DIGITAL PROJECTION

Mercury Quad Series

High Brightness Digital Video Projector

- INSTALLATION AND QUICK-START GUIDE
- CONNECTION GUIDE
- OPERATING GUIDE
- REFERENCE GUIDE



Rev A March 2017
117-787A

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.



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.

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Notes

Risk Group 3 Information

Light hazard warning

Failure to comply with the following may result in serious injury:

- **No direct exposure to the beam is permitted, RG3 IEC 62471-5:2015.**
- **Operators control access to the beam within the hazard distance or install the projector at sufficient height to prevent exposures of spectators' eyes within the hazard distance.**

The hazard distance ***(Fig. 1)*** is the distance measured from the projection lens at which the intensity or energy per unit of surface is lower than the applicable exposure limit on the cornea or skin. If the person is within the hazard distance, the beam is considered unsafe for exposure.

Lens	Part Number	Hazard Distance
0.67 : 1 fixed	105-607	0.47 m
1.12 : 1 fixed	105-608	1.41 m
1.16 - 1.49 : 1 zoom	109-236	1.52 m
1.39 - 1.87 : 1 zoom	105-610	1.63 m
1.87 - 2.56 : 1 zoom	105-611	1.46 m
2.56 - 4.16 : 1 zoom	105-612	2.83 m
4.16 - 6.96 : 1 zoom	105-613	7.02 m
6.92 - 10.36 : 1 zoom	109-235	12.7 m

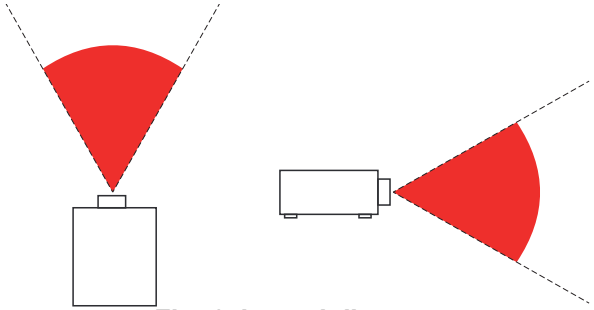
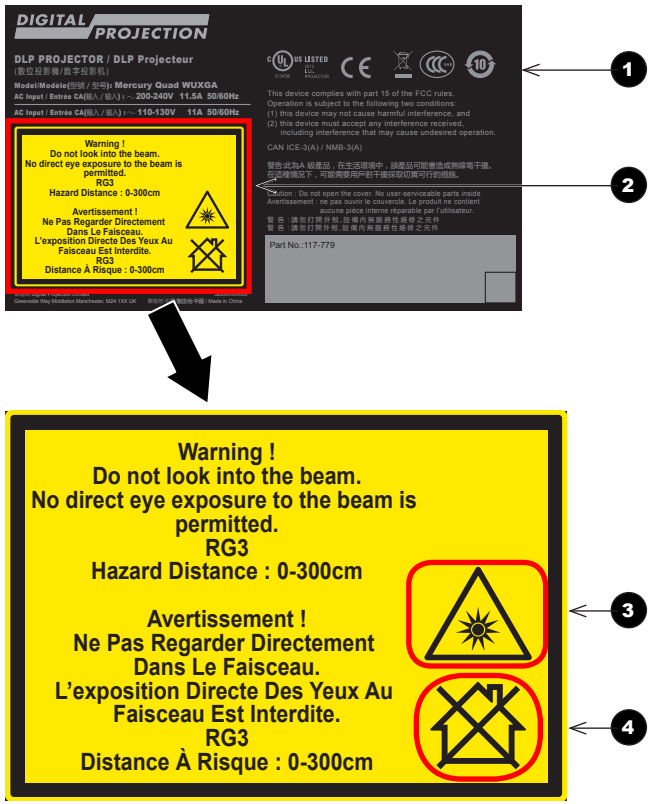


Fig. 1: hazard distance

Notes

Light hazard labels on the body of the projector

Light hazard labelling is part of the product label.



1. **Product label**
2. **Risk Group 3 label**
3. **Hazard Warning symbol**
4. **Not For Home Use logo**

Notes

Introduction

Congratulations on your purchase of this Digital Projection product.

Advanced compact High Brightness projector for large venue applications. Includes:

- High frame rate capability up to 120Hz.
- Sequential, Dual Pipe and Domestic mandatory formats for 3D.
- HDBaseT® for transmission of uncompressed High Definition Video up to 100 m from the source.
- 3G-SDI with loop-through.
- Edge Blend including black level compensation.
- Geometry correction - Keystone, Cornerstone, Electronic Rotation, Pin/Barrel correction.
- Full non-linear warping via PC applcation.
- Blanking control for custom input window sizing.
- Control via LAN and RS232.
- Motorised lens mount for focus, zoom and H/V shift.

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

Notes

CONTENTS

INSTALLATION AND QUICK-START GUIDE 1

WHAT'S IN THE BOX? 3
CONNECTING THE POWER SUPPLY 4
PROJECTOR OVERVIEW 5
Front and rear views 5
CONTROL PANEL 6
Buttons 6
Indicators 7
REMOTE CONTROL 8
Infrared reception 11
POSITIONING THE SCREEN AND PROJECTOR 12
Removing the detachable handles 13
Roll and pitch 14
CHANGING THE LENS 15
Inserting a new lens 15
Removing the lens 15
CHANGING THE LAMPS 16
CHANGING THE FILTERS 17
Front filter 17
Rear filter 18
OPERATING THE PROJECTOR 19
Switching the projector on 19
Switching the projector off 19
Selecting an input signal 20
Selecting a test pattern 20
Adjusting the lens 21
Adjusting the image 21

CONNECTION GUIDE 23

SIGNAL INPUTS 25
EDID on the HDMI and DisplayPort inputs 26
Using HDMI/DisplayPort switchers with the projector 26
3D connections 27
3D sources up to 60Hz requiring frame doubling and left/right interleaving 27
Frame sequential 3D sources up to 120Hz 27
Dual Pipe 3D 27
3D Sync 28
3D Sync in 28
3D Sync out 28
CONTROL CONNECTIONS 29
LAN connection examples 30
RS232 connection example 31

OPERATING GUIDE 33

USING THE MENUS 35
Opening the OSD 35
Opening a menu 35
Exiting menus and closing the OSD 35
Inside a menu 36
Accessing sub-menus 36
Executing commands 36
Editing projector settings 37
Using a slider to set a value 37
Editing numeric values 37

CONTENTS (continued)

USING THE PROJECTOR **38**
Main menu **38**
Lens menu **39**
Lens Control **39**
Lens Memory **40**
Image menu **41**
Noise Reduction **42**
Color menu **43**
Color Space **43**
Color Mode **44**
Geometry menu **49**
Aspect Ratio **49**
Digital Zoom **51**
Overscan **52**
Blanking **53**
Keystone **54**
4 Corners **56**
Rotation **57**
Pincushion / Barrel **58**
Arc **59**
Custom Warp **60**
Edge Blend menu **61**
Blend Width **62**
Black Level Uplift **63**
3D menu **64**
3D types **65**
Some 3D settings explained **66**
Frame rate multiplication in 3D images **67**
Lamp Control menu **68**
Setup menu **69**
ColorMax Setting **71**
Power On/Off **72**
Clock Adjust **73**
OSD Settings **74**
Memory **74**
Network menu **75**
PIP menu **76**
Information menu **77**
Signal Format **77**
System Status **78**
Thermal Status **78**
Factory Reset **79**
POSSIBLE COMBINATIONS OF SETTINGS **80**
WEB CONFIGURATION UTILITY **81**
Projector Control page **82**
Network Setup page **83**
Alert Email Setup page **84**

CONTENTS (continued)

REFERENCE GUIDE 85

THE DMD™ 87

CHOOSING A LENS 89

Basic calculation 90

Basic calculation example 91

Full lens calculation 92

Introducing TRC 92

Calculating TRC 93

Calculating the throw ratio with TRC 94

Full lens calculation example 95

SCREEN REQUIREMENTS 96

Fitting the image to the DMD™ 96

WUXGA images displayed full width 96

WUXGA images displayed with a height of 1080 pixels 97

WUXGA images displayed full height 98

Diagonal screen sizes 99

Fitting the image to the screen 100

Positioning the screen and projector 101

POSITIONING THE IMAGE 102

Maximum offset range 104

ASPECT RATIOS EXPLAINED 105

Aspect ratio examples 106

FRAME RATES AND PULLDOWNS EXPLAINED 108

Interlaced and progressive scan 108

Frame rates of image sources 108

Pulldowns - conversion into destination formats 109

2:3 (normal) pulldown 109

2:3:3:2 (advanced) pulldown 110

APPENDIX A: LENS PART NUMBERS 111

APPENDIX B: SUPPORTED SIGNAL INPUT MODES 112

2D formats 112

3D formats 114

APPENDIX C: WIRING DETAILS 116

Signal inputs and outputs 116

HDMI 1 and 2 116

DisplayPort 117

3G-SDI In, 3G-SDI Out 118

Control connections 119

LAN 119

RS232 119

Trigger 1 & Trigger 2 120

IR input 120

3D Sync IN and 3D Sync OUT 120

DIGITAL PROJECTION

Mercury Quad Series

High Brightness Digital Video Projector

INSTALLATION AND QUICK-START GUIDE



Rev A March 2017

IN THIS GUIDE

What's In The Box? 3

Connecting The Power Supply 4

Projector Overview 5
- Front and rear views 5

Control Panel 6
- Buttons 6
- Indicators 7

Remote Control 8
- Infrared reception 11

Positioning The Screen And Projector 12
- Removing the detachable handles 13
- Roll and pitch 14

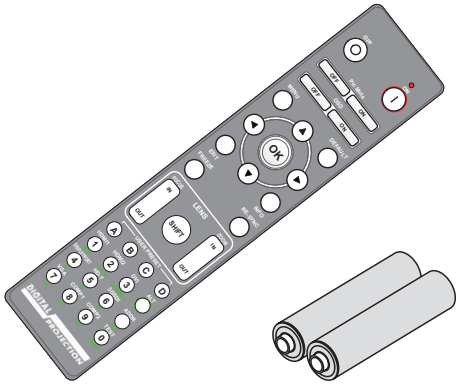
Changing The Lens 15
- Inserting a new lens 15
- Removing the lens 15

Changing The Lamps 16

Changing The Filters 17
- Front filter 17
- Rear filter 18

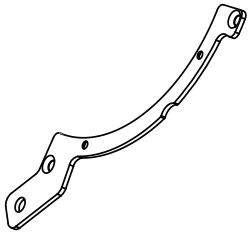
Operating The Projector 19
- Switching the projector on 19
- Switching the projector off 19
- Selecting an input signal 20
- Selecting a test pattern 20
- Adjusting the lens 21
- Adjusting the image 21

What's In The Box?



Remote control (117-780)

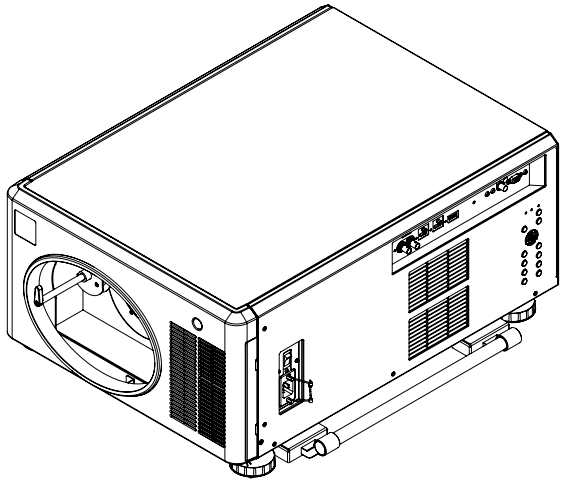
2x AAA batteries



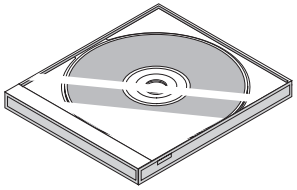
1x lens support bracket



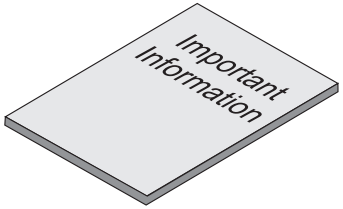
1x M4 screw



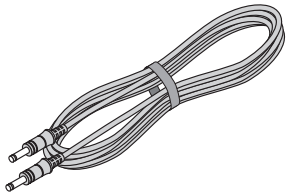
Projector



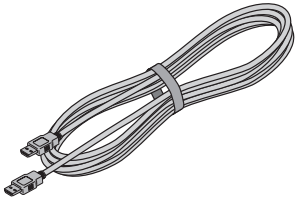
User Manual on disc (118-698)



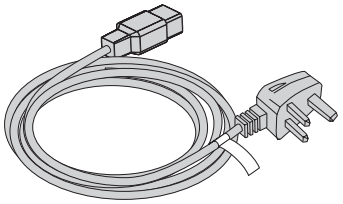
Important Information (117-786)



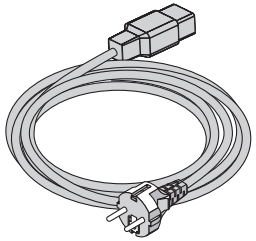
remote control cable



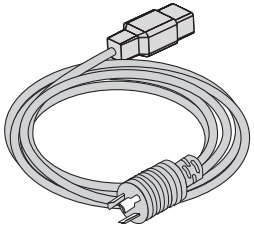
HDMI cable



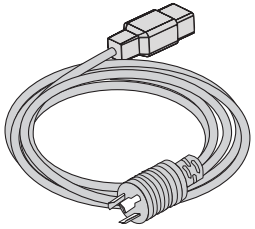
Power cable, United Kingdom (112-000)



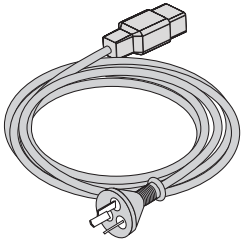
Power cable, Europe (118-728)



Power cable 125V, North America (118-726)



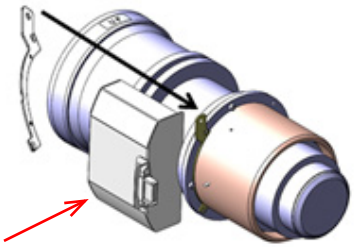
Power cable 250V, North America (118-727)



Power cable, China (118-729)

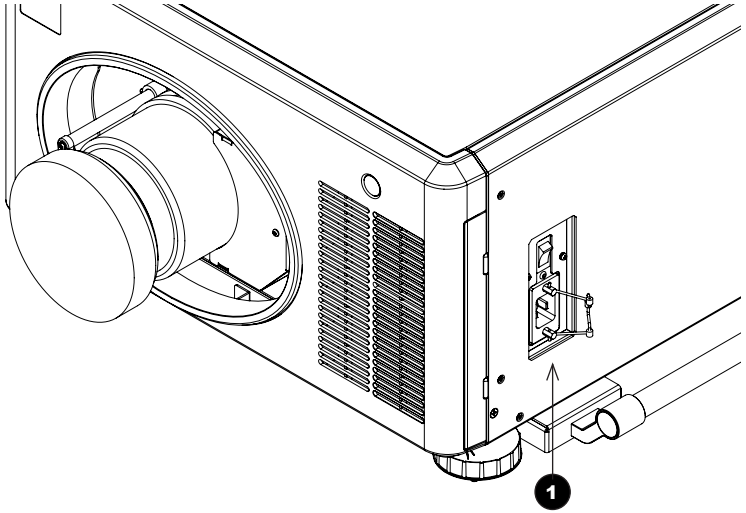
Notes

- *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.*
- *Only one power cable - dependent on the destination territory - will be supplied with the projector.*
- *The **lens support bracket** needs to be attached to the lens as shown below:*



If you need to install and use the lens support bracket, remove the gearbox outer cover (red arrow) in advance.

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 and power switch**

Notes

Use only the power cable provided.

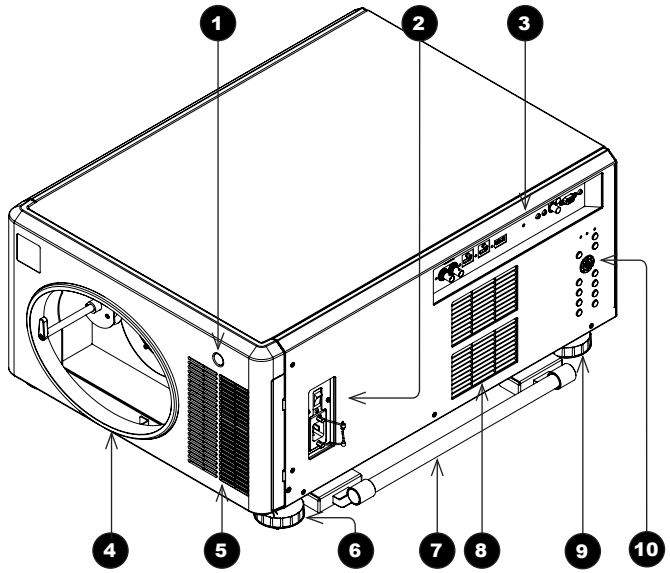
Ensure that the power outlet includes a ground connection as this equipment MUST be earthed.

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

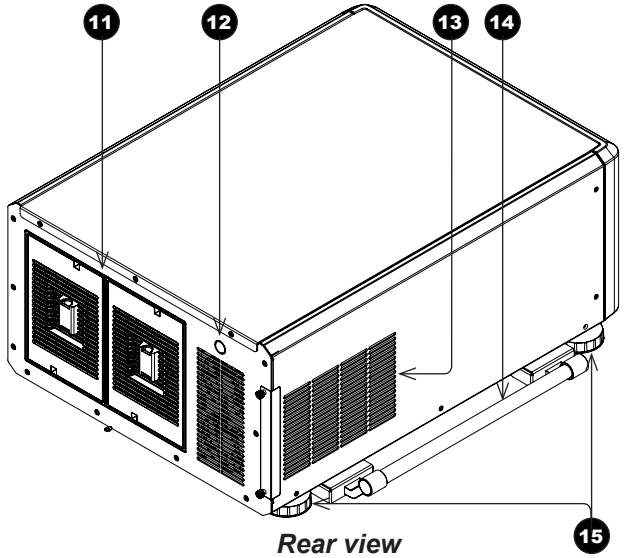
Projector Overview

Front and rear views

1. Front infrared window
2. Power switch and power connection
3. Connection panel
4. Lens mount
5. Air inlet with replaceable filter
6. Adjustable foot
7. Detachable handle
8. Air outlet
9. Adjustable foot
10. Control panel
11. Lamp bay
12. Rear infrared window
13. Air inlet with replaceable filter
14. Detachable handle
15. Adjustable feet



Front view



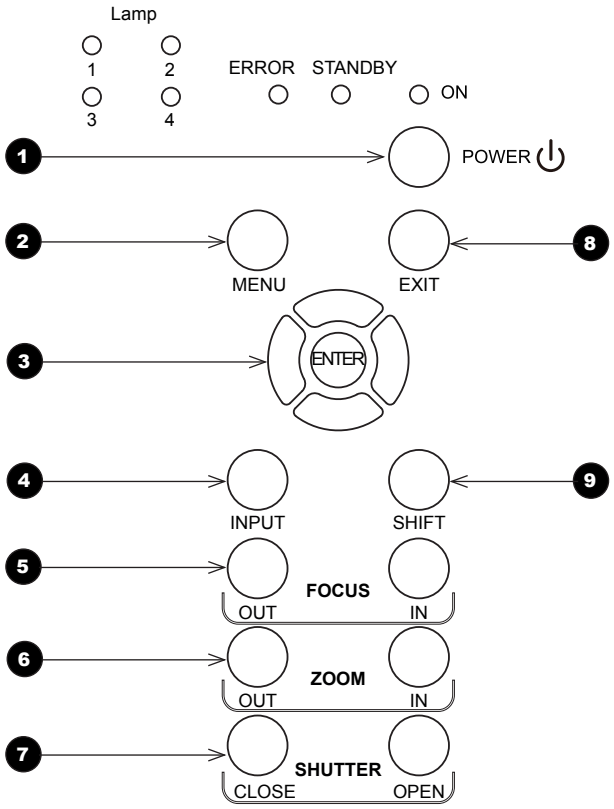
Rear view

Notes

Control Panel

Buttons

1. **POWER button**
   Switch the projector on and off (in STANDBY mode)
2. **MENU button**
   Access the projector OSD (on-screen display).
3. **Navigation (arrow buttons and ENTER)**
   Navigate the OSD and edit settings with the arrows, confirm choice with **ENTER**.
4. **INPUT button**
   Select input source.
5. **Focus IN / OUT**
   Adjust focus.
6. **Zoom IN / OUT**
   Adjust zoom.
7. **Shutter CLOSE / OPEN**
   Open and close the shutter.
8. **EXIT button**
   Close the OSD.
9. **SHIFT button**
   Press and hold this button, then press the arrow buttons to move the lens.



Notes

Indicators

1 Lamp 1-4 indicators

Behavior	*Meaning*	
On (green)		The lamp is switched on (100%).
On (amber)		The lamp is running on less than full capacity (77-99%).
Flashing (green)		The lamp is warming up.
Flashing (amber)		The lamp is cooling down.
On (red)		Ballast Comms Error (call service)
Flashing (red)		Lamp / Interlock Error

2 ERROR indicator (red)

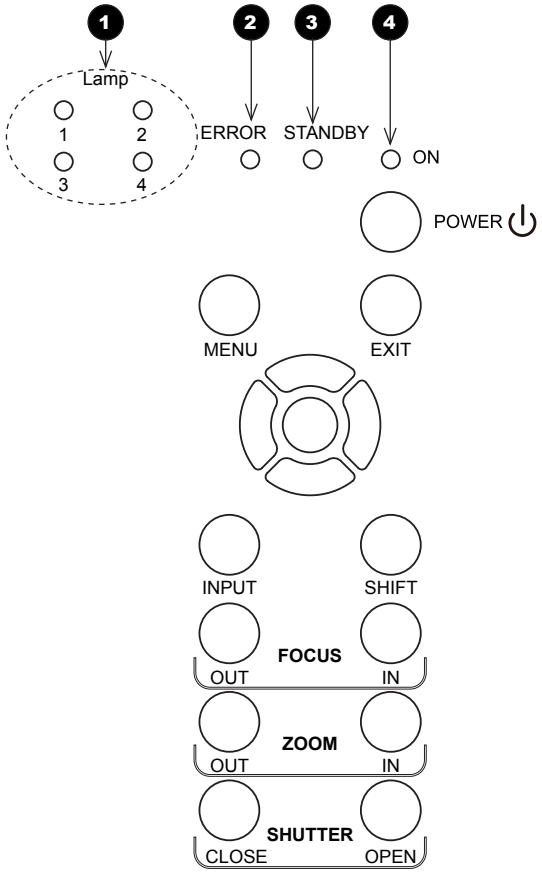
Behavior	*Meaning*	
Flash once, then pause		Lamp failure.
Flash twice, then pause		Lamp door open.
Flash three times, then pause		Fan failure.
Flash four times, then pause		Over temperature.
On		System error.

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 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.



Notes

Remote Control

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

2 **Pic Mute OPEN / CLOSE**
Opens and closes the shutter.

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

4 **MENU**
Press to access the OSD. Press again to hide the OSD.

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.

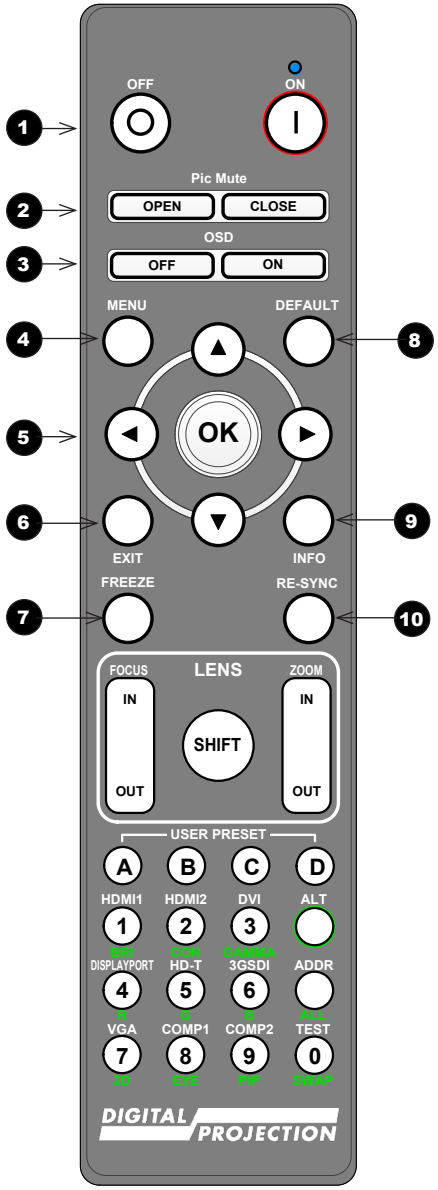
7 **FREEZE**
Freeze the current frame.

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.

continues on next page...



Notes

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

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

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

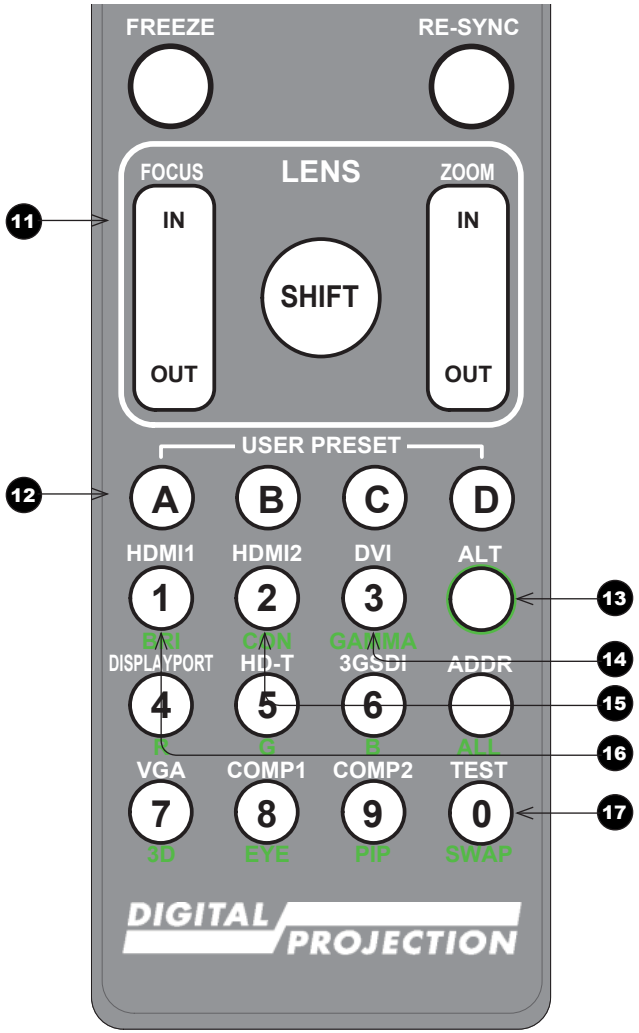
14 **DVI / GAMMA / numeric input 3**
Select the DVI input.
Use with **ALT** to switch to the next **Gamma** value:
...1.0, 1.8, 2.0, 2.2, 2.35, 2.5...

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

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

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...
When **PIP** mode is on, use this button with **ALT** to swap the main and sub images.

continues on next page...



Remote control

Notes

*For further information about user presets, see **Memory** in the **Operating Guide**.*

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

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

19 **3GSDI / B / numeric input 6**
Select the 3G-SDI input.

20 **VGA / 3D / numeric input 7**
Select the VGA input.
Use with **ALT** to toggle the **3D Format** setting between **Off** and **Auto**.

21 **COMP1 / EYE / numeric input 8**
Select the Component 1 input.
Use with **ALT** to switch between left and right eye 3D dominance.

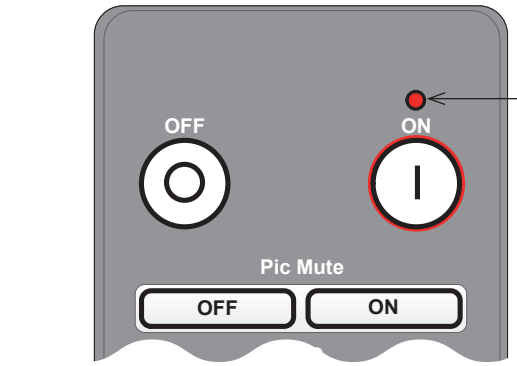
22 **COMP2 / PIP / numeric input 9**
Select the Component 2 input.
Use with **ALT** to switch on **Picture In Picture (PIP)** mode.

