DIGITAL PROJECTION

USER MANUAL

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

Titan Super Quad Series

Titan Quad 2000 Series

Titan Quad Series

Titan 930 Series

Titan 800 Series

High Brightness Digital Video Projector

Rev J July 2014

112-671J

About This Document

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

Keep this manual handy for future reference.

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

Introduction

Congratulations on your purchase of this Digital Projection product!

Your projector has the following key features:

- Support for most 3D standards (if your projector is a 3D model)
- Full range of digital and legacy analog inputs
- Control of most aspects of the projector's operation via LAN and RS232
- Support for a number of aspect ratios and screen sizes
- Nonlinear warp adjustment by moving points on an interpolated grid
- Ceiling mount and rear-screen installation options
- Simultaneous display of two sources via Picture-In-Picture
- Long lamp life
- Motorised lens mount

A serial number is located on the back of the projector. Please record it here:

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INSTALLATION AND QUICK-START GUIDE

Titan Super Quad Series

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High Brightness Digital Video Projector

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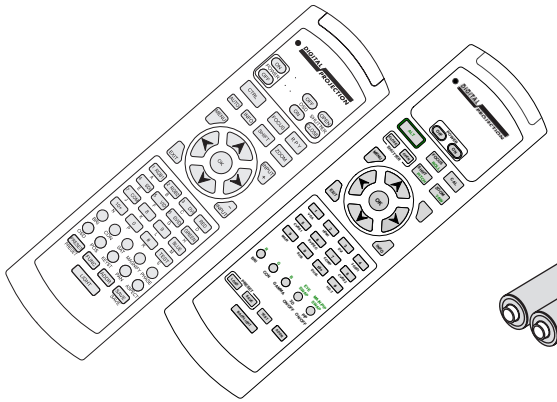
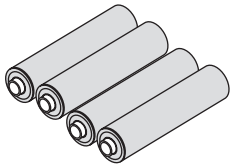
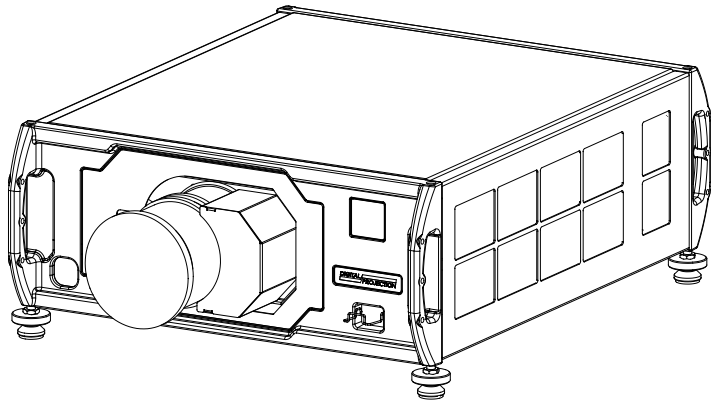
What's In The Box?



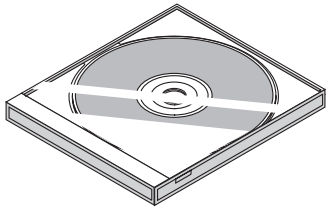
Remote control (105-023) Rev A or B



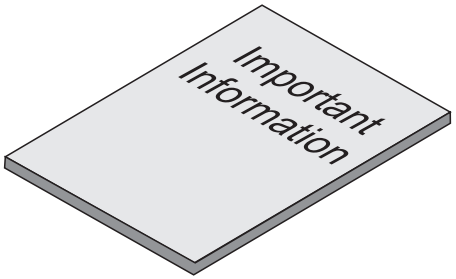
4x AAA batteries



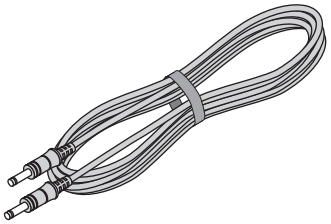
Projector



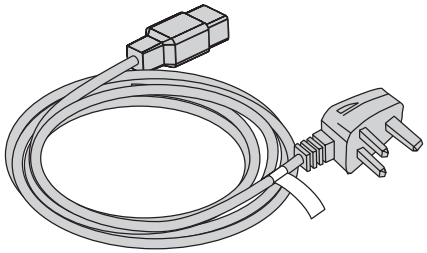
User Manual on disc (115-759)



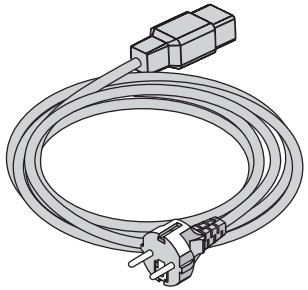
Important Information (112-658)



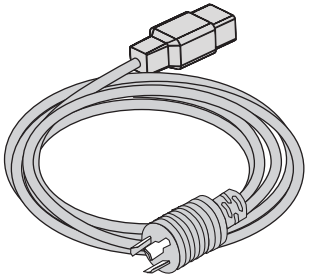
Remote cable (102-162)



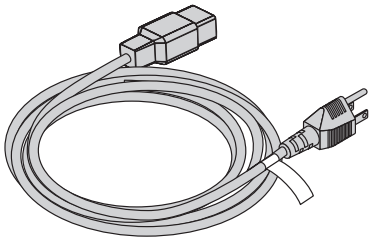
Power cable, United Kingdom (102-180 for Titan 800, 112-000 for Quad)



Power cable, Europe (102-163 for Titan 800, 112-001 for Quad)



Power cable, North America (102-165 for Titan 800, 112-002 for Quad)



Power cable for Titan 930, North America (114-964)

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.

When transporting the projector, always ensure that the removable feet are fully wound in.

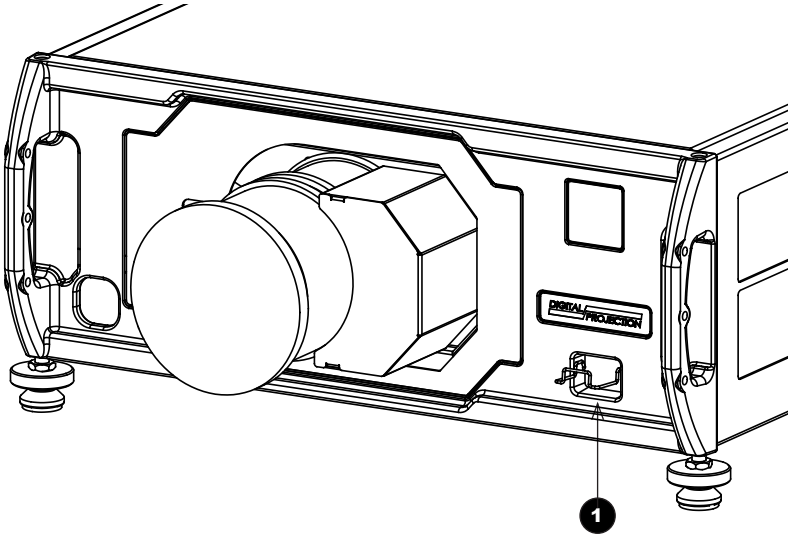
The projector is shipped without a lens.

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

Connecting The Power Supply

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

1 **AC mains inlet with cable lock**



Front view of the projector

Notes

Use only the power cable provided.

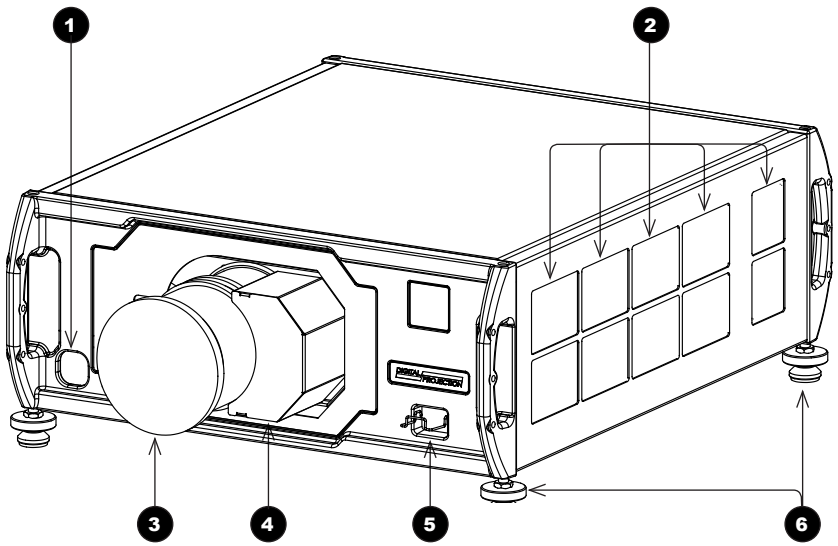
Ensure that the power outlet includes a ground connection as this equipment MUST be earthed.

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

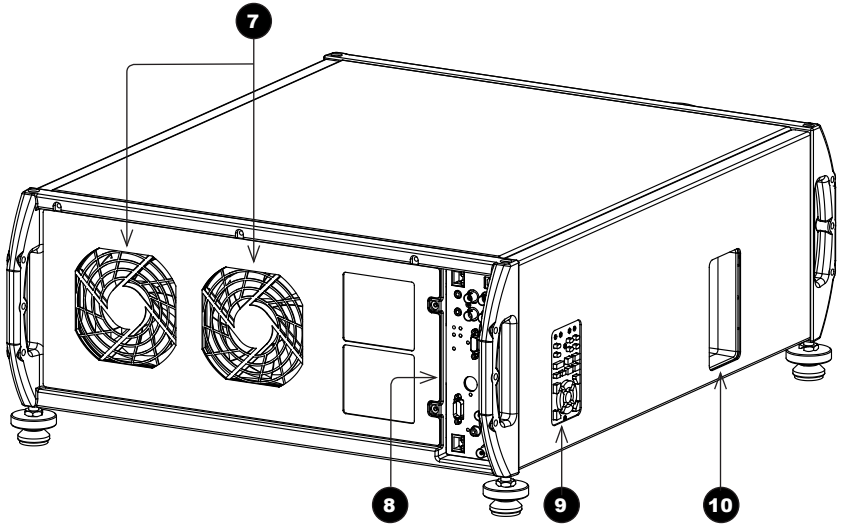
Projector Overview

Front and rear views

1. Front infrared window
2. Air inlets with air filters
3. Lens
4. Lens motor
5. Mains input
6. Adjustable feet
7. Air outlets
8. Rear connection panel with infrared window
9. Control panel
10. Side connection panel



Front view

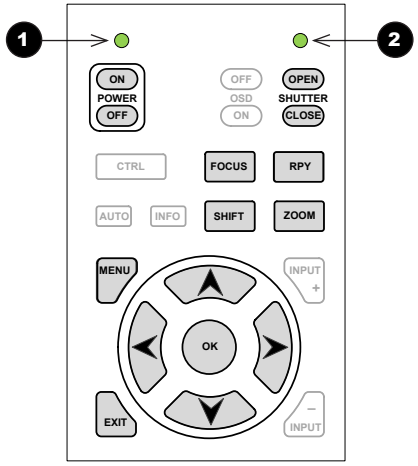


Rear view

Notes

The side connection panel is available on 3D models only.

Control panel indicators



1 Power indicator

Behavior		Meaning
Off	●	The projector is switched off.
On (amber)	●	The projector is in Standby mode.
On (green)	●	The projector is switched on (Normal mode).

2 Shutter indicator

Behavior		Meaning
On (amber)	●	The shutter is closed.
On (green)	●	The shutter is open.

Notes

Only the controls shown highlighted are used on this projector.

During startup all LEDs light up at the same time to indicate the projector is carrying out a self-test.

Connection panel indicators

1 Lamps 1-4 indicators

Behavior	Meaning
On (green)	The lamp is switched on (100%).
On (amber)	The lamp is running on less than full capacity: 80-99% for Titan Quad / Titan 800 86-99% for Titan Super Quad / Titan Quad 2000 / Titan 930
Flashing (green)	The lamp is warming up.
Flashing (amber)	The lamp is cooling down.
On (red)	Projector in standby: Lamp Timer Error (call service) Projector on: Ballast Comms Error (call service)
Flashing (red)	Projector in standby: Lamp Error on previous operation Projector on: Lamp / Interlock Error

2 Error indicator

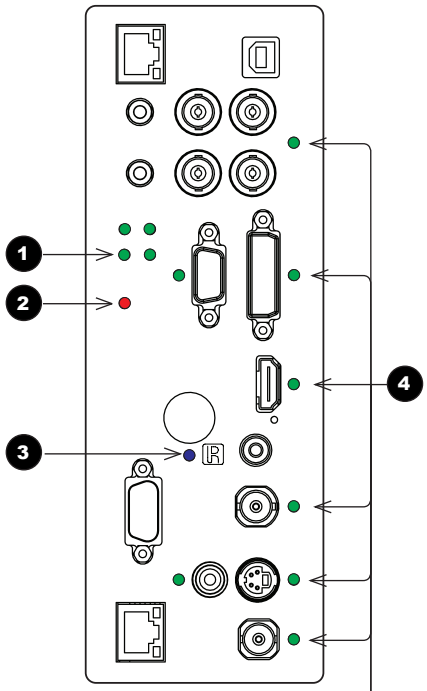
Behavior	Meaning
On (red)	Voltage Error
Flashing (red)	Fan / System Error

3 Infrared indicator

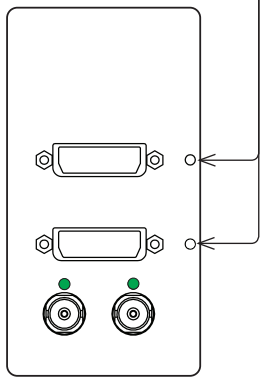
Behavior	Meaning
Flashing (blue)	The projector is receiving input from the remote control or keypad.

4 Input indicators

Behavior	Meaning
On (green)	Input selected. Signal detected and in range.
Flashing (green)	Input selected, but signal is not detected or out of range.



Rear connection panel



Side connection panel

Notes

*For more information about the connection panels, see the **Connection Guide**.*

A red LED always indicates an error. If you receive an error indication, restart the projector. If the problem persists, contact your dealer.

The side connection panel is available on 3D models only.

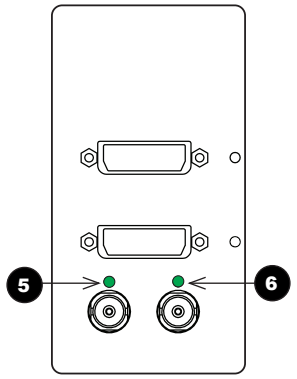
Connection panel indicators - continued from previous page

5 **Sync in indicator**

Behavior		Meaning
On (green)	●	Valid sync in.

6 **Sync out indicator**

Behavior		Meaning
On (green)	●	Valid sync out.



Side connection panel

Notes

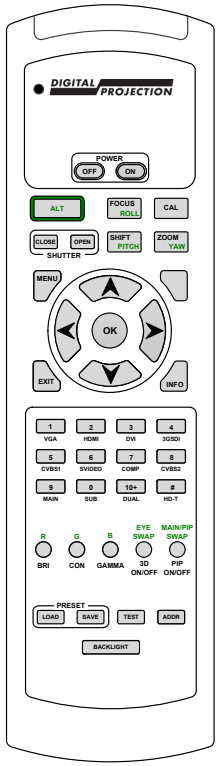
*For more information about the connection panels, see the **Connection Guide**.*

The side connection panel is available on 3D models only.

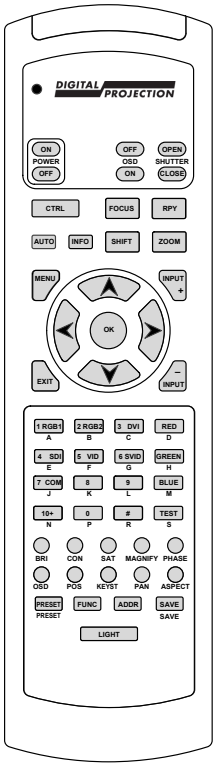
Remote Control

The projector is equipped with one of the remote control devices shown here. The device on the left (105-023 Rev B) was introduced in June 2013; a projector purchased before that date is equipped with the device on the right, 105-023 Rev A.

Both devices and their functions are described in the following pages.



Remote (105-023) Rev B

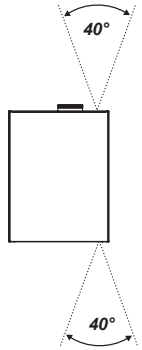


Remote (105-023) Rev A

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

Infrared reception is confirmed by the blue IR LED flashing on the control panel.

The infrared receivers are disabled when a remote control is connected via a cable. For more information, see ***Control Connections*** *in the* ***Connection Guide****.*

Remote control 105-023 Rev B

1 **Transmit indicator**
Flashes when the remote control sends a signal to the projector.
Lights solidly when the projector is in LENS ADJUSTMENT mode.

2 **Power ON / OFF**

3 **ALT**
Acts as a shift key. To use, press and hold this button, then press a green-labeled button.

4 **Shutter OPEN / CLOSE**

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

6 **Navigation**
Navigate through the menus with the arrows, confirm your choice with **OK**.

7 **Input selection**
Select input source.
9, **0** and **10+** are not used on 2D projectors as they are used for inputs on the side connection panel.

8 **Image adjustment**
Adjust brightness, contrast and gamma.
Press this button while holding the **ALT** button down to switch red, green and blue channels on and off.

9 **Lens presets**
To recall a lens preset, press and hold **LOAD**, then press a number button **1** to **5**.
To save a lens preset, press and hold **SAVE**, then press a number button **1** to **5.**

10 **Remote control backlight ON / OFF**
Make the remote control buttons glow in the dark, or switch this feature off.

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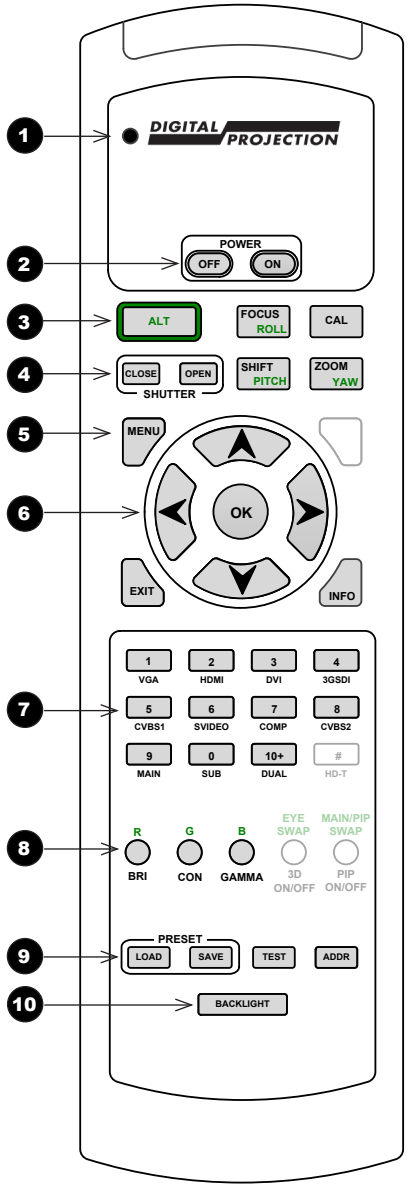


Remote control 105-023 Rev B

Notes

Only the controls shown highlighted are used on this projector.

For more information about LENS ADJUSTMENT mode, see ***Adjusting the lens*** *further in this guide.*

Input selection buttons:

- **1** *to* **8** *- as labeled.*
- **9** *selects Main/DVI (input 9, side connection panel).*
- **0** *selects Sub/HDMI (input 10, side connection panel).*
- **10+** *selects Dual Pipe (both inputs 9 and 10).*

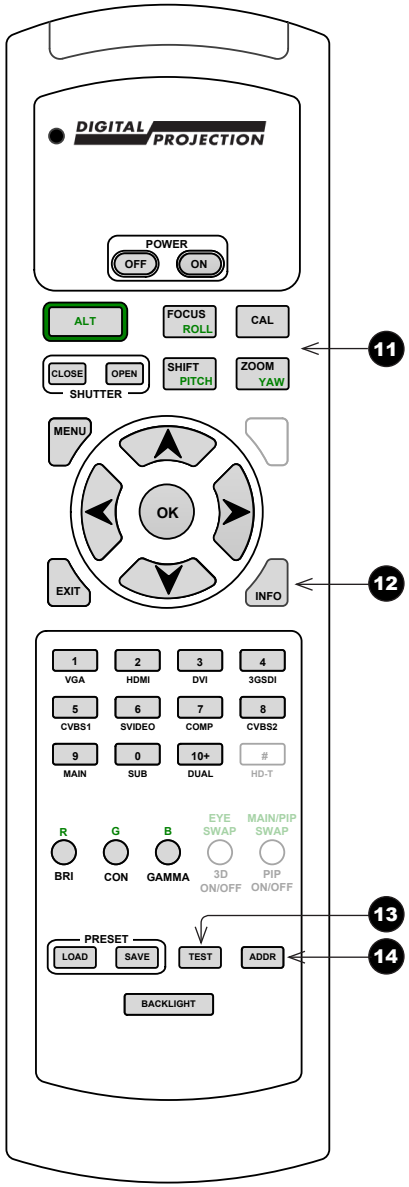
Remote control 105-023 Rev B - continued from previous page

11 **Lens controls**
Adjust position, zoom and focus.
Perform calibration when you change the lens.

12 **INFO**
Open the ***Information*** menu.

13 **TEST**
Switch to test pattern.

14 **IR address**
Set up an address to match the IR address of a projector.



Remote control 105-023 Rev B

Notes

Only the controls shown highlighted are used on this projector.

For more information about IR addresses, see ***Setting up an IR address*** *in the* ***Operating Guide****.*

Remote control 105-023 Rev A

1 **Transmit indicator**
Flashes when the remote control sends a signal to the projector.
Lights solidly when the projector is in LENS ADJUSTMENT mode.

2 **Power ON / OFF**

3 **INFO**
Open the ***Information*** menu.

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

5 **Navigation**
Navigate through the menus with the arrows, confirm your choice with **OK**.

6 **Input selection**
Select input source.
9, 10+ and **#** are not used on 2D projectors.

7 **Settings**
These buttons allow you to change various settings directly from the remote, without opening the OSD:

- **BRI**, **CON**, **SAT** - adjust brightness, contrast and saturation
- **PHASE** - adjust phase for VGA signals
- **MAGNIFY**, **POS**, **PAN** - access the ***Size and Position*** menu
- **OSD** - edit OSD settings
- **ASPECT** - change the aspect ratio

8 **Lens presets**
To recall a preset, press and hold **PRESET**, then press a number button **1** to **5**.
To save a preset, press and hold **SAVE**, then press a number button **1** to **5**.

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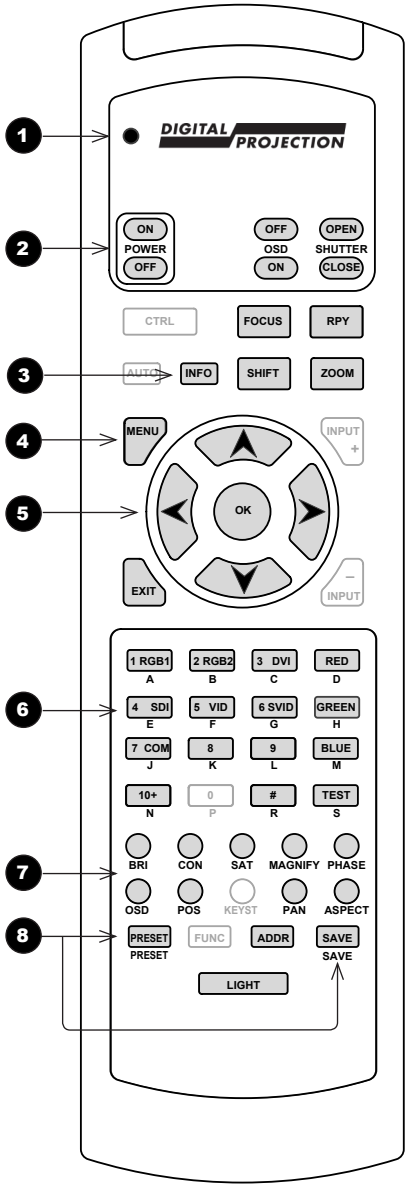


Remote control 105-023 Rev A

Notes

Only the controls shown highlighted are used on this projector.

For more information about LENS ADJUSTMENT mode, see ***Adjusting the lens*** *further in this guide.*

Input selection buttons:

- **1** *selects VGA (input 1)*
- **2** *selects HDMI (input 2)*
- **3** *selects DVI (input 3)*
- **4** *selects 3G-SDI (input 4)*
- **5** *selects Composite 1 (input 5)*
- **6** *selects S-Video (input 6)*
- **7** *selects Component (input 7)*
- **8** *selects Composite 2 (input 8)*
- **9** *selects Main/DVI (input 9, side connection panel)*
- **10+** *selects Dual Pipe (both inputs 9 and 10, side connection panel)*
- **0** *selects Sub/HDMI (input 10, side connection panel)*

Remote control 105-023 Rev A - continued from previous page

9 **OSD ON/OFF**
Switch projector status messages on and off.

10 **Shutter OPEN / CLOSE**

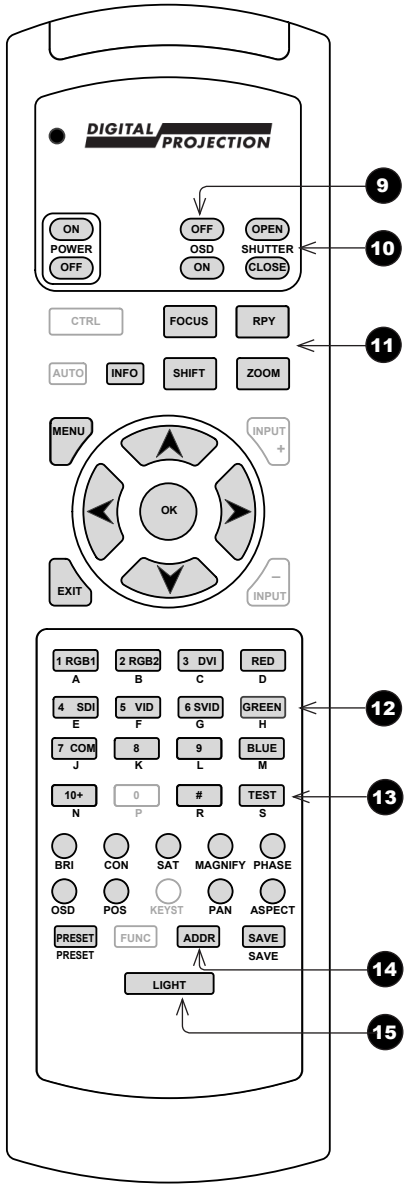
11 **Lens controls**
Adjust position, zoom and focus.
Perform RPY calibration when you change the lens.

12 **Color channels**
Switch red, green and blue channels on and off.

13 **TEST**
Switch to test pattern.

14 **IR address**
Set up an address to match the IR address of a projector.

15 **Remote control backlight ON / OFF**
Make the remote control buttons glow in the dark, or switch this feature off.



Remote control 105-023 Rev A

Notes

Only the controls shown highlighted are used on this projector.

*For more information about IR addresses, see **Setting up an IR address** in the **Operating Guide**.*

Positioning The Screen And Projector

1. Install the screen, ensuring that it is in the best position for viewing by your audience.
2. Position the projector, ensuring that it is at a suitable distance from the screen for the image to fill the screen.

Desktop mount

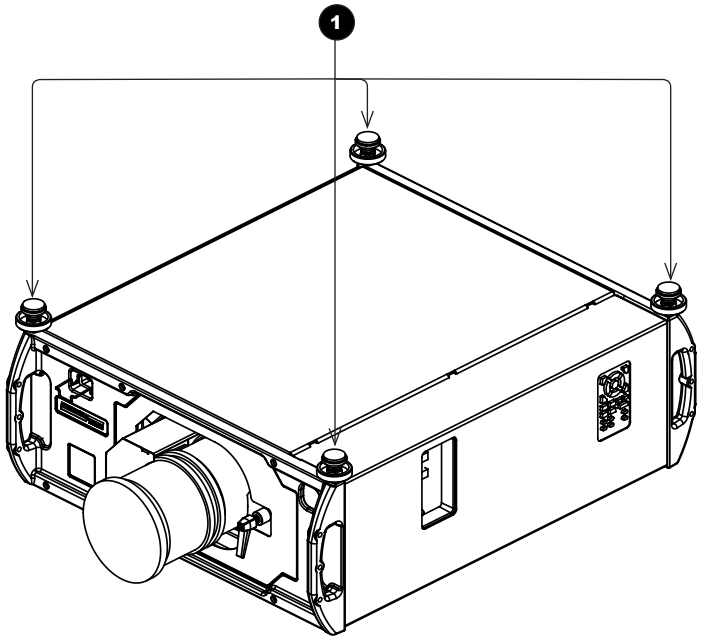
If the projector is to be operated from a flat surface such as a projector table, adjust the projector level by turning the four feet under the chassis. Set the adjustable feet so that the projector is level, and perpendicular to the screen.

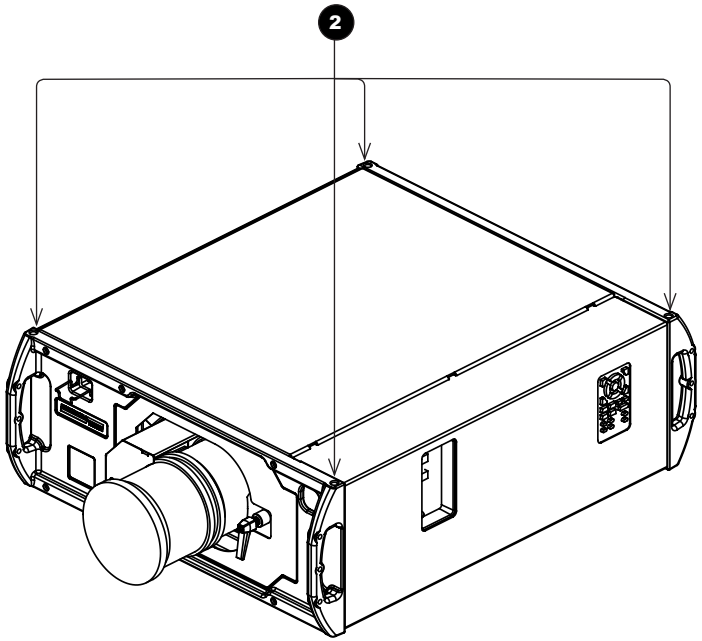
Ceiling mount

Inverted installation is recommended for maximum lens offset.

Remove the four ***adjustable feet*** ❶ and use the four ***M10 fixing holes*** ❷ for ceiling mounting.

You can also use the optional rigging frame, or mount two projectors together using the optional **Titan 40K** assembly.





Notes

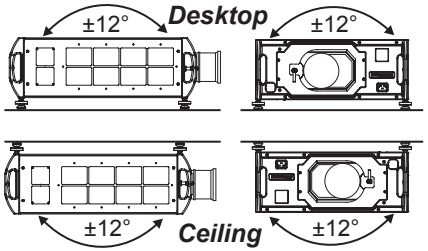
Ensure that there is at least 30 cm (12 in.) of space between the ventilation outlets and any wall, and 10 cm (4 in.) on all other sides.

Do not place heavy objects on top of the projector chassis. Only the chassis corners and the rigging frame are capable of withstanding the weight of another projector.

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

Backup safety chains or wires should always be used with ceiling mount installations.

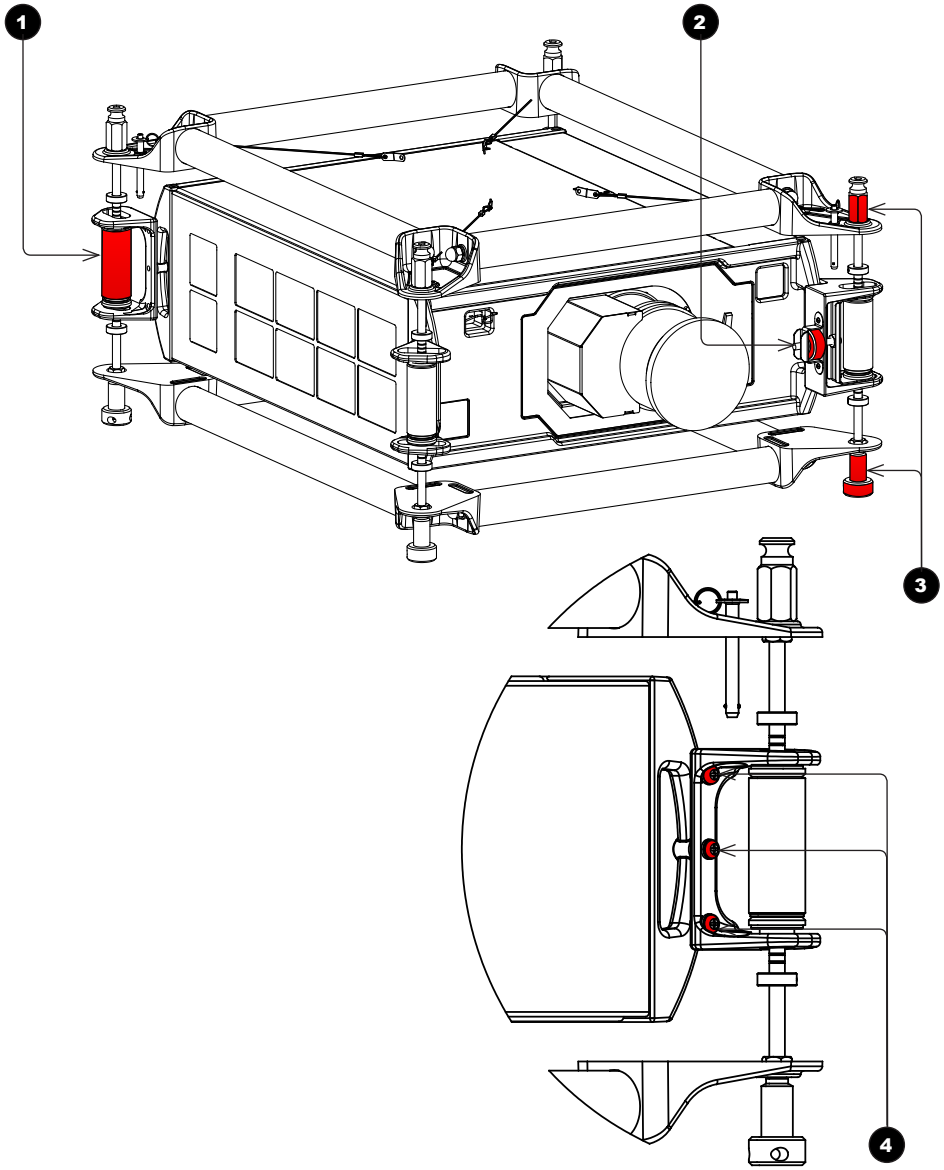
Do not tilt the projector more than ±12° in either direction, in desktop or ceiling mode, when in use, as this may cause serious lamp failure, damage the lamp module and cause extra cost on replacement.



*See also **Adjusting the optional rigging frame** further in this guide.*

Adjusting the optional rigging frame

1. Remove the four adjustable feet.
2. Secure the rigging frame to the projector, as shown here, making sure that the rigging frame is in its upright position and the cable attachments are at the top. Three screws secure each of the adjuster brackets to a corner handle.
3. Adjust pitch, roll and yaw as required.



1. **Vertical adjuster**
2. **Horizontal adjuster**
3. **Frame couplings**
4. **Fixing screws**

Notes

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

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

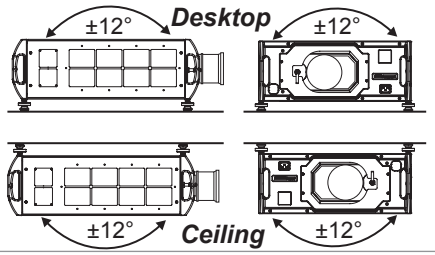
Do not stack more than 3 projectors.

Do not place heavy objects on top of the projector chassis. Only the chassis corners and the rigging frame are capable of withstanding the weight of another projector.

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

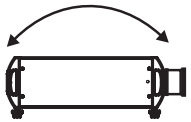
Backup safety chains or wires should always be used with ceiling mount installations.

Do not tilt the projector more than ±12° in either direction, in desktop or ceiling mode, when in use, as this may cause serious lamp failure, damage the lamp module and cause extra cost on replacement.



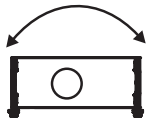
Adjusting pitch, roll and yaw

- To adjust the pitch, turn either the front pair or the rear pair of vertical adjusters, taking care to turn both adjusters by the same amount.



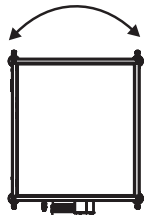
Pitch

- To adjust the roll, turn either the left pair or the right pair of vertical adjusters, taking care to turn both adjusters by the same amount.



Roll

- To adjust the yaw, turn the single horizontal adjuster at the front.

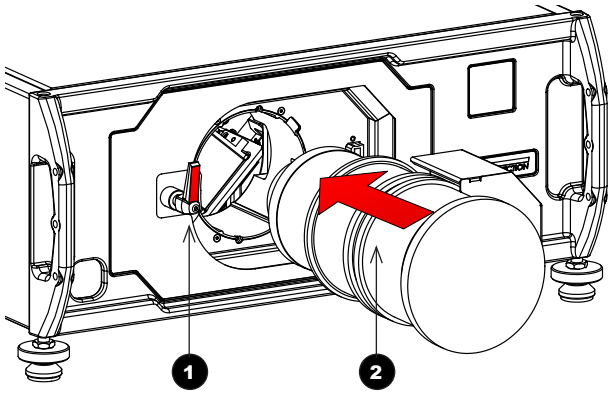


Yaw

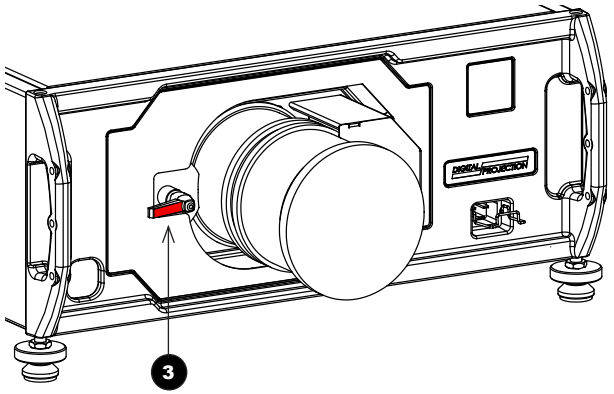
Notes

Fitting The Lens

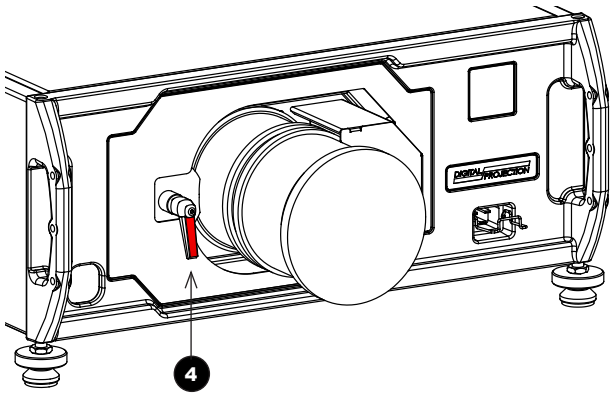
1. Turn the lens release lever clockwise so that it is pointing upwards, to open the lock fully. 1
2. Remove the rear lens cap from the lens.
3. Insert the lens into the lens aperture, making sure that the plug on the zoom drive mechanism lines up with the socket on the front of the projector, then push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



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.

Operating The Projector

Switching the projector on

1. Connect the power cable between the mains supply and the projector. Switch on at the switch next to the power connector.
2. Wait until the self-test has completed and the standby indicator on the projector control panel shows amber. The lamp will be off and the projector will be in STANDBY mode.
3. Press **ON** on the remote control or the control panel and hold for three seconds, to switch the projector ON. The power indicator on the control panel will show green, the lamp will light and the shutter will open.

Switching the projector off

1. Press **OFF** on the remote control or the control panel, and hold for three seconds. The power indicator on the control panel will show amber, the lamp will go out and the cooling fans will run for a short time until the projector enters 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

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

Use only the power cable provided.

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

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

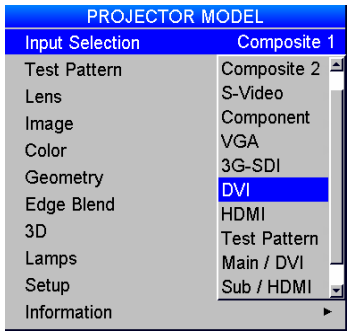
Always allow the lamp to cool for 5 minutes before:

- disconnecting the power
- moving the projector

Selecting an input signal or test pattern

Input signal

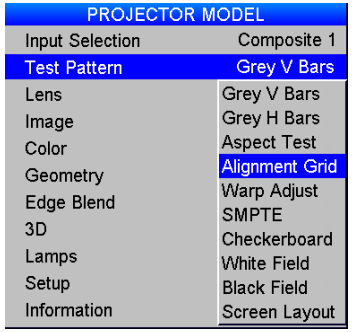
1. Connect an image source to the projector.
2. Switch to the input you want to display:
   - Press one of the input buttons on the remote control, or
   - Open the On-screen display (OSD) by pressing **MENU**. Select an input signal from the **Input Selection** menu, using the **UP** and **DOWN** arrow buttons, then press **OK**.



