E-Vision Laser 4K Series
High Brightness Digital Video Projector

- INSTALLATION AND 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 manual

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 - visit the Digital Projection website for all latest documents.

Legal notice

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Laser Information

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

Optical radiation

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) to be Risk Group 2 (low risk).
Introduction

Congratulations on your purchase of this Digital Projection product.

Your projector has the following key features:

- Displays 4K-UHD with smooth picture processing
- Displays WQXGA+ (2716x1528) with smooth picture off.
- 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.
- Blanking control for custom input window sizing.
- Cornerstone, Vertical & Horizontal Keystone, Pincushion & Barrel, and Image Rotation.
- Separate control of screen and source aspect ratio.
- Control via LAN and RS232.
- Motorised lens mount.

A serial number is located on the side of the projector. Record it here:
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E-Vision Laser 4K Series
High Brightness Digital Video Projector

INSTALLATION AND QUICK-START GUIDE
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- Switching the projector on
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- Selecting a test pattern
- Adjusting the lens
- Adjusting the image
**What's In The Box?**

- Remote control
- 2x AAA batteries
- Security screw
- Projector
- User Manual on disc
- Important Information
- HDMI cable
- Power cable, United Kingdom
- Power cable, Europe
- Power cable, North America
- Power cable, China

**Notes**

- Make sure your box contains everything listed. If any pieces are missing, contact your dealer.
- You should save the original box and packing materials, in case you ever need to ship your projector.
- The projector is shipped without a lens.
- Only one power cable - dependent on the destination territory - will be supplied with the projector.
Connecting The Power Supply

Adjust the **VOLTAGE SELECT switch** ① to the required voltage, then 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:

<table>
<thead>
<tr>
<th>Voltage of power supply used</th>
<th>Position of VOLTAGE SELECT switch</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC100-130V outlet</td>
<td>200 240V~</td>
</tr>
<tr>
<td></td>
<td>100 130V~</td>
</tr>
<tr>
<td>AC200-240V (single phase) outlet</td>
<td>200 240V~</td>
</tr>
<tr>
<td></td>
<td>100 130V~</td>
</tr>
</tbody>
</table>

**Notes**

- 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

Front and rear views
1. Air inlet
2. Front infrared window and indicators
3. Air inlet
4. Lens mount
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
**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 OFF, 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**
    Each of these buttons moves the lens in the specified direction.

11. **FOCUS plus and minus buttons**
    Used to move the focus in and out.

12. **ZOOM plus and minus buttons**
    Used to zoom in and out.

---

**Notes**

AUTO SYNC and ASPECT do not work when the projector uses HDMI 3 or 4.
**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**
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.

Notes

- FREEZE and RE-SYNC are not available when the projector uses input HDMI 3 or 4.
- 3D is only available on the HDMI 3 and 4 inputs.
- This projector does not use the following options on the remote: DVI, VGA, COMP 1 and COMP 2.

continues on next page...
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 / DisplayPort2 / numeric input 3
There is no DVI input on this projector.
Use with ALT to select the DisplayPort 2 input.

15 HDMI 2 / HDMI 4 / numeric input 2
Select the HDMI 1 input.
Use with ALT to select the HDMI 4 input.

16 HDMI 1 / HDMI 3 / numeric input 1
Select the HDMI 1 input.
Use with ALT to select the HDMI 3 input.

17 TEST / SWAP / numeric input 0
Show a test pattern. Press again to show the next test pattern: ...Off, White, Black, Red, Green, Blue, CheckerBoard, CrossHatch, V Burst, H Burst, ColourBar, Screen layout.
When PIP mode is on, use this button with ALT to swap the main and sub images.

continues on next page...

Notes

3D is only available on the HDMI 3 and 4 inputs.

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

20. 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.

21. 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.

22. 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.

23. ADDR / ALL (with red indicator at the top)
   Assign and unassign an IR remote address.
   **To assign an address:**
   1. Press and hold this button until the indicator starts flashing.
   2. Release this 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.
   **To unassign an address and return to the default address 00,**
   - Press and hold ALT and this button simultaneously until the indicator flashes to confirm the change.

Notes

- PIP is not available when the projector uses input HDMI 3 or 4.
- 3D is only available on the HDMI 3 and 4 inputs.
- 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.
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 below 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.
**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.

- **Recommended positions: inputs side up**
- **Also possible**
## Changing The Lens

### Inserting a new lens

1. Remove the front and rear lens caps.

2. Position the lens so that the labels are at the top, and gently insert it all the way into the lens mount.

3. Push the lens in firmly and turn it clockwise until it clicks into place.

### Removing the lens

1. Push in the lens release lever, and turn the lens anti-clockwise.

2. Remove the lens.

---

### 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.

- 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.
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.

Notes
- See also Connecting The Power Supply earlier in this guide.
- 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.
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. Test patterns are displayed in the following order:
  White, Black, Red, Green, Blue, Checkerboard, Crosshatch, V Burst, H Burst, Colour Bars, 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
For full details of how to use the controls and the menu system, see the Operating Guide.
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 adjustment 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.

Notes
For full details of how to adjust the lens using the remote control, see Remote Control earlier in this guide.

Neither of the settings under Picture are available with the HDMI 3 and 4 inputs.
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## Signal Inputs

### Digital inputs and outputs

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<thead>
<tr>
<th></th>
<th>Digital Input/Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>HDBaseT</td>
</tr>
<tr>
<td></td>
<td>Receives digital signal from HDBaseT-compliant devices.</td>
</tr>
<tr>
<td>2</td>
<td>3G-SDI in</td>
</tr>
<tr>
<td>3</td>
<td>3G-SDI out</td>
</tr>
<tr>
<td></td>
<td>Connect a 3G-SDI cable to distribute the 3G-SDI signal to another projector.</td>
</tr>
<tr>
<td>4</td>
<td>HDMI 1 / HDMI 2 / HDMI 3 / HDMI 4</td>
</tr>
<tr>
<td></td>
<td>HDMI 1 and 2 are HDMI 2.0 inputs supporting HDCP 2.2.</td>
</tr>
<tr>
<td></td>
<td>HDMI 3 and 4 are HDMI 1.4b inputs supporting Frame Sequential and Dual Pipe 3D with HDCP 1.4.</td>
</tr>
<tr>
<td></td>
<td>Connect an HDMI cable to the connector.</td>
</tr>
<tr>
<td>5</td>
<td>DisplayPort</td>
</tr>
<tr>
<td></td>
<td>DisplayPort 1.2 input. Connect a DisplayPort cable to the connector.</td>
</tr>
<tr>
<td></td>
<td>Supports sources up to 4K-UHD resolution at 60 Hz and WQXGA at 120Hz.</td>
</tr>
</tbody>
</table>

### 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.

*The EDIDs in the switcher should be the same as the one in the projector.*
**3D connections**

**Frame sequential 1080p 3D up to 120Hz and WUXGA 3D at 100Hz**
1. Connect to HDMI 3 or 4.
2. Set **3D Format** in the 3D menu to **Frame Sequential**.