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

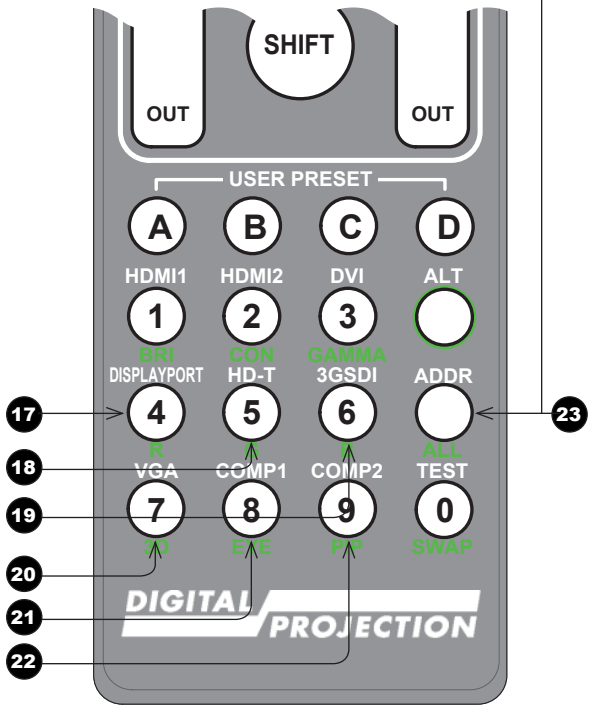
1. Press and hold this button until the indicator starts flashing.
2. Release this button and while the indicator is still flashing, enter a two-digit address using the numeric input buttons. The indicator will flash three times quickly to confirm the change.

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



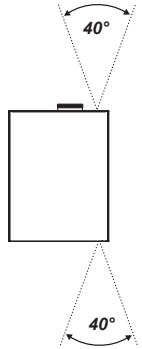
Remote control bottom

Notes

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.



Infrared reception

Notes

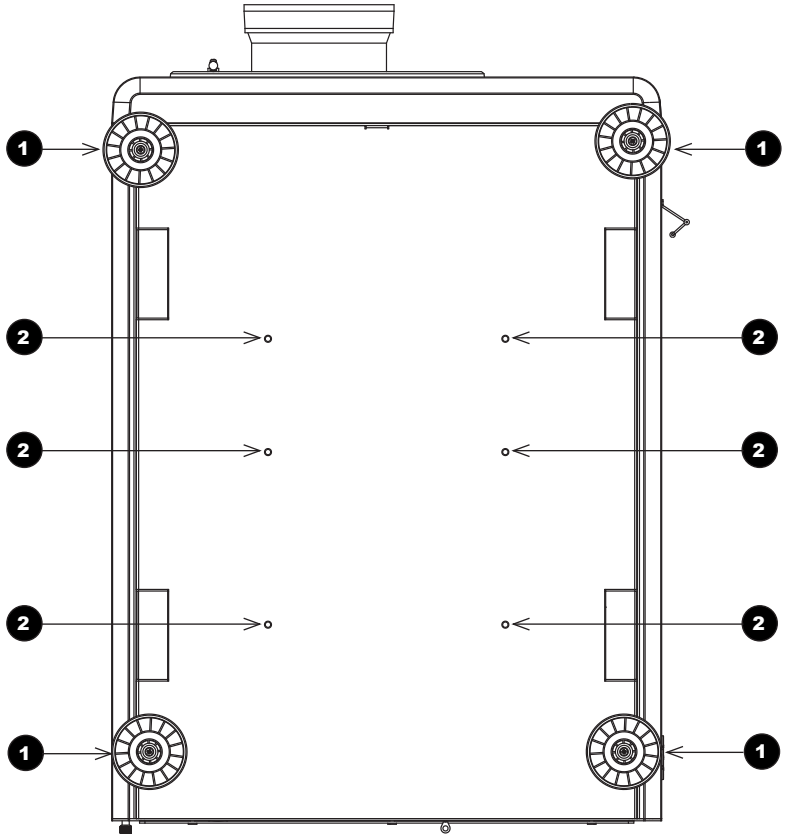
Positioning The Screen And Projector

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.

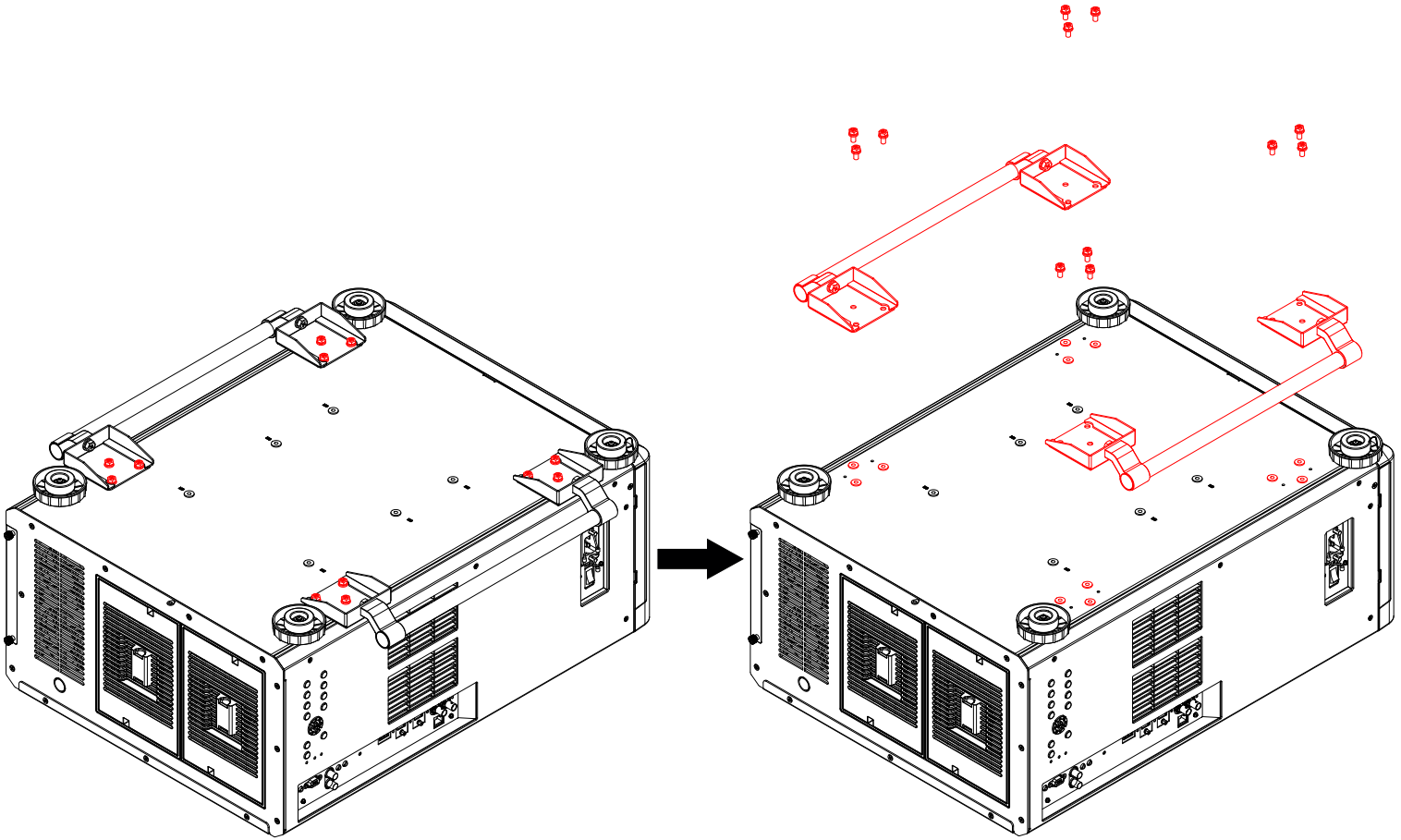
Removing the detachable handles

The projector is fitted with detachable handles for easier lifting and carrying.

You may need to remove the handles as they are likely to get in the way of rigging frames and other installation equipment.

1. Position the projector upside down on a flat surface.
2. Remove the screws to free the handles as shown in the illustration.

The handles can be detached and reattached multiple times.



Notes

The handles are not suitable for supporting the weight of the projector in permanent installations. DO NOT attach clamps and truss mounts to the handles. DO NOT use the handles in ceiling suspension scenarios.

Disconnect the projector from the mains before attempting to remove the handles.

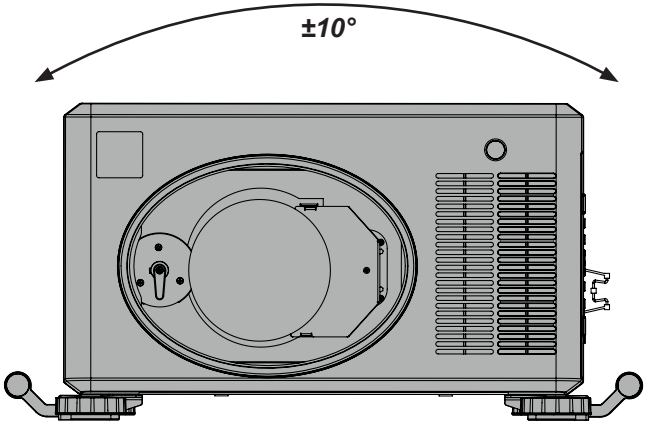
Always allow the projector to cool for 5 minutes before disconnecting the power or moving the projector.

Preserve the removed handles together with the full set of screws to ensure that they can be reattached if needed.

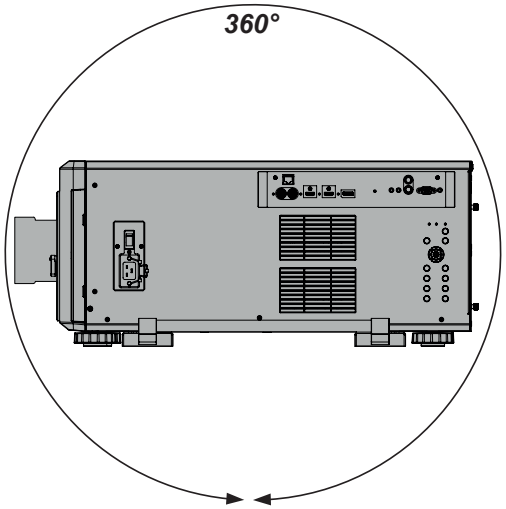
Roll and pitch

Do not tilt the projector more than ±10° from side to side (roll) when in use, as this may cause serious lamp failure, damage the lamp module and cause extra cost on replacement.

The projector may be tilted forwards and backwards (pitch) as necessary.



Roll



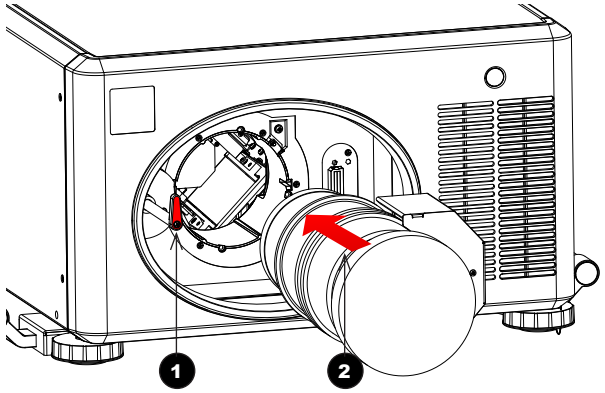
Pitch

Notes

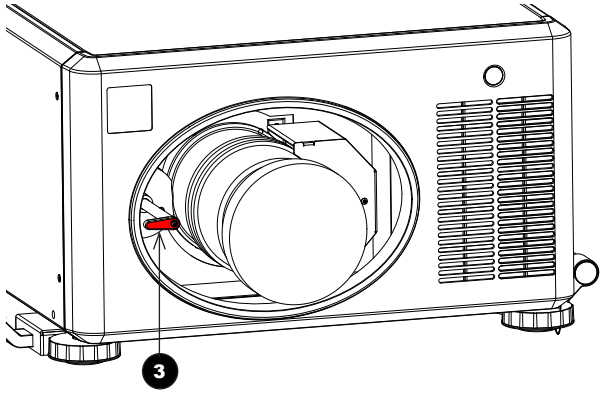
Changing The Lens

Inserting a new lens

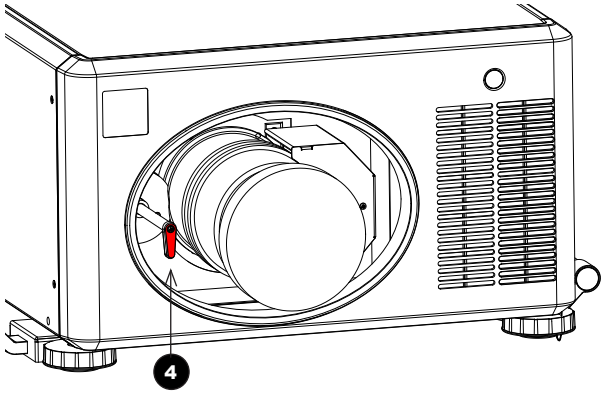
1. Turn the lens release lever clockwise so that it is pointing upwards, to open the lock fully. 1
2. Remove the rear lens cap from the lens.
3. Insert the lens into the lens aperture, making sure that the plug on the zoom drive mechanism lines up with the socket on the front of the projector, then push the lens in firmly as far as it will go. 2



4. Turn the lens release lever anti-clockwise to the mid-position. 3
5. The lens can now be pushed in further. Push the lens in firmly as far as it will go.



6. Turn the lens release lever fully anti-clockwise so that it is pointing downwards, to close the lock fully. 4



Removing the lens

To remove the lens, reverse the procedure described in ***Inserting a new lens*** above:

1. Turn the release lever up to the mid-position, then pull the lens out as far as it will go.
2. Turn the release lever clockwise so it is pointing upwards, then pull the lens out completely.

Notes

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

Always allow the projector to cool for five minutes before disconnecting the power or moving the projector.

The lens release lever should always be set to the locked position to prevent the lens from falling out.

Do not place the projector with its front panel down on a surface, as this may damage the lens or the lens release lever.

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

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

Changing The Lamps

1. Loosen the four captive screws on the back of the projector shown in ***Fig. 1***.
2. Pull out the cover (***Fig. 2***) to reveal the lamp bay (***Fig. 3***).
3. Each individual lamp module is held into position by three captive screws (***Fig. 4***). Loosen the screws and pull out the lamp module (***Fig. 5***).
4. Slide the new lamp module in the empty slot and fasten the screws to lock it into position.
5. Return the cover to its place and tighten the four captive screws.

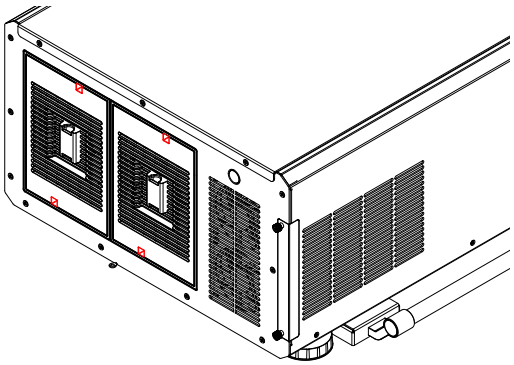


Fig. 1

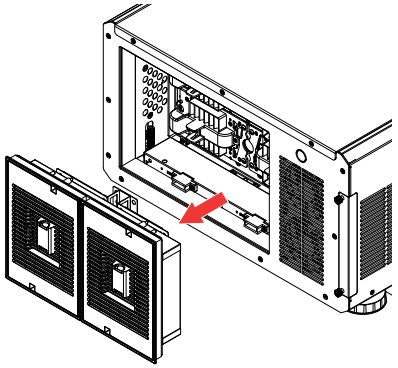


Fig. 2

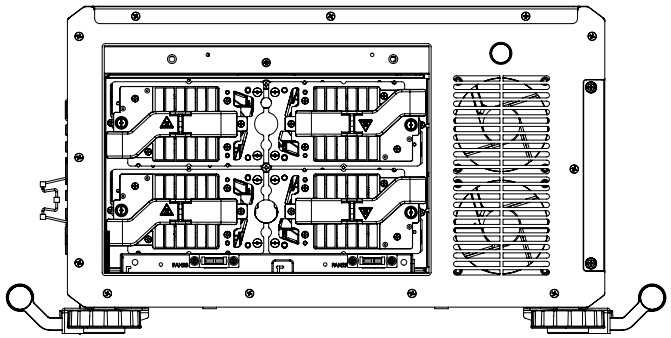


Fig. 3

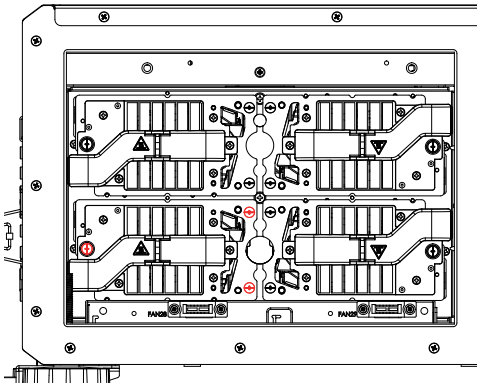


Fig. 4

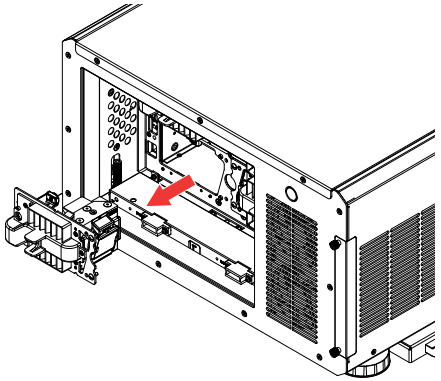


Fig. 5

Notes

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

Always allow the projector to cool for five minutes before disconnecting the power or moving the projector.

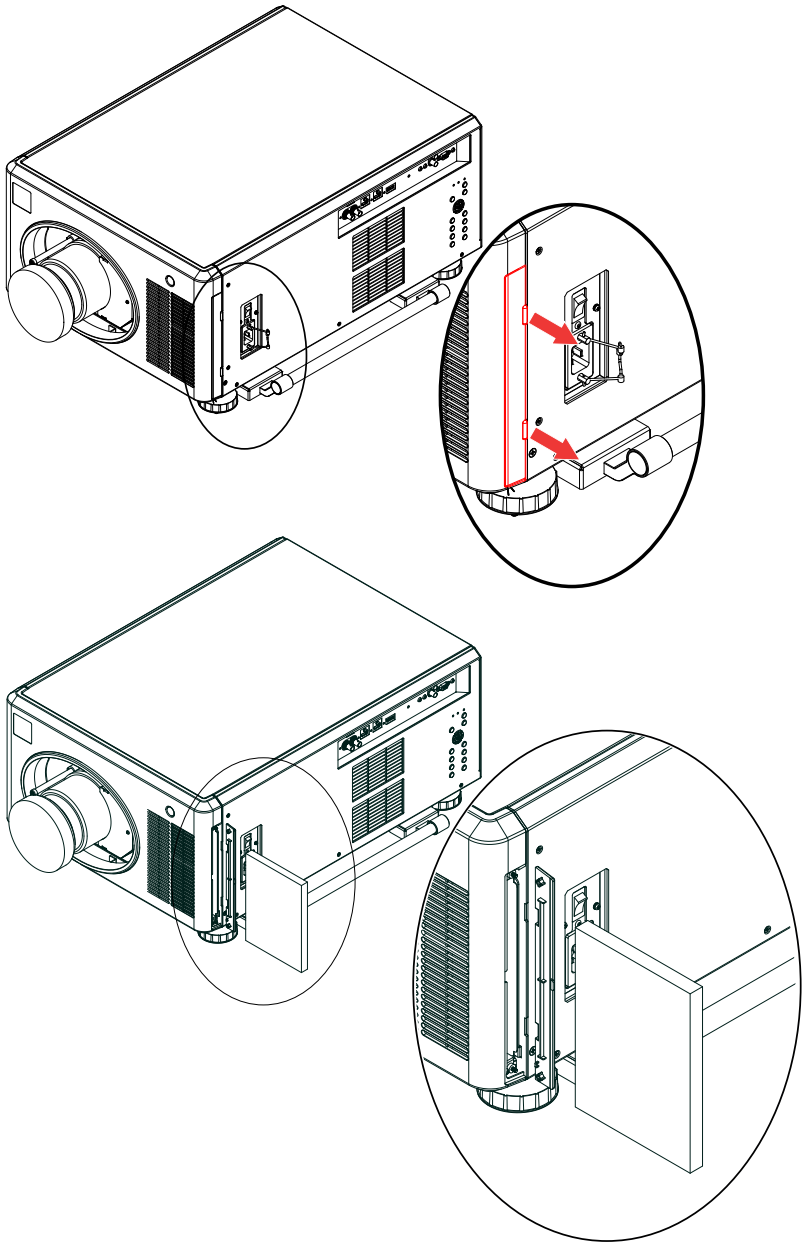
When changing a lamp, avoid using excessive force as this may damage the equipment.

Running on full power each lamp has a typical life of 2500 hours.

Changing The Filters

Front filter

1. Pull out the filter compartment cover.
2. Replace the filter: slide the old filter out of the compartment, then push the new filter in its place.
3. Replace the cover.



Notes

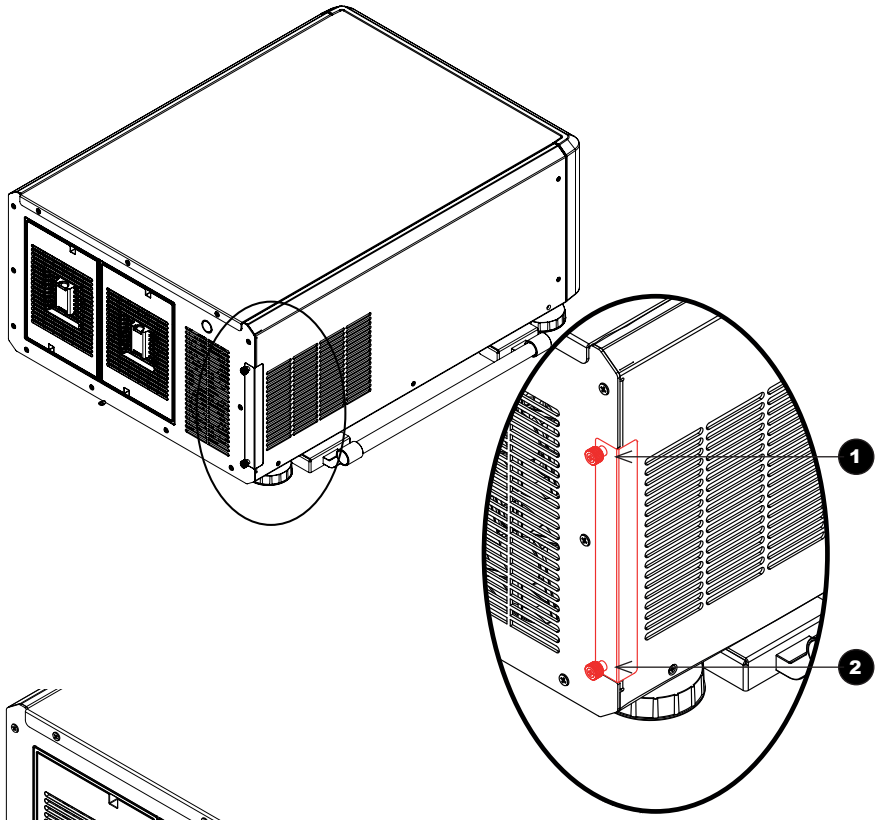
Before changing the filters, always make sure the projector is switched off and fully disconnected from its power supply.

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

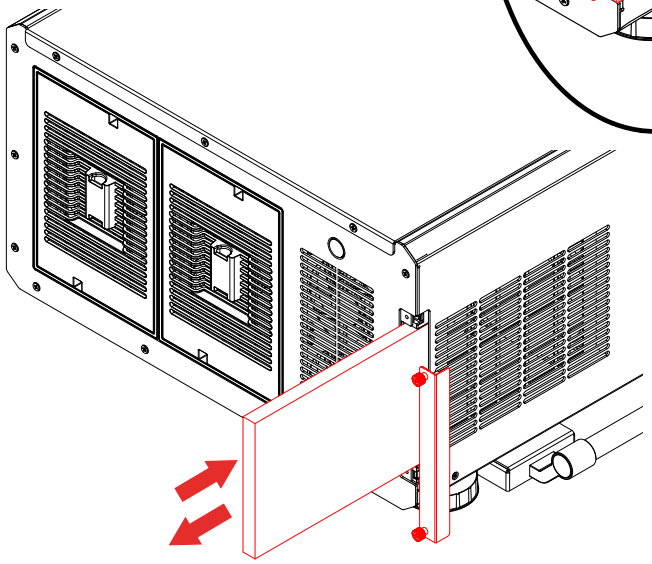
In a normal environment the filters should be changed every 2500 hours.

Rear filter

1. Loosen the ***captive screws*** 1 and 2.
2. Remove the filter compartment cover.



3. Change the filter: slide the old filter out as shown in the illustration, then push the new filter in.
4. Return the cover back in its place and fasten the screws to lock it into position.



Notes

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

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

In a normal environment the filters should be changed every 2500 hours.

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.

Notes



*See also **Connecting The Power Supply** earlier in this guide.*



Use only the power cable provided.



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



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

Selecting an input signal

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

Selecting a test pattern

To display a test pattern:

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

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

  White, Black, Red, Green, Blue, CheckerBoard, CrossHatch, V Burst, H Burst, ColorBar, Plunge, 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** and **Rear Ceiling**.

Keystone

- This can be set from the **Geometry** menu.

Picture

- The aspect ratio of the screen can be set from **Screen Setting** in the **Setup** menu.
- 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

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DIGITAL PROJECTION

Mercury Quad Series

High Brightness Digital Video Projector

CONNECTION GUIDE



Rev A March 2017

IN THIS GUIDE

Signal Inputs 25
- **EDID on the HDMI and DisplayPort inputs** 26
- **Using HDMI/DisplayPort switchers with the projector** 26
- **3D connections** 27
  - 3D sources up to 60Hz requiring frame doubling and left/right interleaving 27
  - Frame sequential 3D sources up to 120Hz 27
  - Dual Pipe 3D 27
- **3D Sync** 28
  - 3D Sync in 28
  - 3D Sync out 28

Control Connections 29
- **LAN connection examples** 30
- **RS232 connection example** 31

Signal Inputs

1 **HDBaseT**

Receives digital signal from HDBaseT-compliant devices.

2 **HDMI I**

HDMI 1.4a input. Connect an ***HDMI*** cable to the connector.

3 **HDMI II**

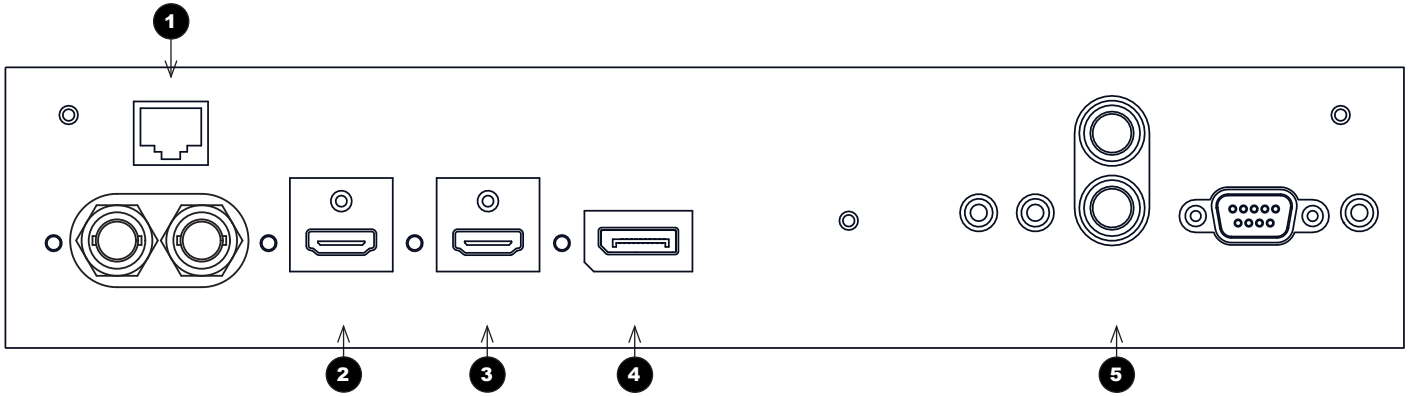
HDMI 1.4a input. Connect an ***HDMI*** cable to the connector.