Test pattern

To display a test pattern:

1. Open the OSD by pressing **MENU**.
2. Select **Test Pattern** from the **Input Selection** menu, using the **UP** and **DOWN** arrow buttons, then press **OK**.
3. Select a pattern from the **Test Pattern** menu, using the **UP** and **DOWN** arrow buttons, then press **OK**.
4. Close the OSD by pressing **MENU** again.



Notes

*For full details of how to use the controls and the menu system, see the **Operating Guide**.*

If the projector is switched off while in TEST PATTERN mode, it will still be in TEST PATTERN mode when switched on again.

Adjusting the lens

The lens can be adjusted using the **Lens** menu, or:

Zoom

- Press **ZOOM**, then use the **UP** and **DOWN** arrow buttons on the keypad or remote control to adjust the size of the image on the screen. When the adjustment is finished, press **EXIT**.

Focus

- Press **FOCUS**, then use the **UP** and **DOWN** arrow buttons on the keypad or remote control to adjust the focus. When the adjustment is finished, press **EXIT**.

Shift

- Press **SHIFT**, then use the **UP**, **DOWN**, **LEFT** and **RIGHT** arrow buttons on the keypad or remote control to adjust the position of the image on the screen. When the adjustment is finished, press **EXIT**.

Notes

When any of the three lens adjustment buttons is pressed, the blue Transmit indicator on the remote control will light for 10 seconds:

After 10 seconds, if no adjustment has been made, the indicator will go out and the lens adjustment button must be pressed again to resume adjustment.

To end the adjustment before 10 seconds has elapsed, press the **EXIT** *button.*

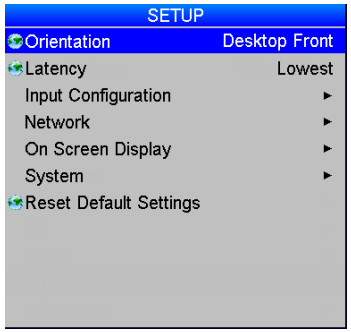
All other adjustments will be locked out until the lens adjustment is ended.

Adjusting the image

Orientation

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

  Select the orientation which suits the positioning of the projector.

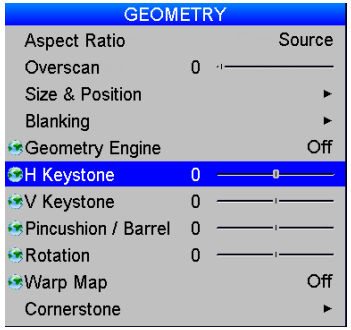


Main Menu
Setup

From the audience's point of view, lens shift always moves the image in the same direction, regardless of projector orientation. For example, **SHIFT UP** *always moves the image toward the ceiling and* **SHIFT LEFT** *always moves the image to the audience's left.*

Keystone

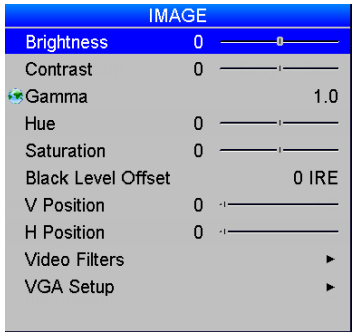
- This can be set from the **Geometry** menu.



Main Menu
Geometry

Picture

- Settings such as **Brightness** and **Contrast** can be set from the **Image** menu.
- Settings can be accessed from the remote control as well. Depending on the remote you are using:
  - On 105-023 Rev B, press **BRI**, **CON** or **GAMMA to** set **Brightness**, **Contrast** or **Gamma** respectively.
  - On 105-023 Rev A, press **BRI**, **CON** or **SAT** to set **Brightness**, **Contrast** or **Saturation** respectively.



Main Menu
Image

For full details of how to use the controls and the menu system, see the ***Operating Guide****.*

For further information about the two remote control devices supported by the projector, see ***Remote Control*** *earlier in this guide.*

Notes

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DIGITAL PROJECTION

CONNECTION GUIDE

Titan Super Quad Series
Titan Quad 2000 Series
Titan Quad Series
Titan 930 Series
Titan 800 Series

High Brightness Digital Video Projector

Rev J July 2014

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Signal Inputs and Outputs

Inputs 1-8, on the rear of the projector, are limited input frame rates up to 60Hz, but provide access to the full geometric adjustment capabilities, including Blend and Warp.

The side inputs 9, 10 and 11 on 3D projectors provide a very direct path to the DMD™ display, with minimal latency and high frame rate capability. Their geometrical adjustment capabilities are limited in comparison with inputs 1-8.

Rear connection panel

1. **VGA** *(input 1)*
   Receives analog signal from a computer. When using this input, it is best to use a fully wired VGA cable (with a blue connector shell) to connect the source to the projector. This will allow the source to determine the projector's capabilities via DDC and show an optimized image.
   Use **Auto Setup** in the **Image/VGA Setup** menu.

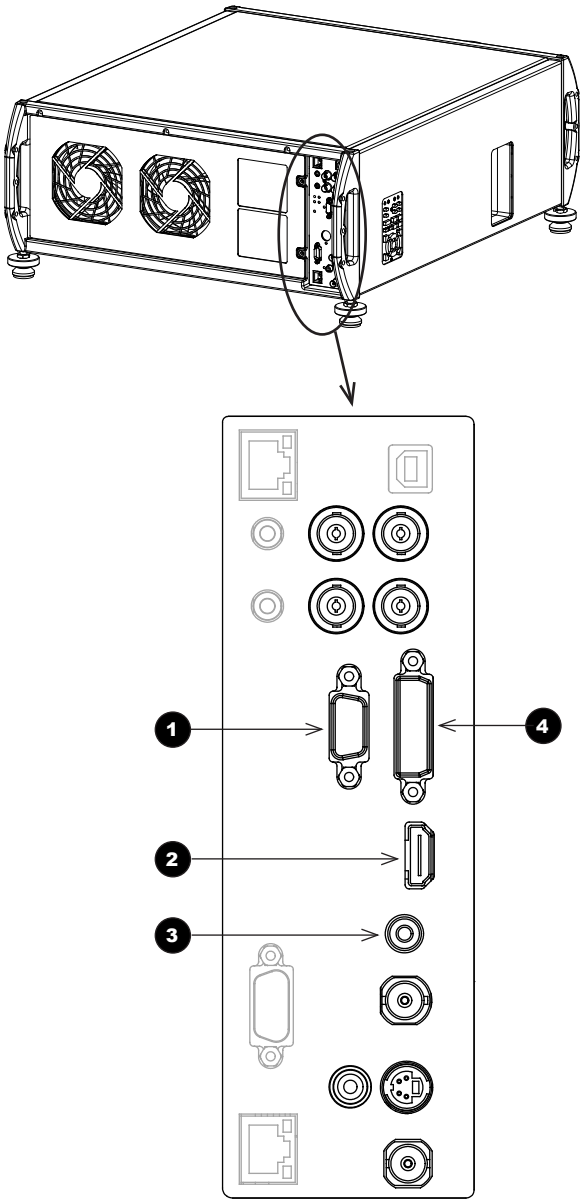
2. **HDMI** *(input 2)*
   Receives digital signal from HDMI-compliant devices. The audio from the HDMI 1 source is available on the SPDIF output.

3. **SPDIF**
   This is a digital output.
   Compatible audio sample packets on the ***HDMI*** input stream are decoded by the projector and output on the ***SPDIF*** connector.

4. **DVI** *(input 3)*
   Analog or Digital DVI-I
   This input has a DVI-I connector, which can receive either analog (DVI-A) or digital (DVI-D) signal from a compatible source.
   Set **DVI-I Port** in the **Setup/Input Configuration** menu to choose between **Analog** and **Digital**.
   Sources up to:
   - 1920x1080 resolution for 1080p models
   - 1920x1200 resolution for WUXGA models

   24-60Hz; up to 12 bits per color. Supports HDCP.

(the list continues overleaf)



Rear Connection Panel

Notes

*For more VGA settings, see **Image menu** in the **Operating Guide.***

*For further information on setting up the DVI 1 input, see **Input Configuration** in the **Operating Guide**.*

WUXGA (1920x1200) is only available at 50 and 60Hz on Input 3. For WUXGA 3D, we recommend the use of Input 9.

*For more information about the difference between the two connection panels, see **Special considerations when using inputs 9-11** further in this section.*

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

Rear connection panel (continued)

5 **3G-SDI** *(input 4)*
Uses a BNC connector to receive uncompressed, unencrypted digital video.
If two video streams are being transmitted, set **3G Level B Stream** in the **Setup/Input Configuration** menu to choose between the two streams

6 **Composite 1 (CVBS 1)** *(input 5)*
Uses a BNC connector to receive composite video.

7 **S-Video** *(input 6)*
Uses a 4-pin mini-DIN connector.

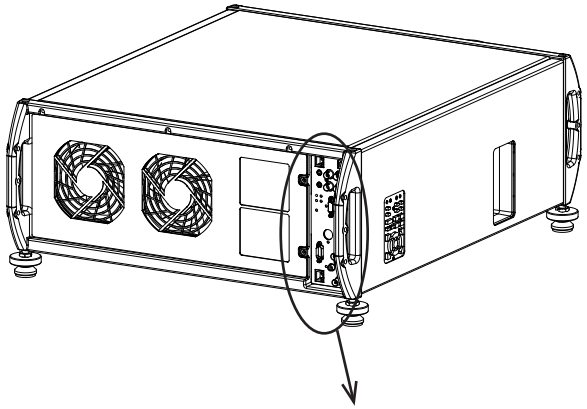
8 **Component** *(input 7)*
Uses either RGsB/RGBS, or YPbPr.
When using ***RGsB or RGBS:***

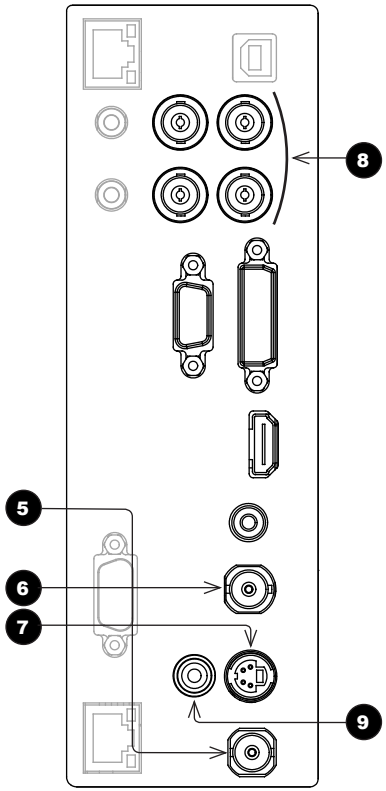
- Set **Component Colour Space** in the **Setup/Input Configuration** menu to **RGB**.
- Set **Component Sync Type** in the **Setup/Input Configuration** menu to **Auto**, except when the projector has problems selecting between **3 Wire (RGsB)** and **4 Wire (RGBS)**.

When using ***YPbPr:***

- Set **Component Colour Space** in the **Setup/Input Configuration** menu to **YPbPr**.

9 **Composite 2 (CVBS 2)** *(input 8)*
Uses an RCA phono connector to receive composite video.





Rear Connection Panel

Notes

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

Side connection panel on 3D projectors

1 **Main/DVI** *(input 9)*
Single or Dual Link DVI-D input.
This input has a DVI-I connector, but can only receive digital (DVI-D) signal from a compatible source.
Sources up to:

- 1920x1080 resolution for 1080p models
- 1920x1200 resolution for WUXGA models

24-160Hz; up to 12 bits per color. Supports HDCP.

2 **Sub/HDMI** *(input 10)*
Single Link DVI-D (HDMI 1.4 compatible) input.
Sources up to:

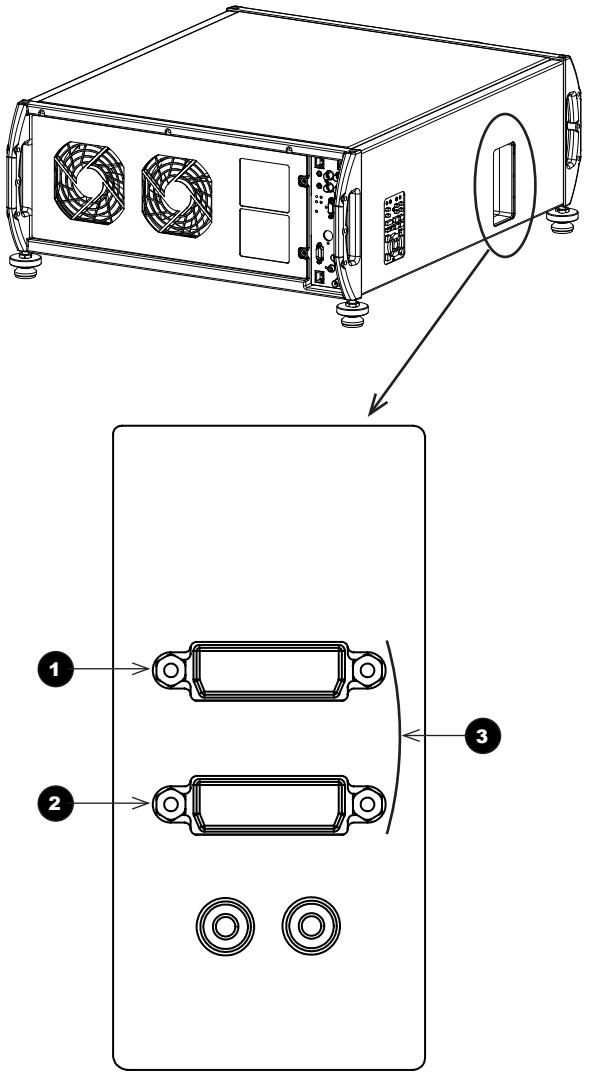
- 1920x1080 resolution for 1080p models
- 1920x1200 resolution for WUXGA models

24-60Hz; up to 12 bits per color.

3 **Twin-Link DVI-D (Dual Pipe)**
Connect both sockets.
Input 9 is the Main input, ***Input 10*** (DVI/HDMI) is the Sub input.
Sources up to:

- 1920x1080 resolution for 1080p models
- 1920x1200 resolution for WUXGA models

at frame rates consistent with up to 148.5 Mpx/sec/pipe (including blanking)·



Side Connection Panel

Notes

There is no scaler on Inputs 9-11.

Images up to and including the native resolution of the display will be displayed pixel for pixel and centred.

This enables the projector to maximise the image bandwidth and grayscale resolution.

For more information about the difference between the two connection panels, see ***Special considerations when using inputs 9-11*** *further in this section.*

For information about 3D video, see ***3D connections*** *further in this guide.*

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

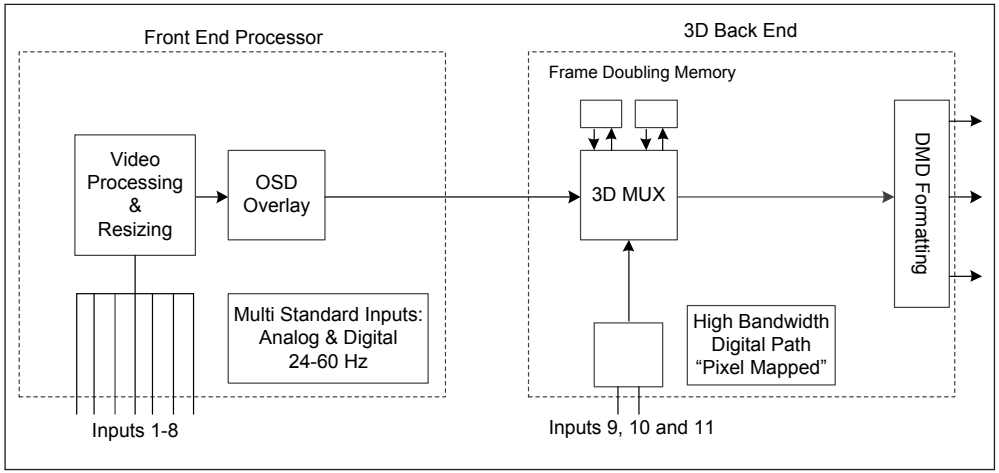
Special considerations when using inputs 9-11

Differences between inputs 9-11 and inputs 1-8

Inputs 9 and 10 have been designed to offer access to a very high bandwidth digital video path, free of the limitations inherent to standard image processing techniques. As such, the image is pixel-mapped directly to each DMD™, so only a subset of the image settings applies to Inputs 9-11.

Global settings, such as input selection, lens and lamp control, are all applicable to Inputs 9-11 but modal settings are not.

Input and processing architecture



EDID on the DVI and VGA inputs

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

Otherwise please 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.

Notes

There is no scaler on Inputs 9-11.

Images up to and including the native resolution of the display will be displayed pixel for pixel and centred.

This enables the projector to maximise the image bandwidth and grayscale resolution.

Global settings are indicated by a globe icon in the OSD and affect all inputs.

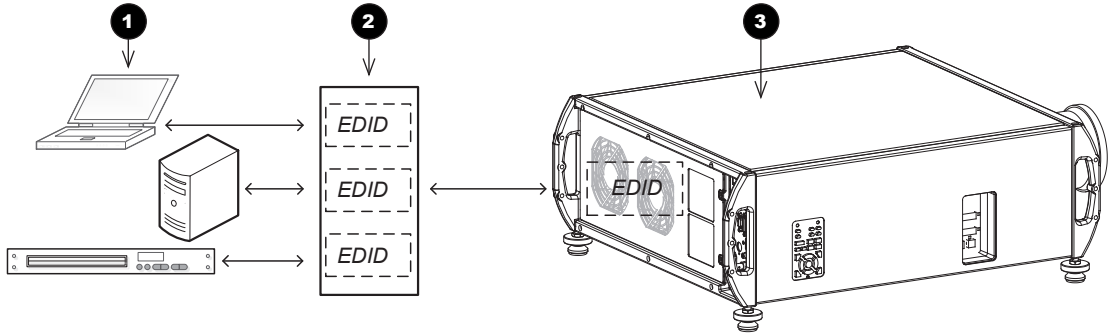
Modal settings only affect the currently displayed input.

Using HDMI/DVI switchers with the projector

When using an HDMI/DVI 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. Please see your switcher's manual for information on how to set this mode.

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

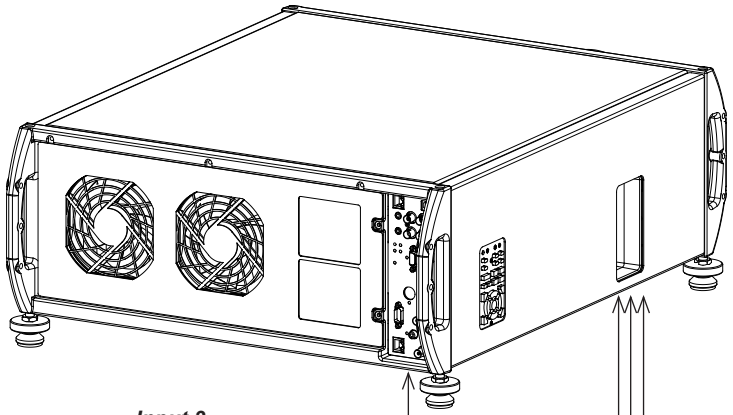
1. **Sources**
2. **Switcher**
3. **Projector**



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

Notes

DVI input connection example



Notes

Dual link DVI:
high bandwidth/frame rate

3D connections

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

1. Connect to any of the inputs on the ***rear connection pane***l.

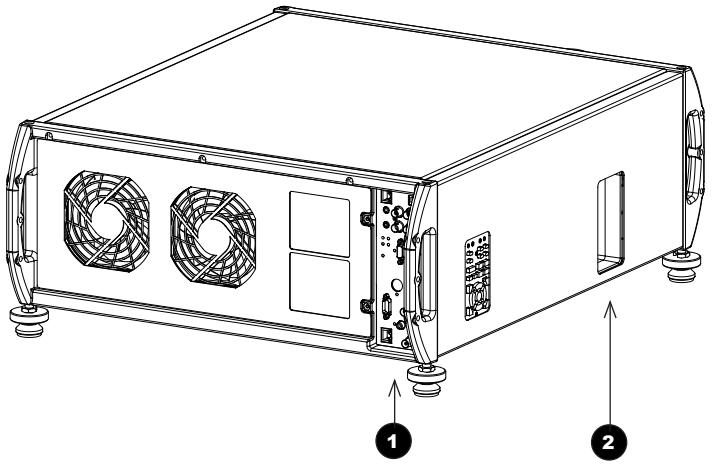
- Set **3D Type** in the **3D** menu to match the format of the incoming signal. Choose from **Sequential**, **Top-and-Bottom** and **Side-by-Side (Half)**.

3D sources above 60Hz not requiring frame doubling

1. Connect to either of the inputs on the ***side connection panel***.
2. Set **3D Type** in the **3D** menu to **Auto**, except when the projector has problems selecting between **Sequential**, **Frame Packing**, **Top-and-Bottom** and **Side-by-Side (Half)**.

Dual Pipe 3D

- Connect to both of the inputs on the ***side connection panel***. ***Input 9*** (Main/DVI) is the ***left*** image, and ***Input 10*** (Sub/HDMI) is the ***right*** image.



1 **Rear connection panel**

2 **Side connection panel**

Notes

WUXGA (1920x1200) is only available at 50 and 60Hz on input 3. For WUXGA 3D, we recommend the use of input 9.

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

3D Sync in

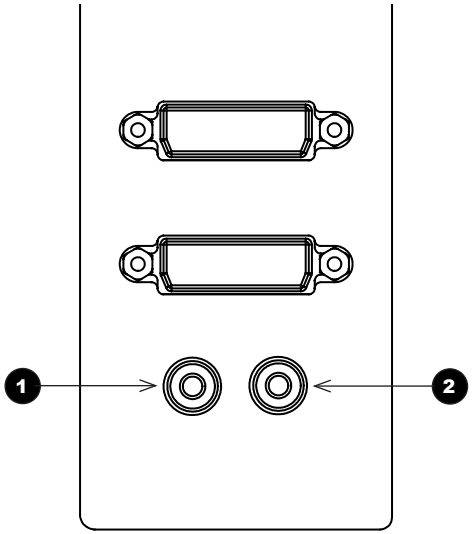
- Sync input signal.

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

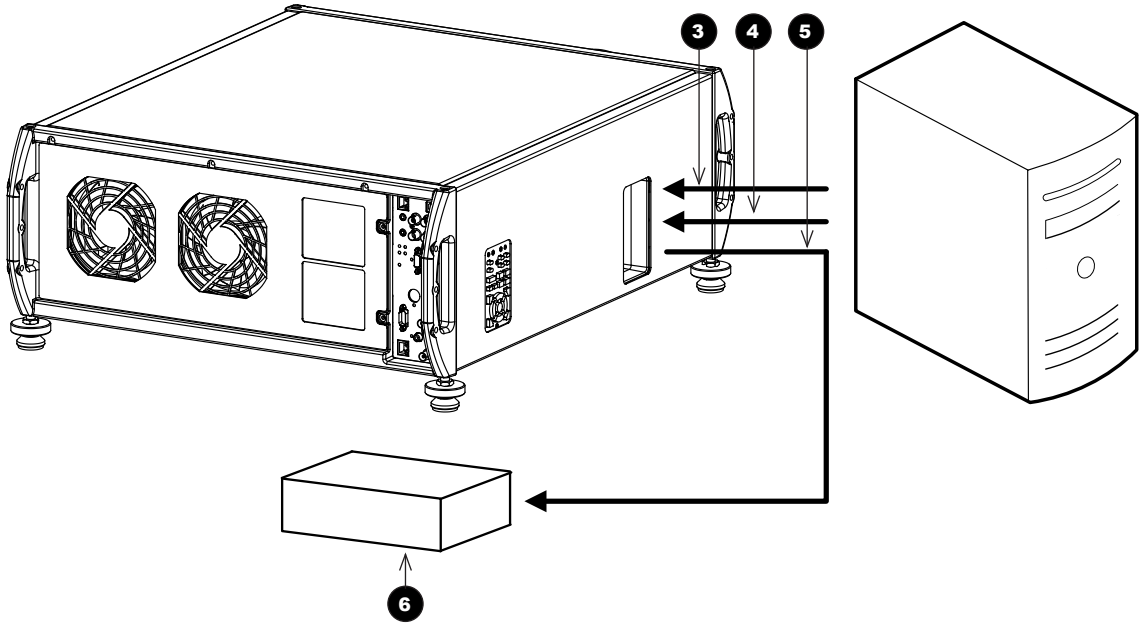
3D Sync out

- Sync output signal. This may be affected by the **Sync Offset** and **Output Sync Polarity** settings in the **3D** menu.

  Connect this to your IR emitter or ZScreen.



Side Connection Panel



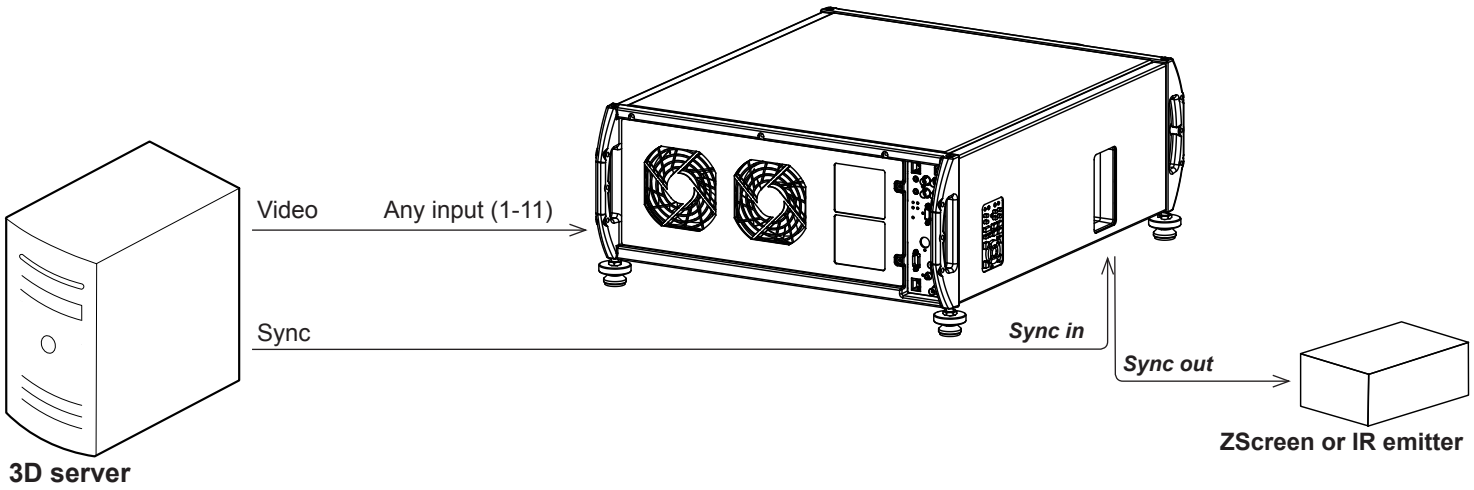
1. **Sync In**
2. **Sync Out**
3. **3D input**
4. **3D Sync In**
5. **3D Sync Out**
6. **IR emitter** or **ZScreen**

Notes

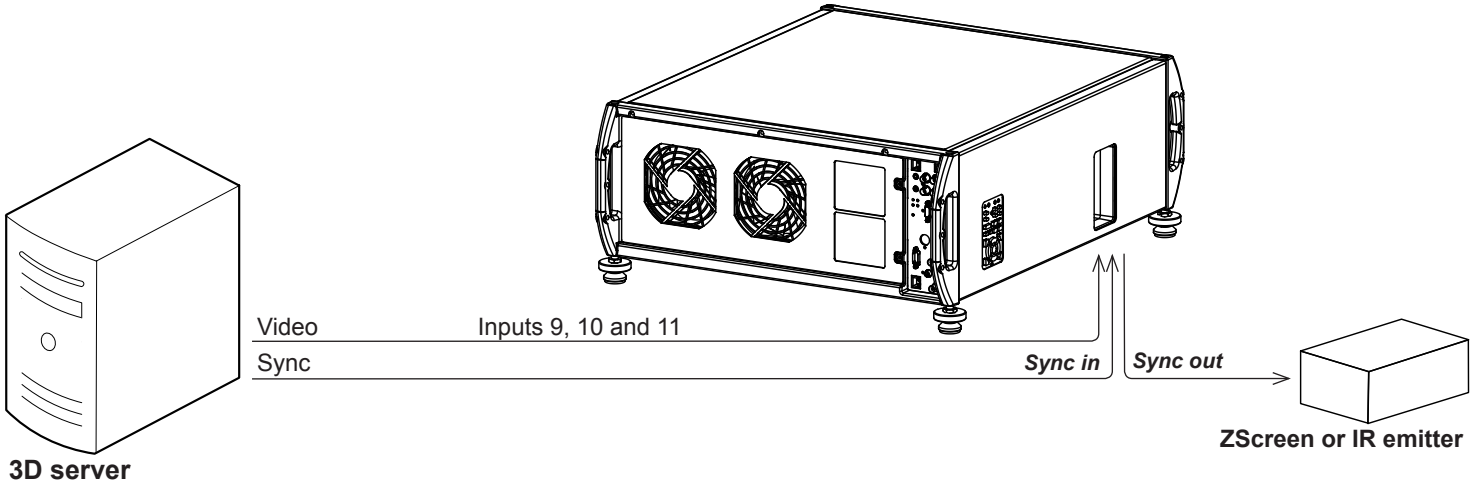
*For a complete listing of pin configurations for all signal and control connectors, see **Appendix E: Wiring Details** in the **Reference Guide**.*

3D connection examples

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



3D sources above 60Hz



Notes

Use inputs 1-8 if the geometry of the image needs to be adjusted.

Control Connections

1 **Update port**
All of the projector's features can be controlled via a serial connection, using the commands described in the ***Protocol Guide.***
In addition, the Update port is used to download, via LAN, firmware updates issued from time to time by Digital Projection.
Use a crossed LAN cable to connect directly to a computer, or an uncrossed cable to connect to a network hub.

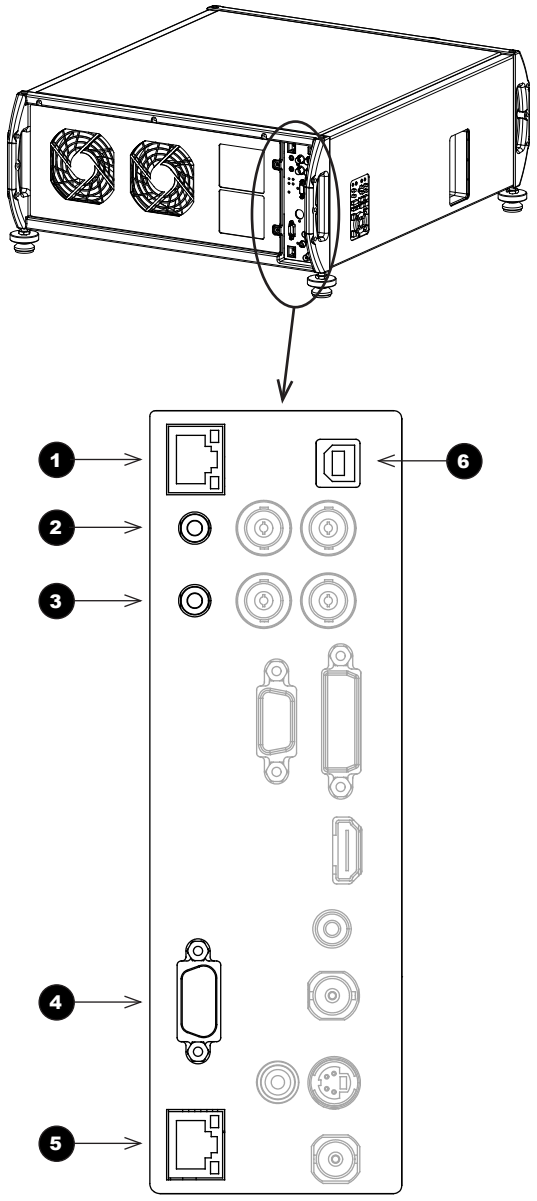
2 **Wired remote control input**
If infrared signals from the remote control cannot reach the projector due to excessive distance or obstructions such as walls or cabinet doors, you can connect an external IR repeater to the remote control input, and position its IR sensor within range of the operator.

3 **Wired remote control output**
To synchronise the control of multiple projectors, connect the ***wired remote output*** of one projector to the ***wired remote input*** of another.

4 **RS232**
All of the projector's features can be controlled via a serial connection, using the commands described in the ***Protocol Guide***.
Use a null-modem cable to connect directly to a computer, or a straight cable to connect to a modem.

5 **LAN**
The projector Warp function is controlled through this port.
In addition, this port can be used with the ***Virtual OSD*** to control the projector.
Use a crossed LAN cable to connect directly to a computer, or an uncrossed cable to connect to a network hub.

6 **Service port**
The Service port is used to download, via USB, firmware updates issued from time to time by Digital Projection.



Rear Connection Panel

Notes

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

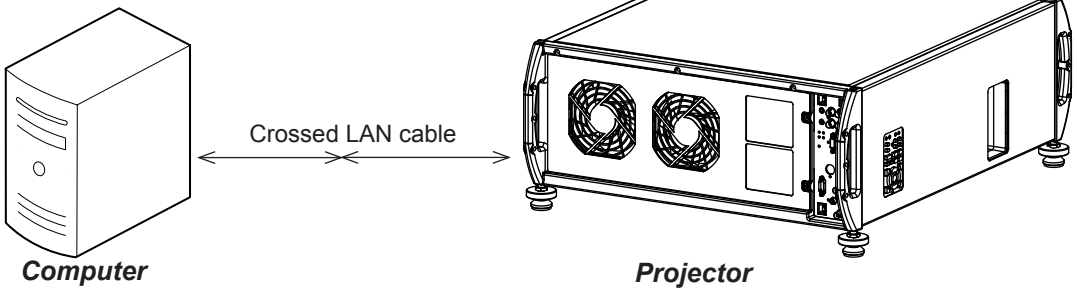
Only one remote connection (RS232 or LAN) should be used at any one time.

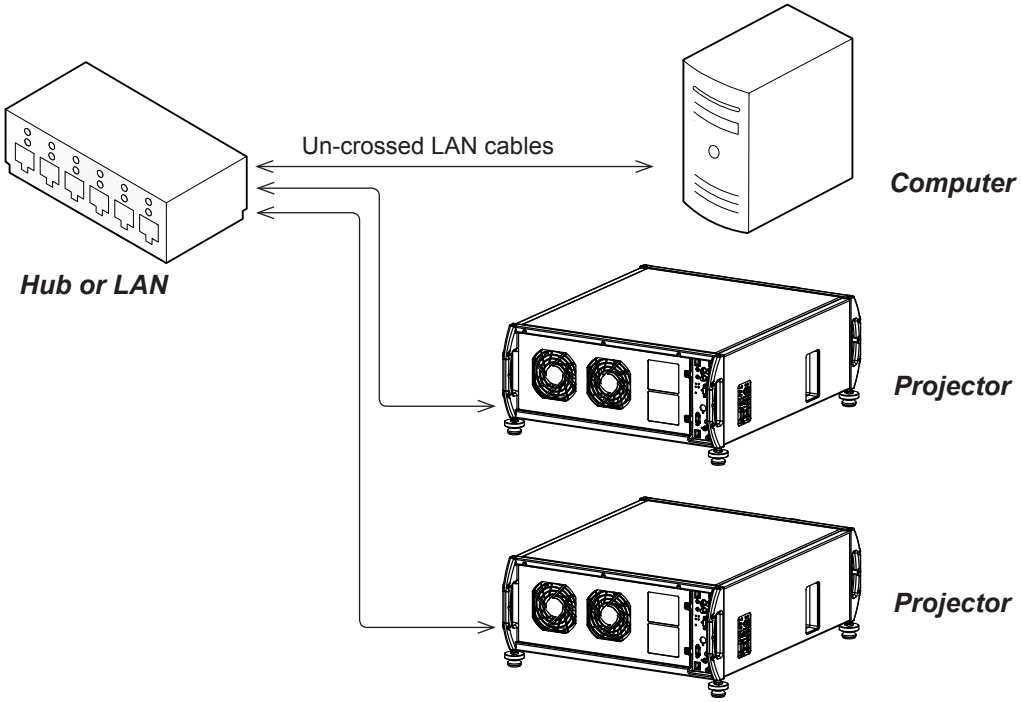
Plugging in the remote control cable will disable the infrared receivers.

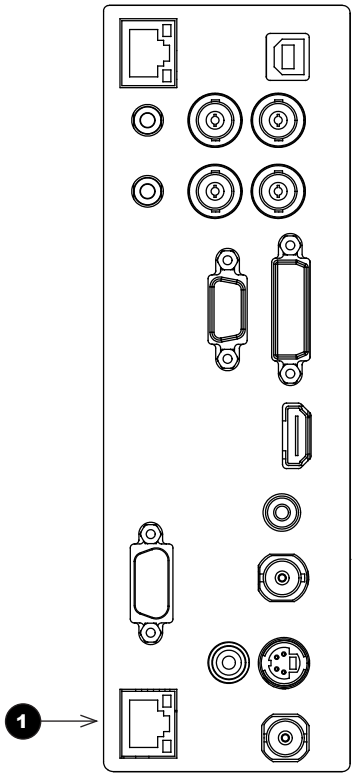
For a list of all commands used to control the projector via a serial connection or LAN, see the ***Protocol Guide****.*

For details on using the Virtual OSD, see the ***Protocol Guide****.*

LAN connection examples





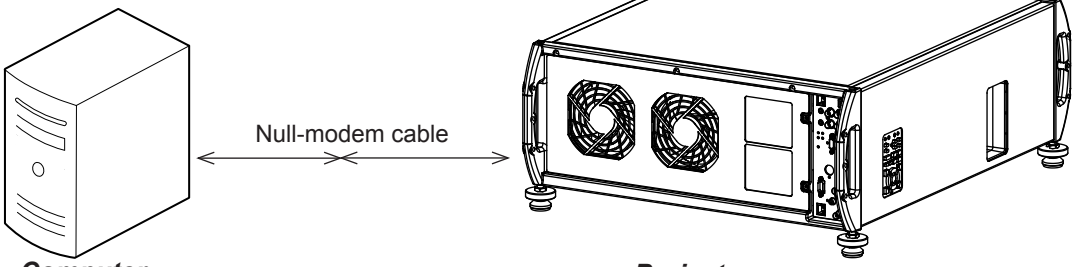


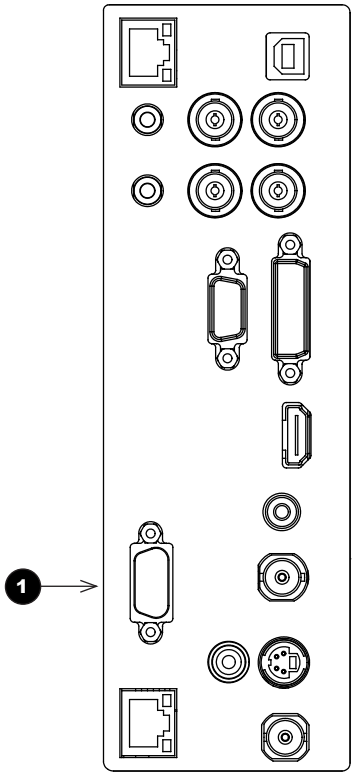
Rear connection panel

1 **LAN**

Notes

RS232 connection example





Rear connection panel

1 **RS232**

Notes

DIGITAL PROJECTION

OPERATING GUIDE

Titan Super Quad Series
Titan Quad 2000 Series
Titan Quad Series
Titan 930 Series
Titan 800 Series

High Brightness Digital Video Projector

Rev J July 2014

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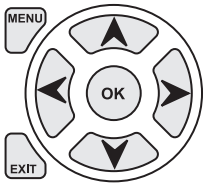
Using The Menus

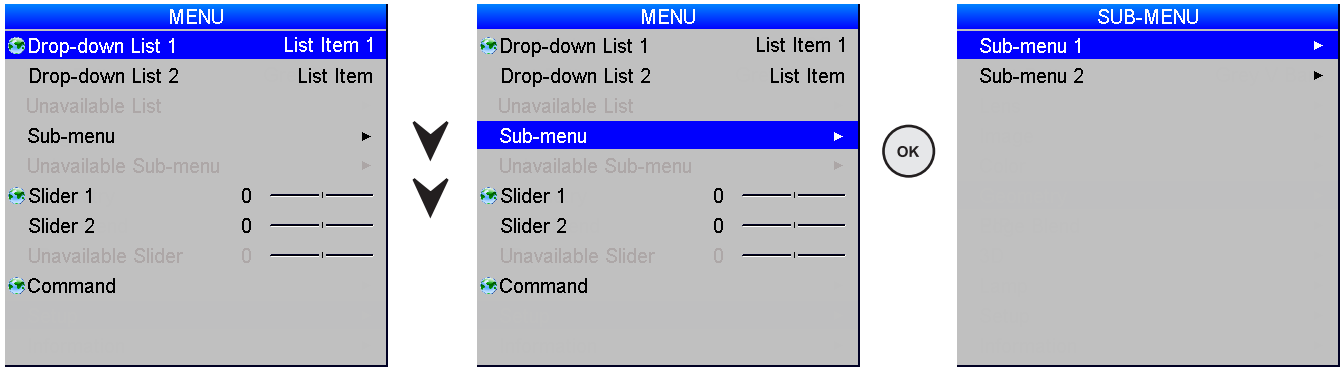
Use the buttons on the projector control panel or on the remote control, to access the menu system.



