAN connection, using Digital Projection's **Projector Controller** application or a terminal emulation program.

Un-crossed LAN cables

Un-crossed LAN cable

RS232 connection example

All of the projector's features can be controlled via a serial connection, using commands described in the **Protocol Guide**.

Straight through cable

Computer to Projector

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DIGITAL PROJECTION

A Delta Associate Company

E-Vision Laser 13000 WU Series

High Brightness Digital Video Projector

OPERATING GUIDE

Using the menus

Opening the Menu

Access the various menus using either the projector control panel or the remote control. On either device:

1. Press the **MENU** button. The on-screen display (OSD) opens showing the list of available menus
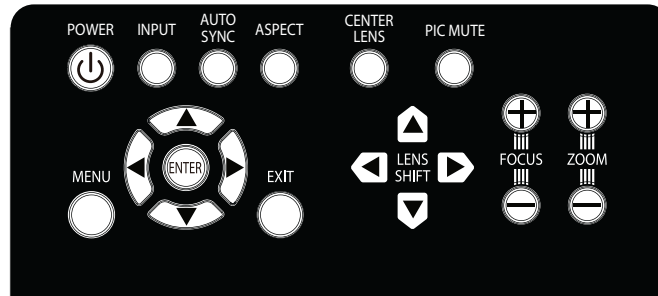
Projector control panel
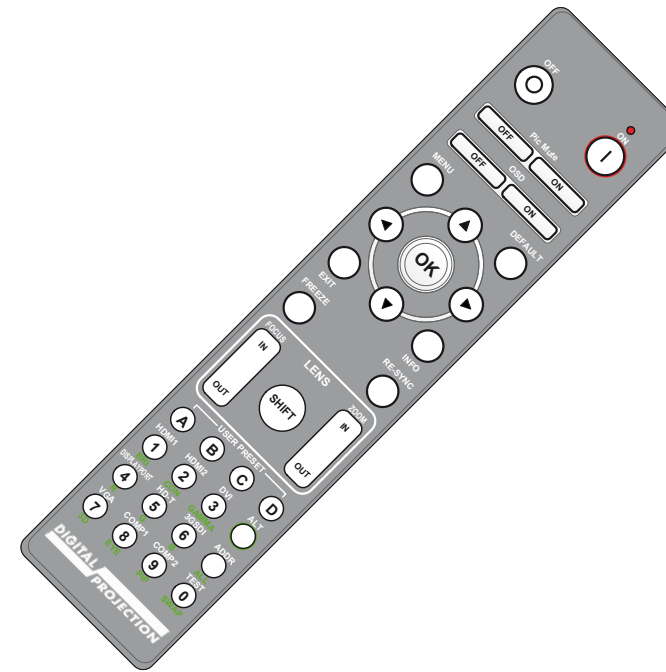
Remote control

Opening a submenu

Move up and down the list using the **UP** and **DOWN** arrow buttons.

To open a submenu:

1. Press **ENTER** on the control panel or **OK** on the remote control.

This guide refers to the above two buttons as **ENTER/OK**.

Exiting menus and closing the OSD

To go back to the previous page:

1. Press **EXIT**.

To close the OSD:

1. Press **MENU**.

Or:

1. Go back to the top level menu
2. Press **EXIT**.

Main Menu	
Input	HDMI 1
Test Pattern	
Lens	►
Image	►
Color	►
Geometry	►
Edge Blend	►
3D	►
Laser	►
Setup	►
Network	►
▼	
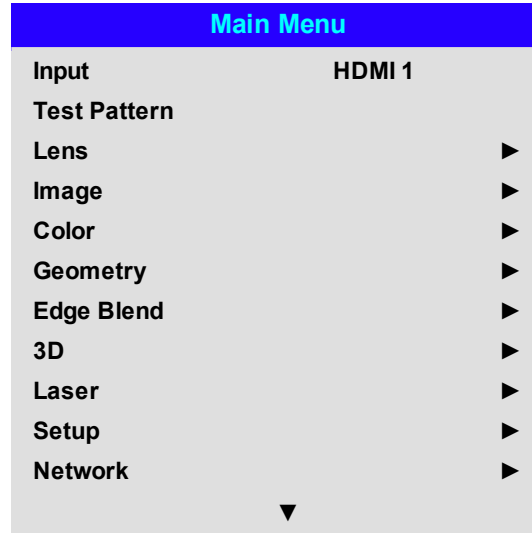
On Screen Display (OSD): Top Level Menu

Main Menu	
▲	
PIP	►
Information	►
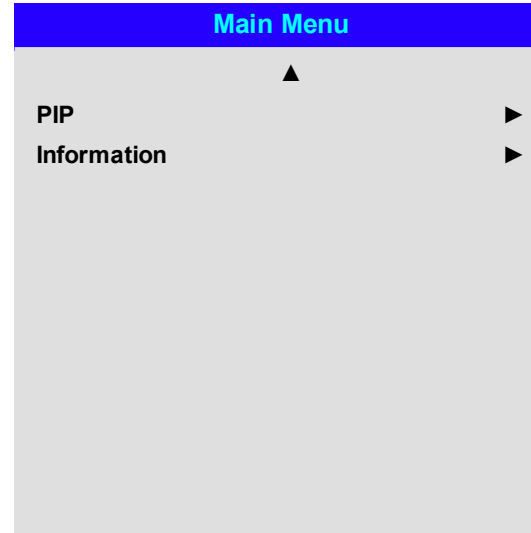
OSD: Top Level Menu Continued

Inside a menu

When you open a menu, the page consists of the following elements:

- Title bar at the top shows which menu you have accessed.
- Highlighted item
- Available and unavailable items Unavailable items appear a pale gray color. Whether an item is available may depend on other settings.
- The text or symbol to the right of an item shows whether the item:
    - has a value that can be changed (the current value is shown)
    - opens a sub-menu (an arrow button is displayed)
    - executes a command (the space to the right of the item is blank).

Menu Name	
Highlighted Item	**Value**
Menu Item	**Value**
Unavailable Item	Value
Slider	**Value** [▭▬]
Sub-menu	►
Command	
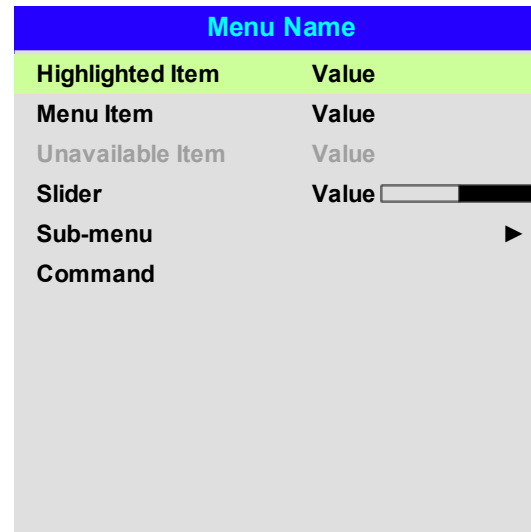
Inside a menu

☞ *The highlighted item has green background.*

Accessing sub menus

Use the **UP** and **DOWN** arrow buttons to highlight the sub-menu, then press **ENTER/OK**.

Executing commands

If the item contains a command, highlighting it reveals an **OK** button.

Press **ENTER/OK** to execute the highlighted command.

You may be asked for confirmation. Use the **ENTER/OK** to confirm, or **EXIT** to cancel.

Menu Name	
Menu Item	**Value**
Highlighted Command	**OK**

Highlighted Command

Command Name	
Warning	
All [Menu] values will be lost.	
Press OK to confirm	
Press Exit to cancel	

Confirmation Dialog

Editing projector settings

If the highlighted menu item contains a list of values to choose from, you can change the value by doing the following:

1. Highlight the menu item and press **ENTER/OK**.
2. In the list of values that opens, use the **UP** and **DOWN** arrow buttons to highlight a value, then press **ENTER/OK** again to select the highlighted value.
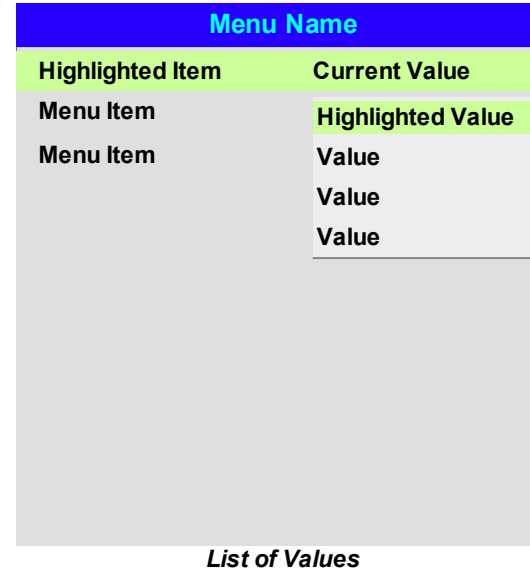
Menu Name	
Highlighted Item	**Current Value**
Menu Item	**Highlighted Value**
Menu Item	**Value**
	Value
	Value

List of Values

Using a slider to set a value

Some parameters open a slider. To set such a parameter:

1. Press the **LEFT** or **RIGHT** arrow button, or **ENTER/OK**. The arrow buttons will open the slider and adjust the value at the same time. **ENTER/OK** will open the slider without altering the initial value.
2. Use the **LEFT** and **RIGHT** arrow buttons to move the slider.
3. When ready, press **EXIT** to exit the slider and return to the menu, or press **MENU** to exit the slider without showing the menu again.

Parameter	**Value**

Slider

Editing numeric values

Some parameters take numeric values without using sliders - for example, color matching values or IP addresses.

1. Use the **UP** and **DOWN** arrow buttons to highlight the row containing the numeric field you wish to edit.
2. Press **ENTER/OK** to enter edit mode. A numeric field in edit mode is white text on blue background.
3. In edit mode:
     - Use the **UP** arrow button to increase the numeric value.
     - Use the **DOWN** arrow button to decrease the numeric value.
4. Use the **LEFT** and **RIGHT** arrow buttons to edit the next or previous numeric fields within the same row.
5. Once ready, press **ENTER/OK** to exit edit mode.

Data	
Row	**x: 0.658 y: 0.339**
Highlighted Row	**x: 0.315 y: 0.662**
Row	**x: 0.146 y: 0.043**
Row	**x: 0.276 y: 0.283**

Notes

Using the projector

Main menu

- **Input**
  Press **ENTER/OK** to open the list of available inputs. Use the **UP** and **DOWN** arrow buttons to select an input from the list, then press **ENTER/OK** to confirm your choice. Press **EXIT** to return to the main menu.
- **Test Pattern**
  Choose from: *White, Black, Red, Green, Blue, Checkerboard, Crosshatch, V Burst, H Burst, Color Bar,* Screen Layout, *Off.* Use the **LEFT** and **RIGHT** arrow buttons to switch between values.
- Lens**,** Image**,** Color, Geometry, Edge Blend**,** 3D**,** Laser**,** Setup and Network.
  Press **ENTER/OK** to open these menus and access various settings.

Press the **DOWN** arrow at the bottom of the page to access additional menus:

- **PIP** and **Information**
  Press **ENTER/OK** to open these menus and access various settings.

Press the **UP** arrow to return to the previous page.

Main Menu	
Input	HDMI 1
Test Pattern	
Lens	▶
Image	▶
Color	▶
Geometry	▶
Edge Blend	▶
3D	▶
Laser	▶
Setup	▶
Network	▶
▼	
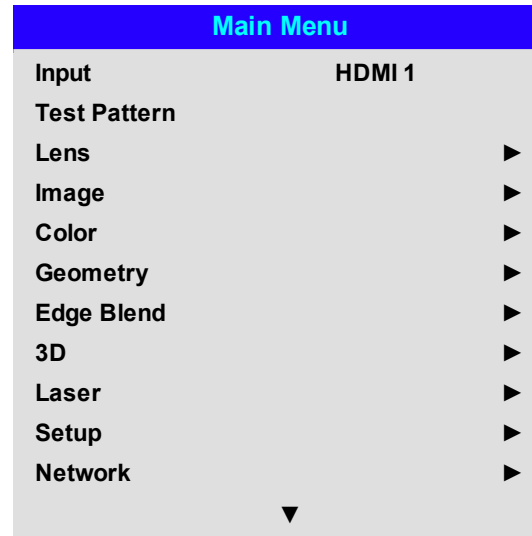
Main Menu, page 1

Main Menu	
▲	
PIP	▶
Information	▶
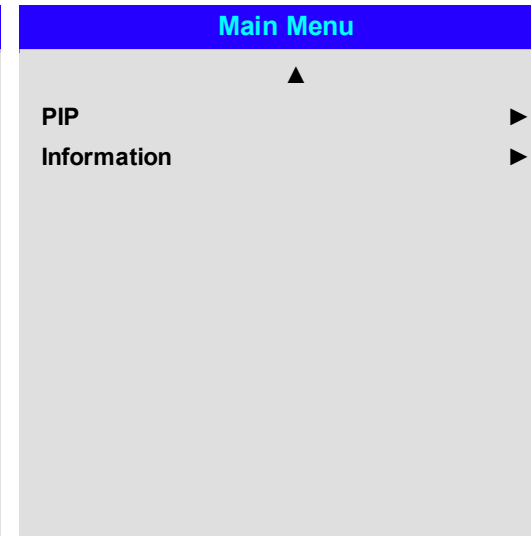
Main menu, page 2

Notes

☞ *See Signal inputs on page 26 for information about the available inputs and connections.*

☞ *Selecting a test pattern hides the OSD. Press **EXIT** to hide the test pattern, and then press **MENU** to show the OSD*

Lens menu

- **Lens Lock**
  When this feature is **On**, all other Lens menu items are disabled.
- **Lens Control**
  Opens a sub-menu, see below.
- **Center Lens**
  Centers the lens.
- **Lens Type**
  Choose a UST or a non-UST lens.
- **Lens Memory**
  Opens a sub-menu, see next page.

Lens	
Lens Lock	**Off**
Lens Control	►
Center Lens	
Lens Type	**non-UST Lens**
Lens Memory	►

Lens control

Lens Control settings operate in **Zoom/Focus Adjustment** and **Shift Adjustment** mode. Press **ENTER/OK** to switch between modes.

When in **Zoom/Focus Adjustment** mode:

- Use the **UP** and **DOWN** arrow buttons to adjust **Zoom**.
- Use the **LEFT** and **RIGHT** arrow buttons to adjust **Focus**.

When in **Shift Adjustment** mode, use the arrow buttons to adjust **Shift**.

Lens Control		
Zoom	▲	▼
Focus	◄	►

[OK] Shift Adjustment

Lens Control
▲
◄ **Shift** ►
▼
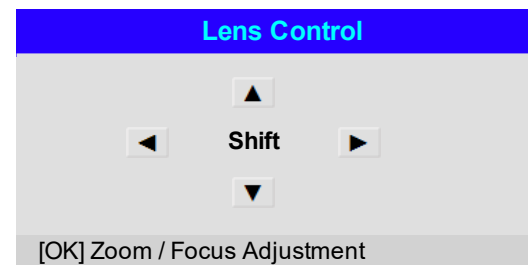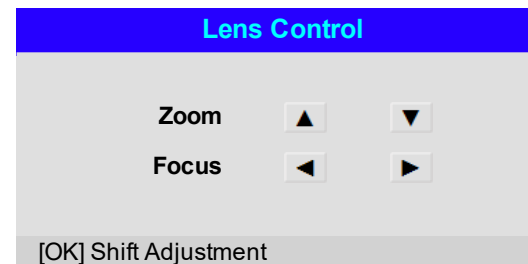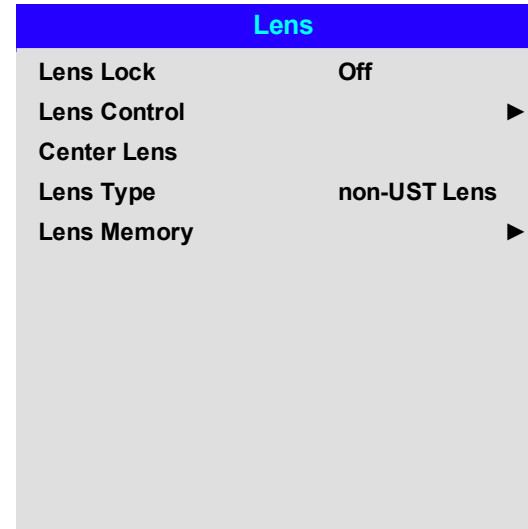
[OK] Zoom / Focus Adjustment

Lens memory

This menu allows you to load, save and delete up to ten lens presets, containing position, zoom, focus and shift adjustment information.

For example, if using different screen sizes and aspect ratios, you can save zoom, focus and positioning for each screen size and aspect ratio in a dedicated preset.

Use **Clear Memory** to delete a memory preset if you need to save a new combination of lens settings in its place. Overwriting a saved memory preset is not possible.

Lens Memory	
Load Memory	►
Save Memory	►
Clear Memory	►

Lens Load Memory	
Memory 1	OK
Memory 2	
Memory 3	
Memory 4	
Memory 5	
Memory 6	
Memory 7	
Memory 8	
Memory 9	
Memory 10	

Lens Save Memory	
Memory 1	OK
Memory 2	
Memory 3	
Memory 4	
Memory 5	
Memory 6	
Memory 7	
Memory 8	
Memory 9	
Memory 10	

Lens Clear Memory	
Memory 1	OK
Memory 2	
Memory 3	
Memory 4	
Memory 5	
Memory 6	
Memory 7	
Memory 8	
Memory 9	
Memory 10	

Notes
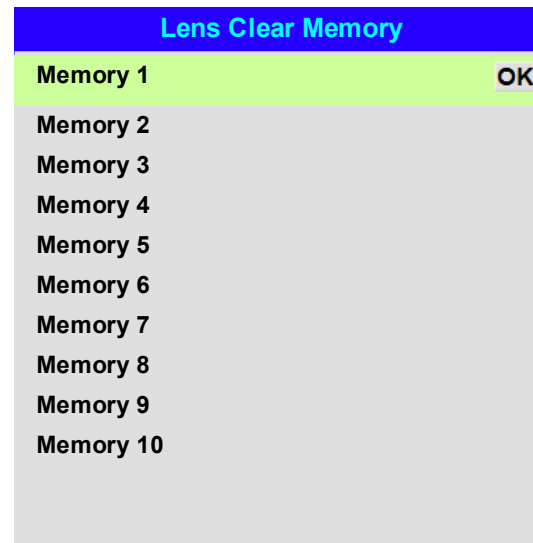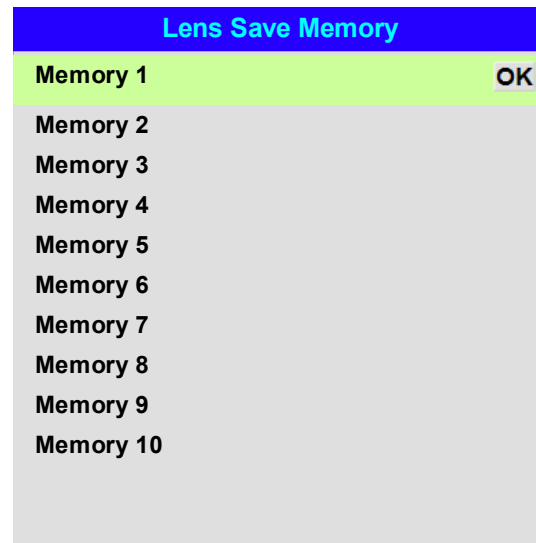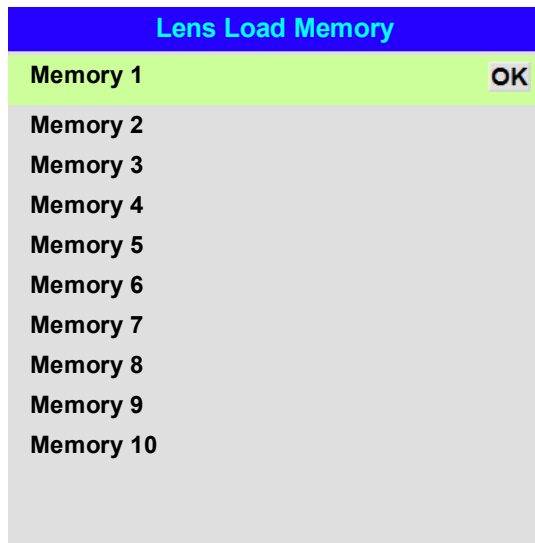
Image menu

- **Picture Mode**
  Choose from **High Bright**, **Presentation** and **Video**.
  Use a different setting depending the type of input source.
  Press **ENTER/SELECT** to open the list.
  Use the **UP** and **DOWN** arrow buttons to select a picture mode from the list, then press **ENTER/OK** to confirm your choice.
  Press **EXIT** to return to the main menu.

