HIGHlite 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.

Legal notice

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

Laser Information

RISK GROUP 2	
CAUTION Possibly hazardous optical radiation emitted from this product. Do not stare at operating lamp. May be harmful to the eyes.	**ATTENTION** Ce produit peut émettre des rayonnements optiques dangereux. Ne pas fixer la lampe en fonctionnement. Peut être nocif pour les yeux.

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

Introduction

Congratulations on your purchase of this Digital Projection product.

Your projector has the following key features:

- 4K-UHD projector.
- HDBaseT® for transmission of uncompressed High Definition Video up to 100 m from the source.
- 3G-SDI with loop-through.
- Edge Blend with black-level correction.
- Blanking control for custom input window sizing.
- Cornerstone, Vertical & Horizontal Keystone, Pincushion & Barrel, and Image Rotation.
- Control via LAN and RS232.
- Motorised lens mount.
- Separate control of screen and source aspect ratio.
- Non-linear warp for irregular projection surfaces.

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

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CONTENTS (continued)

CONTENTS (continued)

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DIGITAL PROJECTION

HIGHlite Laser 4K Series
High Brightness Digital Video Projector

▶ INSTALLATION AND QUICK-START GUIDE

IN THIS GUIDE

What's In The Box?

Remote control

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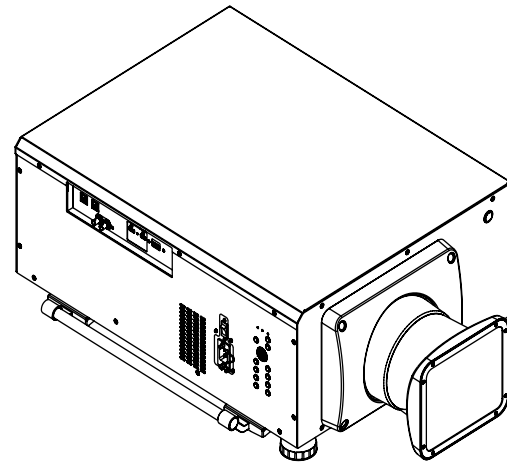
Projector
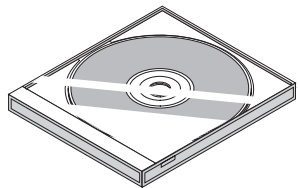
User Manual on disc
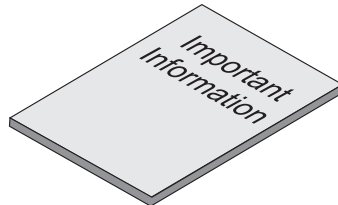
Important Information
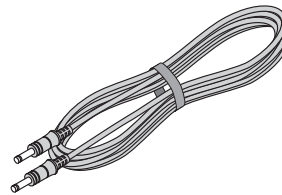
remote control cable
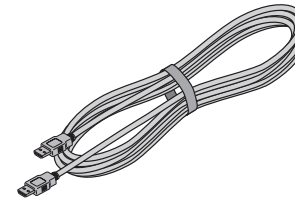
HDMI cable
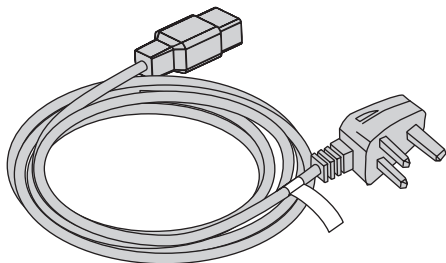
Power cable, United Kingdom
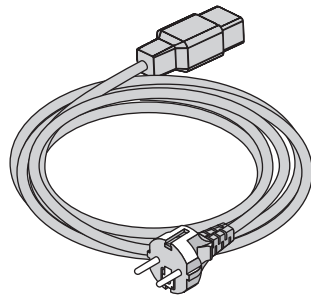
Power cable, Europe
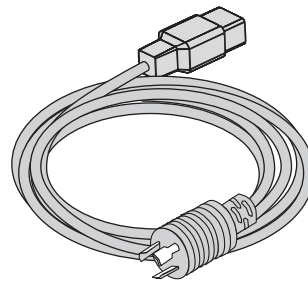
Power cable, North America
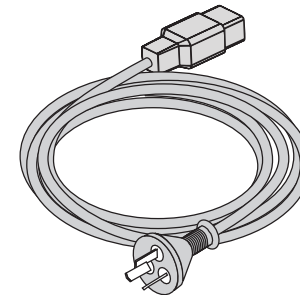
Power cable, China

Notes

☞ *Make sure your box contains everything listed. If any pieces are missing, contact your dealer.*

☞ *Only one remote will be supplied with the projector. For more information, see **Remote Control** further in this guide.*

☞ *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.*

⚠ **Do not use the short lens hood with the *4.34 - 6.76 : 1* zoom lens.**

☞ *For further information about using the right lens and hood, see **The lens hood** further in this guide.*

☞ *Only one power cable - dependent on the destination territory - will be supplied with the projector.*

Connecting The Power Supply

Lift the cable lock up, push the mains connector in firmly and push the lock down to secure the cable.

1   **AC mains inlet with cable lock**

1

Voltage selection

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

Voltage of power supply used	Position of VOLTAGE SELECT switch
AC100V outlet	200 240V~ 110 130V~
AC200V (single phase) outlet	200 240V~ 110 130V~
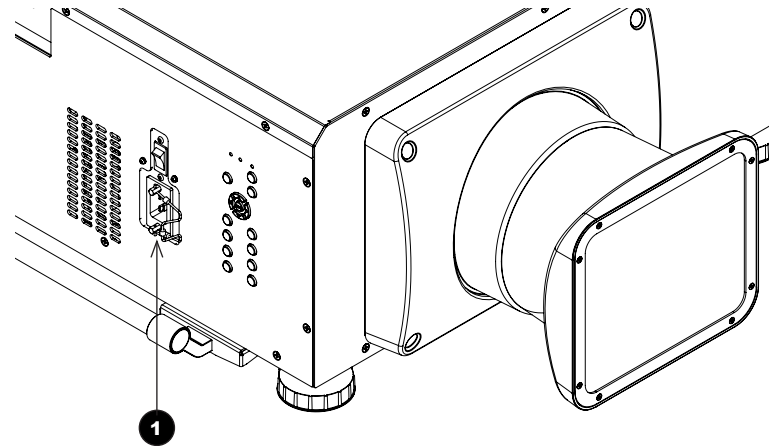
Notes

⚡ **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.**

☞ *When operating on 110V Light output power is reduced by approx 30%.*

Projector Overview

Front and rear views

1   **Connection panel**

2   **Air outlet**

3   **Control panel**

4   **Power switch and power connection**

5   **Lens hood**

6   **Front infrared window**

7   **Air inlet**

8   **Air outlet**

9   **Rear infrared window**

10   **Adjustable feet**

Front view

Rear view
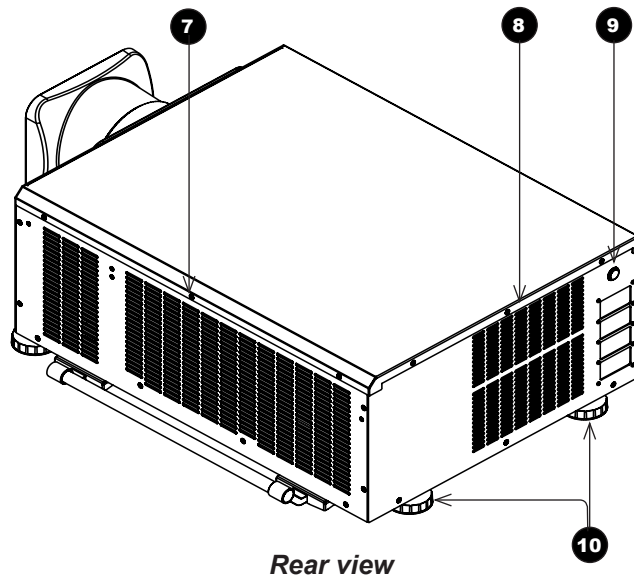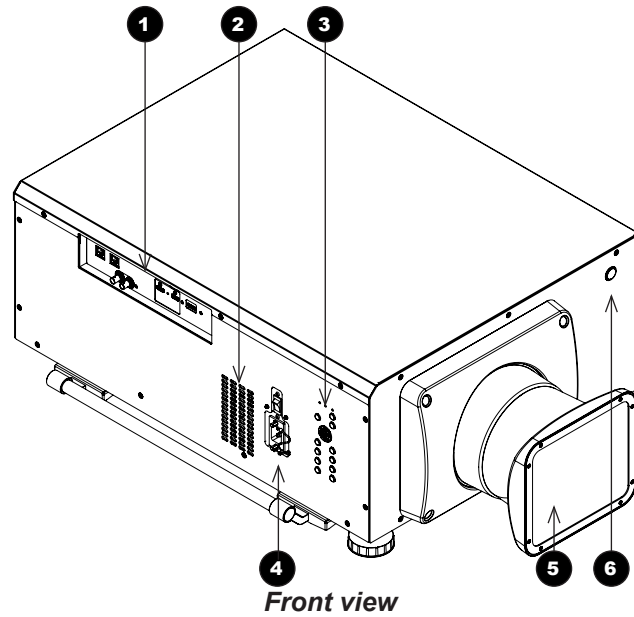
Notes

⚠️ **Do not use the short lens hood with the *4.34 - 6.76 : 1* zoom lens.**

☞ *For further information about using the right lens and hood, see **The lens hood** further in this guide.*

Control Panel

1 **ON indicator (blue)**

Behavior		*Meaning*
Off	⬤	The projector is switched off.
On	⬤	The projector is switched ON.
Flashing	⬤	The projector is warming up or cooling down.

2 **ERROR indicator (red)**

Behavior		*Meaning*
Flash once, then pause	⬤	Laser failure.
Flash twice, then pause	⬤	Cover open.
Flash three times, then pause	⬤	Fan failure.
Flash four times, then pause	⬤	Over temperature.
On	⬤	System error.

3 **STANDBY indicator (green)**

Behavior		*Meaning*
On	⬤	The projector is in STANDBY mode.
Flashing	⬤	The projector is in STANDBY mode. It can be switched on with a network command.

4 **MENU button**
Access the projector OSD (on-screen display).

5 **Navigation (arrow buttons and ENTER)**
Navigate the OSD and edit settings with the arrows, confirm choice with **ENTER**.

6 **INPUT button**
Select input source.

7 **Focus IN / OUT**
Adjust focus.

8 **Zoom IN / OUT**
Adjust zoom.

9 **Shutter CLOSE / OPEN**
Open and close the shutter.

10 **POWER button**
Switch the projector on and off (in STANDBY mode)

11 **EXIT button**
Close the OSD.

12 **SHIFT button**
Press and hold this button, then press the arrow buttons to move the lens.
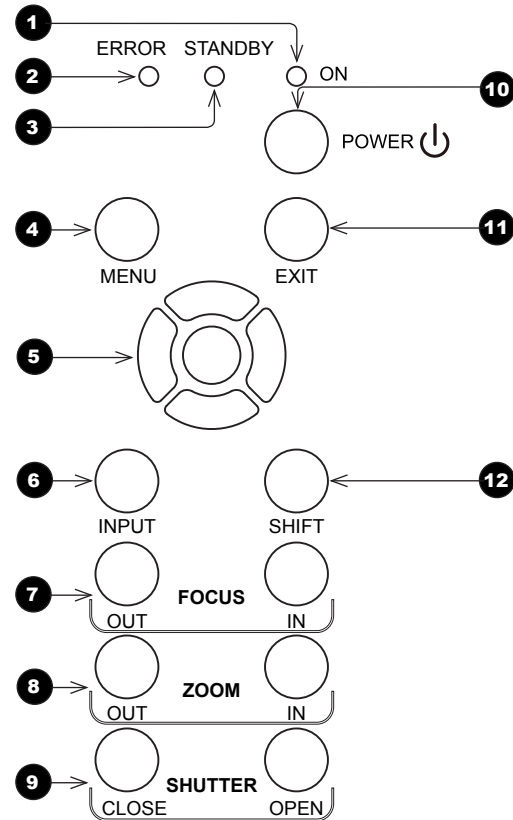
Notes

Remote Control

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

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

2   **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.

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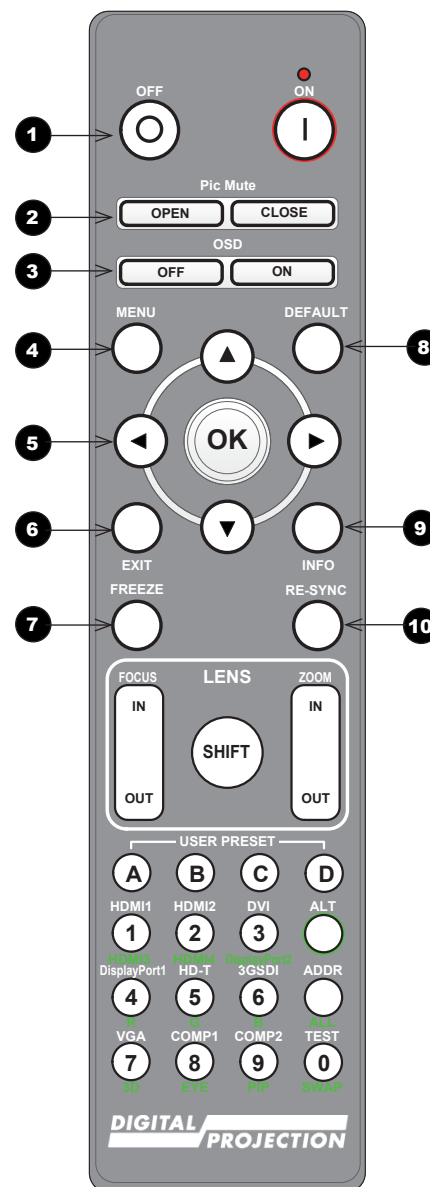
11 LENS adjustment
FOCUS IN / OUT: adjust focus.
SHIFT: press and hold this button, then use the Navigation arrow buttons to move the lens.
ZOOM IN / OUT: adjust zoom.

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.
There is no DisplayPort2 input on this projector.

15 HDMI 2 / HDMI 4 / numeric input 2
Select the HDMI 2 input.
There is no HDMI 4 input on this projector.

16 HDMI 1 / HDMI 3 / numeric input 1
Select the HDMI 1 input.
There is no HDMI 3 input on this projector.

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, ColorBar, Screen Layout...
Use with **ALT** to switch between the **Main** and **Sub PIP** display.

continues on next page...

Remote control

17 **DISPLAYPORT / R / numeric input 4**
Select DisplayPort input.
Use with **ALT** to turn the **Red channel** of the display on and off.

18 **HD-T / G / numeric input 5**
Select the HDBaseT input.
Use with **ALT** to turn the **Green channel** of the display on and off.

19 **3GSDI / B / numeric input 6**
Select the 3G-SDI input.
Use with **ALT** to turn the **Blue channel** of the display on and off.

20 **VGA / 3D / numeric input 7**
There is no VGA input on this projector.
There is no 3D function on this projector.

21 **COMP1 / EYE / numeric input 8**
There is no Component 1 input on this projector.
There is no EYE swap for 3D function on this projector.

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.

Remote control top

Remote control bottom
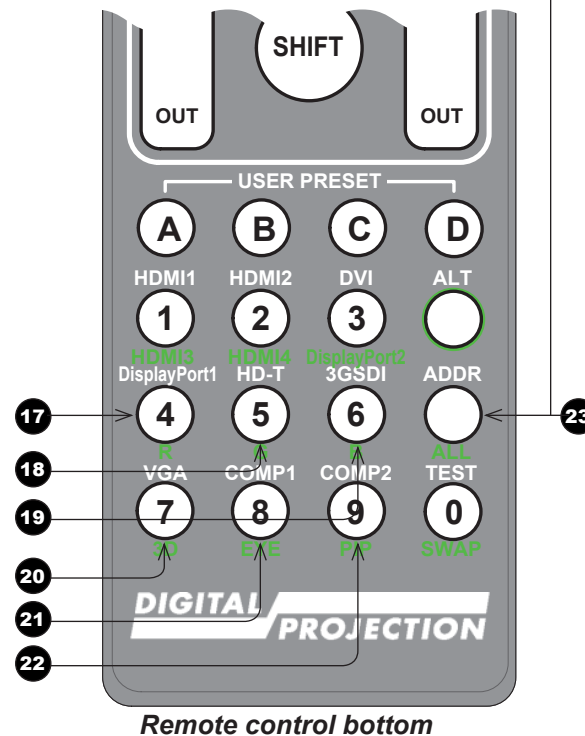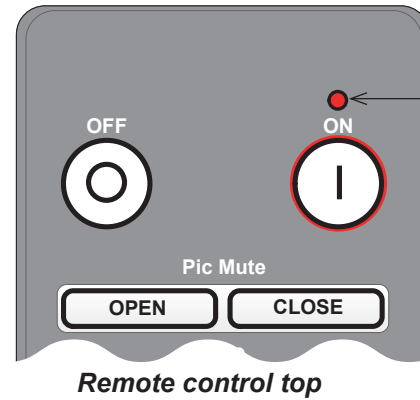
Notes

☞ *This projector does not use the following options on the remote:*

Inputs HDMI 3 and 4, DVI, VGA, COMP 1, COMP 2, 3D, EYE and SWAP

Infrared reception

The projector has infrared sensors at the front and back.