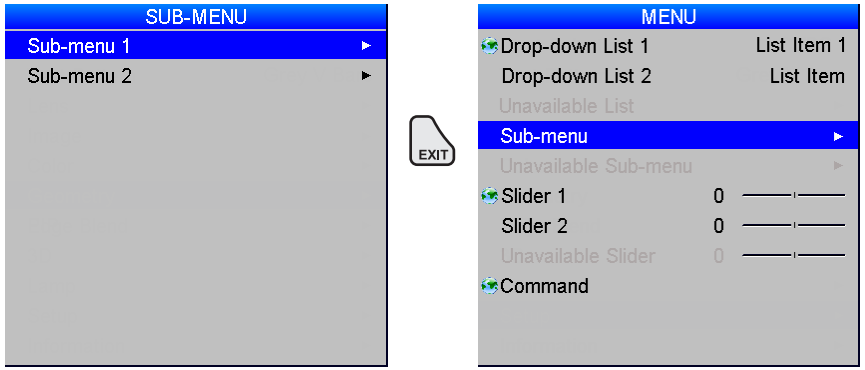
- To open or close the on-screen display (OSD), press **MENU**.

Menus and sub-menus

- To open a sub-menu, select it using the **UP** and **DOWN** arrow buttons, then press **OK**.



- To return to the previous menu, press **EXIT**.



Notes

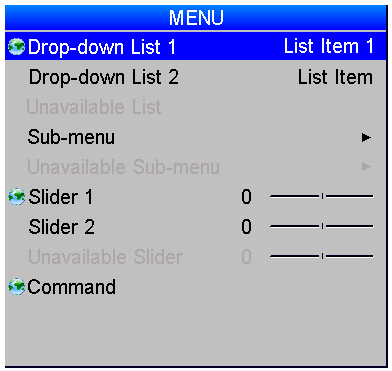
Some menu items may not be available due to settings in other menus. These will be grayed out on the actual menu.

*When **a globe icon** appears next to a setting, the setting affects all sources and all inputs; otherwise, only the current input source will be affected if you change the setting.*

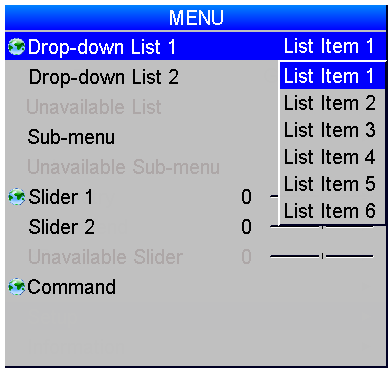
Drop-down lists

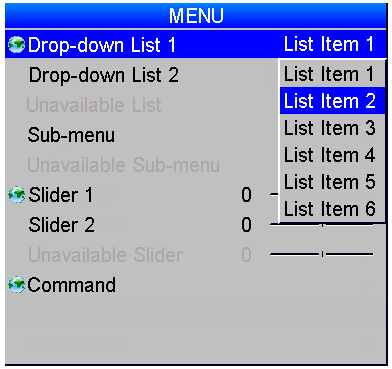
To use a drop-down list:

1. Navigate to the drop-down list in the menu and press **OK**.

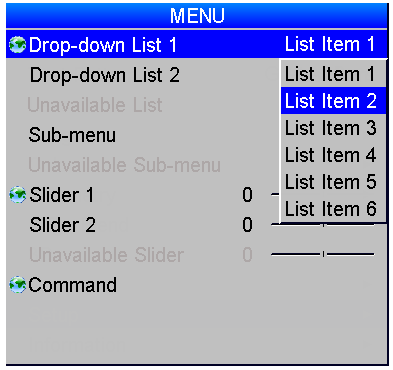


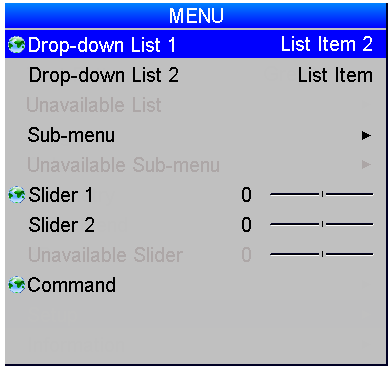
2. Highlight an item from the list using the **UP** and **DOWN** arrow buttons.





3. Press **OK** again to select the highlighted item, or press **EXIT** to exit without changing.





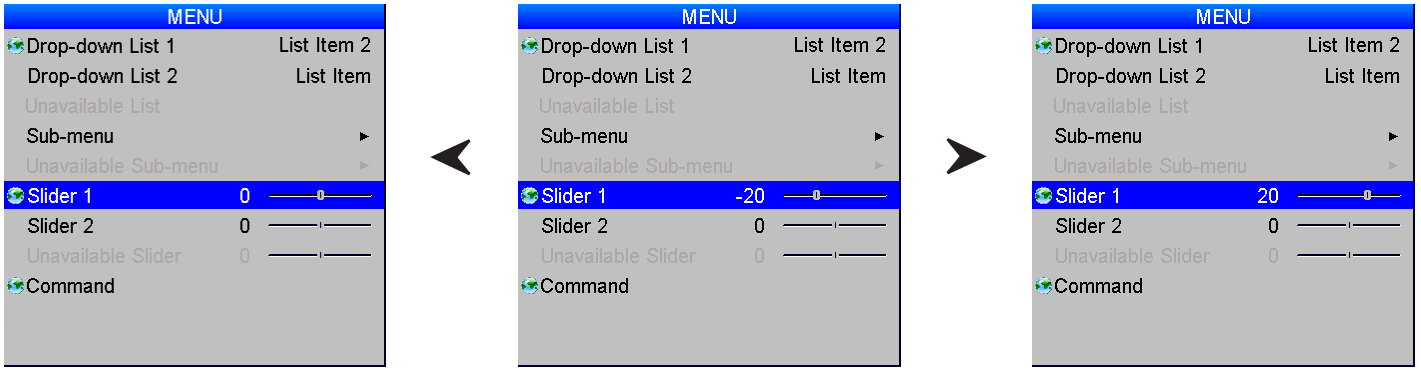
Notes

Some menu items may not be available due to settings in other menus. These will be grayed out on the actual menu.

*When **a globe icon** appears next to a setting, the setting affects all sources and all inputs; otherwise, only the current input source will be affected if you change the setting.*

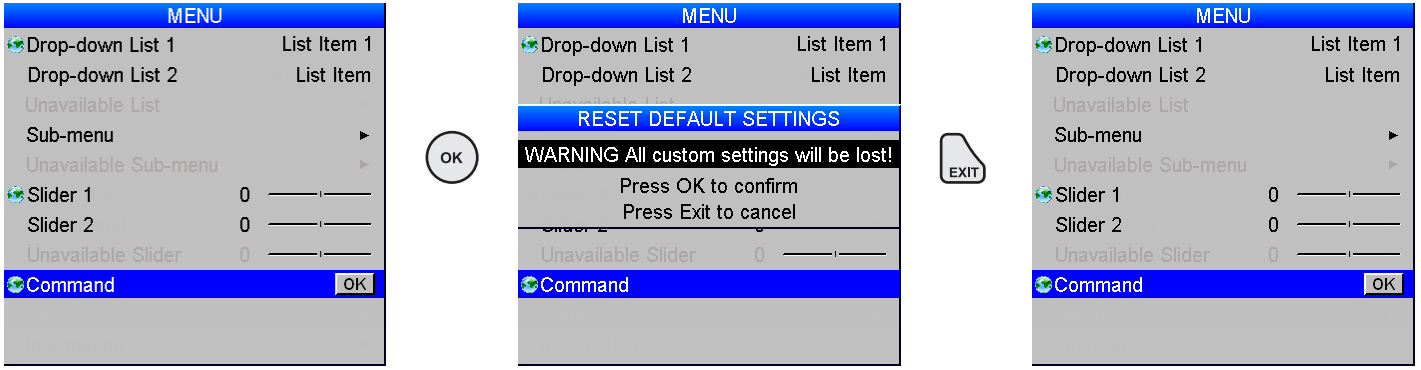
Sliders

To use a slider, press the **LEFT** and **RIGHT** arrow buttons to adjust it.



Commands

To use a command, press **OK**. In the example below, press **OK** to confirm, or press **EXIT** to cancel.



Notes

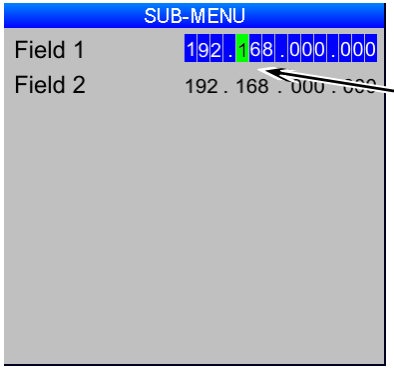
Some menu items may not be available due to settings in other menus. These will be grayed out on the actual menu.

*When **a globe icon** appears next to a setting, the setting affects all sources and all inputs; otherwise, only the current input source will be affected if you change the setting.*

Editing fields

Some features require a text or numeric field to be edited.

1. To edit a field, first select it using the **LEFT** and **RIGHT** arrow buttons, then press **OK**.
2. Use the **LEFT** and **RIGHT** arrow buttons to move the green highlight to the digit or character which is to be changed, then use **UP** and **DOWN** to adjust it.
3. Use the **LEFT** and **RIGHT** arrow buttons to select the next digit or character.
4. Press **OK** to accept the new value, or press **EXIT** to exit without changing.



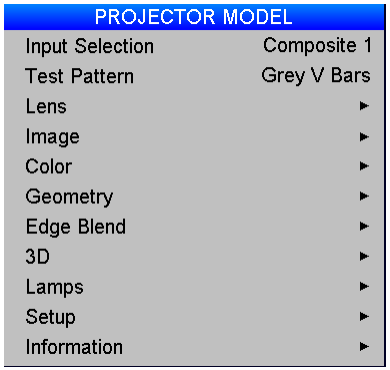
The highlighted digit is being edited

Notes

Some menu items may not be available due to settings in other menus. These will be grayed out on the actual menu.

Using The Projector

Main menu



- **Input Selection**
  Select an input source from the drop-down list.
- **Test Pattern**
  Set **Input Selection** to **Test pattern** and then select a test pattern from the drop-down list.
- **Lens, Image**, **Color** and **Geometry**
  Open these sub-menus to access various picture and screen settings.
- **Edge Blend / PIP**
  PIP and **Edge Blend** are mutually exclusive modes of operation. When the projector is in Edge Blend mode (as shown in the picture), PIP is not available, and vice versa.
- **3D**
  Access **3D** settings.
- **Lamps**
  Select lamp configuration and adjust lamp power.
- **Setup**
  Adjust I**nput Configuration**, **Network**, **On Screen Display** and **System** settings.
- **Information**
  View your current configuration.

Notes

*See also **Using The Menus** earlier in this guide and **Appendix D: Menu Map** in the **Reference Guide**.*

Main Menu

*You can also select an input source by pressing the following buttons on the remote control: **1** to **9** for inputs 1 to 9, **10+** for input 10 and **#** for input 11.*

Inputs 9, 10 and 11 are not available on 2D models.

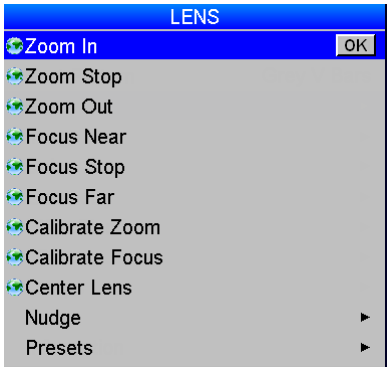
Test patterns are subject to image controls, so brightness, contrast etc. will affect their appearance on screen.

Do not use the provided test patterns for ColorMax.

*You can upload custom test patterns using a network connection - see **Virtual OSD** in the **Protocol Guide**.*

*The **3D** menu is not available with 2D projectors.*

Lens menu



Zoom

To move the lens in or out:

1. Select **Zoom In** or **Zoom Out**, then press **OK**.
2. When the image is the desired size, select **Zoom Stop** and then press **OK**.

Focus

To adjust the focus:

1. Select **Focus Near** or **Focus Far**, then press **OK**.
2. When the image is correctly focussed, select **Focus Stop** and then press **OK**.

Calibrate Zoom and Calibrate Focus

Each time a new lens is fitted into the projector, a calibration procedure must be carried out using these commands.

Before you use a newly fitted lens, select **Calibrate Zoom** and **Calibrate Focus** in turn and wait until the projector establishes minimum and maximum travel distances. Select one command and allow at least 60 seconds for the calibration to take place, then select the other command.

Center Lens

To center the lens, select **Center Lens** and press **OK**.

Notes

Main Menu
Lens

You can also move the lens, focus and zoom using the keypad or the remote:

- *Press* **SHIFT** *followed by an arrow button to shift the lens up, down, left and right.*
- *Press* **FOCUS** *followed by the* **UP** *and* **DOWN** *arrow buttons to adjust the focus.*
- *Press* **ZOOM** *followed by the* **UP** *and* **DOWN** *arrow buttons to zoom in and out.*

You can also calibrate zoom and focus using the keypad:

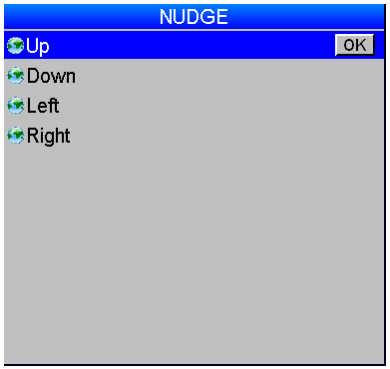
- *Press* **RPY** *followed by the* **RIGHT** *arrow button to calibrate the lens zoom mechanism.*
- *Press* **RPY** *followed by the* **LEFT** *arrow button to calibrate the lens focus mechanism.*

You can calibrate the lens using the remote. Depending on the remote you are using:

- *On* ***105-023 Rev A****, press* **RPY** *followed by the arrow buttons (RIGHT to calibrate zoom,* **LEFT** *to calibrate focus).*
- *On* ***105-023 Rev B****, press and hold* **CAL***, then press* **ZOOM** *or* **FOCUS***.*

Nudge

To position the image correctly on the screen, use the **Nudge** controls.



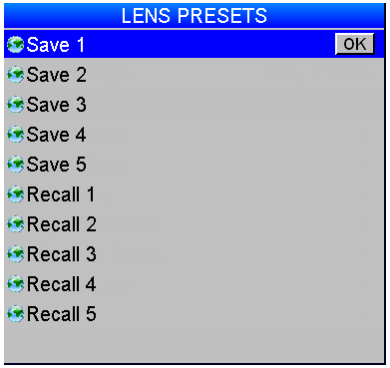
Lens Presets

This menu allows you to save up to five custom lens presets, which you can recall later.

To save a preset using the remote, press and hold **SAVE**, then press the number button for the preset you wish to save.

To recall a preset using the remote:

- On remote ***105-023 Rev A***, press and hold **PRESET**, then press a number button **1** to **5**.
- On remote ***105-023 Rev B***, press and hold **LOAD**, then press a number button **1** to **5**.



Notes

Main Menu
Lens
Nudge

Main Menu
Lens
Lens Presets

To determine which remote control you are using, see ***Remote Control*** *in the* ***Installation and Quick Start Guide****.*

Image menu

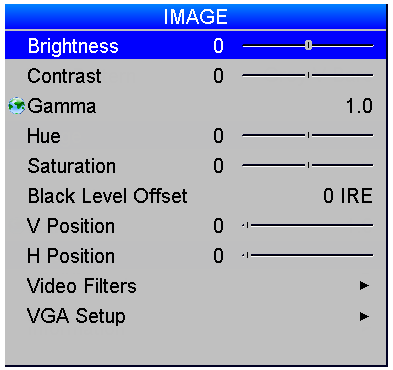
- **Brightness**, **Contrast**, **Gamma**, **Hue** and **Saturation**

  Set the slider or select from the drop-down list as required, to improve the quality of the image.

- **Black Level Offset**

  Set this to **0 IRE** or **7.5 IRE** as required.

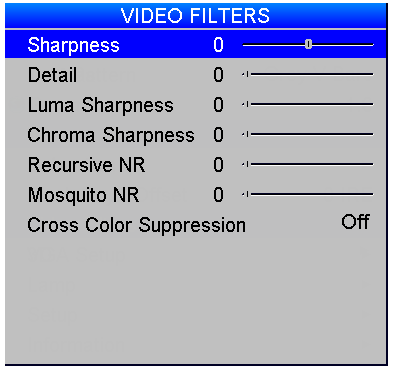
- Use **V Position** and **H Position** to adjust the position manually.



Video Filters

Set the sliders or select from the drop-down list as required, to improve the quality of the image:

- **Sharpness** - a peaking filter to increase high frequency/luminance information.
- **Detail** - a filter which removes low frequency image components.
- **Luma Sharpness** - a filter which enhances luminance sharpness.
- **Chroma Sharpness** - a filter which enhances the color sharpness of the chrominance signal by increasing the steepness of color edges.
- **Recursive NR** - a noise reduction filter which reduces spatial & temporal noise (only applicable to standard definition video signals).
- **Mosquito NR** - a noise reduction filter which reduces block artifacts (only applicable to standard definition video signals).
- **Cross Color Suppression** - a filter which reduces luminance to chrominance crosstalk on Composite Video signals. The crosstalk appears as a rainbow pattern in regions of fine detail.

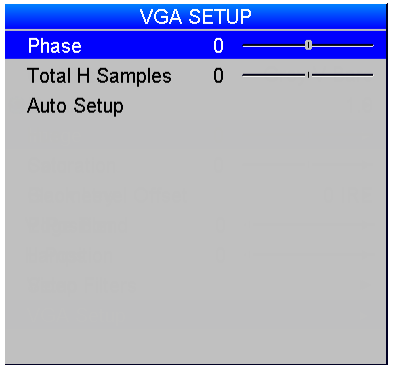


VGA Setup

Use **Auto Setup** to allow the projector to detect the appropriate settings automatically.

If you require manual adjustment:

- Set the **Phase** slider to correct for shimmering or poor quality definition on, for example, fine text.
- Set the **Total H Samples** slider to match the resolution of the incoming video signal.



Notes

Main Menu
Image

*Settings can be accessed from the remote control as well. If your remote is **105-023 Rev A**, you can press **BRI**, **CON** or **SAT**. On **105-023 Rev B**, press **BRI**, **CON** or **GAMMA**.*

Hue applies only to NTSC signals.

When a new input mode is detected (e.g. NTSC, HDTV 1080p, SVGA etc.), all the input settings are saved so that they can be recalled next time that input mode is displayed.

Main Menu
Image
Video Filters

Main Menu
Image
VGA Setup

VGA Setup is not available unless a VGA signal is present.

Color menu

Gamut

Peak gives you the brightest possible image.

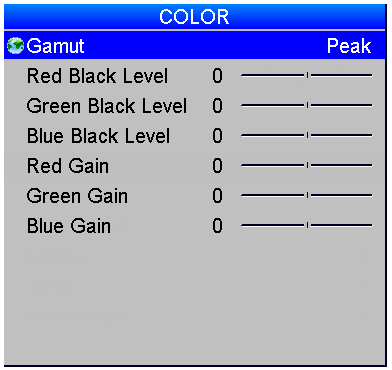
Choose **HDTV** for high definition standards and **SDTV** for standard definition standards.

A value between **3200K** and **9000K** selects the relevant color temperature.

You can upload your own gamut using the Projector Controller software, and then select it from the **User 1** and **User 2** settings.

Black Level and Gain sliders

Set the sliders as required.

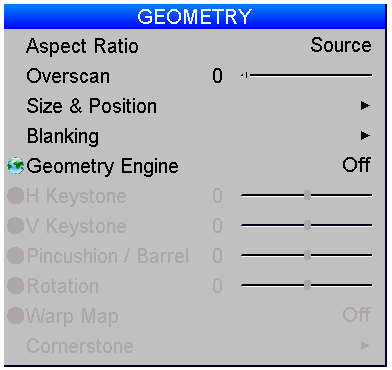


Notes

Main Menu
Color

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

Geometry menu



Aspect Ratio

Choose between **Source**, **Fill Display**, **Fill & Crop, Anamorphic and TheaterScope**.

*Some devices (e.g. certain DVD players) pack a 16:9 image into a 4:3 aspect ratio. In such cases to display the image correctly, choose the **Anamorphic** aspect ratio.*

Overscan

Set this slider to compensate for noisy or badly defined image edges.

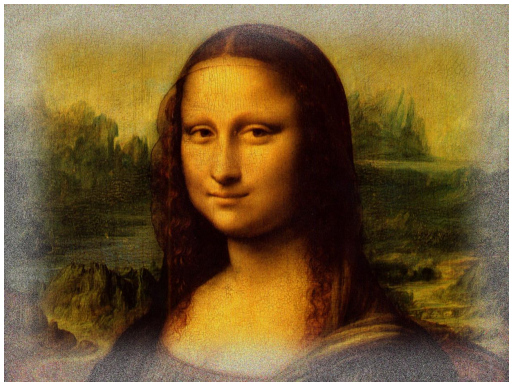
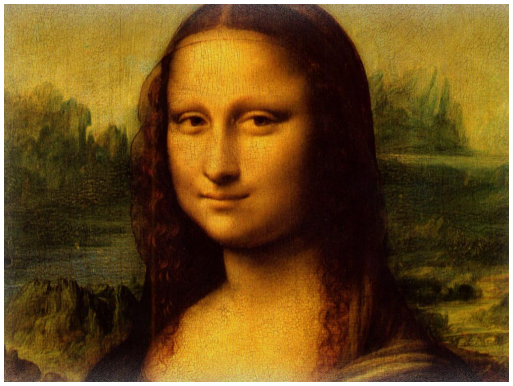


Image with noisy edges



Overscanned image

Notes

Main Menu
Geometry

*An **anamorphic lens** (optional accessory) is used with the **TheaterScope** setting, to ensure that for a **2.35:1** image, the maximum area of the DMD is used, giving maximum image brightness.*

*For examples of how the different aspect ratios affect screen dimensions, see **Aspect Ratios Explained** in the **Reference Guide**.*

*Items on this page may be unavailable depending on the **Geometry Engine** setting.*

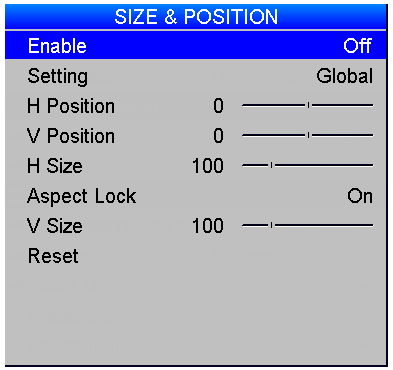
Size & Position

- Set **Enable** to **On** or **Off**.
- Use **Setting** to choose:

  Global, in which case these settings will be applied to all signals on all inputs.

or **Per Mode**, in which case these settings will be applied only to the current input signal.

- Set the **H Position** and **V Position** sliders as required.
- Set **H Size** and **V Size**. When **Aspect Lock** is set to **On**, the **V Size** slider is disabled.
- Select **Reset** and press **OK** to reset all the sliders.

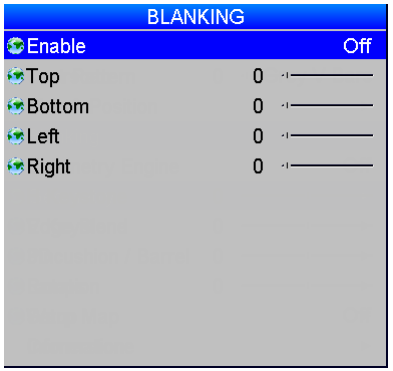


Main Menu
Geometry
Size & Position

Blanking

Blanking curtains can be applied to each edge of the projected image.

- Set **Enable** to **On** or **Off**.
- Set the sliders as required.



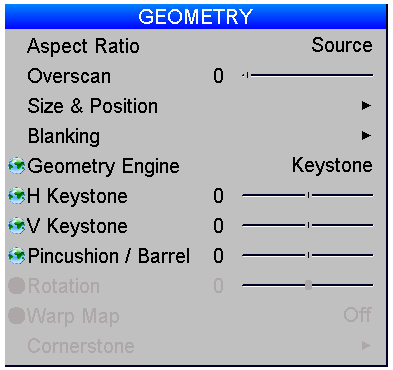
Main Menu
Geometry
Blanking

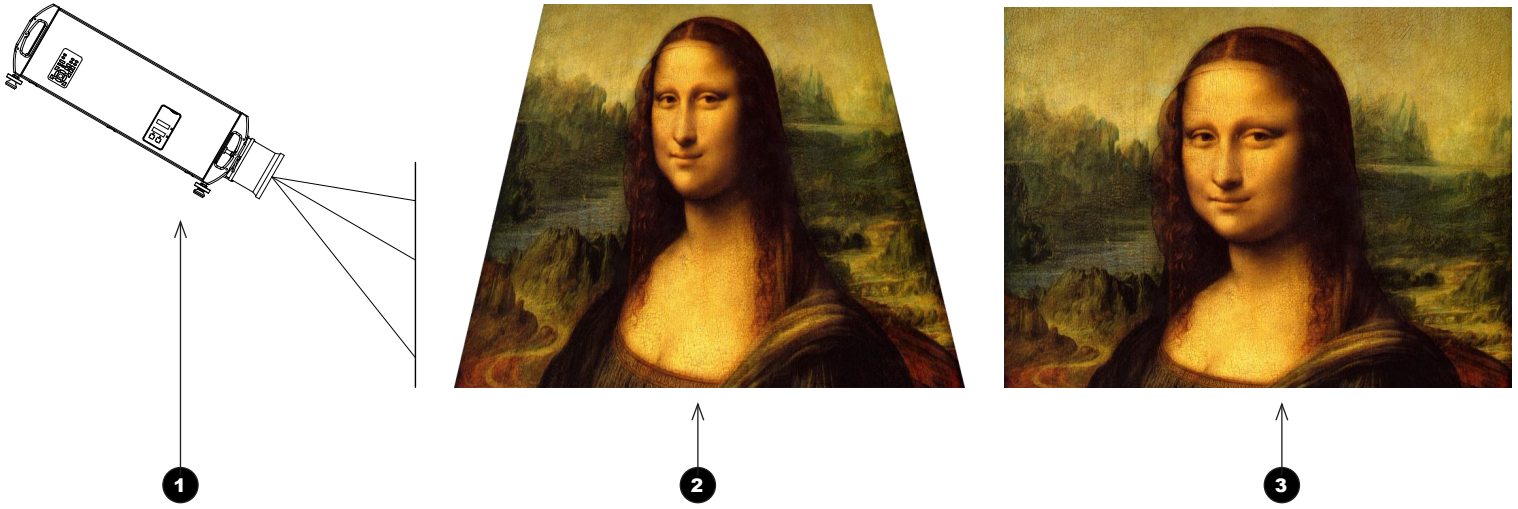
Notes

Geometry Engine

Choose from **Keystone**, **Cornerstone**, **Rotation**, **Warp** or **Off**.

- If **Geometry Engine** is set to **Keystone**, set the **H Keystone** and **V Keystone** sliders to correct for any distortion caused by the projector being in a different horizontal or vertical plane to the screen.





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

2 **The resulting image is distorted**

3 **The image is corrected when Keystone is applied**

Notes

Main Menu
Geometry

Some items on this menu may be unavailable depending on the **Geometry Engine** *setting.*

If possible, position the projector facing the screen at a right angle to avoid geometry corrections.

Geometry Engine (continued)

Keystone settings

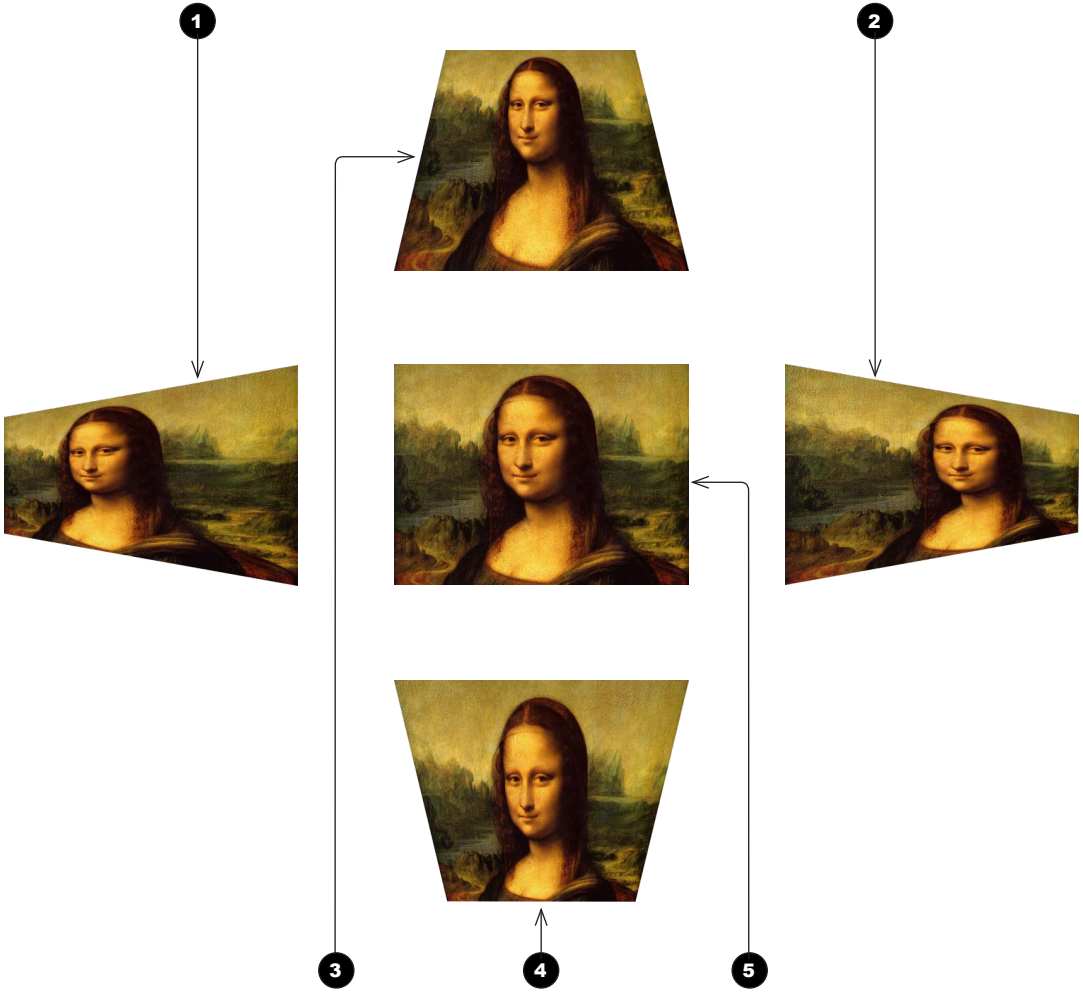
1 **Projector to the left**
The projector is positioned to the left of the screen.
To correct, apply a positive **H Keystone** value using the **RIGHT** arrow button.

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

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

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



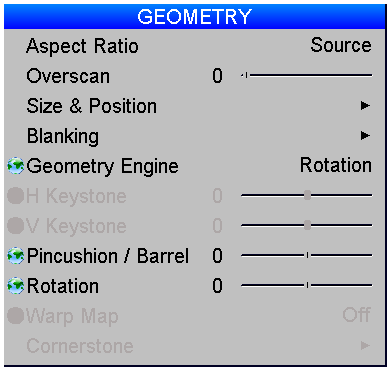
Horizontal and vertical keystone corrections

Notes

Main Menu
Geometry

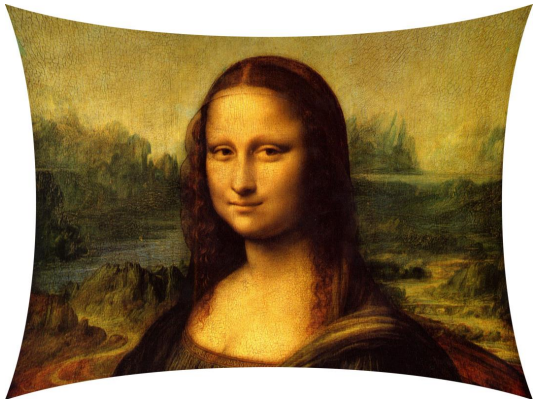
If possible, position the projector facing the screen at a right angle to avoid geometry corrections.

Geometry Engine (continued)

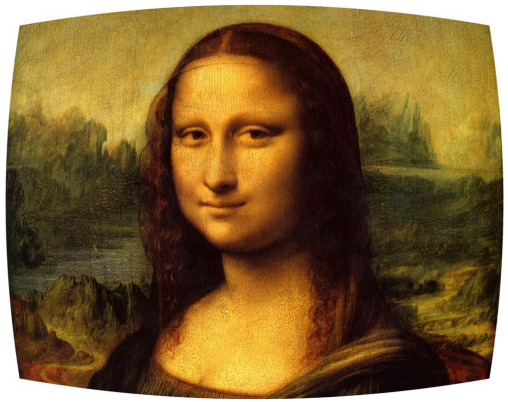


- **Pincushion** / **Barrel** is enabled if **Geometry Engine** is set to ***Keystone*** or ***Rotation***.

  Set the slider to correct for any distortion caused by the screen being concave or convex.



Pincushion



Barrel

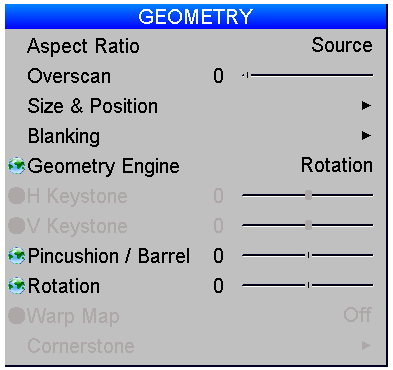
Notes

Main Menu
Geometry

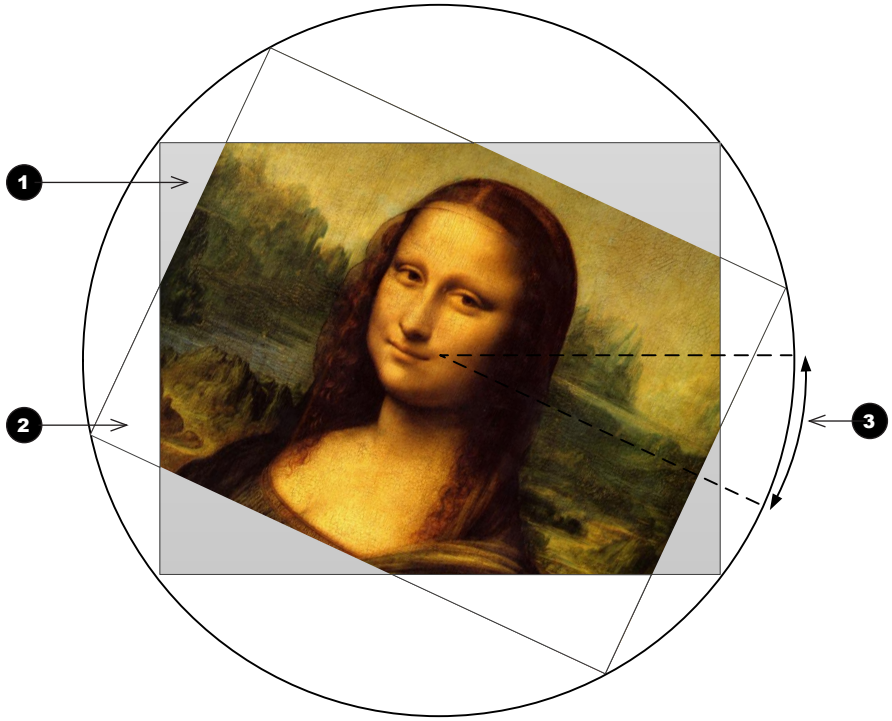
Some items on this menu may be unavailable depending on the **Geometry Engine** *setting.*

If possible, position the projector facing the screen at a right angle to avoid geometry corrections.

Geometry Engine (continued)



- If **Geometry Engine** is set to ***Rotation***, set the **Rotation** slider to rotate the image on the screen.



1. **DMD position**
   The DMD is not rotated.

2. **Area outside DMD**
   The corners of the rotated image leave the DMD and appear cropped.

3. **Angle of rotation**
   The angle equals the **Rotation** setting.
   In this example the angle is 25°, therefore **Rotation = 25**.

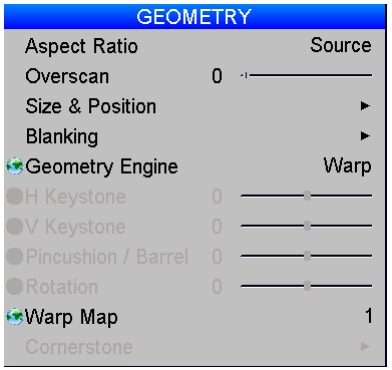
Notes

Main Menu
Geometry

Some items on this menu may be unavailable depending on the **Geometry Engine** *setting.*

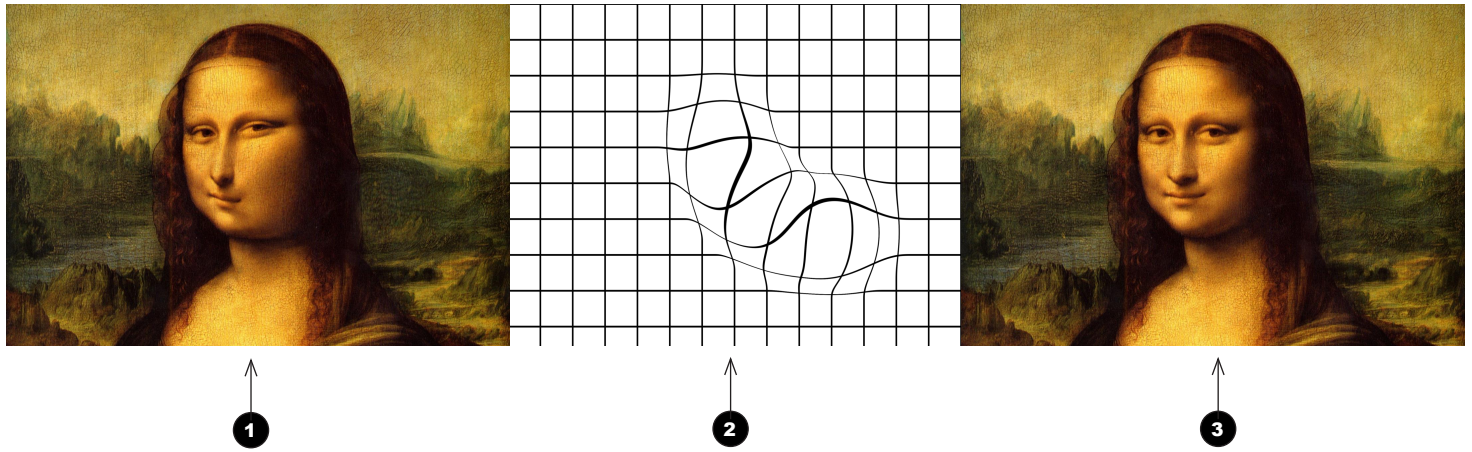
If possible, position the projector facing the screen at a right angle to avoid geometry corrections.

Geometry Engine (continued)



Warp Map

Using ***DP Warp Generator***, an external Digital Projection computer application, up to eight customised warp maps can be created and uploaded to the projector. If **Geometry Engine** is set to ***Warp***, and any warp maps have been uploaded, you can select from the drop-down list.



1 **Distorted image**
The image is projected on an uneven surface.

2 **Warp map**
The map mirrors the surface - raised areas on the surface correspond to hollow areas on the map, and vice versa.

3 **Corrected image**
With the warp map applied, the projector compensates for the surface and the projected image appears undistorted.

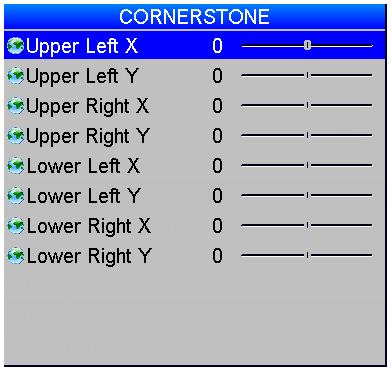
Notes

Main Menu
Geometry

Some items on this menu may be unavailable depending on the **Geometry Engine** *setting.*

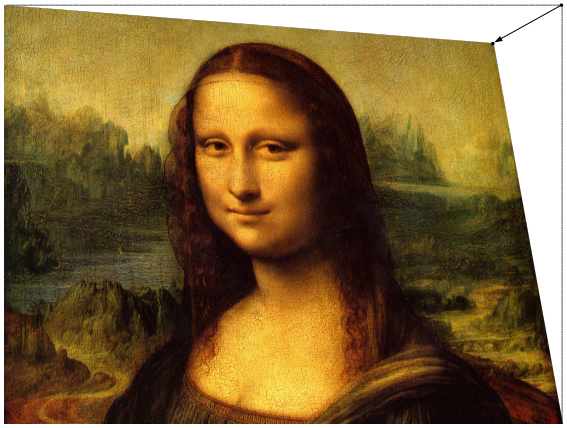
If possible, position the projector facing the screen at a right angle to avoid geometry corrections.