4 **DisplayPort**

DisplayPort 1.1a input. Connect a DisplayPort cable to the connector.
Supports sources up to 1920x1200 resolution, 24-120 Hz. Supports HDCP.

5 **3G-SDI in / out**

Connect the IN socket to a 3G-SDI source.
Connect the OUT to distribute the 3G-SDI signal to another projector.



Notes

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

The projector can receive 100/120Hz and display 3D at 100/120Hz.

*For a complete listing of all supported signal input modes, see **Appendix B: Supported Signal Input Modes** in the **Reference Guide**.*

*For a complete listing of pin configurations for all signal and control connectors, see **Appendix C: Wiring Details** in the **Reference Guide**.*

EDID on the HDMI and DisplayPort inputs

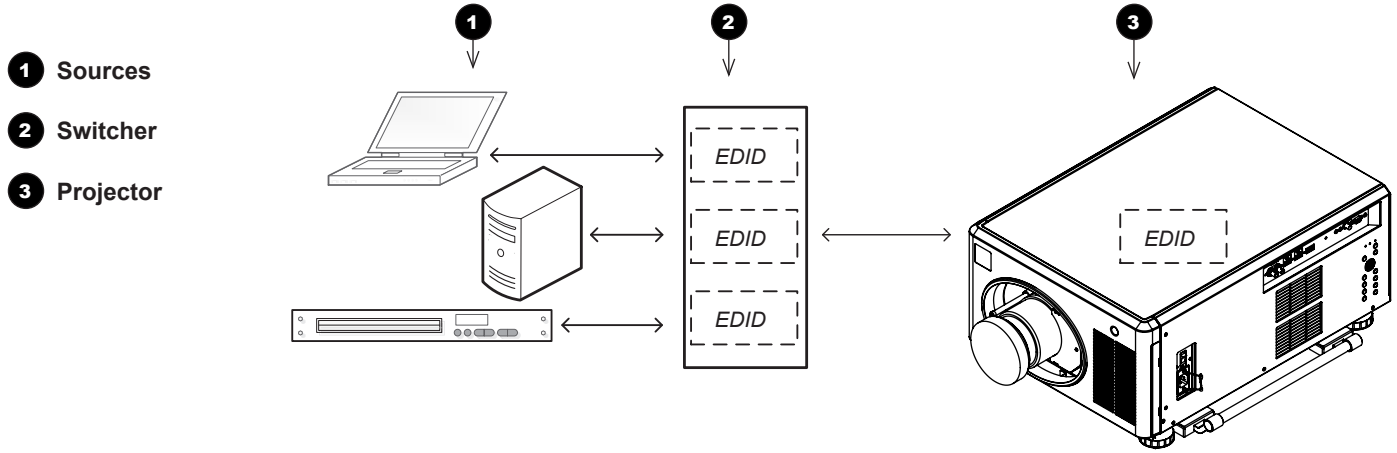
If you are using a computer graphics card or another source that obeys the EDID protocol, the source will automatically configure itself to suit the projector.

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.



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

Notes

3D connections

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

1. Connect to either of the following inputs on the connection panel:
   - HDMI 1
   - HDMI 2
   - HDBaseT
2. Set **3D Format** in the **3D** menu to match the format of the incoming signal. Choose from **Auto**, **Side by Side (Half)** and **Top and Bottom**.

   The **Frame Packing** format is automatically detected by the projector.

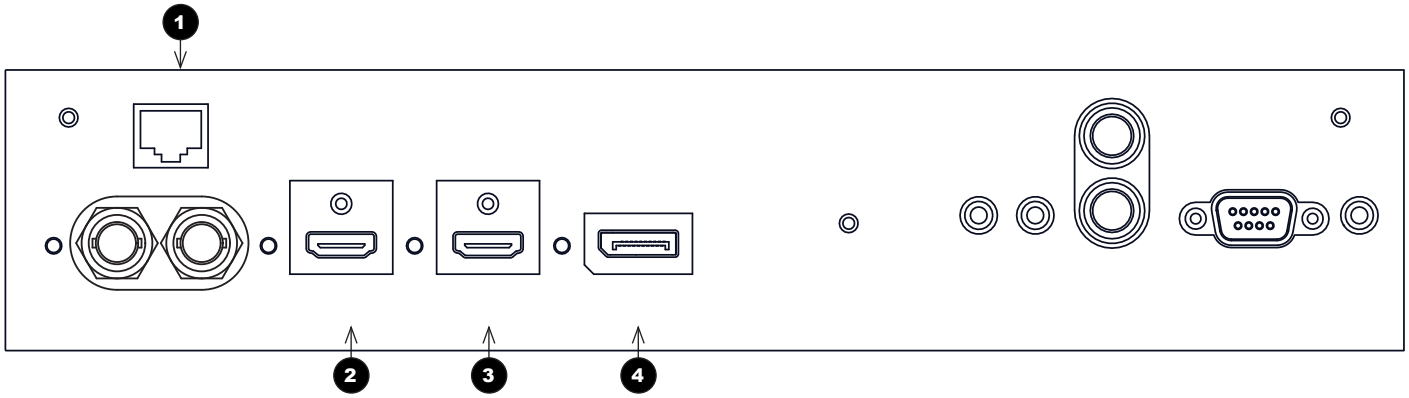
Frame sequential 3D sources up to 120Hz

- Connect to the DisplayPort input.

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

Dual Pipe 3D

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



1. **HDBaseT**
2. **HDMI 1 / Dual Pipe LEFT**
3. **HDMI 2 / Dual Pipe RIGHT**
4. **DisplayPort**

Notes

*For a complete listing of all supported signal input modes, see **Appendix B: Supported Signal Input Modes** in the **Reference Guide**.*

*For a complete listing of pin configurations for all signal and control connectors, see **Appendix C: Wiring Details** in the **Reference Guide**.*

3D Sync

3D Sync in

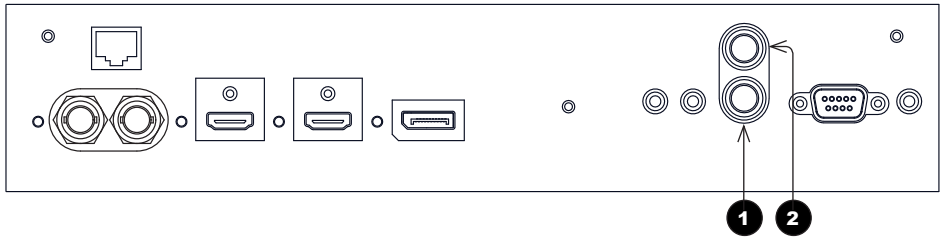
Sync input signal – normally only required for Sequential 3D sources.

- Connect the 3D sync from your graphics card or server.

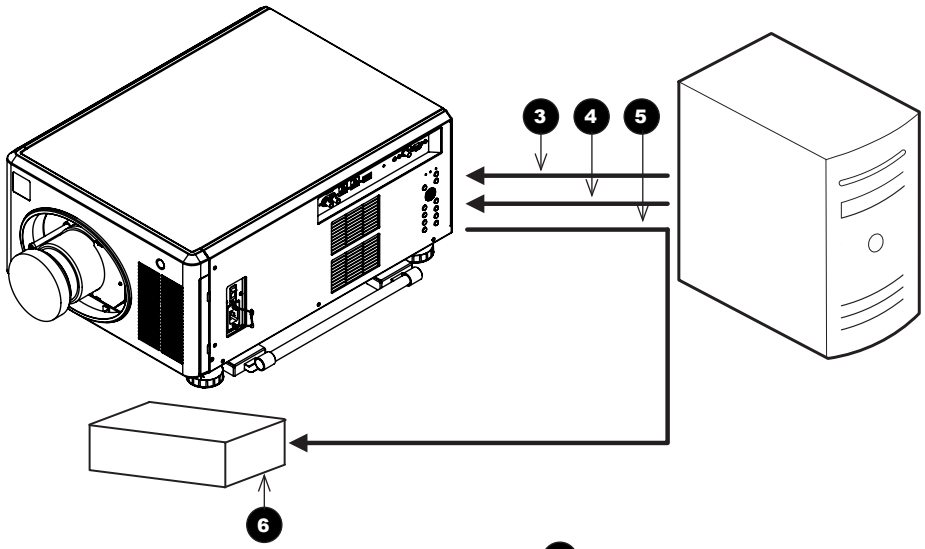
3D Sync out

Sync output signal. This may be affected by the **Sync Offset** setting in the **3D Control** menu.

Connect this to your IR emitter or ZScreen.



1 **Sync In**
2 **Sync Out**



3 **3D input**
4 **3D Sync In**
5 **3D Sync Out**
6 **IR emitter** or **ZScreen**

Notes

*For a complete listing of pin configurations for all signal and control connectors, see **Appendix C: Wiring Details** in the **Reference Guide**.*

The projector can be used with active 3D glasses. Passive 3D glasses such as polarized and split wavelength glasses cannot be used with this projector.

Control Connections

1 **LAN**

- All of the projector's features can be controlled via a LAN connection, using commands described in the ***Protocol Guide***.
- Use a crossed LAN cable to connect directly to a computer, or an uncrossed cable to connect to a network hub.

This connection is also used by the HDbBaseT input.

2 **Trigger 1 & Trigger 2**

The Trigger outputs are activated by one of the three following conditions, as set in the **Setup** menu:

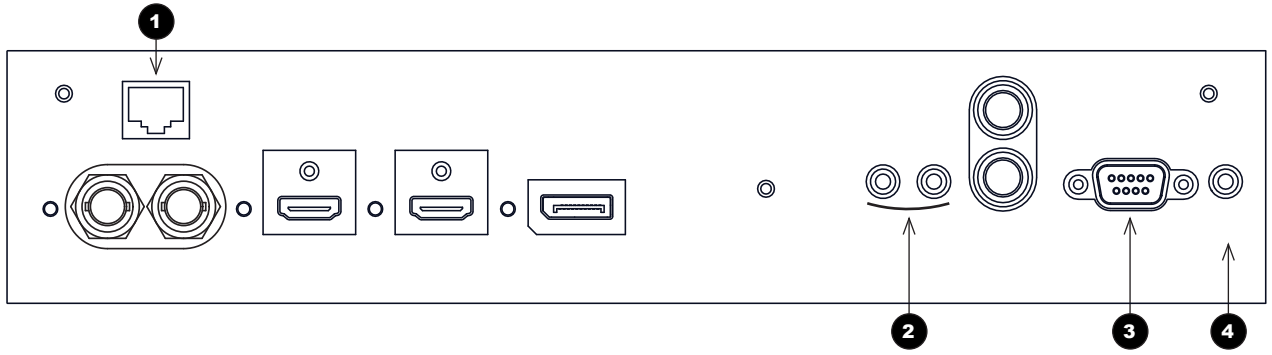
- Screen trigger: can be connected to an electrically operated screen, automatically deploying the screen when the projector starts up, and retracting the screen when the projector shuts down.
- Aspect ratio trigger: can be used to control screen shuttering for different aspect ratios.
- RS232 trigger: can be used to control the screen or screen shuttering on receipt of an RS232 command

3 **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.

4 **Wired Remote**

The remote control can be connected using a standard TRS cable.



Control connections

Notes

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

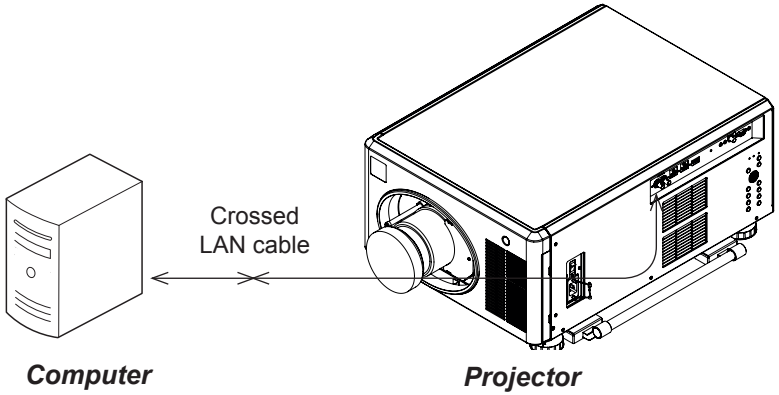
*For a list of all commands used to control the projector via LAN, see the **Protocol Guide**.*

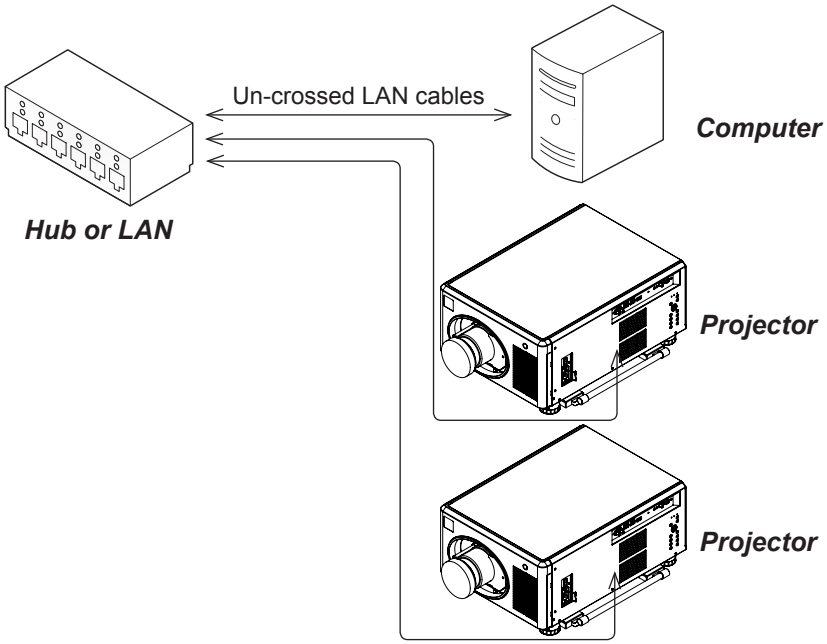
*For a complete listing of pin configurations for all signal and control connectors, see **Appendix C: Wiring Details** in the **Reference Guide**.*

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

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.





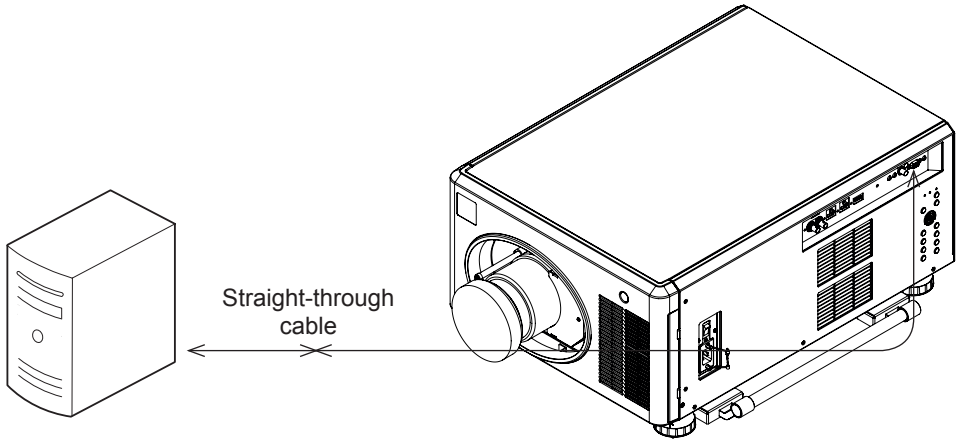


1 **LAN**

Notes

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

RS232 connection example





1 **RS232**

Notes

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DIGITAL PROJECTION

Mercury Quad Series

High Brightness Digital Video Projector

OPERATING GUIDE



Rev A March 2017

IN THIS GUIDE

Using The Menus 35
- **Opening the OSD** 35
- **Opening a menu** 35
- **Exiting menus and closing the OSD** 35
- **Inside a menu** 36
  - Accessing sub-menus 36
  - Executing commands 36
- **Editing projector settings** 37
  - Using a slider to set a value 37
  - Editing numeric values 37

Using The Projector 38
- **Main menu** 38
- **Lens menu** 39
  - Lens Control 39
  - Lens Memory 40
- **Image menu** 41
  - Noise Reduction 42
- **Color menu** 43
  - Color Space 43
  - Color Mode 44
- **Geometry menu** 49
  - Aspect Ratio 49
  - Digital Zoom 51
  - Overscan 52
  - Blanking 53
  - Keystone 54
  - 4 Corners 56
  - Rotation 57
  - Pincushion / Barrel 58
  - Arc 59
  - Custom Warp 60
- **Edge Blend menu** 61
  - Blend Width 62
  - Black Level Uplift 63
- **3D menu** 64
  - 3D types 65
  - Some 3D settings explained 66
  - Frame rate multiplication in 3D images 67
- **Lamp Control menu** 68
- **Setup menu** 69
  - ColorMax Setting 71
  - Power On/Off 72
  - Clock Adjust 73
  - OSD Settings 74
  - Memory 74
- **Network menu** 75
- **PIP menu** 76
- **Information menu** 77
  - Signal Format 77
  - System Status 78
  - Thermal Status 78
  - Factory Reset 79

Possible Combinations Of Settings 80

Web Configuration Utility 81
- **Projector Control page** 82
- **Network Setup page** 83
- **Alert Email Setup page** 84

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

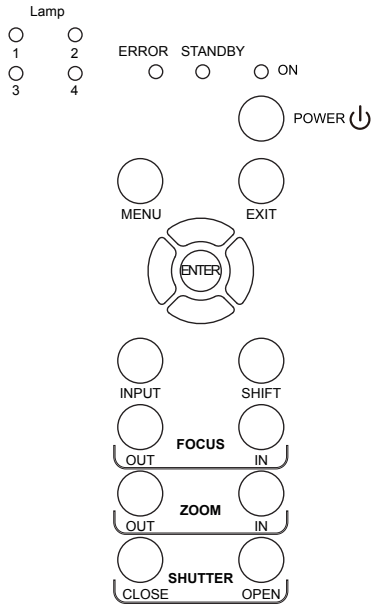
To go back to the previous page,

- press **EXIT**.

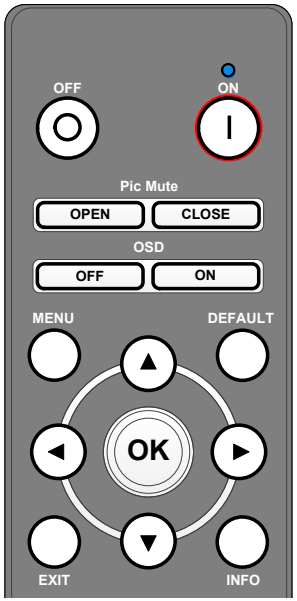
When you reach the top level, pressing **EXIT** will close the OSD.

To close the OSD from any page,

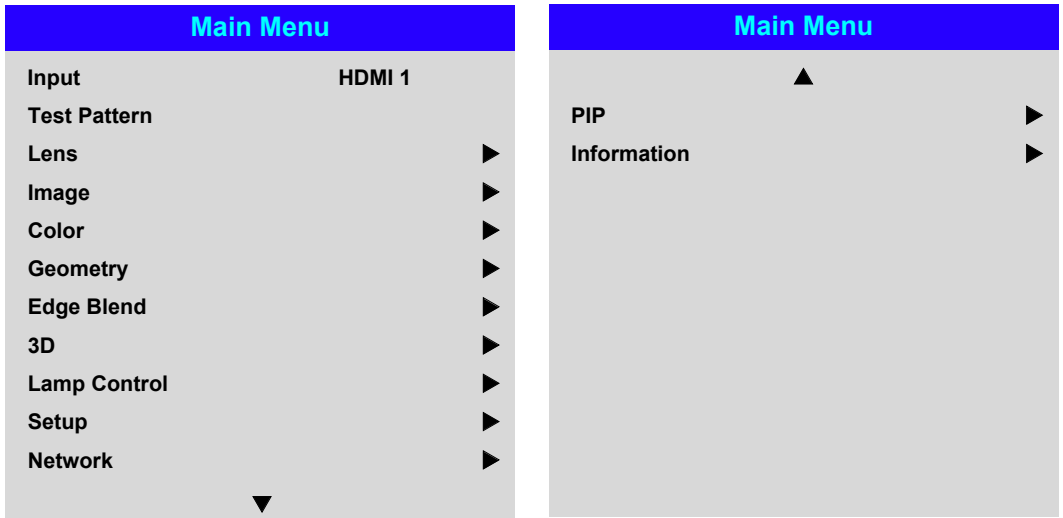
- press **MENU**.



Projector control panel



Remote control



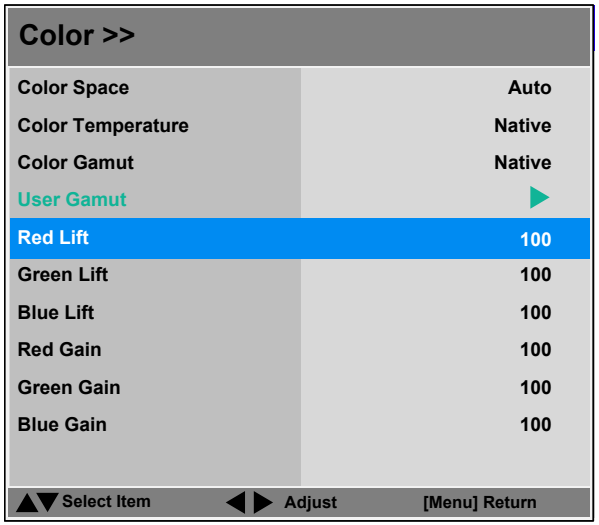
On-screen display (OSD): top level menus

Notes

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).



Inside a menu

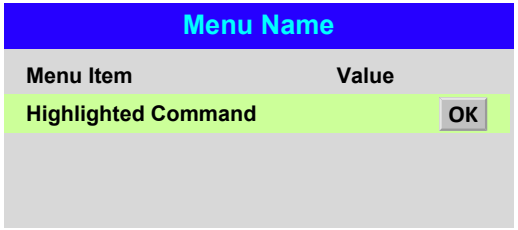
Accessing sub-menus

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

Executing commands

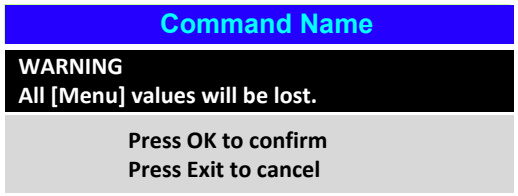
If the item contains a command, highlighting it reveals an **OK** button.

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



Highlighted command

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



Confirmation dialog

Notes

The highlighted item has green background.

Editing projector settings

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

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

Using a slider to set a value

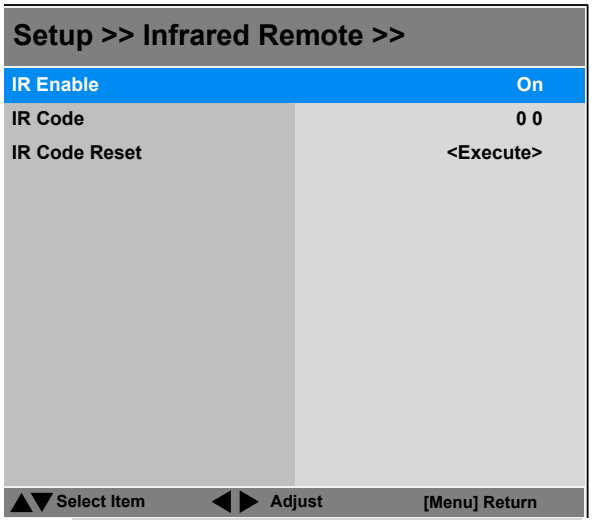
Some parameters open a slider. To set such a parameter:

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

Editing numeric values

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

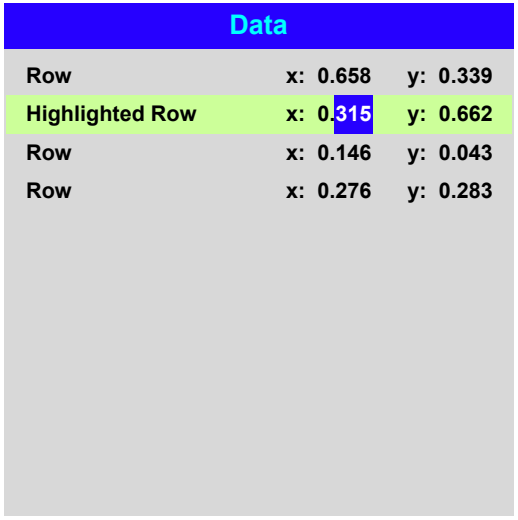
1. Use the **UP** ▲ and **DOWN** ▼ arrow buttons to highlight the row containing the numeric field you wish to edit.
2. Press **ENTER/OK** to enter edit mode. A numeric field in edit mode is white text on blue backgreound.
3. In edit mode:
   - Use the **UP** ▲ arrow button to increase the numeric value.
   - 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.



List of values



Slider



Numeric values

Notes

Some menu items may be unavailable due to settings in other menus. Unavailable menu items appear gray.

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, V Burst, H Burst, ColorBar, Plunge...

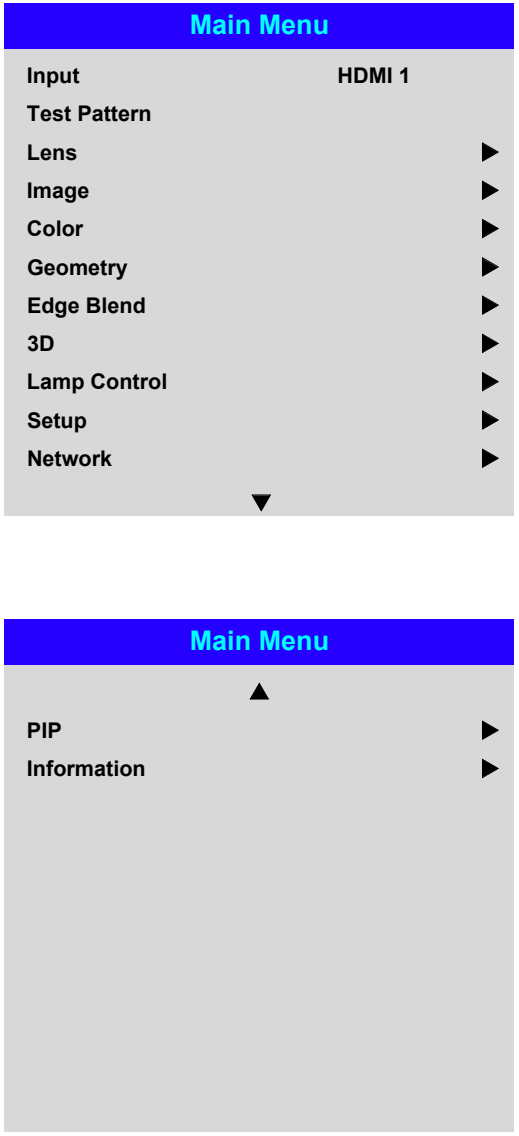
  Use the **LEFT** ◀ and **RIGHT** ▶ arrow buttons to switch between values.

- **Lens, Image**, **Color**, **Geometry**, **Edge Blend**, **3D**, **Laser**, **Setup** and **Network**
  Press **ENTER/OK** to open these menus and access various settings.

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

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

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



Main menu, page 1 and 2

Notes

*See **Signal Inputs** in the **Connection Guide** for further information about the available inputs and connections.*

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

Lens menu

- **Lens Lock**

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

- **Lens Control**

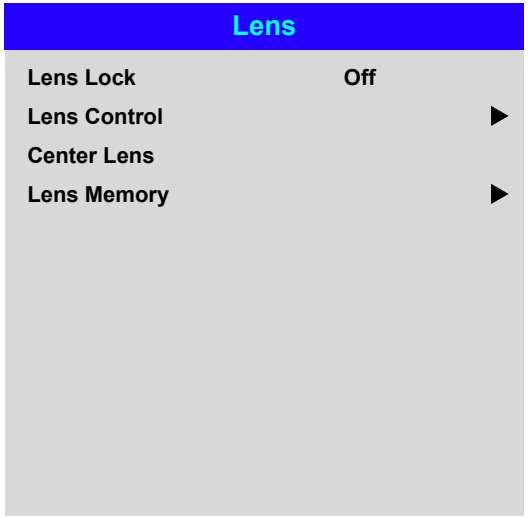
  Opens a sub-menu, see below.

- **Center Lens**

  Centers the lens.

- **Lens Memory**

  Opens a sub-menu, see next page.