**Dual Pipe 1080p, WUXGA and WQXGA+ 3D sources at up to 100 and 120 Hz**
1. Connect the left eye output to the HDMI 3 socket and the right eye output to the HDMI 4 socket.
2. Set **3D Format** in the 3D menu to **Dual-Pipe**.

---

**Notes**

See **3D formats** in the **Reference Guide** for a complete list of supported formats and frame rates.

---

**Diagram**

1. HDMI 3 / Dual Pipe Left
2. HDMI 4 / Dual Pipe Right
**3D Sync**

**3D Sync In**
Sync input signal. Connect the 3D sync from your graphics card or server.

**3D Sync Out**
Sync output signal. Enables 3D from multiple projectors.

**3D Sync IR**
Sync output signal. This is affected by the settings in the 3D menu such as *Dark Time* and *3D Sync Offset*.

Connect this to an IR emitter or ZScreen.

---

**Notes**

1. 3D Sync IR
2. Sync In
3. Sync Out
4. 3D input
5. 3D Sync In
6. 3D Sync IR
7. IR emitter or ZScreen
Control Connections

1. **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.

2. **Ethernet**
This dedicated LAN connection can be used if HDBaseT/LAN is already being used for HDBaseT signal input.

3. **Trigger 1 & Trigger 2**
The Trigger outputs are activated by one of the three following conditions, as set in the Setup menu:
- Screen trigger: can be connected to an electrically operated screen, automatically deploying the screen when the projector starts up, and retracting the screen when the projector shuts down.
- Aspect ratio trigger: can be used to control screen shuttering for different aspect ratios.
- RS232 trigger: can be used to control the screen or screen shuttering on receipt of an RS232 command.

4. **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.

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

---

**Notes**

- For a list of all commands used to control the projector via LAN, see the Protocol Guide.
- Only one remote connection (RS232 or LAN) should be used at any one time.
- With a LAN connection the projector can serve a web page offering status and projector controls.
- Trigger 1 and Trigger 2 are not available with HDMI 3 and 4 inputs.
- Projector Controller is available for download, free of charge, from the Digital Projection website.
**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.

With a LAN connection the projector can serve a web page offering basic projector controls.

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

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.
RS232 connection example

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

Notes

The Protocol Guide is available separately.
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Using The Menus

Opening the OSD
Access the various menus using either the projector control panel or the remote control. On either device,

• press the MENU button.

The on-screen display (OSD) opens showing the list of available menus.

Opening a menu
Move up and down the list using the UP \( \uparrow \) and DOWN \( \downarrow \) arrow buttons. To open a menu,

• 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,

• press EXIT.

When you reach the top level, pressing EXIT will close the OSD.

To close the OSD from any page,

• press MENU.
**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).

**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.

---

**Notes**

The highlighted item has green background.
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.

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.

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.
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:
  ...Off, White, Black, Red, Green, Blue, Checkerboard, Crosshatch, H Burst, V Burst, Colour Bars, Screen Layout.
  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.
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.

**Notes**

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 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.
**Image menu**

- **Picture Mode**
  Choose from **High Bright**, **Presentation** and **Video**. Use a different setting depending on 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.

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

- **Smooth Picture**
  When this feature is **On**, the projector will resize the incoming signal to display in 4K-UHD resolution. When **Off** sources will be displayed within WQXGA+ resolution. **Auto** will display 4K-UHD sources in 4K-UHD resolution with Smooth Picture **On**. Lower resolution sources with be display within WQXGA+ resolution with Smooth Picture **Off**. Aspect ratio selection applies for both Smooth Picture **On** or **Off**.

- **Gamma**
  Choose a de-gamma curve from **1.0**, **1.8**, **2.0**, **2.2**, **2.35**, **2.5**, **S-Curve**, **DICOM**, **HDRPQ-400**, **HDRPQ-500**, **HDRPQ-1000** and **HDRHLG**. 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.

**HDR** (High Dynamic Range) is a new form of gamma developed to create more realistic experience when viewing images delivered using this format, such as scenes with bright sunlight. Unlike traditional gamma HDR is not device or installation independent. HDR content will come with a recommended brightness regardless of screen size. For best results as a guideline the following screens sizes are suggested:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Image</strong></td>
<td></td>
</tr>
<tr>
<td>Picture Mode</td>
<td>High Bright</td>
</tr>
<tr>
<td>Dynamic Black</td>
<td>Off</td>
</tr>
<tr>
<td>Smooth Picture</td>
<td>Auto</td>
</tr>
<tr>
<td>Gamma</td>
<td>2.2</td>
</tr>
<tr>
<td>Brightness</td>
<td>100</td>
</tr>
<tr>
<td>Contrast</td>
<td>100</td>
</tr>
<tr>
<td>Saturation</td>
<td>100</td>
</tr>
<tr>
<td>Hue</td>
<td>100</td>
</tr>
<tr>
<td>Sharpness</td>
<td>10</td>
</tr>
<tr>
<td>Noise Reduction</td>
<td>Off</td>
</tr>
<tr>
<td>Freeze</td>
<td></td>
</tr>
<tr>
<td>Resync</td>
<td></td>
</tr>
</tbody>
</table>

**Notes**

The following settings are not available with input HDMI 3 or HDMI 4:

- **Image > Dynamic Black, Smooth Picture, 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.**
HDR options should only be used with media players and sources equipped with HDR and HDR content.

Perceptual Quantizer (PQ) is the digitizing concept for capture and display and provides metadata to enable the display to understand the coding of the content.

The NIT numbers relate to the brightness of the viewing conditions in NIT. NIT is the unit of brightness measurement for monitors and LED walls that emit light rather than reflect it such as a projection screen. However, it is a reference to the brightness you would choose for a given environment.

HDRHLG is High Dynamic Range – hybrid-log-gamma. This is a broadcast version of HDR for live TV and events.

Currently, HDR gamma selection is manual.

- **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.