Geometry Engine (continued)



Cornerstone

If **Cornerstone** is selected from the main **Geometry** page, you can use the sliders to stretch the image from each of the four corners.



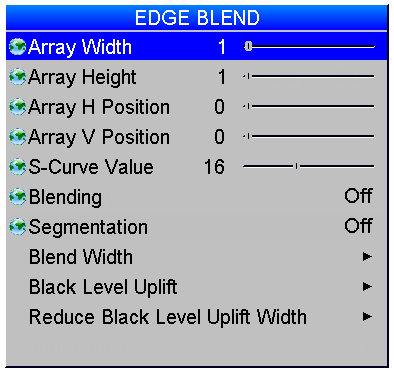
Upper Right X *and* **Upper Right Y** *correction*

Notes

Main Menu
Geometry
Cornerstone

Edge Blend menu

The **Edge Blend** menu is available only when **Setup** > **System** > **Configuration** is set to **Edge Blend**.

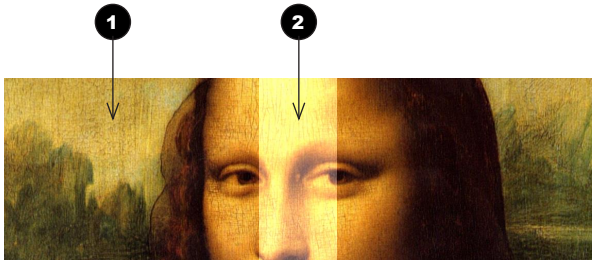


Overview

When several projectors are used to create a large tiled image, the edges need to be blended to avoid the overlaps appearing brighter than the rest of the image.

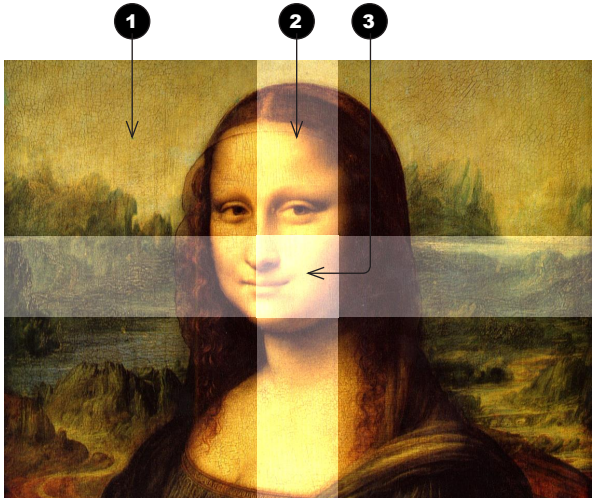
As it is not possible for any projector to produce an absolute black, any 'black' areas in the overlapped edges may appear slightly less dark than those in the rest of the image. **Black Level Uplift** can be used to counteract this effect, by raising the black level of the rest of the image. The amount of uplift required will be either x2 or x4, depending on how many images are overlapped, as shown in the examples on this page.

Image brightness changes from one point to another, within the same blended region. If the same level of black level uplift is applied throughout the blended region, the overlapping edges may still be visible on the screen. Therefore, brightness in these areas is decreased gradually, using an s-curve factor. **S-Curve Value** is used to control the steepness of the decrease.



Two projectors sharing one overlapping edge

1 **x2 uplift area**
2 **no uplift**



Four projectors with overlapping edges

1 **x4 uplift area**
2 **x2 uplift area**
3 **no uplift**

Notes

Main Menu
Edge Blend

This menu is available only when **Setup** > **System** > **Configuration** *is set to* **Edge Blend**.

None of the other items in this menu are available until either the **Array Width** *or the* **Array Height** *setting is greater than* **1**.

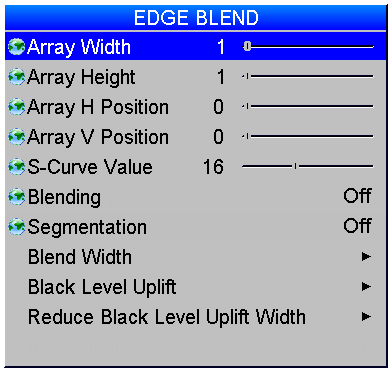
For a detailed step-by-step description of the edge blend process, see ***Blending images from multiple projectors*** *further in this section.*

Array Width and Height

- Set this to the total number of projectors in the array. None of the other options are available until one of these two settings is greater than **1**. The maximum number of projectors is **4** x **4**.

Array H Position and V Position

- These two parameters need to be set correctly for each projector in the array, so that it can determine which edges are to be blended. Sometimes only one edge overlaps, sometimes two, three or four.



Example

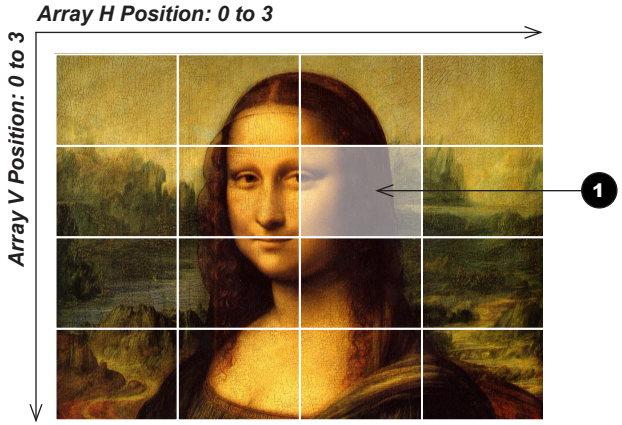
The illustration shows an array of sixteen projectors. **Array Width** and **Array Height** of all projectors have been set up as follows:

- **Array Width** = 4
- **Array Height** = 4

Array H Position and **Array V Position** of each projector have been set up to reflect its vertical and horizontal position in the array.

The settings for ***the third projector in the second row*** ❶ are:

- **Array H Position** = 2
- **Array V Position** = 1



Example array of sixteen projectors

Notes

Main Menu
Edge Blend

This menu is available only when **Setup** > **System** > **Configuration** *is set to* **Edge Blend**.

None of the other items in this menu are available until either the **Array Width** *or the* **Array Height** *setting is greater than* **1**.

The position numbering starts from zero, so the top left projector is at position ***H 0, V 0***.

Which settings are available in these menus depends on:

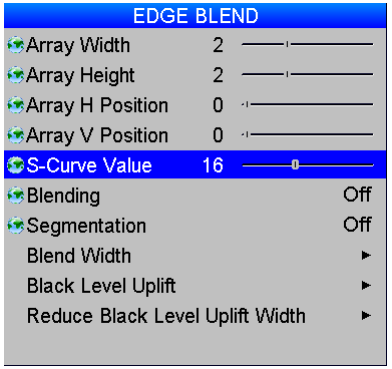
- *the number of projectors in the array*
- *the position of the projector in the array*

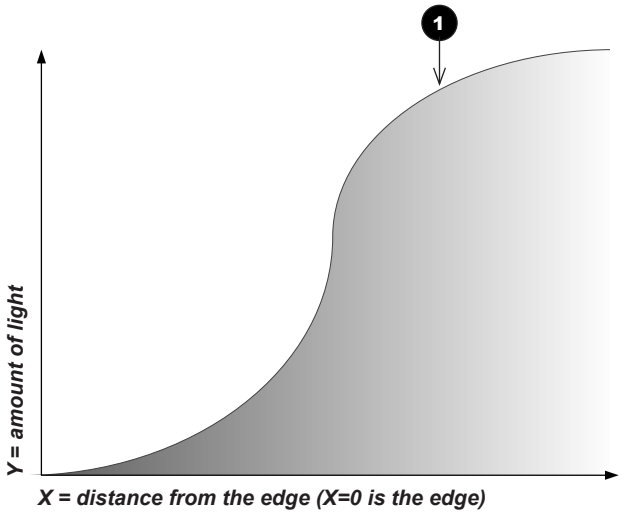
An image like the one shown here can be produced by an array of 16 projectors only if **Segmentation** *is set to* **ON**, *or if an external tool is used to split the image into segments. See* ***Segmentation*** *further in this section.*

For a detailed step-by-step description of the edge blend process, see ***Blending images from multiple projectors*** *further in this section.*

S-Curve Value

- In the regions where two or more projectors overlap, the brightness of the signal is decreased to blend the images. **S-Curve Value** controls the steepness of this decrease.





1 S-Curve

Notes

Main Menu
Edge Blend

This menu is available only when **Setup** > **System** > **Configuration** *is set to* **Edge Blend**.

None of the other items in this menu are available until either the **Array Width** *or the* **Array Height** *setting is greater than* **1**.

For a detailed step-by-step description of the edge blend process, see ***Blending images from multiple projectors*** *further in this section.*

S-Curve Value (continued)

When images overlap, the area of overlap receives light from all overlapping sources. Without S-Curve, the overlapping edges would be brighter than the rest of the image, as shown in ***Fig. 1***.

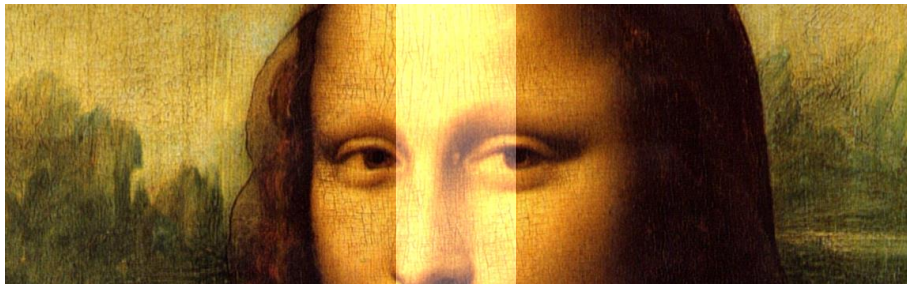


Fig. 1: Overlapping edges without S-Curve

If two reciprocal s-curves are used to control the amount of light from each source in the overlapping region, the total amount of light in the region would remain constant, as shown in ***Fig. 2***.

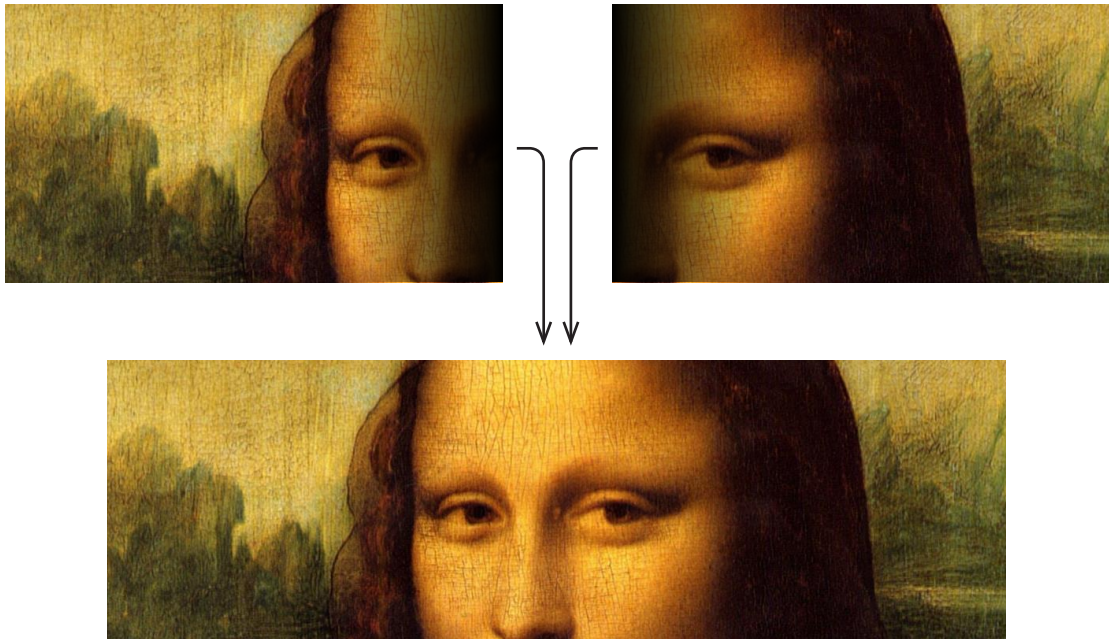


Fig. 2: Applying S-Curve to overlapping edges

Notes

Main Menu
Edge Blend

This menu is available only when **Setup** > **System** > **Configuration** *is set to* **Edge Blend**.

None of the other items in this menu are available until either the **Array Width** *or the* **Array Height** *setting is greater than* **1**.

For a detailed step-by-step description of the edge blend process, see ***Blending images from multiple projectors*** *further in this section.*

Blending

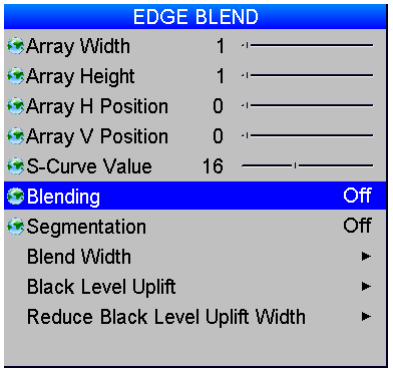
This setting enables s-curve blending, or displays an align pattern to help define overlaps between segments.

Set **Blending** to:

1. **Off**
   Edge Blend is not used.

2. **On**
   S-curves are enabled in the overlapping regions.

3. **Align Pattern**
   The align pattern makes the overlaps more visible and helps adjust the physical position of the projectors in the array.
   The size of the align pattern is controlled by the **Blend Width** group of settings.



1

2

3

Notes

Main Menu
Edge Blend

This menu is available only when **Setup** > **System** > **Configuration** *is set to* **Edge Blend**.

None of the other items in this menu are available until either the **Array Width** *or the* **Array Height** *setting is greater than* **1**.

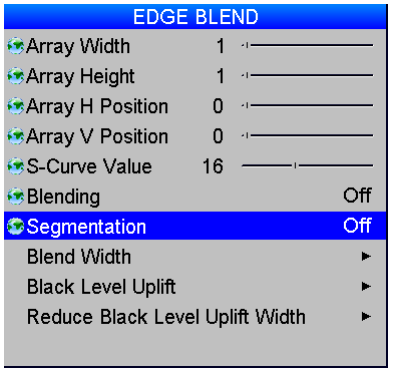
For a detailed step-by-step description of the edge blend process, see ***Blending images from multiple projectors*** *further in this section.*

Segmentation

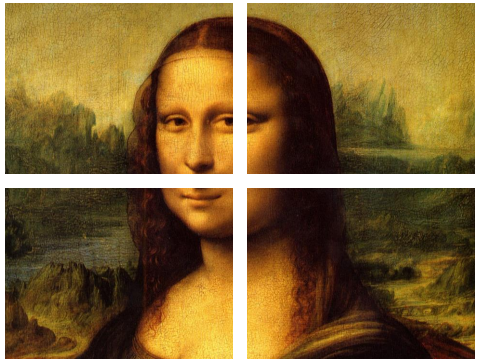
Segmentation can be used if the same image is fed into each projector.

- If **Segmentation** is **Off**, every projector in the array will display the whole image.
- If this setting is **On**, each projector will display its own segment only.

Set to **Off** if you have external software that handles segmentation.



Segmentation off



Segmentation on

Notes

Main Menu
Edge Blend

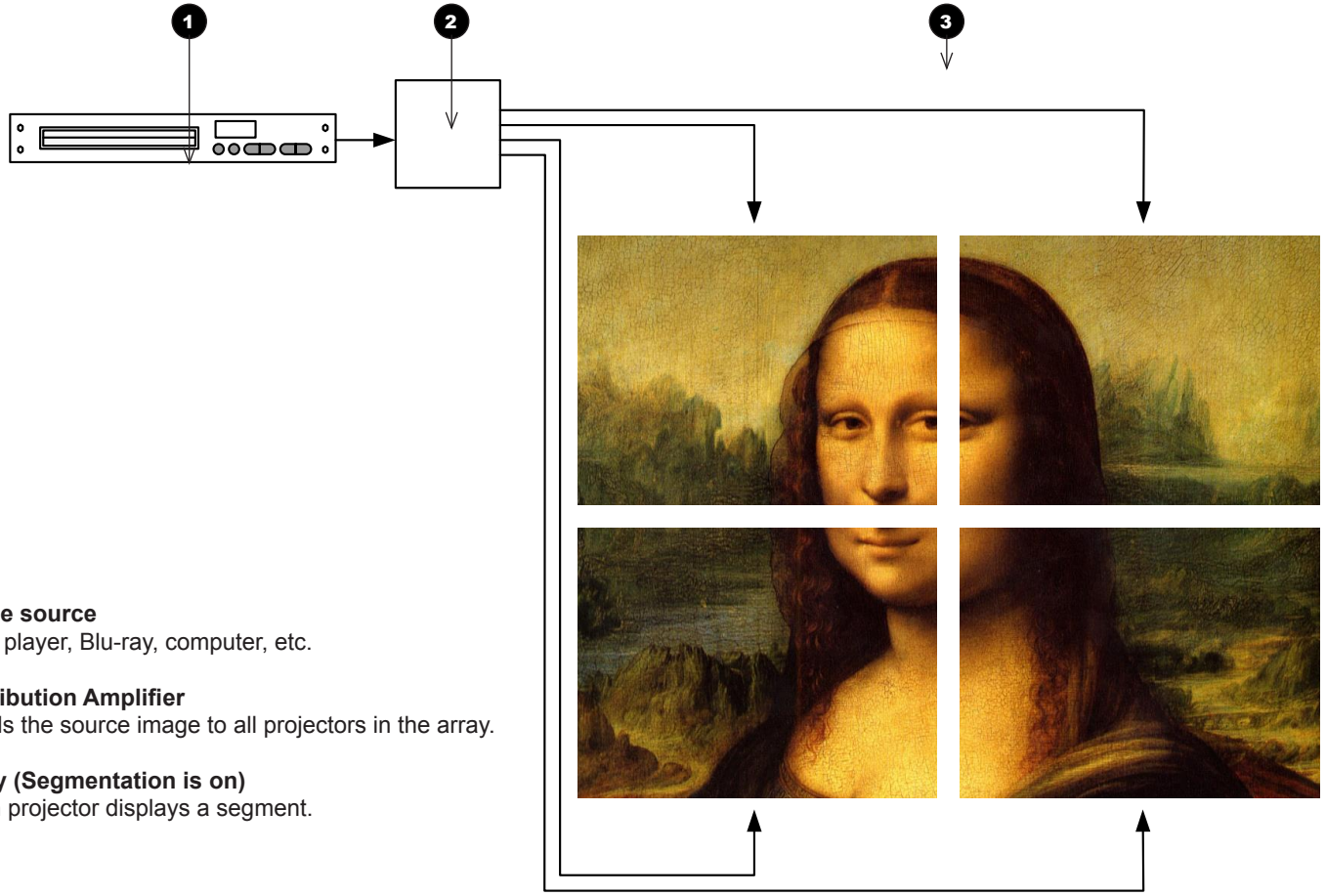
This menu is available only when **Setup** > **System** > **Configuration** *is set to* **Edge Blend**.

None of the other items in this menu are available until either the **Array Width** *or the* **Array Height** *setting is greater than* **1**.

For a detailed step-by-step description of the edge blend process, see ***Blending images from multiple projectors*** *further in this section.*

Segmentation (continued)

An example array:



1 **Image source**
DVD player, Blu-ray, computer, etc.

2 **Distribution Amplifier**
Sends the source image to all projectors in the array.

3 **Array (Segmentation is on)**
Each projector displays a segment.

Notes

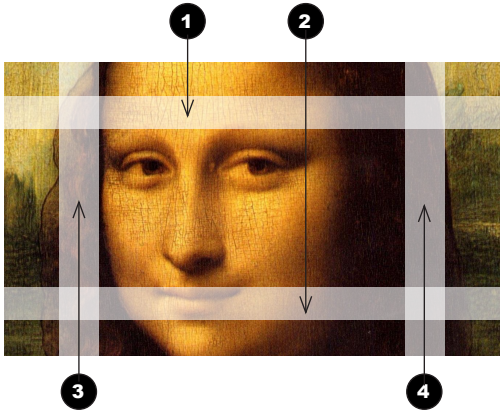
Main Menu
Edge Blend

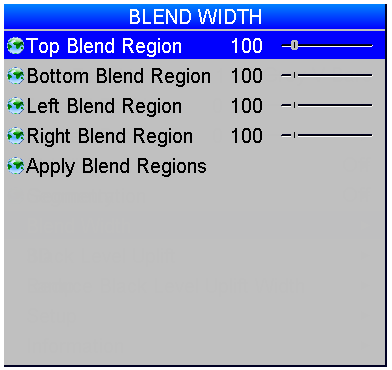
For a detailed step-by-step description of the edge blend process, see ***Blending images from multiple projectors*** *further in this section.*

Blend Width

Use this to set the width of the blended regions.

1. **Top Blend Region**
2. **Bottom Blend Region**
3. **Left Blend Region**
4. **Right Blend Region**





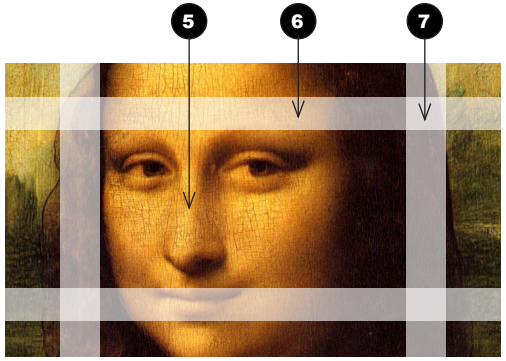
Main Menu
Edge Blend
Blend Width

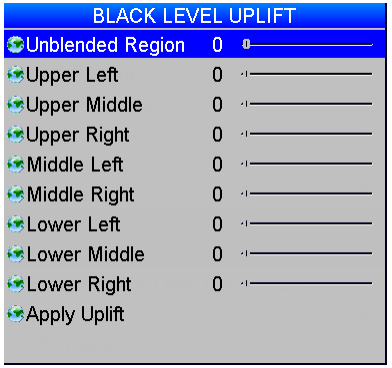
Black Level Uplift

Overlapping edges may appear lighter than the rest of the image. Counteract this effect by raising black levels in the rest of the image. The amount of uplift required will be either x2 or x4, depending on how many images are overlapped.

The following example shows a segment with overlapping edges on all sides.

5. **Unblended Region**
   This region is not overlapped. Black level should be raised by the maximum overlap occurring within the segment, therefore **Black Level Uplift** should be x4.
6. **Upper Middle**
   This section of the image is overlapped by two projectors, therefore the correct amount of **Black Level Uplift** should be x2.
7. **Upper Right**
   This part of the image is overlapped by four projectors, therefore **Black Level Uplift** should not be applied.





Main Menu
Edge Blend
Black Level Uplift

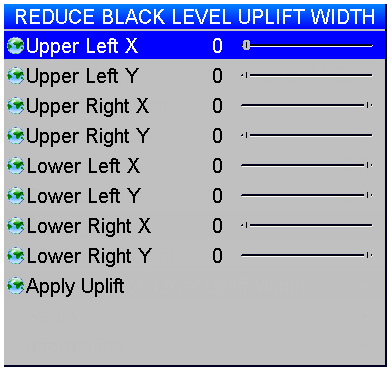
For a detailed step-by-step description of the edge blend process, see ***Blending images from multiple projectors*** *further in this section.*

Notes

To apply the settings in these menus, use the **Apply** *command at the bottom of each page.*

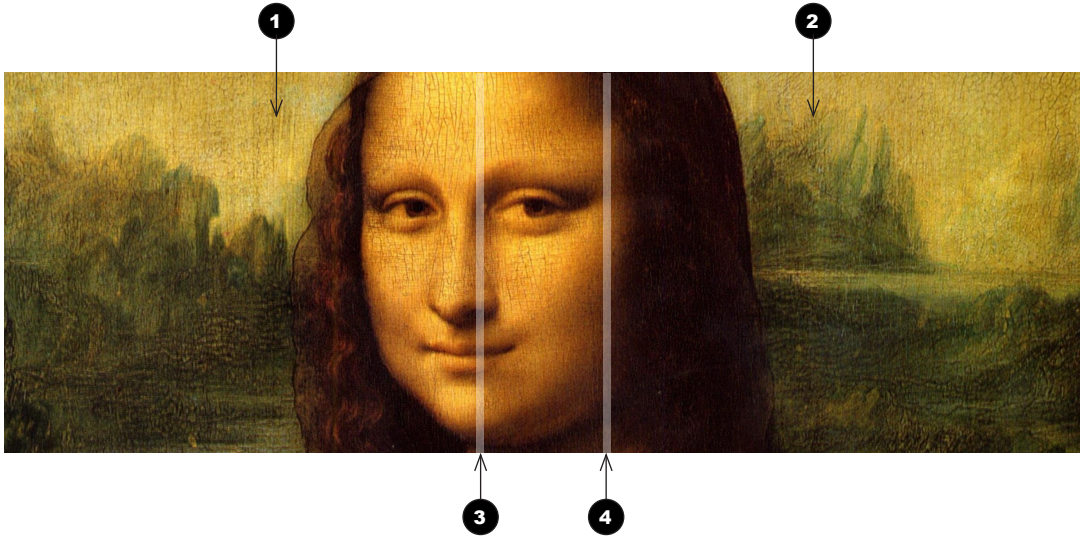
Reduce Black Level Uplift Width

Use this to correct for stray light from the ***pond of mirrors***, the DMD's inactive outermost mirrors.



In the example below, the blended image comes from ***two projectors***, 1 and 2. Both images have black level uplift applied in their unblended regions; 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 artifcats, 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.



Notes

Main Menu
Edge Blend
Reduce Black Level Uplift Width

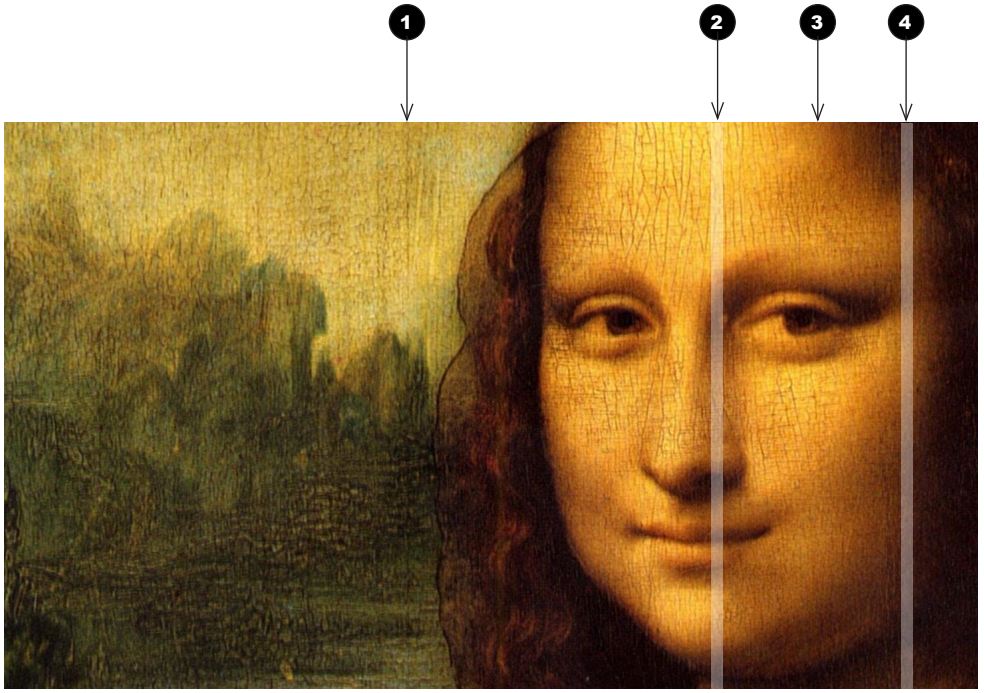
To apply the settings in this menu, use the **Apply Uplift** *command at the bottom of the page.*

For additional information, see ***The DMD™*** *in the* ***Reference Guide****.*

For a detailed step-by-step description of the edge blend process, see ***Blending images from multiple projectors*** *further in this section.*

Reduce Black Level Uplift Width (continued)

A detailed view of one of the projectors in a two-projector array:



1. **Black level uplift region**
   This image occupies the left half of a two-projector array. Black level uplift has created artifacts on the edges of the blend region.
2. **Artifact (left)**
   This artifact is caused by the other projector's pond of mirrors overlapping the black level uplift region of this projector. It can be eliminated if the black level uplift width of this projector is reduced.
3. **Blend region**
   The area in the middle of the array, where the two images overlap. Black level uplift has not been applied here.
4. **Artifact (right)**
   This artifact is caused by this projector's pond of mirrors overlapping the black level uplift region of the other projector. It can be eliminated if the black level uplift width of the other projector is reduced.

Notes

Main Menu
Edge Blend
Reduce Black Level Uplift Width

*For additional information, see **The DMD™** in the **Reference Guide**.*

*For a detailed step-by-step description of the edge blend process, see **Blending images from multiple projectors** further in this section.*

Reduce Black Level Uplift Width (continued)

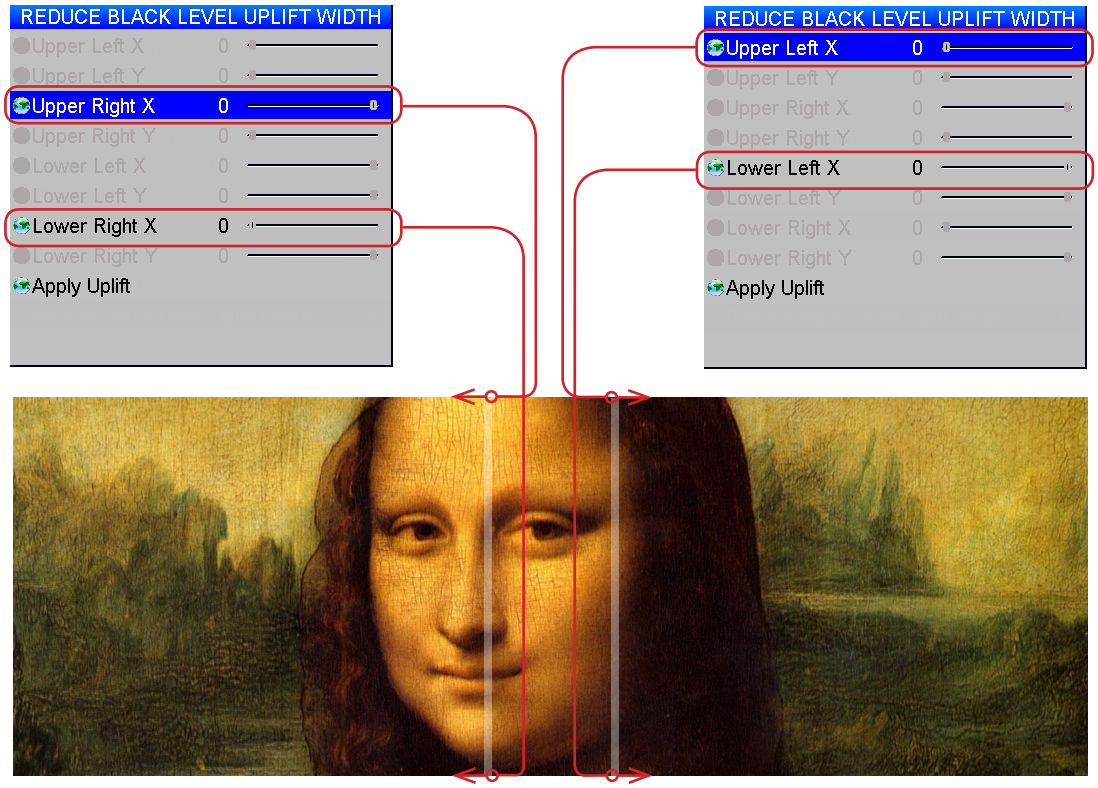
In the **Reduce Black Level Uplift Width** menu, settings correspond to coordinates within the unblended regions. Only relevant coordinates are enabled.

To remove the artifact on the left:

1. Open the **Reduce Black Level Uplift Width** menu of the projector on the left.
2. Adjust **Upper Right X** and **Lower Right X**.
3. Select **Apply Uplift**. The black level uplift region of this projector will withdraw from the pond of mirrors of the other projector and the artifact will disappear.

To remove the artifact on the right,

- Open the **Reduce Black Level Uplift Width** menu of the projector on the right and adjust **Upper Left X** and **Lower Left X**, then select **Apply Uplift**.



Notes

Main Menu
Edge Blend
Reduce Black Level Uplift Width

To apply the settings in this menu, use the ***Apply Uplift*** *command at the bottom of the page.*

For additional information, see ***The DMD™*** *in the* ***Reference Guide****.*

For a detailed step-by-step description of the edge blend process, see ***Blending images from multiple projectors*** *further in this section.*

Blending images from multiple projectors

The following procedure explains how to set up an array of projectors and how to blend the images together.

Before you start

Position the projectors

Ensure that all projectors are in good working order.

Position the projectors so that they are within the required throw distance range. Position the screen where it will remain during operation.

In the initial stages of the procedure you will be using test patterns, therefore it is not necessary to connect the input at this stage. However, you need to make sure that you are able to connect the inputs without moving the projectors.

Control the projectors

You can control the projectors individually by using:

- their respective control panels, or
- a dedicated remote control for each projector, or
- a single remote control for all projectors. To do so, you need to assign a different IR address for each projector.

Consider connecting the projectors in a LAN network and using the Projector Controller application to monitor the projectors and change settings on the whole array at once.

Notes

For information about changing the IR address of a projector, see ***Setting up an IR address*** *further in this guide.*

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

Edge Blend procedure

1. Align the projectors as they will be used in the array.

Each projector should be perpendicular to the screen, or as close as possible. Ideally, each projector should allow for a minimum of 20% screen overlap where it is adjoined by other projectors. Overlaps should be the same in size across the array.

How to align the projectors:

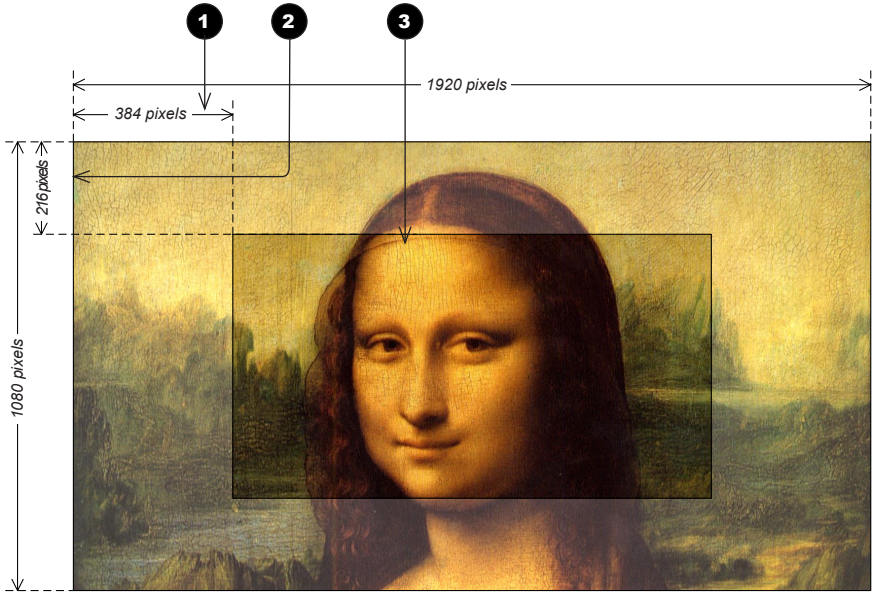
- Ideally, all alignment should be achieved by physically moving the projectors and by using the **Lens Shift** and **Zoom** functions.
- If necessary, use **Image > V Position** and **H Position**.
- Do not use geometry corrections.

Example: 1080p projector overlapped on all sides

1 **Overlap to the left**
This overlap takes 20% of the image width, or 384 pixels.

2 **Overlap to the top**
This overlap takes 20% of the image height, or 216 pixels.

3 **Area without overlaps**
This area is also called ***unblended region***.



A 1080p projector with 20% overlaps on all sides

Notes

Edge Blend procedure (continued)

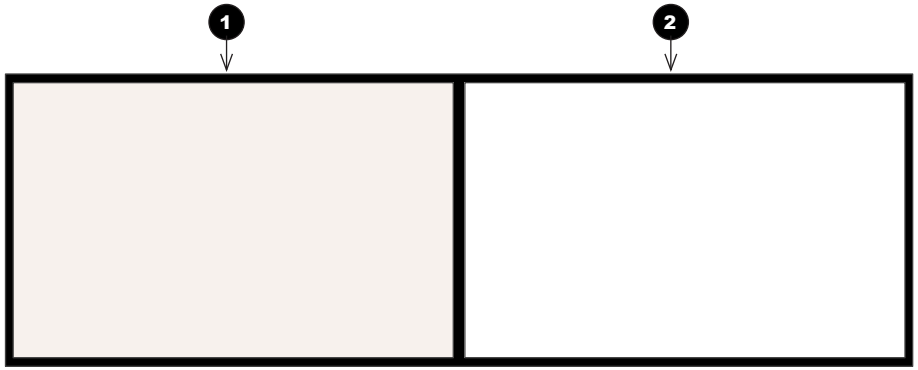
Notes

2. **Ensure that all projectors are color-matched.**

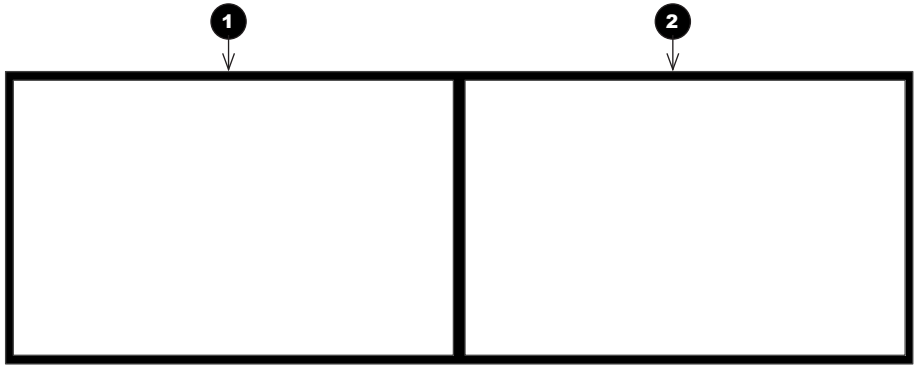
   If necessary, use the **White Field** test pattern and test the light output of each projector.

   Ensure the **Color > Gamut** setting has the same value across the array.

   Use **Lamps > Lamp Power** to compensate for different lamps. Even identical lamps change their light output with age and use.



Before color-match



After color-match

1 **Projector 1: incorrect settings**
Before the color-match this image has incorrect color gamut and lamp power settings

2 **Projector 2: correct settings**

3. **Enter the correct gamma setting.**

   Adjust the gamma setting using the **Image > Gamma** control. For video sources, such as Blu-ray or DVD, use a value of **2.2**; for computer graphics use **2.4**.

   The images may still look slightly different at this stage. It is OK to continue.

Edge Blend procedure (continued)

4. Set up the array.

For each projector, open the **Edge Blend** menu and enter **Array Width**, **Array Height**, **Array H Position** and **Array V Position**.

Array Width and **Array Height** should be identical for all projectors. These settings define the size of the array. For example, a two-by-two array will have the following values:

- **Array Width = 2**
- **Array Height = 2**

The top left projector will have **Array H Position = 0** and **Array V Position = 0**.

1 **Top left**

Array H Position = 0
Array V Position = 0

2 **Top right**

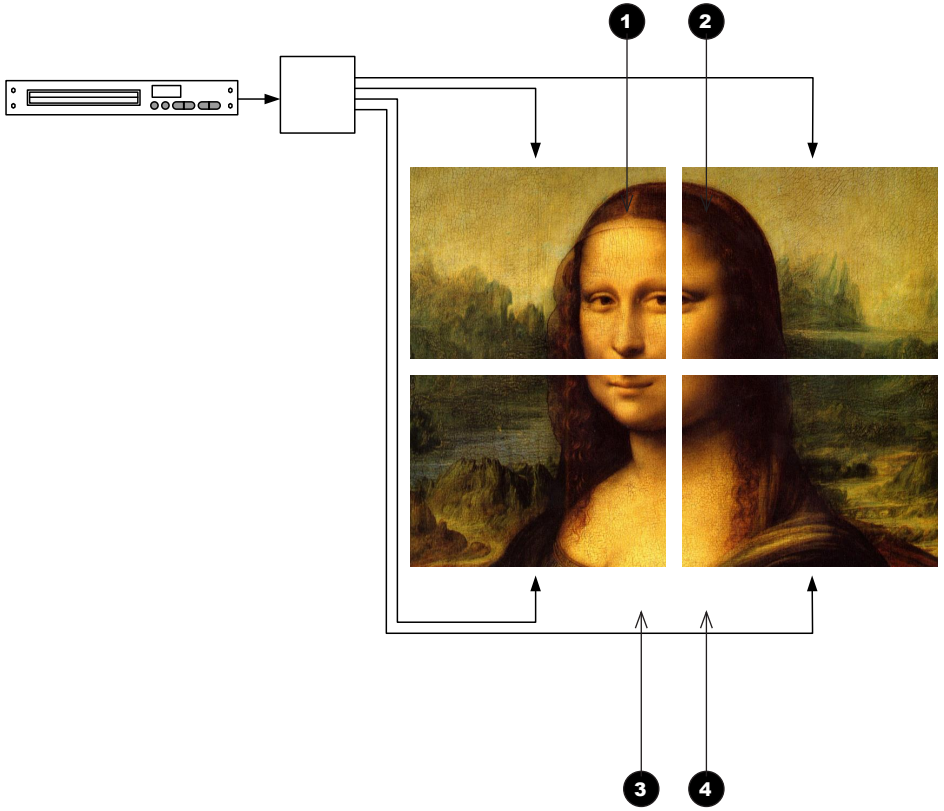
Array H Position = 1
Array V Position = 0

3 **Bottom left**

Array H Position = 0
Array V Position = 1

4 **Bottom right**

Array H Position = 1
Array V Position = 1



Notes

Edge Blend procedure (continued)

5. Define blend regions.

From the **Edge Blend** menu on all projectors, set **Blending** to **Align Pattern**.