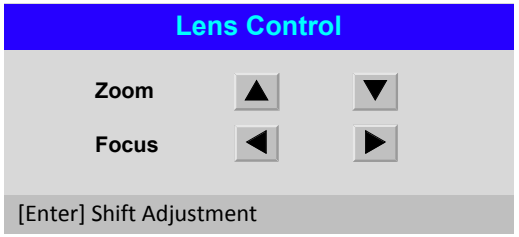
Lens Control

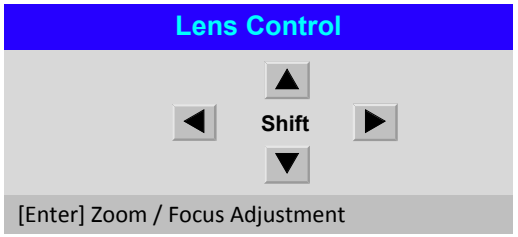
Lens Control settings operate in **Zoom/Focus Adjustment** and **Shift Adjustment** mode. Press **ENTER/OK** to switch between modes.

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**.





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.*

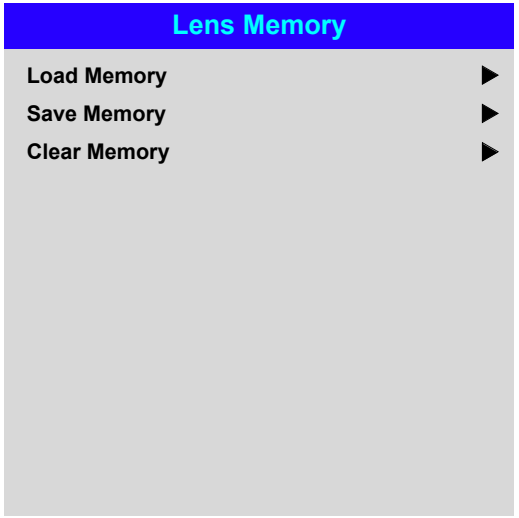
Lens menu continued from previous page

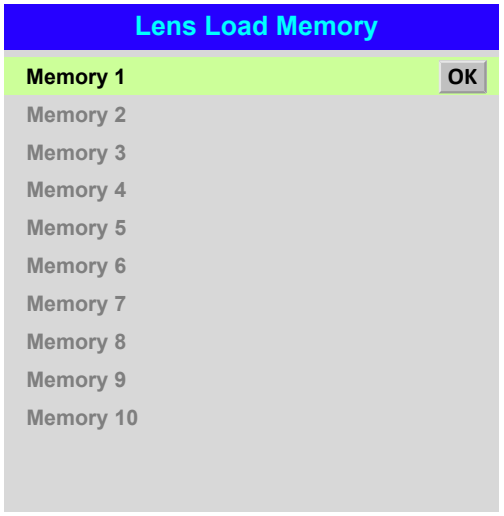
Lens Memory

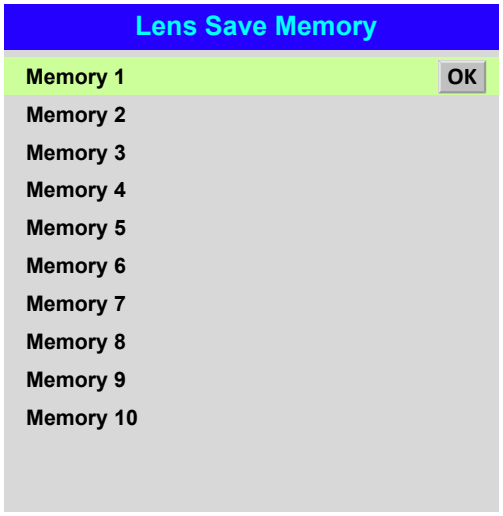
This menu allows you to load, save and delete up to ten lens presets, containing position, zoom, focus and shift adjustment information.

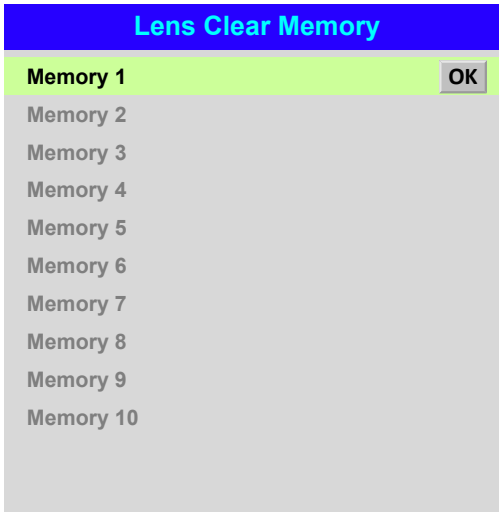
For example, if using different screen sizes and aspect ratios, you can save zoom, focus and positioning for each screen size and aspect ratio in a dedicated preset.

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.









Notes

*The **Lens Memory** function is only available with memory enabled lenses.*

Image menu

- **Gamma**

  Choose a de-gamma curve from **1.0**, **1.8**, **2.0**, **2.2**, **2.35** and **2.5**.

  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.

- **Brightness, Contrast, Saturation, Hue, Sharpness**

  Highlight the setting you wish to edit, and then press **ENTER/OK**, or the **LEFT** ◀ or **RIGHT** ▶ arrow button to open the slider.

  Use the **LEFT** ◀ and **RIGHT** ▶ arrow buttons to adjust the slider.

  Press **EXIT** to close the slider and return to the menu, or **MENU** to close the slider and return to the projected image.

- **Noise Reduction**

  This item opens a sub-menu, see next page.

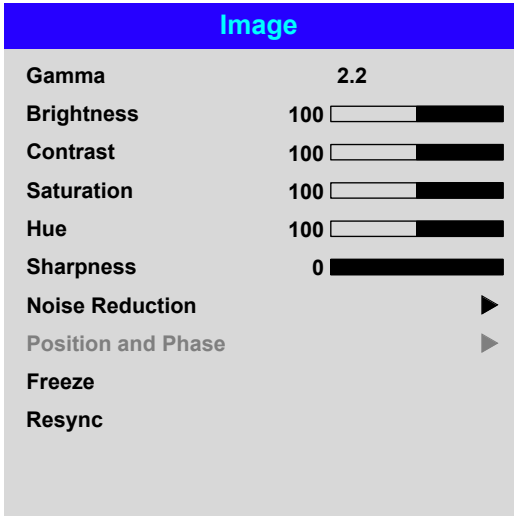
- **Freeze**

  Freezes the current frame.

  Press again to unfreeze.

- **Resync**

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



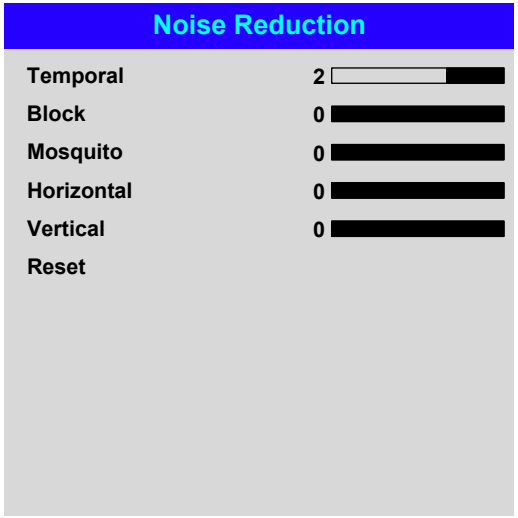
Notes

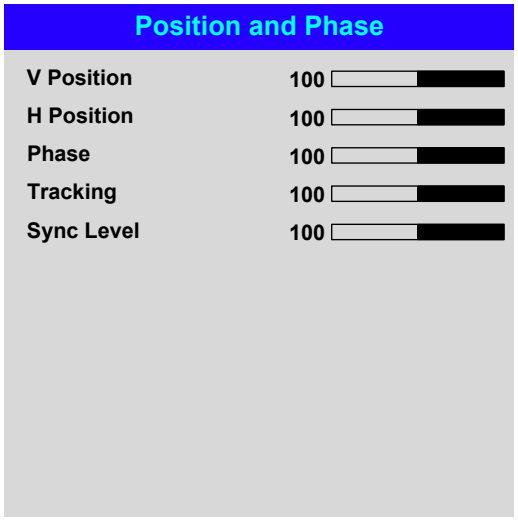
Some settings may be unavailable depending on other settings. For more information, see ***Possible Combinations Of Settings*** *further in this guide.*

Image menu continued from previous page

Noise Reduction

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





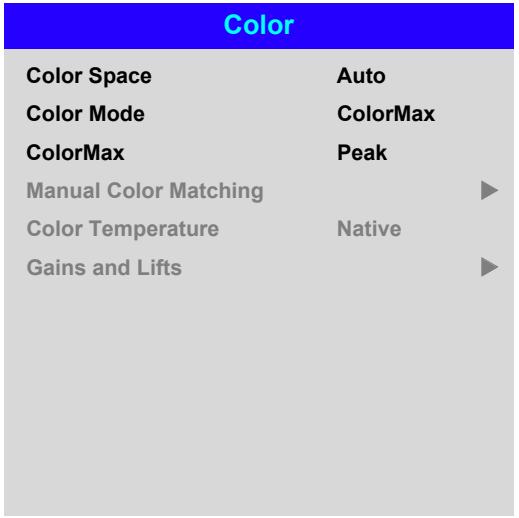
Notes

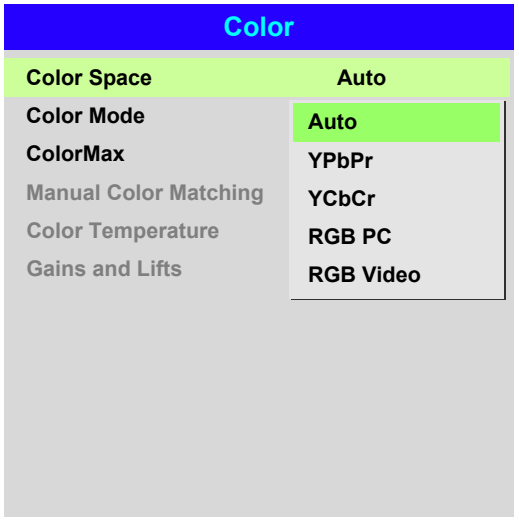
Color menu

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**.



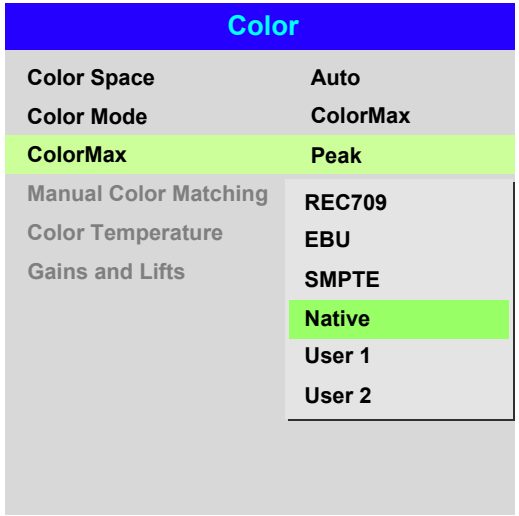


Notes

Color menu continued from previous page

Color Mode

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



ColorMax

1. Set **Color Mode** to **ColorMax**.
2. Navigate to the **ColorMax** setting. Choose from **REC709**, **EBU**, **SMPTE**, **Native**, **User 1** and **User 2**.

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

Notes

Only one color mode can be selected at a time. Settings used by the other color modes are disabled.

*See Setup menu for further information about setting up the **User 1** and **User 2** color gamuts.*

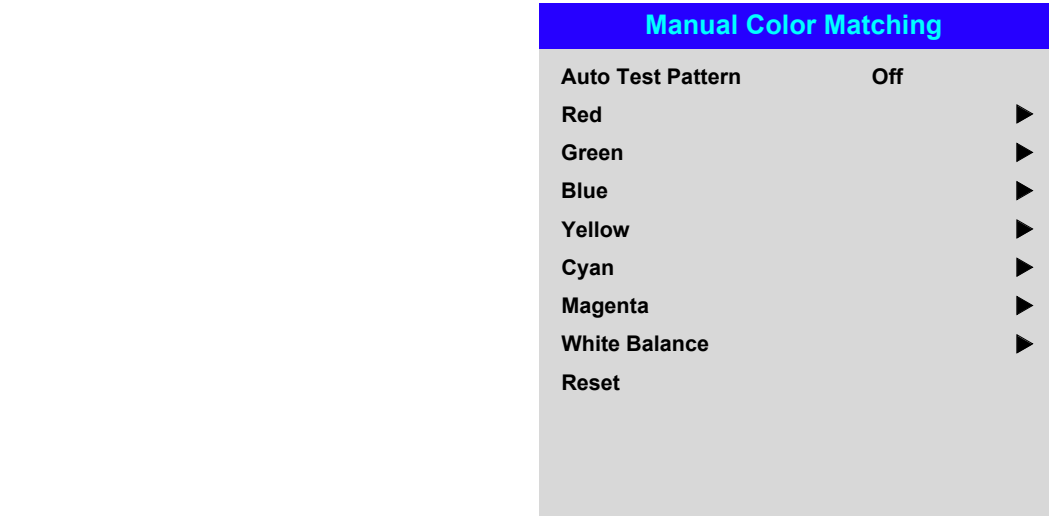
Color menu continued from previous page

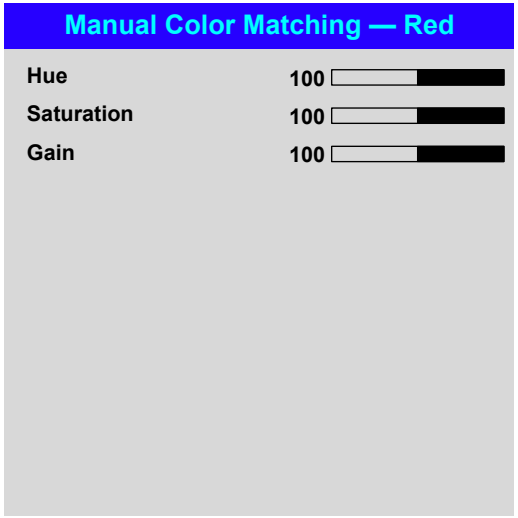
Manual Color Matching

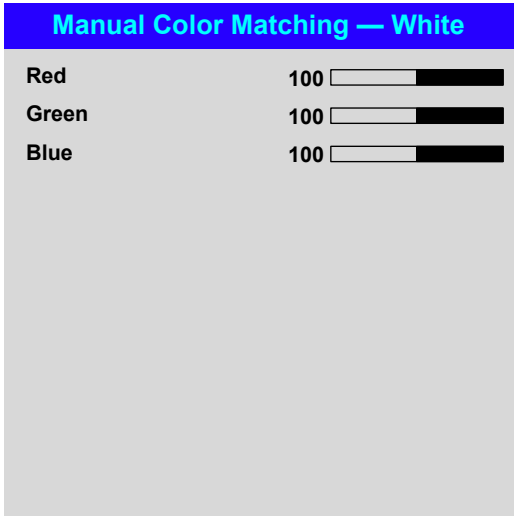
1. Set **Color Mode** to **Manual Color Matching**.
2. Open the **Manual Color Matching** submenu.

   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.







Notes

*For more details about the **Hue**, **Saturation** and **Gain** settings, see **Color matching parameters explained** further in this guide.*

Color menu continued from previous page

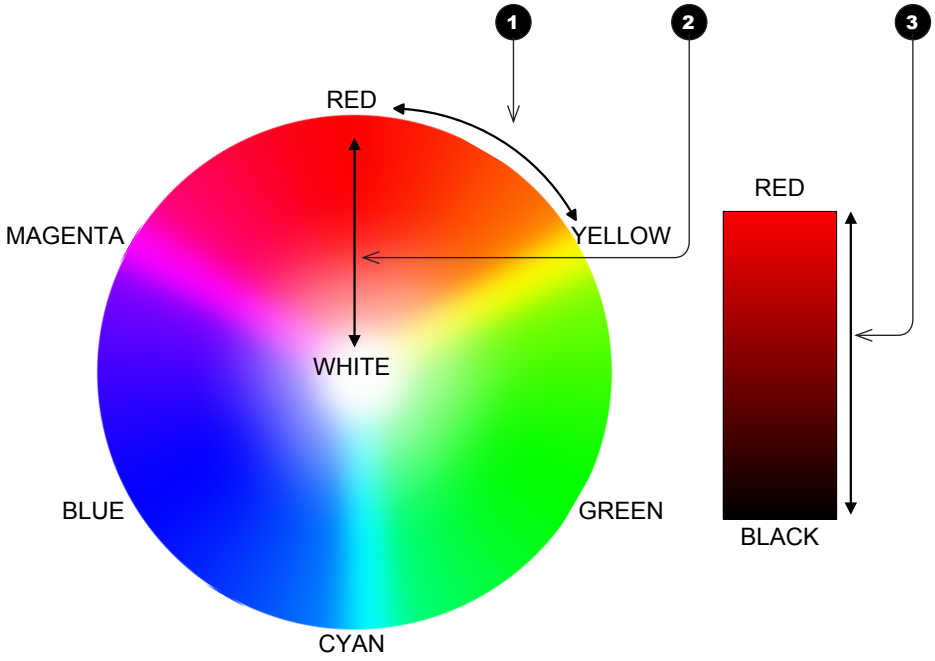
Color matching parameters explained

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.

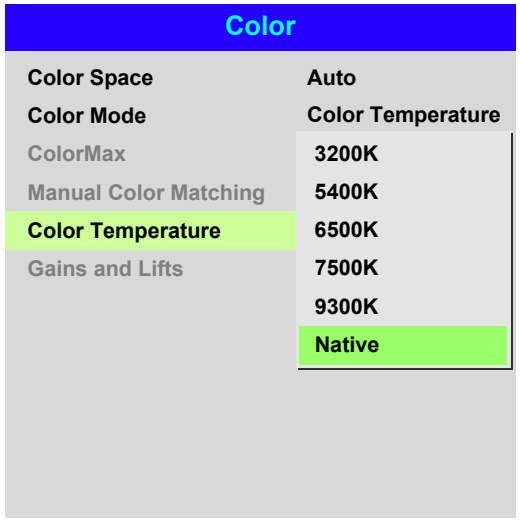


Notes

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).



Notes

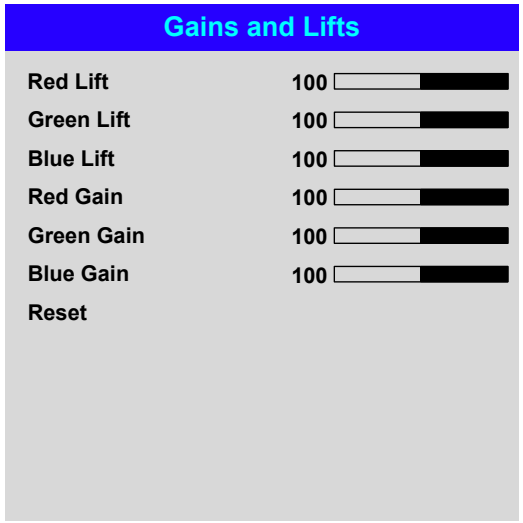
Some settings may be unavailable depending on other settings. For more information, see ***Possible Combinations Of Settings*** *further in this guide.*

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.

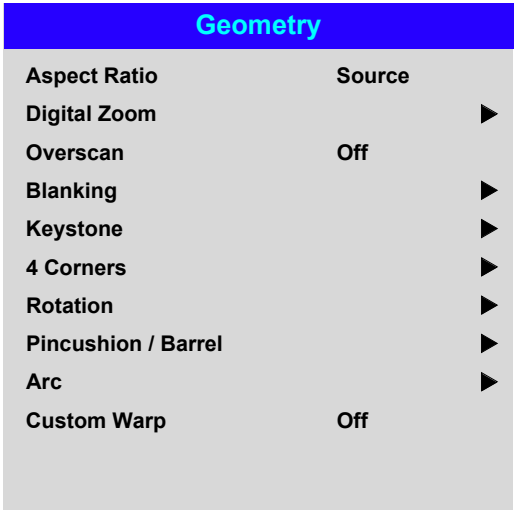
Set the sliders as required.



Notes

Geometry menu

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



Aspect Ratio

This feature defines the aspect ratio of the source.

Use the **Screen Setting** feature (**Setup** menu) to define the screen aspect ratio. It will enable the aspect ratio defined here best fit the actual screen.

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**

Notes

Some settings may be unavailable depending on other settings. For more information, see ***Possible Combinations Of Settings*** *further in this guide.*

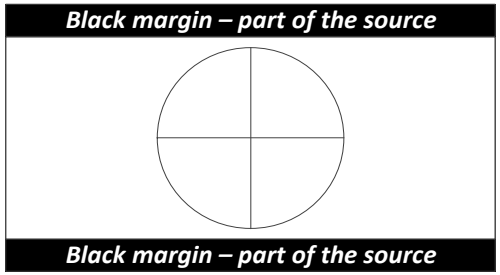
Some combinations of aspect ratios (selected from **Geometry > Aspect Ratio** *and from* **Setup > Screen Setting***) may result in black bars all around the image:* ***letterboxing*** *and* ***pillarboxing*** *due to the disagreeing width and height of image and frame.*

See next page for further information about the **TheaterScope** *aspect ratio.*

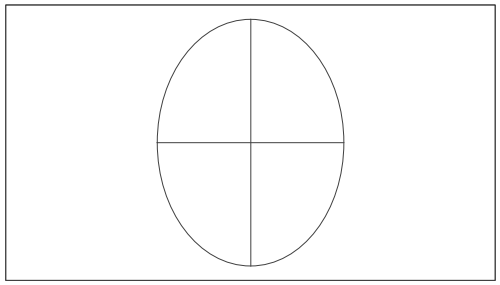
Theaterscope setting

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

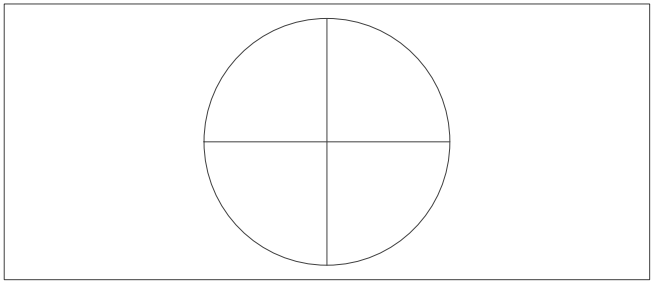
Without an anamorphic lens and without the TheaterScope setting applied, a 16:9 source containing a 2.35:1 image looks like this:



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



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



Notes

TheaterScope *is used with an anamorphic lens.*

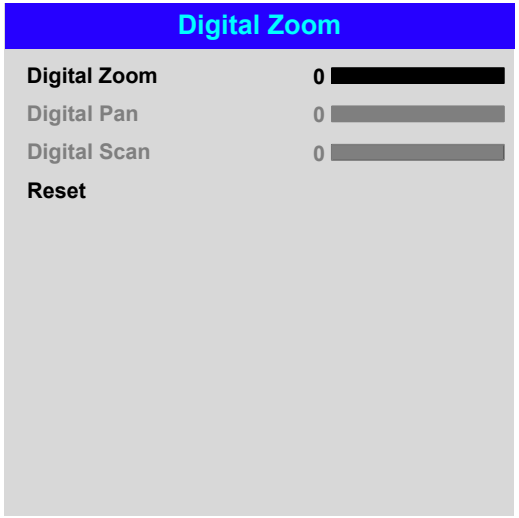
If you use **TheaterScope***, set your screen aspect ratio to 16:9.*

.*Geometry menu continued from previous page*

Digital Zoom

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

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



Notes

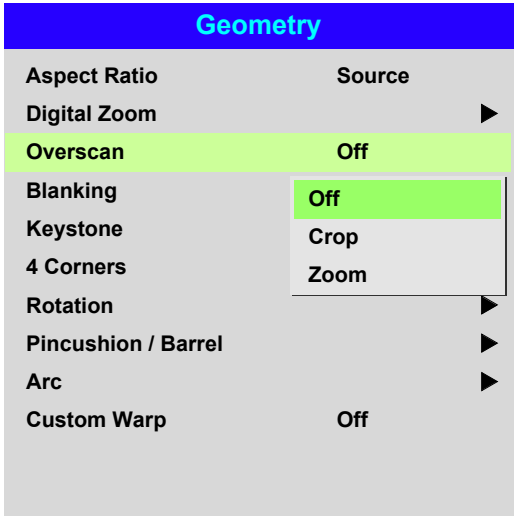
Some settings may be unavailable depending on other settings. For more information, see ***Possible Combinations Of Settings*** *further in this guide.*

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.



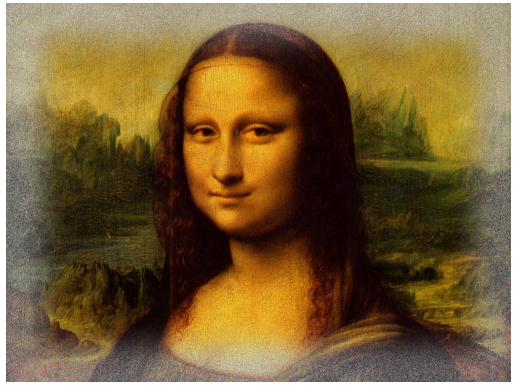
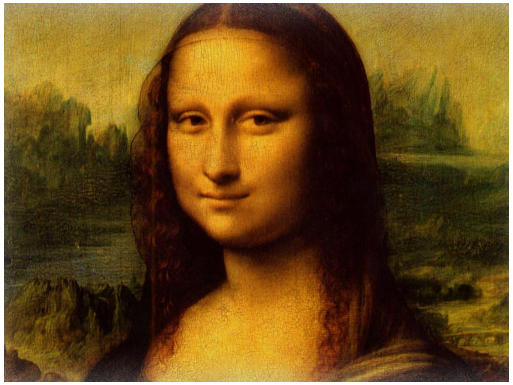


Image with noisy edges



Overscanned image

Notes

Some settings may be unavailable depending on other settings. For more information, see ***Possible Combinations Of Settings*** *further in this guide.*

Geometry menu continued from previous page

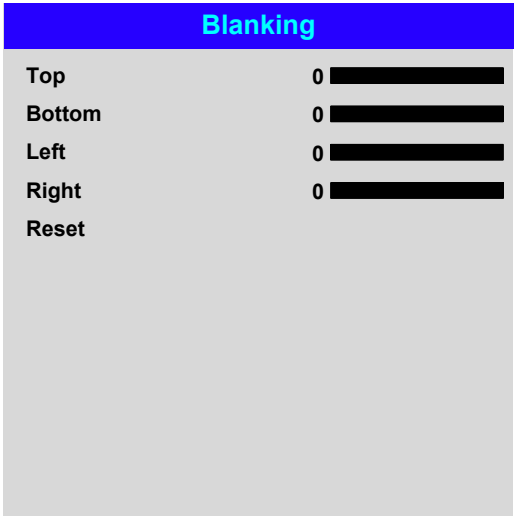
Blanking

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.