- **Freeze**
  Freezes the current frame.

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

**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**.

<table>
<thead>
<tr>
<th>Color</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Color Space</td>
<td>Auto</td>
<td></td>
</tr>
<tr>
<td>Color Mode</td>
<td>ColorMax</td>
<td>Peak</td>
</tr>
<tr>
<td>Manual Color Matching</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Color Temperature</td>
<td>Native</td>
<td></td>
</tr>
<tr>
<td>Gains and Lifts</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes**

*Color Space* is not available with **HDMI 3** or **HDMI 4**.
**Color Mode**
The projector can work in the following color modes: **ColorMax**, **Manual Color Matching**, **Color Temperature** and **Gains and Lifts**.

**ColorMax**
1. Set **Color Mode** to **ColorMax**.
2. Navigate to the **ColorMax** setting. 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.

**Notes**
- Only one color mode can be selected at a time. Settings used by the other color modes are disabled.
- See **Setup menu** for further information about setting up the **User 1** and **User 2** color gamuts.
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.

---

Notes

For more details about the Hue, Saturation and Gain settings, see Color matching parameters explained further in this guide.
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 menu continued from previous page

**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).

<table>
<thead>
<tr>
<th>Color</th>
<th>Color Space</th>
<th>Color Mode</th>
<th>ColorMax</th>
<th>Manual Color Matching</th>
<th>Color Temperature</th>
<th>Gains and Lifts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Auto</td>
<td>Color Temperature</td>
<td>Peak</td>
<td></td>
<td>Native</td>
<td>3200K</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
<td>5400K</td>
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<td>6500K</td>
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<td>7500K</td>
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<td></td>
<td>9300K</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Native</td>
</tr>
</tbody>
</table>

**Notes**
Color menu continued from previous page

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

Set the sliders as required.

<table>
<thead>
<tr>
<th>Gains and Lifts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red Lift</td>
</tr>
<tr>
<td>Green Lift</td>
</tr>
<tr>
<td>Blue Lift</td>
</tr>
<tr>
<td>Red Gain</td>
</tr>
<tr>
<td>Green Gain</td>
</tr>
<tr>
<td>Blue Gain</td>
</tr>
<tr>
<td>Reset</td>
</tr>
</tbody>
</table>

Notes
**Geometry menu**

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

<table>
<thead>
<tr>
<th>Geometry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspect Ratio</td>
</tr>
<tr>
<td>Digital Zoom</td>
</tr>
<tr>
<td>Overscan</td>
</tr>
<tr>
<td>Blanking</td>
</tr>
<tr>
<td>Keystone</td>
</tr>
<tr>
<td>4 Corners</td>
</tr>
<tr>
<td>Rotation</td>
</tr>
<tr>
<td>Pincushion / Barrel</td>
</tr>
<tr>
<td>Arc</td>
</tr>
<tr>
<td>Custom Warp</td>
</tr>
</tbody>
</table>

**Notes**

- Aspect Ratio, Digital Zoom and Overscan are not available with input HDMI 3 or HDMI 4.
- Only one of the following should be used at any one time. Keystone, 4 Corners, Rotation, Pincushion/Barrel and Arc
- For more complex adjustments use Custom Warp later in this section.
- Image scaling and aspect ratio are also influenced by Setup > Screen Setting.
- See next page for further information about the TheaterScope aspect ratio.

**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 2.35:1 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:

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:

---

### Notes

- **TheaterScope is used with an anamorphic lens.**
- **If you use TheaterScope, set your screen aspect ratio to 16:9.**
Geometry menu continued from previous page

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.

<table>
<thead>
<tr>
<th>Digital Zoom</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital Pan</td>
<td>0</td>
</tr>
<tr>
<td>Digital Scan</td>
<td>0</td>
</tr>
<tr>
<td>Reset</td>
<td></td>
</tr>
</tbody>
</table>

Notes

Digital Zoom is a temporary setting and not retained after an input change or power cycle.
**Geometry menu continued from previous page**

**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.

---

**Notes**

- **Geometry**
  - Aspect Ratio
  - Digital Zoom
  - Overscan
  - Blanking
  - Keystone
  - 4 Corners
  - Rotation
  - Pincushion / Barrel
  - Arc

---

*Image with noisy edges*  *Overscanned image*
Geometry menu continued from previous page

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.
Geometry menu continued from previous page

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 example
1. The projector is positioned at an angle
2. The resulting image is distorted
3. The image is corrected when Keystone is applied
Geometry menu continued from previous page

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*
Geometry menu continued from previous page

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

Top Right Corner example
In this illustration, the top right corner requires both horizontal and vertical correction.

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.
Geometry menu continued from previous page

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

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
   The angle equals a quarter of the Rotation setting. In this example the angle is 5°, therefore Rotation = 20.
Geometry menu continued from previous page

**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.

### Notes

<table>
<thead>
<tr>
<th>Pincushion / Barrel</th>
</tr>
</thead>
<tbody>
<tr>
<td>H Pin/Barrel</td>
</tr>
<tr>
<td>V Pin/Barrel</td>
</tr>
<tr>
<td>Keystone</td>
</tr>
<tr>
<td>Reset</td>
</tr>
</tbody>
</table>

**Pincushion / Barrel example**

The illustration shows pincushion and barrel correction applied both horizontally and vertically, in equal measures.
Geometry menu continued from previous page

**Custom Warp**

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

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

**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.

<table>
<thead>
<tr>
<th>Arc</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Top</td>
<td></td>
</tr>
<tr>
<td>Bottom</td>
<td></td>
</tr>
<tr>
<td>Left</td>
<td></td>
</tr>
<tr>
<td>Right</td>
<td></td>
</tr>
<tr>
<td>Reset</td>
<td></td>
</tr>
</tbody>
</table>

**Notes**

Please note that a positive **Arc** value on any edge will reduce the image size as the projector needs to maintain the aspect ratio.

A negative **Arc** value will not affect the overall image size.
**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 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.

---

**Notes**

- When Edge Blend is set to Off, all other edge blend settings are disabled.

- The picture in the blend region needs to be delivered to all overlapping projectors, which may require a special setup of the source.
**Edge Blend menu continued from previous page**

**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**

### Notes

<table>
<thead>
<tr>
<th>Blend Width</th>
<th>Top</th>
<th>Bottom</th>
<th>Left</th>
<th>Right</th>
</tr>
</thead>
<tbody>
<tr>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

---

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**Edge Blend menu continued from previous page**

**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**, 1 and 2. Both images have black level uplift applied; as a result, **artifacts** 3 and 4 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** 1 to remove the **artifact on the right** 4, and the **Left** slider of the **projector on the right** 2 to remove the **artifact on the left** 3.