- **Brightness, Contrast, Saturation, Hue, Sharpness**
  Highlight the setting you wish to edit, and then press **ENTER/OK**, or the **LEFT** or **RIGHT** arrow button to open the slider.
  Use the **LEFT** and **RIGHT** arrow buttons to adjust the slider.
  Press **EXIT** to close the slider and return to the menu, or **MENU** to close the slider and return to the projected image.

- **Noise Reduction**
  Choose a level of noise reduction from **Off, Low, Middle** and **High**.

- **Gamma**
  Choose a de-gamma curve from **1.0, 1.8, 2.0, 2.2, 2.35, 2.5, S-Curve,** and **DICOM**.
  Used correctly, the **Gamma** setting can improve contrast while maintaining good details for blacks and whites.
  If excess ambient light washes out the image and it is difficult to see details in dark areas, lower the **Gamma** setting to compensate. This improves contrast while maintaining good details for blacks.
  Conversely, if the image is washed out and unnatural, with excessive detail in black areas, increase the setting.
  S-Curve is an enhanced mid-tone gamma.
  DICOM is a simulated DICOM display, which can be used for training applications.

- **Dynamic Black**
  Set to On to allow for increased contrast in darker scenes by modulating the light source.

- **Light Off Timer**
  When **Dynamic Black** is **On**, the **Light Off Timer** will define if laser light source will turn off after a period of time has passed. The options are: **Disable, 0.5, 1.0, 1.5, 2.0, 3.0, 4.0** seconds.

- **Position and Phase**
  Open the sub menu to adjust the position and phase settings.

- **Freeze**
  Freezes the current frame.

- **Resync**
  Press **ENTER/OK** to force the projector to resynchronise with the current input

Image	
Picture Mode	High Bright
Brightness	100
Contrast	100
Saturation	100
Hue	100
Sharpness	10
Noise Reduction	▶
Gamma	2.2
Dynamic Black	Off
Light Off Timer	– – – –
Position and Phase	▶
▼	

Image
▲
Freeze
Resync
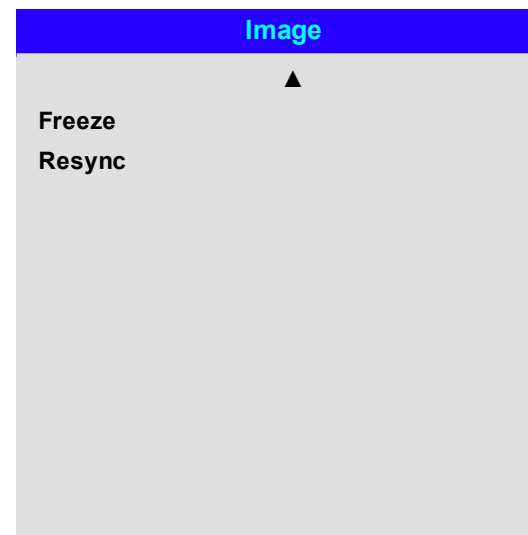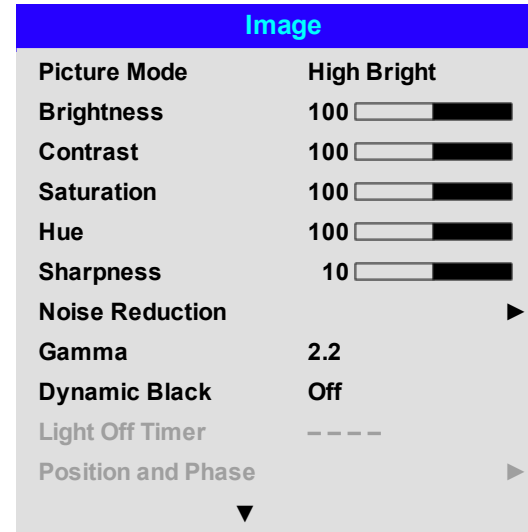
Position and phase

- **V Position** and **H Position**
  Set the sliders as required.
- **Phase**
  Adjusts the phase of the pixel sampling clock relative to the incoming signal. Adjust the phase if noise is visible.
- **Tracking**
  Adjusts the frequency of the pixel sampling clock. Flicker or vertical banding indicate poor tracking.
- **Sync Level**
  Adjusts the voltage level of the signal detection circuitry. Adjust if the projector loses sync during scenes where the signal drops below black.
  Highlight the setting you wish to edit, and then press ENTER/OK, or the LEFT or RIGHT arrow button to open the slider.
  Use the LEFT and RIGHT arrow buttons to adjust the slider.
  Press EXIT to close the slider and return to the menu, or MENU to exit both the slider and the menu.

Position and Phase	
V Position	100
H Position	100
Phase	100
Tracking	100
Sync Level	100
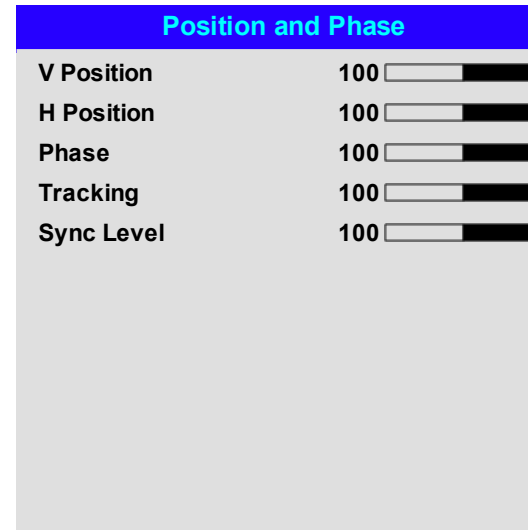
Notes

Some of the settings within the Position and Phase sub-menu, Phase, Tracking and Sync Level, affect only VGA input source. These settings are not available if the projector is using a different source.

Adjust the Phase after adjusting Tracking.

Noise reduction

- **Temporal**
  A time-based filter that removes the noise on the luminance component.
- **Block**
  This filter helps reduce block noise, which appears like small blocks in the image and is caused by MPEG compression.
- **Mosquito**
  This filter helps reduce mosquito noise, which appears around the edges of the image and is caused by the image compression algorithm.
- **Horizontal** and **Vertical**
  These filters soften the image.
- **Reset**

Noise Reduction	
Temporal	100
Block	100
Mosquito	100
Horizontal	100
Vertical	100
Reset	

Notes

Color menu
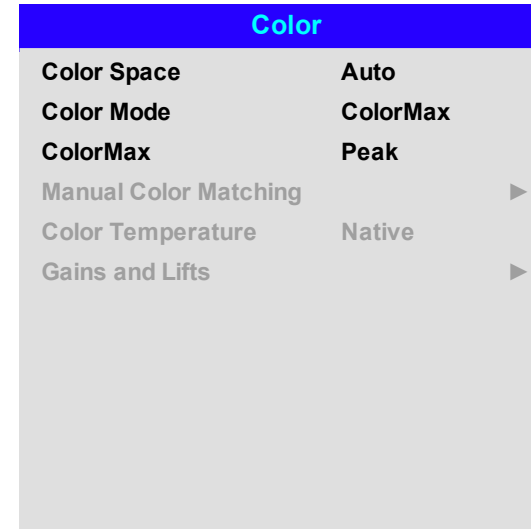
Color	
Color Space	**Auto**
Color Mode	**ColorMax**
ColorMax	**Peak**
Manual Color Matching	▶
Color Temperature	Native
Gains and Lifts	▶

Color space

In most cases, the Auto setting determines the correct colorspace to use. If it does not, you can choose a specific colorspace:

Choose from **Auto**, **YPbPr**, **YCbCr**, **RGB PC** and **RGB Video**.

Color	
Color Space	**Auto**
Color Mode	**Auto**
ColorMax	**YPbPr**
Manual Color Matching	**YCbCr**
Color Temperature	**RGB PC**
Gains and Lifts	**RGB Video**
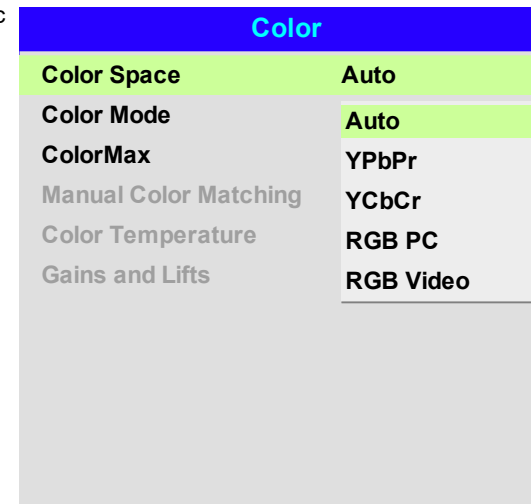
Color mode

The projector can work in the following color modes: **ColorMax, Manual Color Matching, Color Temperature** and **Gains and Lifts**.

Color	
Color Space	**Auto**
Color Mode	**ColorMax**
ColorMax	**ColorMax**
Manual Color Matching	Manual Color Matching
Color Temperature	**Color Temperature**
Gains and Lifts	**Gains and Lifts**

ColorMax

1. Set **Color Mode** to **ColorMax**.
2. Navigate to the **ColorMax** setting.
3. Choose from **HDTV, Peak, User 1** and **User 2**. **User 1** and **User 2** are user-defined color gamuts set via the **Setup > ColorMax** menu.

Color	
Color Space	**Auto**
Color Mode	**ColorMax**
ColorMax	**Peak**
Manual Color Matching	**HDTV**
Color Temperature	**Peak**
Gains and Lifts	**User 1**
	User 2

Manual color matching

1. Set **Color Mode** to **Manual Color Matching**.
2. Open the **Manual Color Matching** submenu.

Here you can do the following:

- Switch **Auto Test Pattern On** and **Off**.
- Adjust **Hue**, **Saturation and** Gain settings for each individual color to improve the color balance of the projected image.
- Adjust white balance RGB values.
- Reset all values.

Manual Color Matching		
Auto Test Pattern	Off	
Red		►
Green		►
Blue		►
Yellow		►
Cyan		►
Magenta		►
White Balance		►
Reset		

Manual Color Matching - Red	
Hue	100
Saturation	100
Gain	100

Manual Color Matching - White Balance	
Red	100
Green	100
Blue	100

Color matching parameters explained

The levels of hue, saturation and gain in the Manual Color Matching menu change the color values in the following ways:

1. **Hue** Specifies the position of each color (red, yellow, green, cyan, blue and magenta) relative to its neighboring colors.

2. **Saturation** Specifies the level of white in each color (i.e. how "pale" each color is).

3. **Gain** Controls the amount of light that goes into each color, i.e. the lowest gain would produce black.
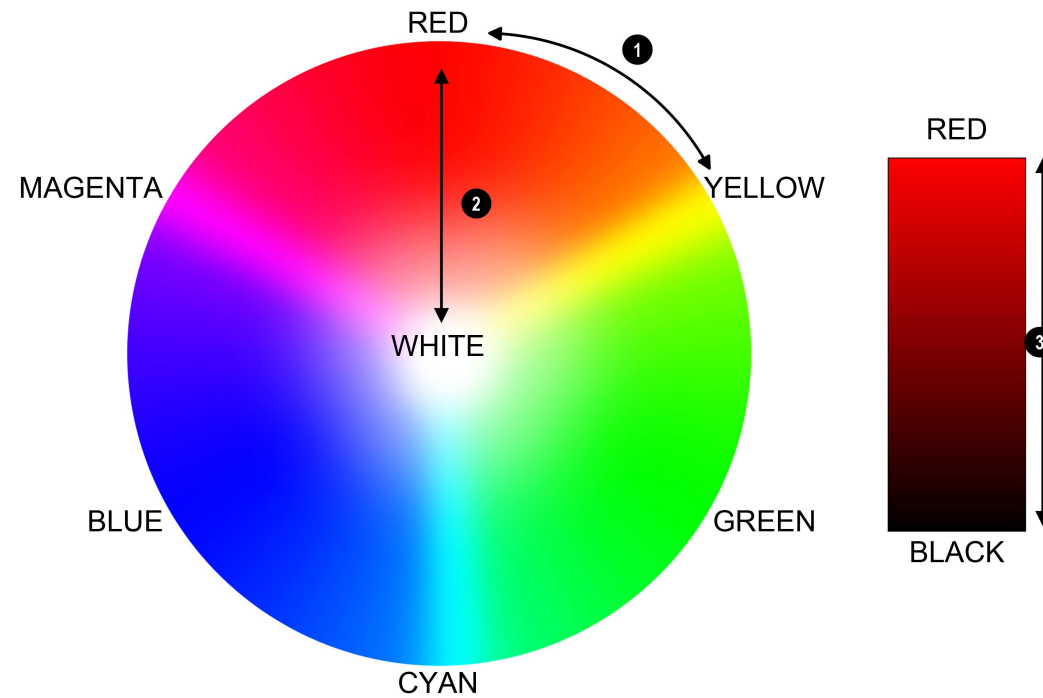
Color temperature

1. Set **Color Mode** to **Color Temperature**.
2. Navigate to the **Color Temperature** setting. Choose a value from **3200K** (warmer) to **9300K** (cooler) or **Native** (no correction).

Color	
Color Space	**Auto**
Color Mode	**Color Temperature**
ColorMax	Peak
Manual Color Matching	▶
Color Temperature	**Native**
Gains and Lifts	**3200K**
	5400K
	6500K
	7500K
	9300K
	Native
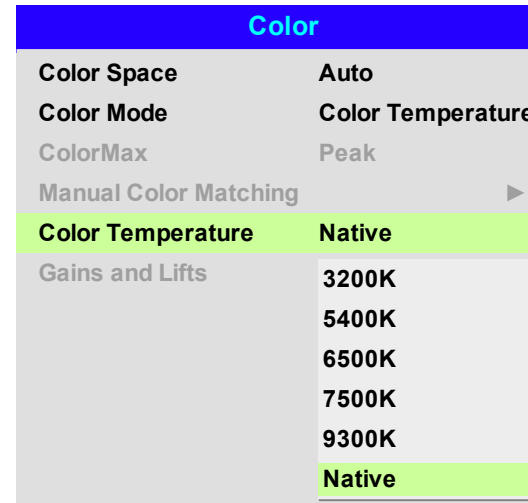
Gains and lifts

1. Set **Color Mode** to **Gains and Lifts**.
2. Open the **Gains and Lifts** submenu.

Lifts allow you to adjust black levels of individual colors, while gains adjust the bright part of the scale.

Set the sliders as required

Gains and Lifts	
Red Lift	**100**
Green Lift	**100**
Blue Lift	**100**
Red Gain	**100**
Green Gain	**100**
Blue Gain	**100**

Notes

Geometry menu

This menu allows you to compensate for image distortions caused by an unusual projection angle or irregular screen surface.

Geometry	
Aspect Ratio	**Source**
Digital Zoom	►
Overscan	**Off**
Blanking	►
Warping Mode	**Keystone**
Keystone	►
4 Corners	►
Rotation	►
Pincushion / Barrel	►
Arc	►
Custom Warp	►

Aspect ratio

This feature defines the aspect ratio of the source. Use the **Setup > Screen Setting** to define the screen aspect ratio.

If you choose a preset aspect ratio from here, it will give you the best fit for your selection.

Choose from:

- **5:4**
- **4:3**
- **16:10**
- **16:9**
- **1.88**
- **2.35**
- **TheaterScope**
- **Source**
- **Unscaled**

Theaterscope setting

The **TheaterScope** setting is used in combination with an anamorphic lens to restore 2.35: images packed into a 16:9 frame. Such images are projected with black lines at the top and bottom of the 16:9 screen to make up for the difference in aspect ratios.

Without an anamorphic lens and without the TheaterScope setting applied, a 16:9 source containing a 2.35:1 image looks like this:
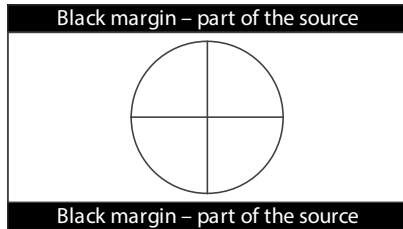
If we change the setting to TheaterScope, the black lines will disappear but the image will stretch vertically to reach the top and bottom of the DMD™:
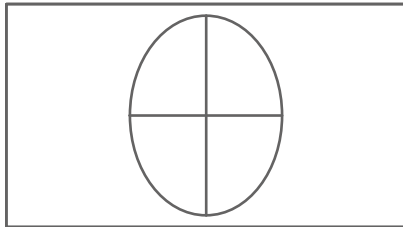
An anamorphic lens will stretch the image horizontally, restoring the original 2.35 ratio:
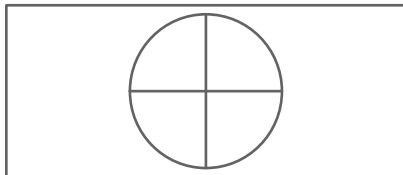
Digital zoom

Digital zooming enlarges a section of the image, while the area outside the enlarged section is cropped out to preserve the overall image size.