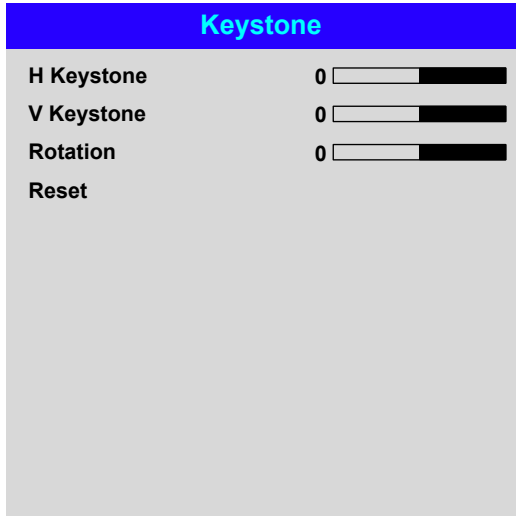
Notes

Some settings may be unavailable depending on other settings. For more information, see ***Possible Combinations Of Settings*** *further in this guide.*

Geometry menu continued from previous page

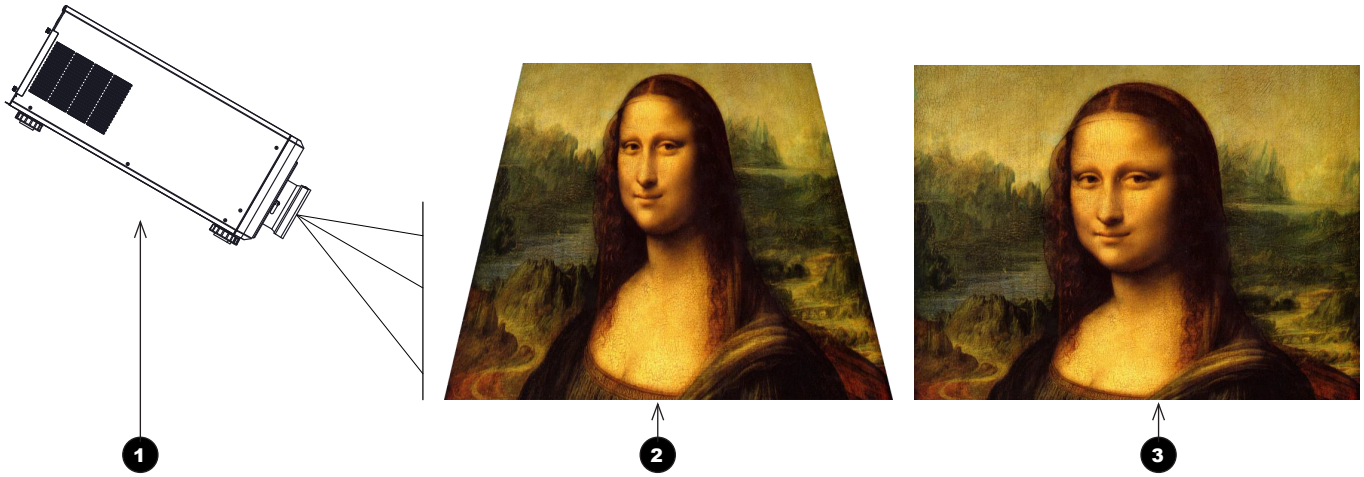
Keystone

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



Keystone example

1. **The projector is positioned at an angle**
2. **The resulting image is distorted**
3. **The image is corrected when Keystone is applied**



Notes

Some settings may be unavailable depending on other settings. For more information, see ***Possible Combinations Of Settings*** *further in this guide.*

Geometry menu continued from previous page

Keystone settings

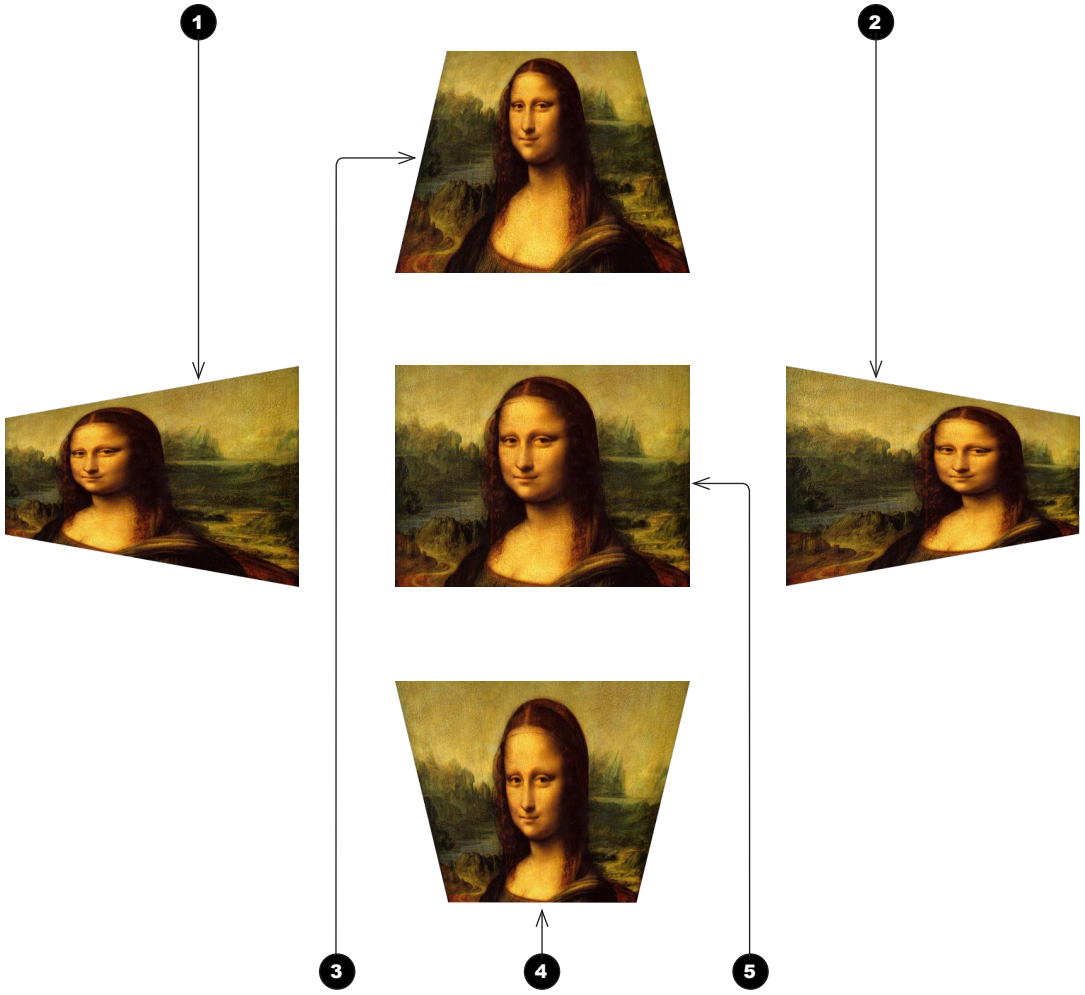
1 **Projector to the left**
The projector is positioned to the left of the screen.
To correct, apply a positive **Horizontal Keystone** value using the **RIGHT** arrow button.

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

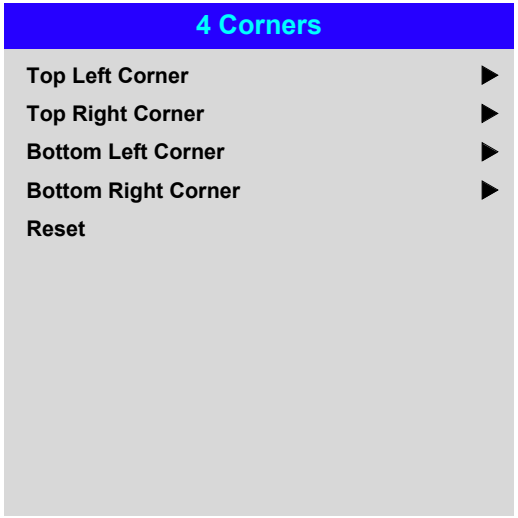
Notes

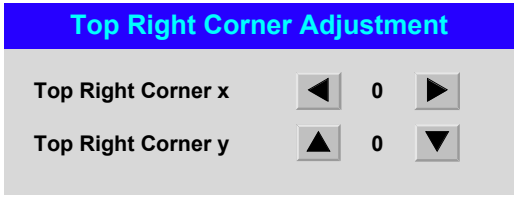
Some settings may be unavailable depending on other settings. For more information, see ***Possible Combinations Of Settings*** *further in this guide.*

Geometry menu continued from previous page

4 Corners

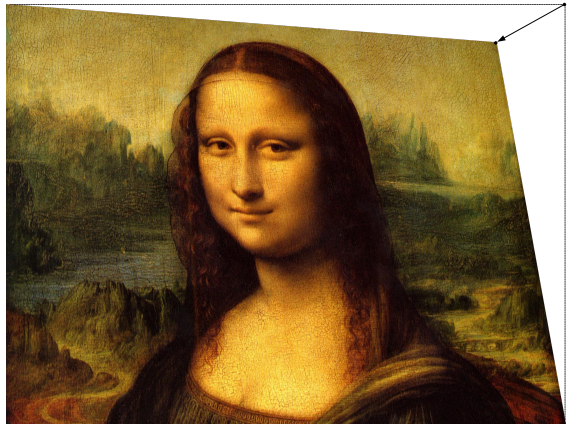
For each corner, apply horizontal and / or vertical correction as necessary to restore the rectangular shape of the image.





Top Right Corner example

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



Top Right Corner ***correction***

Notes

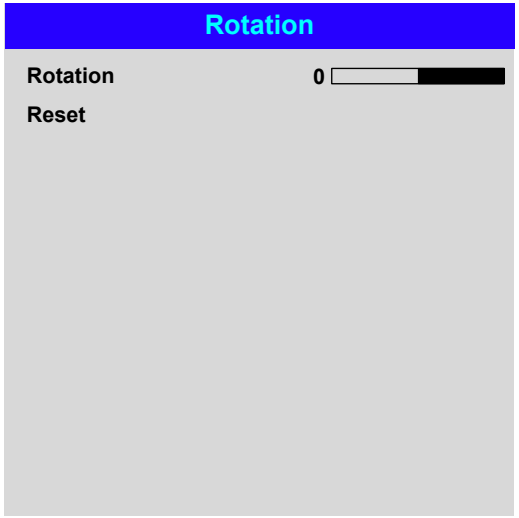
Corner corrections provide a simple setup for awkward installations and irregular shaped screens that may distort the image. To apply a similar (but less flexible) correction, while preserving the original aspect ratio of the image, use the **Keystone** *menu.*

Some settings may be unavailable depending on other settings. For more information, see ***Possible Combinations Of Settings*** *further in this guide.*

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.

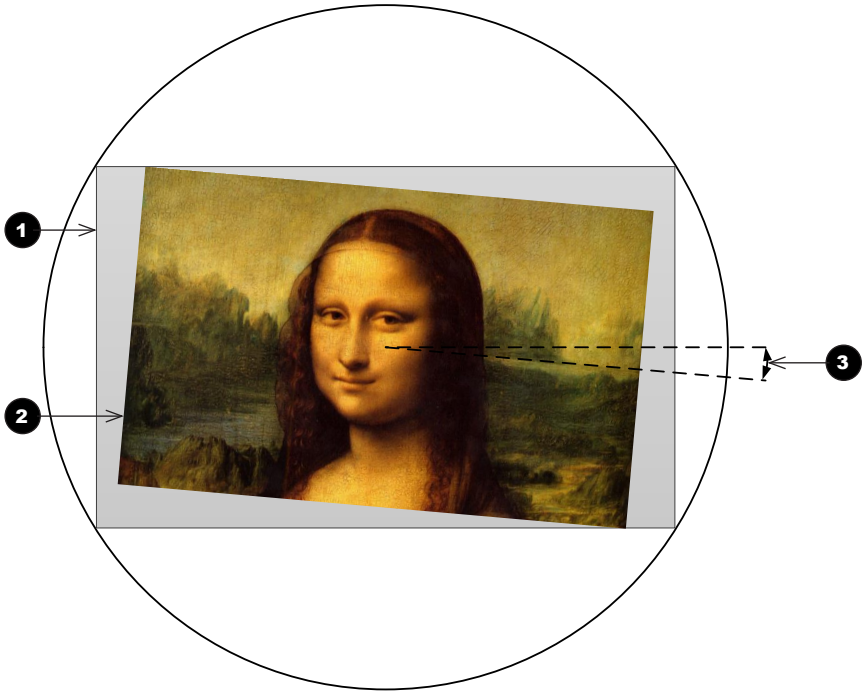


Rotation example

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**.



Notes

*Some settings may be unavailable depending on other settings. For more information, see **Possible Combinations Of Settings** further in this guide.*

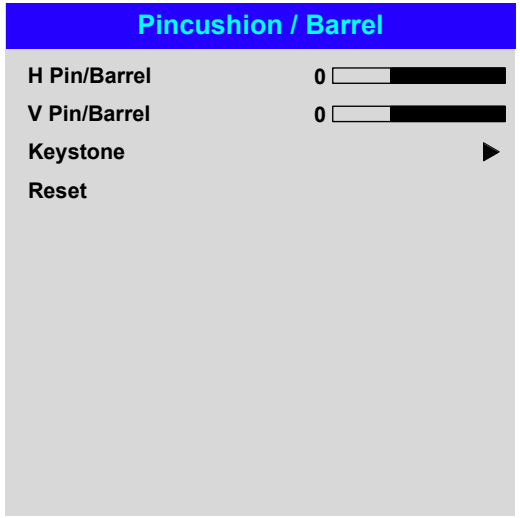
Geometry menu continued from previous page

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.

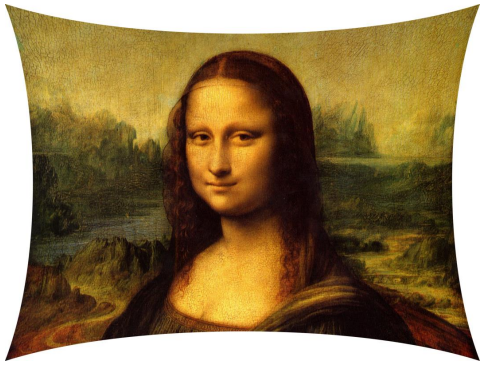
Use the **Pincushion / Barrel** control to compensate electronically for such distortions.

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

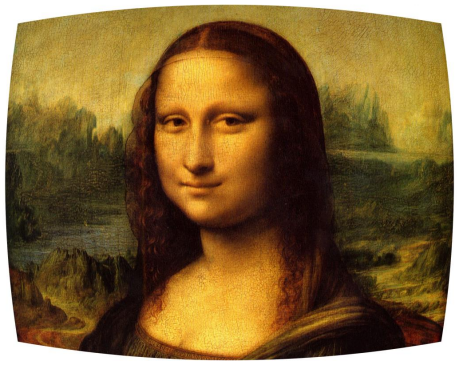


Pincushion / Barrel example

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



Pincushion



Barrel

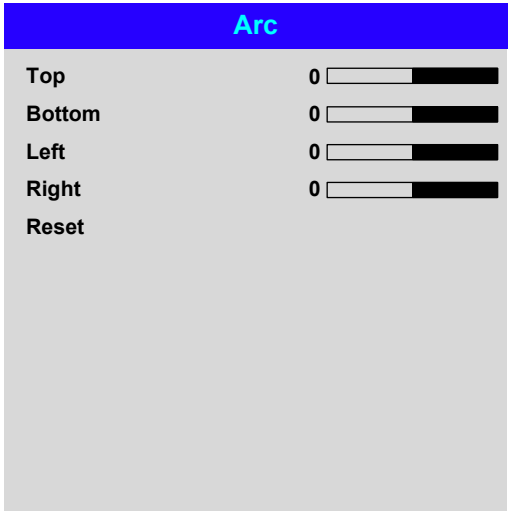
Notes

Some settings may be unavailable depending on other settings. For more information, see ***Possible Combinations Of Settings*** *further in this guide.*

Geometry menu continued from previous page

Arc

This is a geometric correction similar to pincussion and barrel but applied one side at a time, asymmetrically. For example, you can apply the correction to the top while the bottom remains unchanged.



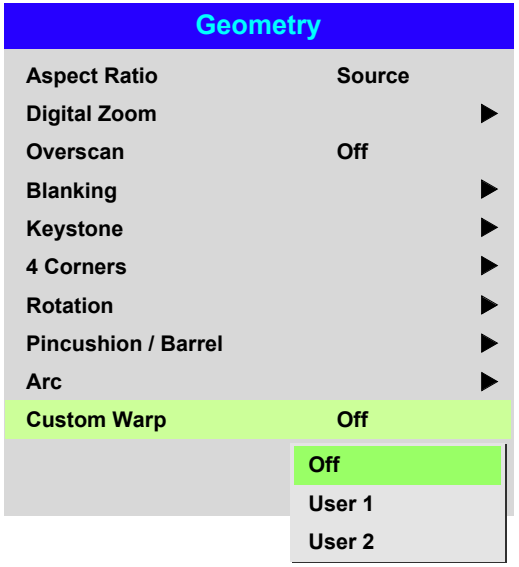
Notes

Some settings may be unavailable depending on other settings. For more information, see ***Possible Combinations Of Settings*** *further in this guide.*

Geometry menu continued from previous page

Custom Warp

Set to **Off**, **User 1** or **User 2** as required.



Notes

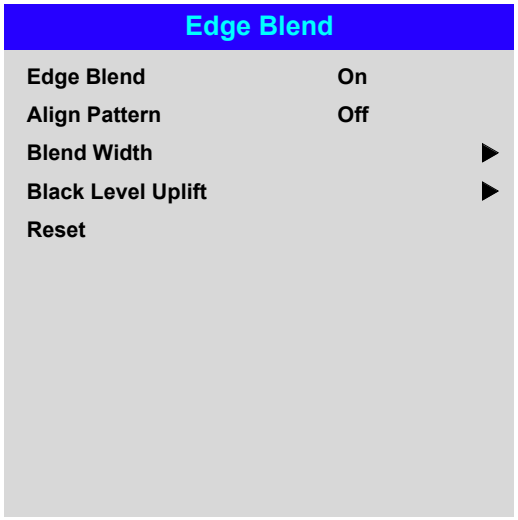
Some settings may be unavailable depending on other settings. For more information, see ***Possible Combinations Of Settings*** *further in this guide.*

Edge Blend menu

Use this menu to blend together images from an array of two or more projectors.

The feature feathers the light output of the projector within the edges that overlap with other projectors in the array: as a result, the overlapping edges are evenly lit and easily blend in with the rest of the image.

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



Notes

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

The picture in the blend region needs to be delivered to all overlapping projectors, which may require a special setup of the source.

*Some settings may be unavailable depending on other settings. For more information, see **Possible Combinations Of Settings** further in this guide.*

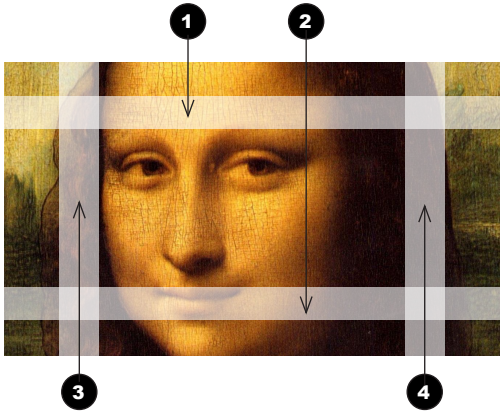
Edge Blend menu continued from previous page

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



Notes

Some settings may be unavailable depending on other settings. For more information, see ***Possible Combinations Of Settings*** *further in this guide.*

Edge Blend menu continued from previous page

Black Level Uplift

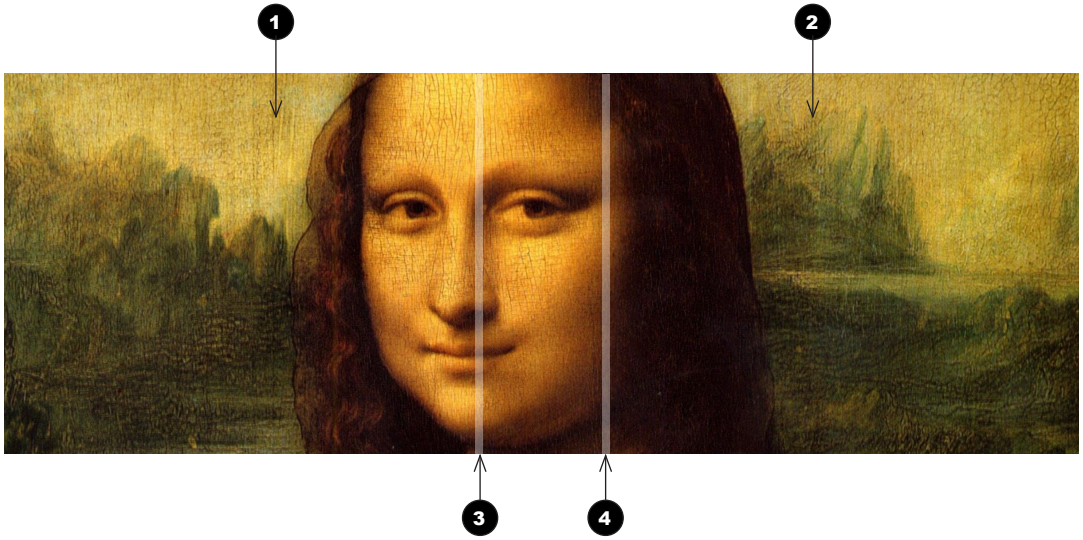
Black in the blended regions appears less dark than in the rest of the image. To compensate fo this, use this menu to raise the black levels of the rest of the image:

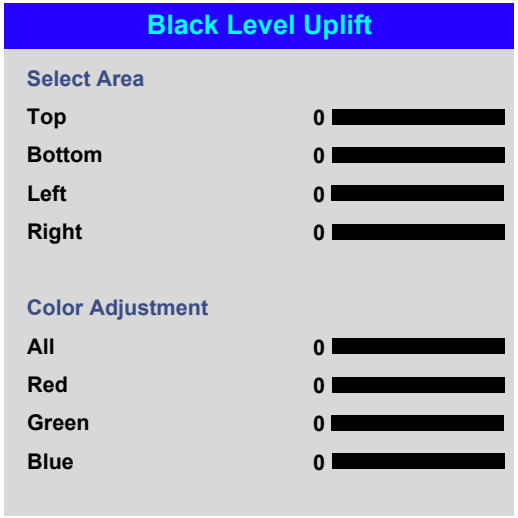
- Set **All** to the required amount of black level correction. This will apply equal correction to the black levels of all colors.
- If necessary, use the individual color sliders (**Red**, **Green** and **Blue**) for fine adjustment.

You may experience artifacts at the edges where the blended region of one projector overlaps the ***pond of mirrors*** of its neighbor. In the example below, the blended image comes from ***two projectors***, 1 and 2. Both images have black level uplift applied; as a result, ***artifacts*** 3 and 4 have emerged at the edges where the black level uplift region of one projector overlaps the pond of mirrors of the other.

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

- Depending on your array, use **Top**, **Bottom**, **Left** and/or **Right** to reduce the black level uplift size. In the example below, use the **Right** slider of the ***projector on the left*** 1 to remove the ***artifact on the right*** 4, and the **Left** slider of the ***projector on the right*** 2 to remove the ***artifact on the left*** 3.





Notes

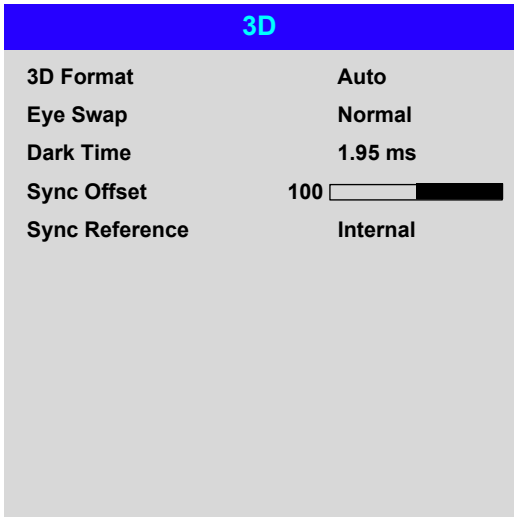
Enable **Align Pattern** *from the* **Edge Blend** *menu to see the black level uplift area.*

Some settings may be unavailable depending on other settings. For more information, see ***Possible Combinations Of Settings*** *further in this guide.*

3D menu

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

- **3D Format** — **Off**, **Auto**, **Side by Side (Half)**, **Top and Bottom**, **Dual Pipe** and **Frame Sequential**.
- **Eye Swap** — **Normal** and **Reverse** (set to **Reverse** if the left- and right-eye images are displayed in the wrong order)
- **Dark Time** — **0.65 ms**, **1.3 ms** and **1.95 ms**. Set to reduce the effect of images overlapping while the glasses are switching.
- ***Sync* Offset** — use the **LEFT** ◀ and **RIGHT** ▶ arrow buttons to compensate for signal processing delays in the projector.
- **Sync Reference**— **External**, **Internal** and **Auto**.



Notes

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

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

*Some settings may be unavailable depending on other settings. For more information, see **Possible Combinations Of Settings** further in this guide.*

***Frame Sequential** is supported on the HDMI, DVI-D and DisplayPort inputs only.*

3D video is only possible on the HDMI, HDBaseT, DisplayPort and DVI inputs.

*The **Frame Packing** format is automatically detected by the projector.*

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

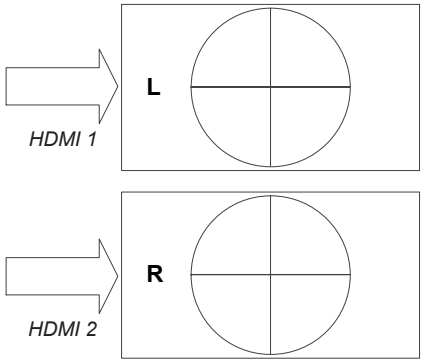
3D menu continued from previous page

3D types

In most situations you can use the **Auto** setting to have the projector automatically detect the format. Otherwise, consider the notes below to help you set up the 3D input manually.

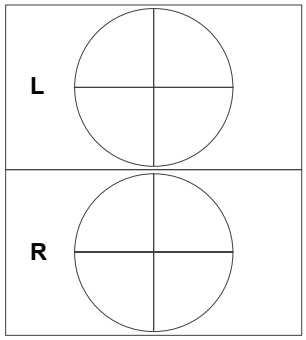
The following 3D formats are supported:

- **Dual Pipe (LEFT and RIGHT)**
  The left and right eye images are delivered on two separate HDMI links, which the projector will interleave for 3D display.



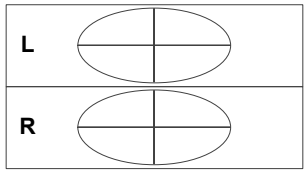
Dual Pipe

- **Frame Packing**
  This format will be detected, re-synchronised, frame-multiplied and displayed at 96 Hz with the left eye / right eye dominance automatically extracted from the video data. You need to optimize **Dark Time** and **Sync Delay** manually to suit your chosen switching glasses.



Frame Packing

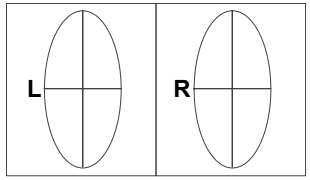
- **Top and Bottom**
  Sets the projector to reformat the video frames and map them to the display with the left eye / right eye dominance automatically extracted from the video data. You need to optimize **Dark Time** and **Sync Delay** manually to suit your chosen switching glasses.



Top-and-Bottom

- **Side by Side (Half)**: interlaced and progressive, 50 and 60Hz
  The side-by-side image will be de-interlaced (if appropriate), resized and then sequentially displayed at 100 or 120 Hz. The left eye / right eye dominance will be automatically extracted from the video data, however you will need to optimize **Dark Time** and **Sync Delay** manually to suit your chosen switching glasses.

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



Side-by-Side (Half)

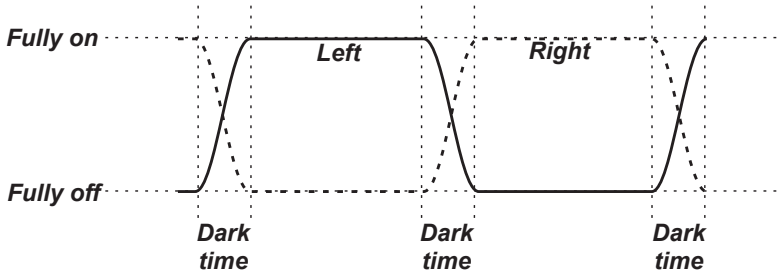
Notes

3D menu continued from previous page

Some 3D settings explained

Dark Time

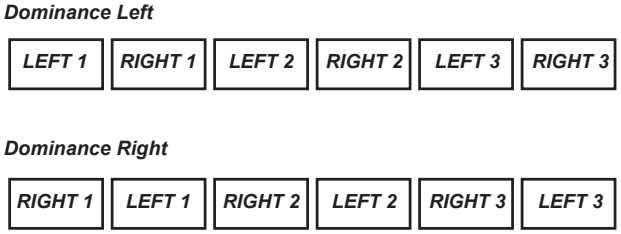
Ghosting can be caused by the left and right images overlapping during the time that the ZScreen or 3D glasses are switching. **Dark Time** allows you to minimize this effect.



Eye Swap

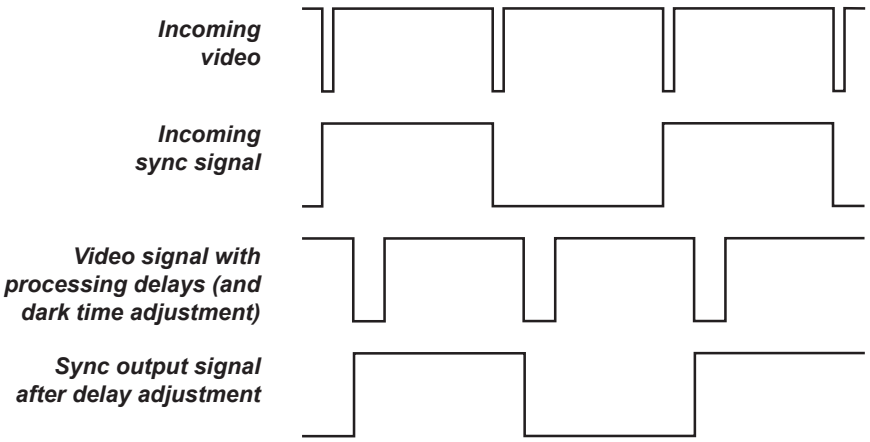
The outgoing 3D frames are in pairs - the dominant frame being presented first. You can determine which frame should be the dominant one.