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

40°

40°

Infrared reception
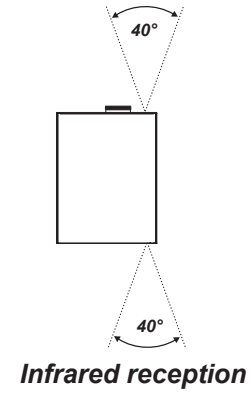
Positioning The Screen And Projector

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 M6 holes for ceiling mount**
           The screws should not penetrate more than 15 mm into the
           body of the projector.
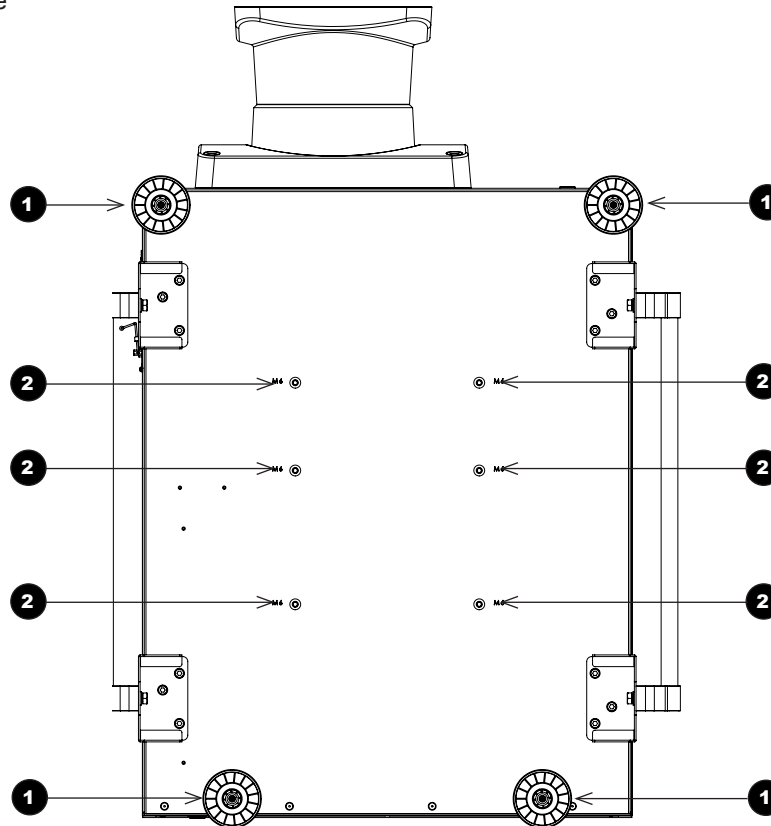
Notes

⚠️ **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 (20 in) of space between the ventilation outlets and any wall, and 30 cm (12 in) on all other sides.**

⚠️ **Do not stack more than 3 projectors.**

Roll and pitch

The projector can be operated in numerous positions.

It is not recommended to position the projector in portrait mode with inputs facing upward, as shown in the diagram.

Roll

Pitch
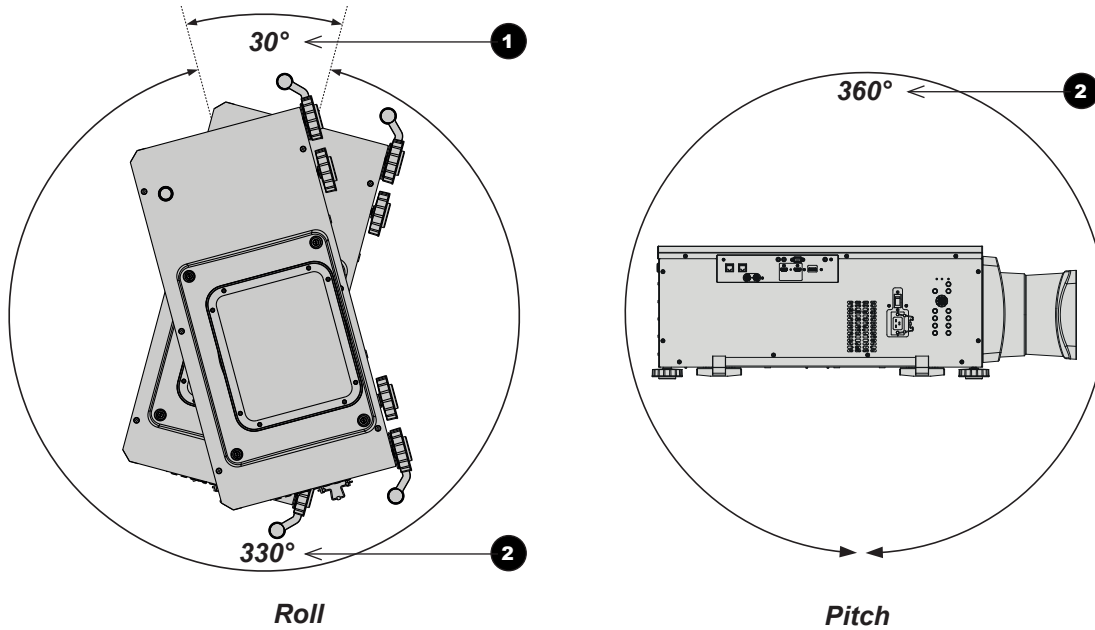
1   **Positions to avoid: inputs side up**

2   **Recommended positions**

Changing The Lens

The lens hood

There are two types of lens hood, short and long.

The short lens hood is used with the following lenses:

Throw ratios	Part number
0.77 : 1 fixed lens	110-808
0.96 - 1.43 : 1 zoom lens	119-011
1.16 : 1 fixed lens	110-809
1.45 - 1.74 : 1 zoom lens	110-803
1.74 - 2.17 : 1 zoom lens	112-878
2.17 - 2.90 : 1 zoom lens	113-852
2.90 - 4.34 : 1 zoom lens	110-806
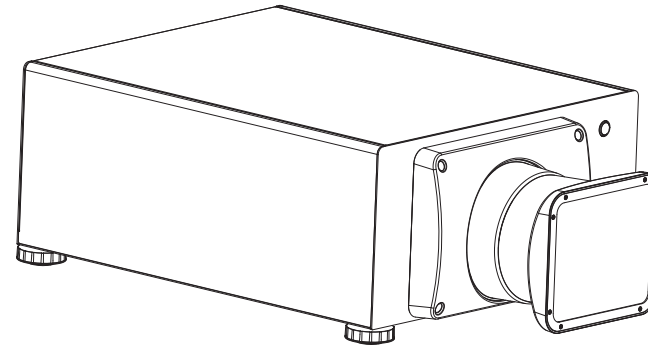
Projector with short lens hood fitted

The long lens hood must be used with the following long throw lens:

Throw ratios	Part number
4.34 - 6.76 : 1 zoom lens	110-807
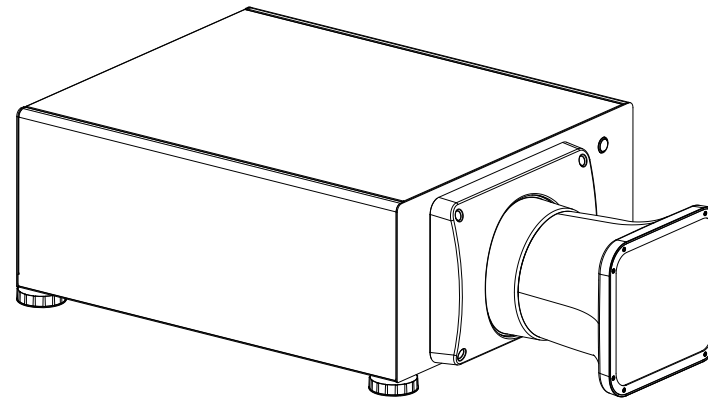
Projector with long lens hood fitted

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.

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

Do not use the short lens hood with the *4.34 - 6.76 : 1* zoom lens.

The projector will not power on without the lens and lens hood fitted.

Inserting a new lens

1. Insert the lens into the lens aperture, making sure that the plug on the zoom drive mechanism lines up with socket on the right of the lens aperture.

2. Rotate the lens clockwise until it clicks into place.

3. Secure the lens hood to the front of the projector with the screws.
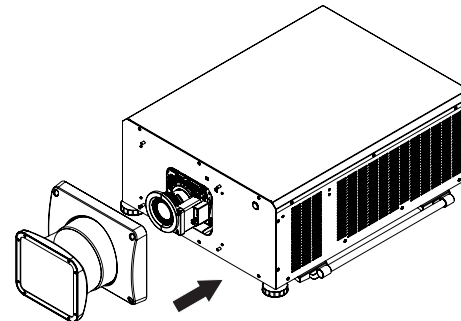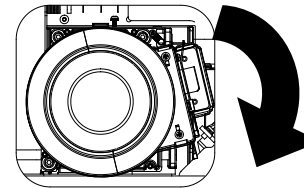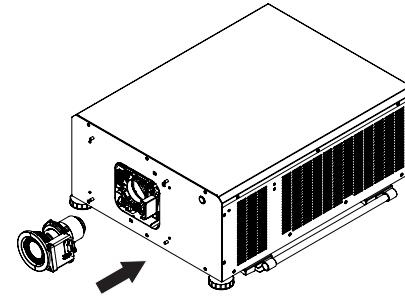
Notes

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.

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

Do not use the short lens hood with the *4.34 - 6.76 : 1* zoom lens.

The projector will not power on without the lens and lens hood fitted.

Removing the lens

1. Loosen the four screws securing the lens hood to the body of the projector. Remove the lens hood.

2. Push down the lens holder tab.

3. Rotate the lens anti-clockwise.

4. Pull the lens forward to remove it from the lens aperture.
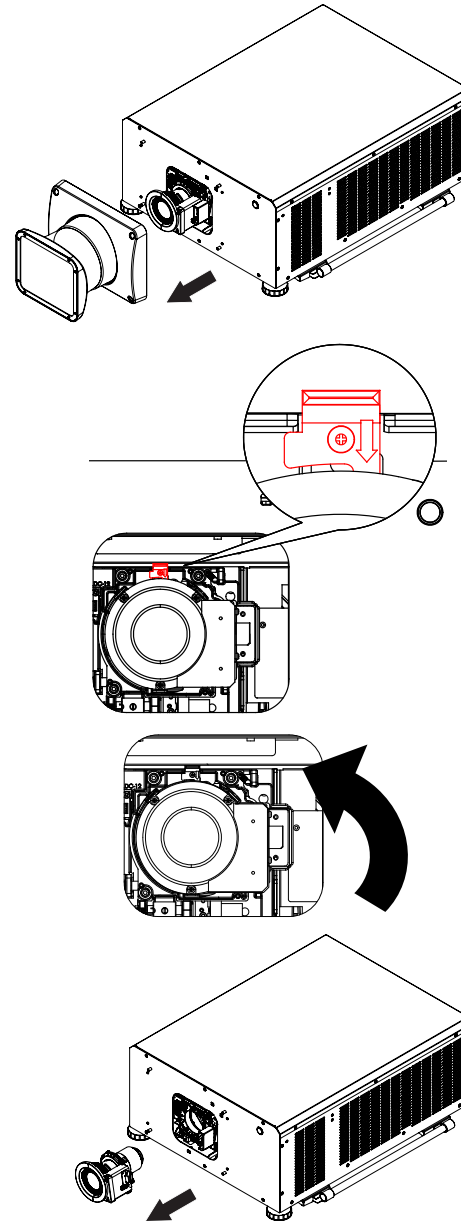
Operating The Projector

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 stready red to indicate that the projector has entered STANDBY mode.

2. If you need to switch the projector off completely, switch off at the mains power switch next to the power connector and then disconnect the power cable from the projector.

Selecting an input signal

1. Connect one or more image sources to the projector.

2. Select the input you want to display:

   - Press one of the input buttons on the remote control.

   - Alternatively, open the On-screen display (OSD) by pressing **MENU**. Highlight **Input** from the main menu, press **ENTER/OK** and then select an input signal using the **UP** ▲ and **DOWN** ▼ arrow buttons. Press **ENTER/OK** to confirm your choice.

Selecting a test pattern

To display a test pattern:

- Press **TEST** on the remote control.

  Change the test pattern using the **LEFT** ◄ and **RIGHT** ► arrow buttons.Test patterns are displayed in the following order:

  White, Black, Red, Green, Blue, CheckerBoard, CrossHatch, V Burst, H Burst, ColorBar, 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**.

Keystone
* This 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

☞ *When adjusting focus and zoom, you may find it useful to display the **CrossHatch** test pattern: press **TEST** on the remote control and navigate through the list of patterns using the **LEFT** ◄ and **RIGHT** ► arrow buttons.*

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

Setup menu

Geometry menu

Image menu

DIGITAL PROJECTION

HIGHlite Laser 4K Series
High Brightness Digital Video Projector

▶ CONNECTION GUIDE

IN THIS GUIDE

Signal Inputs

Digital inputs and outputs

1 **HDBaseT**

Receives digital signal from HDBaseT-compliant devices with LAN connectivity.

2 **Ethernet**

Provides LAN connectivity

3 **3G-SDI in**

4 **3G-SDI out**

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

5 **HDMI I**

HDMI 2.0 input supporting HDCP2.2. Connect an *HDMI* cable to the connector.

6 **HDMI II**

HDMI 2.0 input supporting HDCP2.2. Connect an *HDMI* cable to the connector.

7 **DisplayPort**

DisplayPort 1.2 input. Connect a DisplayPort cable to the connector.
Supports sources up to 4K-UHD resolution at 60 Hz.
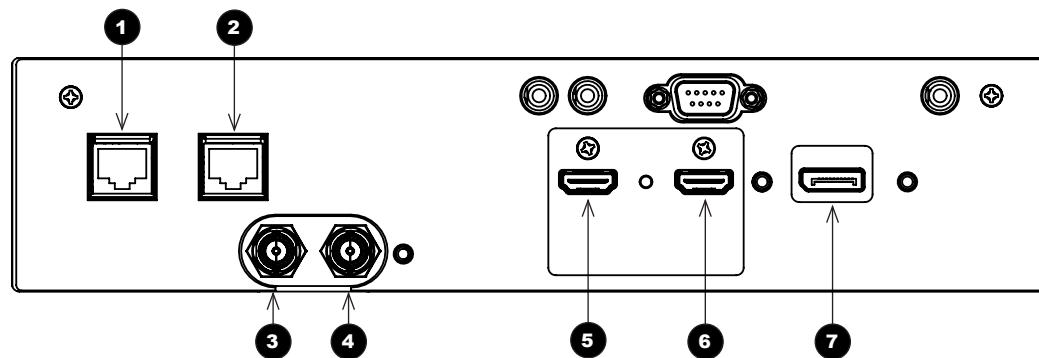
EDID on the HDMI, DisplayPort inputs

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 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 HDMI/DisplayPort switchers with the projector

When using an HDMI/DisplayPort 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.

Additionally, sources which use HDCP encryption may not display properly when connected to the projector via a switcher. Refer to the switcher's manual for more information.

1 **Sources**

2 **Switcher**
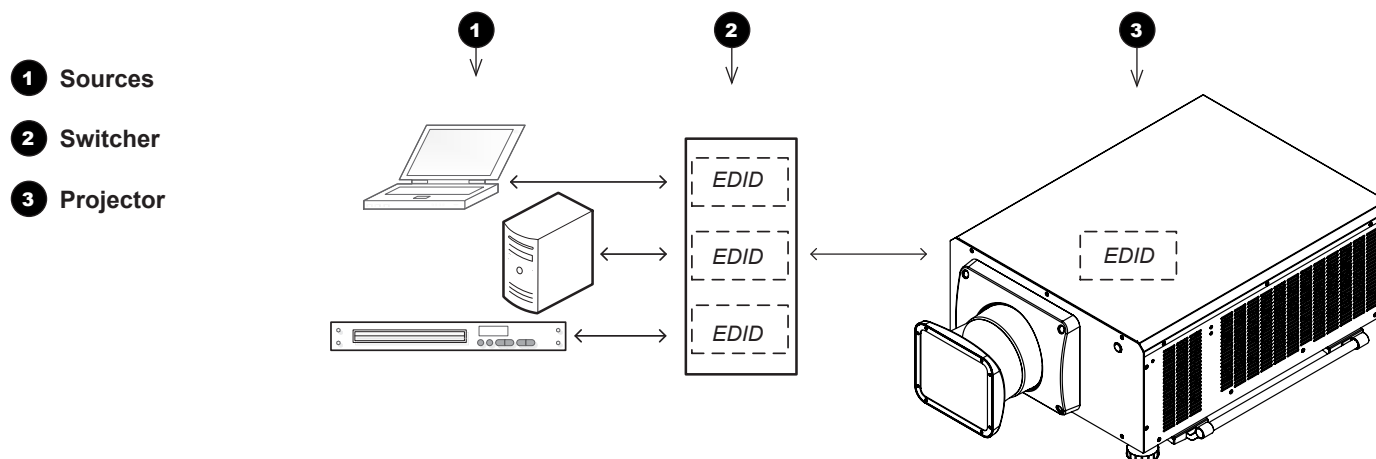
3 **Projector**

The EDIDs in the switcher should be the same as the one in the projector.