---

**Notes**

Enable **Align Pattern** from the **Edge Blend** menu to see the black level uplift area.

---

**Operating Guide**

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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 the glasses.

- **Sync Offset** — use the LEFT and RIGHT arrow buttons to compensate for image overlapping (ghosting) when viewed through 3D glasses.

- **Sync 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 menu settings

<table>
<thead>
<tr>
<th>Setting</th>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>3D Format</td>
<td>Off</td>
</tr>
<tr>
<td>DLP Link</td>
<td>Off</td>
</tr>
<tr>
<td>Eye Swap</td>
<td>Normal</td>
</tr>
<tr>
<td>Dark Time</td>
<td>1.95 ms</td>
</tr>
<tr>
<td>Sync Offset</td>
<td>100</td>
</tr>
<tr>
<td>Sync Reference</td>
<td>Internal</td>
</tr>
</tbody>
</table>

**Notes**

- **3D video** is only possible on the HDMI 3 and HDMI 4 inputs.

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

- For further information about supported 3D formats, see **3D connections** in the **Connection Guide**.

- When 3D is on, the following settings become unavailable:
  - **Image > Smooth Picture, 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.**

See also **3D types** and **Some 3D settings explained** further in this guide.

See **Appendix B: Supported Signal Input Modes > 3D formats** in the **Reference Guide** for 3D resolutions and frame rates.
3D types
To Display a 3D image it 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.

![Diagram showing Dual Pipe](image)

- **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.

![Diagram showing Sequential](image)
Some 3D settings explained

**Dark Time**
Bandung 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.

**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**.

**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).

---

**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.
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** brightness 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 menu

<table>
<thead>
<tr>
<th>Power Mode</th>
<th>Normal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Level</td>
<td>— — — —</td>
</tr>
<tr>
<td>Constant Brightness</td>
<td>Off</td>
</tr>
</tbody>
</table>

**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**.

- **Standby Power**
  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.

- **Screen Setting**
  Choose from **16:10**, **16:9** and **4:3**.

- **ColorMax**
  Set up user-defined color gamut values.

- **Power On/Off Management**
  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.

- **Startup Logo**
  Set this to **On** if you want the DP logo to show when the projector is first switched on.

- **Blank Screen**
  Choose from **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 menu continued from previous page

• **Trigger 1 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:
1. Select IR Code.
2. Use the UP ▲ and DOWN ▼ arrow buttons to change the values.

To assign an IR code for the remote:
1. Press and hold the ADDR button on the remote until the indicator starts flashing.
2. 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,
  1. Press and hold ALT and ADDR simultaneously until the 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.

• **Instant Startup**
  When ON only the Laser will be turned off when the Power off command is given. A subsequent Power On will turn on the laser giving an apparent very fast power on.

---

**Notes**

- **Trigger-1 and Trigger-2** are not available with input HDMI 3 or HDMI 4.

- If you turn the remote control off, you can only turn it back on again from the control panel or via the **Projector Controller** application.

  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.
Setup menu continued from previous page

- **Standby Period**
  
  Used with Instant Startup. If Instant Startup in **ON** and the projector is powered down then the projector will go to Standby after the selected “Standby Period” 30 minutes, 60 minutes, 90 minutes.

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

**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.

---

**Notes**

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

This tool is best used in conjunction with a specialized light meter (a photo spectrometer) to measure color parameters within a particular installation. However, the preloaded generic factory default data set is designed to give more than satisfactory results.
Setup menu continued from previous page

**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.
**Setup menu continued from previous page**

**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.

<table>
<thead>
<tr>
<th>Clock Adjust</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date (dd:MM:yyyy)</td>
</tr>
<tr>
<td>Time (HH:mm)</td>
</tr>
<tr>
<td>Time Zone</td>
</tr>
</tbody>
</table>

Notes

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Setup menu continued from previous page

**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.

**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**, **Smooth Picture**, **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**.

---

**Notes**

Presets from one input cannot be applied to another input.

Presets for inputs HDMI 3 and 4 do not contain all the settings normally stored for other inputs.
Network menu

- **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.

<table>
<thead>
<tr>
<th>Network</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DHCP</td>
<td>Off</td>
</tr>
<tr>
<td>IP</td>
<td>192.168.000.100</td>
</tr>
<tr>
<td>Subnet Mask</td>
<td>255.255.255.000</td>
</tr>
<tr>
<td>Gateway</td>
<td>000.000.000.000</td>
</tr>
<tr>
<td>DNS</td>
<td>000.000.000.000</td>
</tr>
<tr>
<td>MAC</td>
<td>00:18:27:2d:f2:06</td>
</tr>
<tr>
<td>AMX</td>
<td>Off</td>
</tr>
</tbody>
</table>
**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**.

---

**Notes**

*PIP* functionality is not available with inputs HDMI 3 and HDMI 4.
**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.

<table>
<thead>
<tr>
<th>Model Name</th>
<th>E-Vision Laser 4K</th>
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</thead>
<tbody>
<tr>
<td>Serial Number</td>
<td>X000XXXXX0000</td>
</tr>
<tr>
<td>Software Version 1</td>
<td>MD28-VD22-FD09-0.0.356</td>
</tr>
<tr>
<td>Software Version 2</td>
<td>STEP_D08-24-17-3120</td>
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<tr>
<td>Software Version 3</td>
<td>2.0.16.0-P503</td>
</tr>
<tr>
<td>Active / PIP Source</td>
<td>HDMI 1</td>
</tr>
<tr>
<td>Signal Format</td>
<td>▶</td>
</tr>
<tr>
<td>Laser Hours</td>
<td>2</td>
</tr>
<tr>
<td>System Status</td>
<td>▶</td>
</tr>
<tr>
<td>Thermal Status</td>
<td>▶</td>
</tr>
<tr>
<td>Factory Reset</td>
<td></td>
</tr>
</tbody>
</table>

**Signal Format**

<table>
<thead>
<tr>
<th>Active Source</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Timing</td>
<td></td>
</tr>
<tr>
<td>H Refresh</td>
<td>67.500 KHz</td>
</tr>
<tr>
<td>V Refresh</td>
<td>60.00 Hz</td>
</tr>
<tr>
<td>Pixel Clock</td>
<td>148.500 MHz</td>
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</table>

<table>
<thead>
<tr>
<th>PIP Source</th>
<th>576p/50Hz</th>
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</thead>
<tbody>
<tr>
<td>Timing</td>
<td></td>
</tr>
<tr>
<td>H Refresh</td>
<td>31.250 KHz</td>
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<tr>
<td>V Refresh</td>
<td>50.00 Hz</td>
</tr>
<tr>
<td>Pixel Clock</td>
<td>27.0 MHz</td>
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</tbody>
</table>

**Notes**

- PIP Source items are not available with input HDMI 3 or HDMI 4.