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



Sync Delay

The sync signal from the 3D server will be in phase with the frames generated by its graphics card. However, to compensate for processing delays in the projector, **Sync Delay** introduces a delay to the sync output signal sent to the ZScreen or 3D glasses.



Notes

In order to achieve maximum light output and a smooth grayscale, whilst eliminating ghosting, the following procedure is recommended:

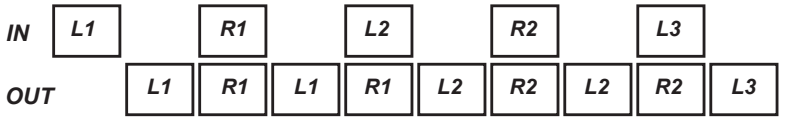
1. *Set* **Dark Time** *to a value appropriate to the glasses or ZScreen, say 1.3 ms or 1.95 ms.*
2. *Adjust* **Sync Offset** *time to eliminate ghosting and achieve a smooth grayscale.*
3. *Repeat steps 1 and 2 until the best result is obtained.*

3D menu continued from previous page

Frame rate multiplication in 3D images

When displaying a low frame rate 3D video, the projector multiplies the frame rate to obtain a flicker-free image. For example, a 60Hz frame rate is doubled to 120 Hz, or a 48 Hz frame rate is tripled to 144 Hz.

Frame rate multiplication is an automatic process. It occurs in the background and cannot be modified by the user.



x2 example

Notes

Lamp Control menu

- **Lamp Selection**

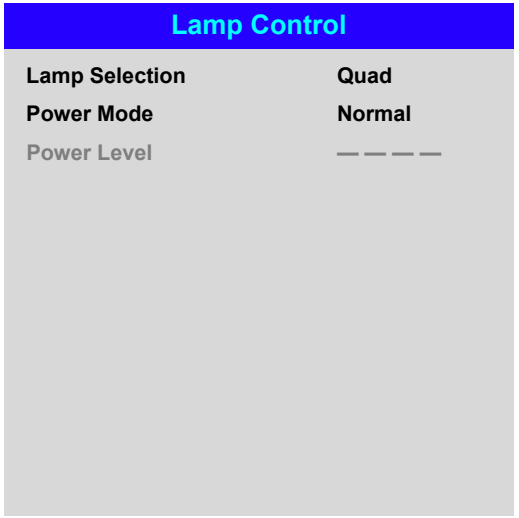
  Choose from **Dual**, **Triple** and **Quad**.

- **Power Mode**
  - **Eco** will automatically set the lamp power to 77%.
  - **Normal** will set the power to 100%.
  - Set to **Custom** if you wish to adjust the power manually.

- **Power Level**

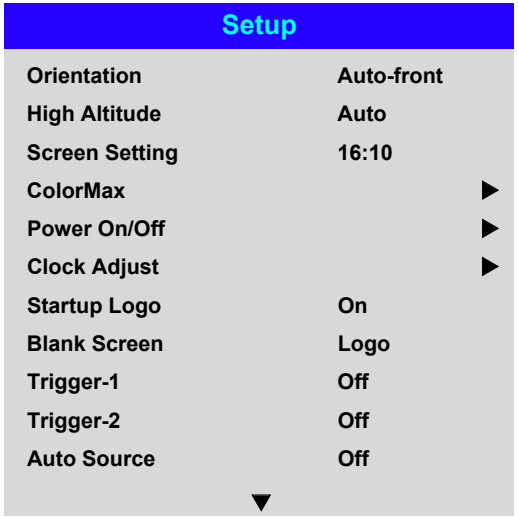
  This setting is only available if **Power Mode** is set to **Custom**.

  Choose a value between 77% and 100%.



Notes

Setup menu



- **Orientation**
  Choose from **Front Tabletop**, **Front Ceiling**, **Rear Tabletop**, **Rear Ceiling**, **Vertical Up** and **Vertical Down**.
- **High Altitude**
  Choose from **On** and **Auto**.
- **Screen Setting**
  Choose from **16:10**, **16:9** and **4:3**.
- **ColorMax**
  Set up user-defined color gamut values.
- **Power On/Off**
  Access the submenu to set up automatic projector power on and power off.
- **Clock Adjust**
  Access the submenu to set current date and local time.
- **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**.
- **Trigger1** and **Trigger 2**
  Choose from **Off**, **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.
- **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.

Notes

__Auto-front__ automatically detects the projector's position and sets the orientation accordingly.

Use __Screen Setting__ in combination with the __Aspect Ratio__ feature found in the __Geometry__ menu to provide the best fit for the projected image and to minimize l__etterboxing__ and __pillarboxing__.

__ColorMax__ is only available if __Color > Color Mode__ is set to __ColorMax__.

The __Trigger 1__ and __Trigger 2__ functions output 12 V depending on the set value:

- *If __Screen__ is set, the trigger will be activated when the projector is switched on.*
- *If __RS232__ is set, the trigger will be activated upon receiving a protocol command.*
- *If any of the other values are set, the trigger will be activated if the __Geometry > Aspect Ratio__ function is set to match the trigger value. For example, if __Trigger 1__ is set to __4:3__, it will output a 12 V charge if you set __Geometry > Aspect Ratio__ to __4:3__.*

Setup menu continued from previous page

- **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.

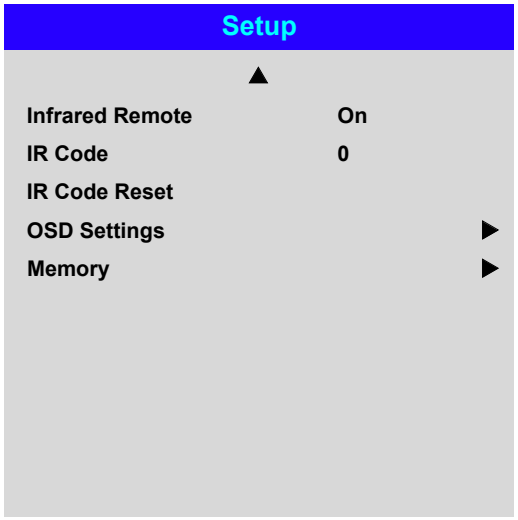
  To assign an IR code for the remote:

  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.

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



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

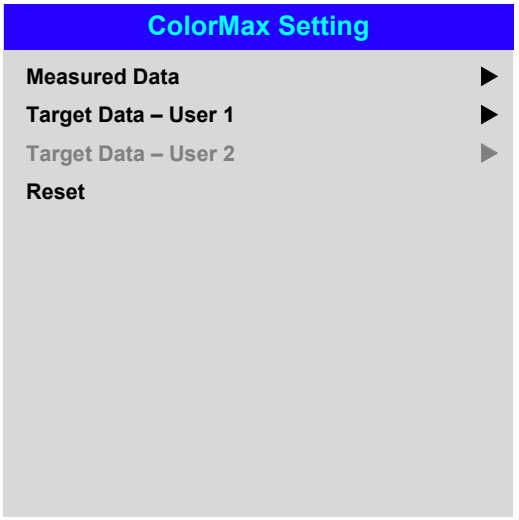
ColorMax Setting

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

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

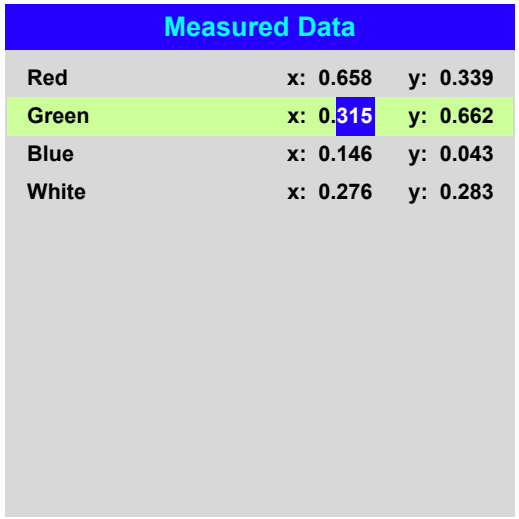
Defining your own colorspace with individual x and y coordinates for each color enables you to match not only the whites but each individual color as well.

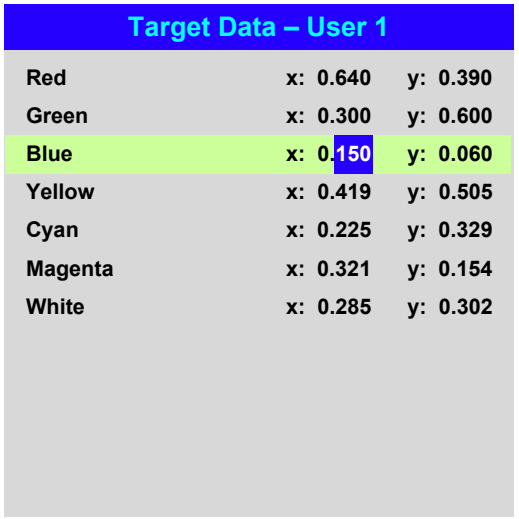
Highlight the submenu you wish to open and press **ENTER/OK** to confirm your choice.



Measured Data / Target Data

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





Notes

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

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

*A **Target Data** submenu is only available if **Color > ColorMax** is set to **User 1** or **User 2**.*

Setup menu continued from previous page

Power On/Off

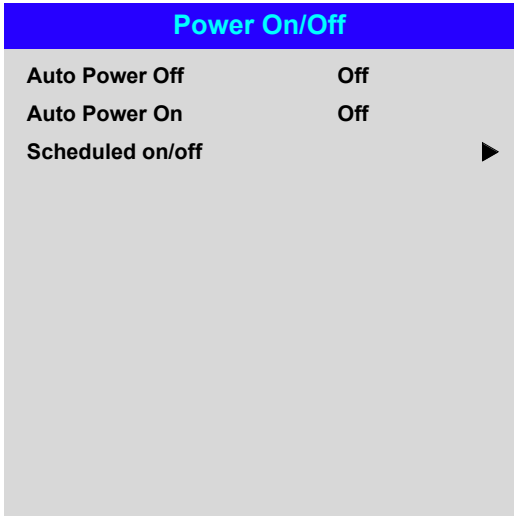
- **Auto Power Off**

  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.

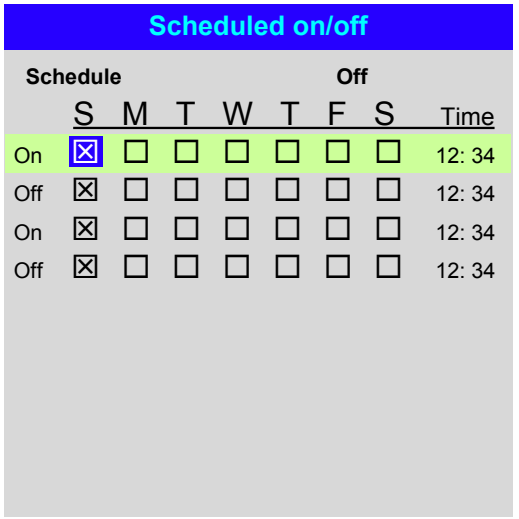
  Set this to **Off** if you want the projector to go into STANDBY mode when the mains is connected. In this case, the projector will not start up until the **POWER** button is pressed on the control panel or the **ON** button is pressed on the remote control.



- **Scheduled on/off**

  Access this submenu to create a weekly schedule for automatic on and off times:

  1. Set a schedule:
     - Use he **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 he **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 he **UP** ▲ and **DOWN** ▼ arrow buttons.
  2. To enable the schedule, set **Schedule** to **On**.



Notes

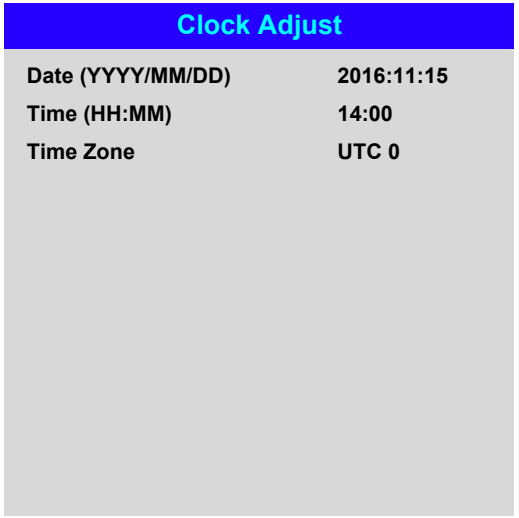
Scheduling only works if **Network > Standby Power** *is* **On**.

Setup menu continued from previous page

Clock Adjust

Use this menu to set date (in **YYYY/MM/DD** 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.



Notes

Setup menu continued from previous page

OSD Settings

- **Language** sets the OSD language.
- **Menu Position** determines where the OSD should appear ont he 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 — **Gamma**, **Brightness**, **Contrast**, **Saturation**, **Hue**, **Sharpness** and **Noise Reduction**
- From the **Color** menu — **Color Space**, **Color Mode**, **ColorMax**, **Color Temperature**, **Dynamic Black**, **RGB Lift** and **RGB Gain**
- From the **Geometry** menu — **Aspect Ratio** and **Overscan**

Memory	
Recall Memory	Default
Save Settings	Preset A

To recall a saved preset:

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

To save a preset:

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

Notes

Presets from one input cannot be applied to another input.

Network menu

- **Network Mode**

  Choose between **Projector Control** and **Service**.

- **Standby Power**

  If this setting is **On**, the LAN socket remains active when the projector is in STANDBY mode. If the setting is **Off**, the LAN socket is disabled when the projector is in STANDBY mode.

- **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**

  When this feature is enabled the projector sends status updates to AMX approximately every 30 seconds.

Network	
Network Mode	Projector Control
Standby Power	Off
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

With **Standby Power** *set to* **Off** *certain features are disabled, including the* **Setup > Power On/Off > Scheduled on/off** *feature.*

PIP menu

- **PIP**

  Turn PIP on and off.

- **Source**

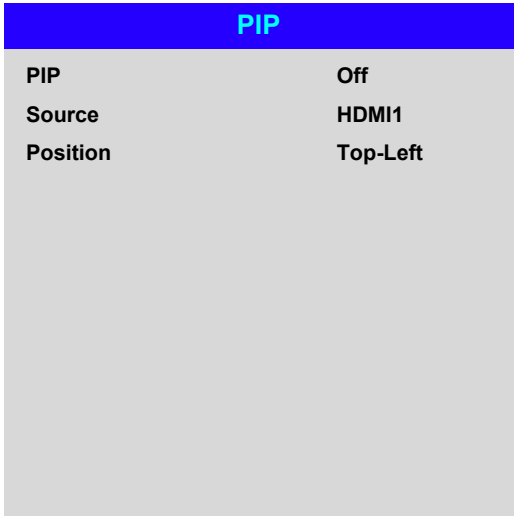
  Select an input source for the PIP image.

  Any combinations are possible between main and PIP input source, as long as:

  - one of the inputs is **HDMI 2** - regardless whether it is used for main or PIP source
  - **DisplayPort**, if used, is at a pixel rate below 165 MHz.

- **Position**

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



Notes

Some settings may be unavailable depending on other settings. For more information, see ***Possible Combinations Of Settings*** *further in this guide.*

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	Mercury Quad WUXGA
Serial Number	X000XXXXX0000
Software Version 1	MD03-SE10-FE09
Software Version 2	LE07-14-RE04-3092
Active / PIP Source	HDMI2 / HDMI1
Signal Format	▶
Lamp Hours	0011/0013/0011/0013 HRS
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

Notes

Information menu continued from previous page

System Status

System Status	
Lamp Selection	Quad
Atmospheric Pressure	98988 Pa (116 m)
AC Voltage	160V – 264V
Altitude Mode	Low
Lamp Power	100%
Lamp 1 Hours	0012 HRS
Lamp 2 Hours	0014 HRS
Lamp 3 Hours	0012 HRS
Lamp 4 Hours	0013 HRS
Lamp Status	On / On / On / On

Thermal Status

Thermal Status	
Inlet Temp.	24
DMD Temp.	38 (C)
Lamp Voltage	84 / 84 / 83 / 84
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 / 2014 / 2014
Fan 19-21 Speed	3506 / 5330 / 3998
Fan 22-24 Speed	3985 / 5207 / 5123
Fan 25-26 Speed	4584 / 4404

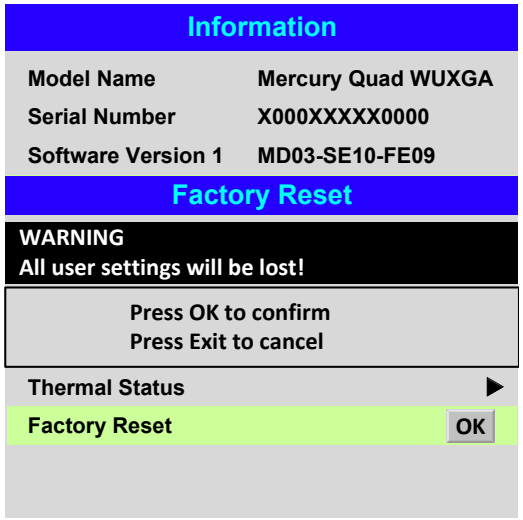
Notes

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.



Notes

Possible Combinations Of Settings

Some OSD settings cannot be used in combination with others. The table below shows the possible combinations.

A tick (✓) means that the combination is possible. A cross (×) means applying the new setting is impossible if the existing setting is being used. A number sign (#) means applying the new setting will disable the existing one.

New Setting / Existing Setting	3D	Warp / Geometry	Blending	Picture Mode	Color Temp.	Overscan	Aspect Ratio	Digital Zoom	PIP
3D		✓	✓	×	×	×	✓	×	×
Warp / Geometry	✓		✓	✓	✓	✓	✓	✓	✓
Blending	✓	✓		✓	✓	✓	✓	✓	✓
Picture Mode	#	✓	✓		✓	✓	✓	✓	✓
Color Temp.	#	✓	✓	✓		✓	✓	✓	✓
Overscan	#	✓	✓	✓	✓		✓	✓	✓
Aspect Ratio	✓	✓	✓	✓	✓	✓		✓	✓
Digital Zoom	#	✓	✓	✓	✓	✓	✓		✓
PIP	#	✓	✓	✓	✓	✓	✓	✓	

Notes

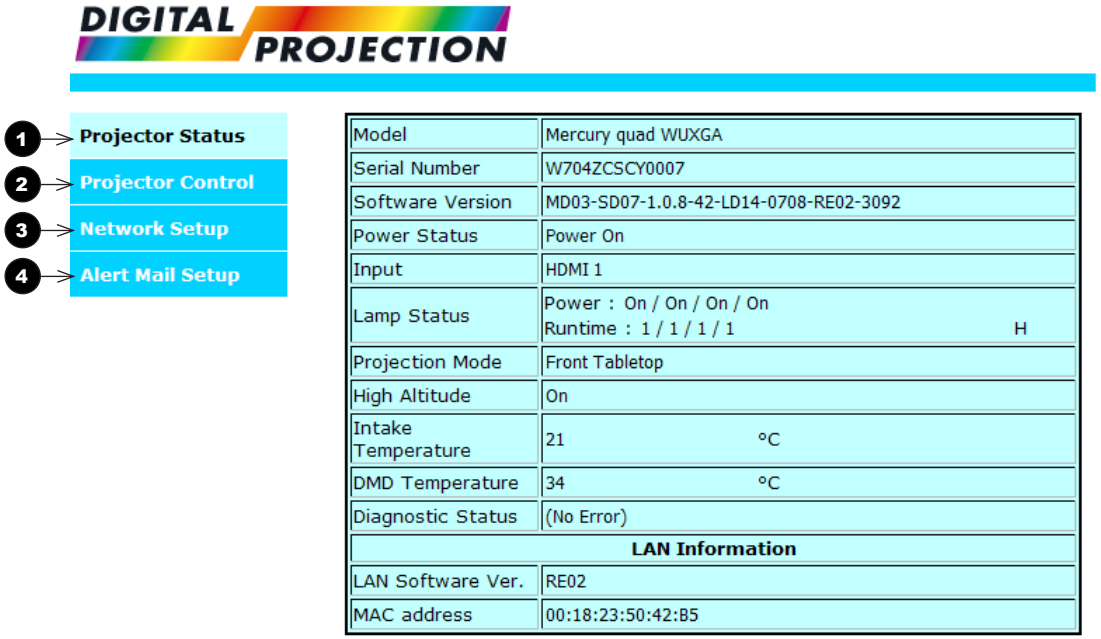
Web Configuration Utility

Use the embedded Web Configuration Utility to control the projector via a LAN network:

1. Make sure the projector is connected to a remote computer via LAN.
2. From the remote computer, access the LAN IP address of the projector. The Web Configuration Utility opens.

The utility's features are arranged in the following tabs:

1. **Projector Status**
   View projector and network information.
2. **Projector Control**
   Access various projector settings.
3. **Network Setup**
   View and configure network settings.
4. **Alert Mail Setup**
   Set up error warnings and regular status reports by email.



Notes

The default LAN IP address is 192.168.0.100.

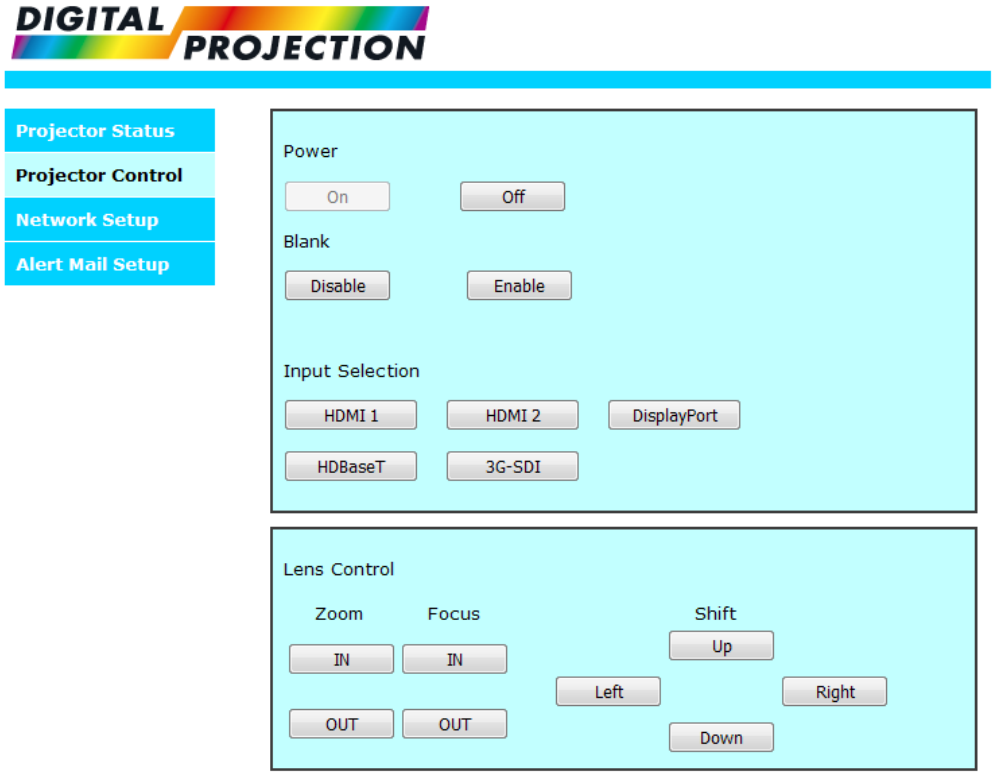
If you suspect this has been changed, view the current **Network** *settings in the* **Setup** *menu.*

For more information about connecting the projector via LAN, see the ***Connection Guide****.*

Projector Control page

From this page you can do the following:

- Switch the projector on and off (**Power**)
- Enable and disable the shutter (**Blank**)
- Select input source (**Input Selection**)
- Zoom, focus nad shift the image (**Lens Control**)

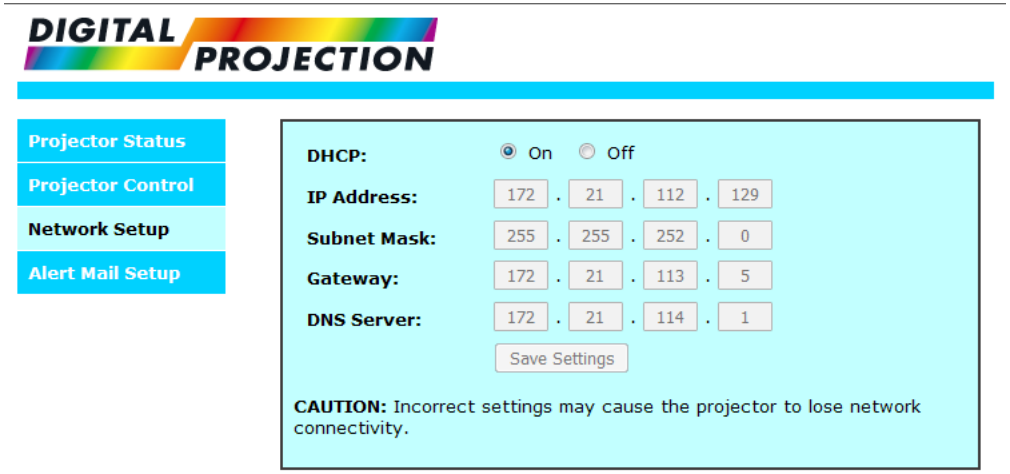


Notes

If **Standby Power** *is set to* **Off**, *the LAN connection will be disabled when the projector is in STANDBY mode. To enable power on via LAN, set* **Network > Standby Power** *to* **On**.

Network Setup page

From this page you can view and configure network settings.



Notes

Changing network settings is only possible if DHCP is set to Off.

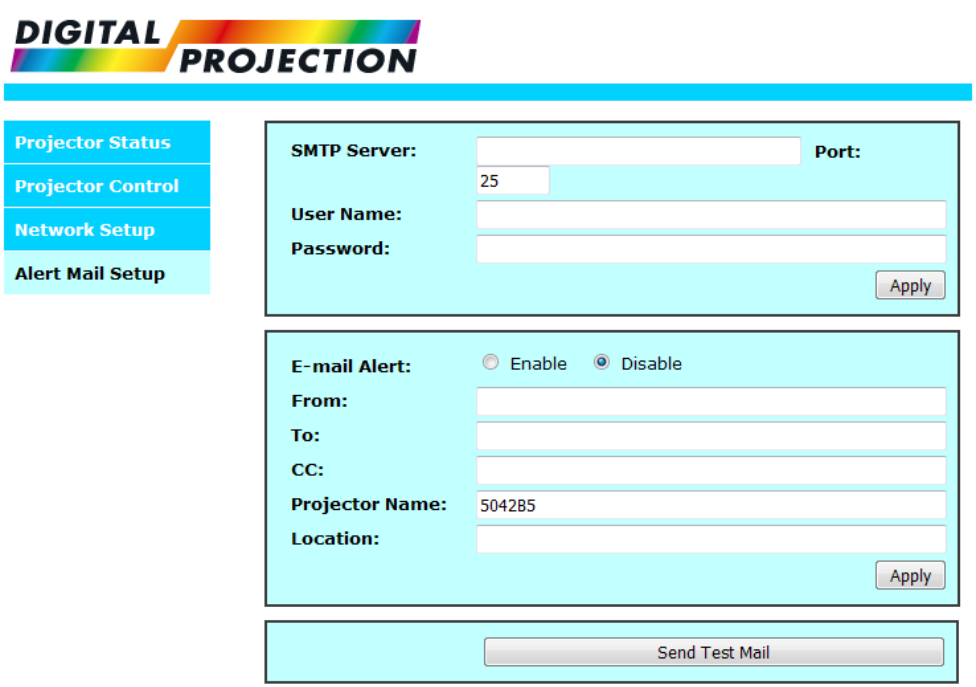
Alert Email Setup page

To receive error warnings and status reports by email:

1. Navigate to the **Alert Mail Setup** tab.
2. Enter user credentials, SMTP settings, email addresses and preferences as required.

   Optionally, click **Send Test Mail** to test your email settings.

For assistance with your network settings, consult your network administrator.