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).
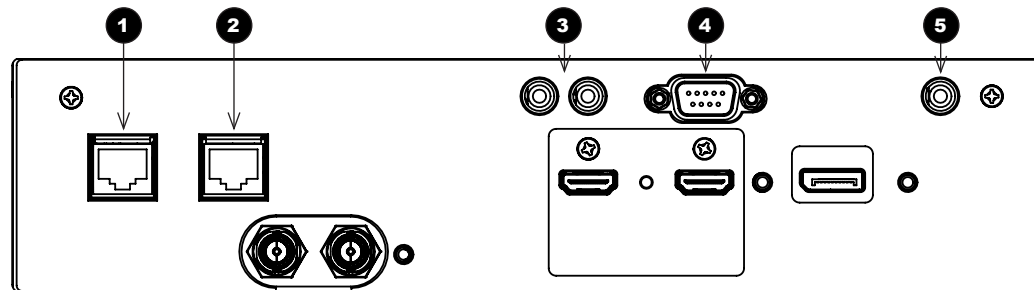
Control connections

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.*

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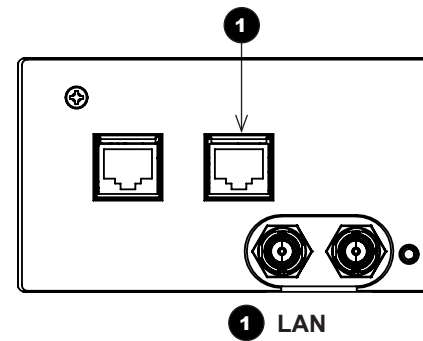
LAN connection examples

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

Crossed
LAN cable

Computer   *Projector*

Un-crossed LAN cables

Computer

Hub or LAN

Projector

Projector

1

1 LAN

RS232 connection example
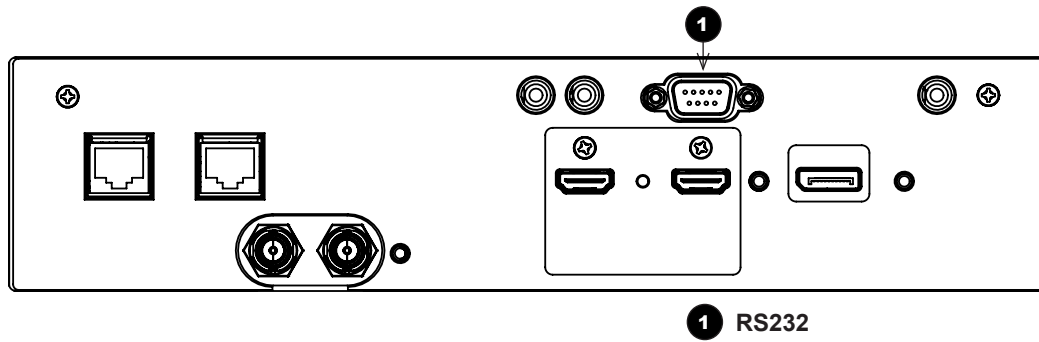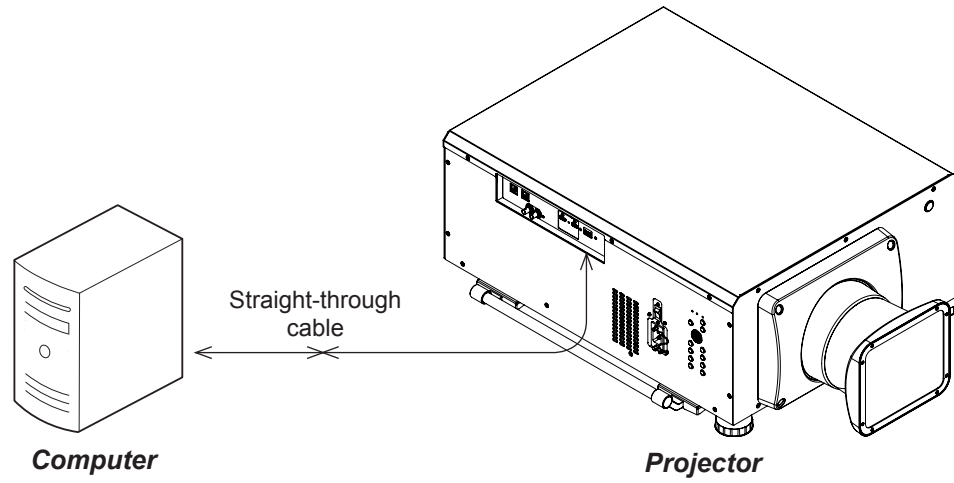
Straight-through cable

Computer

Projector

1

1 **RS232**

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DIGITAL PROJECTION

HIGHlite Laser 4K Series
High Brightness Digital Video Projector

▶ OPERATING GUIDE

CONTENTS

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▲** and **DOWN** ▽ 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**.
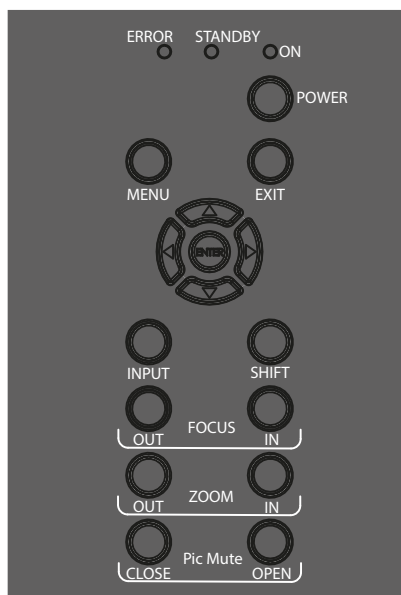
Projector control panel

Remote control

Notes

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

Main Menu	
▲	
PIP	▶
Information	▶
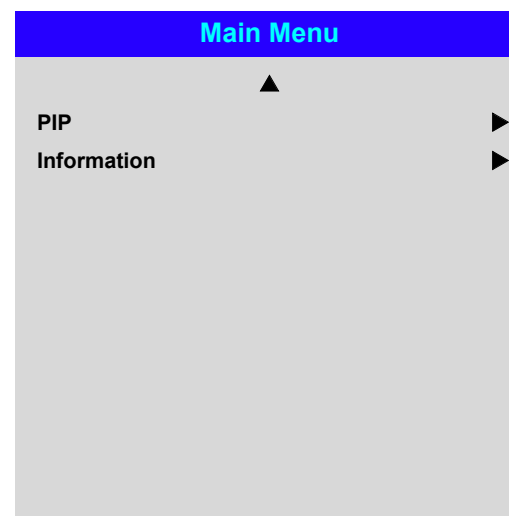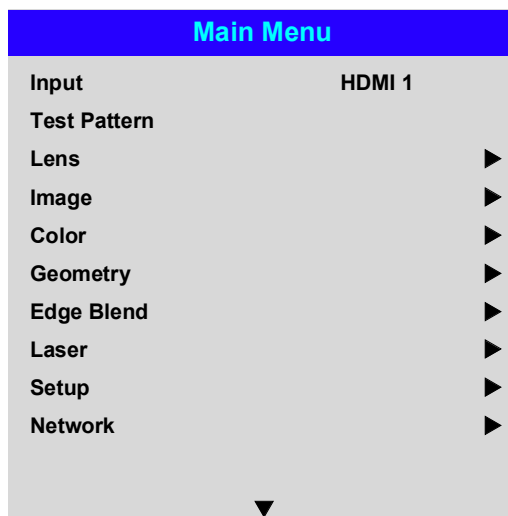
On-screen display (OSD): top level menus

Inside a menu

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

- Title bar at the top
  Shows which menu you have accessed.

- Highlighted item

- Available and unavailable items
  Unavailable items appear a pale gray color. Whether an item is available may depend on other settings.

- The text or symbol to the right of an item shows whether the item:

  - has a value that can be changed (the current value is shown)

  - opens a sub-menu (an arrow button ▶ is displayed)

  - executes a command (the space to the right of the item is blank).

Menu Name	
Highlighted Item	**Value**
Menu Item	**Value**
Unavailable Item	Value
Slider	Value ▭▬
Sub-menu	▶
Command	

Inside a menu

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.

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

Highlighted command

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

Command Name
WARNING **All [Menu] values will be lost.**
Press OK to confirm **Press Exit to cancel**
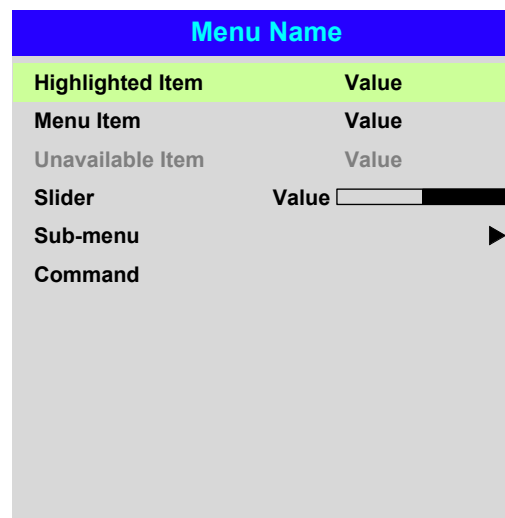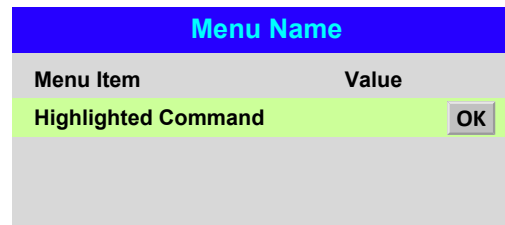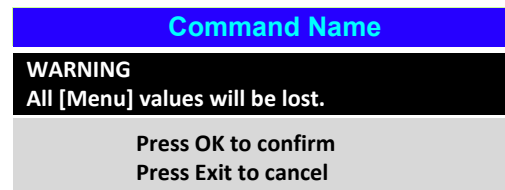
Confirmation dialog

☞ *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.

Menu Name	
Highlighted Item	**Current Value**
Menu Item	**Highlighted Value**
Menu Item	**Value**
	Value
	Value

List of values

Parameter	Value ▭

Slider

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

Numeric values

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**, **Laser**, **Setup** and **Network**
  Press **ENTER/OK** to open these menus and access various settings.

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

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

Press the **UP** ▲ arrow to return to the previous page.
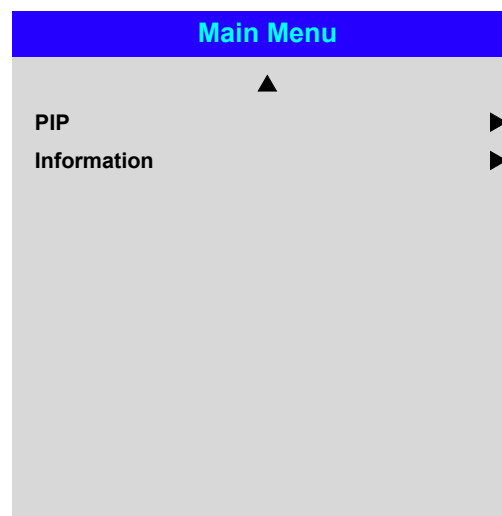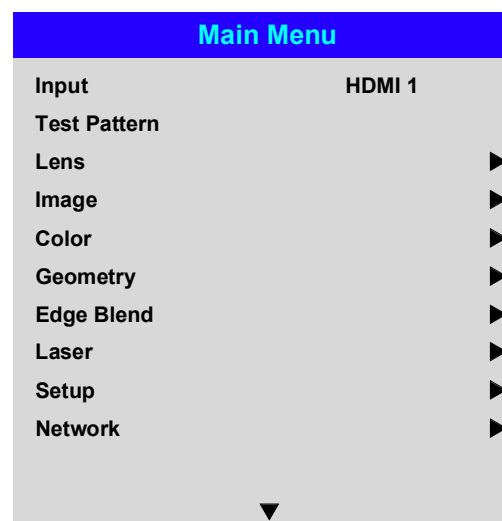
Main Menu	
Input	**HDMI 1**
Test Pattern	
Lens	▶
Image	▶
Color	▶
Geometry	▶
Edge Blend	▶
Laser	▶
Setup	▶
Network	▶
▼	

Main Menu	
▲	
PIP	▶
Information	▶

Main menu, page 1 and 2

Lens menu

- **Lens Lock**

  When this feature is **On**, all other **Lens** menu items are disabled.

- **Lens Control**

  Opens a sub-menu, see below.

- **Center Lens**

  Centers the lens.

- **Lens Type**

  Choose a UST or a non-UST lens.

- **Lens Memory**

  Opens a sub-menu, see next page.

Lens	
Lens Lock	**Off**
Lens Control	▶
Center Lens	
Lens Memory	▶
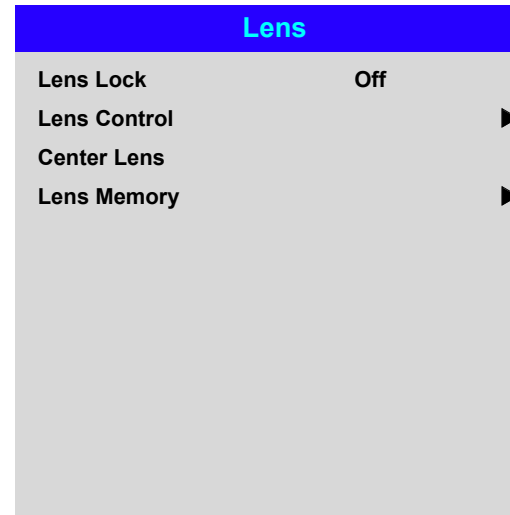
Lens Control

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

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

- Use the **UP** ▲ and **DOWN** ▼ arrow buttons to adjust **Zoom**.

- Use the **LEFT** ◀ and **RIGHT** ▶ arrow buttons to adjust **Focus**.
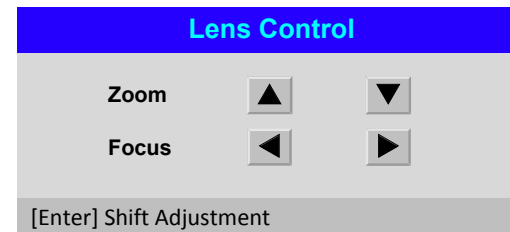
When in **Shift Adjustment** mode, use the arrow buttons to adjust **Shift**.

Lens Control		
Zoom	▲	▼
Focus	◀	▶
[Enter] Shift Adjustment		

Lens Control		
	▲	
◀	**Shift**	▶
	▼	
[Enter] Zoom / Focus Adjustment		
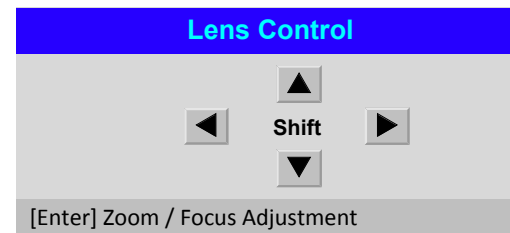
Notes

Lens menu continued from previous page

Lens Memory

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

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

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

Lens Memory

Load Memory	▶
Save Memory	▶
Clear Memory	▶

Lens Load Memory

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

Lens Save Memory

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

Lens Clear Memory

Memory 1	OK
Memory 2	
Memory 3	
Memory 4	
Memory 5	
Memory 6	
Memory 7	
Memory 8	
Memory 9	
Memory 10	
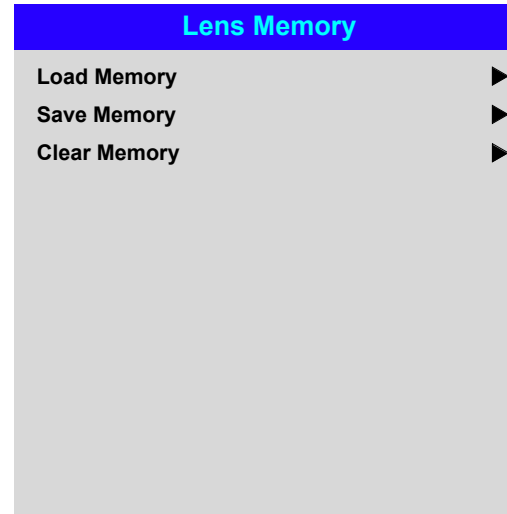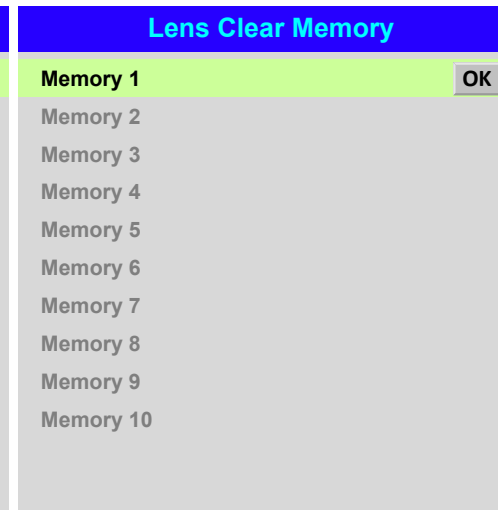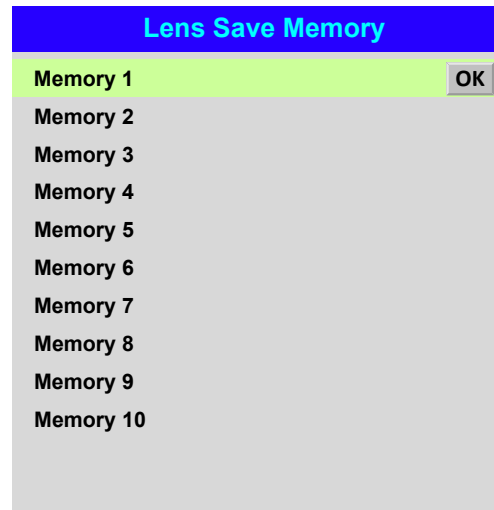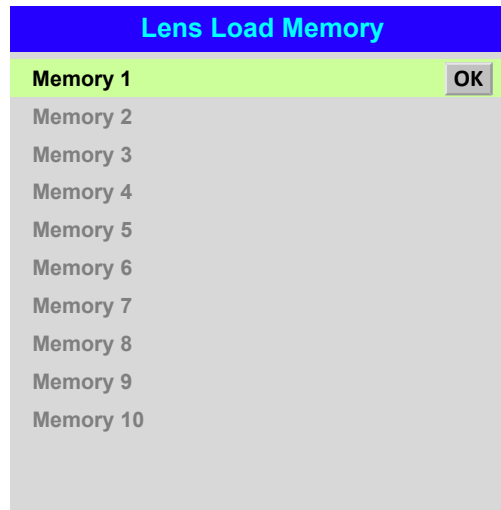
Image menu

- **Dynamic Black**

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

- **Light Off Timer**

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

- **Gamma**

  Choose a de-gamma curve from **1.0**, **1.8**, **2.0**, **2.2**, **2.35**, **2.5**, **S-Curve**, and **DICOM**. Used correctly, the **Gamma** setting can improve contrast while maintaining good details for blacks and whites.