- **Digital Zoom** defines the level of zoom that needs to be applied. If **Digital Zoom** is set to 0, then the other settings in the menu will be disabled.
- **Digital Pan** and **Digital Scan** specify the area that is being enlarged:
    - **Digital Pan** adjusts the horizontal coordinates.
    - **Digital Scan** adjusts the vertical coordinates.

The **Reset** command restores the default **Digital Zoom, Digital Pan** and **Digital Scan** values.

Digital Zoom	
Digital Zoom	0
Digital Pan	0
Digital Scan	0
Reset	
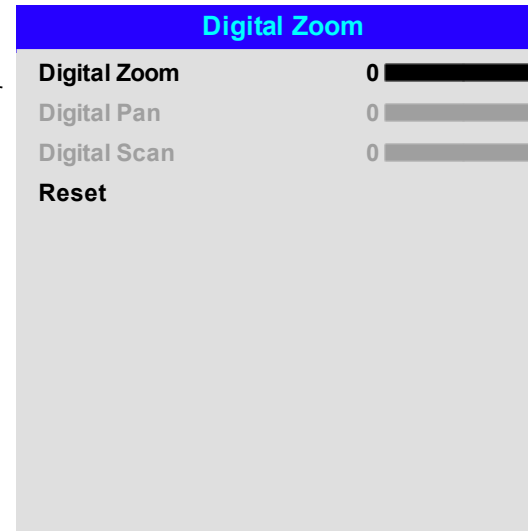
Notes

Digital Zoom is a temporary setting and not retained after an input change or power cycle.

Overscan

Use this setting to compensate for noisy or badly defined image edges.

Crop removes unwanted artifacts from the edges of your image by cropping the edges.

Zoom increases the size of the image to force the edges off-screen

Geometry	
Aspect Ratio	Source
Digital Zoom	▶
Overscan	Off
Blanking	Off
Warping Mode	Crop
Keystone	Zoom
4 Corners	
Rotation	▶
Pincushion / Barrel	▶
Arc	▶
Custom Warp	▶
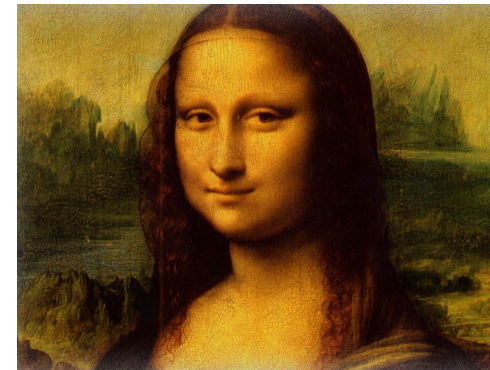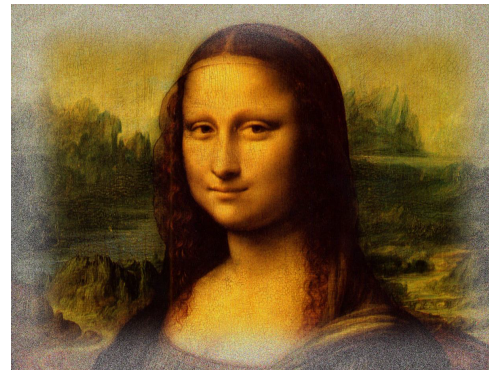
Blanking

Use this feature to:

- fit an odd-sized screen;
- cut off timecode dots in the top line of a picture;
- cut off subtitles, etc.

Select the edge you wish to blank and use the **LEFT** and **RIGHT** arrow buttons to determine the amount of correction.

Use the **Reset** command to restore blanked edges.

Blanking	
Top	0
Bottom	0
Left	0
Right	0
Reset	
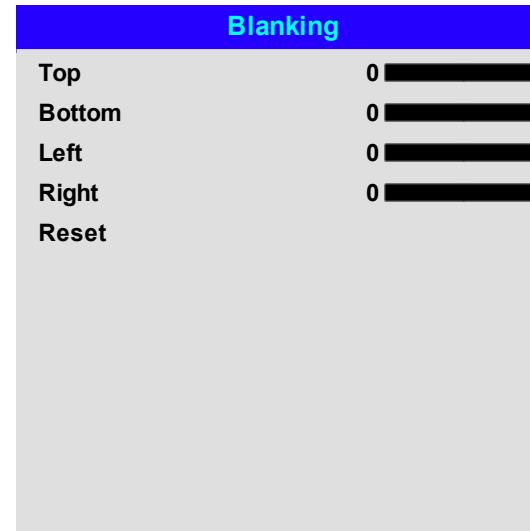
Notes

Keystone

Use this setting to compensate for any distortion caused by the projector being in a different horizontal or vertical plane to the screen.

Keystone	
H Keystone	0
V Keystone	0
Rotation	0
Reset	

Keystone example

The projector is positioned at an angle
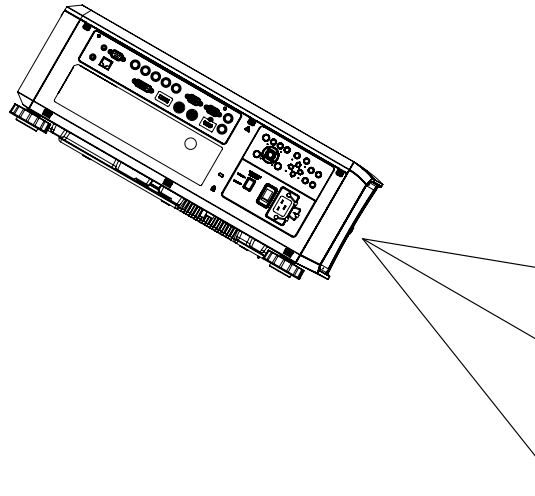
The resulting image is distorted
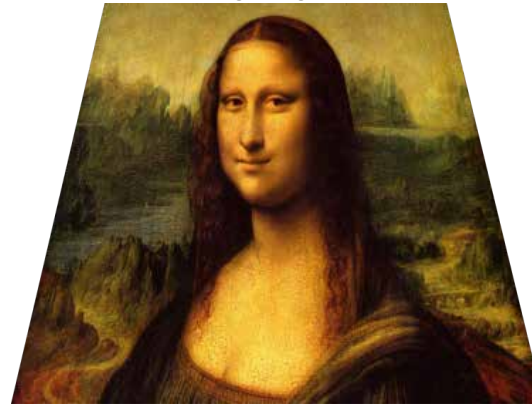
The image is corrected when Keystone is applied

Keystone settings

1. **Projector to the left** The projector is positioned to the left of the screen. To correct, apply a positive **Horizontal Keystone** value using the **RIGHT** arrow button.

2. **Projector to the right** The projector is positioned to the right of the screen. To correct, apply a negative **Horizontal Keystone** value using the **LEFT** arrow button.

3. **Projector high** The projector is positioned above the screen at a downward angle. To correct, apply a negative **Vertical Keystone** value using the **DOWN** arrow button.

4. **Projector low** The projector is positioned below the screen at an upward angle. To correct, apply a positive **Vertical Keystone** value using the **UP** arrow button.

5. **Projector straight** The projector is directly opposite the screen at a right angle both horizontally and vertically. No correction is needed.
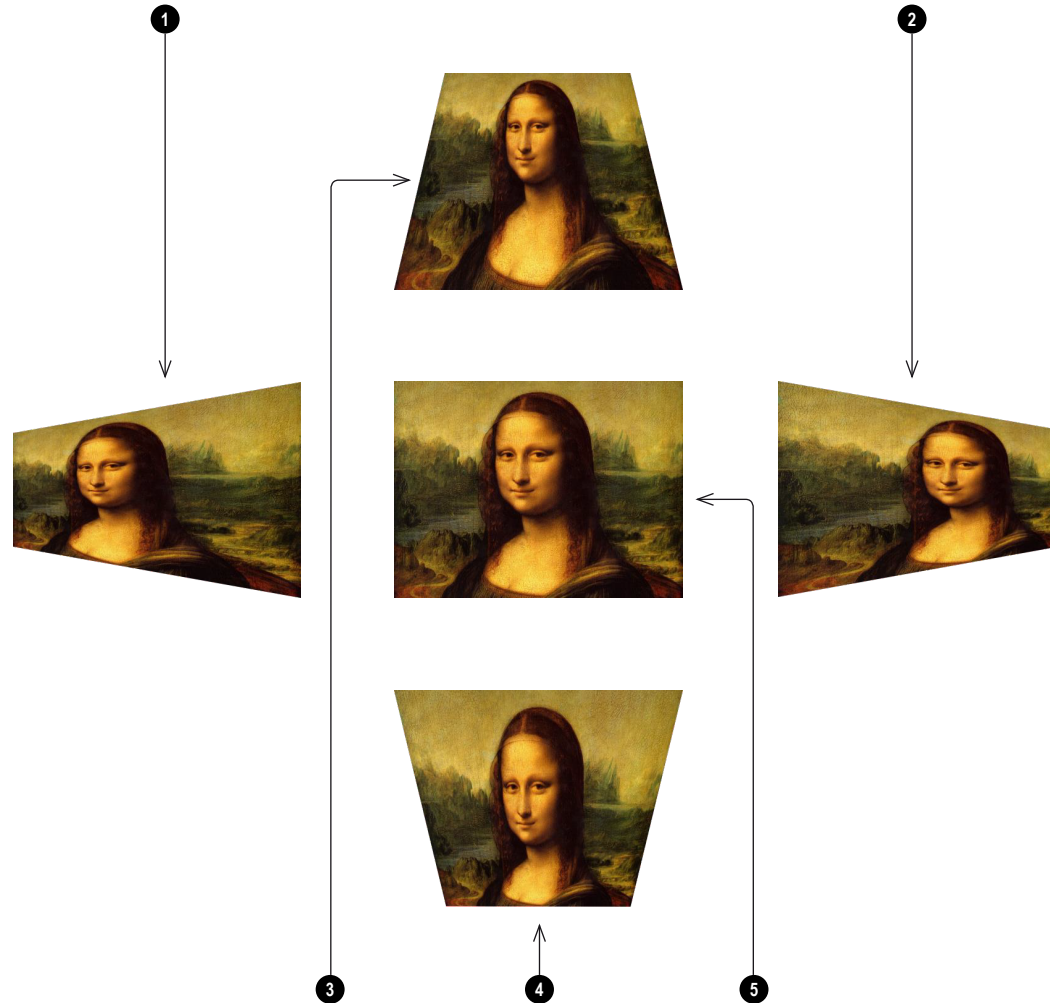
Horizontal and vertical keystone corrections

4 corners

For each corner, apply horizontal and / or vertical correction as necessary to restore the rectangular shape of the image.

4 Corners	
Top Left Corner	►
Top Right Corner	►
Bottom Left Corner	►
Bottom Right Corner	►
Reset	
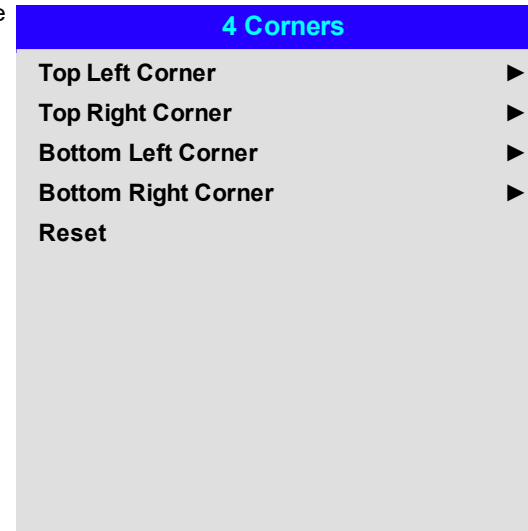
Notes

*Corner corrections provide a simple setup for awkward installations and irregular shaped screens that may distort the image. To apply a similar (but less flexible) correction, while preserving the original aspect ratio of the image, use the **Keystone** menu.*

Top right corner example

In this illustration, the top right corner requires both horizontal and vertical correction.

Top Right Corner Adjustment

Top Right Corner x   ◄   0   ►

Top Right Corner y   ▲   0   ▼
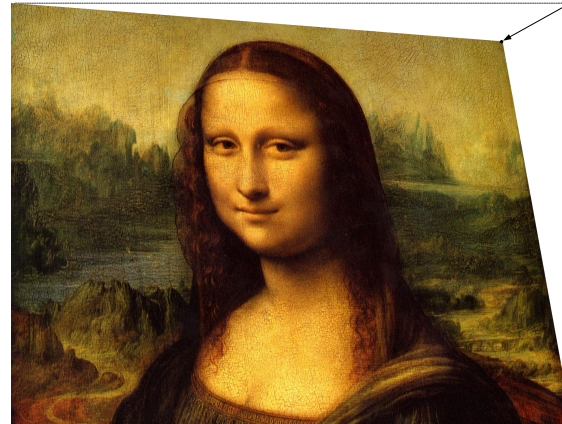
Rotation

Use this feature for example to correct a mounting error causing the image not to be level with the screen.

Rotation	
Rotation	0
Reset	
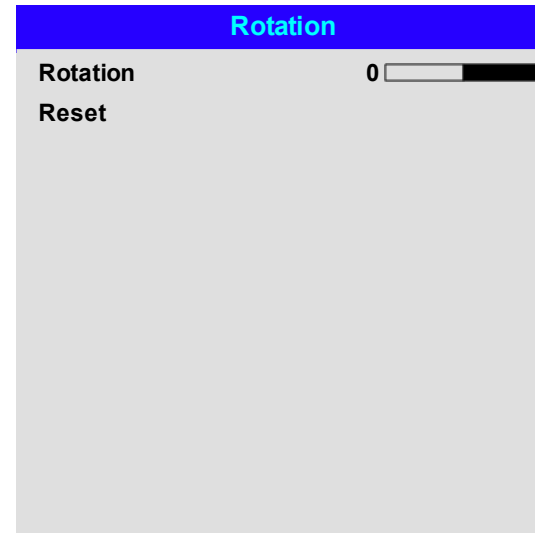
Rotation example

1. **DMD™ area**
   The DMD™ is not rotated. It still covers the area that would be occupied by the image without correction.

2. **Rotated image**
   The image is smaller than the surrounding DMD™ area. It is scaled in order to remain within the DMD™ area.

3. **Angle of rotation**
   Each step on the slider is 0.25° of rotation. In this example the angle is 5°, therefore Rotation value is 20.
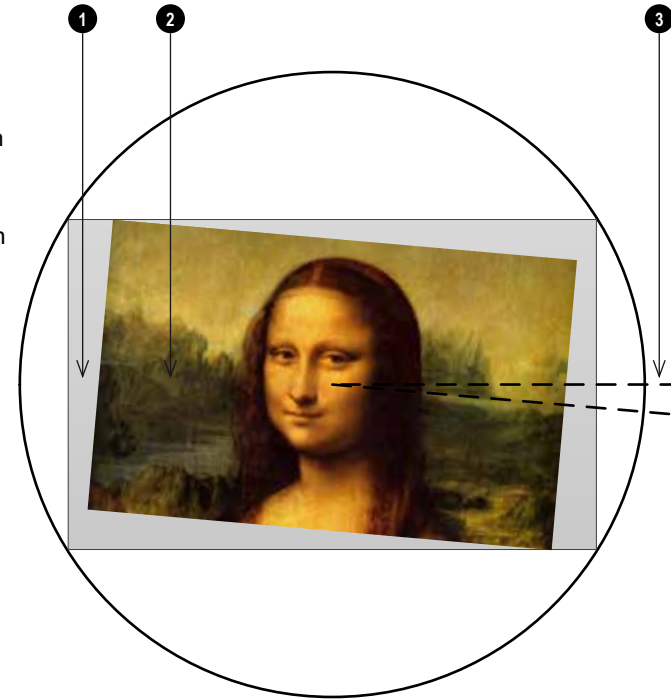
Pincushion / barrel

Pincushion or barrel distortions are the result of poor or incorrect tensioning of the screen or using a surface that is not flat.

Use the **Pincushion / Barrel** control to compensate electronically for such distortions.

You can also use this menu to make simple panoramic screen corrections without using external processors.

Pincushion / Barrel	
H Pin/Barrel	0
V Pin/Barrel	0
Keystone	►
Reset	
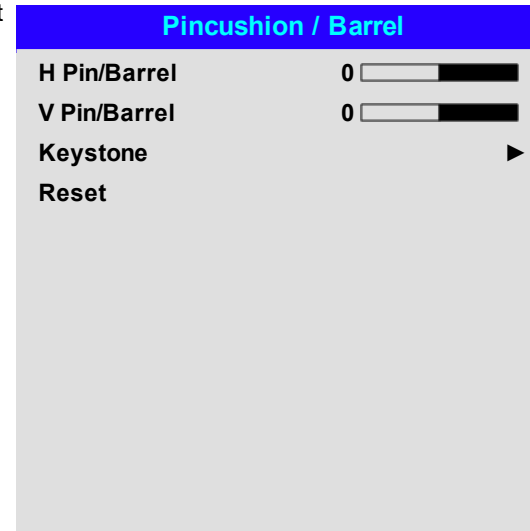
Pincushion/ Barrel example

The illustration shows pincushion and barrel correction applied both horizontally and vertically, in equal measures.
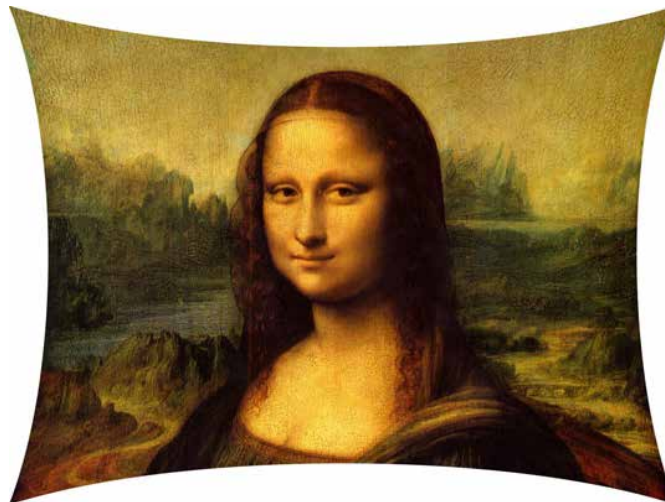
Pincushion

Barrel

Arc

This feature is similar to **Pincushion / Barrel** but allows you to apply curvature to each edge of the image independently so you can have any combination of corrections.