Set up **Blend Width** on each projector so that the align patterns overlap perfectly and completely cover the blend regions ***(Fig. 2)***.

If necessary, physically move the projectors and/or use **Lens Shift** and **Zoom** again to align the array perfectly

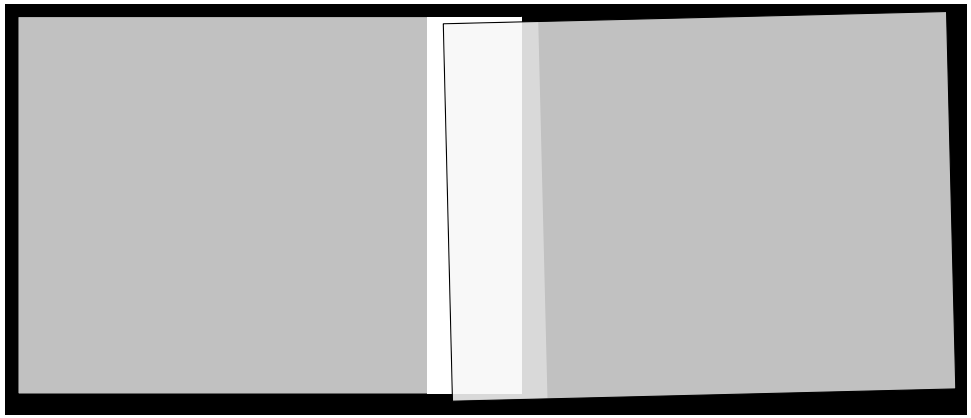
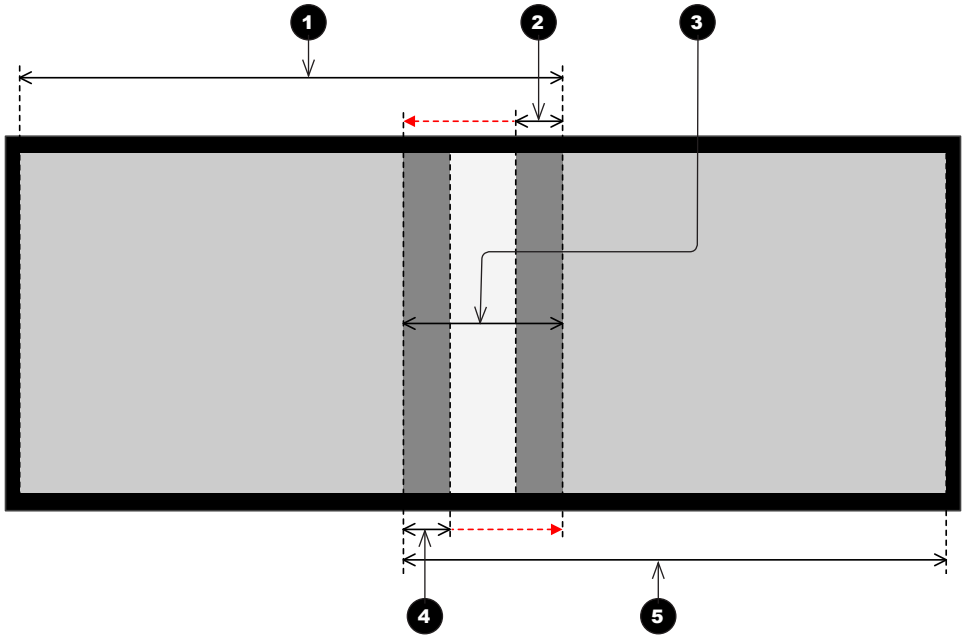


Fig. 1 Align patterns make it easy to see where the overlap is not perfect

Fig. 2



1. **Left projector**
2. **Align pattern of left projector**
   The red arrow next to the align pattern shows what correction needs to be made for the align pattern to cover the whole blend region.
3. **Blend region**
   The brighter ribbon in the middle is overlap area not covered by the align patterns.
4. **Align pattern of right projector**
   The red arrow next to the align pattern shows what correction needs to be made for the align pattern to cover the whole blend region.
5. **Right projector**

Fig. 2 Projectors with align patterns not covering the blend region

Notes

Edge Blend procedure (continued)

6. **Uplift black levels (optional).**

   If you do not need to uplift the black levels, skip to *step 8, Blend the images*.

   Switch all projectors to the **Black Field** test pattern.

   The level of black will differ across the image as shown in ***Fig. 1***. Uplift the black levels using **Edge Blend > Black Level Uplift**.

   How to uplift black levels

   Regions may be overlapped by two or four projectors. An array will always contain regions overlapped by at least two projectors.

   - **x2 overlaps**

     If your array only contains two-projector overlaps, you need to uplift the black levels in the unblended regions – the exact value will depend on the projector, environment, etc. Do not uplift black levels in the overlapping region(s).

   - **x2 and x4 overlaps**

     Sometimes a region is overlapped by four projectors. For example, in a two-by-two segment setup, **Array Width = 2** and **Array Height = 2**, the region in the middle is overlapped by all four projectors (as shown in ***Fig. 1***). If your array contains such regions, you need to uplift black levels roughly four times in the unblended regions, and roughly double in the regions overlapped by two projectors.

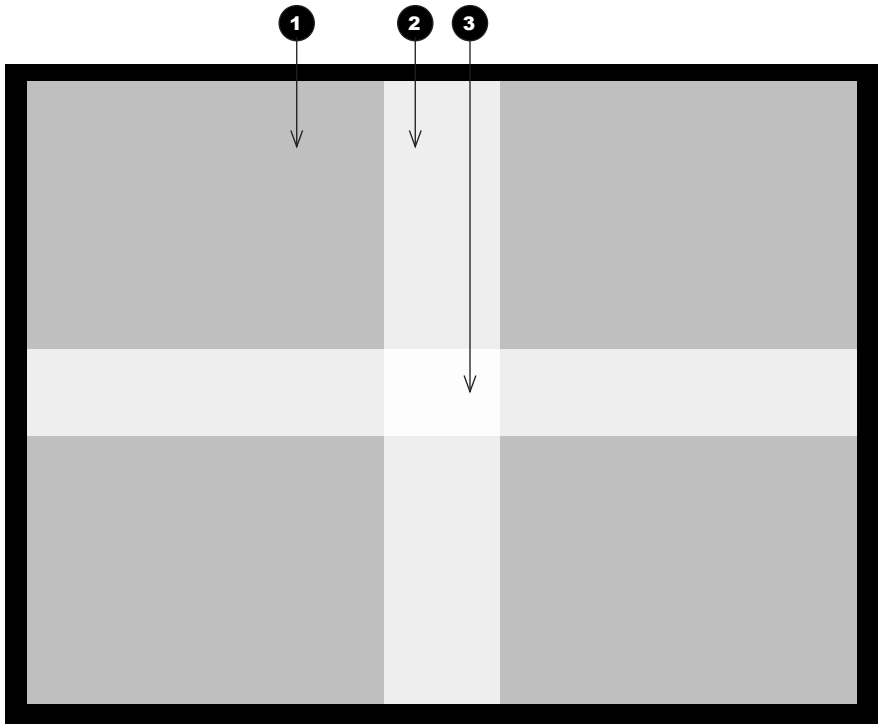


Fig. 1 Different black levels

1. **Unblended region**
   This region is not overlapped. Black level should be raised by the maximum overlap occurring within the image, therefore the value of **Black Level Uplift** should be the highest here.

2. **x2 overlap**
   This section of the image is overlapped by two projectors, therefore the correct amount of **Black Level Uplift** should be roughly half the value of uplift within the unblended region.

3. **x4 overlap**
   This part of the image is overlapped by four projectors, therefore **Black Level Uplift** should not be applied.

Notes

Edge Blend procedure (continued)

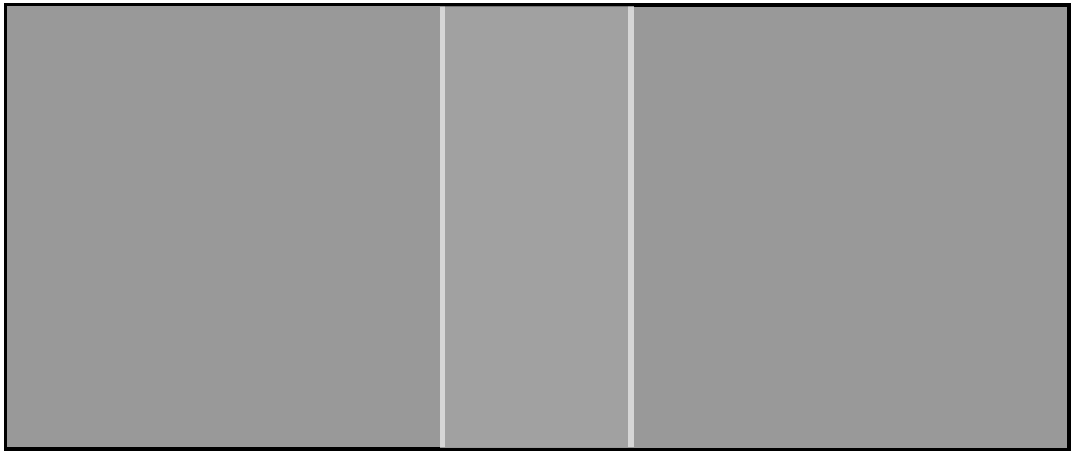
Notes

7. **Adjust uplift edges (optional).**

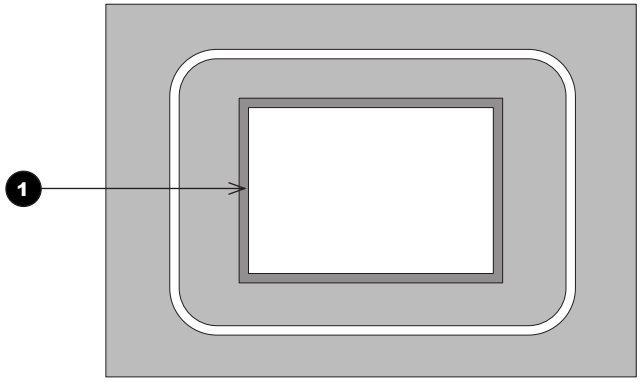
   This step is necessary if you have uplifted the black levels in the previous step.

   During the black level uplift process, brighter lines appear on the edges of the uplifted regions. This is due to the inactive area around the periphery of the DMD, also known as ***pond of mirrors*** (1).

   To remove these edges, use the **Edge Blend > Reduce Black Level Uplift Width** settings for each projector individually. Enter X and Y corrections for each part of the image to achieve this.



The edges of the uplift area are brighter due to light from the pond of mirrors



DMD

Edge Blend procedure (continued)

8. Blend the images.

Set **Edge Blend > Blending** to **On** for each projector to activate s-curves in the blend regions.

Once blending is activated, use test patterns to detect irregularities within the blend and to correct them.

What test patterns to use

- Use **White Field** (recommended) and/or **Grey H Bars**, if you are blending horizontally aligned images, and **Grey V Bars**, if the images are vertically aligned.

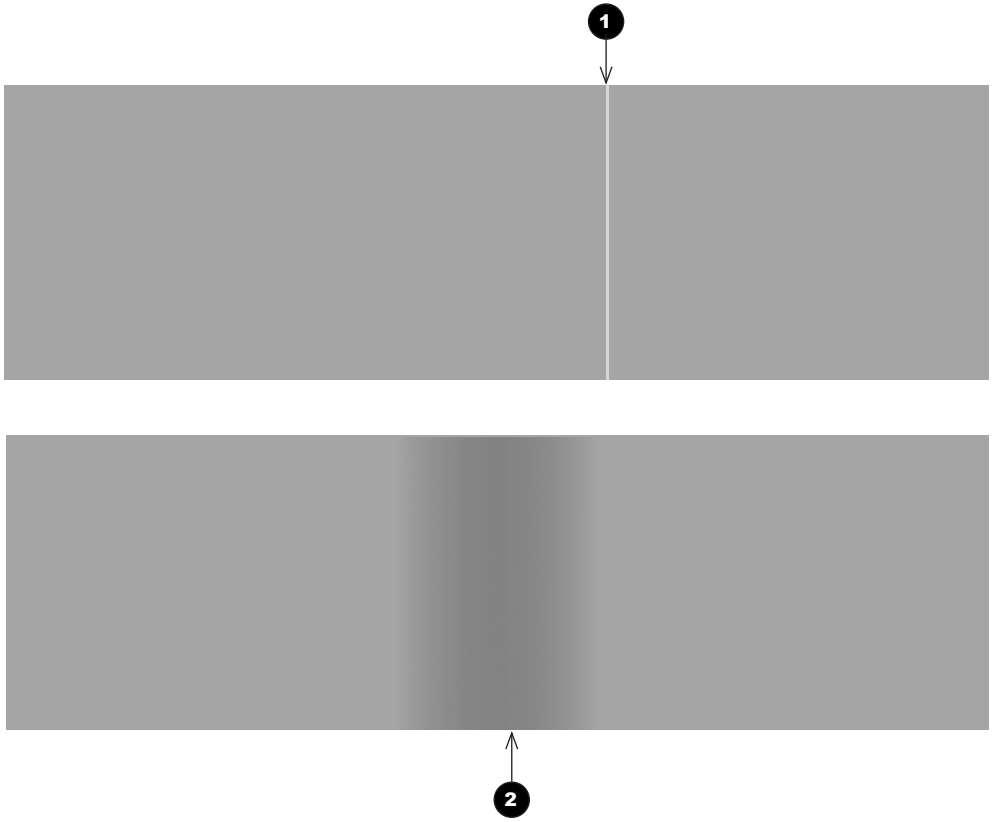
What irregularities to look for

- There might be ***a hard line*** 1 visible where one of the edges is overlapped by the other image.

How to correct

1. Switch **Lamps > Compensation** to **Manual**.
2. Alter the compensation value from the slider until the line disappears.

Once you have removed the line, check if ***the blend region is darker than the rest of the image*** 2. If this is the case, adjust the **Edge Blend > S-Curve Value** setting until the blend region is the same as the rest of the image.



Notes

Edge Blend procedure (continued)

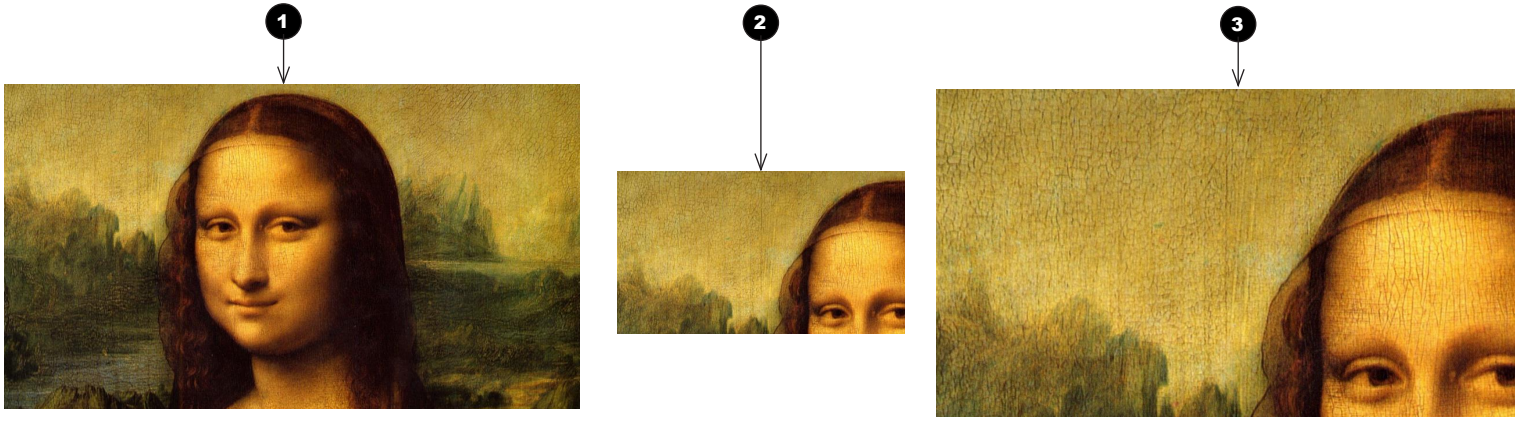
9. Set up segmentation (optional).

If you are feeding the same source into all the projectors and aim to have each projector reproduce a segment of the source, you can use the **Edge Blend > Segmentation** function, or you can use an external processor to control the segments.

To use the **Segmentation** function:

1. On each projector, set **Edge Blend > Segmentation** to **On**.
2. Test with the source. If necessary, enter further corrections as described in steps 6, 7 and 8 above.

Bear in mind that using the Segmentation function brings a loss of resolution, as shown below:



1 **Whole image**
This is a 1080p image and contains 2,073,600 pixels.

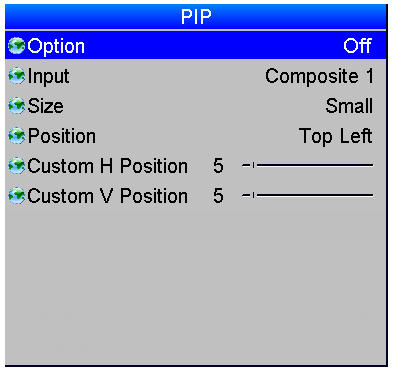
2 **Top left segment in a 2x2 array**
This segment contains 518,400 pixels, a quarter of the original image.

3 **The segment projected with a 1080p DMD**
The segment zoomed in to fill a 1080p DMD. The pixels are larger but not greater in number.

Notes

PIP menu

Two images can be combined in three different ways using this feature. The PIP menu is available only when **Setup** > **System** > **Configuration** is set to **PIP**.



Option

- Select **PIP**, **PAP**, or **POP** mode from the drop-down list.

Input

- Select an **Input** for the sub-image from the drop-down list. The inputs are divided into two groups – the main image must be from one group, and the sub-image must be from the other group.
  - Group A: **COMPOSITE 1, COMPOSITE 2**, **S-VIDEO** and **3G-SDI**
  - Group B: **COMPONENT, VGA**, **DVI**, **HDMI** and **DVI-A**

  The inputs from the same group as the main input signal will appear disabled in the list.

Size

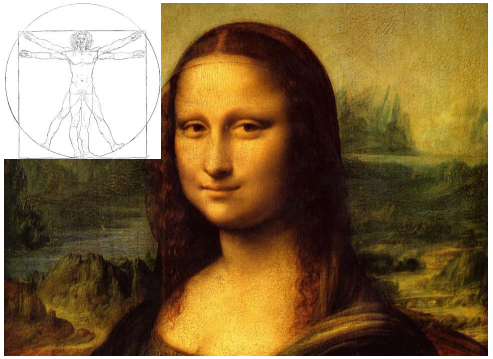
- Select a size for the sub-image from the drop-down list.

Position

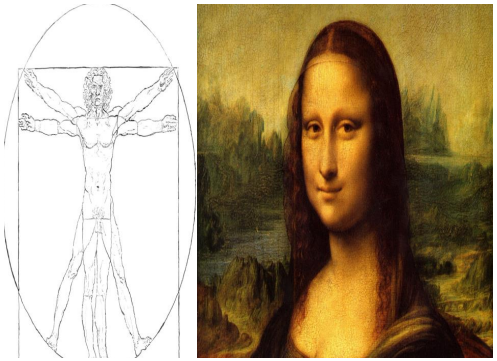
- Select one of the preset positions for the sub-image from the drop-down list.

Custom Position

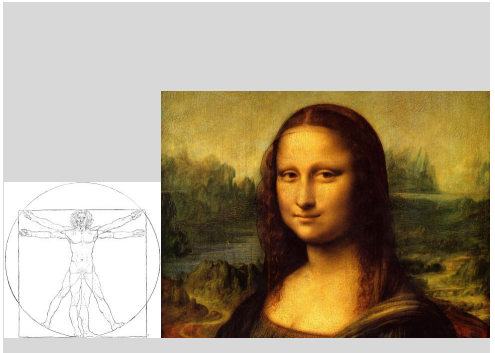
- If you have chosen **Custom** from the **Position** drop-down list, then you can use the sliders to position the image manually.



PIP: Picture In Picture



PAP: Picture And Picture



POP: Picture Opposite Picture

Notes

Main Menu
PIP

This menu is available only when **Setup** > **System** > **Configuration** *is set to* **PIP**.

PIP, **PAP** *and* **POP** *are NOT possible when* **Input** *is set to* **Test Pattern**.

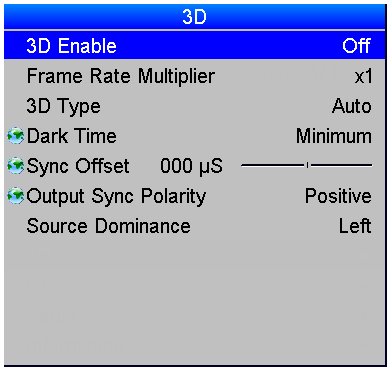
In these examples, the painting is the main image, and the test pattern is the sub-image, shown at the **Medium** *size setting.*

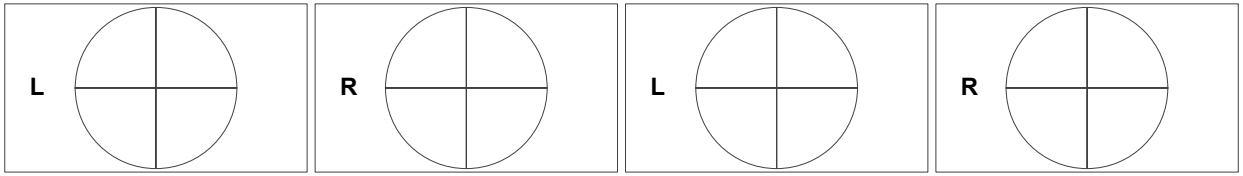
The **Position** *settings apply ONLY to* **PIP** *mode. PAP and POP are always as shown in these examples.*

3D menu

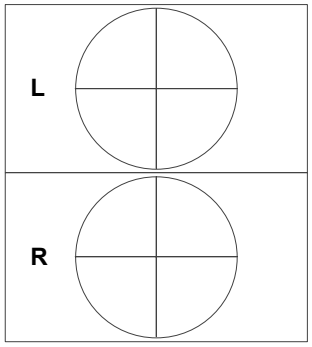
- Set **3D Enable** to **On** or **Off** as required.
- Use the **Frame Rate Multiplier** to reduce flicker when the incoming 3D video signal has a low frame rate.

  For example, a 48Hz frame rate could be tripled to 144Hz.
- **3D Type** should be set to **Auto**, except when the projector has problems selecting between **Sequential**, **Frame Packing**, **Top and Bottom** and **Side by Side (Half)**.
- Set the **Dark Time** to reduce the ghosting that can be caused by the images overlapping whilst the glasses are switching.
- Set the **Sync Offset** to compensate for signal processing delays in the projector.
- Set the **Output Sync Polarity** to suit the glasses, or if the left and right images appear to be swapped.
- Set **Source Dominance** to **Left** or **Right** to suit the incoming 3D video signal.

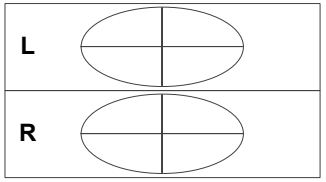




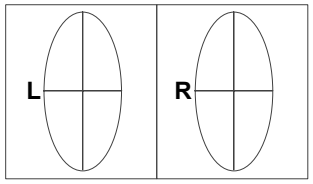
Sequential



Frame Packing



Top-and-Bottom



Side-by-Side (Half)

Notes

Main Menu
3D

When using frame rate multiplication, the final output frame rate must not exceed 144Hz.

*Set **Dark Time** to the value appropriate to the glasses or ZScreen.*

*Adjust **Sync Offset** to eliminate ghosting and achieve a smooth grayscale.*

*For additional information on 3D settings, see **Some 3D settings explained** further in this section.*

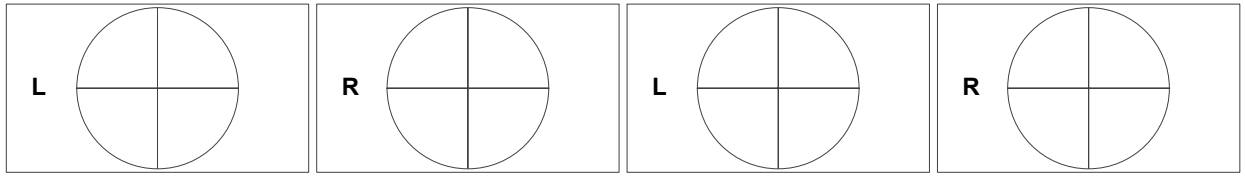
The information on this page does not apply to 2D projectors.

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.

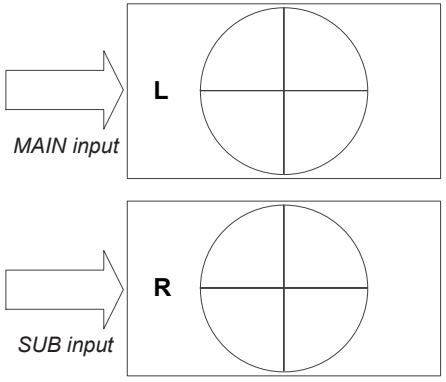
The following 3D formats are supported:

- **Sequential**
  Main will accept frame rates up to 160Hz. Lower frame rates can be multiplied for display. An example would be 60Hz (30 frames per eye in Left-Right sequence (L1, R1, L2, R2…) with **Frame Rate Multiplier** set to 2x, resulting in a displayed sequence at 120Hz (L1, R1, L1, R1, L2, R2, L2, R2…). **Sub** can accept frame rates up to 60Hz and frame-multiply in a similar manner.
  Frame Rate Multiplier should never be set to result in a displayed frame rate above 160Hz - doing so will result in an image error.
  For sequential 3D, an external sync is required to identify left and right frames. If no sync is available from the sequential source, the projector will generate an output sync, but it may then be necessary to manually reset the dominance each time the player is started.



Sequential

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



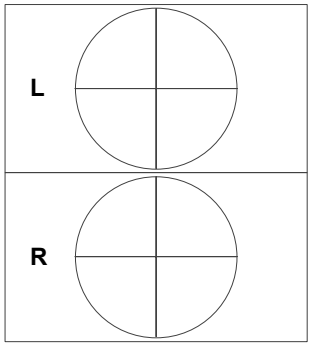
Dual Pipe

Notes

The information on this page does not apply to 2D projectors.

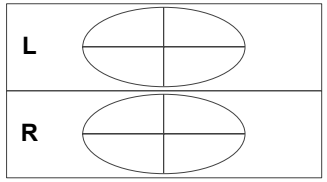
3D types (continued)

- **Frame Packing**
  This format will be detected, re-synchronised, frame-multiplied and displayed at 144Hz with the left eye / right eye dominance automatically extracted from the video data. You need to optimize **Dark Time** and **Sync Offset** manually to suit your chosen switching glasses. You also need to set an appropriate frame rate multiplication: for **Frame Packing**, we recommend **3x**.)



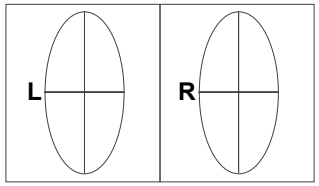
Frame Packing

- **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 Offset** manually to suit your chosen switching glasses. You also need to set an appropriate frame multiplication: for a 60Hz **Top-and-Bottom** source **Frame Rate Multiplier** should be set to **1x** because the two halves of the image will automatically be extracted to create a displayed rate of twice the input rate.



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 120Hz. The left eye / right eye dominance will be automatically extracted from the video data, however you will need to optimize **Dark Time** and **Sync Offset** manually to suit your chosen switching glasses.
  When 3D is disabled, 1080i will be treated conventionally. For a 60Hz **Top-and-Bottom** source **Frame Rate Multiplier** should be set to **1x** because the two halves of the image will automatically be extracted to create a displayed rate of twice the input rate.



Side-by-Side (Half)

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

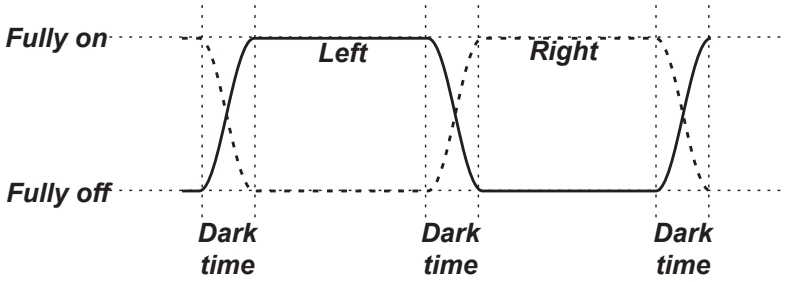
Notes

The information on this page does not apply to 2D projectors.

Some 3D settings explained

Dark Time

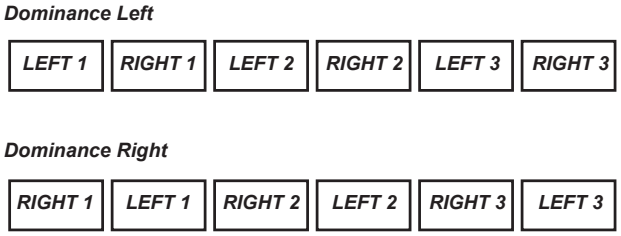
Ghosting can be caused by the left and right images overlapping during the time that the ZScreen or 3D glasses are switching. **Dark Time** allows you to minimize this effect.



Source Dominance

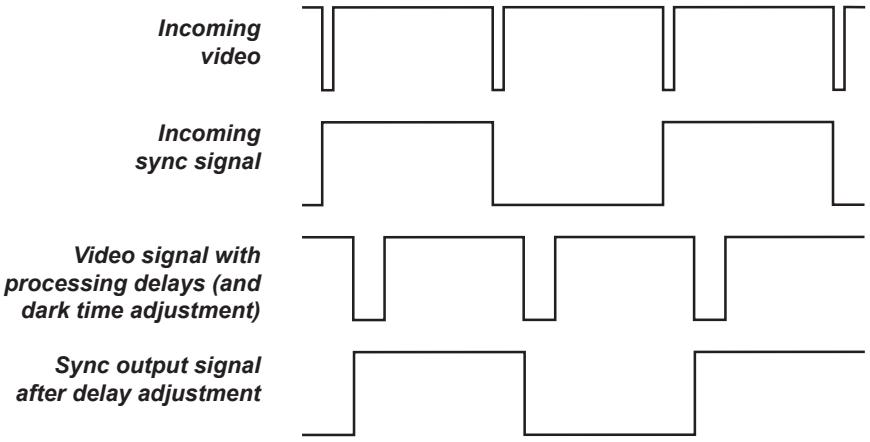
The outgoing 3D frames are in pairs - the dominant frame being presented first. You can determine which frame should be the dominant one.

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



Sync Offset

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



Notes

The information on this page does not apply to 2D projectors.

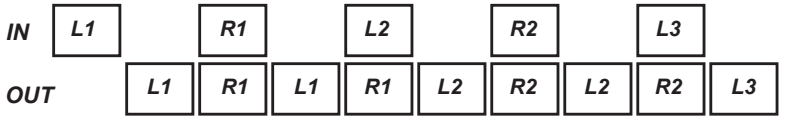
In order to achieve maximum light output and a smooth grayscale, whilst eliminating ghosting, the following procedure is recommended:

1. *Set* **Dark Time** *to a value appropriate to the glasses or ZScreen, say 650* µS *or 1300* µS.
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.*

Some 3D settings explained (continued)

Frame Rate Multiplier

If the 3D video is available only at low frame rates, it will be necessary to multiply the frame rate to obtain a flicker-free image. For example, a 60Hz frame rate can be doubled to 120Hz, or a 48Hz frame rate could be tripled to 144Hz.



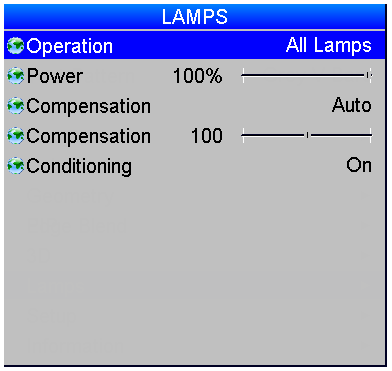
x2 example

Notes

The information on this page does not apply to 2D projectors.

Lamps menu

This menu differs from model to model. The illustration shows the **Lamps** menu for Titan Super Quad Series and Titan Quad 2000 Series.



- **Operation**

  Titan 930 Series, Titan 800 Series
  Set **Operation** to choose between **Lamp 1 + Lamp 2**, **Lamp 1**, **Lamp 2** and **Auto 1**. In the **Auto 1** mode, the lamp usage will be spread evenly over the two lamps, over time.

  Titan Super Quad Series, Titan Quad 2000 Series and Titan Quad Series
  Set **Operation** to choose between **All Lamps**, **Auto 3**, **Auto 2** and **Auto 1.** In the **Auto** modes, the lamp usage will be spread evenly over the four lamps, over time.

- **Power**

  Titan Quad Series, Titan 800 Series
  Set the slider to vary the power between 80% and 100%.

  Titan Super Quad Series, Titan 2000 Series, Titan 930 Series
  Set the slider to vary the power between 86% and 100%.

- **Compensation**

  All models
  In most cases the **Compensation** control should be left set to **Auto**. If you find that colored gradients are not displayed correctly, set the **Compensation** control to **Manual** and adjust the slider until the gradient is smooth.

- **Conditioning**

  Titan Super Quad Series, Titan 2000 Series and Titan 930 Series
  In most cases the **Conditioning** control should be left set to **On** which will lengthen the life of the lamps. However, if you wish to avoid very slight lamp intensity changes during operation, the control should be set to **Off**.

  Titan Quad Series, Titan 800 Series
  This control is not available on these models.

If you have rented the projector from a dealer, the projector may have been shipped with some of its lamps deactivated to lower the rental cost. You can reactivate these lamps (at extra cost) using the **Feature Control** setting in the ***Setup > System*** menu.

Notes

Main Menu
Lamps

Running the lamps at a lower power will increase their expected lifetime.

To learn more about **Feature Control**, *see* ***System*** *further in this guide.*

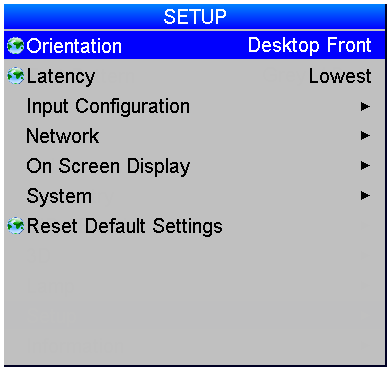
Setup menu

- **Orientation**

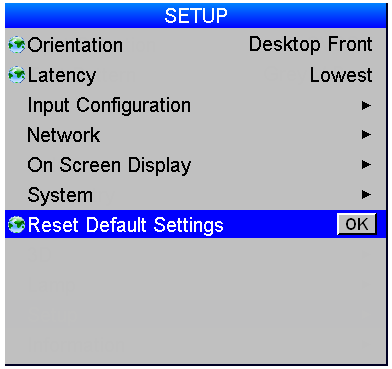
  Depending on how the projector is mounted, select the appropriate setting from the drop-down list.

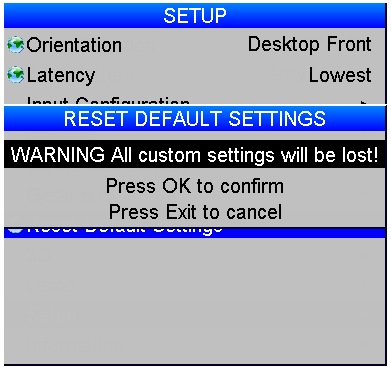
- **Latency**

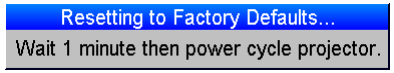
  Affects interlaced sources only. For fastest response, the **Lowest** setting gives minimum frame delay. For improved performance with films involving motion sequences, the **Best Video** setting uses adaptive de-interlacing and interpolation, but takes longer to process.



Reset Default Settings







When you press **OK** to restore the factory default settings, a warning message appears, asking you to confirm or cancel.

Once the process has begun, wait one minute and then power cycle the projector so the restored settings can take effect.

Notes

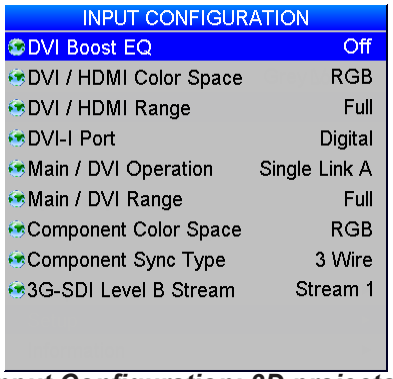
Main Menu
Setup

Do NOT do this unless you are sure that you want to restore ALL the current settings to their factory defaults.

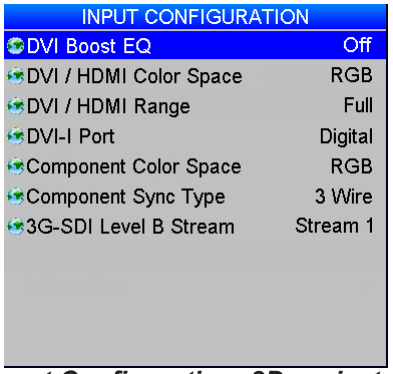
Input Configuration

This menu allows adjustment of various technical parameters specific to each of the signal inputs.

- **DVI Boost EQ** should normally be set to **Off,** except when you are having problems with a long DVI cable.
- **DVI / HDMI Color Space** should normally be set to **Auto**, except when the projector has problems identifying the correct colour space.
- **DVI / HDMI Range** should normally be set to **Auto**, except when you are having contrast problems with some DVI sources.
- Set **DVI-I Port** to choose between the **Analog** and **Digital** signals from a DVI-I source.
- **Main / DVI Operation**
  Select between single and dual link DVI reception.
- **Main / DVI Range**
  Select between **Full** and **Limited** range.
- Set **Component Colour Space** to choose between **RGB** and **YPbPr**.
- **Component Sync Type** should be set to **Auto**, except when the projector has problems selecting between **3 Wire** (RGsB) and **4 Wire** (RGBS).
- If two video streams are being transmitted, use **3G-SDI Level B Stream** to choose between the two streams.



Input Configuration: 3D projector



Input Configuration: 2D projector

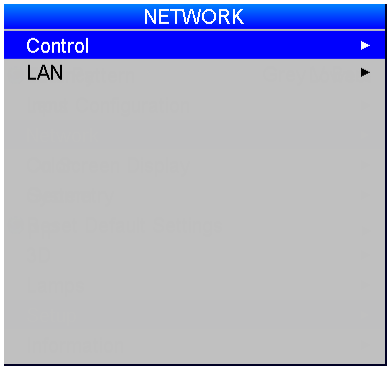
Notes

Main Menu
Setup
Input Configuration

Main / DVI Operation *and* **Main / DVI Range** *are only available on 3D projectors..*

Network

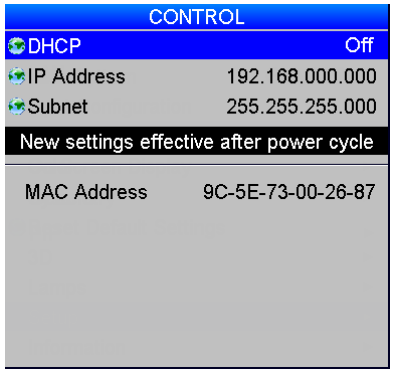
This menu allows setup of two networks, Control (via the RS232 port) and LAN (via the LAN port).



Control

- 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 set to **On**, it will not be possible to edit either **IP Address** or **Subnet**.
- If **DHCP** is set to **Off:**
  1. Edit **IP Address** and **Subnet** as required.
  2. Power cycle the projector in order for the new settings to take effect.