---

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Information menu continued from previous page

### System Status

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
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<td>160V – 264V</td>
</tr>
<tr>
<td>Ceiling Mode</td>
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</tr>
<tr>
<td>Tilt Angle</td>
<td>4 deg</td>
</tr>
<tr>
<td>Portrait Angle</td>
<td>0 deg</td>
</tr>
<tr>
<td>Altitude Mode</td>
<td>Low</td>
</tr>
<tr>
<td>Laser Power</td>
<td>100%</td>
</tr>
<tr>
<td>License Key</td>
<td>License Pass. Timeout Not Expired</td>
</tr>
</tbody>
</table>

### Thermal Status

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
<td>DMD Temp.</td>
<td>38 (°C)</td>
</tr>
<tr>
<td>LD 1-2 Temp.</td>
<td>49 / 42 (°C)</td>
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<tr>
<td>Fan 1-3 Speed</td>
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</tr>
<tr>
<td>Fan 4-6 Speed</td>
<td>1410 / 1200 / 1205</td>
</tr>
<tr>
<td>Fan 7-9 Speed</td>
<td>1211 / 1407 / 1410</td>
</tr>
<tr>
<td>Fan 10-12 Speed</td>
<td>0 / 3005 / 3007</td>
</tr>
<tr>
<td>Fan 13-15 Speed</td>
<td>2986 / 2984 / 2984</td>
</tr>
<tr>
<td>Fan 16-18 Speed</td>
<td>3020 / NA / NA</td>
</tr>
<tr>
<td>Water Pump Speed</td>
<td>3506</td>
</tr>
</tbody>
</table>
Information menu continued from previous page

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.

<table>
<thead>
<tr>
<th>Information</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Model Name</td>
<td>E-Vision Laser 8500</td>
</tr>
<tr>
<td>Serial Number</td>
<td>X000XXXXX0000</td>
</tr>
<tr>
<td>Software Version 1</td>
<td>MD03-SE10-FE09</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Factory Reset</th>
</tr>
</thead>
<tbody>
<tr>
<td>WARNING</td>
</tr>
<tr>
<td>All user settings will be lost!</td>
</tr>
<tr>
<td>Press OK to confirm</td>
</tr>
<tr>
<td>Press Exit to cancel</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Thermal Status</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Factory Reset</td>
<td>OK</td>
</tr>
</tbody>
</table>

Notes
Factory reset does not reset the Network settings, or High Altitude mode.
The served web pages allow you to control the projector remotely via LAN.

The default IP address is **192.168.0.100**.
Digital Projection E-Vision Laser 4K Series

State Control

- Power: On, Off

Input Selection
- DisplayPort, HDMI 1, HDMI 2, HDBaseT, 3G-SDI, HDMI 3 (3D), HDMI 4 (3D)

Lens Control

- Zoom In, Focus In, Shift

- Zoom Out, Focus Out

Notes
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIP Pixel Clock</td>
<td>NA</td>
</tr>
<tr>
<td>Laser Hours</td>
<td>19</td>
</tr>
<tr>
<td>System Status</td>
<td></td>
</tr>
<tr>
<td>Atmospheric Pressure</td>
<td>101258 Pa(5 m)</td>
</tr>
<tr>
<td>AC Voltage</td>
<td>180V-264V</td>
</tr>
<tr>
<td>Ceiling Mode</td>
<td>Table Top</td>
</tr>
<tr>
<td>Tilt Angle</td>
<td>0</td>
</tr>
<tr>
<td>Portrait Angle</td>
<td>0</td>
</tr>
<tr>
<td>Altitude Mode</td>
<td>Auto</td>
</tr>
<tr>
<td>Laser Power</td>
<td>100</td>
</tr>
<tr>
<td>License Key</td>
<td>License Pass, Timeout Not Expired</td>
</tr>
<tr>
<td>Thermal Status</td>
<td></td>
</tr>
<tr>
<td>Inlet 1-2 Temp.</td>
<td>23 / 34</td>
</tr>
<tr>
<td>DMD Temp</td>
<td>34</td>
</tr>
<tr>
<td>LD 1-2 Temp</td>
<td>46 / 42</td>
</tr>
<tr>
<td>Fan 1-3Speed</td>
<td>1412/1415/1409</td>
</tr>
<tr>
<td>Fan 4-6Speed</td>
<td>1415/1195/1209</td>
</tr>
<tr>
<td>Fan 7-9Speed</td>
<td>1242/1408/1400</td>
</tr>
<tr>
<td>Fan 10-12Speed</td>
<td>NA/NA/2983</td>
</tr>
<tr>
<td>Fan 13-15Speed</td>
<td>2983/NA/3006</td>
</tr>
<tr>
<td>Fan 16Speed</td>
<td>3005</td>
</tr>
<tr>
<td>Water Pump Speed</td>
<td>3718</td>
</tr>
</tbody>
</table>

Factory Reset
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- Basic Calculation Example .............................................. 91
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- Full Lens Calculation Example ....................................... 95

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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:

<table>
<thead>
<tr>
<th>Throw ratios</th>
<th>Focus range</th>
<th>Lens shift</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.377 : 1 fixed (UST)*</td>
<td>0.82 m - 2.71 m</td>
<td>Depends on image size, see UST Lens Installation Guide (separate document).</td>
</tr>
<tr>
<td>0.74 - 0.93 : 1 zoom</td>
<td>1.02 m - 12.7 m</td>
<td>V: 0.5 (U) 0.3 (D) frame</td>
</tr>
<tr>
<td></td>
<td></td>
<td>H: 0.1 (L) 0.2 (R) frame</td>
</tr>
<tr>
<td>0.76 : 1 fixed*</td>
<td>0.81 m - 5.08 m</td>
<td>none</td>
</tr>
<tr>
<td>1.24 - 1.78 : 1 zoom</td>
<td>1.33 m - 11.73 m</td>
<td>V: 0.5 (U) 0.3 (D) frame</td>
</tr>
<tr>
<td></td>
<td></td>
<td>H: 0.1 (L) 0.2 (R) frame</td>
</tr>
<tr>
<td>1.71 - 2.25 : 1 zoom</td>
<td>1.83 m - 14.9 m</td>
<td>V: 0.5 (U) 0.3 (D) frame</td>
</tr>
<tr>
<td></td>
<td></td>
<td>H: 0.1 (L) 0.2 (R) frame</td>
</tr>
<tr>
<td>2.20 - 3.67 : 1 zoom</td>
<td>2.36 m - 24.2 m</td>
<td>V: 0.5 (U) 0.3 (D) frame</td>
</tr>
<tr>
<td></td>
<td></td>
<td>H: 0.1 (L) 0.2 (R) frame</td>
</tr>
<tr>
<td>3.54 - 5.36 : 1 zoom*</td>
<td>3.8 m - 35.35 m</td>
<td>V: 0.5 (U) 0.3 (D) frame</td>
</tr>
<tr>
<td></td>
<td></td>
<td>H: 0.1 (L) 0.2 (R) frame</td>
</tr>
<tr>
<td>5.24 - 8.27 : 1 zoom*</td>
<td>5.59 m - 54.8 m</td>
<td>V: 0.5 (U) 0.3 (D) frame</td>
</tr>
<tr>
<td></td>
<td></td>
<td>H: 0.1 (L) 0.2 (R) frame</td>
</tr>
</tbody>
</table>

Lenses marked with an asterisk (*) above are only available for High Brightness projectors. All other lenses have High Contrast counterparts.

To choose a lens, calculate the throw ratio required.

Notes

- Throw distance calculations are based on the distance from the outer end of the lens, which will vary from lens to lens.
- The distance between the front of the projector chassis and the outer end of the lens is called lens extension. Lens extensions are measured when the lens is focused at infinity, and 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 0.74 - 0.93 : 1 zoom lens has an additional feature permitting focus correction for curved screens. The front ring of the lens is a manual control which provides focus curvature adjustment to correct for the different focal distances between center and corner.
- For information about individual lens part numbers, see Appendix A at the end of this document.
**Basic calculation**

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

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

\[
\text{Throw ratio} = \frac{\text{Throw distance}}{\text{Screen width}}
\]

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

2. Match the throw ratio with a lens from the table below:

<table>
<thead>
<tr>
<th>Throw ratios</th>
<th>Focus range</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.377 : 1 fixed (UST)</td>
<td>0.82 m - 2.71 m</td>
</tr>
<tr>
<td>0.74 - 0.93 : 1 zoom</td>
<td>1.02 m - 12.7 m</td>
</tr>
<tr>
<td>0.76 : 1 fixed</td>
<td>0.81 m - 5.08 m</td>
</tr>
<tr>
<td>1.24 - 1.78 : 1 zoom</td>
<td>1.33 m - 11.73 m</td>
</tr>
<tr>
<td>1.71 - 2.25 : 1 zoom</td>
<td>1.83 m - 14.9 m</td>
</tr>
<tr>
<td>2.20 - 3.67 : 1 zoom</td>
<td>2.36 m - 24.2 m</td>
</tr>
<tr>
<td>3.54 - 5.36 : 1 zoom</td>
<td>3.8 m - 35.35 m</td>
</tr>
<tr>
<td>5.24 - 8.27 : 1 zoom</td>
<td>5.59 m - 54.8 m</td>
</tr>
</tbody>
</table>

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

---

**Notes**

- The lens table shown on this page includes High Brightness lenses only. For a full list, see [Appendix A](#) at the end of this document.

- The basic calculation on this page does not take into consideration DMD™ and image size, which could affect the throw ratio. For a more complex and realistic calculation, see [Full lens calculation](#) in this section.

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

- For information about individual lens part numbers, see [Appendix A](#) at the end of this document.
Basic calculation example

1. Calculate the throw ratio using the formula.
   Your screen is 4.5 m wide and you wish to place the projector approximately 11 m from the screen. The throw ratio will then be
   \[
   \frac{11}{4.5} = 2.44
   \]

2. Match the result with the lens table.
   The lens matching a throw ratio of 2.44 is the **2.20 - 3.67 : 1 zoom lens**.

3. Check whether the lens covers the required throw distance.
   The focus range quoted for the 2.20 - 3.67 : 1 zoom lens is **2.36 - 24.2 m**. The required distance of 11 m is within the range.

<table>
<thead>
<tr>
<th>Throw ratios</th>
<th>Focus range</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.377 : 1 fixed (UST)</td>
<td>0.82 m - 2.71 m</td>
</tr>
<tr>
<td>0.74 - 0.93 : 1 zoom</td>
<td>1.02 m - 12.7 m</td>
</tr>
<tr>
<td>0.76 : 1 fixed</td>
<td>0.81 m - 5.08 m</td>
</tr>
<tr>
<td>1.24 - 1.78 : 1 zoom</td>
<td>1.33 m - 11.73 m</td>
</tr>
<tr>
<td>1.71 - 2.25 : 1 zoom</td>
<td>1.83 m - 14.9 m</td>
</tr>
<tr>
<td>2.20 - 3.67 : 1 zoom</td>
<td>2.36 m - 24.2 m</td>
</tr>
<tr>
<td>3.54 - 5.36 : 1 zoom</td>
<td>3.8 m - 35.35 m</td>
</tr>
<tr>
<td>5.24 - 8.27 : 1 zoom</td>
<td>5.59 m - 54.8 m</td>
</tr>
</tbody>
</table>

**Notes**

- The lens table shown on this page includes High Brightness lenses only. For a full list, see Appendix A at the end of this document.
- The basic calculation on this page does not take into consideration DMD™ and image size, which could affect the throw ratio. For a more complex and realistic calculation, see Full lens calculation in this section.
- For information about individual lens part numbers, see Appendix A at the end of this document.
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.