Arc	
Top	0
Bottom	0
Left	0
Right	0
Reset	
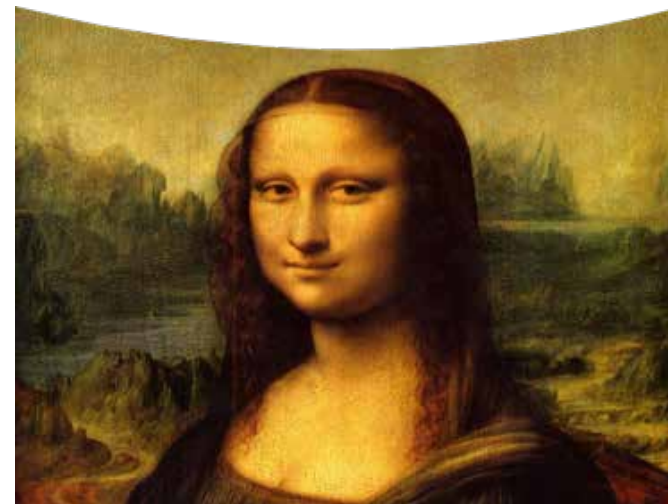
Custom warp

This feature permits selection of predefined User warp maps. Use the Projector Controller PC application to create the custom warp maps.

Custom warp maps provide non-linear curvature correction for curved or spherical screens and other irregular shaped surfaces such as building mapping.

Custom Warp

Off

User 1

User 2
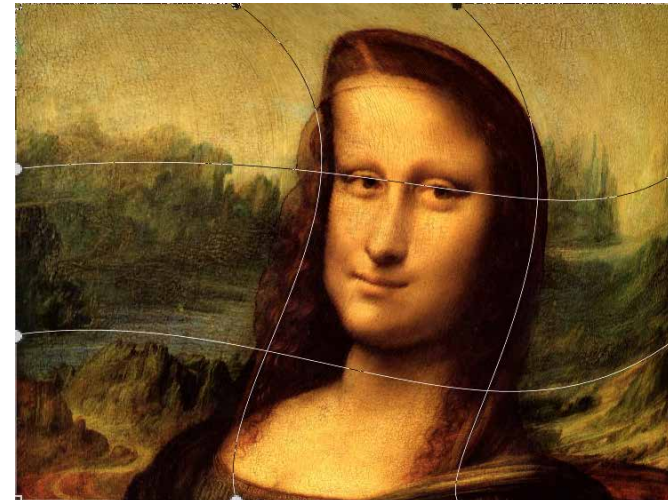
Edge blend menu

Use this menu to blend together images from an array of two or more projectors. The feature feathers the light output of the projector within the edges that overlap with other projectors in the array: as a result, the overlapping edges are evenly lit and easily blend in with the rest of the image.

- **Edge Blend**
  Enable and disable **Edge Blend**
- **Align Pattern**
  Add markers to the image showing the edges of the blend area and making the overlaps more visible to help adjust the physical position of the projectors in the array.
- **Blend Start**
  Determine the start point of the blended regions. top, bottom, left right
- **Blend Width**
  Determine the width of the blended regions.
- **Black Level Uplift**
  Adjust black levels to compensate if the blended regions appear brighter than the rest of the image.
- **Reset**
  Reset all **Edge Blend** settings to their factory default values.

Edge Blend	
Edge Blend	On
Align Pattern	Off
Blend Start	►
Blend Width	►
Black Level Uplift	►
Reset	

Blend start

Use the blend start options to deactivate pixels at the edge of the image and set the start point for the blended region. Use the **LEFT** and **RIGHT** arrow buttons to set the start point of the blended regions:

1. Top
2. Bottom
3. Left
4. Right
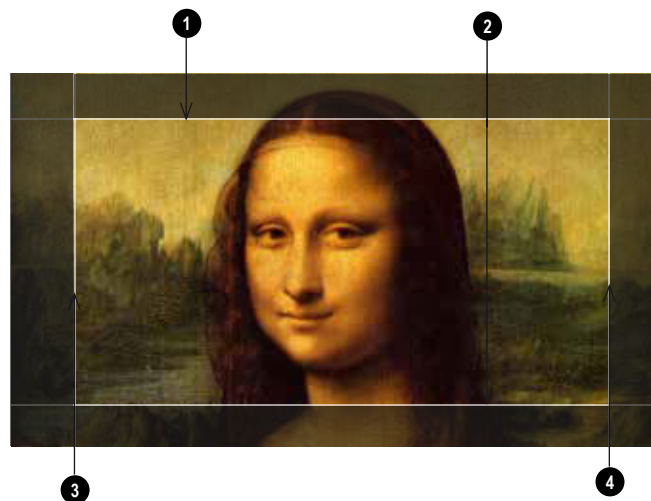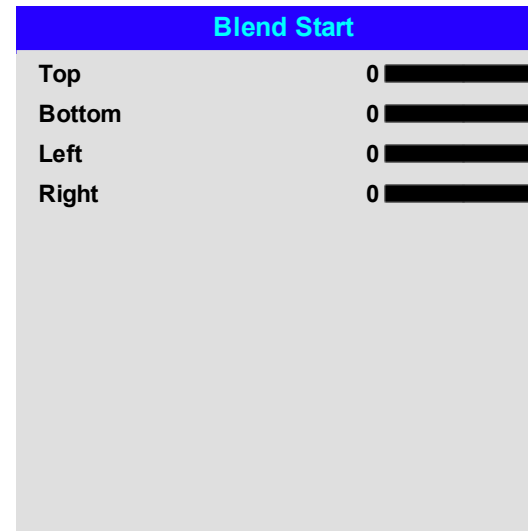
Blend width

Use the **LEFT** and **RIGHT** arrow buttons to set the width of the blended regions:

1. Top
2. Bottom
3. Left
4. Right
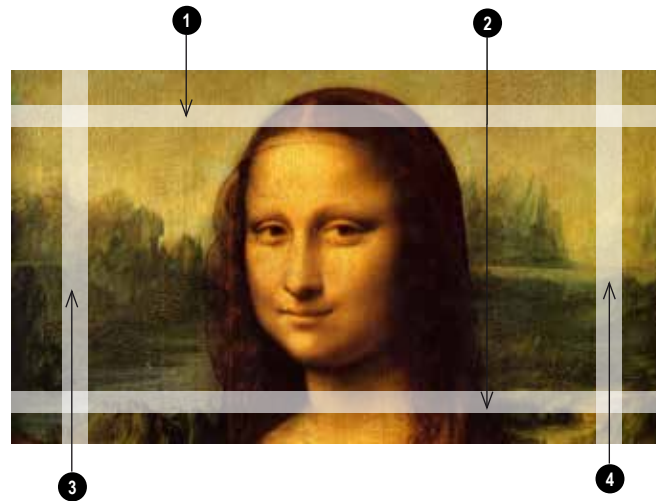
Black level uplift

Black in the blended regions appears less dark than in the rest of the image. To compensate for this, use this menu to raise the black levels of the rest of the image:

- Set **All** to the required amount of black level correction. This will apply equal correction to the black levels of all colors
- If necessary, use the individual color sliders (**Red**, **Green** and **Blue**) for fine adjustment.

You may experience artifacts at the edges where the blended region of one projector overlaps the *pond of mirrors* of its neighbor. In the example below, the blended image comes from *two projectors*, ❶ and ❷. Both images have black level uplift applied; as a result, *artifacts* ❸ and ❹ have emerged at the edges where the black level uplift region of one projector overlaps the pond of mirrors of the other.

To remove the artifacts, you need to slightly reduce the size of the black level uplift region of each projector so it does not overlap the pond of mirrors of the other projector.

- Depending on your array, use **Top**, **Bottom**, **Left** and/or **Right** to reduce the black level uplift size. In the example below, use the **Right** slider of the **projector on the left** ❶ to remove the *artifact on the right* ❹ , and the **Left** slider of the *projector on the right* ❷ to remove the *artifact on the left* ❸.
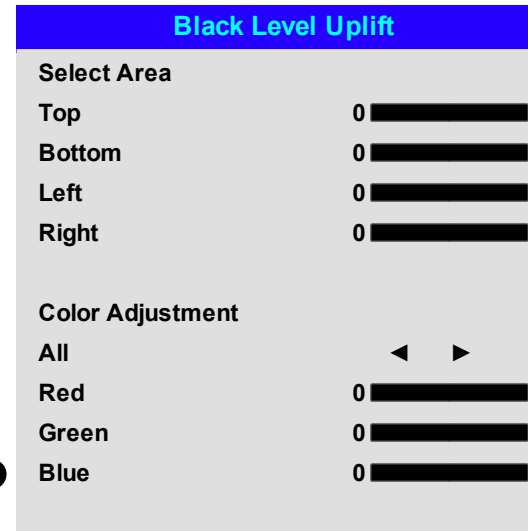
Black Level Uplift	
Select Area	
Top	0
Bottom	0
Left	0
Right	0
Color Adjustment	
All	◄ ►
Red	0
Green	0
Blue	0
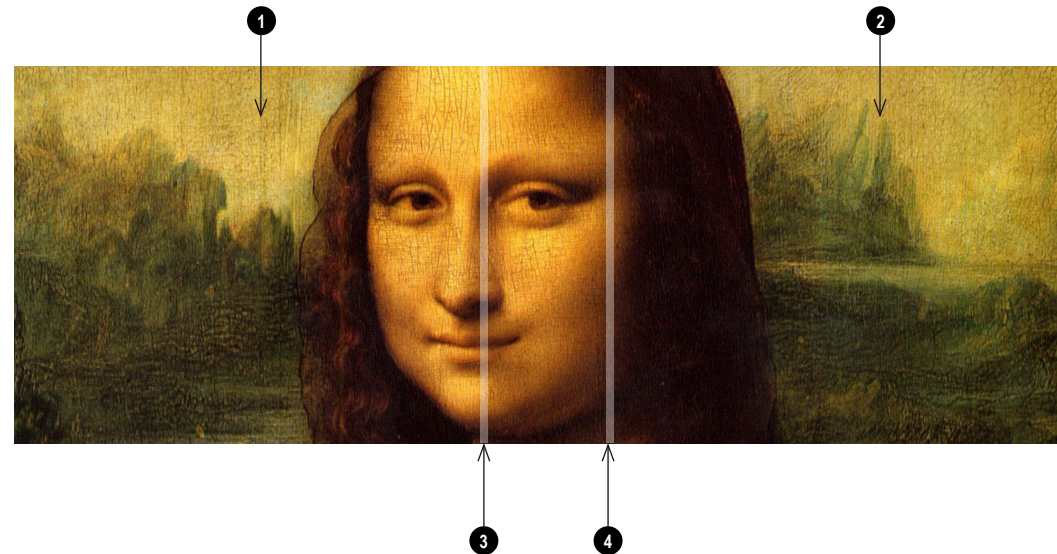
3D menu

Use this menu to enable, disable and set up 3D input, as follows:

- **3D Format — Off, Dual Pipe** and **Frame Sequential**.
  Frame Sequential is for sources where Left and Right eye images are delivered as alternate frames from a single input. **Dual Pipe** is for sources where Left and Right eye are delivered on separate inputs.
- **DLP Link — Off / On**.
  DLP Link On emits a sync pulse for the 3D glasses via the projected image. **DLP Link Off** will send the sync pulse to the sync out connector to use with an external third party emitter.
- **Eye Swap — Normal** and **Reverse**.
  (set to **Reverse** if the left- and right-eye images are displayed in the wrong order)
- **Dark Time — 0.65 ms, 1.3 ms** and **1.95 ms**.
  Set to reduce the effect of banding and image overlapping when viewed through 3D glasses.

3D Sync

- **Offset**.
  Use the **LEFT** and **RIGHT** arrow buttons to compensate for image overlapping (ghosting) when viewed through 3D glasses.
- **Reference— External** and **Internal**.
  Select the source of the 3D sync. Internal is referenced to the incoming video. External is for Frame Sequential 3D sources and is supplied by the graphics card or player.

3D	
3D Format	**Auto**
DLP Link	Off
Eye Swap	Normal
Dark Time	1.95 ms
3D Sync	
Offset	100
Reference	Internal

Notes

☞ *If **3D Format** is set to **Off**, all other 3D settings will be unavailable.*

☞ *See 3D connections on page 28 for more information about supported 3D formats.*

☞ *The following settings are not available when 3D is on:*
Image > Brightness, Contrast, Saturation, Hue, Sharpness, Noise Reduction, Freeze, Resync.
Color > Color Space.
Geometry > Aspect Ratio, Digital Zoom, Overscan.
Setup > Screen Setting, Auto Source, Trigger-1, Trigger-2.
PIP > all settings.

☞ *Also: See 3D types on the next page and See Some 3D settings explained on page 73*

☞ *See 3D formats on page 109 for 3D resolutions and frame rates.*

3D types

To display a 3D image if is first necessary to select the 3D format. This can either be Frame Sequential or Dual Pipe. These formats are described below:

- **Dual Pipe (LEFT and RIGHT)** The left and right eye images are delivered on two separate HDMI links, which the projector will interleave for 3D display.
- **Frame Sequential** For sequential 3D, an external sync is required to identify left and right frames. If no sync is available from the sequential source, the projector will generate an output sync, but it may then be necessary to manually set the Eye Swap each time the player is started.

Dark Time and **Sync Offset** need to be set only once, to optimize the image for the glasses in use.

HDMI 1   **L**

HDMI 2   **R**

Dual Pipe

L   R   L   R
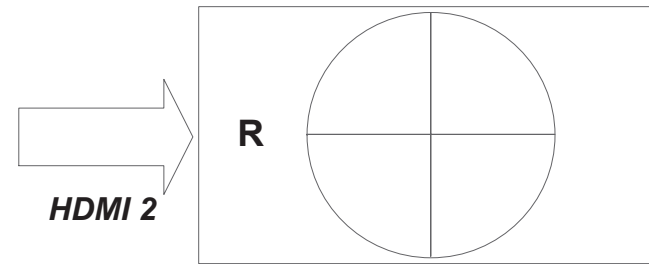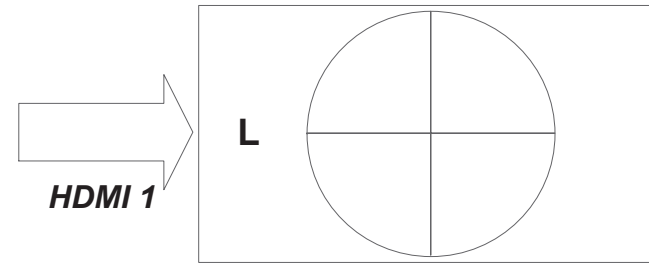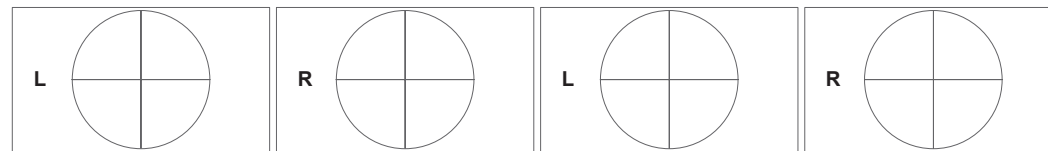
Sequential

Notes

Some 3D settings explained

Dark time

Banding can be caused if the image is displayed before each eye of the 3D switching glasses or ZScreen is not fully open. **Dark Time** allows you to minimize this effect.

Fully On

Left   Right

Fully Off

**Dark
Time**   **Dark
Time**   **Dark
Time**

Eye swap

The outgoing 3D frames are in pairs - the dominant frame being presented first. You can determine which frame should be the dominant one.

By convention the default setting is **Left**.

| LEFT 1 | RIGHT 1 | LEFT 2 | RIGHT 2 | LEFT 3 | RIGHT 3 |

Dominance Left

| RIGHT 1 | LEFT 1 | RIGHT 2 | LEFT 2 | RIGHT 3 | LEFT 3 |

Dominance Right
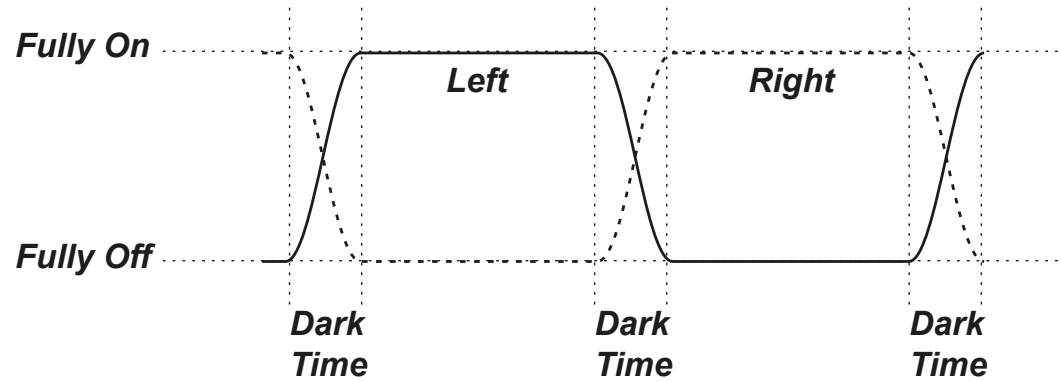
> ***Notes***
>
> *In order to achieve maximum light output and a smooth grayscale, whilst eliminating ghosting, the following procedure is recommended:*
> *1. Set **Dark Time** to a value appropriate to the glasses or ZScreen, say 1.3 ms or 1.95 ms.*
> *2. Adjust **Sync Offset** time to eliminate ghosting and achieve a smooth grayscale.*
> *3. Repeat steps 1 and 2 until the best result is obtained.*

Sync offset

The sync signal from the 3D server will be in phase with the frames generated by its graphics card. However, to compensate for switching delays in the glasses or ZScreen, **Sync Offset** is used to adjust the sync output signal sent to the ZScreen or 3D glasses to minimise overlapping (ghosting in the image when viewed through the 3D glasses.

Incoming video

Incoming sync signal

Video signal with processing delays (and dark time adjustment)
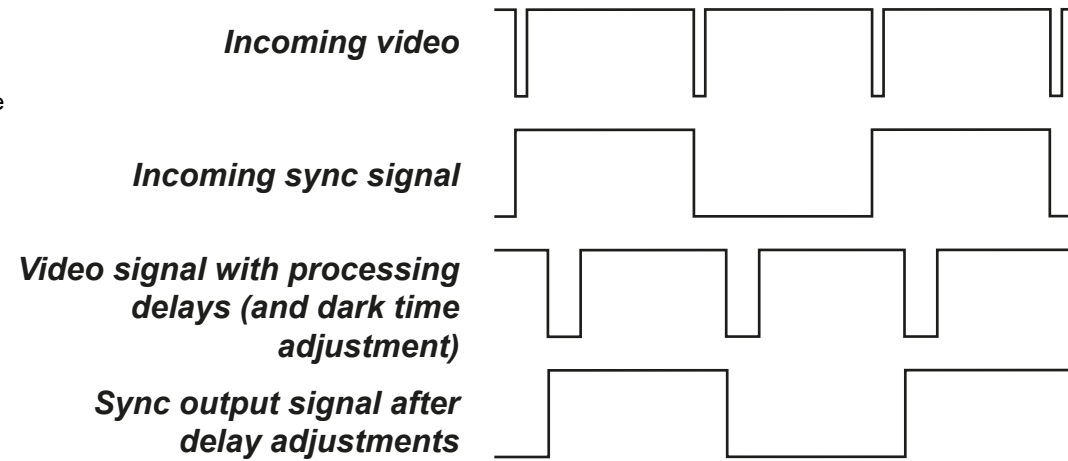
Sync output signal after delay adjustments

Laser menu

- **Power Mode**
    - **Eco** will automatically set the laser power to 80%.
    - **Normal** will set the power to 100%.
    - Set to **Custom** if you wish to adjust the power manually.
- **Power Level**
  This setting is only available if **Power Mode** is set to **Custom**.
  Choose a value between 20 and 100, ranging from 20% to 100% laser power.
- **Constant Brightness**
  Once a **Custom Power Mode** has been set, then Constant Brightness can be turned **ON**.
  This setting will maintain the brightness until the maximum laser power has been reached. The lower the power level the longer it will be maintained.