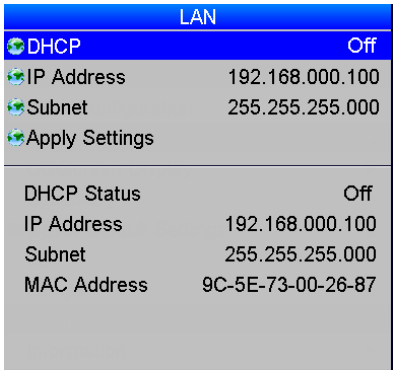
The MAC Address of the projector is shown at the bottom of the screen.



LAN

- 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 set to **On**, it will not be possible to edit either **IP Address** or **Subnet**.
- If **DHCP** is set to **Off:**
  1. Edit **IP Address** and **Subnet** as required.
  2. Select **Apply Settings** and press **OK**.

The fields at the bottom of the menu show the current settings.



Notes

Main Menu
Setup
Network

Any new settings will not be effective until the projector has been power cycled.

If the first digit of an address octet is set to "2", then it will not be possible to enter values above 5 for the second or third digits. To overcome this, set the first digit to either "0" or "1". You can set the first digit back to "2" later if necessary.

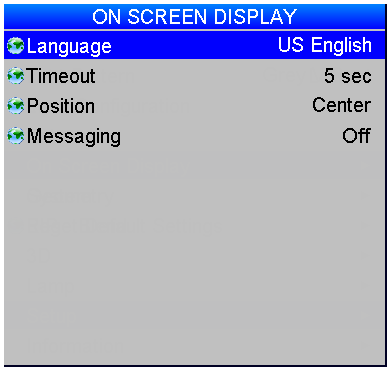
Main Menu
Setup
Network
Control

Main Menu
Setup
Network
LAN

On Screen Display

- Select a display **Language** from the drop-down list.
- The menus will disappear if no buttons are pressed within the **Timeout** selected from the drop-down list. If you want the menus to stay on screen permanently, then select **Infinite**.
- Select a **Position** from the drop-down list.
- If you do not want projector status messages to be displayed, for instance

, then set **Messaging** to **Off**.



Notes

Main Menu
Setup
On Screen Display

System

- **Configuration**: switch between **PIP** and **Edge Blend**.
- Use **IR Address** to set an address for the remote control.

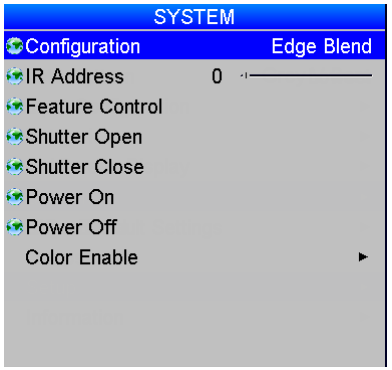
The other settings in this menu are provided mainly to allow control from the Virtual OSD.

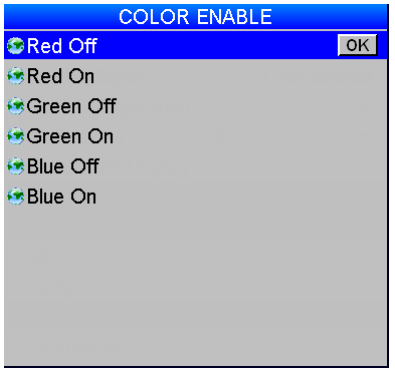
- **Feature Control**

  If you have rented the projector from a dealer, the projector may have been shipped with some of its lamps deactivated to lower the rental cost. If more brightness is needed, these lamps can be activated (at extra cost) by obtaining an unlock PIN code from your dealer.

  Once you have entered the PIN code using this control, you will need to reboot the projector to enable the extra lamps.

- Use the **Shutter Open** and **Shutter Close** commands as required.
- Use the **Power Off** command to set the projector into **Standby** mode.
- Use the **Color Enable** sub-menu to switch individual colors on and off.





Notes

Main Menu
Setup
System

*When you switch between **PIP** and **Edge Blend**, the projector will reboot instantly to enable the new setting.*

*The **Power On** command has no function when seen on the projector OSD.*

*However, it can be used from the **Virtual OSD** described in the **Protocol Guide**.*

*Both the keypad and remote control have dedicated buttons allowing access to the **Shutter Open**, **Shutter Close**, **Power On** and **Power Off** commands.*

Main Menu
Setup
System
Color Enable

Do not switch off all colors at the same time. In the event of this happening, power cycle the projector to restore the default settings.

At power on, all colors are enabled regardless of the previous setting.

Setting up an IR address

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

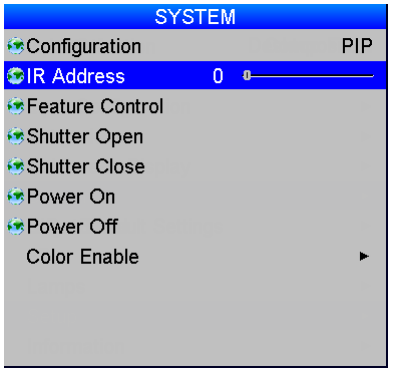
The default IR address is 00. This is also a master address, which, if assigned to a remote, will work regardless of the value assigned to the projector.

To assign an IR address for the projector,

- Open the OSD, access ***Setup > System*** and select **IR Address**.

To assign IR address for the remote:

1. Press and hold the **ADDR** button on the remote.
2. Press two number buttons sequentially to enter the address. For numbers less than 10, use a leading zero.
3. Release the **ADDR** button.
   The transmit indicator on the remote will flash twice to confirm the setting.



Notes

Main Menu
Setup
System

*Change the IR address of the projector before changing the address of the remote. You can check the value assigned to the projector by using the control panel to access **Setup > System**. However, you cannot check the value assigned to the remote.*

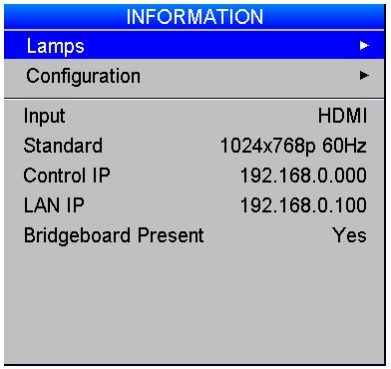
*In the event of a mismatch between the projector and the remote, change the remote IR address to the master address or to the projector address. To check the projector address, access **Setup > System** using the control panel.*

When fresh batteries are inserted in the remote control, it will revert to the default address 00. If you have previously assigned a different address, you need to change it manually.

If two or more projectors are assigned the same address, they can be controlled from one remote control, provided they are connected by cable or in range of the infrared.

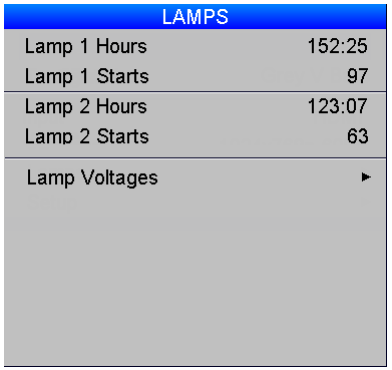
Information menu

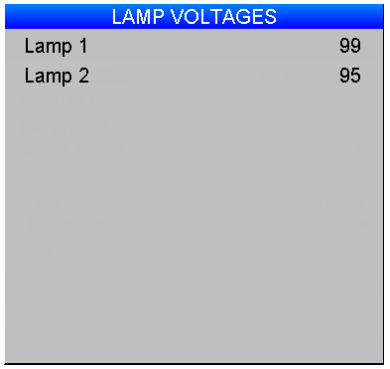
This menu gives information about lamp operating times, software and hardware configuration, input source and network settings.



Lamps

This menu gives information about lamp hours, starts and voltages.





Notes

The values shown in the menus on this page are examples and may differ significantly on your OSD.

Main Menu
Information

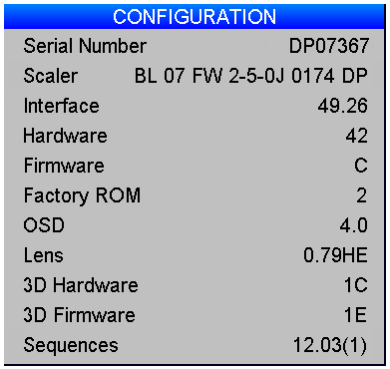
Main Menu
Information
Lamps

Lamp information differs between dual lamp and quad lamp projectors. These illustrations refer to a dual lamp model.

Main Menu
Information
Lamps
Lamp Voltages

Configuration

This menu gives information about the various projector components. If you need to contact your dealer about an issue with the projector they may want you to quote some of the information shown on this page to help diagnose the problem.



Notes

The values shown in the menu on this page are examples and may differ significantly on your OSD.

Main Menu
Information
Configuration

The configuration shown here is for a 3D model.

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DIGITAL PROJECTION

REFERENCE GUIDE

Titan Super Quad Series
Titan Quad 2000 Series
Titan Quad Series
Titan 800 Series
Titan 930 Series

High Brightness Digital Video Projector

Rev J July 2014

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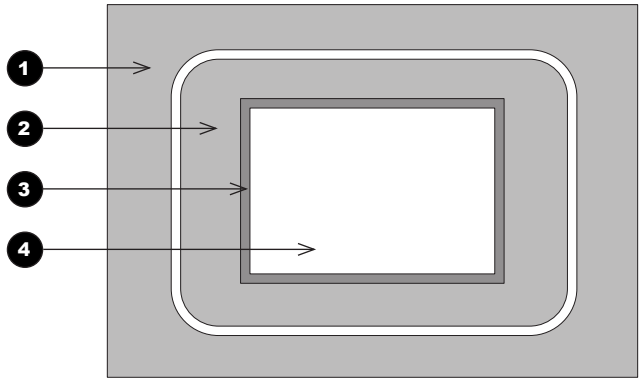
The DMD™

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.

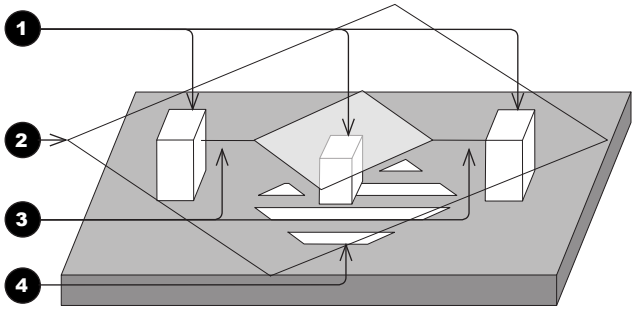
1. **Casing**
2. **Light shield**
3. **Pond of mirrors**
4. **Array**



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**

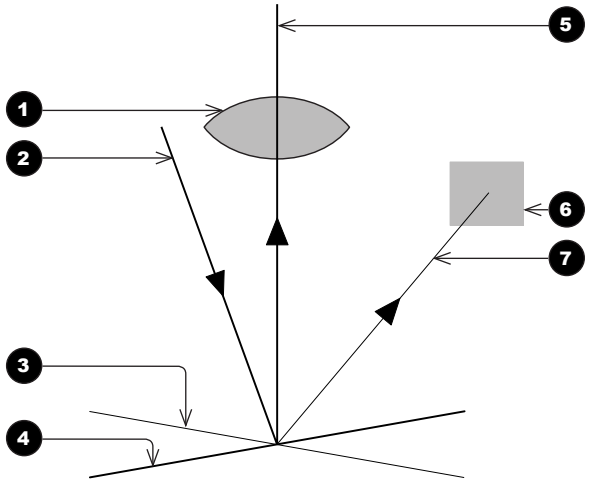


Mirror element with tilt mechanism

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.

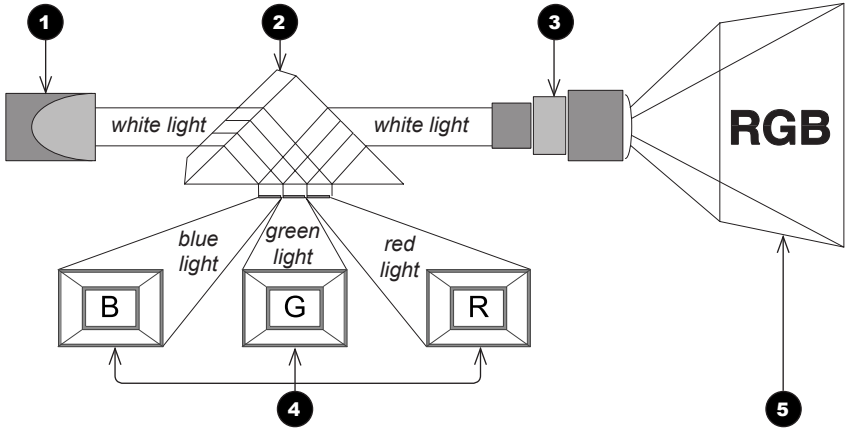
1. **Projection lens**
2. **Incoming light from the lamp**
3. **Mirror element tilted to the right**
4. **Mirror element tilted to the left**
5. **Reflected light, left tilt**
6. **Light dump**
7. **Reflected light, right tilt**



Light flow

The projector optically filters white light from the lamp 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. **Lamp**
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. In addition, each lens has a High Brightness and a High Contrast version.

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

Throw ratios for 1080p and WUXGA	Throw ratios for SX+	Lens extension (±2%)	Throw distance range
0.67 : 1 fixed lens	0.73 : 1 fixed lens	204 mm (8.0 in.)	1.1 m - 10 m (3.6 ft - 32.8 ft)
1.12 : 1 fixed lens (3 m - 15 m)	1.21 : 1 (3 m - 15 m) fixed lens	268 mm (10.6 in.)	3 m - 15 m (9.8 ft - 49.2 ft)
1.12 : 1 fixed lens (1.2 m - 2 m)	1.21 : 1 (1.2 m - 2.0 m) fixed lens	268 mm (10.6 in.)	1.2 m - 2 m (3.9 ft - 6.6 ft)
1.16 - 1.49 : 1 zoom lens	1.26 - 1.61 : 1 zoom lens	226 mm (8.9 in.)	3 m - 15 m (9.8 ft - 49.2 ft)
1.39 - 1.87 : 1 zoom lens	1.5 - 2.02 : 1 zoom lens	194 mm (7.6 in.)	4 m - 24 m (13.1 ft - 78.7 ft)
1.87 - 2.56 : 1 zoom lens	2.02 - 2.77 : 1 zoom lens	159 mm (6.3 in.)	4 m - 24 m (13.1 ft - 78.7 ft)
2.56 - 4.17 : 1 zoom lens	2.77 - 4.51 : 1 zoom lens	145 mm (5.7 in.)	9.1 m - 45 m (29.9 ft - 147.6 ft)
4.17 - 6.95 : 1 zoom lens	4.51 - 7.53 : 1 zoom lens	129 mm (5.1 in.)	12 m - 80 m (39.4 ft - 262.5 ft)
6.93 - 10.34 : 1 zoom lens	7.5 - 11.2 : 1 zoom lens	179 mm (7.0 in.)	12 m - 80 m (39.4 ft - 262.5 ft)
1.50 - 2.17 : 1 zoom lens	1.63 - 2.35 : 1 zoom lens	184 mm (7.2 in.)	5 m - 25 m (16.4 ft - 82 ft)
1.72 - 2.71 : 1 zoom lens	1.86 - 2.93 : 1 zoom lens	178 mm (7.0 in.)	5 m - 25 m (16.4 ft - 82 ft)
2.15 - 3.36 : 1 zoom lens	2.33 - 2.64 : 1 zoom lens	180 mm (7.1 in.)	5 m - 25 m (16.4 ft - 82 ft)

To choose a lens, either calculate the ***throw ratio*** required, or use the ***lens charts*** provided at the end of this guide.

Notes

The High Brightness lenses are recommended for the standard models, for maximum light output.

The High Contrast lenses are recommended for the Ultra Contrast models, for maximum contrast.

The same lens has different effective throw ratios for WUXGA and 1080p, and for SX+, due to the different width of the DMD.

Each time a new lens is fitted to the projector, the calibration procedure must be carried out. See *Lens menu* in the *Operating Guide*.

*You can also use the information in **Appendix B: Lens Charts** to choose a lens.*

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

Basic calculation

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

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

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

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

Throw ratios for 1080p and WUXGA	Throw ratios for SX+	Throw distance range
0.67 : 1 fixed lens	0.73 : 1 fixed lens	1.1 m - 10 m (3.6 ft - 32.8 ft)
1.12 : 1 fixed lens (3 m - 15 m)	1.21 : 1 (3 m - 15 m) fixed lens	3 m - 15 m (9.8 - 49.2 ft)
1.12 : 1 fixed lens (1.2 m - 2 m)	1.21 : 1 (1.2 m - 2.0 m) fixed lens	1.2 m - 2 m (3.9 - 6.6 ft)
1.16 - 1.49 : 1 zoom lens	1.26 - 1.61 : 1 zoom lens	3 m - 15 m (9.8 - 49.2 ft)
1.39 - 1.87 : 1 zoom lens	1.5 - 2.02 : 1 zoom lens	4 m - 24 m (13.1 - 78.7 ft)
1.87 - 2.56 : 1 zoom lens	2.02 - 2.77 : 1 zoom lens	4 m - 24 m (13.1 - 78.7 ft)
2.56 - 4.17 : 1 zoom lens	2.77 - 4.51 : 1 zoom lens	9.1 m - 45 m (29.9 - 147.6 ft)
4.17 - 6.95 : 1 zoom lens	4.51 - 7.53 : 1 zoom lens	12 m - 80 m (39.4 - 262.5 ft)
6.93 - 10.34 : 1 zoom lens	7.5 - 11.2 : 1 zoom lens	12 m - 80 m (39.4 - 262.5 ft)
1.50 - 2.17 : 1 zoom lens	1.63 - 2.35 : 1 zoom lens	5 m - 25 m (16.4 - 82 ft)
1.72 - 2.71 : 1 zoom lens	1.86 - 2.93 : 1 zoom lens	5 m - 25 m (16.4 - 82 ft)
2.15 - 3.36 : 1 zoom lens	2.33 - 2.64 : 1 zoom lens	5 m - 25 m (16.4 - 82 ft)

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

Notes

The basic calculation on this page does not take into consideration DMD™ and image size, which could affect the throw ratio. 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.

You can also use the information in ***Appendix B: Lens Charts*** *to choose a lens.*

For information about individual lens part numbers, see ***Appendix A: Lens Part Numbers*** *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 your WUXGA 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 lenses matching a throw ratio of 2.44 are:

   - ***the 1.87 - 2.56 : 1 zoom lens***
   - ***the 1.72 - 2.71 : 1 zoom lens***
   - ***the 2.15 - 3.36 : 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 m - 24 m***. The required distance of 11 m is within the range.

   The other two lenses have a range of ***5 m - 25 m***, also within the range.

INFORMATION YOU NEED FOR THIS CALCULATION

- The throw ratio formula:

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

- The lens table:

Throw ratios for 1080p and WUXGA	Throw distance range
0.67 : 1 fixed lens	1.1 m - 10 m (3.6 ft - 32.8 ft)
1.12 : 1 fixed lens (3 m - 15 m)	3 m - 15 m (9.8 ft - 49.2 ft)
1.12 : 1 fixed lens (1.2 m - 2 m)	1.2 m - 2 m (3.9 ft - 6.6 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 - 4.17 : 1 zoom lens	9.1 m - 45 m (29.9 ft - 147.6 ft)
4.17 - 6.95 : 1 zoom lens	12 m - 80 m (39.4 ft - 262.5 ft)
6.93 - 10.34 : 1 zoom lens	12 m - 80 m (39.4 ft - 262.5 ft)
1.50 - 2.17 : 1 zoom lens	5 m - 25 m (16.4 ft - 82 ft)
1.72 - 2.71 : 1 zoom lens	5 m - 25 m (16.4 ft - 82 ft)
2.15 - 3.36 : 1 zoom lens	5 m - 25 m (16.4 ft - 82 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.*

You can also use the information in ***Appendix B: Lens Charts*** *to choose a lens.*

For information about individual lens part numbers, see ***Appendix A: Lens Part Numbers*** *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 1080p DMD™.

When a 1080p 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.

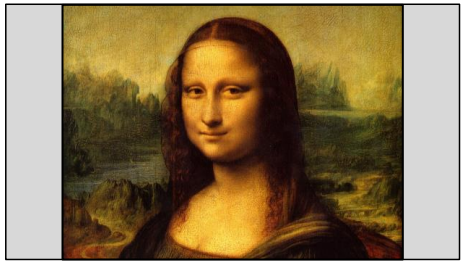


Fig. 1

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.

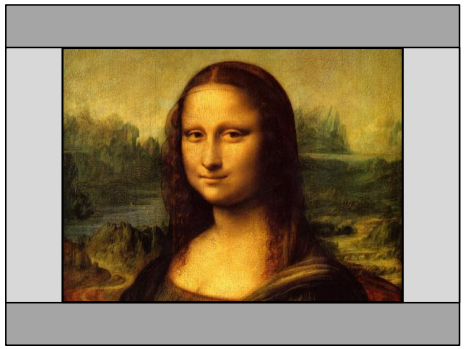


Fig. 2

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.

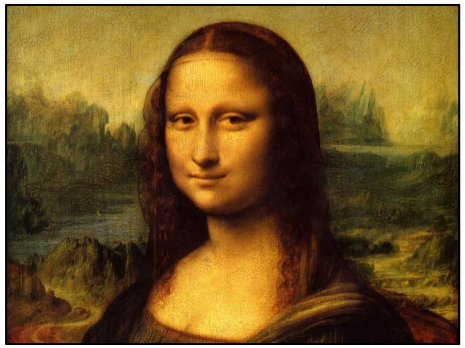


Fig. 3

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.

You can also use the information in ***Appendix B: Lens Charts*** *to choose a lens.*

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

Calculating TRC

To calculate TRC, use the following formula:

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

TRC table

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

Image format	1080p projector	WUXGA projector	SX+ projector
2.35:1 (Scope), 1920 x 817 pixels	TRC < 1, not used	TRC < 1, not used	TRC < 1, not used
1.85:1 (Flat), 1920 x 1037 pixels	TRC < 1, not used	TRC < 1, not used	TRC < 1, not used
1.78:1 (16:9), 1920 x 1080	TRC = 1, not used	TRC < 1, not used	TRC < 1, not used
1.66:1 (Vista), 1792 x 1080 pixels	TRC = 1.07	TRC < 1, not used	TRC < 1, not used
1.6:1 (16:10), 1728 x 1080 pixels	TRC = 1.11	TRC = 1, not used	TRC < 1, not used
1.33:1 (4:3), 1440 x 1080 pixels	TRC = 1.33	TRC = 1.2	TRC = 1, not used
1.25:1 (5:4), 1350 x 1080 pixels	TRC = 1.42	TRC = 1.28	TRC = 1.07

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.

You can also use the information in ***Appendix B: Lens Charts*** *to choose a lens.*

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

Calculating the throw ratio with TRC

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

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

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

Throw ratios for 1080p and WUXGA	Throw ratios for SX+	Throw distance range
0.67 : 1 fixed lens	0.73 : 1 fixed lens	1.1 m - 10 m (3.6 ft - 32.8 ft)
1.12 : 1 fixed lens (3 m - 15 m)	1.21 : 1 (3 m - 15 m) fixed lens	3 m - 15 m (9.8 - 49.2 ft)
1.12 : 1 fixed lens (1.2 m - 2 m)	1.21 : 1 (1.2 m - 2.0 m) fixed lens	1.2 m - 2 m (3.9 - 6.6 ft)
1.16 - 1.49 : 1 zoom lens	1.26 - 1.61 : 1 zoom lens	3 m - 15 m (9.8 - 49.2 ft)
1.39 - 1.87 : 1 zoom lens	1.5 - 2.02 : 1 zoom lens	4 m - 24 m (13.1 - 78.7 ft)
1.87 - 2.56 : 1 zoom lens	2.02 - 2.77 : 1 zoom lens	4 m - 24 m (13.1 - 78.7 ft)
2.56 - 4.17 : 1 zoom lens	2.77 - 4.51 : 1 zoom lens	9.1 m - 45 m (29.9 - 147.6 ft)
4.17 - 6.95 : 1 zoom lens	4.51 - 7.53 : 1 zoom lens	12 m - 80 m (39.4 - 262.5 ft)
6.93 - 10.34 : 1 zoom lens	7.5 - 11.2 : 1 zoom lens	12 m - 80 m (39.4 - 262.5 ft)
1.50 - 2.17 : 1 zoom lens	1.63 - 2.35 : 1 zoom lens	5 m - 25 m (16.4 - 82 ft)
1.72 - 2.71 : 1 zoom lens	1.86 - 2.93 : 1 zoom lens	5 m - 25 m (16.4 - 82 ft)
2.15 - 3.36 : 1 zoom lens	2.33 - 2.64 : 1 zoom lens	5 m - 25 m (16.4 - 82 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.

*You can also use the information in **Appendix B: Lens Charts** to choose a lens.*

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

Full lens calculation example

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

1. Calculate TRC as follows:

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

2. Calculate the throw ratio:

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

3. Find a match in the lens table.

   The table shows that the lenses matching a throw ratio of 2.44 are:

   - ***the 1.87 - 2.56 : 1 zoom lens***
   - ***the 1.50 - 2.17 : 1 zoom lens***
   - ***the 1.72 - 2.71 : 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 m - 24 m***. The required distance of 11 m is within the range.

   The other two lenses have a range of ***5 m - 25 m***, also within the range.

INFORMATION YOU NEED FOR THESE CALCULATIONS

- The TRC formula $TRC = \frac{\text{DMD™ aspect ratio}}{\text{Source aspect ratio}}$
- The TRC table (to use instead of the formula)

Image format	WUXGA projector
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

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

- The lens table:

Throw ratios for 1080p and WUXGA	Throw distance range
0.67 : 1 fixed lens	1.1 m - 10 m (3.6 ft - 32.8 ft)
1.12 : 1 fixed lens (3 m - 15 m)	3 m - 15 m (9.8 ft - 49.2 ft)
1.12 : 1 fixed lens (1.2 m - 2 m)	1.2 m - 2 m (3.9 ft - 6.6 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 - 4.17 : 1 zoom lens	9.1 m - 45 m (29.9 ft - 147.6 ft)
4.17 - 6.95 : 1 zoom lens	12 m - 80 m (39.4 ft - 262.5 ft)
6.93 - 10.34 : 1 zoom lens	12 m - 80 m (39.4 ft - 262.5 ft)
1.50 - 2.17 : 1 zoom lens	5 m - 25 m (16.4 ft - 82 ft)
1.72 - 2.71 : 1 zoom lens	5 m - 25 m (16.4 ft - 82 ft)
2.15 - 3.36 : 1 zoom lens	5 m - 25 m (16.4 ft - 82 ft)

Notes

You can also use the information in ***Appendix B: Lens Charts*** *to choose a lens.*

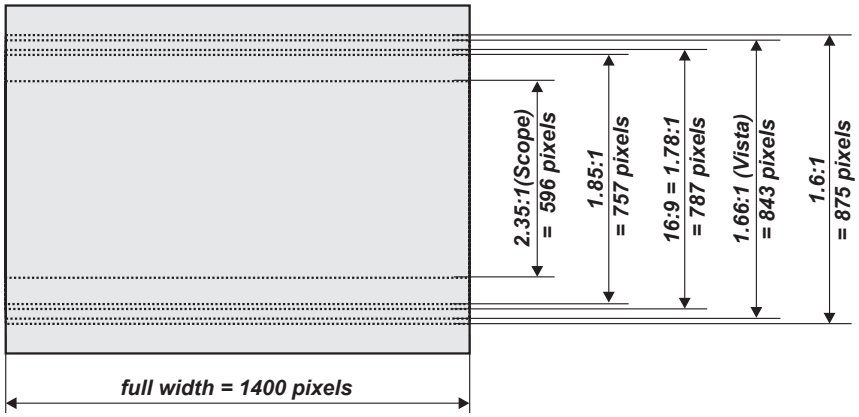
For information about individual lens part numbers, see ***Appendix A: Lens Part Numbers*** *at the end of this document.*

Screen Requirements

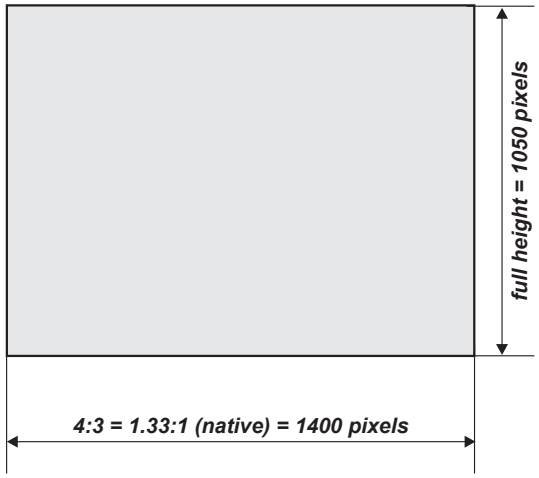
Fitting the image to the DMD™

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.

SX+ images displayed full width

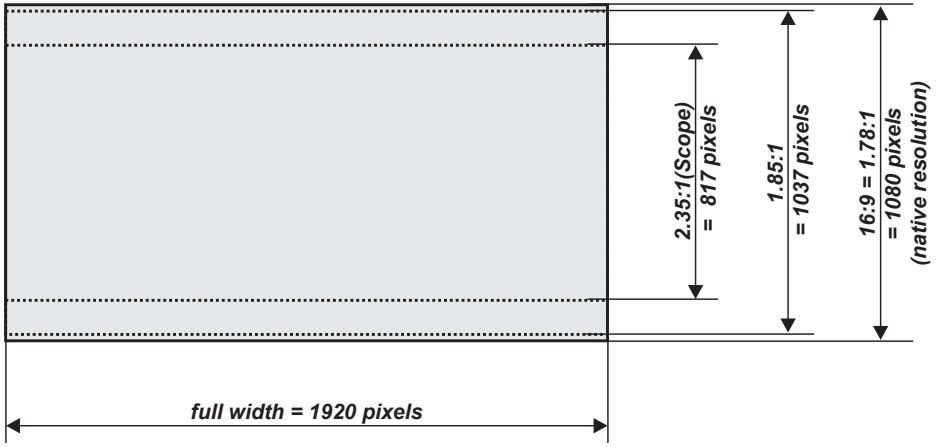


SX+ images displayed full height

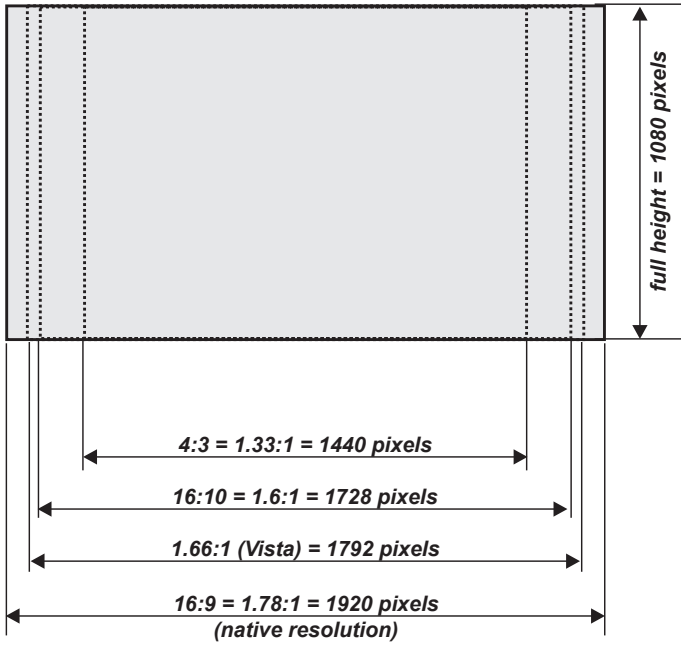


Notes

1080p images displayed full width

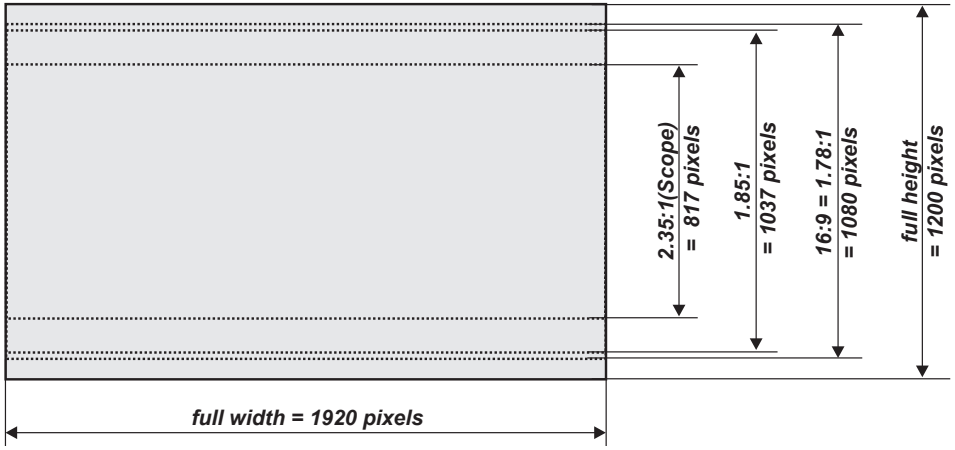


1080p images displayed full height

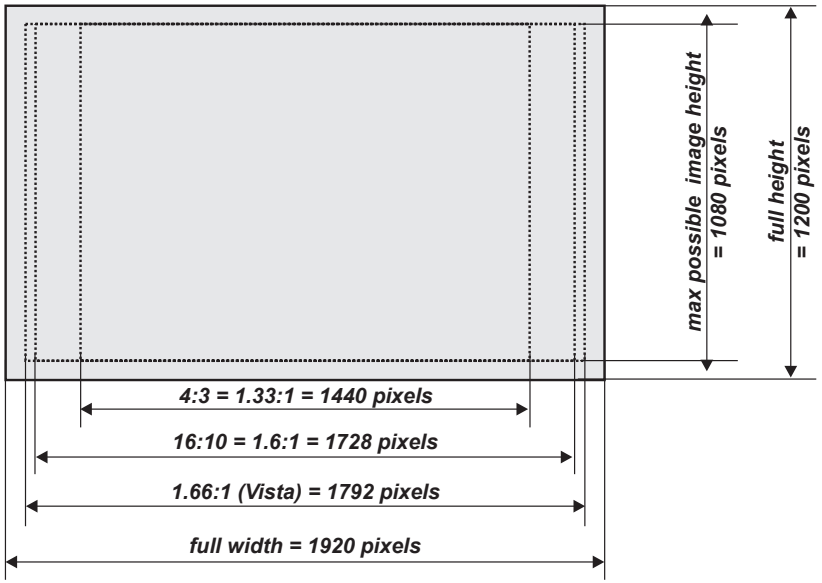


Notes

WUXGA images displayed full width



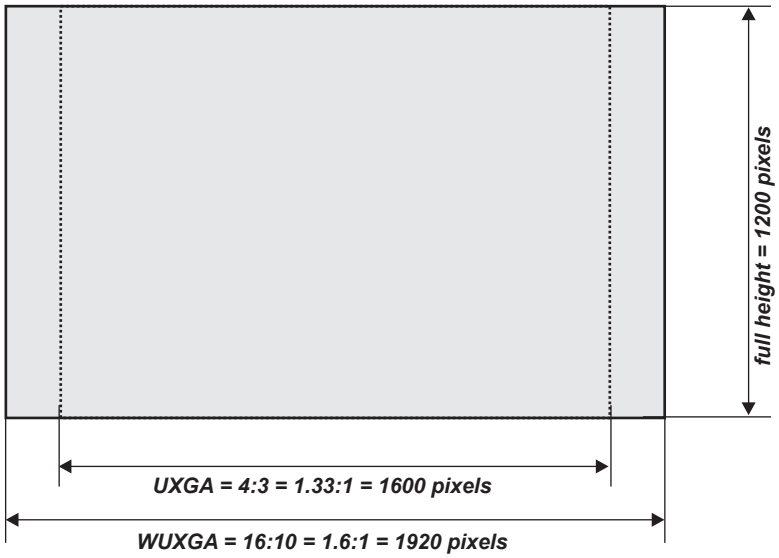
WUXGA images displayed with a height of 1080 pixels



Notes

The images shown here cannot fill the full height of the DMD™, and will be scaled to a height of 1080 pixels.

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

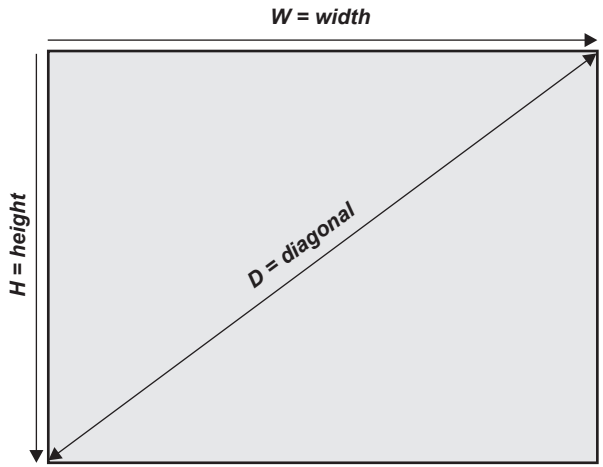
1.85:1
W = D x 0.88 ***H*** = D x 0.47

16:9 = 1.78:1 (native aspect ratio for 1080p projectors)
W = D x 0.87 ***H*** = D x 0.49

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

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

4:3 = 1.33:1 (native aspect ratio for SX+ projectors)
W = D x 0.8 ***H*** = D x 0.6



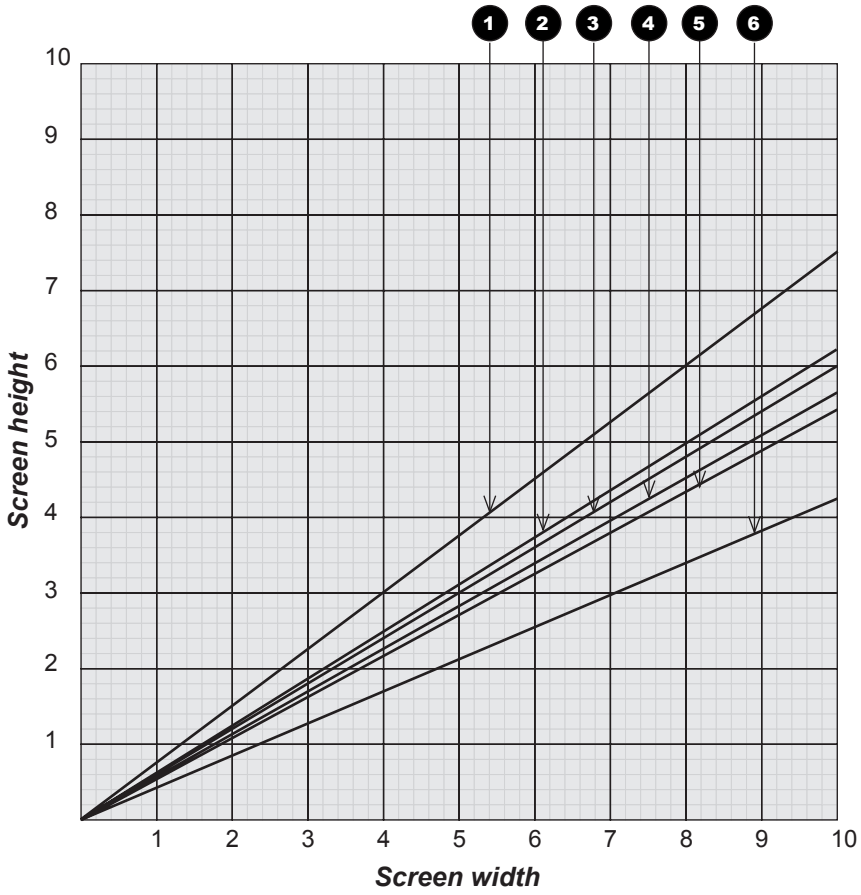
Notes

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, or the sample calculations below 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**
   (native aspect ratio for SX+ projectors)
   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**
   (native aspect ratio for 1080p projectors)
   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

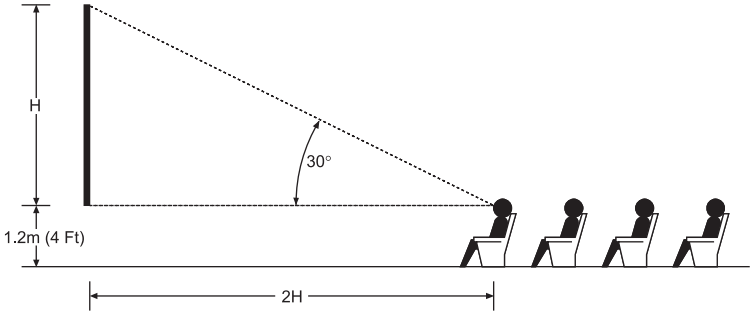


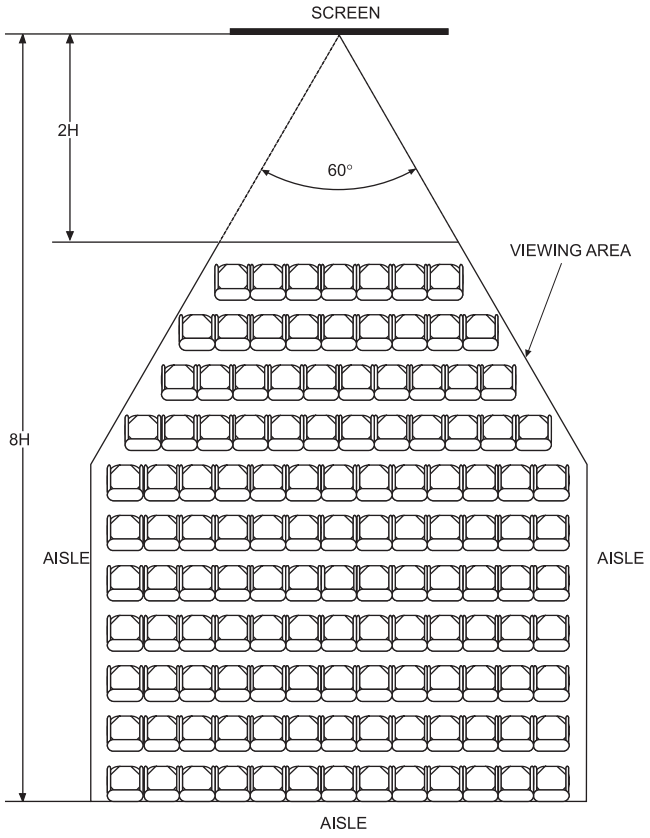
Notes

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 ft) 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.