  If excess ambient light washes out the image and it is difficult to see details in dark areas, lower the **Gamma** setting to compensate. This improves contrast while maintaining good details for blacks. Conversely, if the image is washed out and unnatural, with excessive detail in black areas, increase the setting.

  S-Curve is an enhanced mid-tone gamma.

  DICOM is a simulated DICOM display, which can be used for training applications.

- **HDR**

  Choose an HDR setting from **AUTO**, **HDRPQ-400**, **HDRPQ-500**, **HDRPQ-1000** and **HDRHLG**

  Auto is the default setting. When a 4KUHD Blue-Ray player sends an HDR flag to the projector it will select the appropriate option according to the player data.

  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.

Image	
Dynamic Black	Off
Light Off Timer	Disable
Gamma	2.2
HDR	Auto
Brightness	100
Contrast	100
Saturation	100
Hue	100
Sharpness	10
Noise Reduction	Off
Freeze	
Resync	

Notes

☞ *Selecting an HDR setting will disable the Gamma setting.*

If the HDR setting is Auto, the Gamma setting is only disabled when the image source is HDR.

HDR Screen sizes		Screen width (cm)		
Model	Lumens	400 NIT	500 NIT	1000 NIT
HLL4K	12,500	384cm	343cm	243cm

HDR options should only be used with media players and sources equiped 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.

Brightness	**100**

- **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**.

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

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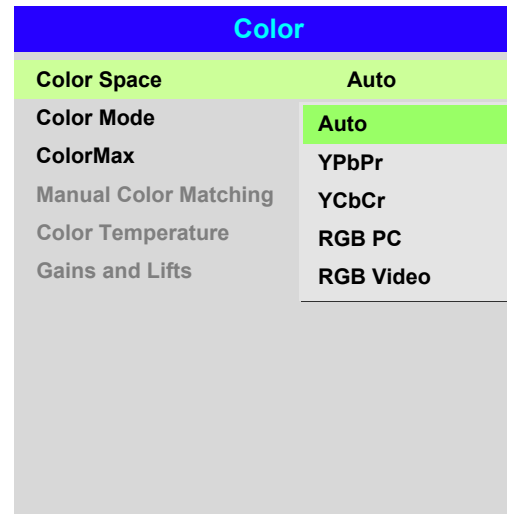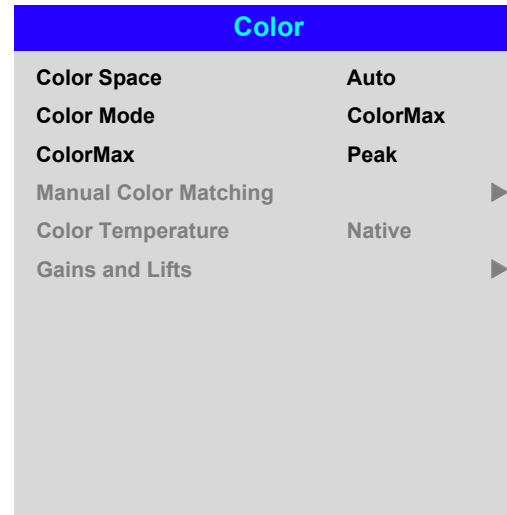
Color Mode

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

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

ColorMax

1. Set **Color Mode** to **ColorMax**.

2. Navigate to the **ColorMax** setting. Choose from **REC709**, **EBU**, **SMPTE**, **Peak**, **User 1** and **User 2**.

User 1 and **User 2** are user-defined color gamuts set via the **Setup > ColorMax** menu.

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

Color menu continued from previous page

Manual Color Matching

1. Set **Color Mode** to **Manual Color Matching**.

2. Open the **Manual Color Matching** submenu.

    Here you can do the following:

    *   Switch **Auto Test Pattern On** and **Off**.

    *   Adjust **Hue**, **Saturation** and **Gain** settings for each individual color to improve the color balance of the projected image.

    *   Adjust white balance RGB values.

    *   Reset all values.

Manual Color Matching	
Auto Test Pattern	**Off**
Red	▶
Green	▶
Blue	▶
Yellow	▶
Cyan	▶
Magenta	▶
White Balance	▶
Reset	
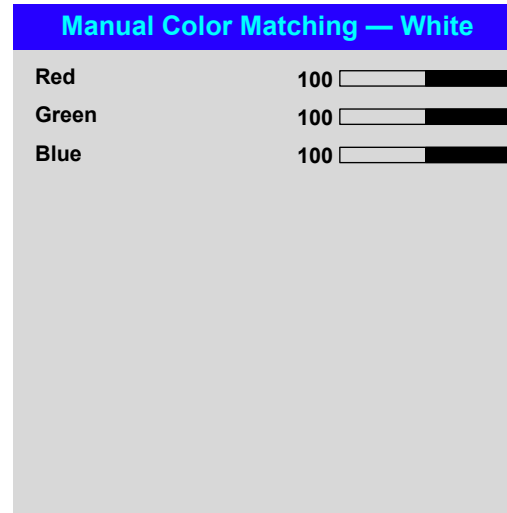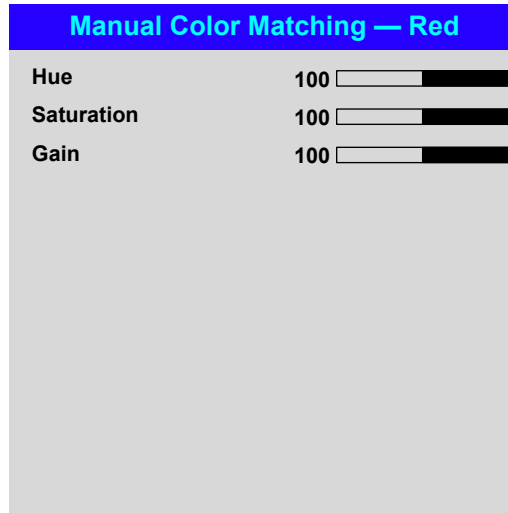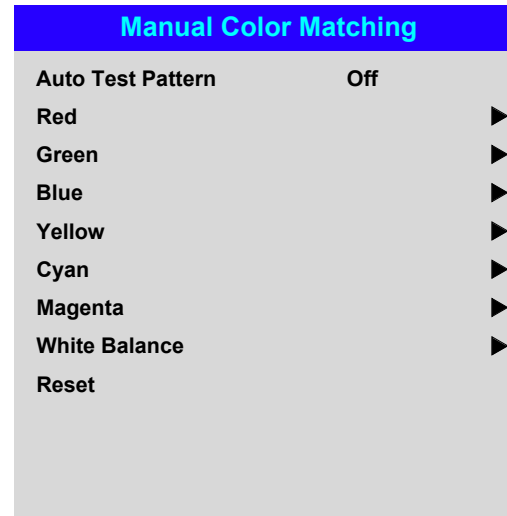
☞ *For more details about the* **Hue**, **Saturation** *and* **Gain** *settings, see* **Color matching parameters explained** *further in this guide.*

Manual Color Matching — Red	
Hue	100
Saturation	100
Gain	100

Manual Color Matching — White	
Red	100
Green	100
Blue	100

Color menu continued from previous page

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.
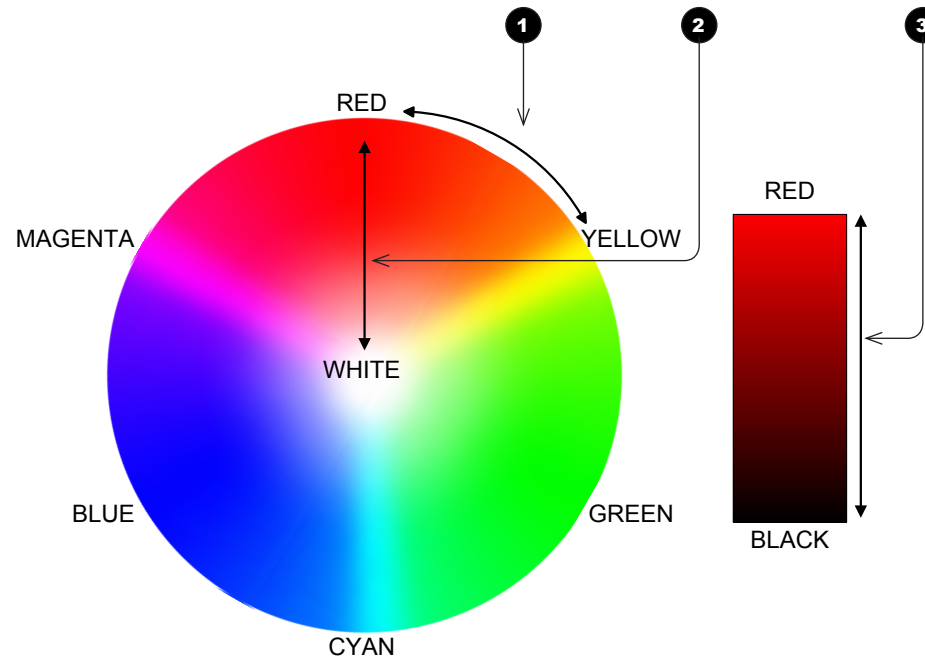
Notes

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).

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

3200K	
5400K	
6500K	
7500K	
9300K	
Native	
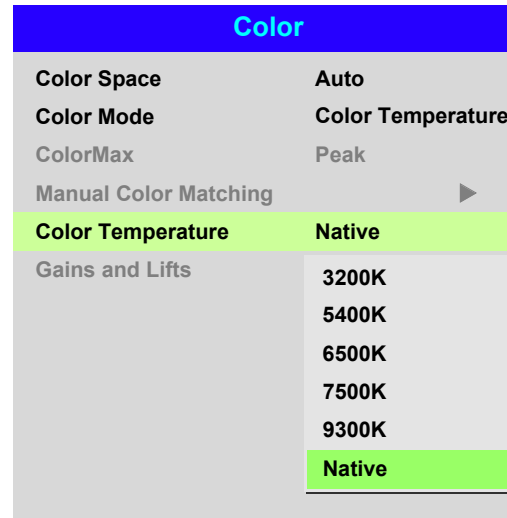
Color menu continued from previous page

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.

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

Geometry menu

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

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

Aspect Ratio

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

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

Choose from:

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

Theaterscope setting

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

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

Black margin – part of the source
Black margin – part of the source

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

An anamorphic lens will stretch the image horizontally, restoring the original 2.35 ratio:

.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.

Digital Zoom	
Digital Zoom	0
Digital Pan	0
Digital Scan	0
Reset	
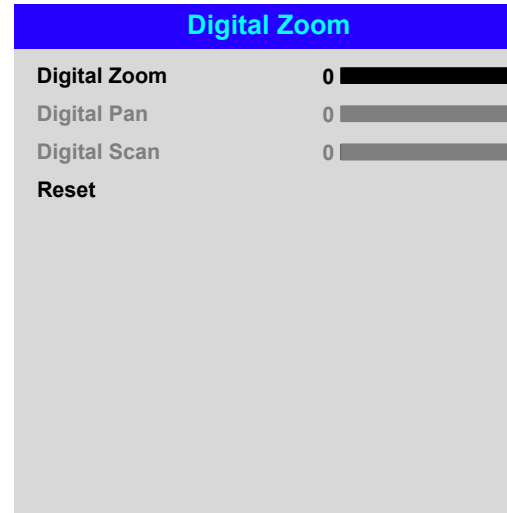
☞ *Digital Zoom is a temporary setting and not retained after an input change or power cycle*.

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.

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

Dropdown: **Off** / **Crop** / **Zoom**
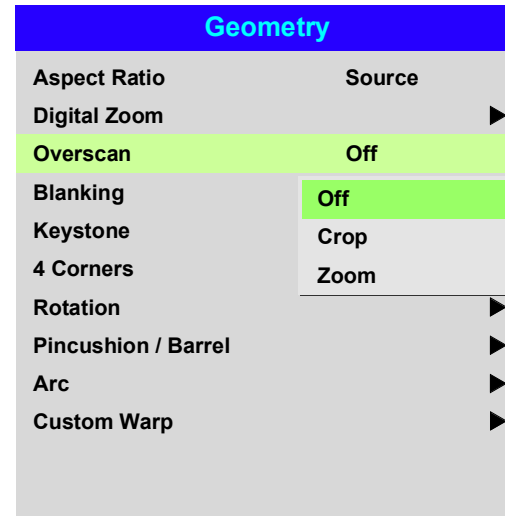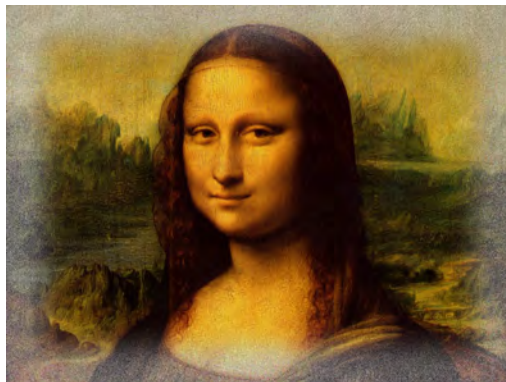
Image with noisy edges
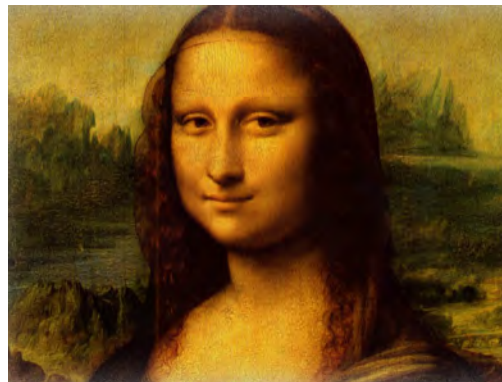
Overscanned image

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.