Laser	
Power Mode	**Normal**
Power Level	– – – –
Constant Brightness	Off

Notes

Setup menu

- **Orientation**
  Choose from **Front Tabletop, Front Ceiling, Rear Tabletop, Rear Ceiling** and **Auto-front**.
- **Cooling Condition**
  Choose from **Table, Ceiling, Freetilt** and **Auto**.
- **High Altitude**
  Choose from **On, Auto** and **Quiet**.
- **Screen Setting**
  Choose from **16:10, 16:9** and **4:3**.
- **ColorMax Setting**
  Set up user-defined color gamut values.
- **Power On/Off**
  Access the submenu to set up automatic projector power on and power off.
- **Clock Adjust**
  Access the submenu to set current date and local time.
- **Standby Mode**
  Choose from **SuperECO**, **ECO** and **Normal**.
  SuperECO uses minimal power and disables power ON via LAN.
  ECO uses a low power setting but enables power ON via Ethernet port only.
  Normal enables power ON via both HDBase-T/LAN and Ethernet ports.
- **Startup Logo**
  Choose from **Off**, **Original** and **User**.
  Select original to display the Digital Projection Ltd. logo on startup. Select User to display a custom logo. Use the projector controller application to set the custom logo for the User option.
- **Blank Screen**
  Choose from **Original, Logo, Black, Blue** and **White**.
- **Auto Source**
  If this setting is **On**, the projector will automatically search for an active input source.

Highlight the **DOWN** arrow at the bottom of the page and press **ENTER/OK** to navigate to the second Setup menu page.

Setup	
Orientation	**Auto-front**
Cooling Condition	**Auto**
High Altitude	**Auto**
Screen Setting	**16:10**
ColorMax Setting	▶
Clock Adjust	▶
Standby Mode	**Normal**
Startup Logo	**Original**
Blank Screen	**Original**
Auto Source	**Off**
	▼

Notes

☞ *Auto-front automatically detects the projector's position and sets Table or Ceiling orientation accordingly.*

☞ *Custom Logo. Please request a Custom Logo Upload Tool from your local Digital Projection Service provider to upload a custom logo.*

- **Trigger1** and **Trigger 2**
Choose from **Screen, 5:4, 4:3, 16:10, 16:9, 1.88, 2.35, TheaterScope, Source, Unscaled** or **RS232** to determine what will cause each trigger output to activate.
- **Infrared Remote**
Set to **Off** if you wish to disable the remote control.
- **IR Code**
The projector and the remote control need a matching IR code: a two-digit number between *00* and *99*. The default IR code is *00*. This is also a master code, which, if assigned to a remote, will work regardless of the value assigned to the projector.
    - **To assign an IR code for the projector:** Select IR code. Use the UP and DOWN arrow buttons to change the values.
    - **To assign an IR code for the remote**, press and hold the **ADDR** button on the remote until the On indicator starts flashing. Release the **ADDR** button and while the indicator is still flashing, enter a two digit address using the numeric input buttons. The indicator will flash three times quickly to confirm the change.
- **IR Code Reset**
Use this command to unassign an IR code from the projector. This will revert the **IR Code** value to 00. **To unassign an IR code from the remote control**, press and hold **ALT** and **ADDR** simultaneously until the On indicator flashes to confirm the change.
- **OSD Settings**
Access this submenu to adjust the appearance and position of the on-screen display.
- **Memory**
Access this submenu to save up to four presets containing custom combinations of image settings, or to recall a saved preset.
- **Image Latency**
Select **Fast** for improved latency.
Select **Normal** when image corruption occurs. Image corruption (frame tearing) may occur when a high level of warping is applied to the image and fast latency is selected. See Geometry menu on page 52 for information about image warping.
- **PIC Mute**
Choose from **Laser** and **DMD Blanking**. Select Laser to turn the laser off when PIC Mute activated. Select DMD Blanking to project a black image when PIC Mute is activated.

Highlight the **UP** arrow at the top of the page and press **ENTER/OK** to go back to the first **Setup** menu page.

Setup	
▲	
Trigger-1	Off
Trigger-2	Off
Infrared Remote	On
IR Code	0
IR Code Reset	
OSD Settings	►
Memory	►
Image Latency	Normal
PIC Mute	Laser

Notes

☞ *The **Projector Controller** software is available for download from the Digital Projection website, free of charge.*

☞ *A wired remote control will also be disabled if **Infrared Remote** is set to **Off**.*

ColorMax

ColorMax permits seven point color matching of red, green, blue, yellow, cyan, magenta and white.

You can enter your own gamut values here, or edit values you have imported using the **Projector Controller** software.

Defining your own colorspace with individual x and y coordinates for each color enables you to match not only the whites but each individual color as well.

Highlight the submenu you wish to open and press **ENTER/OK** to confirm your choice.

ColorMax	
Measured Data	▶
Target Data - User1	▶
Target Data - User 2	▶

Measured data/ target data

1. Use the **UP** and **DOWN** arrow buttons to highlight a color, then use the **LEFT** and **RIGHT** arrow buttons to navigate to the x or y coordinate.
2. Use the **UP** and **DOWN** arrow buttons to increase and decrease the value, respectively.
3. Exit edit mode:
   - press **ENTER/OK**, if you want to save the edited values.
   - press **EXIT**, if you do not wish to save the edited values
4. If necessary, highlight another color and repeat the procedure.

Measured Data	
Red	x: 0.658 y: 0.339
Green	x: 0.315 y: 0.662
Blue	x: 0.146 y: 0.043
White	x: 0.276 y 0.283
Reset	

Target Data - User1	
Red	x: 0.640 y: 0.390
Green	x:0.300 y: 0.600
Blue	x: 0.150 y: 0.060
Yellow	x: 0.419 y: 0.505
Cyan	x: 0.225 y: 0.329
Magenta	x: 0.321 y: 0.154
White	x: 0.285 y: 0.302

Power on / off

- **Auto Power Off**
  Set this to On if you want the projector to go into STANDBY mode when no input source is detected for 20 minutes.
- **Auto Power On**
  Set this to **On** if you want the projector to start up immediately when the mains is connected. Set this to **Off** if you want the projector to go into STANDBY mode when the mains is connected. In this case, the projector will not start up until the **POWER** button is pressed on the control panel or the **ON** button is pressed on the remote control.
- **Scheduled on/off**
  Access this submenu to create a weekly schedule for automatic on and off times:
  1. Set a schedule:
     - Use the **UP** and **DOWN** arrow buttons to highlight a row, then press **ENTER/OK** to enable edit mode.
     - Within a row, navigate with the **LEFT** and **RIGHT** arrow buttons. Set values with the **UP** and **DOWN** arrow buttons.
     - To exit edit mode, press **ENTER/OK**. Alternatively, press **EXIT** if you don't want the changes to take effect. Move to another row using the **UP** and **DOWN** arrow buttons.
  2. To enable the schedule, set Schedule to **On**.

Power on/off	
Auto Power Off	Off
Auto Power On	Off
Scheduled on-off	▶

Scheduled on-off							
Schedule					**Off**		
	S	M	T	W	T	F	S	Time
On	⊠	☐	☐	☐	☐	☐	☐	12:34
Off	⊠	☐	☐	☐	☐	☐	☐	12:34
On	⊠	☐	☐	☐	☐	☐	☐	12:34
Off	⊠	☐	☐	☐	☐	☐	☐	12:34

Clock adjust

Use this menu to set date (in **dd:MM:yyyy** format), time (in **HH:mm** format) and time zone.

The date and time set here will affect any schedule created within the **Power On/Off** menu.

Clock Adjust	
Date (dd:MM:yyyy)	**30:11:2017**
Time (HH:mm)	**16:00**
Time Zone	**UTC 00**

OSD settings

- **Language** sets the OSD language.
- **Menu Position** determines where the OSD should appear on the screen when activated.
- **Menu Transparency** sets OSD transparency between 0% (no transparency), 25%, 50% and 75%.
- **Time Out** determines how long the OSD should remain on screen if no buttons are pressed. Choose Always On to disable this feature.
- **Message Box** determines whether projector status messages should appear on the screen.

OSD Settings	
Language	**English**
Menu Position	**Center**
Menu Transparency	**0**
Time Out	**30 Seconds**
Message Box	**On**

Notes

Memory

The current image settings can be saved as a preset, which you can recall later. The default settings can be recalled at any time as well.

Up to four custom presets can be stored for each input.

The following settings are saved in a preset:

- From the **Image** menu — **Dynamic Black, Gamma, Brightness, Contrast, Saturation, Hue, Sharpness** and **Noise Reduction**
- From the **Color** menu — **Color Space, Color Mode, ColorMax, Color Temperature, Dynamic Black, RGB Lift** and **RGB Gain**
- From the **Geometry** menu — **Aspect Ratio** and **Overscan**.

To recall a saved preset:

- Select **Recall Memory** and press **ENTER/OK**, then select a preset from **Preset A** to **Preset D**. Select **Default** to load factory default values.

To save a preset:

- Select **Save Settings** and press **ENTER/OK**, then choose from **Preset A**, **Preset B, Preset C** and **Preset D**.

Memory	
Recall Memory	**Default**
Save Settings	**Preset A**

Network menu

- **Network Mode**
  Choose between **Projector Control** and **Service**.
- **DHCP, IP, Subnet Mask, Gateway, DNS**
  Set **DHCP** to **On** if the IP address is to be assigned by a DHCP server, or **Off** if it is to be set here.
  If **DHCP** is **On**, it will not be possible to edit IP Address, Subnet Mask, Gateway or DNS.
  If **DHCP** is set to **Off**, edit IP Address, Subnet Mask, Gateway and DNS as required.
- **MAC** This field is read-only.
- **AMX** Switch on or off

Network	
Network Mode	**Projector Control**
DHCP	**Off**
IP	**192.168.000.10**
Subnet Mask	**255.255.255.000**
Gateway	**000.000.000.000**
DNS	**000.000.000.000**
MAC	**00:18:28:2d:f2:06**
AMX	**Off**

Notes

PIP menu

- **PIP** Turn PIP on and off.
- **Source** Select an input source for the PIP image. Any combinations are possible between main and PIP input source, as long as one of the inputs is either **DisplayPort** or **3G-SDI**.
- **Position** Set the location of the PIP image on the screen. Choose from **Top-Left, Top-Right, Bottom-Left, Bottom-Right** and **PBP**.

PIP	
PIP	Off
Source	HDMI1
Position	Top-Left

Notes

Information menu

This menu gives information about software and hardware configuration, input source and laser operating times It also allows you to restore the factory default settings.

Information	
Model Name	**E-Vision Laser 13000 WU**
Serial Number	**X000XXXXX0000**
Software Version 1	**MD03-SE10-FE09**
Software Version 2	**STEP_D08-24-17-3120**
Active / PIP Source	**HDMI 1**
Signal Format	►
Laser Hours	**2**
System Status	►
Thermal Status	►
Factory Reset	

Signal format

Signal Format	
Active Source	
Timing	**1080p/60Hz**
H Refresh	**67.500 KHz**
V Refresh	**60.00 Hz**
Pixel Clock	**148.500 MHz**
PIP Source	
Timing	**576p/50Hz**
H Refresh	**31.250 KHz**
V Refresh	**50.00 Hz**
Pixel Clock	**27.0 MHz**

System status

System Status	
Atmospheric Pressure	98988 Pa (116m)
AC Voltage	160V - 264V
Ceiling Mode	0
Tilt Angle	4 deg
Portrait Angle	0 deg
Altitude Mode	Auto
Laser Power	100%
Constant Brightness	Off

Thermal status

Thermal Status	
Inlet Temp.	Ti1 = 24 (C)
DMD Temp.	38 (C)
LD Temp.	B2=51 / B3=48 (C)
RLD Temp.	U=40.1 / D=39 (C)
Outside Temp.	22 (C)
Fan 1-3 Speed	1399 / 1402 / 4391
Fan 4-6 Speed	1310 / 1200 / 1205
Fan 7-9 Speed	1211 / 1407 / 1410
Fan 10-12 Speed	NA / 3005 / 3007
Fan 13 - 15 Speed	NA / NA / 2984
Fan 16 Speed	3020
Water Pump Speed	3506

Factory reset

To restore the factory default settings:

1. Navigate to **Factory Reset** and press **ENTER/OK**.

2. When prompted, press **ENTER/OK** to confirm your choice, or press **EXIT** to cancel.

Information	
Model Name	E-Vision Laser 13000 WU
Serial Number	X000XXXXX0000
Software Version 1	MD03-SE10-FE09

Factory Reset

Warning
All user settings will be lost

Press OK to confirm
Press Exit to cancel

Thermal Status	►
Factory Reset	OK

Notes

☞ *Factory reset does not reset the Network settings, or High Altitude mode*

Served web pages

The served web pages allow you to control the projector remotely via LAN.

The default IP address is **192.168.0.100**.

DIGITAL PROJECTION	

Navigation	
Projector Status	
Projector Control	
Crestron RoomView	
PJLink	
Network Setup	
Alert Mail Setup	

Model	Laser Projector
Serial Number	
Software Version	
Power Status	On
Input	HDMI 1 (1080p/24Hz)
Laser Status	Power: Normal Runtime: 100 H
Projection Mode	Front Tabletop
High Altitude	Off
Intake Temperature	30°C
DMD Temperature	30°C
Laser Temperature	30°C
Diagnostic Status	Normal
LAN Information	
LAN Software Ver.	RE01
MAC Address	00:18:23:01:02:03

DIGITAL PROJECTION

Projector Status	
Projector Control	
Crestron RoomView	
PJLink	
Network Setup	
Alert Mail Setup	

Power   [On]   [Off]
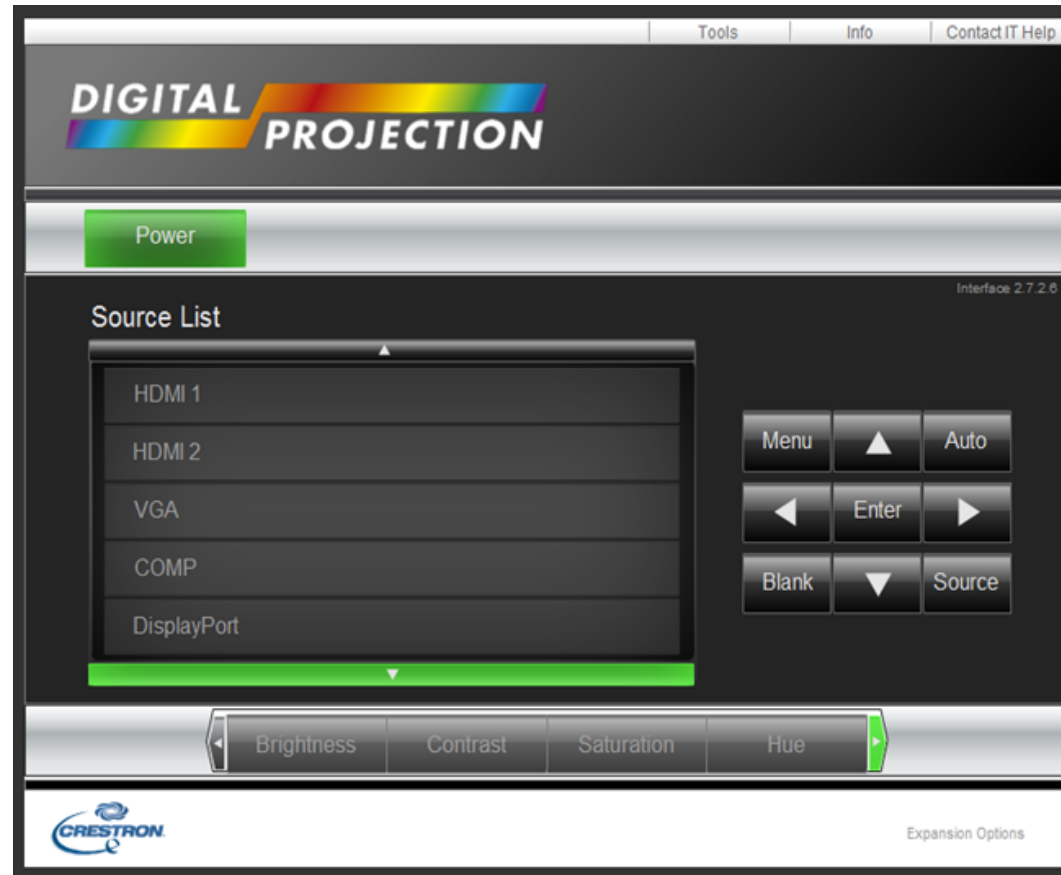
Shutter [Open] [Close]

Input Selection

[HDMI 1]   [HDMI 2]   [VGA]   [COMP]

[DisplayPort]   [HDBaseT]   [3G-SDI]

Lens Control

Shift

Zoom   Focus   [Up]

[IN]   [IN]   [Left]   [Right]

[OUT]   [OUT]   [Down]

Tools   Info   Contact IT Help

DIGITAL PROJECTION

Power

Interface 2.7.2.6

Source List

HDMI 1

HDMI 2

VGA

COMP

DisplayPort

Menu   ▲   Auto

◄   Enter   ►

Blank   ▼   Source

Brightness   Contrast   Saturation   Hue

CRESTRON   Expansion Options

DIGITAL PROJECTION

Projector Status	
Projector Control	PJLink Security: ○ On ○ Off
Crestron RoomView	Password: ••••••••••••••
PJLink	Apply
Network Setup	
Alert Mail Setup	

DIGITAL PROJECTION

Projector Status	DHCP: ○ On ○ Off
Projector Control	IP Address: 192 . 168 . 0 . 100
Crestron RoomView	Subnet Mask: 255 . 255 . 255 . 0
PJLink	Gateway: 0 . 0 . 0 . 0
Network Setup	DNS Server: 0 . 0 . 0 . 0
Alert Mail Setup	Save Settings

CAUTION: Incorrect settings may cause the projector to lose network connectivity.