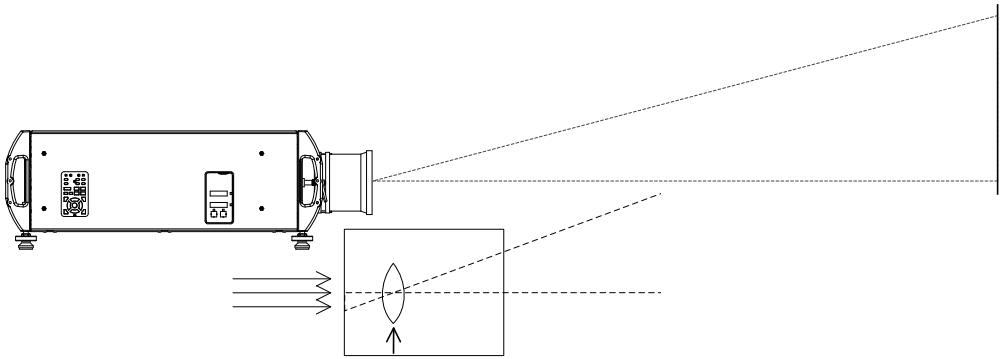
*The image can be flipped for rear projection (see **Setup menu** in the **Operating Guide**) and displayed without the need for extra mirrors or equipment.*

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

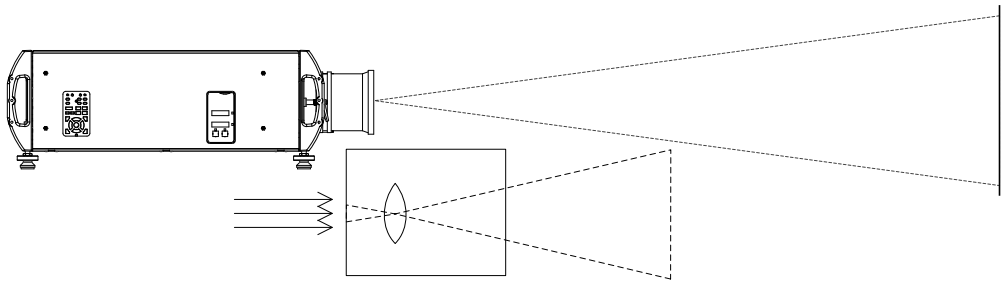
Rear installation is generally more complicated and advice should be sought from your local dealer before attempting it.

Positioning The Image

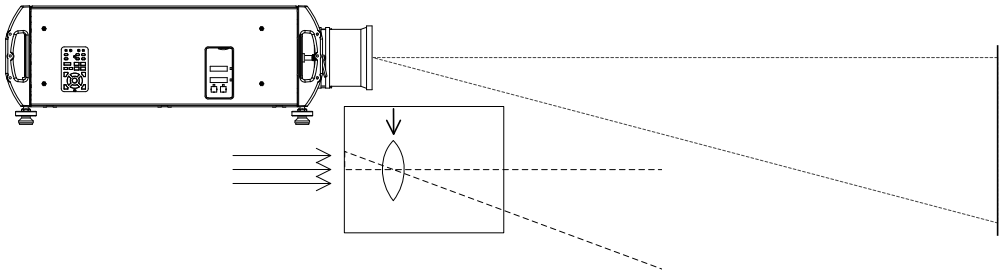
The normal position for the projector is at the centre of the screen. However, you can set the projector above or below the centre, or to one side, and adjust the image using the **Lens shift** feature (known as ***rising*** and ***falling front***) to maintain a geometrically correct image.



Shifting the lens up (rising front)



Centered lens



Shifting the lens down (falling front)

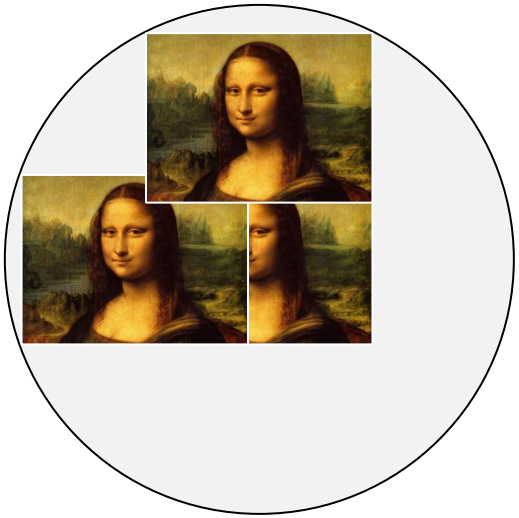
Notes

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

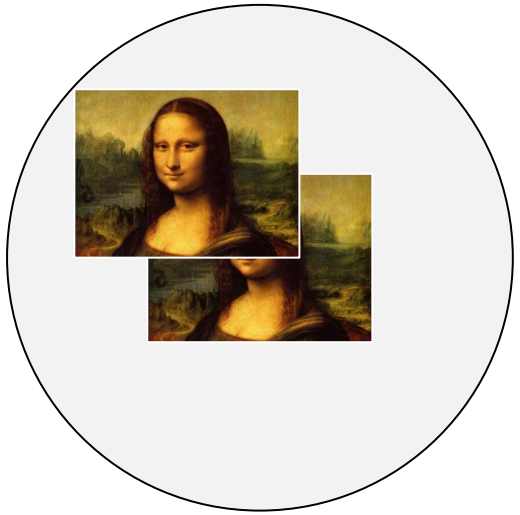
Whenever possible, position the projector so that the lens is centered for the highest quality image.

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 menu** 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.

for WUXGA projectors	**vertical (pixels)**	**horizontal (pixels)**	**vertical (frames)**	**horizontal (frames)**
0.67 : 1 fixed lens	±130	±85	±0.108	±0.044
1.16 - 1.49 : 1 zoom lens	±490	±360	±0.408	±0.188
1.50 - 2.17 : 1, 1.72 - 2.71 : 1 and 2.15 - 3.36 : 1 zoom lenses	±285	±200	±0.237	±0.104
1.12 : 1 fixed lenses and all other zoom lenses	+680 / -540	±360	+0.567 / - 0.45	±0.188

for 1080p projectors	**vertical (pixels)**	**horizontal (pixels)**	**vertical (frames)**	**horizontal (frames)**
0.67 : 1 fixed lens	±190	±120	±0.176	±0.063
1.16 - 1.49 : 1 zoom lens	+550 / -540	±360	+0.509 / - 0.5	±0.188
1.50 - 2.17 : 1, 1.72 - 2.71 : 1 and 2.15 - 3.36 : 1 zoom lenses	±345	±229	±0.319	±0.119
1.12 : 1 fixed lenses and all other zoom lenses	+740 / -540	±360	+0.685 / - 0.5	±0.188

for SX+ projectors	**vertical (pixels)**	**horizontal (pixels)**	**vertical (frames)**	**horizontal (frames)**
0.73 : 1 fixed lens	±120	±95	±0.114	±0.068
1.26 - 1.61 : 1 zoom lens	±380	±280	±0.362	±0.2
1.63 - 2.35 : 1, 1.86 - 2.93 : 1 and 2.33 - 3.64 : 1 zoom lenses	±232	±187	±0.221	±0.134
1.21 : 1 fixed lenses and all other zoom lenses	+525 / -420	±280	+0.5 / - 0.4	±0.2

Notes

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

Aspect Ratios Explained

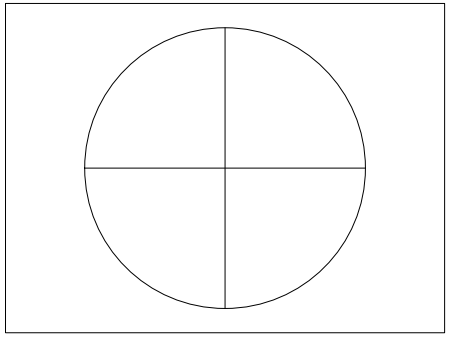
The appearance of a projected image on the screen depends on a combination of the following:

- The DMD™ resolution:
  - **SX+ (SXGA+)** with a 1400 x 1050 resolution, corresponding to an aspect ratio of 4:3
  - **1080p** with a 1920 x 1080 resolution, corresponding to an aspect ratio of 16:9
  - **WUXGA** with a 1920 x 1200 resolution, corresponding to an aspect ratio of 16:10
- The aspect ratio of the input signal: **4:3**, **16:9** or **16:10**
- The value of the **Aspect Ratio** setting of the projector:
  - **Source** - show the image with its original aspect ratio, not using the whole screen if the DMD™ aspect ratio does not match.
  - **Fill Display** - fill the screen but force the DMD™ aspect ratio on the image.
  - **Fill & Crop** - fill the screen without changing the original aspect ratio but cropping the image to fit the DMD™ aspect ratio.
  - **Anamorphic** - force a 16:9 ratio on the source. You need this setting to resolve 16:9 images packed into a 4:3 frame, otherwise it distorts the image.
  - **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.

Notes

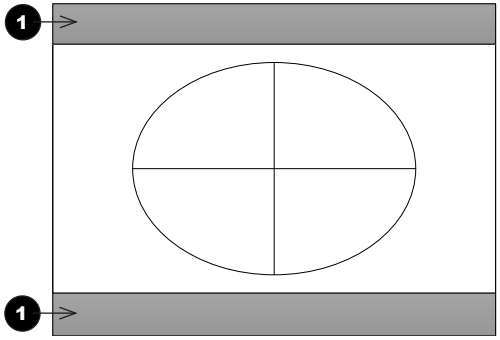
Aspect ratio examples for DMD™ resolution SX+ (SXGA+)

Source: 4:3 (native resolution)



Aspect Ratio:
Source / Fill Display / Fill & Crop

1 **Unused screen areas**



Aspect Ratio: Anamorphic

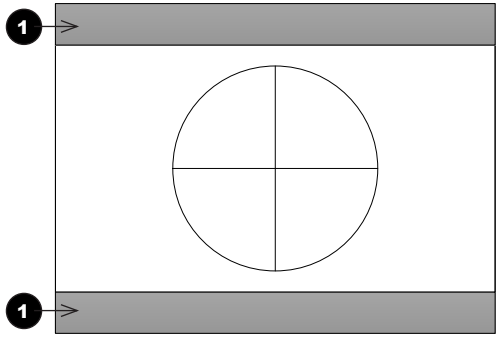
Notes

Aspect ratio examples for DMD™ resolution SX+ (SXGA+) (continued)

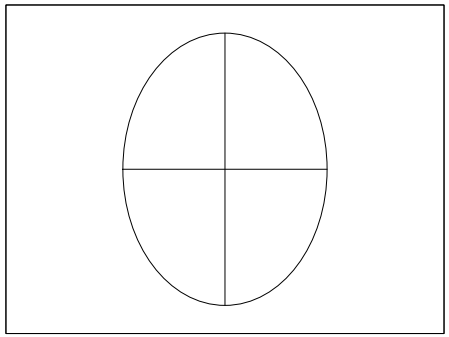
Source: 16:9

1 Unused screen areas

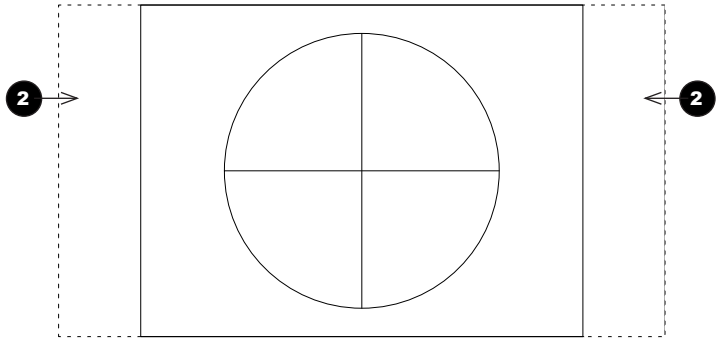
2 Cropped parts of the image



Aspect Ratio: Source



Aspect Ratio: Fill Display



Aspect Ratio: Fill & Crop

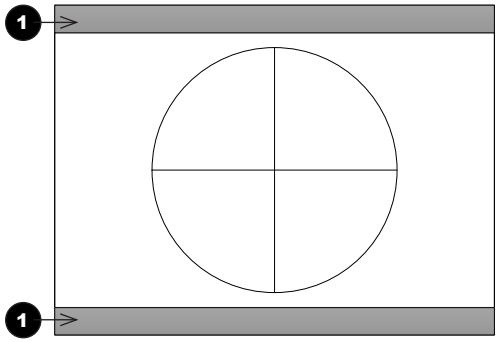
Notes

Aspect ratio examples for DMD™ resolution SX+ (SXGA+) (continued)

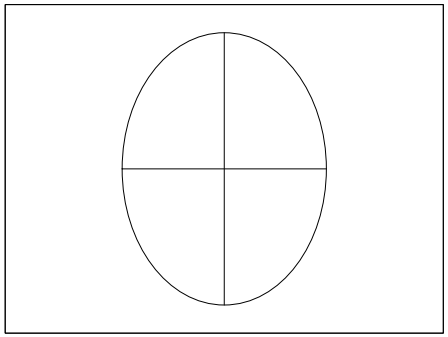
Source: 16:10

1 Unused screen areas

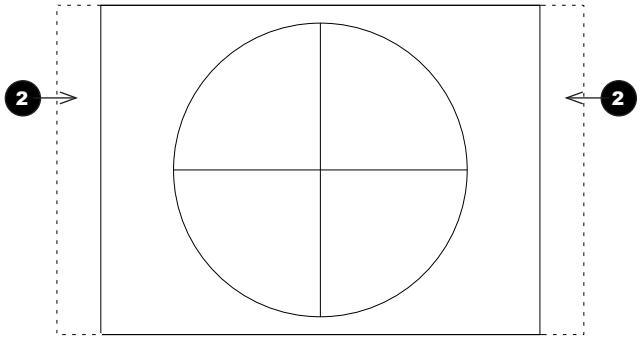
2 Cropped parts of the image



Aspect Ratio: Source



Aspect Ratio: Fill Display



Aspect Ratio: Fill & Crop

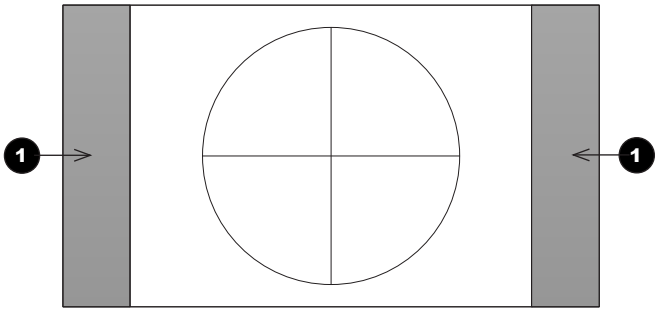
Notes

Aspect ratio examples for DMD™ resolution 1080p

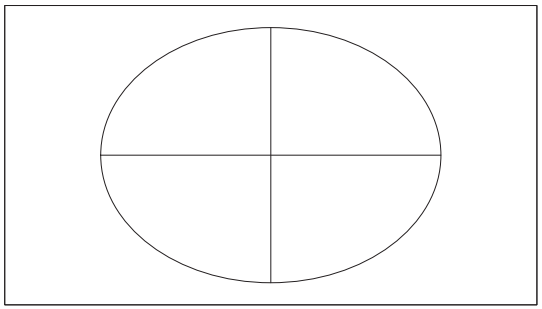
Source: 4:3

1 **Unused screen areas**

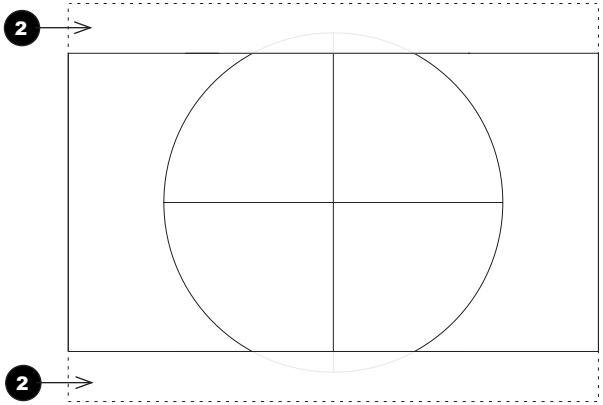
2 **Cropped parts of the image**



Aspect Ratio: Source



Aspect Ratio: Fill Display, Anamorphic

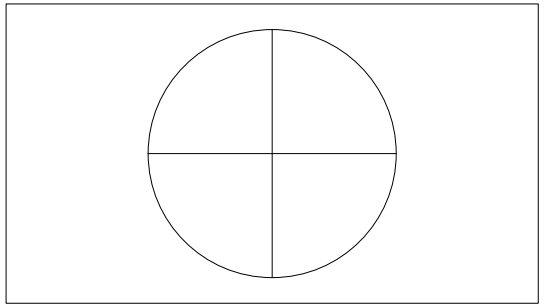


Aspect Ratio: Fill & Crop

Notes

Aspect ratio examples for DMD™ resolution 1080p (continued)

Source: 16:9 (native resolution)



Aspect Ratio: Source / Fill Display / Fill & Crop

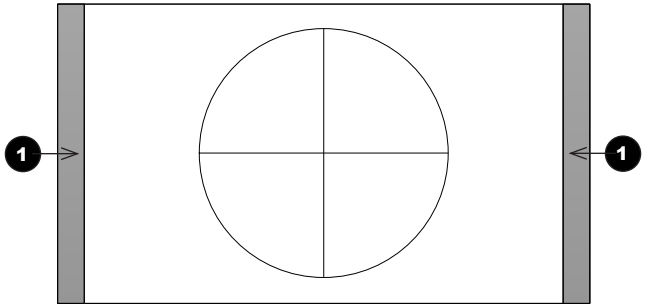
Notes

Aspect ratio examples for DMD™ resolution 1080p (continued)

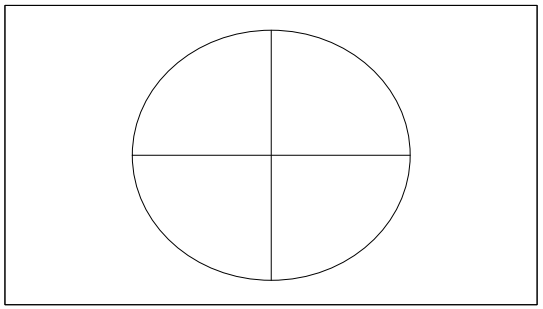
Source: 16:10

1 **Unused screen areas**

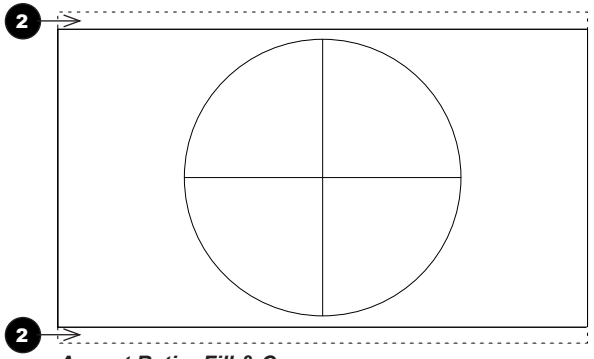
2 **Cropped parts of the image**



Aspect Ratio: Source



Aspect Ratio: Fill Display



Aspect Ratio: Fill & Crop

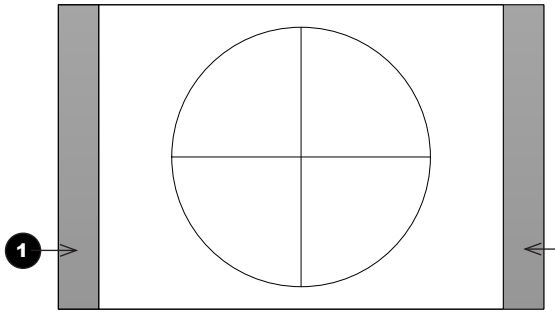
Notes

Aspect ratio examples for DMD™ resolution WUXGA

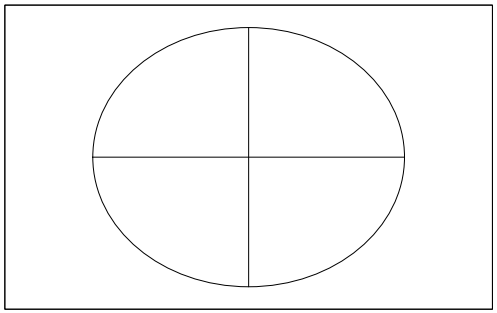
Source: 4:3

1 Unused screen areas

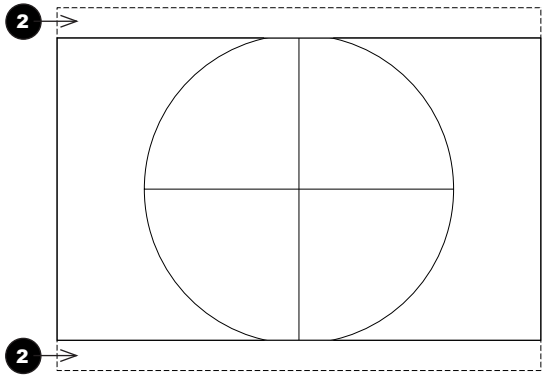
2 Cropped parts of the image



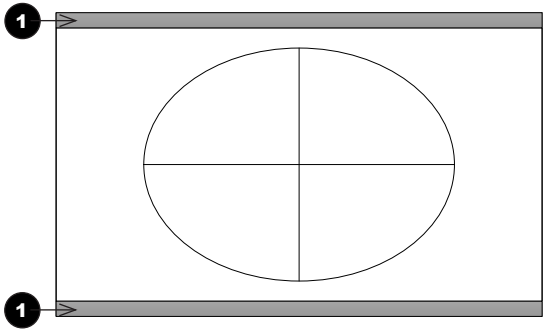
Aspect Ratio: Source



Aspect Ratio: Fill Display



Aspect Ratio: Fill & Crop



Aspect Ratio: Anamorphic

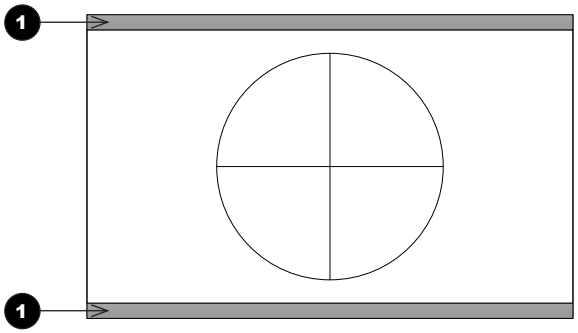
Notes

Aspect ratio examples for DMD™ resolution WUXGA (continued)

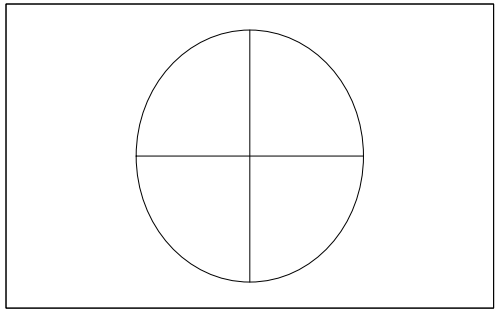
Source: 16:9

1 Unused screen areas

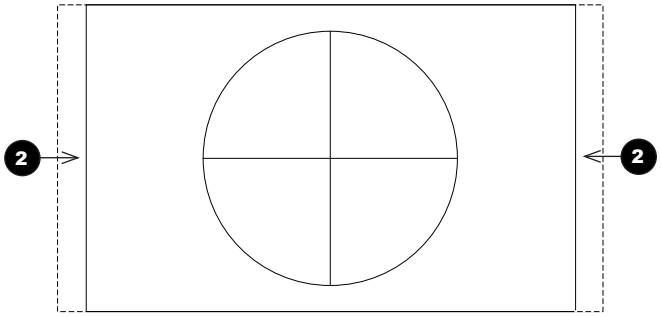
2 Cropped parts of the image



Aspect Ratio: Source



Aspect Ratio: Fill Display

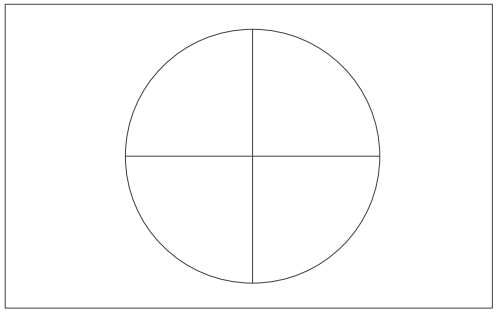


Aspect Ratio: Fill & Crop

Notes

Aspect ratio examples for DMD™ resolution WUXGA (continued)

Source: 16:10 (native resolution)



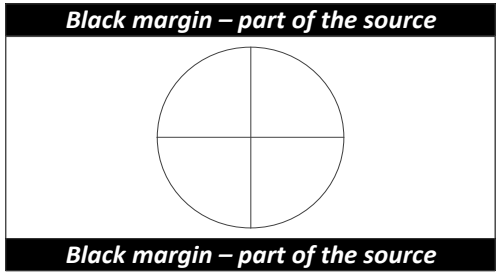
Aspect Ratio: Source / Fill Display / Fill & Crop

Notes

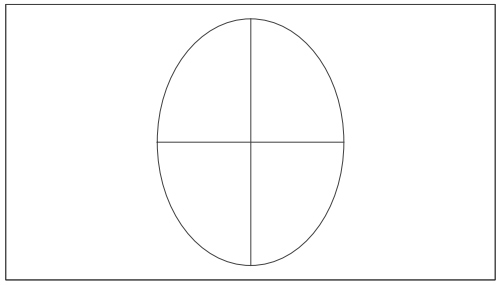
Aspect ratio example: TheaterScope

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.

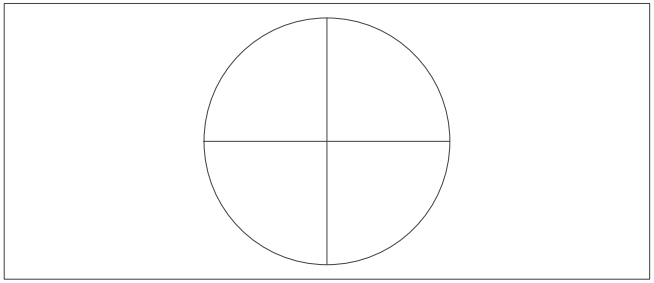
Without an anamorphic lens and without the TheaterScope setting applied, a 16:9 source containing a 2.35:1 image looks like this:



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.

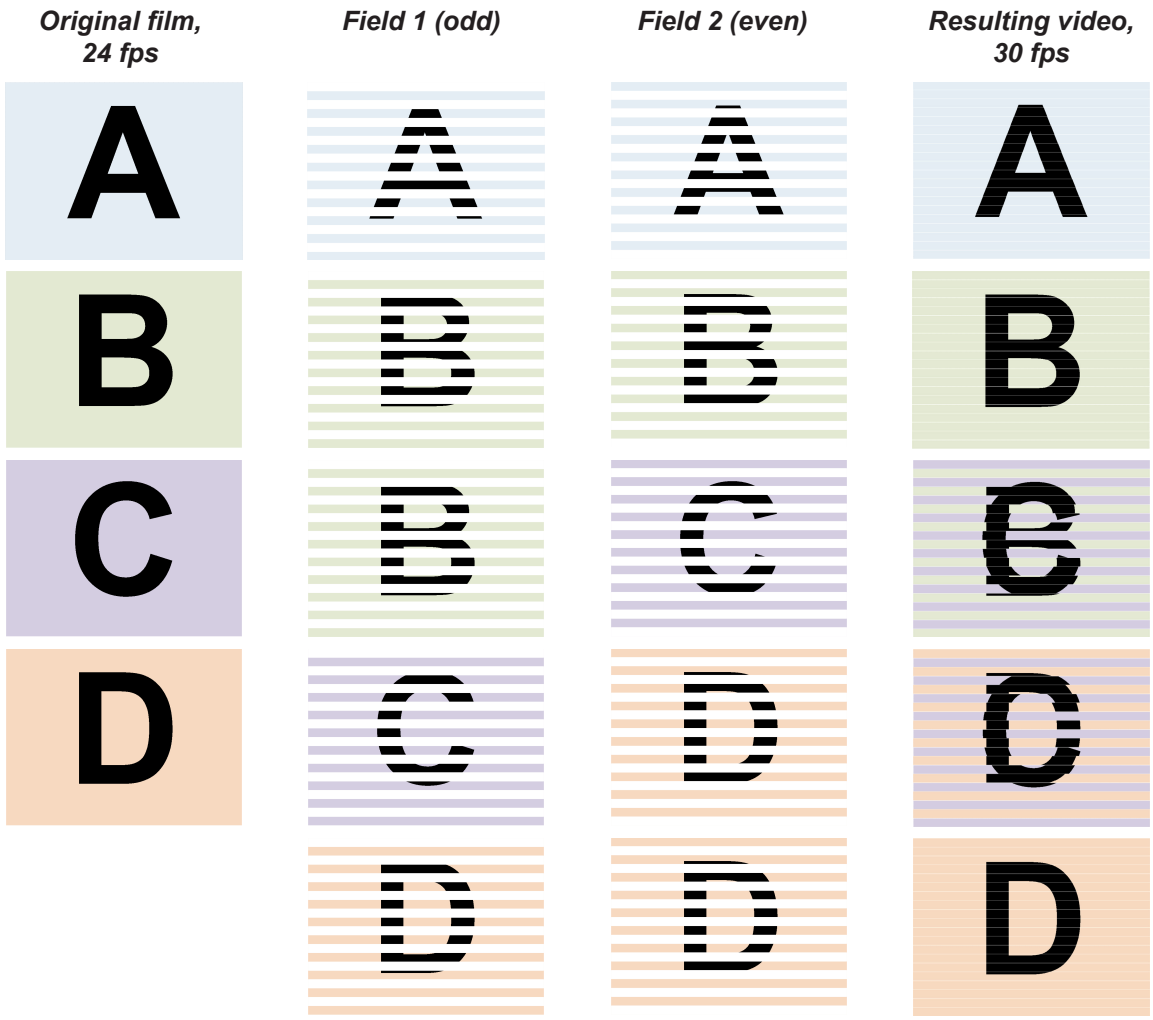
Notes

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.

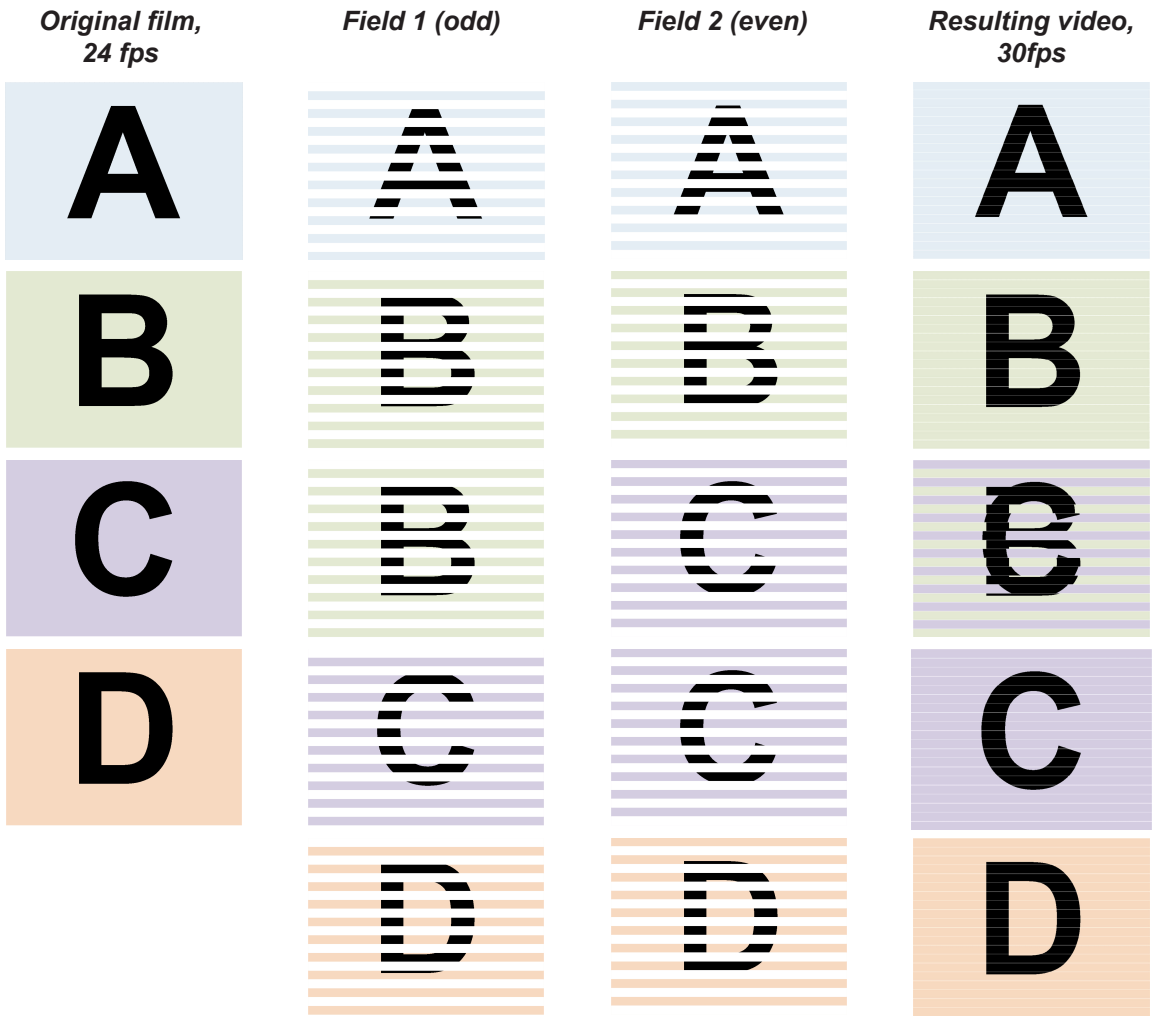


Notes

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

Appendix A: Lens Part Numbers

Throw ratios for 1080p and WUXGA projectors	Throw ratios for SX+ projectors	Lens extension (±2%)	Throw distance range	Part number for High Brightness lens	Part number for High Contrast lens
0.67 : 1 fixed lens	0.73 : 1 fixed lens	204 mm (8.0 in.)	1.1 - 10 m (3.6 - 32.8 ft)	105-607	107-195
1.12 : 1 fixed lens (3 - 15 m)	1.21 : 1 (3 - 15 m) fixed lens	268 mm (10.6 in.)	3 - 15 m (9.8 - 49.2 ft)	105-608	105-608
1.12 : 1 fixed lens (1.2 - 2 m)	1.21 : 1 (1.2 - 2.0 m) fixed lens	268 mm (10.6 in.)	1.2 - 2 m (3.9 - 6.6 ft)	105-609	105-609
1.16 - 1.49 : 1 zoom lens	1.26 - 1.61 : 1 zoom lens	226 mm (8.9 in.)	3 - 15 m (9.8 - 49.2 ft)	109-236	109-359
1.39 - 1.87 : 1 zoom lens	1.5 - 2.02 : 1 zoom lens	194 mm (7.6 in.)	4 - 24 m (13.1 - 78.7 ft)	105-610	107-196
1.87 - 2.56 : 1 zoom lens	2.02 - 2.77 : 1 zoom lens	159 mm (6.3 in.)	4 - 24 m (13.1 - 78.7 ft)	105-611	107-197
2.56 - 4.17 : 1 zoom lens	2.77 - 4.51 : 1 zoom lens	145 mm (5.7 in.)	9.1 - 45 m (29.9 - 147.6 ft)	105-612	107-198
4.17 - 6.95 : 1 zoom lens	4.51 - 7.53 : 1 zoom lens	129 mm (5.1 in.)	12 - 80 m (39.4 - 262.5 ft)	105-613	107-199
6.93 - 10.34 : 1 zoom lens	7.5 - 11.2 : 1 zoom lens	179 mm (7.0 in.)	12 - 80 m (39.4 - 262.5 ft)	109-235	109-358
1.50 - 2.17 : 1 zoom lens	1.63 - 2.35 : 1 zoom lens	184 mm (7.2 in.)	5 - 25 m (16.4 - 82 ft)	114-143	n/a
1.72 - 2.71 : 1 zoom lens	1.86 - 2.93 : 1 zoom lens	178 mm (7.0 in.)	5 - 25 m (16.4 - 82 ft)	114-144	n/a
2.15 - 3.36 : 1 zoom lens	2.33 - 2.64 : 1 zoom lens	180 mm (7.1 in.)	5 - 25 m (16.4 - 82 ft)	114-145	n/a

Notes

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

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

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

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

The High Brightness lenses are recommended for the standard models, for maximum light output.

The High Contrast lenses are recommended for the Ultra Contrast models, for maximum contrast.

Lens extension is measured when the lens is focussed at infinity, and fully extended. At other focus settings, the extension could be up to 10mm less.

Appendix B: Lens Charts

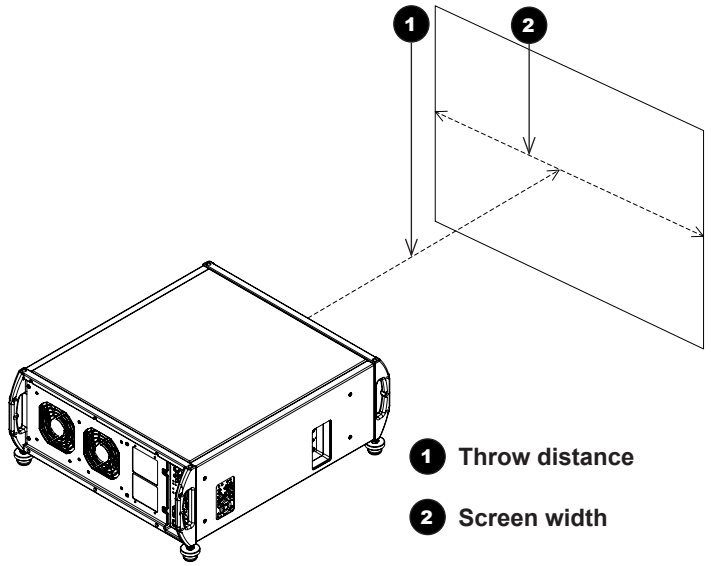
How to use the lens charts

The lens charts on the following pages provide a quick guide to the type of lens needed for a particular projector.

To use the lens charts, you need the following information:

- The DMD resolution of your projector
- The distance between the projector and the screen (throw distance)
- The maximum width of your screen

In the chart for the required DMD resolution, find the point where the throw distance corresponds to the screen width, as shown in the example below.

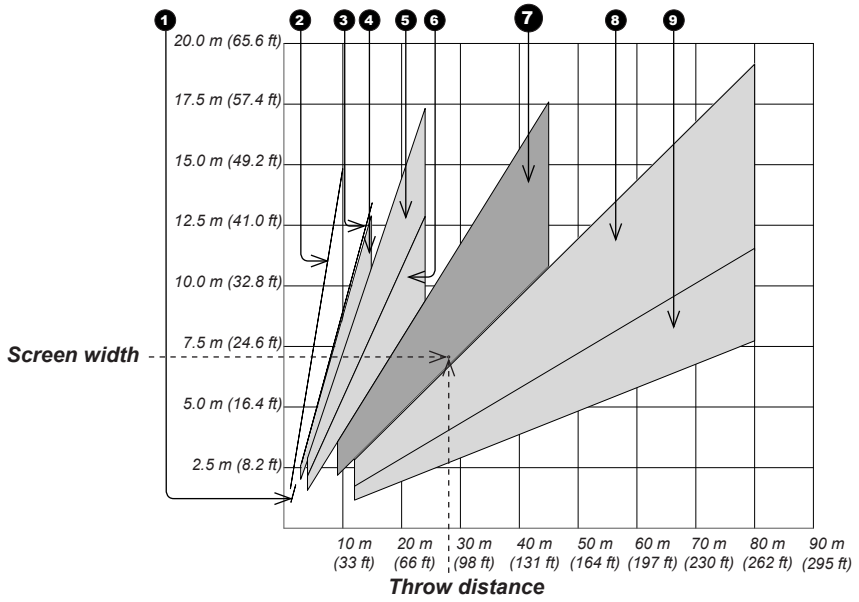


Example

For a 1080p projector with

- throw distance 28 m, and
- screen width 7 m,

the correct lens would be number 7 in the chart.