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.
Calculating TRC

To calculate TRC, use the following formula:

\[
TRC = \frac{1.78 \times \text{DMD™ aspect ratio}}{\text{Source aspect ratio}}
\]

TRC table

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

<table>
<thead>
<tr>
<th>Image Aspect Ratio</th>
<th>SP-ON (4K-UHD)</th>
<th>SP-OFF (WQXGA+)</th>
<th>TRC</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.35:1 (Scope)</td>
<td>3840 x 1634 pixels</td>
<td>2716 x 1156 pixels</td>
<td>TRC &lt; 1, not used</td>
</tr>
<tr>
<td>1.85:1 (Flat)</td>
<td>3840 x 2075 pixels</td>
<td>2716 x 1468 pixels</td>
<td>TRC &lt; 1, not used</td>
</tr>
<tr>
<td>1.78:1 (16:9)</td>
<td>3840 x 2160 pixels</td>
<td>2716 x 1528 pixels</td>
<td>TRC = 1, not used (native aspect ratio)</td>
</tr>
<tr>
<td>1.66:1 (Vista)</td>
<td>3585 x 2160 pixels</td>
<td>2536 x 1528 pixels</td>
<td>TRC = 1.07</td>
</tr>
<tr>
<td>1.6:1 (16:10)</td>
<td>3456 x 2160 pixels</td>
<td>2444 x 1528 pixels</td>
<td>TRC = 1.11</td>
</tr>
<tr>
<td>1.33:1 (4:3)</td>
<td>2873 x 2160 pixels</td>
<td>2032 x 1528 pixels</td>
<td>TRC = 1.33</td>
</tr>
<tr>
<td>1.25:1 (5:4)</td>
<td>2700 x 2160 pixels</td>
<td>1910 x 1528 pixels</td>
<td>TRC = 1.42</td>
</tr>
</tbody>
</table>

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.
Calculating the throw ratio with TRC

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

   \[ \text{Throw ratio} = \frac{\text{Throw distance}}{\text{Screen width} \times \text{TRC}} \]

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

<table>
<thead>
<tr>
<th>Throw ratios</th>
<th>Focus range</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.377 : 1 fixed (UST)</td>
<td>0.82 m - 2.71 m</td>
</tr>
<tr>
<td>0.74 - 0.93 : 1 zoom</td>
<td>1.02 m - 12.7 m</td>
</tr>
<tr>
<td>0.76 : 1 fixed</td>
<td>0.81 m - 5.08 m</td>
</tr>
<tr>
<td>1.24 - 1.78 : 1 zoom</td>
<td>1.33 m - 11.73 m</td>
</tr>
<tr>
<td>1.71 - 2.25 : 1 zoom</td>
<td>1.83 m - 14.9 m</td>
</tr>
<tr>
<td>2.20 - 3.67 : 1 zoom</td>
<td>2.36 m - 24.2 m</td>
</tr>
<tr>
<td>3.54 - 5.36 : 1 zoom</td>
<td>3.8 m - 35.35 m</td>
</tr>
<tr>
<td>5.24 - 8.27 : 1 zoom</td>
<td>5.59 m - 54.8 m</td>
</tr>
</tbody>
</table>

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

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

1. Calculate TRC as follows:
   \[
   TRC = \frac{1.78}{1.33} = 1.33
   \]

2. Calculate the throw ratio:
   \[
   \text{Throw ratio} = \frac{11}{4.5 \times 1.33} = 1.84
   \]

3. Find a match in the lens table.
   The table shows that the matching lens is the 2.2 - 3.67 : 1 zoom lens.

4. Check whether the lens covers the required throw distance.
   The focus range quoted for the 2.2 - 3.67 : 1 zoom lens is 2.36 m - 24.2 m. The required distance of 11 m is within the range.

---

INFORMATION YOU NEED FOR THESE CALCULATIONS

- The TRC formula
  \[
  TRC = \frac{DMD^\text{™ aspect ratio}}{\text{Source aspect ratio}}
  \]
- The TRC table (to use instead of the formula)
  
<table>
<thead>
<tr>
<th>Source aspect ratio</th>
<th>TRC used?</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.35:1 (Scope)</td>
<td>TRC not used</td>
</tr>
<tr>
<td>1.85:1 (Flat)</td>
<td>TRC not used</td>
</tr>
<tr>
<td>1.78:1 (16:9)</td>
<td>TRC not used (native aspect ratio)</td>
</tr>
<tr>
<td>1.66:1 (Vista)</td>
<td>TRC = 1.07</td>
</tr>
<tr>
<td>1.6:1 (16:10)</td>
<td>TRC = 1.11</td>
</tr>
<tr>
<td>1.33:1 (4:3)</td>
<td>TRC = 1.33</td>
</tr>
<tr>
<td>1.25:1 (5:4)</td>
<td>TRC = 1.42</td>
</tr>
</tbody>
</table>

- The throw ratio formula
  \[
  \text{Throw ratio} = \frac{\text{Throw distance}}{\text{Screen width x TRC}}
  \]
- The lens table:

<table>
<thead>
<tr>
<th>Throw ratios</th>
<th>Focus range</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.377 : 1 fixed (UST)</td>
<td>0.82 m - 2.71 m</td>
</tr>
<tr>
<td>0.74 - 0.93 : 1 zoom</td>
<td>1.02 m - 12.7 m</td>
</tr>
<tr>
<td>0.76 : 1 fixed</td>
<td>0.81 m - 5.08 m</td>
</tr>
<tr>
<td>1.24 - 1.78 : 1 zoom</td>
<td>1.33 m - 11.73 m</td>
</tr>
<tr>
<td>1.71 - 2.25 : 1 zoom</td>
<td>1.83 m - 14.9 m</td>
</tr>
<tr>
<td>2.20 - 3.67 : 1 zoom</td>
<td>2.36 m - 24.2 m</td>
</tr>
<tr>
<td>3.54 - 5.36 : 1 zoom</td>
<td>3.8 m - 35.35 m</td>
</tr>
<tr>
<td>5.24 - 8.27 : 1 zoom</td>
<td>5.59 m - 54.8 m</td>
</tr>
</tbody>
</table>

---

Notes

The lens table shown on this page includes High Brightness lenses only. For a full list, see Appendix A at the end of this document.
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.

- **Shifting the lens up (rising front)**
- **Centered 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 below.