DIGITAL PROJECTION

- Projector Status
- Projector Control
- Crestron RoomView
- PJLink
- Network Setup
- **Alert Mail Setup**

SMTP Server:
SMTP Server Port: 25
User Name:
Password:

Apply

E-mail Alert: ○ Enable   ○ Disable
From:
To:
CC:
Projector Name:
Location:

Apply

Send Test Mail

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DIGITAL PROJECTION

A Delta Associate Company

E-Vision Laser 13000 WU Series

High Brightness Digital Video Projector

REFERENCE GUIDE

Choosing a lens

A number of lenses are available. Which lens you choose depends on the screen size, image aspect ratio, throw distance and light output.

The following table shows all available lenses in order of their throw ratios:

Throw Ratio	Focus Range	Lens Shift	Part Number
0.377 : 1 fixed (UST)	0.82 m - 2.71 m	Depends on image size, see **UST Lens Installation Guide** (separate document)	117-341
0.75 - 0.93 : 1 zoom	1.02 m - 12.7 m	V: 0.5 (U) 0.3 (D) frame H: 0.1 (L) 0.2 (R) frame	115-339
0.76 : 1 fixed	0.81 m - 5.08 m	none	112-499
1.25 - 1.79 : 1 zoom	1.33 m - 11.73 m	V: 0.5 (U) 0.3 (D) frame H: 0.1 (L) 0.2 (R) frame	112-500
1.73 - 2.27 : 1 zoom	1.83 m - 14.9 m	V: 0.5 (U) 0.3 (D) frame H: 0.1 (L) 0.2 (R) frame	112-501
2.22 - 3.67 : 1 zoom	2.36 m - 24.2 m	V: 0.5 (U) 0.3 (D) frame H: 0.1 (L) 0.2 (R) frame	112-502
3.58 - 5.38 : 1 zoom	3.8 m - 35.35 m	V: 0.5 (U) 0.3 (D) frame H: 0.1 (L) 0.2 (R) frame	112-503
5.31 - 8.26 : 1 zoom	5.59 m - 54.8 m	V: 0.5 (U) 0.3 (D) frame H: 0.1 (L) 0.2 (R) frame	112-504

To choose a lens, calculate the *throw ratio* required. Allow a tolerance of +/- 3% in the throw ratio calculation.

Notes

Throw distance calculations are based on the distance from the outer end of the lens, which varies from lens to lens. The lens extension is the distance between the front of the projector chassis and the outer end of the lens when it is fully extended.

Refer to the projector CAD drawings for individual lens extension figures.

*The **0.377 : 1 fixed lens** has no adjustable shift value. However, the lens has an inherent offset depending on image size. See the UST documentation published separately on the Digital Projection website.*

*The **0.75 - 0.93 : 1 zoom lens** has a feature that permits focus correction for curved screens. The front ring of the lens is a manual control that provides focus curvature adjustment to correct for the different focal distances between center and corner.*

Basic calculation

Identify the required lens by calculating the **throw ratio**.

A **throw ratio** is the ratio of the throw distance ❷ to the screen width ❶:

$$ThrowRatio = ThrowDistance/ScreenWidth$$

1. Use the formula above to obtain the required throw ratio.

2. Allow a tolerance of +/- 3% in the throw ratio calculation and match the throw ratio with a lens from the table below:

Throw ratios	Focus range
0.377 : 1 fixed (UST)	0.82 m - 2.71 m
0.75 - 0.93 : 1 zoom	1.02 m - 12.7 m
0.76 : 1 fixed	0.81 m - 5.08 m
1.25 - 1.79 : 1 zoom	1.33 m - 11.73 m
1.73 - 2.27 : 1 zoom	1.83 m - 14.9 m
2.22 - 3.67 : 1 zoom	2.36 m - 24.2 m
3.58 - 5.38 : 1 zoom	3.8 m - 35.35 m
5.31 - 8.26 : 1 zoom	5.59 m - 54.8 m

3. Ensure the required throw distance is within the range covered by the lens.
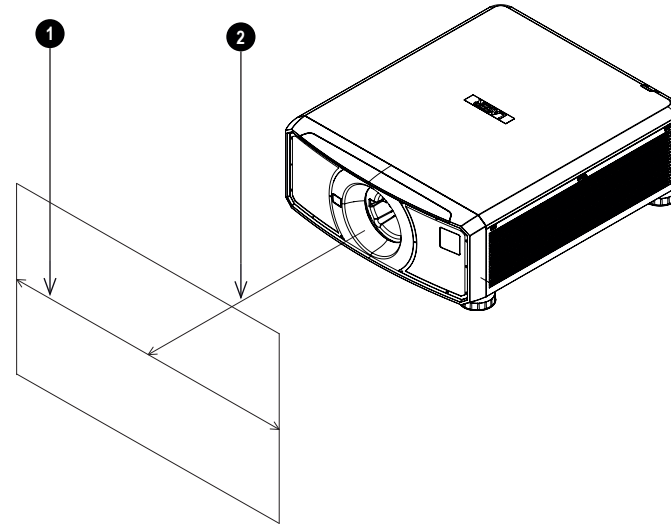
Notes

The basic calculation on this page does not take into consideration DMD™ and image size, which could affect the throw ratio.See Full lens calculation on page 97 for a more complex and realistic calculation.

When calculating the throw ratio, be sure to use identical measurement units for both the throw distance and the screen width.

See Choosing a lens on the previous page for information about individual lens part numbers

Basic calculation example

1. Calculate the throw ratio using the formula.
   Your screen is **4.5m** wide and you wish to place the projector approximately **11m** from the screen. The throw ratio will then be
   *11 ÷ 4.5= **2.44***
2. Match the result with the lens table.
   The lens matching a throw ratio of 2.44 is the ***2.22 - 3.67 : 1 zoom lens*** .
3. **Check whether the lens covers the required throw distance.**
   The focus range quoted for the 2.22 - 3.67 : 1 zoom lens is **2.36 - 24.2m**.The required distance of 11m is within the range.

INFORMATION YOU NEED FOR THIS CALCULATION

The throw ratio formula:

$$ThrowRatio = ThrowDistance/ScreenWidth$$

Allow a tolerance of +/- 3% in the throw ratio calculation.

The lens table:

Throw ratios	Focus range
0.377 : 1 fixed (UST)	0.82 m - 2.71 m
0.75 - 0.93 : 1 zoom	1.02 m - 12.7 m
0.76 : 1 fixed	0.81 m - 5.08 m
1.25 - 1.79 : 1 zoom	1.33 m - 11.73 m
1.73 - 2.27 : 1 zoom	1.83 m - 14.9 m
2.22 - 3.67 : 1 zoom	2.36 m - 24.2 m
3.58 - 5.38 : 1 zoom	3.8 m - 35.35 m
5.31 - 8.26 : 1 zoom	5.59 m - 54.8 m

Notes

The basic calculation on this page does not take into consideration DMD™ and image size, which could affect the throw ratio.See Full lens calculation on the facing page for a more complex and realistic calculation.

See Choosing a lens on page 94 for information about individual lens part numbers.

Full lens calculation

Introducing TRC

The choice of lens will affect the image size and will address discrepancies between the DMD™ resolution and the source.

When an image fills the height of the DMD™ but not the width, it uses less than 100% of the DMD™ surface. A lens chosen using the basic formula may produce an image that is considerably smaller than the actual screen.

To compensate for loss of screen space in such situations, you need to increase the throw ratio using a **Throw Ratio Correction (TRC)**.

Example

Fig. 1 illustrates a 4:3 image within a 16:9 display

When a 16:9 projector is used for a 4:3 image, the image does not fill the width of the DMD™, creating a **pillarboxing** effect - blank spaces to the left and right.

Fig. 2 shows the same image projected on a 4:3 screen using a standard lens (chosen with the basic calculation).

The DMD™ accurately fills the width of the screen; however, the pillarboxing is now part of the projected image and is transferred to the screen.

The DMD™ does not fill the height of the screen, which has caused **letterboxing** - further blank spaces at the top and bottom of the screen.

The image is now surrounded by blank space, which can be removed if the throw ratio is increased.

Fig. 3 shows the image projected on the same screen with a lens chosen using TRC. The increased throw ratio has allowed the 4:3 image to fill the 4:3 screen seamlessly

Fig 1

Fig 2

Fig 3

Calculating TRC

To calculate TRC, use the following formula:

$$TRC = 1.6(DMD^{™} \, Aspect \, Ratio)/Source \, Aspect \, Ratio.$$

TRC table

Alternatively, you can save time by referencing the following table, which shows the TRC value for some popular image formats:

2.35:1 (Scope)	1920 x 817 pixels	TRC < 1, not used
1.85:1 (Flat)	1920 x 1037 pixels	TRC < 1, not used
1.78:1 (16:9)	1920 x 1080 pixels	TRC < 1, not used
1.6:1 (16:10)	1920 x 1200 pixels	TRC < 1, not used (native aspect ratio)
1.33:1 (4:3)	1596 x 1200 pixels	TRC = 1.2
1.25:1 (5:4)	1500 x 1200 pixels	TRC = 1.28

Calculating the throw ratio with TRC

1. For TRC > 1, amend the basic throw ratio formula as follows:

   $$Throw \, Ratio = Throw \, Distance/Screen \, Width * TRC$$

   Allow a tolerance of +/- 3% in the throw ratio calculation.

2. Once a throw ratio is established, identify the matching lens from the table:

Throw ratios	Focus range
0.377 : 1 fixed (UST)	0.82 m - 2.71 m
0.75 - 0.93 : 1 zoom	1.02 m - 12.7 m
0.76 : 1 fixed	0.81 m - 5.08 m
1.25 - 1.79 : 1 zoom	1.33 m - 11.73 m
1.73 - 2.27 : 1 zoom	1.83 m - 14.9 m
2.22 - 3.67 : 1 zoom	2.36 m - 24.2 m
3.58 - 5.38 : 1 zoom	3.8 m - 35.35 m
5.31 - 8.26 : 1 zoom	5.59 m - 54.8 m

3. Ensure the required throw distance is within the range of the matching lens.

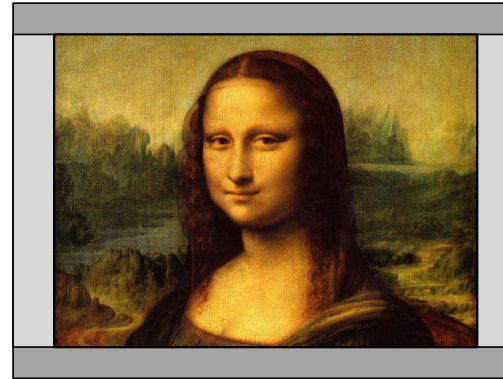### Notes

☞ *TRC can only be applied if greater than 1. If TRC is 1 or less, disregard it and calculate the throw ratio using the basic formula.*

☞ *TRC can only be applied if greater than 1. If TRC is 1 or less, disregard it and calculate the throw ratio using the basic formula*

Full lens calculation example

Your screen is **4.5m** wide; you wish to place the projector approximately **11m** from the screen. The source is **4:3**.

1. Calculate TRC as follows:
   TRC = 1.6 / 1.33 = 1.2.

2. Calculate the throw ratio:
   Throw ratio = 11 / 4.5 x 1.2 = **2.04**

3. Allow a tolerance of +/- 3% in the throw ratio calculation and find a match in the lens table.
   The table shows that the matching lens is **the 1.73 - 2.27 : 1 zoom lens**.

4. Check whether the lens covers the required throw distance.
   The focus range quoted for the 1.73 - 2.27 : 1 zoom lens is **1.83m - 14.9m**. The required distance of 11 m is within the range.

INFORMATION YOU NEED FOR THESE CALCULATIONS

The TRC formula

$$TRC = DMD^{™}\ AspectRatio/SourceAspectRatio$$

The TRC table (to use instead of the formula)

2.35:1 (Scope)	TRC < 1, not used
1.85:1 (Flat)	TRC < 1, not used
1.78:1 (16:9)	TRC < 1, not used
1.6:1 (16:10)	TRC < 1, not used (native aspect ratio)
1.33:1 (4:3)	TRC = 1.2
1.25:1 (5:4)	TRC = 1.28

The throw ratio formula

$$ThrowRatio = ThrowDistance/ScreenWidth * TRC$$

Allow a tolerance of +/- 3% in the throw ratio calculation.

The lens table:

Throw ratios	Focus range
0.377 : 1 fixed (UST)	0.82 m - 2.71 m
0.75 - 0.93 : 1 zoom	1.02 m - 12.7 m
0.76 : 1 fixed	0.81 m - 5.08 m
1.25 - 1.79 : 1 zoom	1.33 m - 11.73 m
1.73 - 2.27 : 1 zoom	1.83 m - 14.9 m
2.22 - 3.67 : 1 zoom	2.36 m - 24.2 m
3.58 - 5.38 : 1 zoom	3.8 m - 35.35 m
5.31 - 8.26 : 1 zoom	5.59 m - 54.8 m

Notes

Screen requirements

Fitting the image to the display

If the source image supplied to the projector is smaller than the WUXGA resolution, the image will not fill the display. The following examples show how a number of common formats may be displayed, depending on your DMD™ resolution.

WUXGA images displayed full width

2.35:1 (Scope) = 817 pixels
16:9 1.78:1 = 1080 pixels
16:10 (full height) = 1200 pixels
full width = 1920 pixels
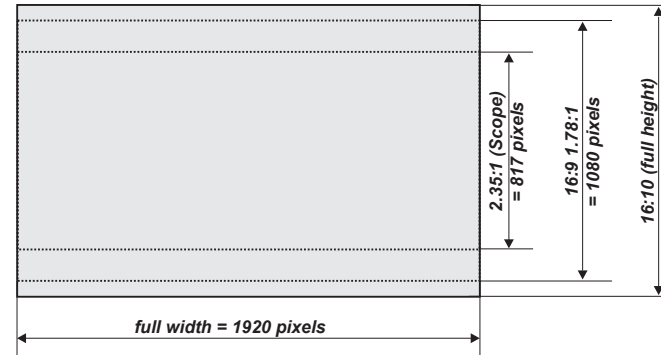
WUXGA images displayed with a height of 1200 pixels

full height = 1200 pixels
4:3 = 1.33:1 = 1596 pixels
16:10 = 1.6:1 = 1920 pixels
full width = 1920 pixels
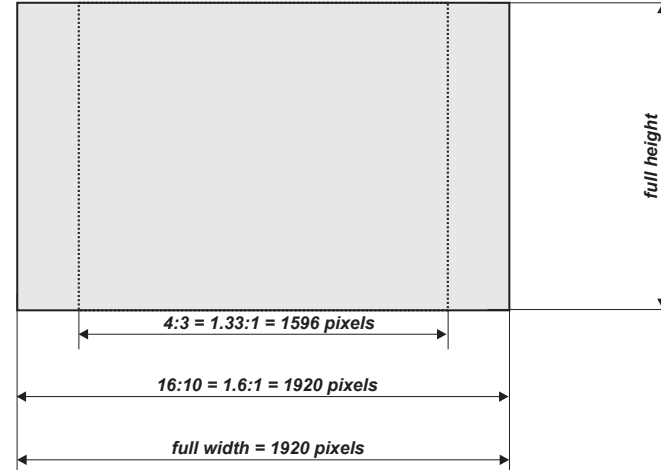
WUXGA images displayed full height

full height = 1200 pixels

4:3 = 1.33:1 = 1596 pixels
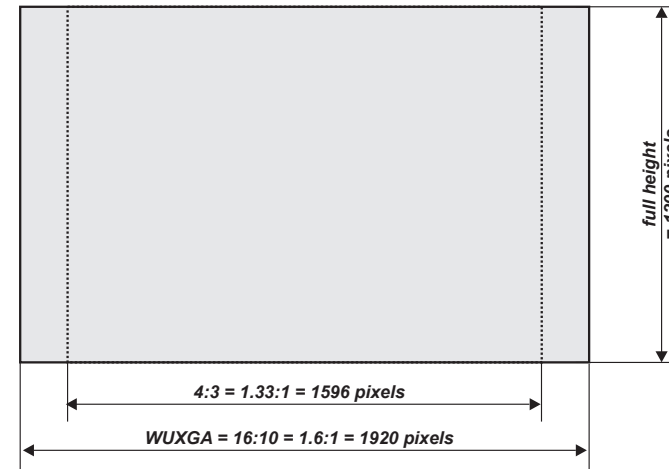
WUXGA = 16:10 = 1.6:1 = 1920 pixels

Diagonal screen sizes

Screen sizes are sometimes specified by their diagonal size (D). When dealing with large screens and projection distances at different aspect ratios, it is more convenient to measure screen width (W) and height (H).

The example calculations below show how to convert diagonal sizes into width and height, at various aspect ratios.