Notes

DIGITAL PROJECTION

Mercury Quad Series

High Brightness Digital Video Projector

REFERENCE GUIDE



Rev A March 2017

IN THIS GUIDE

The DMD™ 87

Choosing A Lens 89
- **Basic calculation** 90
- **Basic calculation example** 91
- **Full lens calculation** 92
  - Introducing TRC 92
  - Calculating TRC 93
  - Calculating the throw ratio with TRC 94
- **Full lens calculation example** 95

Screen Requirements 96
- **Fitting the image to the DMD™** 96
  - WUXGA images displayed full width 96
  - WUXGA images displayed with a height of 1080 pixels 97
  - WUXGA images displayed full height 98
- **Diagonal screen sizes** 99
- **Fitting the image to the screen** 100
- **Positioning the screen and projector** 101

Positioning The Image 102
- **Maximum offset range** 104

Aspect Ratios Explained 105
- **Aspect ratio examples** 106

Frame Rates And Pulldowns Explained 108
- **Interlaced and progressive scan** 108
- **Frame rates of image sources** 108
- **Pulldowns - conversion into destination formats** 109
  - 2:3 (normal) pulldown 109
  - 2:3:3:2 (advanced) pulldown 110

Appendix A: Lens Part Numbers 111

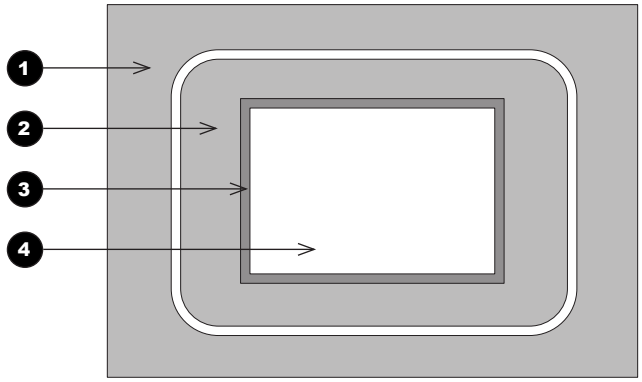
Appendix B: Supported Signal Input Modes 112
- **2D formats** 112
- **3D formats** 114

Appendix C: Wiring Details 116
- **Signal inputs and outputs** 116
  - HDMI 1 and 2 116
  - DisplayPort 117
  - 3G-SDI In, 3G-SDI Out 118
- **Control connections** 119
  - LAN 119
  - RS232 119
  - Trigger 1 & Trigger 2 120
  - IR input 120
  - 3D Sync IN and 3D Sync OUT 120

The DMD™

A DMD™ (Digital Micromirror Device™) is a true digital light modulator which utilises an array of up to 2.3 million moving aluminium mirrors, with each one representing a pixel in the final projected image. The outermost micromirrors in the array remain inactive (***pond of mirrors***) and are not used in constructing the image.

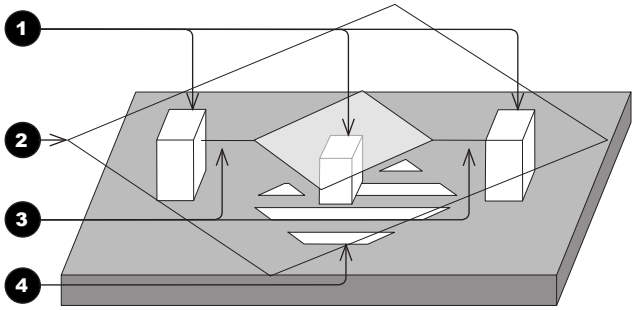
1. **Casing**
2. **Light shield**
3. **Pond of mirrors**
4. **Array**



DMD™

Each mirror element is suspended over address electrodes by a torsion hinge between two posts.

1. **Support posts**
2. **Mirror element**
3. **Torsion hinges**
4. **Offset address electrode**

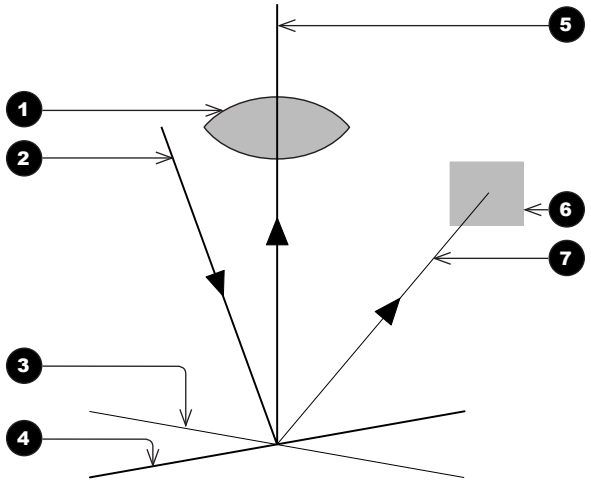


Mirror element with tilt mechanism

Notes

Depending on the voltage polarity applied, each mirror will either tilt to the left to produce a bright pixel or to the right for a dark pixel. When light is applied to the complete DMD™, only the light redirected from a mirror tilting to the left is projected.

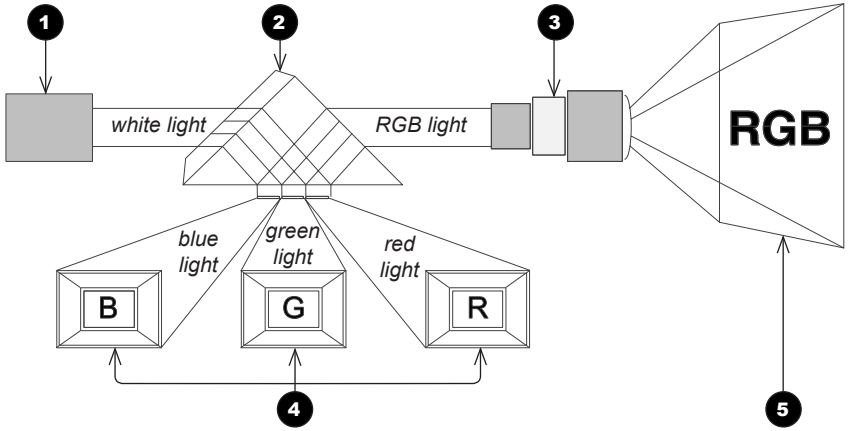
1. **Projection lens**
2. **Incoming light from the illumination module**
3. **Mirror element tilted to the right**
4. **Mirror element tilted to the left**
5. **Reflected light, left tilt**
6. **Light dump**
7. **Reflected light, right tilt**



Light flow

The projector optically filters white light from the illumination module into its constituent red, green and blue. Each color illuminates a separate DMD™ whose modulated output is then recombined with the other two to form the projected full color image.

1. **Illumination module**
2. **Optical filtering of light into red, green and blue**
3. **Projection lens**
4. **DMD™ devices**
5. **Full color image displayed on screen**



Filtering process

Notes

Choosing A Lens

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

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

Throw ratio	Throw distance range
0.67:1 fixed lens	1.1 m - 10 m (3.6 ft - 33 ft)
1.12:1 fixed lens	3 m - 15 m (9.8 ft - 49.2 ft)
1.16 - 1.49:1 zoom lens	3 m - 15 m (9.8 ft - 49.2 ft)
1.39 - 1.87:1 zoom lens	4 m - 24 m (13.1 ft - 78.7 ft)
1.87 - 2.56:1 zoom lens	4 m - 24 m (13.1 ft - 78.7 ft)
2.56 - 4.16:1 zoom lens	9.1 m - 45 m (29.9 ft - 147.6 ft)
4.16 - 6.96:1 zoom lens	12 m - 80 m (39.3 ft - 262.5 ft)
6.92 - 10.36:1 zoom lens	12 m - 80 m (39.3 ft - 262.5 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.

Notes

*For information about individual lens part numbers, see **Appendix A** at the end of this document.*

Basic calculation

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

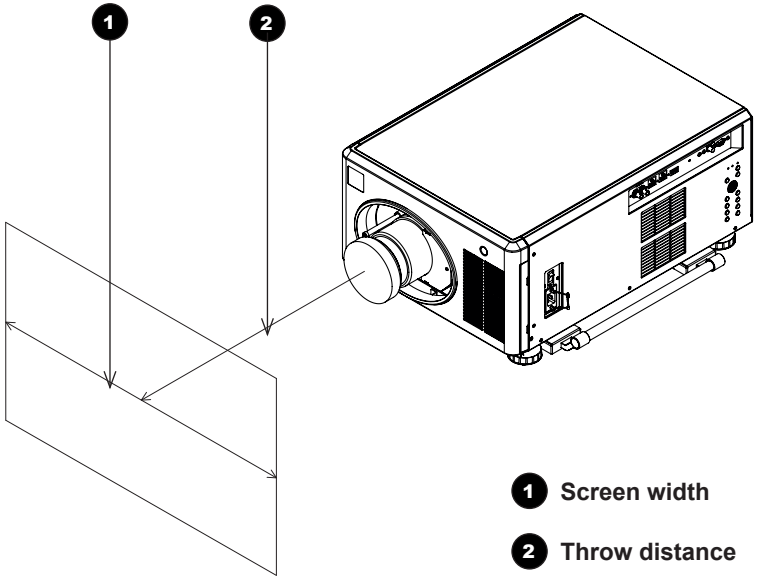
A ***throw ratio*** is the ratio of the throw distance to the screen width:

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

1. Use the formula above to obtain the required throw ratio.
2. Match the throw ratio with a lens from the table below:

Throw ratio	Throw distance range
0.67:1 fixed lens	1.1 m - 10 m (3.6 ft - 33 ft)
1.12:1 fixed lens	3 m - 15 m (9.8 ft - 49.2 ft)
1.16 - 1.49:1 zoom lens	3 m - 15 m (9.8 ft - 49.2 ft)
1.39 - 1.87:1 zoom lens	4 m - 24 m (13.1 ft - 78.7 ft)
1.87 - 2.56:1 zoom lens	4 m - 24 m (13.1 ft - 78.7 ft)
2.56 - 4.16:1 zoom lens	9.1 m - 45 m (29.9 ft - 147.6 ft)
4.16 - 6.96:1 zoom lens	12 m - 80 m (39.3 ft - 262.5 ft)
6.92 - 10.36:1 zoom lens	12 m - 80 m (39.3 ft - 262.5 ft)

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



1 **Screen width**

2 **Throw distance**

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.*

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

For information about individual lens part numbers, see ***Appendix A*** *at the end of this document.*

Basic calculation example

1. **Calculate the throw ratio using the formula.**

   Your screen is ***4.5 m*** wide and you wish to place the projector approximately ***11 m*** from the screen. The throw ratio will then be

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

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

   The lens matching a throw ratio of 2.44 is ***the 1.87 - 2.56 : 1 zoom lens***.

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

   The range quoted for the 1.87 - 2.56 : 1 zoom lens is ***4 - 24 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 ratio	Throw distance range
0.67:1 fixed lens	1.1 m - 10 m (3.6 ft - 33 ft)
1.12:1 fixed lens	3 m - 15 m (9.8 ft - 49.2 ft)
1.16 - 1.49:1 zoom lens	3 m - 15 m (9.8 ft - 49.2 ft)
1.39 - 1.87:1 zoom lens	4 m - 24 m (13.1 ft - 78.7 ft)
1.87 - 2.56:1 zoom lens	4 m - 24 m (13.1 ft - 78.7 ft)
2.56 - 4.16:1 zoom lens	9.1 m - 45 m (29.9 ft - 147.6 ft)
4.16 - 6.96:1 zoom lens	12 m - 80 m (39.3 ft - 262.5 ft)
6.92 - 10.36:1 zoom lens	12 m - 80 m (39.3 ft - 262.5 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 WUXGA DMD™.

When a WUXGA 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

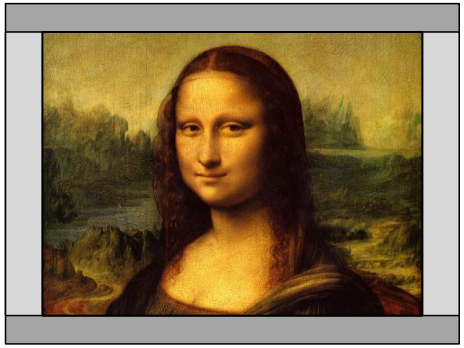


Fig. 2

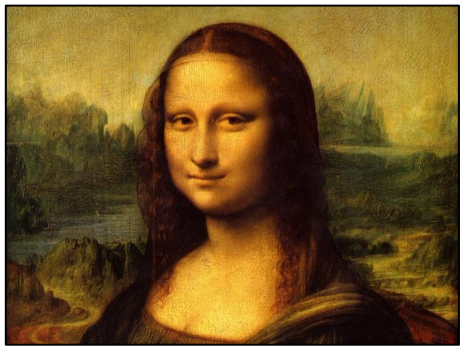


Fig. 3

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:

$$TRC = \frac{1.6\ (DMD™\ aspect\ ratio)}{Source\ aspect\ ratio}$$

TRC table

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

2.35:1 (Scope), 1920 x 817 pixels	TRC < 1, not used
1.85:1 (Flat), 1920 x 1037 pixels	TRC < 1, not used
1.78:1 (16:9), 1920 x 1080	TRC < 1, not used
1.66:1 (Vista), 1792 x 1080 pixels	TRC < 1, not used
1.6:1 (16:10), 1728 x 1080 pixels	TRC = 1, not used (native resolution)
1.33:1 (4:3), 1440 x 1080 pixels	TRC = 1.2
1.25:1 (5:4), 1350 x 1080 pixels	TRC = 1.28

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:

$$\textit{Throw ratio} = \frac{\textit{Throw distance}}{\textit{Screen width } \boldsymbol{x\ TRC}}$$

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

Throw ratio	Throw distance range
0.67:1 fixed lens	1.1 m - 10 m (3.6 ft - 33 ft)
1.12:1 fixed lens	3 m - 15 m (9.8 ft - 49.2 ft)
1.16 - 1.49:1 zoom lens	3 m - 15 m (9.8 ft - 49.2 ft)
1.39 - 1.87:1 zoom lens	4 m - 24 m (13.1 ft - 78.7 ft)
1.87 - 2.56:1 zoom lens	4 m - 24 m (13.1 ft - 78.7 ft)
2.56 - 4.16:1 zoom lens	9.1 m - 45 m (29.9 ft - 147.6 ft)
4.16 - 6.96:1 zoom lens	12 m - 80 m (39.3 ft - 262.5 ft)
6.92 - 10.36:1 zoom lens	12 m - 80 m (39.3 ft - 262.5 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.

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:

$$TRC = \frac{1.6}{1.33} = 1.2$$

2. Calculate the throw ratio:

$$Throw\ ratio = \frac{11}{4.5 \times 1.2} = 2.04$$

3. Find a match in the lens table.

   The table shows that the matching lens is ***the 1.87 - 2.56 : 1 zoom lens***.

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

   The range quoted for the 1.87 - 2.56 : 1 zoom lens is ***4 - 24 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
1.66:1 (Vista)	TRC not used
1.6:1 (16:10)	TRC not used (native resolution)
1.33:1 (4:3)	TRC = 1.2
1.25:1 (5:4)	TRC = 1.28

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

- The lens table:

Throw ratio	**Throw distance range**
0.67:1 fixed lens	1.1 m - 10 m (3.6 ft - 33 ft)
1.12:1 fixed lens	3 m - 15 m (9.8 ft - 49.2 ft)
1.16 - 1.49:1 zoom lens	3 m - 15 m (9.8 ft - 49.2 ft)
1.39 - 1.87:1 zoom lens	4 m - 24 m (13.1 ft - 78.7 ft)
1.87 - 2.56:1 zoom lens	4 m - 24 m (13.1 ft - 78.7 ft)
2.56 - 4.16:1 zoom lens	9.1 m - 45 m (29.9 ft - 147.6 ft)
4.16 - 6.96:1 zoom lens	12 m - 80 m (39.3 ft - 262.5 ft)
6.92 - 10.36:1 zoom lens	12 m - 80 m (39.3 ft - 262.5 ft)

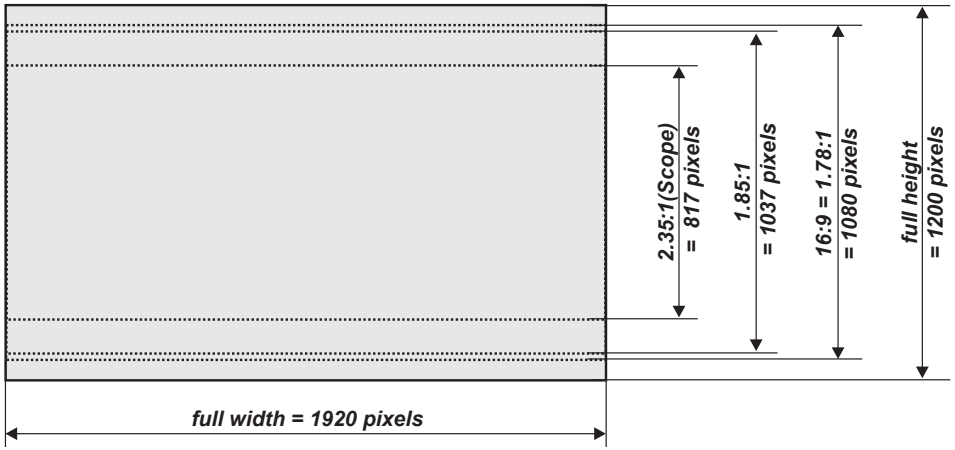
Notes

Screen Requirements

Fitting the image to the DMD™

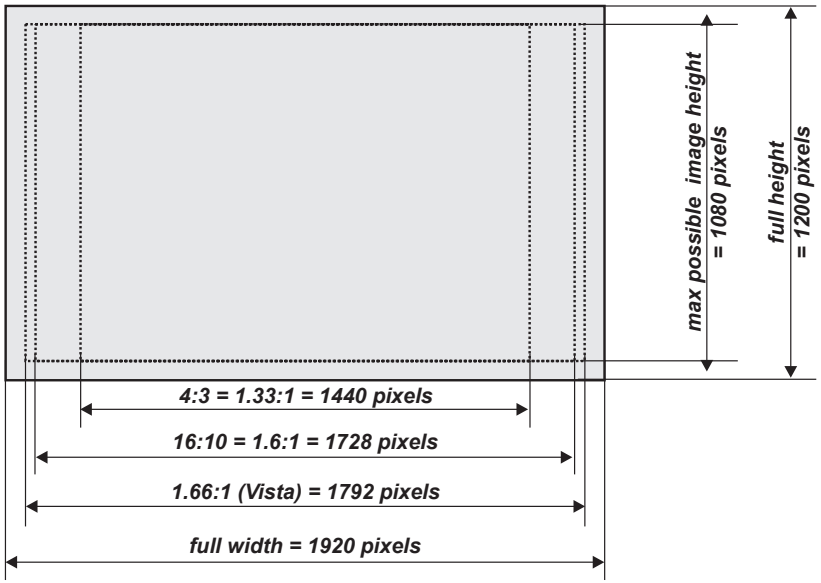
If the source image supplied to the projector is smaller than the DMD™ resolution, the image will not fill the DMD™. The following examples show how a number of common formats may be displayed, depending on your DMD™ resolution.

WUXGA images displayed full width



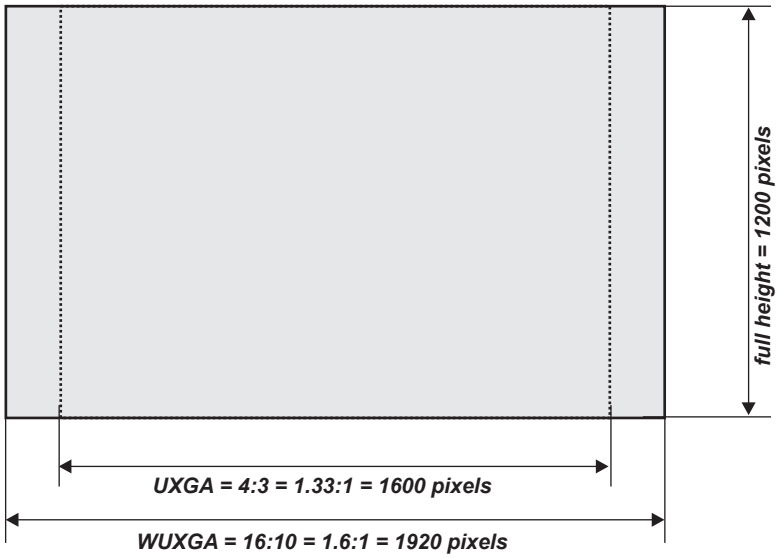
Notes

WUXGA images displayed with a height of 1080 pixels



Notes

WUXGA images displayed full height



Notes

Only WUXGA or UXGA images can fill the full height of the DMD™, using all 1200 pixels without scaling.

Diagonal screen sizes

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

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

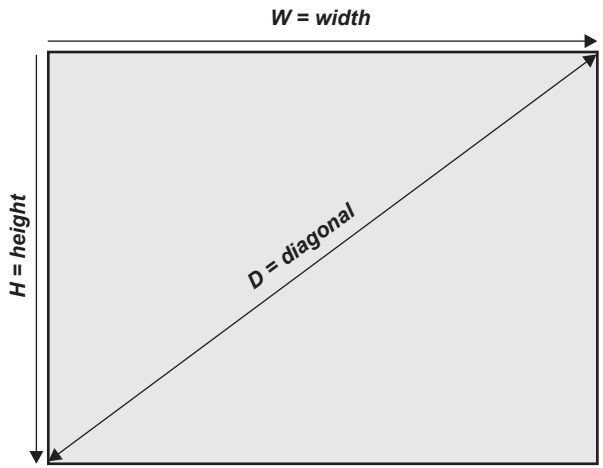
2.35:1 (Scope)
W = D x 0.92 ***H*** = D x 0.39

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

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

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

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



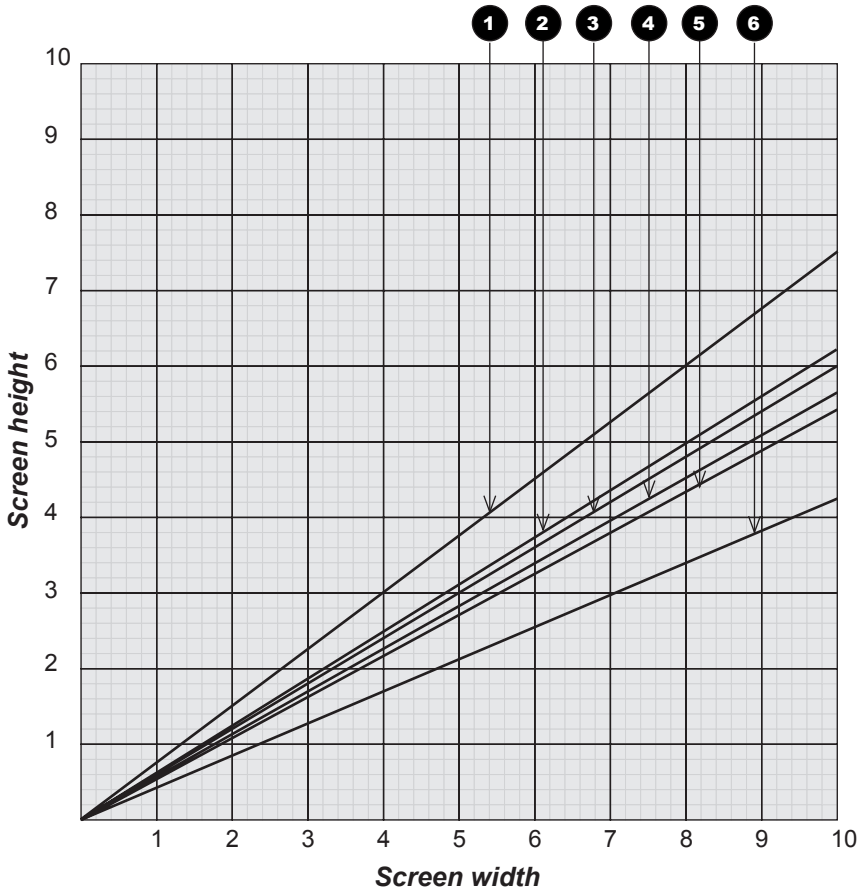
Notes

Fitting the image to the screen

It is important that your screen is of sufficient height and width to display images at all the aspect ratios you are planning to use.

Use the conversion chart to check that you are able to display the full image on your screen. If you have insufficient height or width, you will have to reduce the overall image size in order to display the full image on your screen.

1. **4:3 = 1.33:1**
   W = H x 1.33, H = W x 0.75
2. **16:10 = 1.6:1**
   (native aspect ratio for WUXGA projectors)
   W = H x 1.6, H = W x 0.625
3. **1.66:1 (Vista)**
   W = H x 1.66, H = W x 0.6
4. **16:9 = 1.78:1**
   W = H x 1.78, H = W x 0.56
5. **1.85:1 (Flat)**
   W = H x 1.85, H = W x 0.54
6. **2.35:1 (Scope)**
   W = H x 2.35, H = W x 0.426

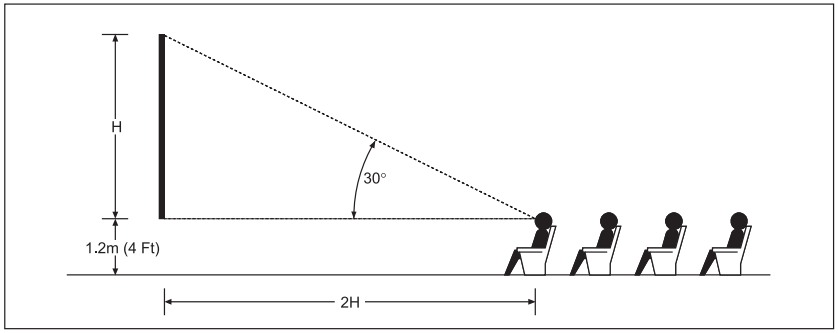


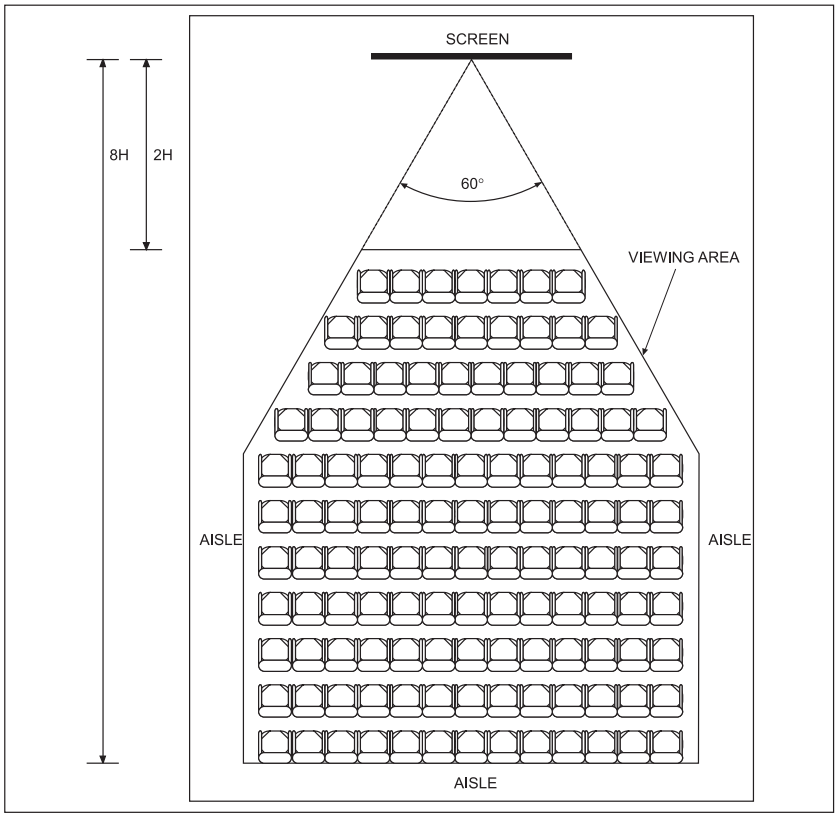
Notes

Positioning the screen and projector

For optimum viewing, the screen should be a flat surface perpendicular to the floor. The bottom of the screen should be 1.2 m (4 feet) above the floor and the front row of the audience should not have to look up more than 30° to see the top of the screen.

The distance between the front row of the audience and the screen should be at least twice the screen height and the distance between the back row and the screen should be a maximum of 8 times the screen height. The screen viewing area should be within a 60° range from the face of the screen.





Notes

The projector should be installed as close to the power outlet as possible.

The power connection should be easily accessible, so that it can be disconnected in an emergency.

Ensure that there is at least 30 cm (12 in) of space between the ventilation outlets and any wall, and 10 cm (4 in) on all other sides.

Do not install the projector close to anything that might be affected by its operational heat, for instance, polystyrene ceiling tiles, curtains etc.