Blanking	
Top	0
Bottom	0
Left	0
Right	0
Reset	
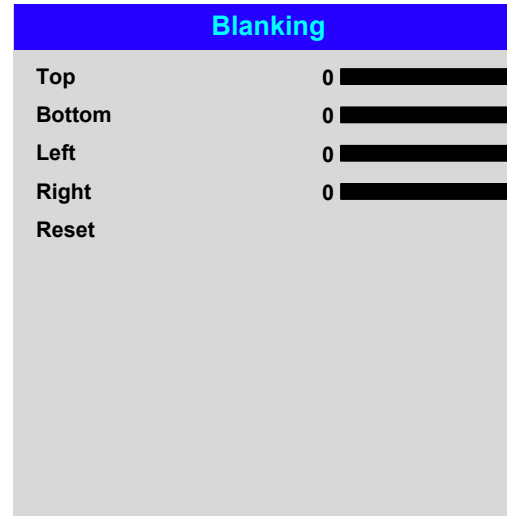
Geometry menu continued from previous page

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	
H Keystone	0
V Keystone	0
Rotation	0
Reset	
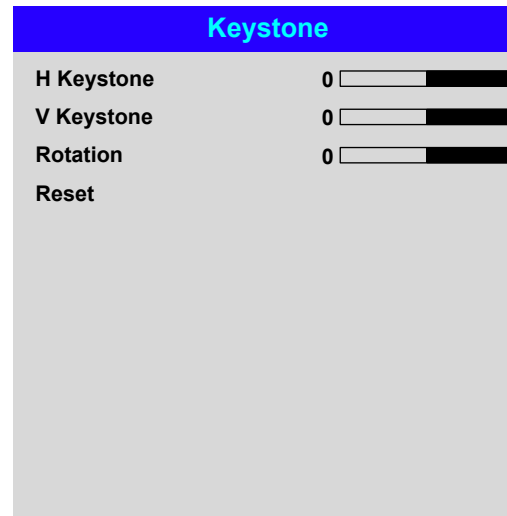
Keystone example

① **The projector is positioned at an angle**

② **The resulting image is distorted**

③ **The image is corrected when Keystone is applied**
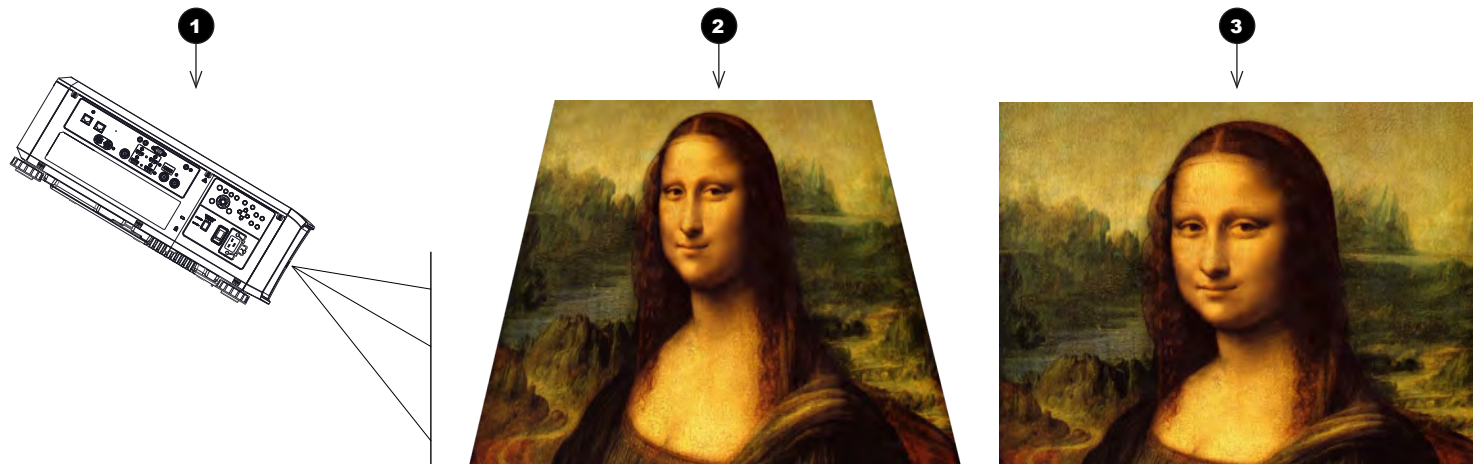
Geometry menu continued from previous page

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.
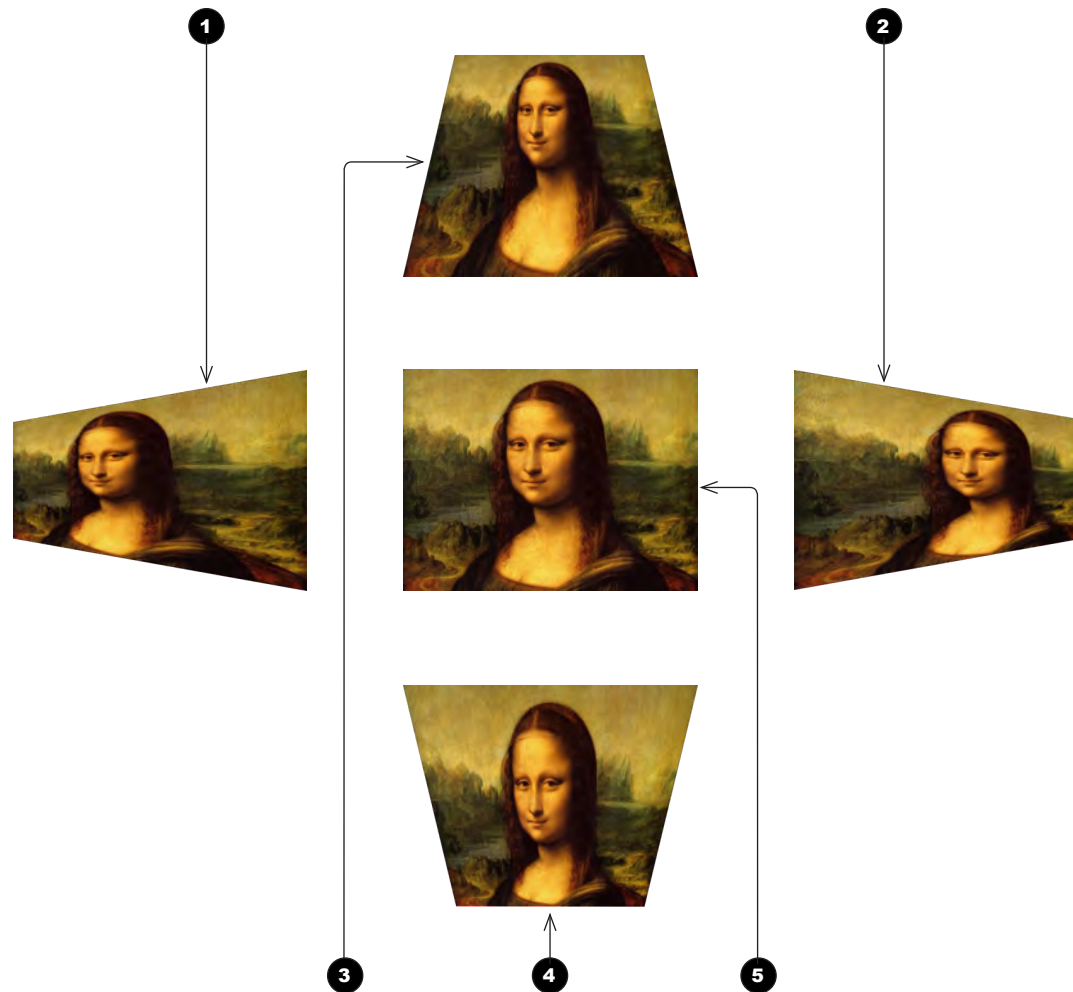
Horizontal and vertical keystone corrections

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.

4 Corners

Top Left Corner	▶
Top Right Corner	▶
Bottom Left Corner	▶
Bottom Right Corner	▶
Reset	

Top Right Corner example

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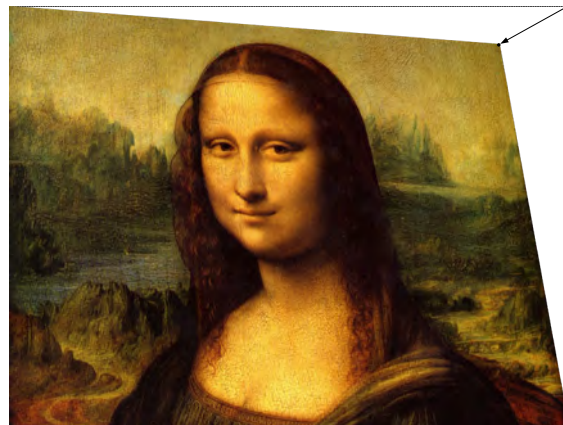
Top Right Corner *correction*
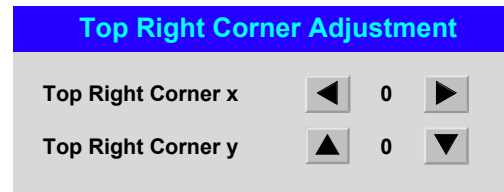
Top Right Corner Adjustment

Top Right Corner x	◀	0	▶
Top Right Corner y	▲	0	▼

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**.

Rotation

| Rotation | 0 |
| Reset | |
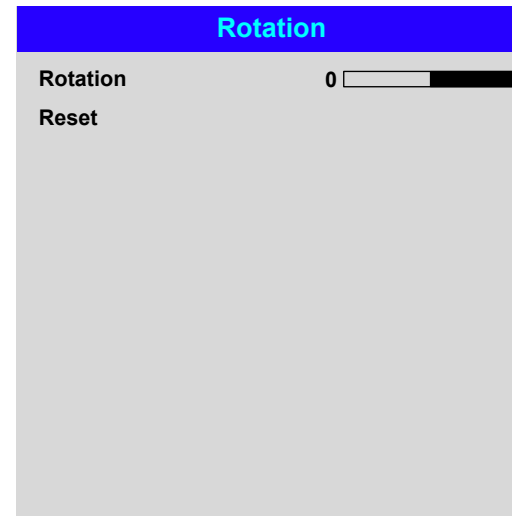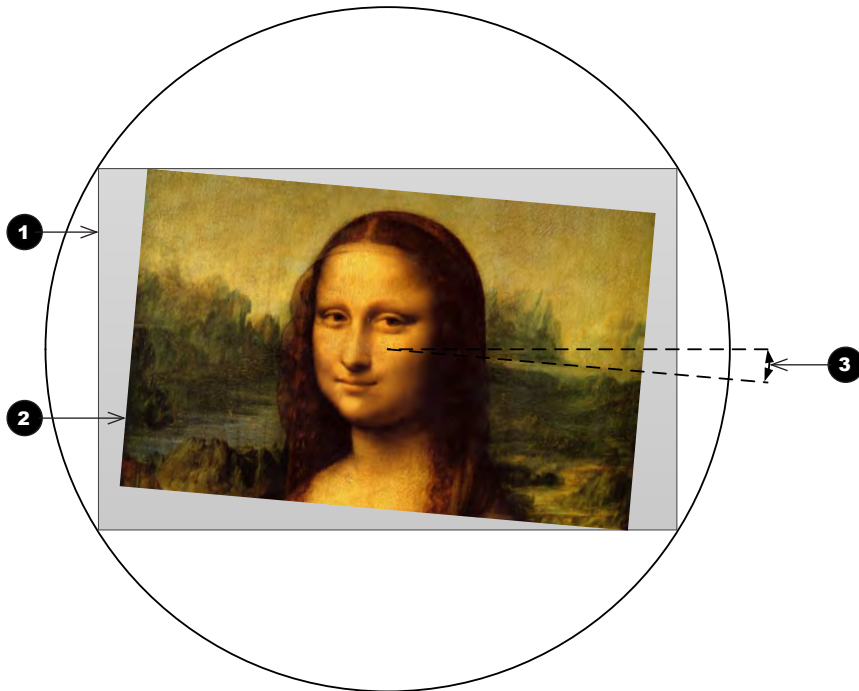
Geometry menu continued from previous page

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.

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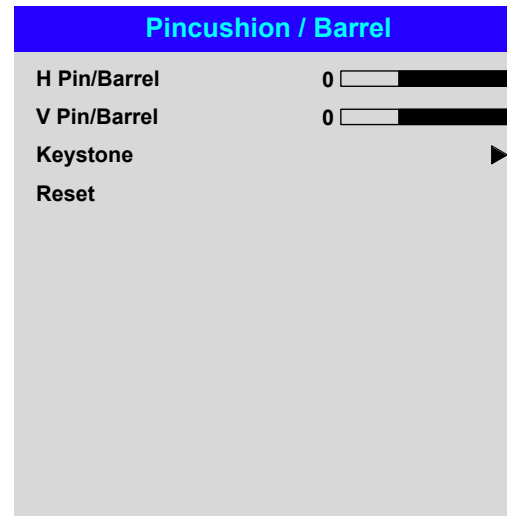
Pincushion / Barrel example

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

Pincushion

Barrel

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.

Arc	
Top	0
Bottom	0
Left	0
Right	0
Reset	

☞ *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.*

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

Custom Warp

Off

User 1

User 2
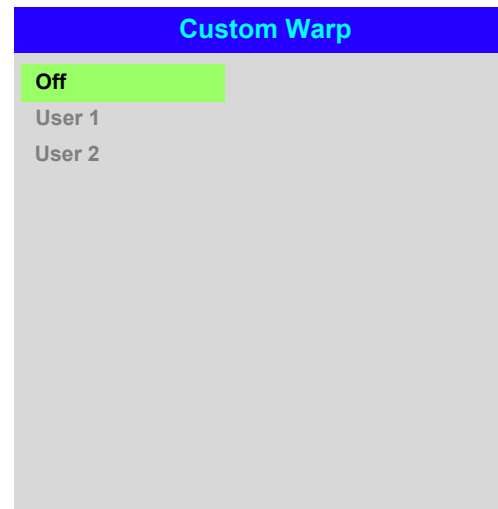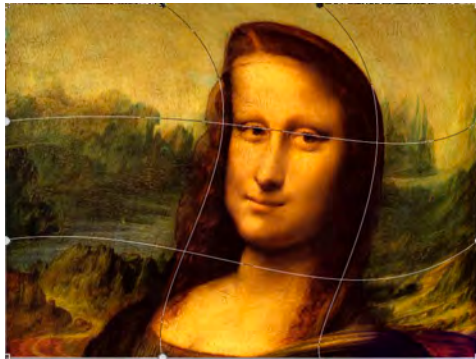
Notes

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.

Edge Blend	
Edge Blend	**On**
Align Pattern	**Off**
Blend Width	▶
Black Level Uplift	▶
Reset	
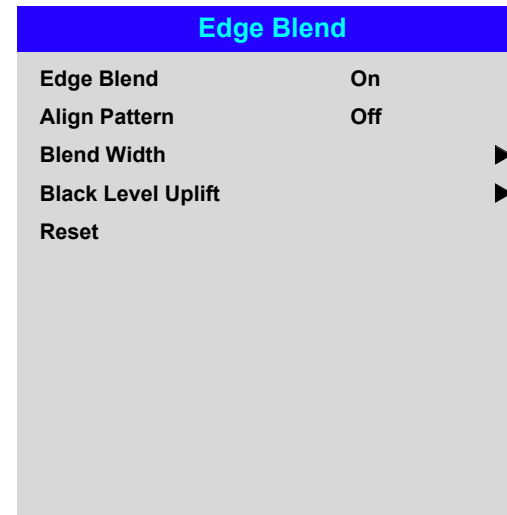
Notes

☞ *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:
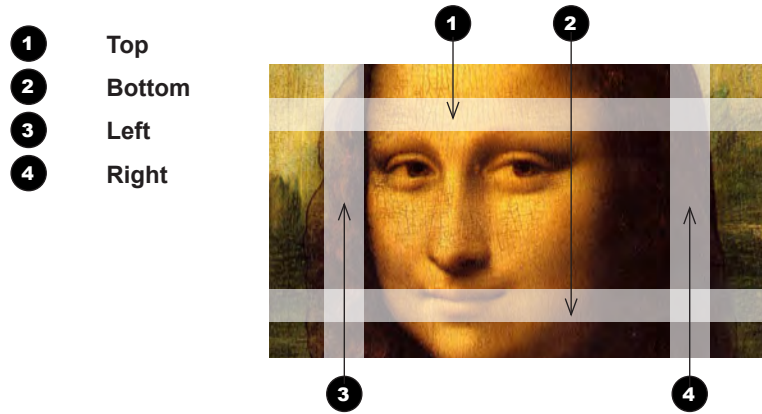
Blend Width	
Top	0
Bottom	0
Left	0
Right	0

1   Top

2   Bottom

3   Left

4   Right

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**.

Black Level Uplift

Select Area
Top	0
Bottom	0
Left	0
Right	0

Colour Adjustment
All	◄ ►
Red	0
Green	0
Blue	0

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.

Laser	
Power Mode	**Normal**
Power Level	— — — —
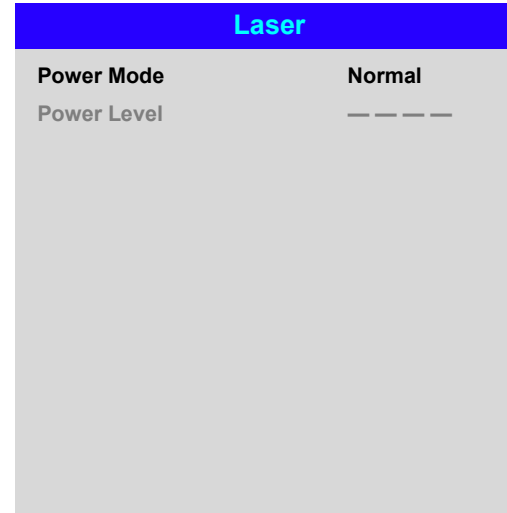
Notes

Setup menu

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

- **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	
Orientation	**Auto-front**
High Altitude	**Auto**
Standby Power	**SuperECO**
Screen Setting	**16:9**
ColorMax	▶
Power On/Off Management	▶
Clock Adjust	▶
Startup Logo	**On**
Blank Screen	**Logo**
Auto Source	**Off**
▼	

Notes

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

Setup menu continued from previous page

- **Trigger1** and **Trigger 2**
Choose from **Screen**, **5:4**, **4:3**, **16:10**, **16:9**, **1.88**, **2.35**, **TheaterScope**, **Source**, **Unscaled** or **RS232** to determine what will cause each trigger output to activate.

- **Infrared Remote**
Set to **Off** if you wish to disable the remote control.