*Full horizontal or vertical shift*

*Combined shift is reduced*
### Appendix A: Lens Part Numbers

<table>
<thead>
<tr>
<th>Throw ratio</th>
<th>High Brightness or High Contrast?</th>
<th>Part number</th>
<th>Focus range</th>
<th>Lens shift</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.377 : 1 fixed (UST)</td>
<td>High Brightness</td>
<td>117-341</td>
<td>0.82 m - 2.71 m</td>
<td>none</td>
</tr>
<tr>
<td>0.74 - 0.93 : 1 zoom</td>
<td>High Brightness</td>
<td>115-339</td>
<td>1.02 m - 12.7 m</td>
<td>V: 0.5 (U) 0.3 (D) frame&lt;br&gt;H: 0.1 (L) 0.2 (R) frame</td>
</tr>
<tr>
<td>0.74 - 0.93 : 1 zoom</td>
<td>High Contrast</td>
<td>118-679</td>
<td>1.02 m - 12.7 m</td>
<td>V: 0.5 (U) 0.3 (D) frame&lt;br&gt;H: 0.1 (L) 0.2 (R) frame</td>
</tr>
<tr>
<td>0.76 : 1 fixed</td>
<td>High Brightness</td>
<td>112-499</td>
<td>0.81 m - 5.08 m</td>
<td>none</td>
</tr>
<tr>
<td>1.24 - 1.78 : 1 zoom</td>
<td>High Brightness</td>
<td>112-500</td>
<td>1.33 m - 11.73 m</td>
<td>V: 0.5 (U) 0.3 (D) frame&lt;br&gt;H: 0.1 (L) 0.2 (R) frame</td>
</tr>
<tr>
<td>1.24 - 1.78 : 1 zoom</td>
<td>High Contrast</td>
<td>118-563</td>
<td>1.33 m - 11.73 m</td>
<td>V: 0.5 (U) 0.3 (D) frame&lt;br&gt;H: 0.1 (L) 0.2 (R) frame</td>
</tr>
<tr>
<td>1.71 - 2.25 : 1 zoom</td>
<td>High Brightness</td>
<td>112-501</td>
<td>1.83 m - 14.9 m</td>
<td>V: 0.5 (U) 0.3 (D) frame&lt;br&gt;H: 0.1 (L) 0.2 (R) frame</td>
</tr>
<tr>
<td>1.71 - 2.25 : 1 zoom</td>
<td>High Contrast</td>
<td>118-562</td>
<td>1.83 m - 14.9 m</td>
<td>V: 0.5 (U) 0.3 (D) frame&lt;br&gt;H: 0.1 (L) 0.2 (R) frame</td>
</tr>
<tr>
<td>2.20 - 3.67 : 1 zoom</td>
<td>High Brightness</td>
<td>112-502</td>
<td>2.36 m - 24.2 m</td>
<td>V: 0.5 (U) 0.3 (D) frame&lt;br&gt;H: 0.1 (L) 0.2 (R) frame</td>
</tr>
<tr>
<td>2.20 - 3.67 : 1 zoom</td>
<td>High Contrast</td>
<td>118-680</td>
<td>2.36 m - 24.2 m</td>
<td>V: 0.5 (U) 0.3 (D) frame&lt;br&gt;H: 0.1 (L) 0.2 (R) frame</td>
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<td>3.54 - 5.36 : 1 zoom</td>
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<td>112-503</td>
<td>3.8 m - 35.35 m</td>
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<tr>
<td>5.24 - 8.27 : 1 zoom</td>
<td>High Brightness</td>
<td>112-504</td>
<td>5.59 m - 54.8 m</td>
<td>V: 0.5 (U) 0.3 (D) frame&lt;br&gt;H: 0.1 (L) 0.2 (R) frame</td>
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</table>

**Notes**

- **Throw distance calculations are based on the distance from the outer end of the lens, which will vary from lens to lens.**
- The distance between the front of the projector chassis and the outer end of the lens is called lens extension. Lens extensions are measured when the lens is focused at infinity, and 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 0.74 - 0.93 : 1 zoom lens has an additional feature permitting focus correction for curved screens. The front ring of the lens is a manual control which provides focus curvature adjustment to correct for the different focal distances between center and corner.**
# Appendix B: Supported Signal Input Modes

## 2D formats

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<th>Signal Format</th>
<th>Resolution</th>
<th>Frame Rate</th>
<th>DisplayPort</th>
<th>HDMI / HD-BaseT</th>
<th>Output Frame Rate (Hz)</th>
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## APPENDIX B: SUPPORTED SIGNAL INPUT MODES

### Signal Format

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### Notes

- Apple Mac
  - 640x480 60Hz
  - 832x624 60Hz
- SDTV
  - 480i 59.94Hz 60Hz
  - 1440x480i 60Hz
  - 1440x576i 50Hz
  - 576i 50Hz
- EDTV
  - 480p 59.94Hz
  - 576p 50Hz
- HDTV
  - 1035i 60Hz
  - 1080i 59.94Hz
  - 1080i 60Hz
  - 720p 50Hz
  - 1080p 23.98Hz

- Apple Mac
  - 640x480 66.59Hz 60Hz
  - 832x624 74.54Hz 60Hz
- SDTV
  - 480i 59.94Hz
  - 1440x480i 60Hz
  - 1440x576i 50Hz
  - 576i 50Hz
- EDTV
  - 480p 59.94Hz
  - 576p 50Hz
- HDTV
  - 1035i 60Hz
  - 1080i 59.94Hz
  - 1080i 60Hz
  - 720p 50Hz
  - 1080p 23.98Hz
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**Notes**

*1  HDBaseT supports 4K 24/25/30Hz 4:2:2 only  
*2  HDBaseT supports 4K 50/60Hz 4:2:0 only  
*3  HDMI 1.2 support up to 4:2:2, HDBaseT does not support
### SDI formats

<table>
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<tr>
<th>Timing</th>
<th>SDI Link mode</th>
<th>Signal Standards</th>
<th>Color Encode</th>
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<th>Bit Depth</th>
<th>Remark</th>
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**Notes**
Appendix C: Wiring Details

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

Notes

RS232:
pin view of female connector
**Trigger 1 & Trigger 2**

3.5 mm mini jack

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<th>Trigger</th>
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<td>Sleeve</td>
<td>Ground</td>
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Output: 12V, 200 mA max

**Wired remote control**

3.5 mm mini jack

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<td>Ground</td>
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Output: 2.85-3.15V, Max. 500 mA

**Sync IN, Sync OUT and 3D Sync IR**

75 ohm BNC

Max input / output voltage: 5.5V
Appendix D: Glossary Of Terms

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

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.

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`.

### 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

See `Chrominance`.
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.

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.

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

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.
**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.

**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).
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.

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.

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

Overlapping region
See blend region.

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.

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.

**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.

**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.

**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.

**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:

\[ TRC = \frac{DMD™ \text{ aspect ratio}}{\text{Source aspect ratio}} \]

TRC is only used in calculations if it is greater than 1.

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

**WUXGA**

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

**Y**

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

**YUV**

See Pr, Pb.

**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.
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