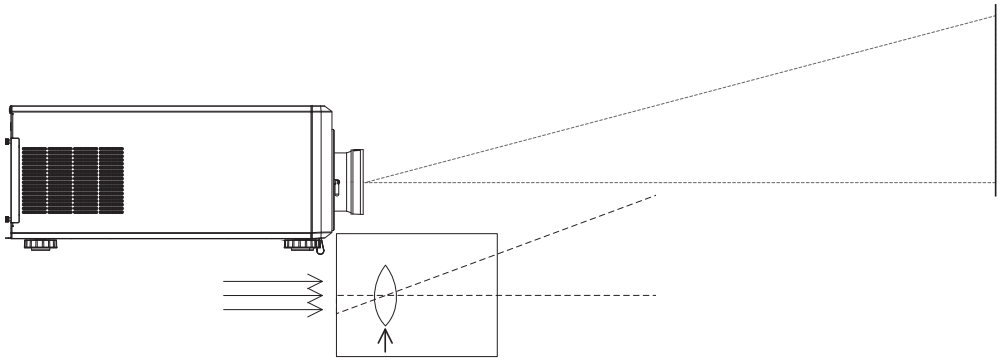
*The image can be flipped for rear projection (see **Setup menu** in the **Operating Guide**) and displayed without the need for extra mirrors or equipment.*

However, you must ensure that there is sufficient distance behind the screen for the projector to be correctly located.

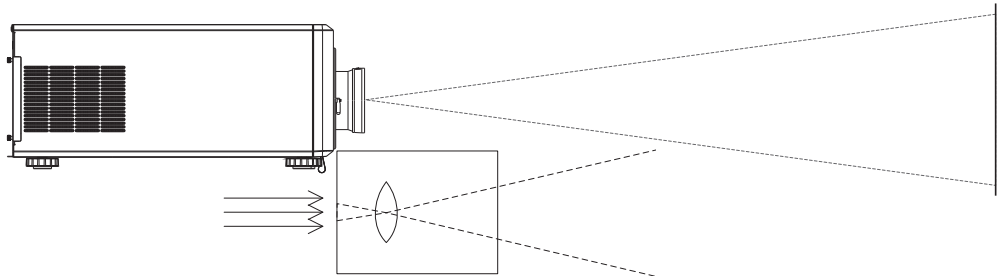
Rear installation is generally more complicated and advice should be sought from your local dealer before attempting it.

Positioning The Image

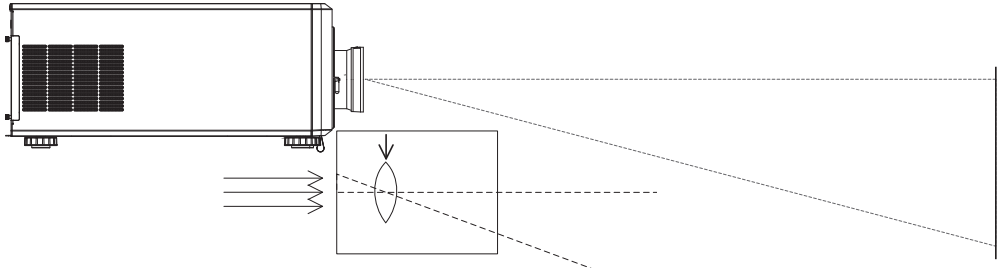
The normal position for the projector is at the centre of the screen. However, you can set the projector above or below the centre, or to one side, and adjust the image using the **Lens shift** feature (known as ***rising and falling front***) to maintain a geometrically correct image.



Shifting the lens up (rising front)



Centered lens



Shifting the lens down (falling front)

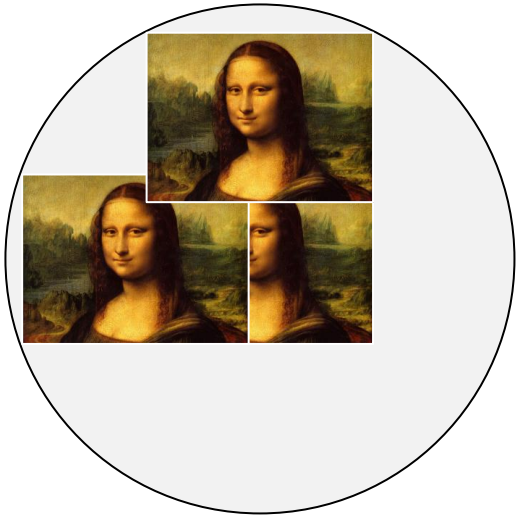
Notes

*For more information on shifting the lens, see **Lens control** in the **Operating Guide**.*

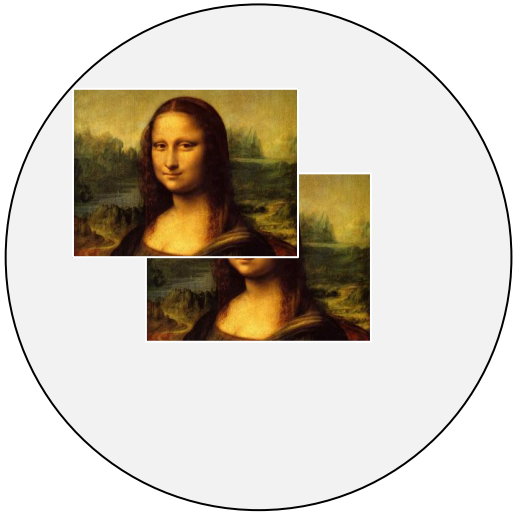
Whenever possible, position the projector so that the lens is centered for the highest quality image.

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

Notes

*For more information on shifting the lens, see **Lens control** in the **Operating Guide**.*

Maximum offset range

The maximum offset range available with no distortion or vignetting is dependent on which lens is used. Shifting the lens beyond its undistorted limits may be physically possible, however you may experience some vignetting or distortion.

Throw ratio	Lens shift
0.67:1 fixed lens	Vert: 0.108 (U) 0.108 (D) frame, Hor: 0.044 (L) 0.044 (R) frame
1.12:1 fixed lens	Vert: 0.567 (U) 0.45 (D) frame, Hor: 0.188 (L) 0.188 (R) frame
1.16 - 1.49:1 zoom lens	Vert: 0.408 (U) 0.408 (D) frame, Hor: 0.188 (L) 0.188 (R) frame
1.39 - 1.87:1 zoom lens	Vert: 0.567 (U) 0.45 (D) frame, Hor: 0.188 (L) 0.188 (R) frame
1.87 - 2.56:1 zoom lens	Vert: 0.567 (U) 0.45 (D) frame, Hor: 0.188 (L) 0.188 (R) frame
2.56 - 4.16:1 zoom lens	Vert: 0.567 (U) 0.45 (D) frame, Hor: 0.188 (L) 0.188 (R) frame
4.16 - 6.96:1 zoom lens	Vert: 0.567 (U) 0.45 (D) frame, Hor: 0.188 (L) 0.188 (R) frame
6.92 - 10.36:1 zoom lens	Vert: 0.567 (U) 0.45 (D) frame, Hor: 0.188 (L) 0.188 (R) frame

Notes

*For more information on shifting the lens, see **Lens control** in the **Operating Guide**.*

Aspect Ratios Explained

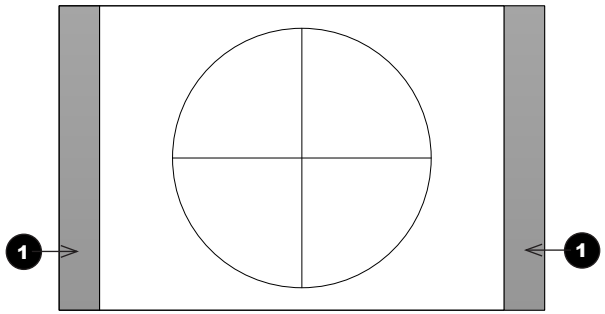
The appearance of a projected image on the screen depends on a combination of the following:

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

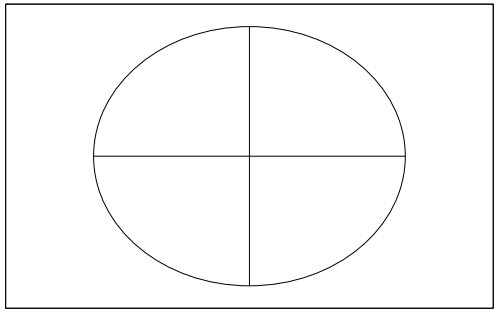
Notes

Aspect ratio examples

Source: 4:3

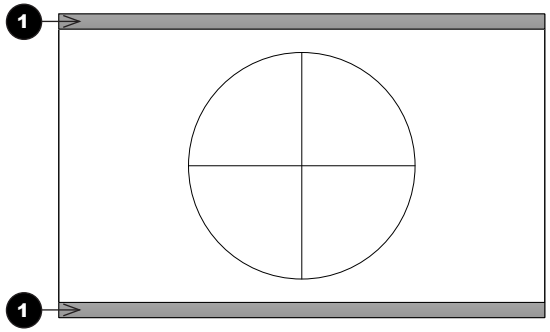


Aspect Ratio: Source / 4:3

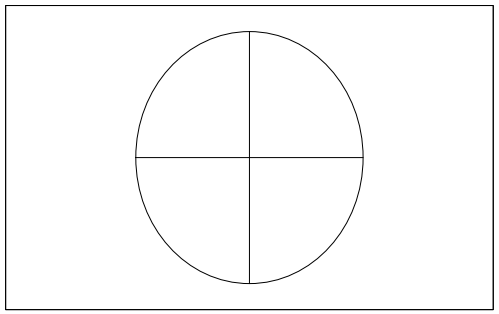


Aspect Ratio: 16:10

Source: 16:9

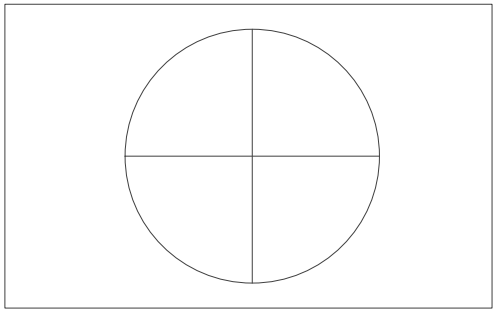


Aspect Ratio: Source / 16:9



Aspect Ratio: 16:10

Source: 16:10 (native)



Aspect Ratio: Source / 16:10

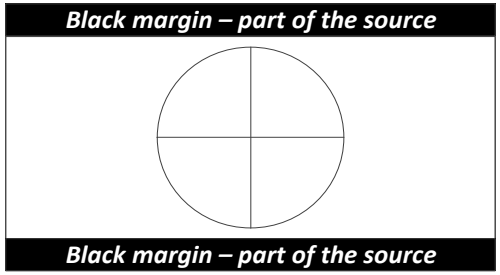
1 **Unused screen areas**

Notes

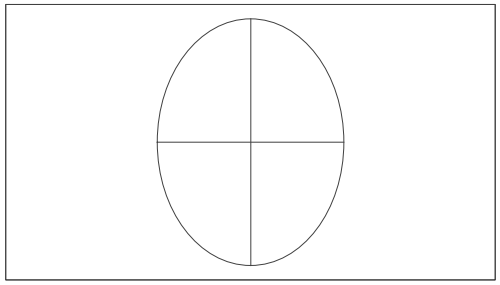
Aspect ratio example: TheaterScope

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.

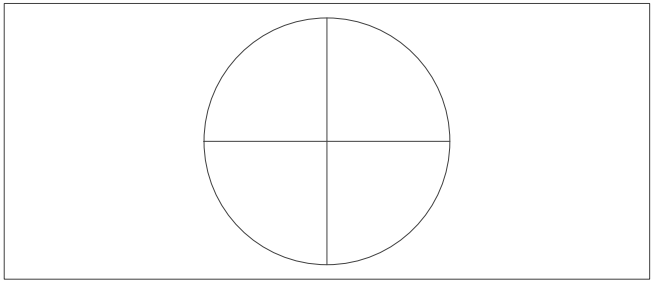
Without an anamorphic lens and without the TheaterScope setting applied, a 16:9 source containing a 2.35:1 image looks like this:



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



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



Notes

Frame Rates And Pulldowns Explained

Interlaced and progressive scan

A ***progressive scan*** is a method of updating the image by drawing all the lines of each frame in a sequence. In contrast, ***interlaced video*** alternately scans odd and even lines. In old analog TV interlacing was commonly used as a way of doubling the refresh rate without consuming extra bandwidth.

The following artifacts are common with interlaced video:

- edge tear (combing)

  The image lands between two fields and blurs. This is commonly observed when viewing rapid lateral movement.

- aliasing (stair-stepping)

  The texture of the image becomes populated with unrealistic patterns. Aliasing occurs because of differences between the original frame rate and the destination format.

- twitter

  The image shimmers, for example when showing rolling credits. This happens when the image contains thin horizontal lines that only appear in one field.

Frame rates of image sources

Original analog films are made at 24 fps and the whole frame is projected at once. To eliminate flicker and create an impression of continuous movement, the projector blades divide the images so that the viewer sees 48 frames per second.

Interlaced video scans odd lines, then even. Two fields are blended into one image. NTSC video (60i) is 29.97 fps, or 59.94 fields per second.

24p video is progressive but without the benefit of projector blades dividing the images, so it looks jumpier on playback than film. 24p is the optimal format for projects that are finished on film.

30p is optimal for projects finished on video. It has fewer strobing issues than 24p in video playback.

Notes

Pulldowns - conversion into destination formats

Pulldowns are a method of converting a 24p source into a different destination format by adding extra frames to the source.

2:3 (normal) pulldown

This method is used to convert a 24p source (film) into a 60i destination (NTSC video) by adding two extra fields for every four frames, effectively increasing the frame rate to 30 fps. The frame is split into fields and then two fields are repeated for every four original frames as shown in the illustration below.

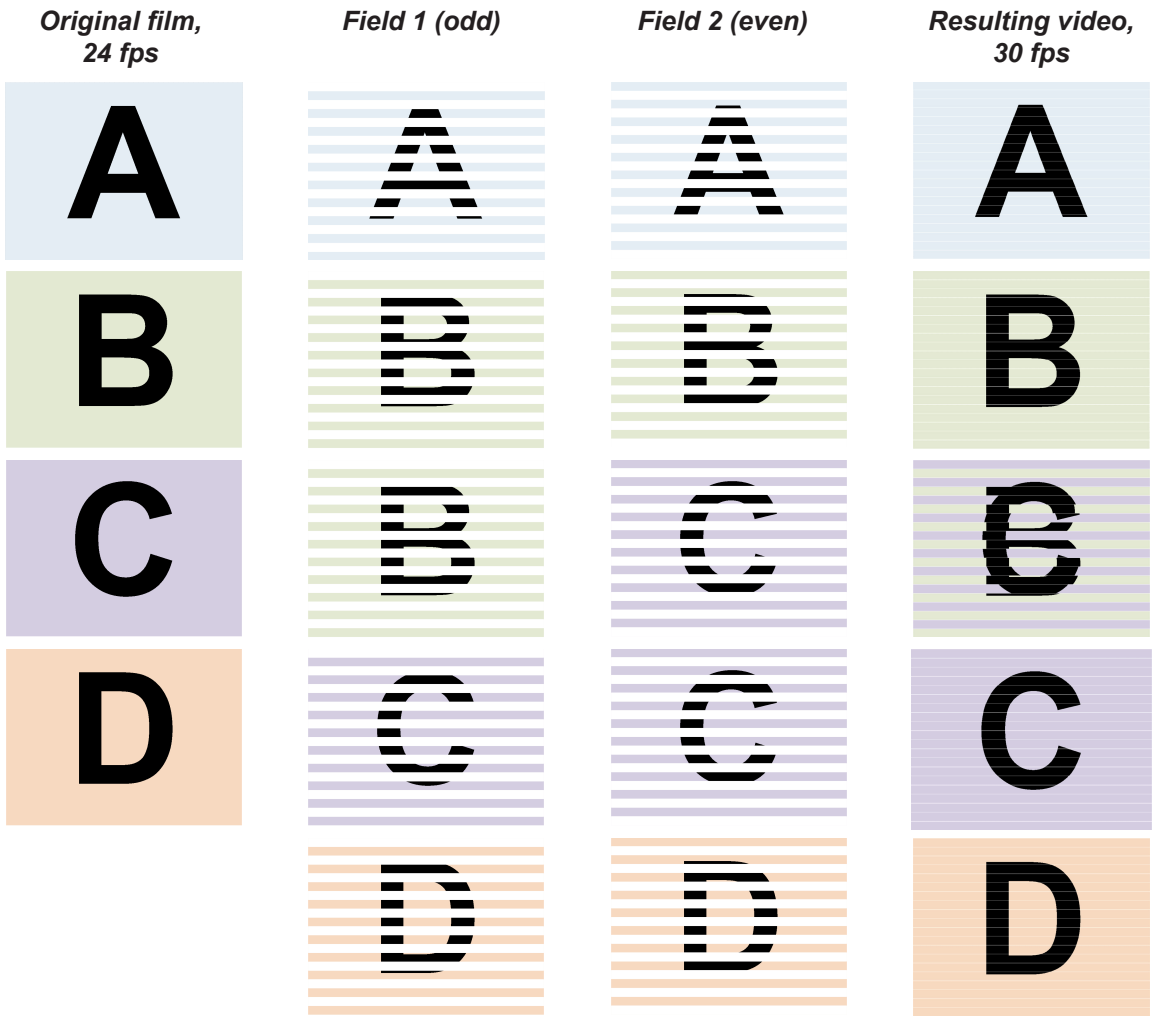


Notes

2:3:3:2 (advanced) pulldown

This method is very similar to the normal pulldown. Unlike the normal pulldown method, the resulting 30 fps video sequence contains only one frame containing fields from two different source frames.

The advantage of this method is that it is easier to reverse, if necessary.



Notes

The projector will use advanced pulldown on suitable video material, wherever possible.

Appendix A: Lens Part Numbers

Throw ratio	Part number	Throw distance range	Lens shift
0.67:1 fixed lens	105-607	1.1 m - 10 m (3.6 ft - 33 ft)	Vert: 0.108 (U) 0.108 (D) frame, Hor: 0.044 (L) 0.044 (R) frame
1.12:1 fixed lens	105-608	3 m - 15 m (9.8 ft - 49.2 ft)	Vert: 0.567 (U) 0.45 (D) frame, Hor: 0.188 (L) 0.188 (R) frame
1.16 - 1.49:1 zoom lens	109-236	3 m - 15 m (9.8 ft - 49.2 ft)	Vert: 0.408 (U) 0.408 (D) frame, Hor: 0.188 (L) 0.188 (R) frame
1.39 - 1.87:1 zoom lens	105-610	4 m - 24 m (13.1 ft - 78.7 ft)	Vert: 0.567 (U) 0.45 (D) frame, Hor: 0.188 (L) 0.188 (R) frame
1.87 - 2.56:1 zoom lens	105-611	4 m - 24 m (13.1 ft - 78.7 ft)	Vert: 0.567 (U) 0.45 (D) frame, Hor: 0.188 (L) 0.188 (R) frame
2.56 - 4.16:1 zoom lens	105-612	9.1 m - 45 m (29.9 ft - 147.6 ft)	Vert: 0.567 (U) 0.45 (D) frame, Hor: 0.188 (L) 0.188 (R) frame
4.16 - 6.96:1 zoom lens	105-613	12 m - 80 m (39.3 ft - 262.5 ft)	Vert: 0.567 (U) 0.45 (D) frame, Hor: 0.188 (L) 0.188 (R) frame
6.92 - 10.36:1 zoom lens	109-235	12 m - 80 m (39.3 ft - 262.5 ft)	Vert: 0.567 (U) 0.45 (D) frame, Hor: 0.188 (L) 0.188 (R) frame

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****.*

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

Appendix B: Supported Signal Input Modes

2D formats

Standard	Resolution	Frame Rate (Hz)	DisplayPort	HDMI / HDBaseT				HD/SDI/3G
				RGB	YUV 8-bit	YUV 10-bit	YUV 12-bit	
PC	640x480	59.94	X	X				
	640x480	74.99	X	X				
	640x480	85	X	X				
	800x600	60.32	X	X				
	800x600	75	X	X				
	800x600	85.06	X	X				
	848x480	47.95	X	X				
	848x480	59.94	X	X				
	1024*768	60	X	X				
	1024*768	75	X	X				
	1024*768	85	X	X				
	1280x720	47.95	X	X				
	1280x1024	60.02	X	X				
	1280x1024	75.02	X	X				
	1280x1024	85.02	X	X				
	1600x1200	60	X	X				
	1920x1080	47.95	X	X				
	1680x1050	59.94	X	X				
	1920x1200 RB	50	X	X				
	1920x1200 RB	60	X	X				
	1400X1050	60	X	X				
	1366 x 768	60	X	X				
	1440 x 900	60	X	X				

Notes

Standard	Resolution	Frame Rate (Hz)	DisplayPort	HDMI / HDBaseT				HD/SDI/3G
				RGB	YUV 8-bit	YUV 10-bit	YUV 12-bit	
PC (continued)	1280 x 768	60	X	X				
	1280 x 800	60	X	X				
	1280 x 960	60	X	X				
Apple Mac	640x480	66.59	X	X				
	832x624	74.54	X	X				
SDTV	480i	59.94						X
	1440x480i	60		X	X	X	X	
	1440x576i	50		X	X	X	X	
	576i	50						X
EDTV	480p	59.94	X	X	X	X	X	
	576p	50	X	X	X	X	X	
HDTV	1035i	60	X	X	X	X	X	X
	1080i	50	X	X	X	X	X	X
	1080i	59.94	X	X	X	X	X	X
	1080i	60	X	X	X	X	X	X
	720p	50	X	X	X	X	X	X
	720p	59.94	X	X	X	X	X	X
	720p	60	X	X	X	X	X	X
	1080p	23.98	X	X	X	X	X	X
	1080p	24	X	X	X	X	X	X
	1080p	25	X	X	X	X	X	X
	1080p	29.97	X	X	X	X	X	x
	1080p	30	X	X	X	X	X	X
	1080p	50	X	X	X	X	X	X
	1080p	59.94	X	X	X	X	X	X
	1080p	60	X	X	X	X	X	X

Notes

Standard	Resolution	Frame Rate (Hz)	DisplayPort	HDMI / HDBaseT				HD/SDI/3G
				RGB	YUV 8-bit	YUV 10-bit	YUV 12-bit	
PsF formats	1080sf	30						X
	1080sf	25						X

3D formats

Standard	Resolution	V-Freq (Hz)	V-Total	H-Freq (kHz)	HDMI1/2 (*1)	DisplayPort (*2)	HBLL Dual-pipe HDMI (*3)	HBLL DisplayPort (*3)	Remarks
720p50 Frame Packing	1280x720	50.00	1470	37.50	✓				
720p59 Frame Packing	1280x720	59.94	1470	44.96	✓				
720p60 Frame Packing	1280x720	60.00	1470	45.00	✓				
720p50 Top-and-Bottom	1280x720	50.00	750	37.50	✓	✓			
720p59 Top-and-Bottom	1280x720	59.94	750	44.96	✓	✓			
720p60 Top-and-Bottom	1280x720	60.00	750	45.00	✓	✓			
1080p23 Frame Packing	1920x1080	23.98	2205	26.97	✓				
1080p24 Frame Packing	1920x1080	24.00	2205	27.00	✓				
1080i50 Side-by-Side (Half)	1920x1080	50.00	1125	56.25	✓	✓			
1080i59 Side-by-Side (Half)	1920x1080	59.94	1125	67.43	✓	✓			
1080i60 Side-by-Side (Half)	1920x1080	60.00	1125	67.50	✓	✓			
1080p50 Side-by-Side (Half)	1920x1080	50.00	1125	56.25	✓	✓			
1080p59 Side-by-Side (Half)	1920x1080	59.94	1125	67.43	✓	✓			
1080p60 Side-by-Side (Half)	1920x1080	60.00	1125	67.50	✓	✓			
1080p50 Top-and-Bottom	1920x1080	50.00	1125	56.25	✓	✓			

Notes

Remarks:

****1: Based on IT6802 chip specification***

****2: Based on IT6535 chip specification***

**3: HBLL (High Bandwidth Low Latency) mode without warping/ blending.*

**4: 8-bit / color.*

Standard	Resolution	V-Freq (Hz)	V-Total	H-Freq (kHz)	HDMI1/2 (*1)	DisplayPort (*2)	HBLL Dual-pipe HDMI (*3)	HBLL DisplayPort (*3)	Remarks
1080p59 Top-and-Bottom	1920x1080	59.94	1125	67.43	✓	✓			
1080p60 Top-and-Bottom	1920x1080	60.00	1125	67.50	✓	✓			
1080p50 Frame Sequential	1920x1080	50.00	1125	56.25	✓	✓			
1080p59 Frame Sequential	1920x1080	59.94	1125	67.43	✓	✓			
1080p60 Frame Sequential	1920x1080	60.00	1125	67.50	✓	✓			
1080p100 Frame Sequential	1920x1080	100.00	1125	112.50				✓	*4
1080p120 Frame Sequential	1920x1080	120.00	1125	135.00				✓	*4
WUXGA_100_RB Frame Sequential	1920x1200	100.00	1258	125.72				✓	
WUXGA_120_RB Frame Sequential	1920x1200	120.00	1271	152.40				✓	*4
1080p23 Dual Pipe	1920x1080	23.98	1125	26.97			✓		
1080p24 Dual Pipe	1920x1080	24.00	1125	27.00			✓		
1080p25 Dual Pipe	1920x1080	25.00	1125	28.13			✓		
1080p30 Dual Pipe	1920x1080	30.00	1125	33.75			✓		
1080p50 Dual Pipe	1920x1080	50.00	1125	56.25			✓		
1080p59 Dual Pipe	1920x1080	59.94	1125	67.43			✓		
1080p60 Dual Pipe	1920x1080	60.00	1125	67.50			✓		
WUXGA_60_RB Dual Pipe	1920x1200	60.00	1235	74.04			✓		

Notes

Remarks:

**1: Based on IT6802 chip specification*

**2: Based on IT6535 chip specification*

**3: HBLL (High Bandwidth Low Latency) mode without warping/ blending.*

**4: 8-bit / color.*

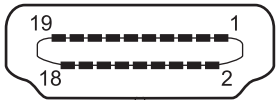
Appendix C: Wiring Details

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



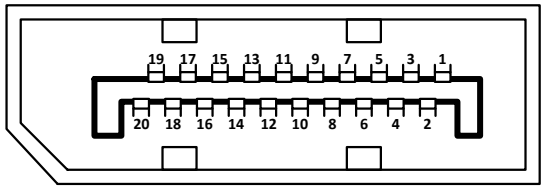
HDMI: pin view of panel connector

Notes

DisplayPort

DisplayPort 1.1a

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

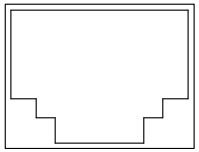
75 ohm BNC



3G-SDI connector

HDBaseT input

RJ45 socket.



HDBaseT input

Notes

3G-SDI signals are very high speed digital signals which require better quality coaxial cable than conventional analogue video. The data rate is 3 Gigabits per second.

In choosing cable length and connectors for any installation the frequency response loss in decibels should be proportional to √f, from 1 MHz, to 3 GHz.

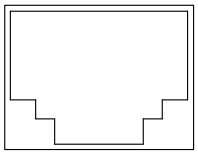
High-bandwidth Digital Content Protection (HDCP) is supported on this input.

Control connections

LAN

RJ45 socket

(Shared with HDBaseT)



HDBaseT/LAN port

RS232

9 way D-type connector

1 unused

2 Received Data (RX)

3 Transmitted Data (TX)

4 unused

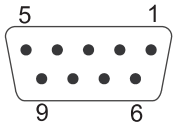
5 Signal Ground

6 unused

7 unused

8 unused

9 unused



RS232:
pin view of female connector

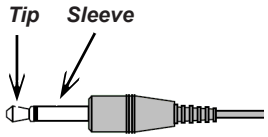
Notes

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

Trigger 1 & Trigger 2

3.5 mm mini jack

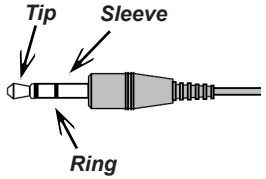
Tip Signal
Sleeve Ground
Output: 12V, 200 mA max



IR input

3.5 mm mini jack

Tip Power
Ring Signal
Sleeve Ground
Output: 3.3V ±5%, 500 mA max



3D Sync IN and 3D Sync OUT

75 ohm BNC

Sync OUT output voltage 5V

Sync IN input voltage 3.3V~5V



pin view of female connector

Notes

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