- **IR Code**
The projector and the remote control need a matching IR code: a two-digit number between **00** and **99**.

The default IR code is **00**. This is also a master code, which, if assigned to a remote, will work regardless of the value assigned to the projector.

To assign an IR code for the projector:

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,

- 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.

Setup	
▲	
Trigger-1	Off
Trigger-2	Off
Infrared Remote	On
IR Code	0
IR Code Reset	
OSD Settings	►
Memory	►
Instant Startup	Off
Standby Period	30 Min.

Notes

☞ *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.

Notes

Setup menu continued from previous 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.

ColorMax	
Measured Data	▶
Target Data – User 1	▶
Target Data – User 2	▶

Measured Data / Target Data

1. Use the **UP ▲** and **DOWN ▼** arrow buttons to highlight a color, then use the **LEFT ◀** and **RIGHT ▶** arrow buttons to navigate to the **x** or **y** coordinate.

2. Use the **UP ▲** and **DOWN ▼** arrow buttons to increase and decrease the value, respectively.

3. Exit edit mode:

   • press **ENTER/OK**, if you want to save the edited values.

   • press **EXIT**, if you do not wish to save the edited values

4. If necessary, highlight another color and repeat the procedure.

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

Target Data – User 1		
Red	x: 0.640	y: 0.390
Green	x: 0.300	y: 0.600
Blue	x: 0.150	y: 0.060
Yellow	x: 0.419	y: 0.505
Cyan	x: 0.225	y: 0.329
Magenta	x: 0.321	y: 0.154
White	x: 0.285	y: 0.302

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**.

Power On/Off Management	
Auto Power Off	**Off**
Auto Power On	**Off**
Scheduled on/off	►

Scheduled on/off

Schedule							Off	
	S	M	T	W	T	F	S	Time
On	☒	☐	☐	☐	☐	☐	☐	12: 34
Off	☒	☐	☐	☐	☐	☐	☐	12: 34
On	☒	☐	☐	☐	☐	☐	☐	12: 34
Off	☒	☐	☐	☐	☐	☐	☐	12: 34
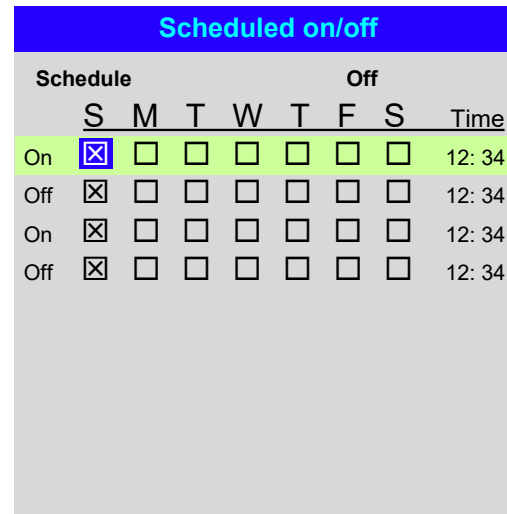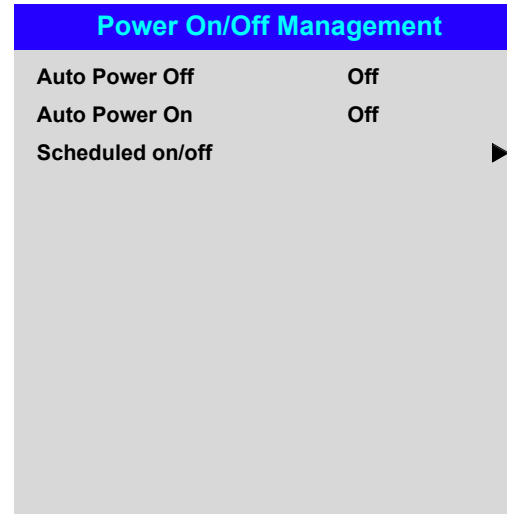
Setup menu continued from previous page

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.

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

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.

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

Memory

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

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

The following settings are saved in a preset:

- From the **Image** menu — **Dynamic Black, Gamma**, **HDR**, **Brightness**, **Contrast**, **Saturation**, **Hue**, **Sharpness** and **Noise Reduction**

- From the **Color** menu — **Color Space**, **Color Mode**, **ColorMax**, **Color Temperature**, **Dynamic Black**, **RGB Lift** and **RGB Gain**

- From the **Geometry** menu — **Aspect Ratio** and **Overscan**

To recall a saved preset:

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

To save a preset:

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

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

☞ *Presets from one input cannot be applied to another input.*

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.

Network	
DHCP	Off
IP	192 . 168 . 000 . 100
Subnet Mask	255 . 255 . 255 . 000
Gateway	000 . 000 . 000 . 000
DNS	000 . 000 . 000 . 000
MAC	00: 18: 27: 2d: f2: 06
AMX	Off

Notes

PIP menu

- **PIP**

  Turn PIP on and off.

- **Source**

  Select an input source for the PIP image.

  Any combinations are possible between main and PIP input source, as long as one of the inputs is either **DisplayPort** or **3G-SDI**.

- **Position**

  Set the location of the PIP image on the screen. Choose from **Top-Left**, **Top-Right**, **Bottom-Left**, **Bottom-Right** and **PBP**.

PIP	
PIP	**Off**
Source	**HDMI1**
Position	**Top-Left**

Notes

Information menu

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

Information	
Model Name	**HIGHlite Laser 4K 12000**
Serial Number	**X000XXXXX0000**
Software Version 1	**MD17-VD21-1.14-20170828**
Software Version 2	**STEP3_E01-23-17-3120**
Software Version 3	**2.0.14.0**
Active / PIP Source	**HDMI 1**
Signal Format	▶
Laser Hours	**2**
System Status	▶
Thermal Status	▶
Factory Reset	

Signal Format

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

Information menu continued from previous page

System Status

System Status	
Atmospheric Pressure	98988 Pa (116 m)
AC Voltage	160V – 264V
Ceiling Mode	0
Tilt Angle	4 deg
Portrait Angle	0 deg
Altitude Mode	Low
Laser Power	100%
License Key	License Pass. Timeout Not Expired

Thermal Status

Thermal Status	
Inlet/DMD Temp.	23 / 24 (C)
PW Temp.	58 (C)
LD 1-6 Temp.	41 / 46 / 41 / 48 / 49 / 49 (C)
Fan 1-3 Speed	1399 / 1402 / 1391
Fan 4-6 Speed	1410 / 1200 / 1205
Fan 7-9 Speed	1211 / 1407 / 1410
Fan 10-12 Speed	0 / 3005 / 3007
Fan 13-15 Speed	2986 / 2984 / 2984
Fan 16-18 Speed	3020 / NA / NA
Fan 19-21 Speed	1200 / 1204 / 1200
Fan 12-24 Speed	2283 / 2332 / 1800
Water Pump Speed	2718 / 3378 / 3220

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.
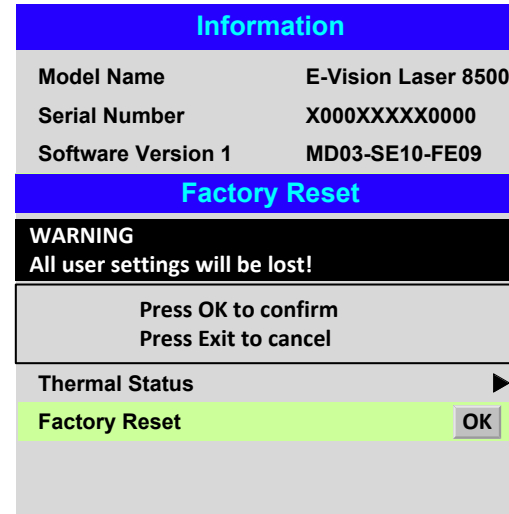
Information	
Model Name	E-Vision Laser 8500
Serial Number	X000XXXXX0000
Software Version 1	MD03-SE10-FE09

Factory Reset

WARNING
All user settings will be lost!

Press OK to confirm
Press Exit to cancel

Thermal Status	▶
Factory Reset	OK

Served Web Pages

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

The default IP address is *192.168.0.100*.

Projector Status

Projector Control

Crestron RoomView

Network Setup

Alert Mail Setup

Date/Time Setup

Error Log

DP OSD Function

Hot Key

PicMute | OSD

Freeze

Projector Information

Model	HIGHlite Laser 4K 12000
Serial Number	W713ZDUCY0018
Software Version 1	MP03-VP05-1.1.4-20171220
Software Version 2	STP3_E01-23-17-3120
Software Version 3	2.0.23.0
Power Status	Power On
Input	HDMI 1
Laser Status	Power : On Runtime : 71 H
Projection Mode	Front Tabletop
High Altitude	Auto
Inlet Temperature	21 °C
DMD Temperature	33 °C
LD Temperature	42 / 36 / 37 / 41 / 43 / 42 °C
Diagnostic Status	No Error

LAN Information

| MAC address | 00:18:23:50:4E:06 |

DIGITAL PROJECTION

| Projector Status |
| Projector Control |
| Crestron RoomView |
| Network Setup |
| Alert Mail Setup |
| **Date/Time Setup** |
| Error Log |
| DP OSD Function |

Hot Key
| PicMute | OSD |
| Freeze |

Time Zone:

Time Zone: UTC(-11:00) ▼

Select Local time zone, Current zone is UTC +00:00

SaveTimeZone

Time:

Date: 2018.01.30   e.g.2000.01.01
Clock: 12:04   e.g.23:59

Current time is set to :2018.01.30   ; 12:04

SaveTime

DIGITAL PROJECTION

| Projector Status |
| Projector Control |
| Crestron RoomView |
| Network Setup |
| Alert Mail Setup |
| Date/Time Setup |
| **Error Log** |
| DP OSD Function |

Hot Key
| PicMute | OSD |
| Freeze |

Projector Error Log

ErrLog: 4 / Current PowerOn times: 8

No	Code	PwrOn	L1(Hr/Pwr)	T(Ti/Tc)	Desc
1	1161	7	31/2	13/13	ErrFrontCoverOpen
2	1141	6	31/2	18/20	ErrLensSwitchOpen
3	1151	3	5/2	21/26	ErrCoverDoorOpen
4	1151	2	5/2	22/28	ErrCoverDoorOpen

Page 1   Page 2

Notes

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Projector Status
Projector Control
Crestron RoomView
Network Setup
Alert Mail Setup
Date/Time Setup
Error Log
DP OSD Function

Hot Key
PicMute   OSD
Freeze

Input

- Input [HDMI1 ▼]

Test Pattern

Exit Test Pattern

Lens

- Lens Lock ⦿ off ○ on
- CenterLens [Do]
- LensMemory [Memory 1 ▼] [Save] [Load] [Clear]

Image

- DynamicBlack ⦿ off ○ on
- Light Off Timer [Disable ▼]
- Gamma [2.2 ▼]
- HDR Mode [HDR Auto ▼]
- Brightness [-] [_____] [+] 112
- Constrast [-] [_____] [+] 87
- Staturation [-] [_____] [+] 130
- Hue [-] [_____] [+] 100
- Sharpness [-] [_____] [+] 0
- Noise Reduction [off ▼]
- [Freeze]
- [Resync]

color

- ColorSpace [Auto ▼]
- ColorMode [ColorMax ▼]
- ColorMax [Peak ▼]
- Manual Color Matching
  Red
  Hue [-] [_____] [+] 250
  Saturation [-] [_____] [+] 250
  Gain [-] [_____] [+] 250
  Green
  Hue [-] [_____] [+] 250
  Saturation

Gain [-] [_____] [+] 250
Green
Hue [-] [_____] [+] 250
Saturation [-] [_____] [+] 250
Gain [-] [_____] [+] 250
Blue
Hue [-] [_____] [+] 250
Saturation [-] [_____] [+] 250
Gain [-] [_____] [+] 250
Yellow
Hue [-] [_____] [+] 220
Saturation [-] [_____] [+] 250
Gain [-] [_____] [+] 250
Magenta
Hue [-] [_____] [+] 280
Saturation [-] [_____] [+] 250
Gain [-] [_____] [+] 250
Cyan
Hue [-] [_____] [+] 230
Saturation [-] [_____] [+] 250
Gain [-] [_____] [+] 250
White Balance
Red [-] [_____] [+] 250
Green [-] [_____] [+] 250
Blue [-] [_____] [+] 250
[Manual Color Matching Reset]
- Color Temperature [Native ▼]
- Gains and Lifts
  Red Lift [-] [_____] [+] 100
  Green Lift [-] [_____] [+] 100
  Blue Lift [-] [_____] [+] 100
  Red Gain [-] [_____] [+] 100
  Green Gain [-] [_____] [+] 100
  Blue Gain [-] [_____] [+] 100
  [Gains and Lifts Reset]

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DIGITAL PROJECTION

Projector Status

Projector Control

Crestron RoomView

Network Setup

Alert Mail Setup

Date/Time Setup

Error Log

DP OSD Function

Hot Key
PicMute | OSD
Freeze

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geometry

- Aspect Ratio [Source ▼]
- Digital Zoom
  Digital Zoom   [-] [_____] [+] 0%
  Digital Pan   [-] [_____] [+] 0
  Digital Scan   [-] [_____] [+] 0
  [Digital Zoom Reset]
- Overscan [Off ▼]
- Blanking
  Top   [-] [_____] [+] 0
  Bottom [-] [_____] [+] 0
  Left   [-] [_____] [+] 0
  Right   [-] [_____] [+] 0
  [Blanking Reset]
- ○ Keystone
  H Keystone [-] [_____] [+] 0
  V Keystone [-] [_____] [+] 0
  Rotation   [-] [_____] [+] 0
  [Keystone Reset]
- ○ 4 Corners
  Top Left Corner X   [-] [_____] [+] 0
  Top Left Corner Y   [-] [_____] [+] 0
  Top Right Corner X   [-] [_____] [+] 0
  Top Right Corner Y   [-] [_____] [+] 0
  Bottom Left Corner X   [-] [_____] [+] 0
  Bottom Left Corner Y   [-] [_____] [+] 0
  Bottom Right Corner X [-] [_____] [+] 0
  Bottom Right Corner Y [-] [_____] [+] 0
  [4 Corners Reset]
- ○ Rotation   [-] [_____] [+] 0
  [Rotation Reset]
- ● Pincushion/Barrel
  H Pin/Barrel [-] [_____] [+] 0
  V Pin/Barrel [-] [_____] [+] 0
  Keystone
  H Keystone   [-] [_____] [+] 0
  V Keystone   [-] [_____] [+] 0
  Rotation   [-] [_____] [+] 0
  [Pincushion/Barrel Reset]
- ○ Arc
  Top   [-] [_____] [+] 0
  Bottom [-] [_____] [+] 0
  Left   [-] [_____] [+] 0
  Right   [-] [_____] [+] 0
  [Arc Reset]
- ○ Custom Warp [Off ▼]

edgeblend

- Edge Blend ○ off ● on
- Align Pattern ○ off ● on
- Blend Width
  Top   [-] [_____] [+] 0
  Bottom [-] [_____] [+] 0
  Left   [-] [_____] [+] 0
  Right   [-] [_____] [+] 0
- Black Level Uplift
  Select Area
  Top   [-] [_____] [+] 0
  Bottom [-] [_____] [+] 0
  Left   [-] [_____] [+] 0
  Right   [-] [_____] [+] 0
  Color Adjustment
  All   [-] [+]
  Red   [-] [_____] [+] 0
  Green   [-] [_____] [+] 0
  Blue   [-] [_____] [+] 0
  [Edgeblend Reset]

laser

- Power Mode [Custom ▼]
- Power Level [-] [_____] [+] 70

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DIGITAL PROJECTION

HIGHlite Laser 4K Series
High Brightness Digital Video Projector

▶ REFERENCE GUIDE

IN THIS GUIDE

Choosing A Lens

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

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

Throw ratios	Throw distance range
0.77 : 1 fixed lens	1.3 - 15 m (4.3 - 49.2 ft)
0.96 - 1.43 : 1 zoom lens	1.8 - 10.0 m (5.9 - 32.8 ft)
1.16 : 1 fixed lens	1.4 - 25 m (4.6 - 82 ft)
1.45 - 1.74 : 1 zoom lens	1.8 - 9.3 m (5.9 - 30.5 ft)
1.74 - 2.17 : 1 zoom lens	2.2 - 11.8 m (7.2 - 38.7 ft)
2.17 - 2.90 : 1 zoom lens	2.7 - 15.4 m (8.9 - 50.5 ft)
2.90 - 4.34 : 1 zoom lens	3.6 - 22.5 m (11.8 - 73.8 ft)
4.34 - 6.76 : 1 zoom lens	5.5 - 35 m (18 - 114.8 ft)

To choose a lens, either calculate the **throw ratio** required, or use the **lens charts** provided in Appendix B 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:

Throw ratios	Throw distance range
0.77 : 1 fixed lens	1.3 - 15 m (4.3 - 49.2 ft)
0.96 - 1.43 : 1 zoom lens	1.8 - 10.0 m (5.9 - 32.8 ft)
1.16 : 1 fixed lens	1.4 - 25 m (4.6 - 82 ft)
1.45 - 1.74 : 1 zoom lens	1.8 - 9.3 m (5.9 - 30.5 ft)
1.74 - 2.17 : 1 zoom lens	2.2 - 11.8 m (7.2 - 38.7 ft)
2.17 - 2.90 : 1 zoom lens	2.7 - 15.4 m (8.9 - 50.5 ft)
2.90 - 4.34 : 1 zoom lens	3.6 - 22.5 m (11.8 - 73.8 ft)
4.34 - 6.76 : 1 zoom lens	5.5 - 35 m (18 - 114.8 ft)

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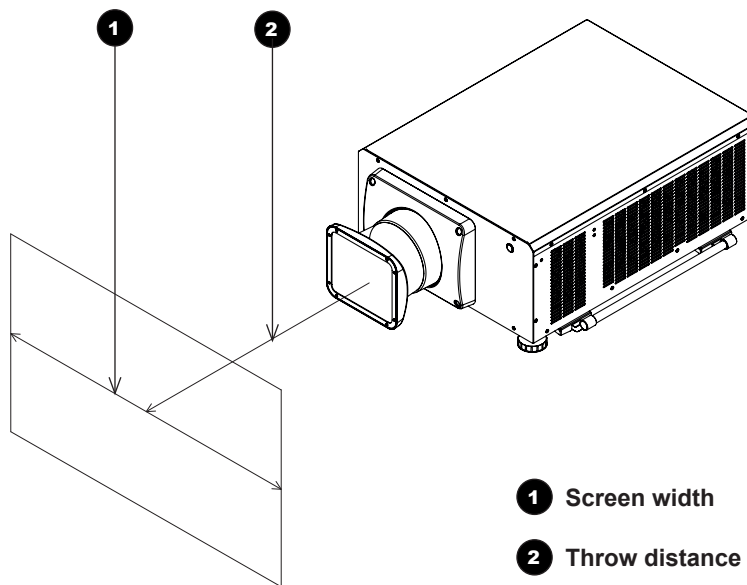
1 Screen width

2 Throw distance

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

   $$\frac{11}{4.5} = \textbf{2.44}$$

2. **Match the result with the lens table.**

   The lens matching a throw ratio of 2.44 is **the 2.17 - 2.90 : 1 zoom lens**.