2.35:1 (Scope)
W = D x 0.92 H = D x 0.39

1.85:1
W = D x 0.88 H = D x 0.47

16:9 = 1.78:1
W = D x 0.87 H = D x 0.49

16:10 = 1.6:1 (native aspect ratio for WUXGA projectors)
W = D x 0.85 H = D x 0.53

W = width

H = height

D = diagonal
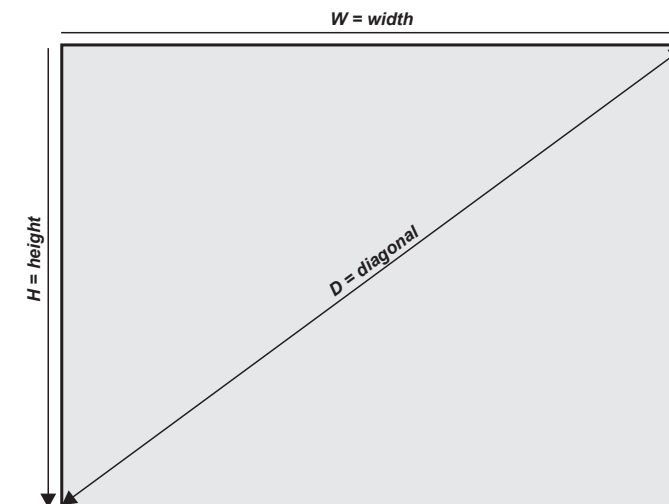
Positioning the image

The normal position for the projector is at the centre of the screen. However, you can set the projector above or below the centre, or to one side, and adjust the image using the **Lens shift** feature (known as **rising and falling front**) to maintain a geometrically correct image.
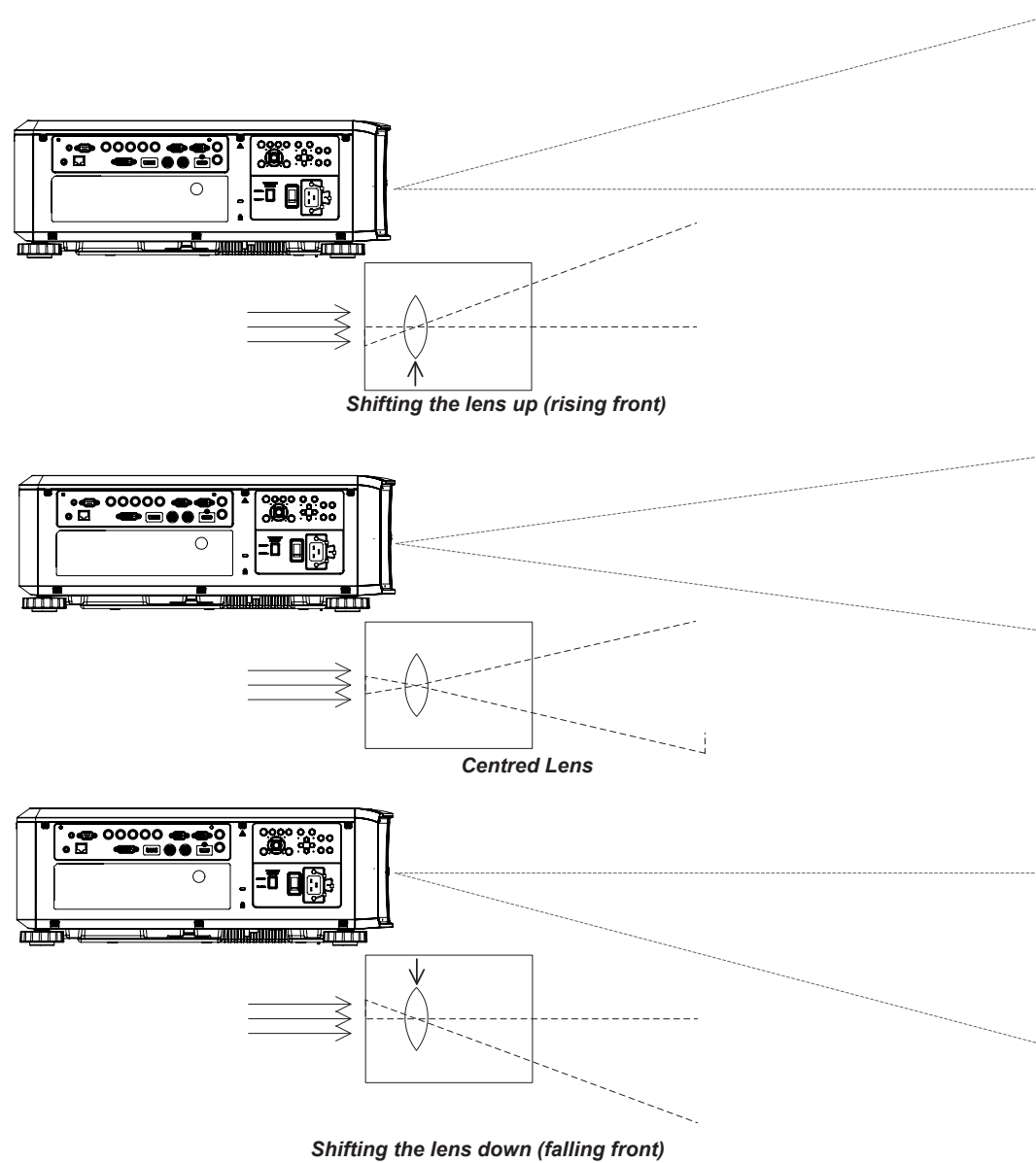
Whenever possible, position the projector so that the lens is centered for the highest quality image

Notes

Shifting the lens up (rising front)

Centred Lens

Shifting the lens down (falling front)

Any single adjustment outside the ranges specified on the following page may result in an unacceptable level of distortion, particularly at the corners of the image, due to the image passing through the periphery of the lens optics.

If the lens is to be shifted in two directions combined, the maximum range without distortion will be somewhat less, as can be seen in the illustrations.
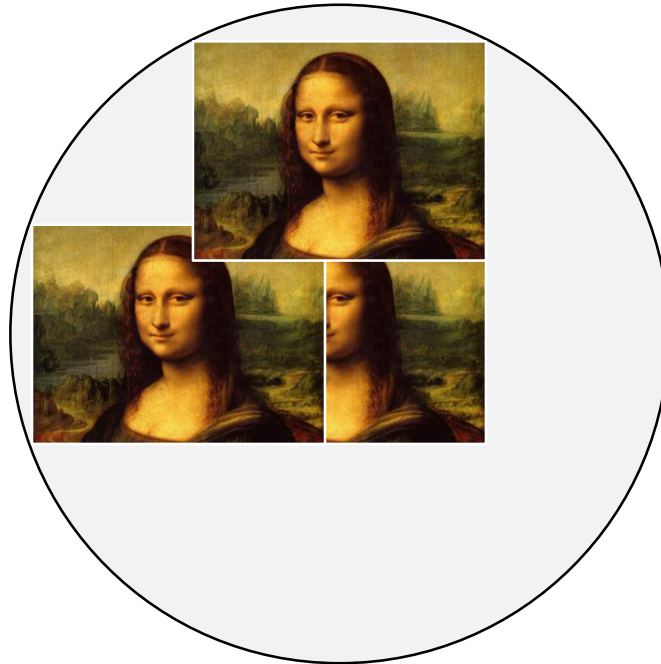
Full horizontal or vertical shift
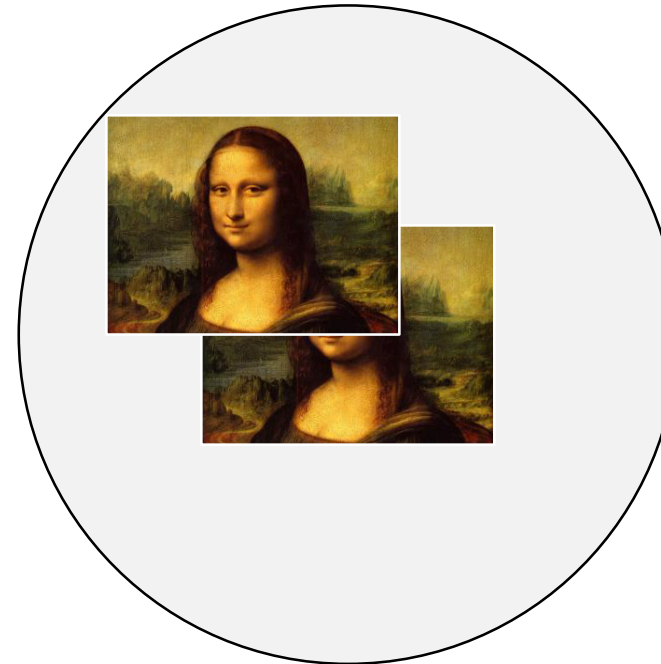
Combined shift is reduced

Aspect ratios explained

The appearance of a projected image on the screen depends on a combination of the following:

- The display resolution is **WUXGA** with a 1920 x 1200 resolution, corresponding to an aspect ratio of 16:10
- The aspect ratio of the input signal: usually **4:3**, **16:9** or **16:10**
- The value of the **Aspect Ratio** setting of the projector:
    - **16:9**, **4:3**, **16:10** and **5:4** stretch the image to the selected aspect ratio. **16:9** leaves black bars at the top and bottom of the screen (letterboxing effect); **4:3** and **5:4** leave black bars at the sides of the screen (pillarboxing).
    - **TheaterScope** is a special setting used in combination with an anamorphic lens, an optional accessory. It removes letterboxing from a 2.35:1 source packed into a 16:9 frame.
    - **Source** shows the image with its original aspect ratio, if this does not match the native aspect ratio of the DMD^{TM}, then the image will be scaled to either fit the full width or height of the display.

Aspect ratios examples

1. Unused screen areas

Source: 4:3

Aspect Ratio: Source / 4:3

Aspect Ratio 16:10

Source: 16:9

Aspect Ratio: Source / 16:9
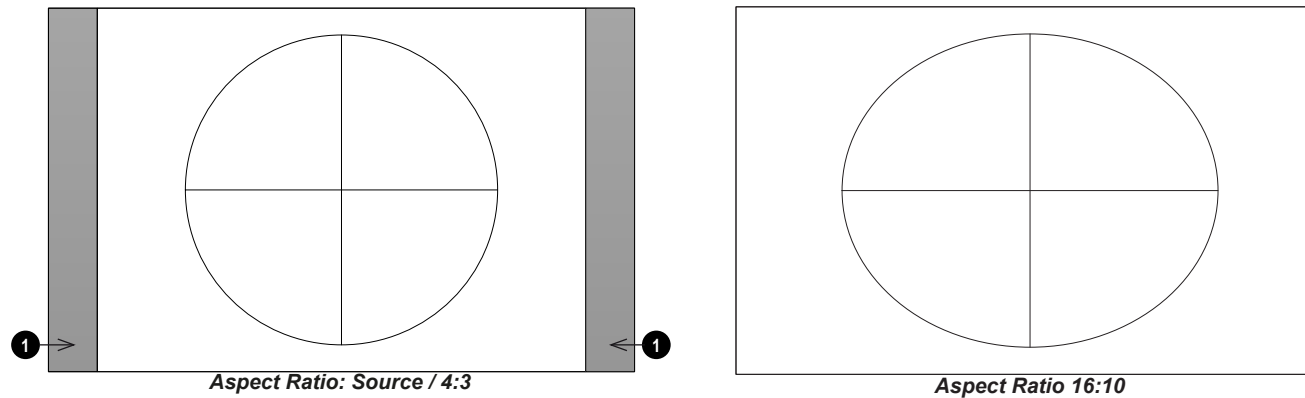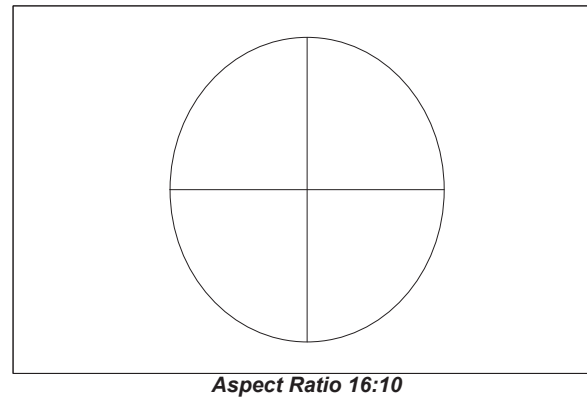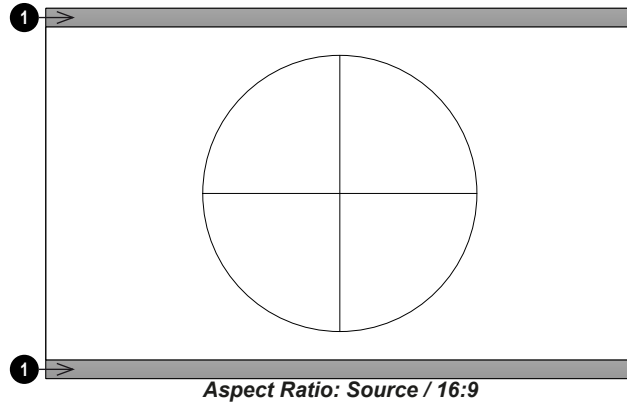
Aspect Ratio 16:10

Source: 16:10 (native)

Aspect Ratio: Source / 16:10
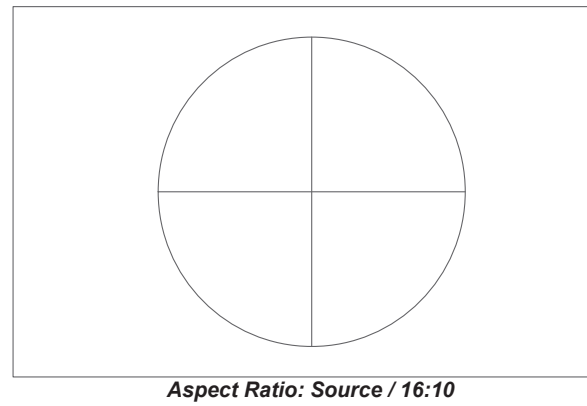
Aspect ratio example: TheatreScope

The TheaterScope setting is used in combination with an anamorphic lens to restore 2.35:1 images packed into a 16:9 frame. Such images are projected with black lines at the top and bottom of the 16:9 screen to make up for the difference in aspect ratios.

Without an anamorphic lens and without the TheaterScope setting applied, a 16:9 source containing a 2.35:1 image looks like this:

Black margin – part of the source

Black margin – part of the source
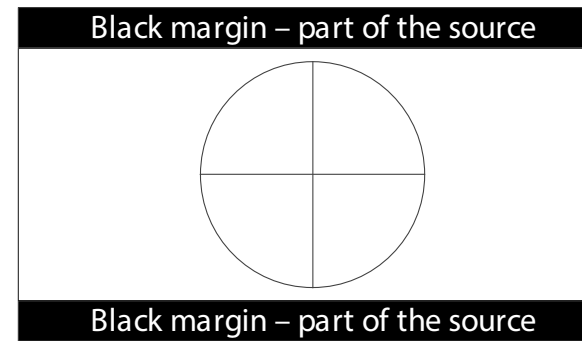
If we change the setting to TheaterScope, the black lines will disappear but the image will stretch vertically to reach the top and bottom of the DMD™:

An anamorphic lens will stretch the image horizontally, restoring the original 2.35 ratio:
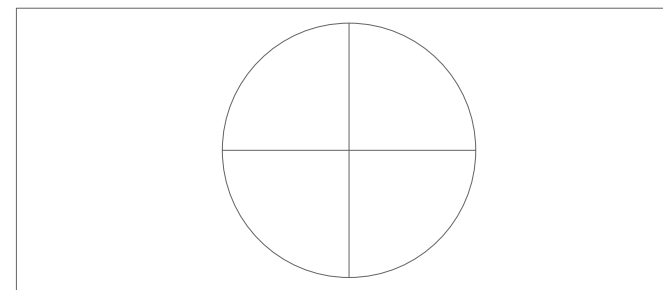
Appendix A: supported signal input modes

Notes

2D formats

Signal Format	Resolution	Frame Rate (Hz)	DisplayPort / DVI-D	HDMI / HD-BaseT				Output Frame Rate (Hz)	Remarks
				RGB	YUV 8-bit	YUV 10-bit	YUV 12-bit		
PC	640 x 480	59.94	✓	✓				60	
	640 x 480	74.99	✓	✓				60	
	640 x 480	85	✓	✓				60	
	800 x 600	60.32	✓	✓				60	
	800 x 600	75	✓	✓				60	
	800 x 600	85.06	✓	✓				60	
	848 x 480	47.95	✓	✓				48	
	848 x 480	59.94	✓	✓				60	
	1024 x 768	60	✓	✓				60	
	1024 x 768	75	✓	✓				60	
	1024 x 768	85	✓	✓				60	
	1280 x 720	47.95	✓	✓				48	
	1280 x 1024	60.02	✓	✓				60	
	1280 x 1024	75.02	✓	✓				60	
	1280 x 1024	85.02	✓	✓				60	
	1600 x 1200	60	✓	✓				60	
	1920 x 1080	47.95	✓	✓				48	
	1680 x 1050	59.94	✓	✓				60	
	1920 x 1200 RB	50	✓	✓				50	
	1920 x 1200 RB	60	✓	✓				60	
	1400 x 1050	60	✓	✓				60	
	1366 x 768	60	✓	✓				60	
	1440 x 900	60	✓	✓				60	
	1280 x 768	60	✓	✓				60	
	1280 x 800	60	✓	✓				60	
	1280 x 960	60	✓	✓				60	
Apple Mac	640 x 480	66.59	✓	✓				60	
	832x624	74.54	✓	✓				60	

Signal Format	Resolution	Frame Rate (Hz)	DisplayPort / DVI-D	HDMI / HD-BaseT				Output Frame Rate (Hz)	Remarks	Notes
				RGB	YUV 8-bit	YUV 10-bit	YUV 12-bit			
SDTV	480i	59.94		✓				60		
	1440x480i	60		✓	✓	✓	✓	60		
	1440x576i	50		✓	✓	✓	✓	50		
	576i	50		✓				50		
EDTV	480p	59.94	✓	✓	✓	✓	✓	60		
	576p	50	✓	✓	✓	✓	✓	50		
HDTV	1035i	60	✓	✓	✓	✓	✓	60		
	1080i	50	✓	✓	✓	✓	✓	50		
	1080i	59.94	✓	✓	✓	✓	✓	60		
	1080i	60	✓	✓	✓	✓	✓	60		
	720p	50	✓	✓	✓	✓	✓	60		
	720p	59.94	✓	✓	✓	✓	✓	60		
	720p	60	✓	✓	✓	✓	✓	60		
	1080p	23.98	✓	✓	✓	✓	✓	48		
	1080p	24	✓	✓	✓	✓	✓	48		
	1080p	25	✓	✓	✓	✓	✓	60		
	1080p	29.97	✓	✓	✓	✓	✓	60		
	1080p	30	✓	✓	✓	✓	✓	60		
	1080p	50	✓	✓	✓	✓	✓	50		
	1080p	59.94	✓	✓	✓	✓	✓	60		
	1080p	60	✓	✓	✓	✓	✓	60		

3D formats

Standard		Resolution	V-Freq (Hz)	V-Total	H Freq. (kHz)	HDMI 1/2	DisplayPort / DVI-D	HB Dual-pipe HDMI (*1)	HB DisplayPort (*1)	Output Frame Rate (Hz)	Remarks
720p50	Frame Packing	1280x720	50.00	1470	37.50	✓				100	*3
720p59	Frame Packing	1280x720	59.94	1470	44.96	✓				120	*3
720p60	Frame Packing	1280x720	60.00	1470	45.00	✓				120	*3
720p50	Top-and-Bottom	1280x720	50.00	750	37.50	✓	✓			100	*3
720p59	Top-and-Bottom	1280x720	59.94	750	44.96	✓	✓			120	*3
720p60	Top-and-Bottom	1280x720	60.00	750	45.00	✓	✓			120	*3
1080p23	Frame Packing	1920x1080	23.98	2205	26.97	✓				96	*4
1080p24	Frame Packing	1920x1080	24.00	2205	27.00	✓				96	*4
1080i50	Side-by-Side (Half)	1920x1080	50.00	1125	56.25	✓	✓			100	*3
1080i59	Side-by-Side (Half)	1920x1080	59.94	1125	67.43	✓	✓			120	*3
1080i60	Side-by-Side (Half)	1920x1080	60.00	1125	67.50	✓	✓			120	*3
1080p50	Side-by-Side (Half)	1920x1080	50.00	1125	56.25	✓	✓			100	*3
1080p59	Side-by-Side (Half)	1920x1080	59.94	1125	67.43	✓	✓			120	*3
1080p60	Side-by-Side (Half)	1920x1080	60.00	1125	67.50	✓	✓			120	*3
1080p50	Top-and-Bottom	1920x1080	50.00	1125	56.25	✓	✓			100	*3
1080p59	Top-and-Bottom	1920x1080	59.94	1125	67.43	✓	✓			120	*3
1080p60 Top-and-Bottom	Top-and-Bottom	1920x1080	60.00	1125	67.50	✓	✓			120	*3
1080p50	Frame Sequential	1920x1080	50.00	1125	56.25	✓	✓			100	*3
1080p59	Frame Sequential	1920x1080	59.94	1125	67.43	✓	✓			120	*3
1080p60	Frame Sequential	1920x1080	60.00	1125	67.50	✓	✓			120	*3