3. **Check whether the lens covers the required throw distance.**

   The range quoted for the 2.17 - 2.90 : 1 zoom lens is **2.7 - 15.4 m**. The required distance of 11 m is within the range.

INFORMATION YOU NEED FOR THIS CALCULATION

- The throw ratio formula:

$$\text{Throw ratio} = \frac{\text{Throw distance}}{\text{Screen width}}$$

- The lens table:

Throw ratios	Throw distance range
0.77 : 1 fixed lens	1.3 - 15 m (4.3 - 49.2 ft)
0.96 - 1.43 : 1 zoom lens	1.8 - 10.0 m (5.9 - 32.8 ft)
1.16 : 1 fixed lens	1.4 - 25 m (4.6 - 82 ft)
1.45 - 1.74 : 1 zoom lens	1.8 - 9.3 m (5.9 - 30.5 ft)
1.74 - 2.17 : 1 zoom lens	2.2 - 11.8 m (7.2 - 38.7 ft)
2.17 - 2.90 : 1 zoom lens	2.7 - 15.4 m (8.9 - 50.5 ft)
2.90 - 4.34 : 1 zoom lens	3.6 - 22.5 m (11.8 - 73.8 ft)
4.34 - 6.76 : 1 zoom lens	5.5 - 35 m (18 - 114.8 ft)

Notes

☞ *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 4K-UHD Display.

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

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

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

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

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

Fig. 3 shows the image projected on the same screen with a lens chosen using TRC.

The increased throw ratio has allowed the 4:3 image to fill the 4:3 screen seamlessly.
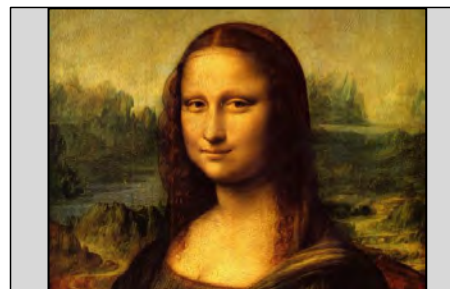
Fig. 1
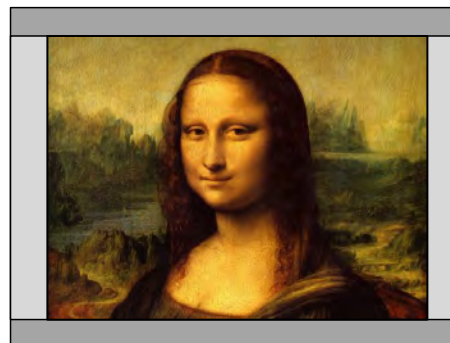
Fig. 2
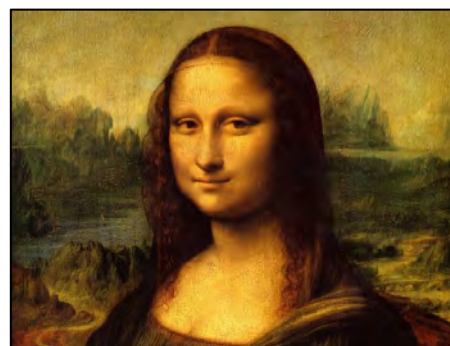
Fig. 3

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:

$$TRC = \frac{1.78 \ (DMD^{™} \ aspect \ ratio)}{Source \ aspect \ ratio}$$

TRC table

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

2.35:1 (Scope), 3840 x 1634 pixels	TRC < 1, not used
1.85:1 (Flat), 3840 x 2075 pixels	TRC < 1, not used
1.78:1 (16:9), 3840 x 2160	TRC < 1, not used (native resolution)
1.66:1 (Vista), 3585 x 2160 pixels	TRC < 1.07, not used
1.6:1 (16:10), 3456 x 2160 pixels	TRC = 1.11, not used
1.33:1 (4:3), 2873 x 2160 pixels	TRC = 1.33
1.25:1 (5:4), 2700 x 2160 pixels	TRC = 1.42

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:

$$\text{Throw ratio} = \frac{\text{Throw distance}}{\text{Screen width } \textbf{x TRC}}$$

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

Throw ratios	Throw distance range
0.77 : 1 fixed lens	1.3 - 15 m (4.3 - 49.2 ft)
0.96 - 1.43 : 1 zoom lens	1.8 - 10.0 m (5.9 - 32.8 ft)
1.16 : 1 fixed lens	1.4 - 25 m (4.6 - 82 ft)
1.45 - 1.74 : 1 zoom lens	1.8 - 9.3 m (5.9 - 30.5 ft)
1.74 - 2.17 : 1 zoom lens	2.2 - 11.8 m (7.2 - 38.7 ft)
2.17 - 2.90 : 1 zoom lens	2.7 - 15.4 m (8.9 - 50.5 ft)
2.90 - 4.34 : 1 zoom lens	3.6 - 22.5 m (11.8 - 73.8 ft)
4.34 - 6.76 : 1 zoom lens	5.5 - 35 m (18 - 114.8 ft)

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

Notes

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

⚠ **Do not use the short lens hood with the *4.34 - 6.76 : 1* zoom lens.**

☞ *For further information about using the right lens and hood, see **The lens hood** in the **Installation and Quick-Start Guide**.*

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:

    $$Throw\ ratio = \frac{11}{4.5 \times 1.33} = 1.84$$

3. Find a match in the lens table.

    The table shows that the matching lens is **the 1.74 - 2.17 : 1 zoom lens**.

4. Check whether the lens covers the required throw distance.

    The range quoted for the 1.74 - 2.17 : 1 zoom lens is **2.2 - 11.8 m**. The required distance of 11 m is within the range.

INFORMATION YOU NEED FOR THESE CALCULATIONS

- The TRC formula $$TRC = \frac{DMD^{™}\ aspect\ ratio}{Source\ aspect\ ratio}$$

- The TRC table (to use instead of the formula)

2.35:1 (Scope)	TRC not used
1.85:1 (Flat)	TRC not used
1.78:1 (16:9)	TRC not used (native resolution)
1.66:1 (Vista)	TRC = 1.07
1.6:1 (16:10)	TRC = 1.07
1.33:1 (4:3)	TRC = 1.33
1.25:1 (5:4)	TRC = 1.42

- The throw ratio formula $$Throw\ ratio = \frac{Throw\ distance}{Screen\ width \times TRC}$$

- The lens table:

Throw ratios	Throw distance range
0.77 : 1 fixed lens	1.3 - 15 m (4.3 - 49.2 ft)
0.96 - 1.43 : 1 zoom lens	1.8 - 10.0 m (5.9 - 32.8 ft)
1.16 : 1 fixed lens	1.4 - 25 m (4.6 - 82 ft)
1.45 - 1.74 : 1 zoom lens	1.8 - 9.3 m (5.9 - 30.5 ft)
1.74 - 2.17 : 1 zoom lens	2.2 - 11.8 m (7.2 - 38.7 ft)
2.17 - 2.90 : 1 zoom lens	2.7 - 15.4 m (8.9 - 50.5 ft)
2.90 - 4.34 : 1 zoom lens	3.6 - 22.5 m (11.8 - 73.8 ft)
4.34 - 6.76 : 1 zoom lens	5.5 - 35 m (18 - 114.8 ft)

Notes

Screen Requirements

Fitting the image to the display

If the source image supplied to the projector is smaller than the 4K-UHD resolution, the image will not fill the display. The following examples show how a number of common formats may be displayed, depending on your DMD™ resolution.

4K-UHD images displayed full width

2.35:1(Scope) = 1634 pixels

1.85:1 = 2075 pixels

16:9 1.78:1 (full height) = 2160 pixels

full width = 3840 pixels
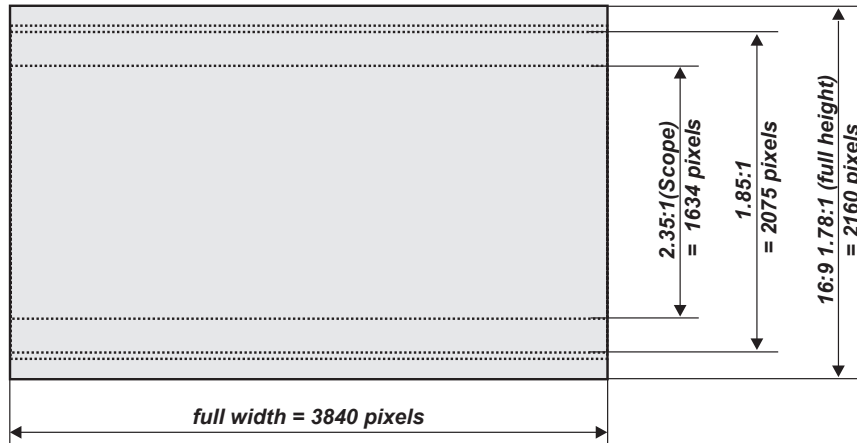
4K-UHD images displayed with a height of 2160 pixels

full height = 2160 pixels

4:3 = 1.33:1 = 2873 pixels

16:10 = 1.6:1 = 3456 pixels

1.66:1 (Vista) = 3585 pixels

full width = 3840 pixels
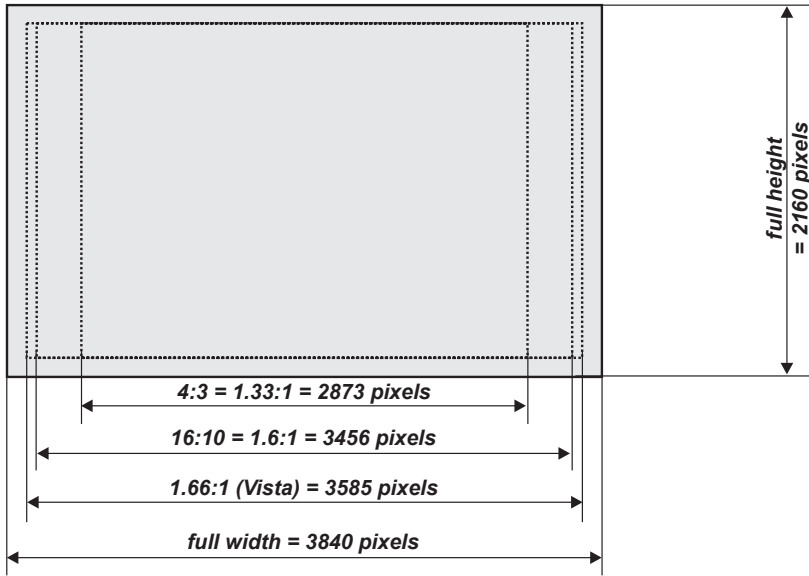
4K-UHD images displayed full height

full height = 2160 pixels

UXGA = 4:3 = 1.33:1 = 2873 pixels
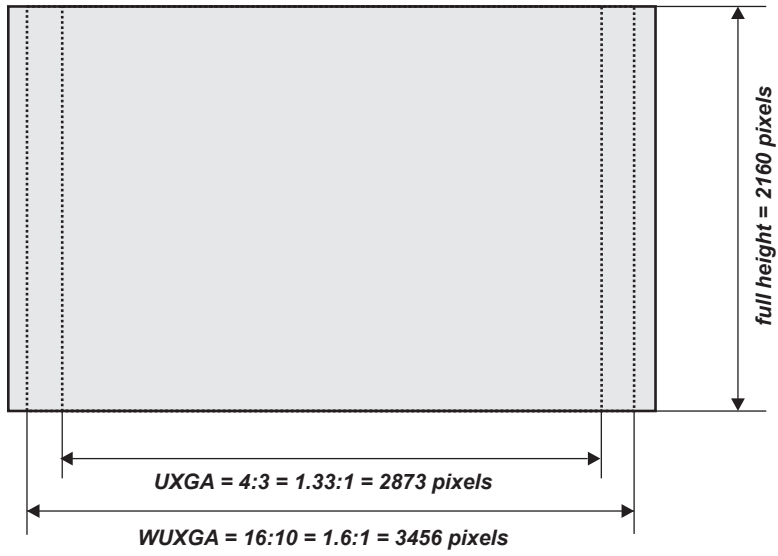
WUXGA = 16:10 = 1.6:1 = 3456 pixels

Diagonal screen sizes

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

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

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

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

16:9 = 1.78:1 (native aspect ratio for 4K-UHD projectors)
W = D x 0.87   **H** = D x 0.49

1.66:1 (Vista)
W = D x 0.86   **H** = D x 0.52

16:10 = 1.6:1
W = D x 0.85   **H** = D x 0.53

W = width

H = height

D = diagonal
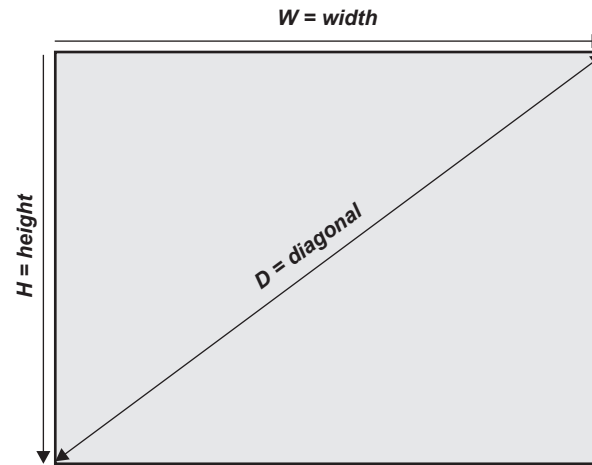
Positioning The Image

The normal position for the projector is at the centre of the screen. However, you can set the projector above or below the centre, or to one side, and adjust the image using the **Lens shift** feature (known as *rising and falling front*) to maintain a geometrically correct image.
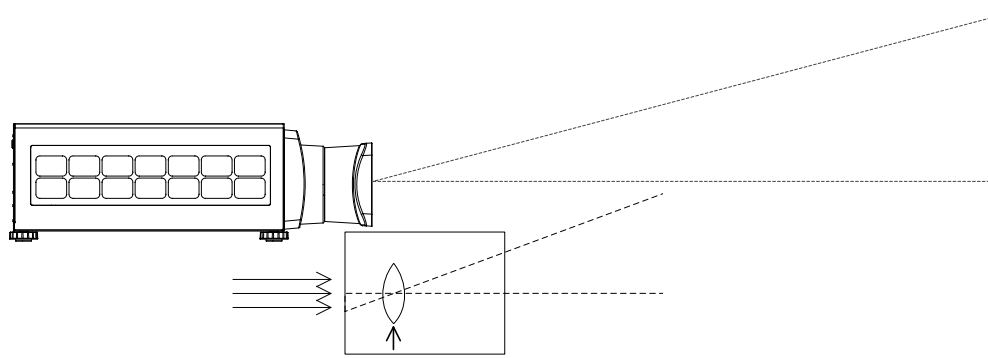
Shifting the lens up (rising front)
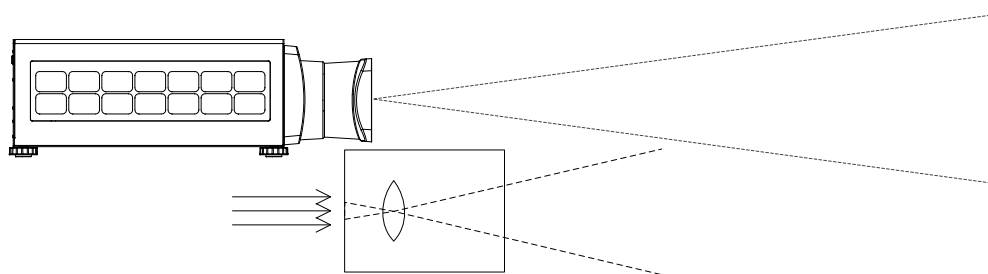
Centered lens
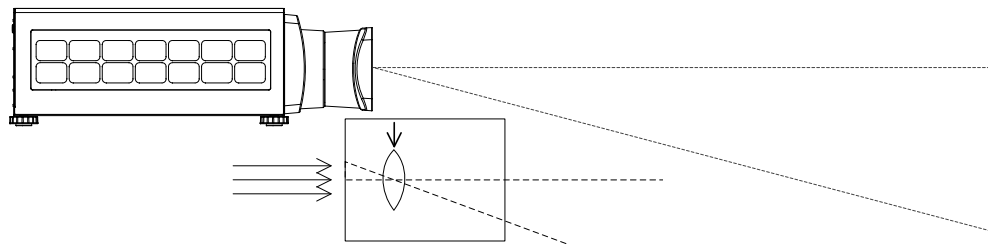
Shifting the lens down (falling front)