Notes

☞ *1: HB(High Bandwidth) mode without warping/blending.*

☞ *2: 8-bit / color.*

☞ *3: Frame drop at scaler and frame doubling at formatter. Sources greater than 60 fps are processed at half the frame rate, then frame doubled.*

☞ *4 Output display frame rate up to 96Hz for 24Hz 3D input*

Standard		Resolution	V-Freq (Hz)	V-Total	H Freq. (kHz)	HDMI 1/2	DisplayPort / DVI-D	HB Dual-pipe HDMI (*1)	HB DisplayPort (*1)	Output Frame Rate (Hz)	Remarks
1080p100	Frame Sequential	1920x1080	100.00	1125	112.50				✓	100	*2, *3
1080p120	Frame Sequential	1920x1080	120.00	1125	135.00				✓	120	*2, *3
WUXGA_100_RB	Frame Sequential	1920x1200	100.00	1258	125.72				✓	100	*3
WUXGA_120_RB	Frame Sequential	1920x1200	120.00	1271	152.40				✓	120	*2, *3
1080p23	Dual Pipe	1920x1080	23.98	1125	26.97			✓		96	*4
1080p24	Dual Pipe	1920x1080	24.00	1125	27.00			✓		96	*4
1080p25	Dual Pipe	1920x1080	25.00	1125	28.13			✓		100	*3
1080p30	Dual Pipe	1920x1080	30.00	1125	33.75			✓		120	*3
1080p50	Dual Pipe	1920x1080	50.00	1125	56.25			✓		100	*3
1080p59	Dual Pipe	1920x1080	59.94	1125	67.43			✓		120	*3
1080p60	Dual Pipe	1920x1080	60.00	1125	67.50			✓		120	*3
WUXGA_60_RB	Dual Pipe	1920x1200	60.00	1235	74.04			✓		120	*3

Notes

SDI formats

Timing	SDI Link Mode	Signal Standards	Color Encode	Sampling Structure	Bit Depth
NTSC	SD	SMPTE 259M-C 270Mbps SD	YCbCr	4:2:2	10
PAL	SD	SMPTE 259M-C 270Mbps SD	YCbCr	4:2:2	10
1035i60	HD	SMPTE 292M 1.5Gbps HD	YCbCr	4:2:2	10
1080i59	HD	SMPTE 292M 1.5Gbps HD	YCbCr	4:2:2	10
1080i60	HD	SMPTE 292M 1.5Gbps HD	YCbCr	4:2:2	10
1080P30	HD	SMPTE 292M 1.5Gbps HD	YCbCr	4:2:2	10
1080P25	HD	SMPTE 292M 1.5Gbps HD	YCbCr	4:2:2	10
1080i50	HD	SMPTE 292M 1.5Gbps HD	YCbCr	4:2:2	10
1080P24	HD	SMPTE 292M 1.5Gbps HD	YCbCr	4:2:2	10
720P60	HD	SMPTE 292M 1.5Gbps HD	YCbCr	4:2:2	10
720P50	HD	SMPTE 292M 1.5Gbps HD	YCbCr	4:2:2	10
1080Sf25	HD	SMPTE 292M 1.5Gbps HD	YCbCr	4:2:2	10
1080Sf30	HD	SMPTE 292M 1.5Gbps HD	YCbCr	4:2:2	10
1080P50	3G Level A	SMPTE 424M 3Gbps	YCbCr	4:2:2	10
1080P59	3G Level A	SMPTE 424M 3Gbps	YCbCr	4:2:2	10
1080P60	3G Level A	SMPTE 424M 3Gbps	YCbCr	4:2:2	10
1080P50	3G Level B	SMPTE 424M 3Gbps	YCbCr	4:2:2	10
1080P59	3G Level B	SMPTE 424M 3Gbps	YCbCr	4:2:2	10
1080P60	3G Level B	SMPTE 424M 3Gbps	YCbCr	4:2:2	10

Notes

Appendix B: wiring details

Signal inputs and outputs

HDMI 1 and 2

19 way type A connector

1. TMDS Data 2+
2. TMDS Data 2 Shield
3. TMDS Data 2-
4. TMDS Data 1+
5. TMDS Data 1 Shield
6. TMDS Data 1-
7. TMDS Data 0+
8. TMDS Data 0 Shield
9. TMDS Data 0-
10. TMDS Clock+
11. TMDS Clock Shield
12. TMDS Clock-
13. CEC
14. not connected
15. SCL (DDC Clock)
16. SCA (DDC Data)
17. DDC/CEC Ground
18. +5 V Power
19. Hot Plug Detect

HDMI: pin view of panel connector

Notes

DisplayPort

DisplayPort 1.2

Pin 1   ML_Lane 0 (p)   Lane 0 (positive)
Pin 2   GND   Ground
Pin 3   ML_Lane 0 (n)   Lane 0 (negative)
Pin 4   ML_Lane 1 (p)   Lane 1 (positive)
Pin 5   GND   Ground
Pin 6   ML_Lane 1 (n)   Lane 1 (negative)
Pin 7   ML_Lane 2 (p)   Lane 2 (positive)
Pin 8   GND   Ground
Pin 9   ML_Lane 2 (n)   Lane 2 (negative)
Pin 10 ML_Lane 3 (p)   Lane 3 (positive)
Pin 11 GND   Ground
Pin 12 ML_Lane 3 (n)   Lane 3 (negative)
Pin 13 CONFIG1   Connected to Ground1
Pin 14 CONFIG2   Connected to Ground1
Pin 15 AUX CH (p)   Auxiliary Channel (positive)
Pin 16 GND   Ground
Pin 17 AUX CH (n)   Auxiliary Channel (negative)
Pin 18 Hot Plug   Hot Plug Detect
Pin 19 Return   Return for Power
Pin 20 DP_PWR   Power for connector (3.3 V 500 mA)
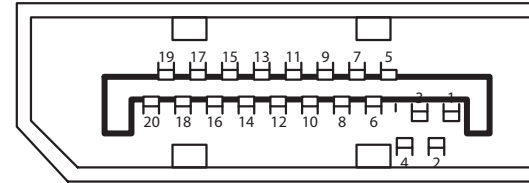
Notes

DisplayPort: pin view of panel connector

3G-SDI in, 3G-SDI out

75 ohm BNC

3G-SDI connector

HDBaseT input

RJ45 socket.
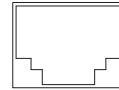
HDBaseT / LAN

Notes

Control connections

LAN

RJ45 socket (Shared with HDBaseT)
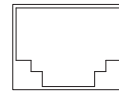
HDBaseT / LAN

RS232

9 way D-type connector

1. unused
2. Transmitted Data (TX)
3. Received Data (RX)
4. unused
5. Signal Ground
6. unused
7. unused
8. unused
9. unused

RS232
pin view of female connector

IR input

3.5 mm mini jack

Tip Signal

Ring Not connected

Sleeve Ground

Tip **Sleeve**

Ring

Appendix C: glossary of terms

1

1080p
> An HDTV resolution which corresponds to 1920 x 1080 pixels (a widescreen aspect ratio of 16:9).

3

3D active glasses
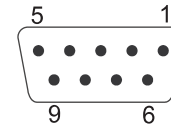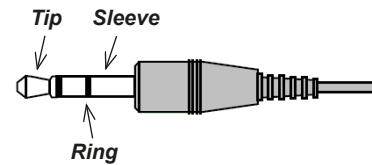> Wireless battery-powered glasses with LCD shutters. Synchronization information is communicated to the glasses by means of an infrared (IR) or radio frequency (RF) emitter which is connected to the Sync Out terminal on the projector. IR or RF pulses are transmitted by the emitter to signal when the left eye and right eye images are being displayed. The glasses incorporate a sensor which detects the emitter's signal and synchronises the left and right eye shutters with the projected image.

3D passive glasses
> Passive glasses do not require a power source to work. Light with left-hand polarisation can pass through the left lens and light with right hand polarisation can pass through the right-hand lens. These glasses are used in conjunction with another device which polarizes the image, such as a ZScreen.

A

Adjust lines
> A pattern applied to the image where its edge is to be blended with another image. Adjust lines are used to position the projectors in the array during the edge blend process.

Anamorphic lens
> A special lens which, when used with the TheaterScope aspect ratio, allows watching 2.35:1 content packed in a 16:9 source.

Aperture
> The opening of the lens that determines the angle through which light travels to come into focus.

Aspect ratio
> The proportional relationship between the width and the height of the projected image. It is represented by two numbers separated by a colon, indicating the ratio of image width and height respectively: for example, 16:9 or 2.35:1. Not to be confused with resolution.

B

Blanking (projection)
The ability to intentionally turn off, that is, set to black, areas around the edges of the projected image. It is sometimes referred to as "curtains" since it can be used to blank an area of image that literally falls on the curtains at the side of the screen in a movie theater. Usually no image resizing or geometric correction takes place and the "blanked" part of the image is lost. Not to be confused with horizontal and vertical blanking (video signal).

Blanking (video signal)
The section of the video signal where there is no active video data. Not to be confused with blanking (projection).

Blend region
The area of the image that is to overlap with another image in an edge blend setup. Sometimes called overlapping region.

Brightness (electronic control)
A control which adds a fixed intensity value to every pixel in the display, moving the entire range of displayed intensities up or down, and is used to set the black point in the image (see Contrast). In Component Video signals, brightness is the same as luminance.

Brightness (optical)
Describes how 'bright' an image that is projected onto a screen appears to an observer.

C

C
Also known as 'C', this is the component, or pair of components, of a Component Video signal which describes color difference information.

Chrominance
Also known as 'C', this is the component, or pair of components, of a Component Video signal which describes color difference information.

Color difference
In Component Video signals, the difference between specified colors and the luminance component. Color difference is zero for monochrome images.

Color gamut
The spectrum of color available to be displayed.

Color temperature
The position along the black body curve on the chromaticity diagram, normally quoted in Kelvin. It takes into account the preset values for color balance in the service set-up to take up the variations in the prism. The projector allows you to adjust this temperature (i.e. adjust the picture color temperature).

Component video
A three-wire or four-wire video interface that carries the signal split into its basic RGB components or luminance (brightness) and two-color difference signals (YUV) and synchronization signals.

Contrast (electronic control)
The adjustment of the white point of the image without affecting the black point. This increases the intensity range of the displayed image.

Contrast (optical)
The intensity difference between the darkest and lightest areas of the screen.

Cr, Cb
Color difference signals used with 'Y' for digital Component Video inputs. They provide information about the signal color. Not to be confused with Pr, Pb.

Crop
Remove part of the projected image. Alternatively, fit an image into a frame with a different aspect ratio by removing part of the image. The image is resized so that either its length or its width equals the length or width of the frame, while the other dimension has moved outside the frame; the excess area is then cut out.

D

Dark time
The time inserted between frames when using 3D active glasses, to avoid ghosting caused by switching time between left and right eye.

DDC (Display Data Channel)
A communications link between the source and projector. DDC is used on the HDMI, DVI and VGA inputs. The link is used by the source to read the EDID stored in the projector.

Deinterlacing
The process of converting interlaced video signals into progressive ones.

DHCP (Dynamic Host Configuration Protocol)
A network protocol that is used to configure network devices so that they can communicate on an IP network, for example by allocating an IP address.

DMD™ (Digital Micromirror Device™)
The optical tool that transforms the electronic signal from the input source into an optical image projected on the screen. The DMD™ of a projector has a fixed resolution, which affects the aspect ratio of the projected image. A Digital Micromirror Device™ (DMD™) consists of moving microscopic mirrors. Each mirror, which acts as a pixel, is suspended between two posts by a thin torsion hinge. It can be tilted to produce either a bright or dark pixel.

E

Edge blend
A method of creating a combined image by blending the adjoining edges of two or more individual images.

Notes

Edge tear

An artifact observed in interlaced video where the screen appears to be split horizontally. Edge tears appear when the video feed is out of sync with the refresh rate of the display device.

EDID (Extended Display Identification Data)

Information stored in the projector that can be read by the source. EDID is used on the HDMI, DVI and VGA inputs, allowing the source to automatically configure to the optimum display settings.

EDTV (Enhanced Definition Television)

A progressive digital television system with a lower resolution than HDTV.

F

Field

In interlaced video, a part of the image frame that is scanned separately. A field is a collection of either all the odd lines or all the even lines within the frame.

Frame

One of the many still images displayed in a sequence to create a moving picture. A frame is made of horizontal lines of pixels. For example, a 1920x1080 frame consists of 1080 lines, each containing 1920 pixels. In analog video frames are scanned one at a time (progressive scanning) or split into fields for each field to be scanned separately (interlaced video).

Frame rate

The number of frames shown per second (fps). In TV and video, a frame rate is the rate at which the display device scans the screen to "draw" the frame.

Frame rate multiplication

To stop low frame rate 3D images from flickering, frame rate multiplication can be used, which increases the displayed frame rate by two or three times

G

Gamma

A nonlinear operation used to code and decode luminance. It originates from the Cathode Ray Tube technology used in legacy television sets.

Ghosting

An artifact in 3D image viewing. Ghosting occurs when an image intended for one eye is partially seen by the other eye. Ghosting can be removed by optimizing the dark time and sync delay.

H

HDCP (High-bandwidth Digital Content Protection)
An encryption scheme used to protect video content.

HDTV (High Definition Television)
A television system with a higher resolution than SDTV and EDTV. It can be transmitted in various formats, notably 1080p and 720p.

Hertz (Hz)
Cycles per second.

Horizontal Scan Rate
The rate at which the lines of the incoming signal are refreshed. The rate is set by the horizontal synchronization from the source and measured in Hertz.

Hs + Vs
Horizontal and vertical synchronization.

Hue
The graduation (red/green balance) of color (applicable to NTSC).

I

Interlacing
A method of updating the image. The screen is divided in two fields, one containing every odd horizontal line, the other one containing the even lines. The fields are then alternately updated. In analog TV interlacing was commonly used as a way of doubling the refresh rate without consuming extra bandwidth.

Interleaving
The alternation between left and right eye images when displaying 3D.

L

LED (Light Emitting Diode)
An electronic component that emits light.

Letterboxing
Black margins at the top and bottom of the image. Letterboxing appears when a wider image is packed into a narrower frame without changing the original aspect ratio.

Lumen
A photometric unit of radiant power. For projectors, it is normally used to specify the total amount of emitted visible light.

Luminance
Also known as 'Y', this is the part of a Component Video signal which affects the brightness, i.e. the black and white part.

N

Noise
Electrical interference displayed on the screen.

NTSC (National Television Standards Committee)
The United States standard for television - 525 lines transmitted at 60 interlaced fields per second

O

OSD (on-screen display)
The projector menus allowing you to adjust various settings.

Overlapping region
The area of the image that is to overlap with another image in an edge blend setup. Sometimes called overlapping region.

P

PAL (Phase Alternate Line)
The television system used in the UK, Australia and other countries - 625 lines transmitted at 50 interlaced fields per second.

Pillarboxing
Black margins at the left and right of the image. Pillarboxing appears when a narrower image is packed into a wider frame without changing the aspect ratio.

Pixel
Short for Picture Element. The most basic unit of an image. Pixels are arranged in lines and columns. Each pixel corresponds to a micromirror within the DMD™; resolutions reflect the number of pixels per line by the number of lines. For example, a 1080p projector contains 1080 lines, each consisting of 1920 pixels.

Pond of mirrors
Area around the periphery of the DMD™ containing inactive mirrors. The pond of mirrors may cause artifacts, for example during the edge blending process.

Pr, Pb
Color difference signals used with 'Y' for analog Component Video inputs. They provide information about the signal color. Not to be confused with Cr, Cb.

Notes

Primary colors

Three colors any two of which cannot be mixed to produce the third. In additive color television systems the primary colors are red, green and blue.

Progressive scanning

A method of updating the image in which the lines of each frame are drawn in a sequence, without interlacing.

Pulldown

The process of converting a 24 fps film footage to a video frame rate (25 fps for PAL/SECAM, 30 fps for NTSC) by adding extra frames. DP projectors automatically carry out reverse pulldown whenever possible.

R

Resolution

The number of pixels in an image, usually represented by the number of pixels per line and the number of lines (for example, 1920 x 1200).

RGB (Red, Green and Blue)

An uncompressed Component Video standard.

S

Saturation

The amount of color in an image.

Scope

An aspect ratio of 2.35:1.

SDTV (Standard Definition Television)

An interlaced television system with a lower resolution than HDTV. For PAL and SECAM signals, the resolution is 576i; for NTSC it is 480i.

SECAM (Sequential Color with Memory)

The television system used in France, Russia and some other countries - 625 lines transmitted at 50 interlaced fields per second.

Smooth picture

A feature that can display a higher resolution source than the native resolution of the projector without loosing any pixel data.

SX+

A display resolution of 1400 x 1050 pixels with a 4:3 screen aspect ratio. (Shortened from SXGA+, stands for Super Extended Graphics Array Plus.)

Synchronization

A timing signal used to coordinate an action.

T

Test pattern

A still image specially prepared for testing a projection system. It may contain various combinations of colors, lines and geometric shapes.

TheaterScope

An aspect ratio used in conjunction with a special anamorphic lens to display 2.35:1 images packed into a 16:9 frame.

Throw distance

The distance between the screen and the projector.

Throw ratio

The ratio of the throw distance to the screen width.

TRC (Throw ratio correction)

A special number used in calculating throw distances and throw ratios when the image does not fill the width of the DMD™. TRC is the ratio of the DMD™ aspect ratio to the image source aspect ratio: TRC = DMD™ aspect ratio / Source aspect ratio TRC is only used in calculations if it is greater than 1.

U

UXGA

A display resolution of 1600 x 1200 pixels with a 4:3 screen aspect ratio. (Stands for Ultra Extended Graphics Array.)

V

Vertical Scan Rate

The rate at which the frames of the incoming signal are refreshed. The rate is set by the vertical synchronization from the source and measured in Hertz.

Vignetting

Optical cropping of the image caused by the components in the projection lens. This can happen if too much offset is applied when positioning the image using the lens mount.

Vista

An aspect ratio of 1.66:1.

W

WUXGA

A display resolution of 1920 x 1200 pixels with a 16:10 screen aspect ratio. (Stands for Widescreen Ultra Extended Graphics Array.)

Y

Y

This is the luminance input (brightness) from a Component Video signal.

YUV

Color difference signals used with 'Y' for analog Component Video inputs. They provide information about the signal color. Not to be confused with Cr, Cb.

Z

ZScreen

A special kind of light modulator which polarizes the projected image for 3D viewing. It normally requires that images are projected onto a silver screen. The ZScreen is placed between the projector lens and screen. It changes the polarization of the projected light and switches between left- and right-handed circularly polarized light at the field rate.

DIGITAL PROJECTION

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