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.
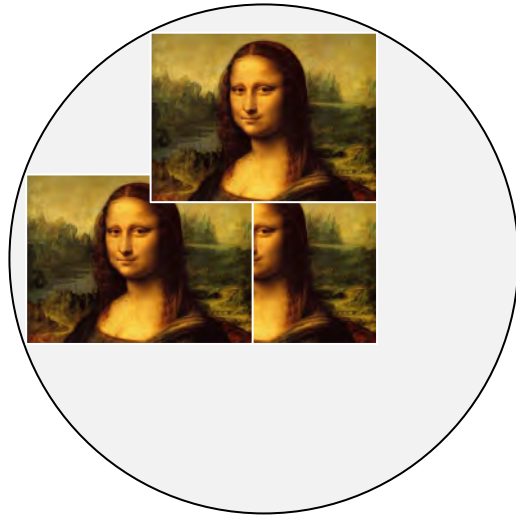
Full horizontal or vertical shift
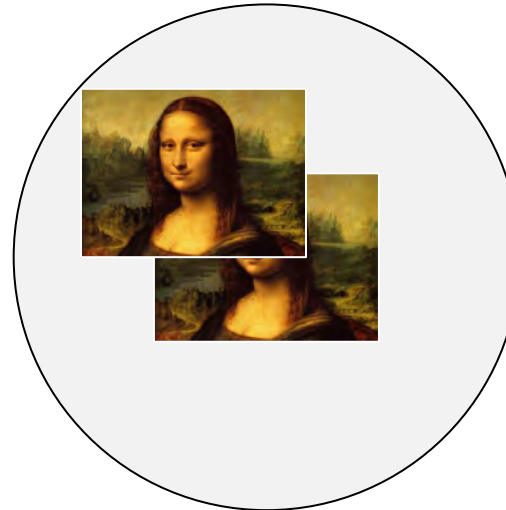
Combined shift is reduced

Aspect Ratios Explained

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

- The display resolution is **4K-UHD** with a 3840 x 2160 resolution, corresponding to an aspect ratio of 16:9

- The aspect ratio of the input signal: usually **4:3**, **16:9** or **16:10**

- The value of the **Aspect Ratio** setting of the projector:

    - **16:9**, **4:3**, **16:10** and **5:4** stretch the image to the selected aspect ratio. **16:9** leaves black bars at the top and bottom of the screen (letterboxing effect); **4:3** and **5:4** leave black bars at the sides of the screen (pillarboxing).

    - **TheaterScope** is a special setting used in combination with an anamorphic lens, an optional accessory. It removes letterboxing from a 2.35:1 source packed into a 16:9 frame.

    - **4:3 Narrow** is a special setting used in combination with an anamorphic lens, an optional accessory. It squeezes 4:3 content so that the intended aspect ratio is displayed on screen when projected through an anamorphic lens.

    - **Source** shows the image with its original aspect ratio, if this does not match the native aspect ratio of the DMD™, then the image will be scaled to either fit the full width or height of the display.

Aspect ratio examples

Source: 4:3
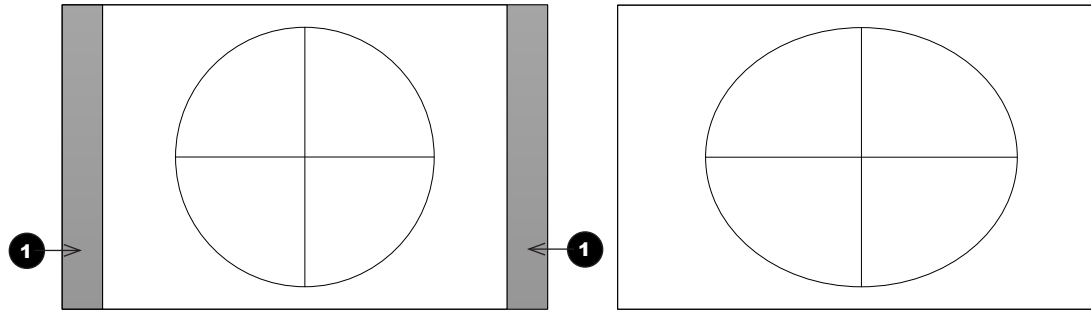
Aspect Ratio: Source / 4:3

Aspect Ratio: 16:10

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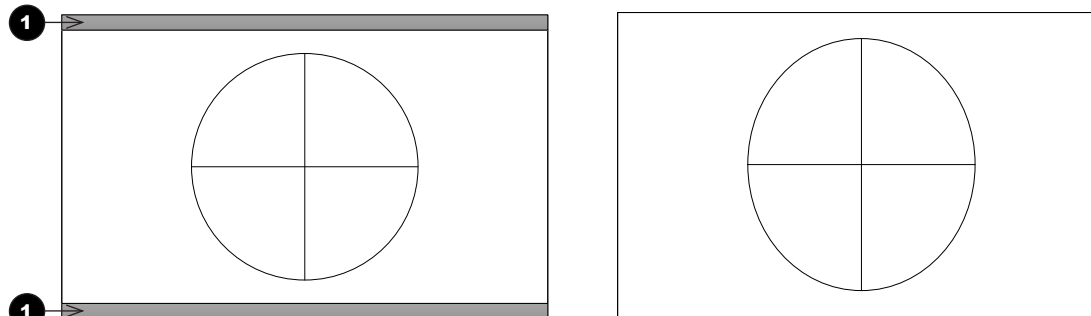
Aspect Ratio: Source / 16:9

Aspect Ratio: 16:10

Source: 16:10 (native)
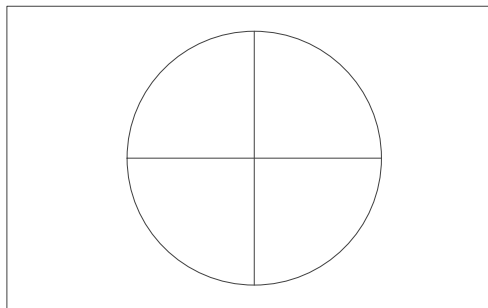
1 **Unused screen areas**

Aspect Ratio: Source / 16:10

Aspect ratio example: TheaterScope

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

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

Black margin – part of the source

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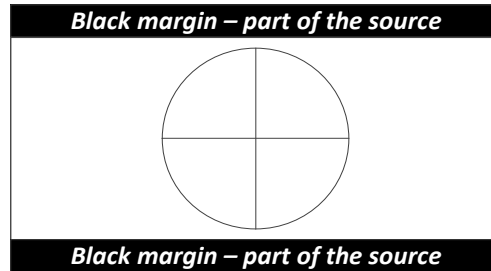
If we change the setting to **TheaterScope**, the black lines will disappear but the image will stretch vertically to reach the top and bottom of the DMD™:

An anamorphic lens will stretch the image horizontally, restoring the original 2.35 ratio:
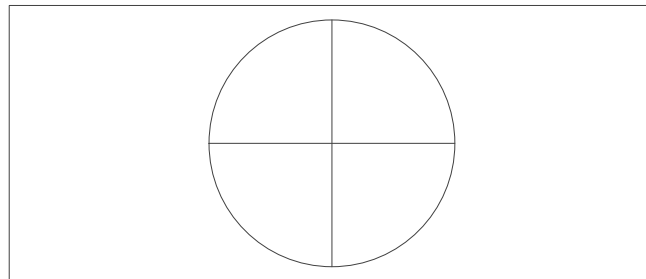
Appendix A: Lens Part Numbers

Throw ratios	Part number	Throw distance range	Lens extension
0.77 : 1 fixed lens	110-808	1.3 - 15 m (4.3 - 49.2 ft)	170.9 mm
0.96 - 1.43 : 1 zoom lens	119-011	1.8 - 10.0 m (5.9 - 32.8 ft)	158.3 mm
1.16 : 1 fixed lens	110-809	1.4 - 25 m (4.6 - 82 ft)	144.3 mm
1.45 - 1.74 : 1 zoom lens	110-803	1.8 - 9.3 m (5.9 - 30.5 ft)	115.1 mm
1.74 - 2.17 : 1 zoom lens	112-878	2.2 - 11.8 m (7.2 - 38.7 ft)	73.7 mm
2.17 - 2.90 : 1 zoom lens	113-852	2.7 - 15.4 m (8.9 - 50.5 ft)	80.6 mm
2.90 - 4.34 : 1 zoom lens	110-806	3.6 - 22.5 m (11.8 - 73.8 ft)	72.6 mm
4.34 - 6.76 : 1 zoom lens	110-807	5.5 - 35 m (18 - 114.8 ft)	83.3 mm

Notes

☞ *The throw ratios given here apply only when the image fills the width of the DMD™.*

For images that do not fill the width of the DMD™, the throw ratio needs to be recalculated using a throw ratio correction (TRC).

For further information, see **Choosing A Lens** *and* **Appendix B: Lens Charts**.

☞ *Throw distance calculations are based on the distance from the outer end of the lens, which will vary from lens to lens.*

⚠ **Do not use the short lens hood with the *4.34 - 6.76 : 1* zoom lens.**

☞ *For further information about using the right lens and hood, see* **The lens hood** *in the* **Installation and Quick-Start Guide**.

Appendix B: Supported Signal Input Modes

2D formats

Signal Format	Resolution	Frame Rate (Hz)	DisplayPort / DVI-D	HDMI / HD-BaseT				Output Frame Rate (Hz)	Remarks
				RGB	YUV 8-bit	YUV 10-bit	YUV 12-bit		
PC	640x480	59.94	X	X				60	
	640x480	74.99	X	X				60	
	640x480	85	X	X				60	
	800x600	60.32	X	X				60	
	800x600	75	X	X				60	
	800x600	85.06	X	X				60	
	848x480	47.95	X	X				48	
	848x480	59.94	X	X				60	
	1024*768	60	X	X				60	
	1024*768	75	X	X				60	
	1024*768	85	X	X				60	
	1280x720	47.95	X	X				48	
	1280x1024	60.02	X	X				60	
	1280x1024	75.02	X	X				60	
	1280x1024	85.02	X	X				60	
	1600x1200	60	X	X				60	
	1920x1080	47.95	X	X				48	
	1680x1050	59.94	X	X				60	
	1920x1200 RB	50	X	X				50	
	1920x1200 RB	60	X	X				60	
	1400X1050	60	X	X				60	
	1366 x 768	60	X	X				60	

Signal Format	Resolution	Frame Rate (Hz)	DisplayPort / DVI-D	HDMI / HD-BaseT				Output Frame Rate (Hz)	Remarks
				RGB	YUV 8-bit	YUV 10-bit	YUV 12-bit		
PC (continued)	1440 x 900	60	X	X				60	
	1280 x 768	60	X	X				60	
	1280 x 800	60	X	X				60	
	1280 x 960	60	X	X				60	
Apple Mac	640x480	66.59	X	X				60	
	832x624	74.54	X	X				60	
SDTV	480i	59.94						60	
	1440x480i	60		X	X	X	X	60	
	1440x576i	50		X	X	X	X	50	
	576i	50						50	
EDTV	480p	59.94	X	X	X	X	X	60	
	576p	50	X	X	X	X	X	50	
HDTV	1035i	60	X	X	X	X	X	60	
	1080i	50	X	X	X	X	X	50	
	1080i	59.94	X	X	X	X	X	60	
	1080i	60	X	X	X	X	X	60	
	720p	50	X	X	X	X	X	60	
	720p	59.94	X	X	X	X	X	60	
	720p	60	X	X	X	X	X	60	
	1080p	23.98	X	X	X	X	X	48	
	1080p	24	X	X	X	X	X	48	
	1080p	25	X	X	X	X	X	60	
	1080p	29.97	X	X	X	X	X	60	
	1080p	30	X	X	X	X	X	60	
	1080p	50	X	X	X	X	X	50	

Notes

Signal Format	Resolution	Frame Rate (Hz)	DisplayPort / DVI-D	HDMI / HD-BaseT					Output Frame Rate (Hz)	Remarks
				RGB	YUV 8-bit	YUV 10-bit	YUV 12-bit			
HDTV (continued)	1080p	59.94	X	X	X	X	X	60	
	1080p	60	X	X	X	X	X	60	
	2K (2048x1080)	24/25/30/50/60	X	X	X	X	X	48/50/60/50/60	
	4K-UHD	24/25/30	X	X	X	X*1	X*1	48/50/60	*1
	4K-UHD	50/60	X	X (8 bits)	X*2	X*3	X*3	50/60	*2, *3

SDI Format

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

Notes

☞ **Remarks:**

*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

Timing	SDI Link mode	Signal Standards	Color Encode	Sampling Structure	Bit Depth
1080P59	3G Level A	SMPTE 424M 3Gbps	YCbCr	4:2:2	10
1080P60	3G Level A	SMPTE 424M 3Gbps	YCbCr	4:2:2	10
1080P50	3G Level B	SMPTE 424M 3Gbps	YCbCr	4:2:2	10
1080P59	3G Level B	SMPTE 424M 3Gbps	YCbCr	4:2:2	10
1080P60	3G Level B	SMPTE 424M 3Gbps	YCbCr	4:2:2	10

Appendix C: Wiring Details

Signal inputs and outputs

HDMI 1 and 2

19 way type A connector

1   TMDS Data 2+

2   TMDS Data 2 Shield

3   TMDS Data 2-

4   TMDS Data 1+

5   TMDS Data 1 Shield

6   TMDS Data 1-

7   TMDS Data 0+

8   TMDS Data 0 Shield

9   TMDS Data 0-

10   TMDS Clock+

11   TMDS Clock Shield

12   TMDS Clock-

13   CEC

14   not connected

15   SCL (DDC Clock)

16   SCA (DDC Data)

17   DDC/CEC Ground

18   +5 V Power

19   Hot Plug Detect

HDMI: pin view of panel connector

DisplayPort

DisplayPort 1.2

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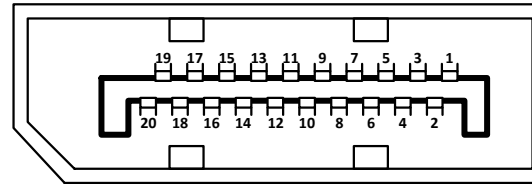
DisplayPort: pin view of panel connector

Notes

3G-SDI In, 3G-SDI Out

75 ohm BNC

3G-SDI connector

HDBaseT input

RJ45 socket.
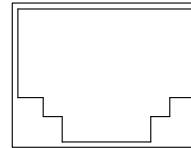
HDBaseT input

Control connections

LAN

RJ45 socket

(Shared with HDBaseT)

HDBaseT/LAN port

☞ *Only one remote connection (RS232 or LAN) should be used at any one time.*
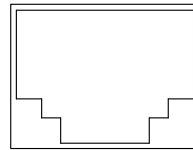
RS232

9 way D-type connector

1 unused

2 Received Data (RX)

3 Transmitted Data (TX)

4 unused

5 Signal Ground

6 unused

7 unused

8 unused

9 unused

```
5          1
  • • • • •
   • • • •
9          6
```
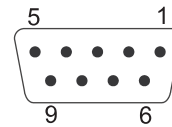
RS232:
pin view of female connector

Trigger 1 & Trigger 2

3.5 mm mini jack

Tip Signal
Sleeve Ground
Output: 12V, 200 mA max
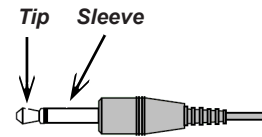
IR input

3.5 mm mini jack

Tip Signal
Ring Not connected
Sleeve Ground
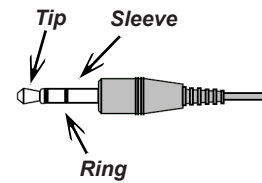
Appendix D: Glossary Of Terms

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.

4K-UHD

An *HDTV resolution* which corresponds to 3480 x 2160 *pixels* (a widescreen *aspect ratio* of 16:9).

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.

Notes

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.

Notes

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:

$$TRC = \frac{DMD™ \ aspect \ ratio}{Source \ aspect \ ratio}$$

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.

Notes

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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