Notes

For information about individual lens part numbers, see ***Appendix A: Lens Part Numbers****.*

How to find the right lens chart

Charts are shown in order of DMD resolution, as follows:

- 1080p
- WUXGA
- SX+

For each resolution, the available lenses are shown in different charts depending on applicable ***throw ratio corrections*** (TRC).

For each resolution, lens charts are arranged in ascending TRC order, starting from full width images, where TRC=1.

All full width images are grouped together. 1080p and WUXGA are shown in the same chart.

1080p (1920 x 1080 pixels)

Full width images - the same chart

Formats that fit the width of the DMD™ without applying a throw ratio correction (TRC) include:

- **2.35:1 (Scope)** 1920 x 817 pixels TRC = 1
- **1.85:1 (Flat)** 1920 x 1037 pixels TRC = 1
- **1.78:1 (16:9)** 1920 x 1080 pixels (native resolution) TRC = 1

Full height images - different charts

A throw ratio correction (TRC) has been applied to the following charts:

- **1.25:1 (5:4)** 1350 x 1080 pixels TRC = 1.42
- **1.33:1 (4:3)** 1440 x 1080 pixels TRC = 1.33
- **1.6:1 (16:10)** 1728 x 1080 pixels TRC = 1.11
- **1.66:1 (Vista)** 1792 x 1080 pixels TRC = 1.07

Notes

For information about individual lens part numbers, see ***Appendix A: Lens Part Numbers****.*

WUXGA (1920 x 1200 pixels)

Full width images - the same chart

Formats that fit the width of the DMD™ without applying a throw ratio correction (TRC) include:

- **2.35:1 (Scope)** 1920 x 817 pixels TRC = 1
- **1.85:1 (Flat)** 1920 x 1037 pixels TRC = 1
- **1.78:1 (16:9)** 1920 x 1080 pixels TRC = 1
- **1.66:1 (Vista)** 1920 x 1156 pixels TRC = 1
- **1.6:1 (16:10)** 1920 x 1200 pixels (native resolution) TRC = 1

Full height images - different charts

A throw ratio correction (TRC) has been applied to the following charts:

- **1.25:1 (5:4)** 1500 x 1200 pixels TRC = 1.28
- **1.33:1 (4:3)** 1600 x 1200 pixels TRC = 1.2

Notes

For information about individual lens part numbers, see ***Appendix A: Lens Part Numbers****.*

SX+ (1400 x 1050 pixels)

Full width images - the same chart

Formats that fit the width of the DMD™ without applying a throw ratio correction (TRC) include:

• **2.35:1 (Scope)**	1400 x 596 pixels	TRC = 1
• **1.85:1 (Flat)**	1400 x 757 pixels	TRC = 1
• **1.78:1 (16:9)**	1400 x 786 pixels	TRC = 1
• **1.66:1 (Vista)**	1400 x 843 pixels	TRC = 1
• **1.6:1 (16:10)**	1400 x 875 pixels	TRC = 1
• **1.33:1 (4:3)**	1400 x 1050 pixels (native resolution)	TRC = 1

Full height images - different charts

A throw ratio correction (TRC) has been applied to the following chart:

1.25:1 (5:4)	1312 x 1050 pixels	TRC = 1.07

Notes

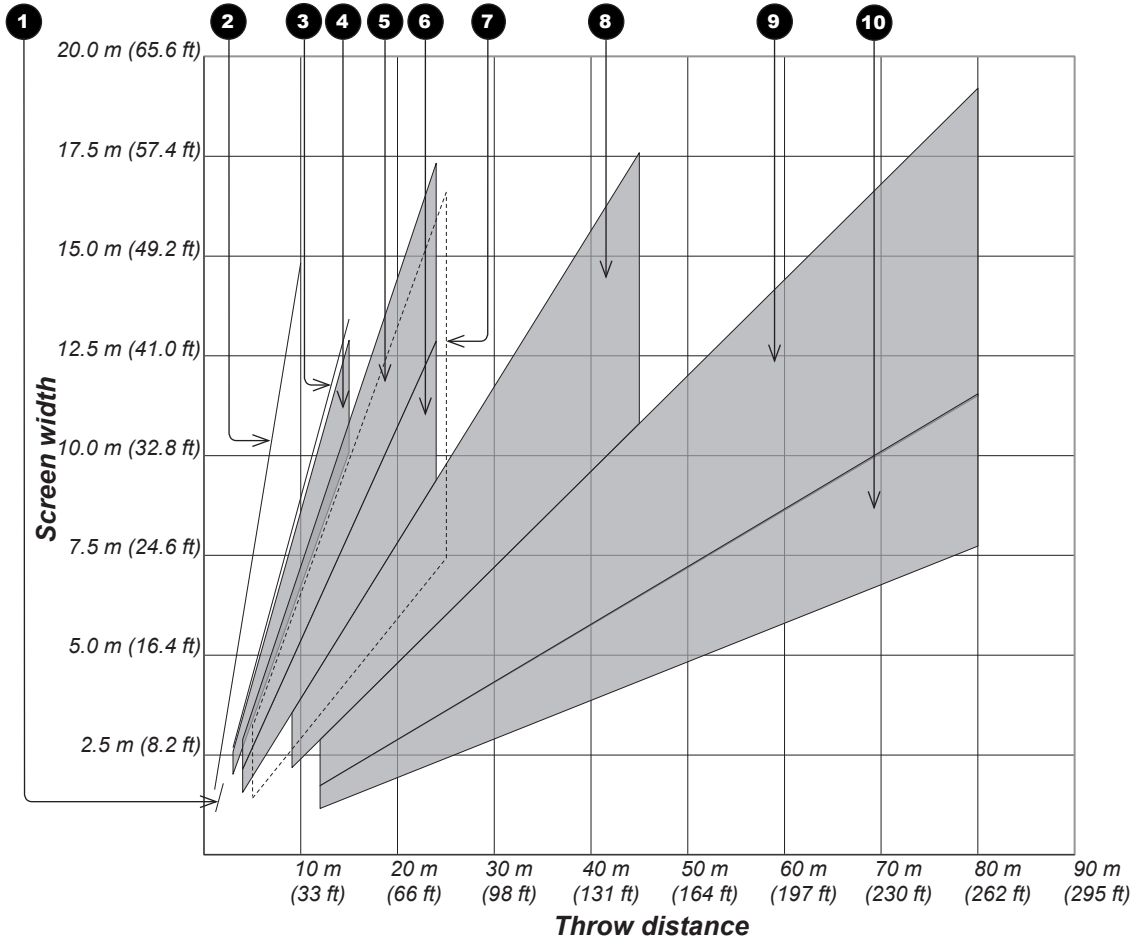
For information about individual lens part numbers, see ***Appendix A: Lens Part Numbers****.*

DMD™ resolution 1080p / WUXGA, full width images

For 1080p, full width images are 2.35:1 (Scope), 1.85:1 (Flat) 1.78:1 (native).

For WUXGA, full width images are all of the above, plus 1.66:1 (Vista) and 1.6:1 (native).

1. **1.12 : 1 fixed lens (short)**
2. **0.67 : 1 fixed lens**
3. **1.12 - 1 fixed lens**
4. **1.16 - 1.49 : 1 zoom lens**
5. **1.39 - 1.87 : 1 zoom lens**
6. **1.87 - 2.56 : 1 zoom lens**
7. **Other lenses (next page)**
8. **2.56 - 4.17 : 1 zoom lens**
9. **4.17 - 6.95 : 1 zoom lens**
10. **6.93 - 10.34 : 1 zoom lens**



Notes

This chart has a TRC of 1.0, for use with the following images:

For WUXGA:

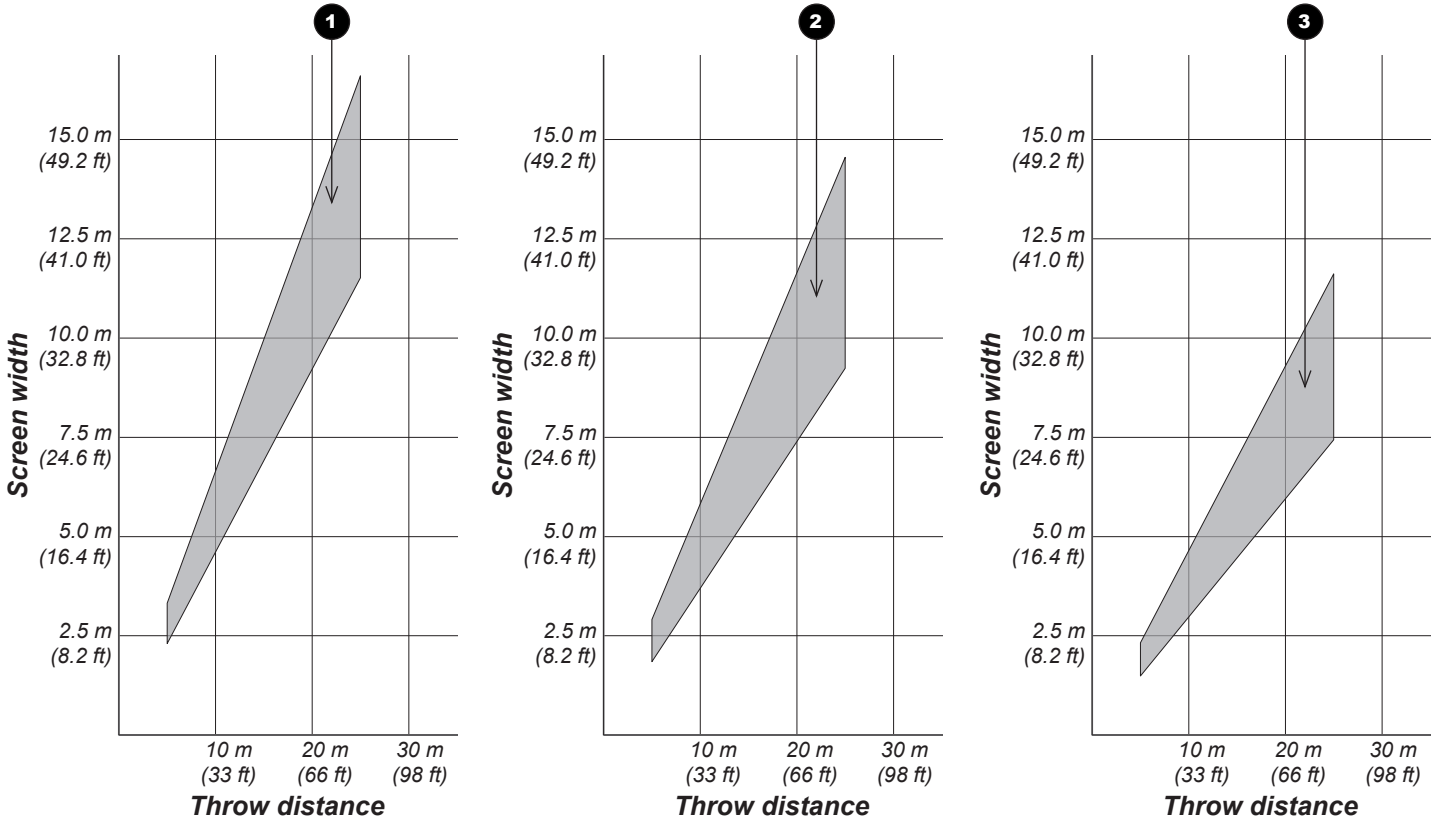
2.35:1 (Scope), 1.85:1 (Flat), 1.78:1 (16:9), 1.66:1 (Vista) and 1.6:1 (native)

For 1080p:

2.35:1 (Scope), 1.85:1 (Flat) and 1.78:1 (native)

For information about individual lens part numbers, see ***Appendix A: Lens Part Numbers****.*

DMD™ resolution 1080p/WUXGA, full width images (continued)



1 **1.50 - 2.17 : 1 zoom lens**

2 **1.72 - 2.71 : 1 zoom lens**

3 **2.15 - 3.36 : 1 zoom lens**

Notes

This chart has a TRC of 1.0, for use with the following images:

For WUXGA:

2.35:1 (Scope), 1.85:1 (Flat), 1.78:1 (16:9), 1.66:1 (Vista) and 1.6:1 (native)

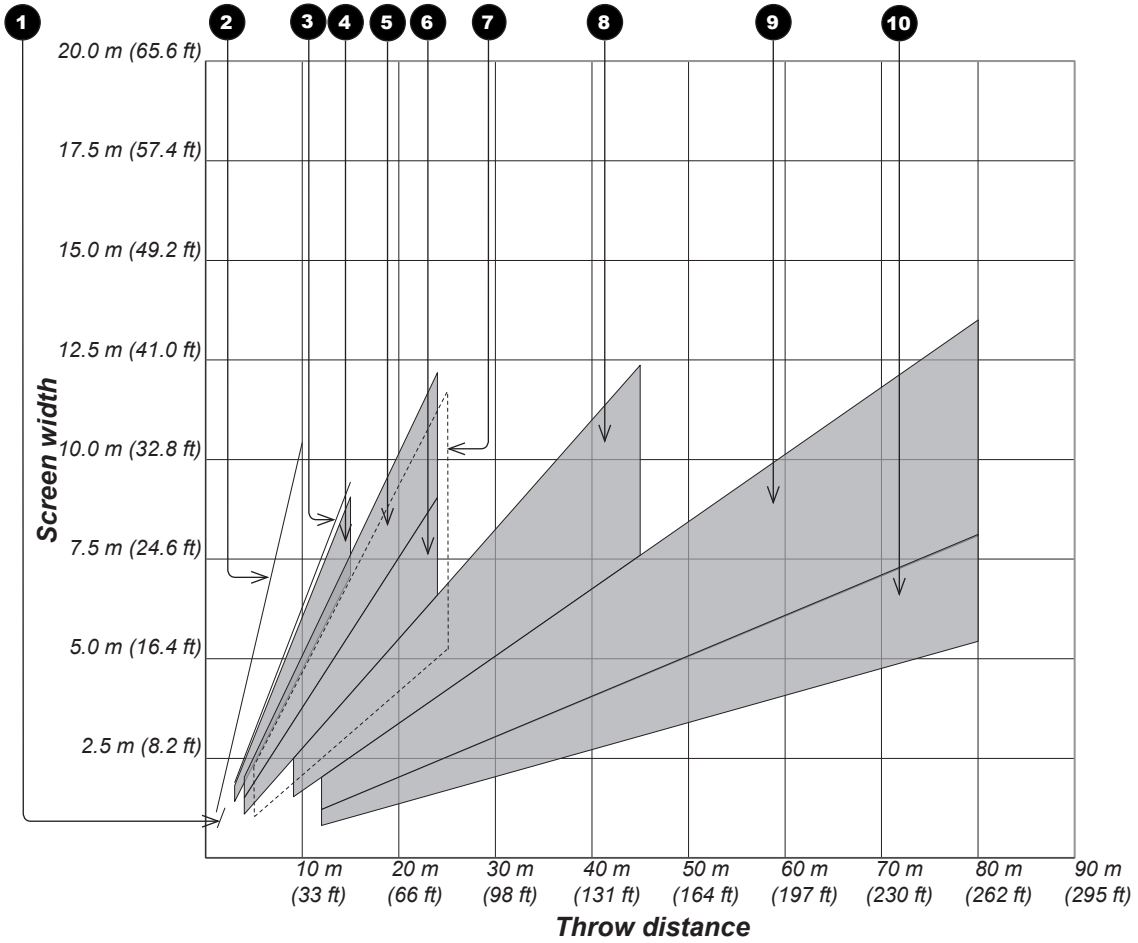
For 1080p:

2.35:1 (Scope), 1.85:1 (Flat) and 1.78:1 (native)

For information about individual lens part numbers, see ***Appendix A: Lens Part Numbers****.*

DMD™ resolution 1080p, 1.25:1 images

1. 1.12 : 1 fixed lens (short)
2. 0.67 : 1 fixed lens
3. 1.12 - 1 fixed lens
4. 1.16 - 1.49 : 1 zoom lens
5. 1.39 - 1.87 : 1 zoom lens
6. 1.87 - 2.56 : 1 zoom lens
7. Other lenses (next page)
8. 2.56 - 4.17 : 1 zoom lens
9. 4.17 - 6.95 : 1 zoom lens
10. 6.93 - 10.34 : 1 zoom lens



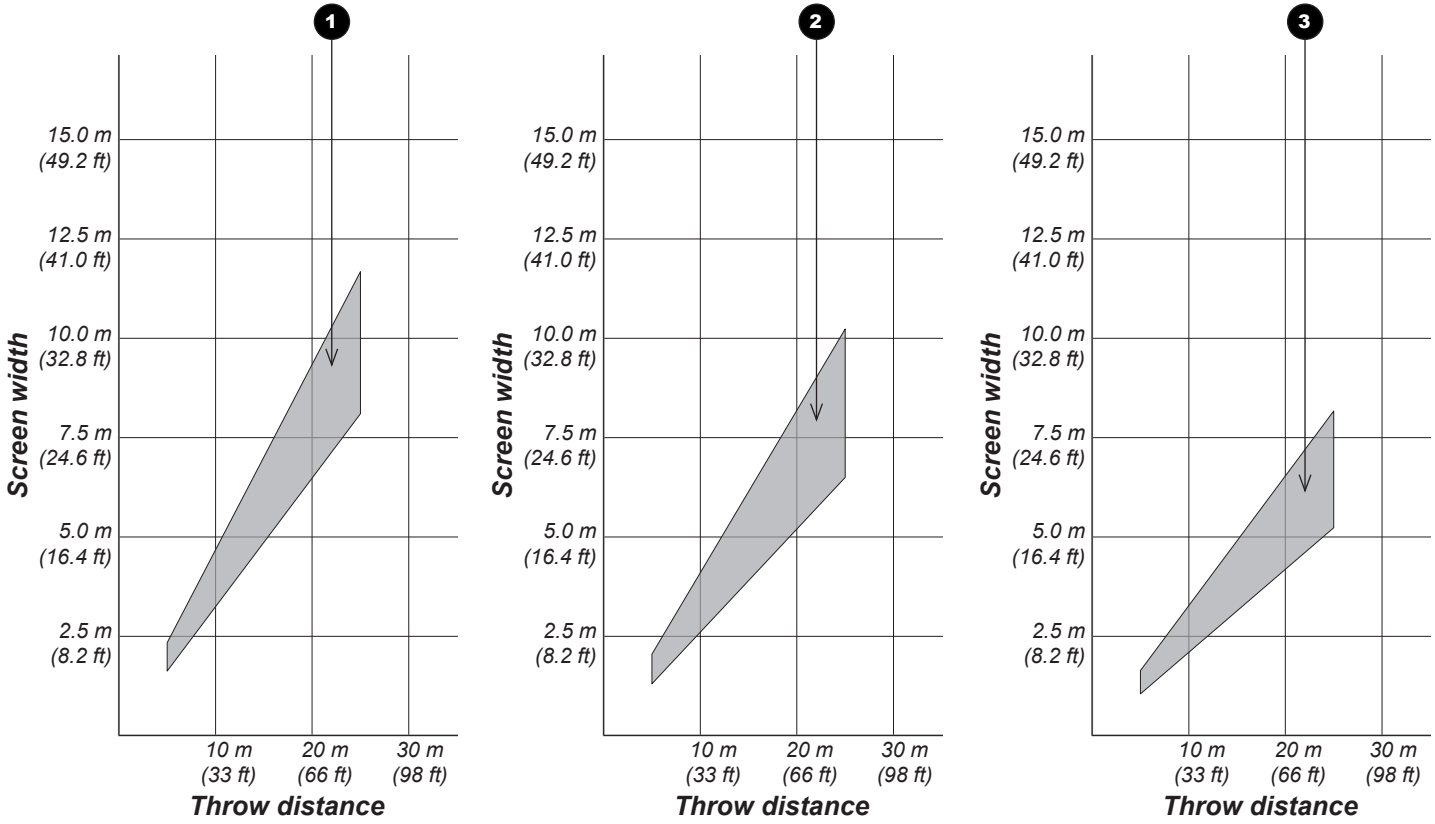
Notes

This chart has a TRC of 1.42, for use with the following images:

1.25:1 (5:4)

For information about individual lens part numbers, see ***Appendix A: Lens Part Numbers****.*

DMD™ resolution 1080p, 1.25:1 images (continued)



1 **1.50 - 2.17 : 1 zoom lens**

2 **1.72 - 2.71 : 1 zoom lens**

3 **2.15 - 3.36 : 1 zoom lens**

Notes

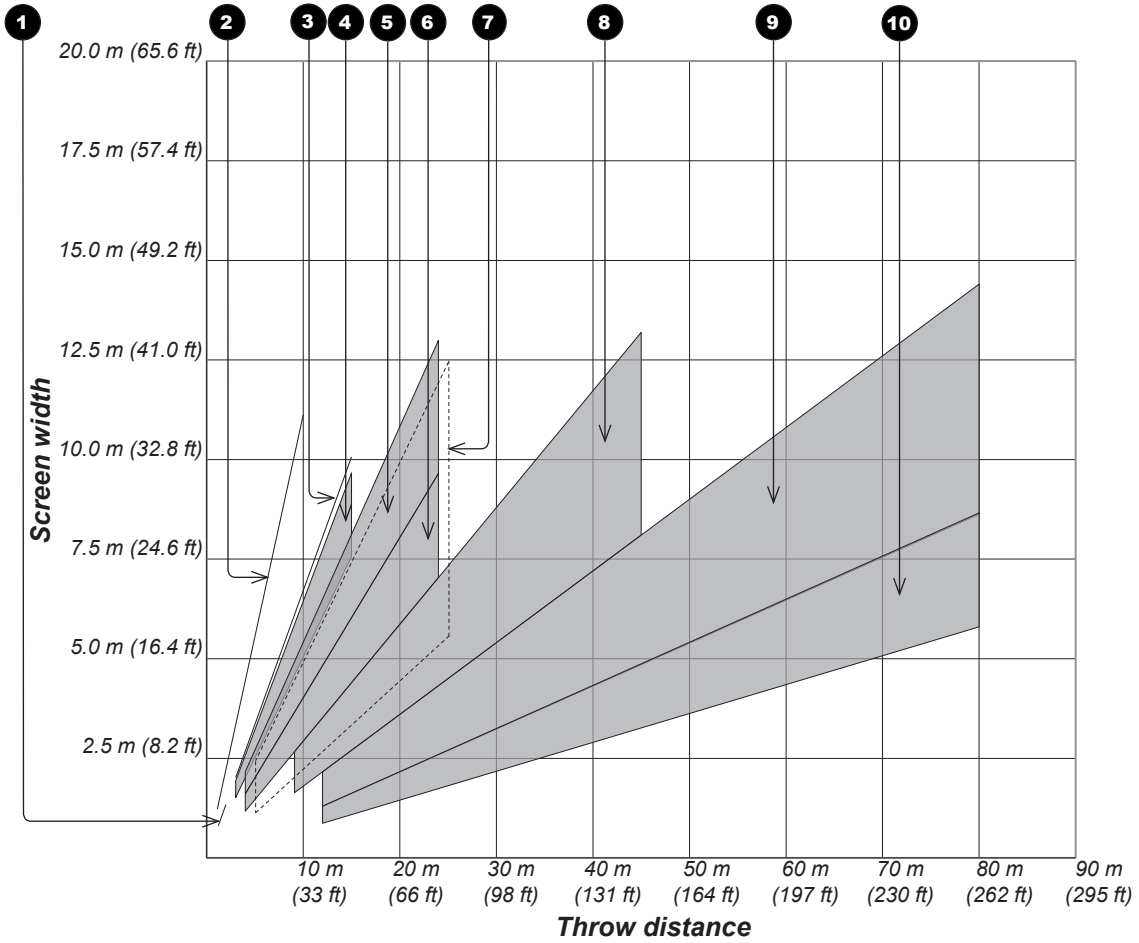
This chart has a TRC of 1.42, for use with the following images:

1.25:1 (5:4)

For information about individual lens part numbers, see ***Appendix A: Lens Part Numbers****.*

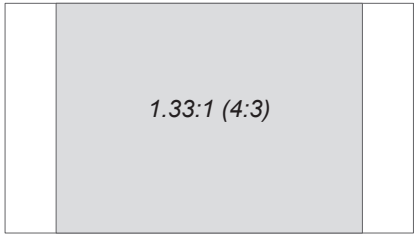
DMD™ resolution 1080p, 1.33:1 images

1. 1.12 : 1 fixed lens (short)
2. 0.67 : 1 fixed lens
3. 1.12 - 1 fixed lens
4. 1.16 - 1.49 : 1 zoom lens
5. 1.39 - 1.87 : 1 zoom lens
6. 1.87 - 2.56 : 1 zoom lens
7. Other lenses (next page)
8. 2.56 - 4.17 : 1 zoom lens
9. 4.17 - 6.95 : 1 zoom lens
10. 6.93 - 10.34 : 1 zoom lens



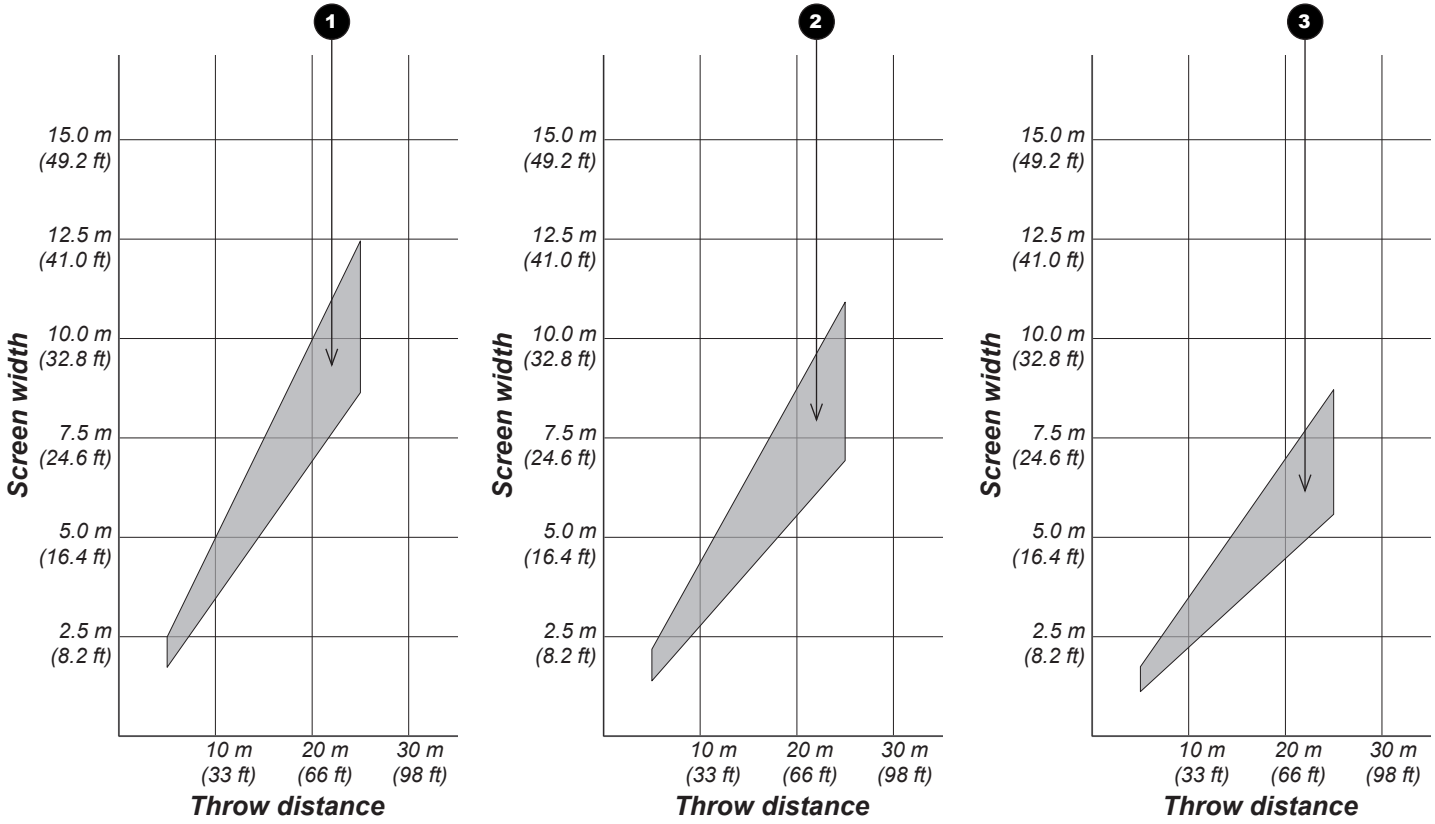
Notes

This chart has a TRC of 1.33, for use with the following images:



For information about individual lens part numbers, see ***Appendix A: Lens Part Numbers***.

DMD™ resolution 1080p, 1.33:1 images (continued)



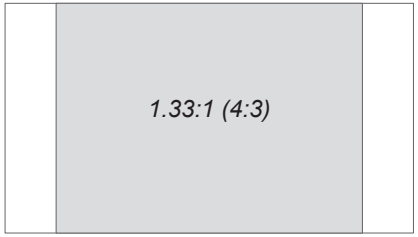
1 **1.50 - 2.17 : 1 zoom lens**

2 **1.72 - 2.71 : 1 zoom lens**

3 **2.15 - 3.36 : 1 zoom lens**

Notes

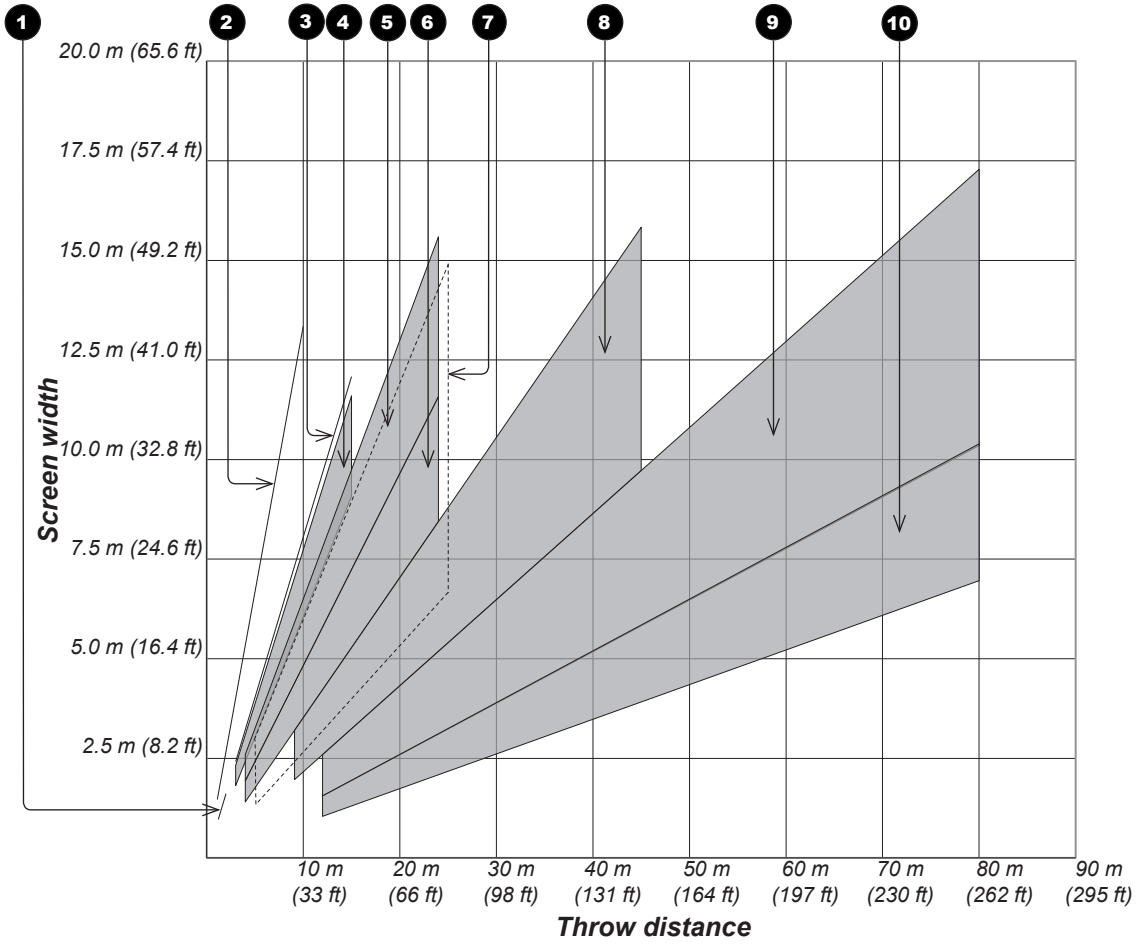
This chart has a TRC of 1.33, for use with the following images:



For information about individual lens part numbers, see ***Appendix A: Lens Part Numbers****.*

DMD™ resolution 1080p, 1.6:1 images

1. 1.12 : 1 fixed lens (short)
2. 0.67 : 1 fixed lens
3. 1.12 - 1 fixed lens
4. 1.16 - 1.49 : 1 zoom lens
5. 1.39 - 1.87 : 1 zoom lens
6. 1.87 - 2.56 : 1 zoom lens
7. Other lenses (next page)
8. 2.56 - 4.17 : 1 zoom lens
9. 4.17 - 6.95 : 1 zoom lens
10. 6.93 - 10.34 : 1 zoom lens



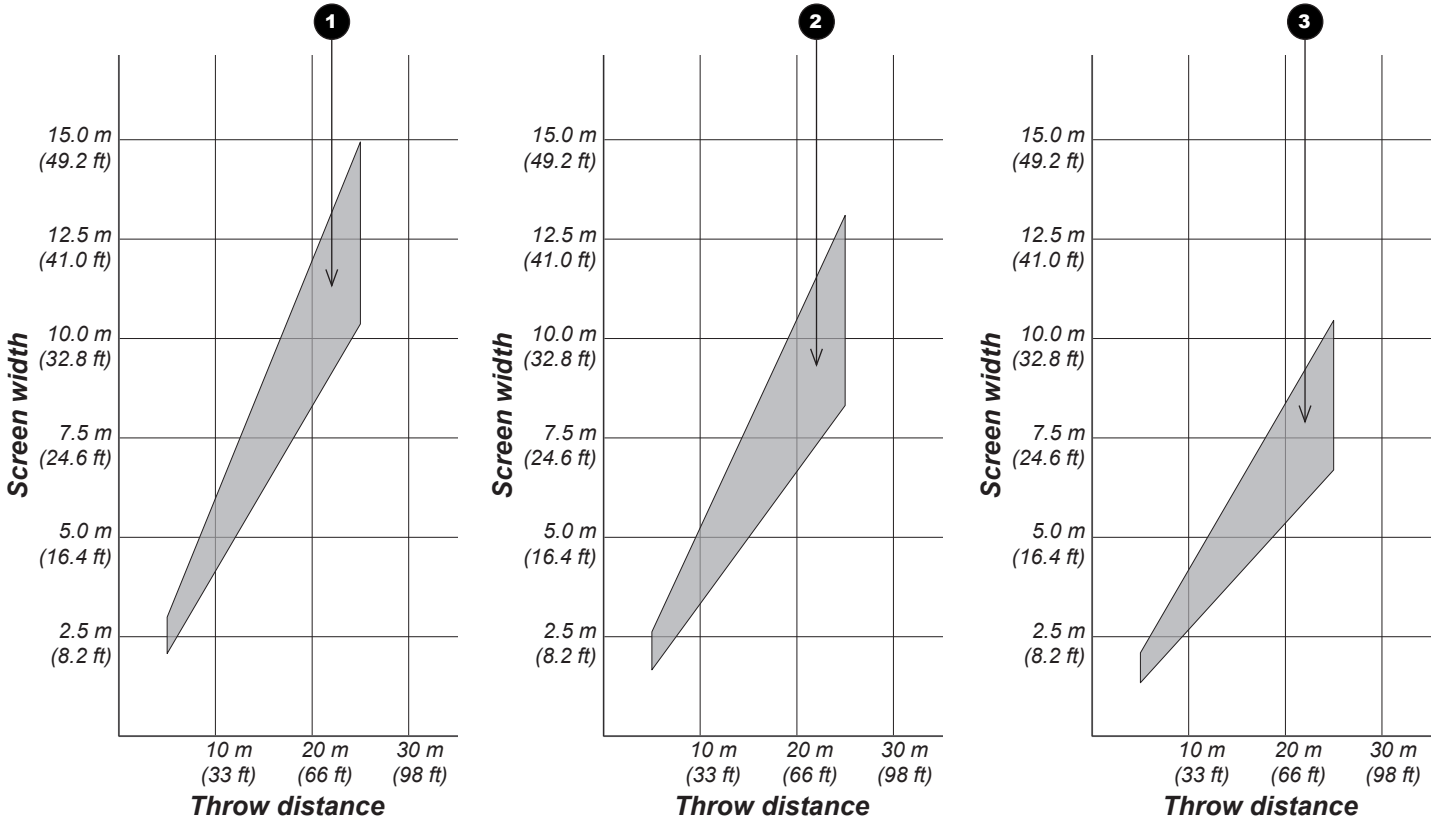
Notes

This chart has a TRC of 1.11, for use with the following images:

1.6:1 (16:10)

For information about individual lens part numbers, see ***Appendix A: Lens Part Numbers****.*

DMD™ resolution 1080p, 1.6:1 images (continued)



1. **1.50 - 2.17 : 1 zoom lens**
2. **1.72 - 2.71 : 1 zoom lens**
3. **2.15 - 3.36 : 1 zoom lens**

Notes

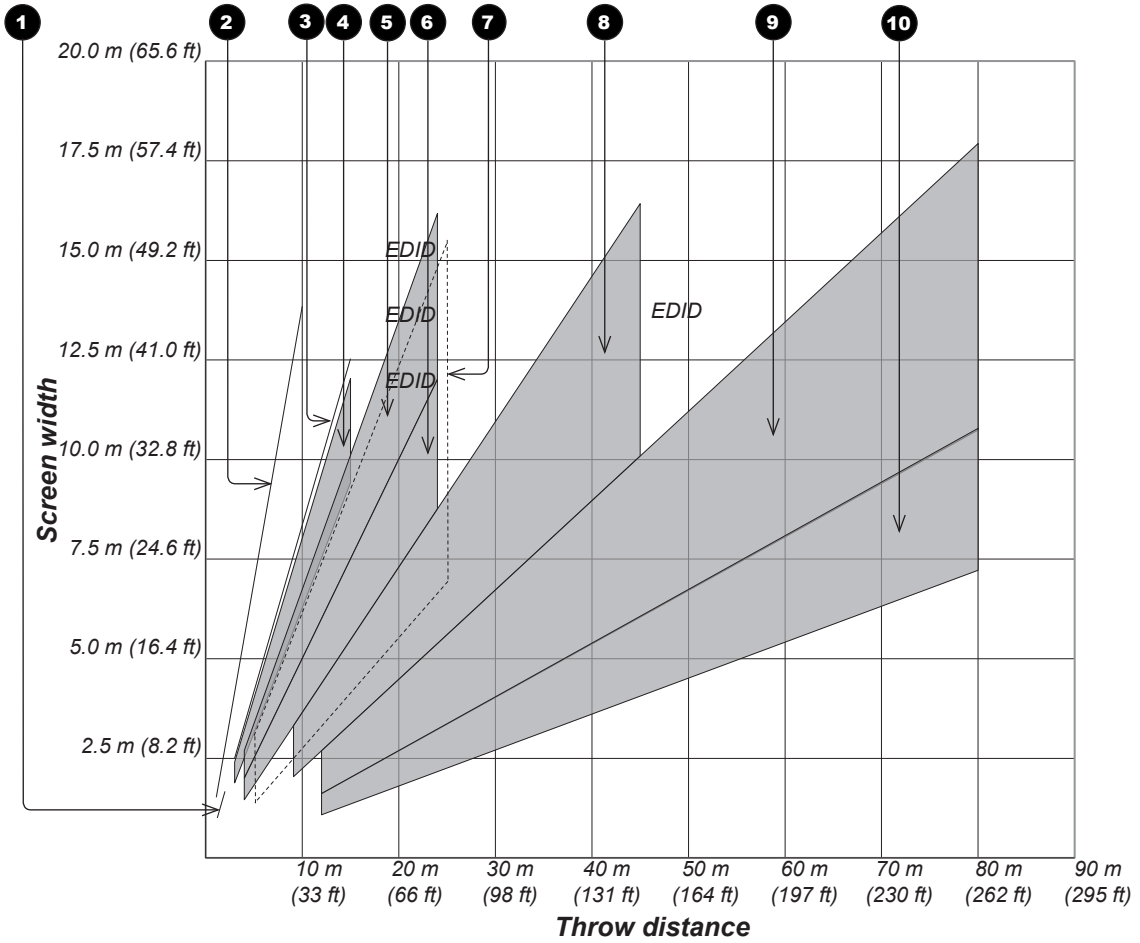
This chart has a TRC of 1.11, for use with the following images:

1.6:1 (16:10)

For information about individual lens part numbers, see ***Appendix A: Lens Part Numbers****.*

DMD™ resolution 1080p, 1.66:1 images

1. 1.12 : 1 fixed lens (short)
2. 0.67 : 1 fixed lens
3. 1.12 - 1 fixed lens
4. 1.16 - 1.49 : 1 zoom lens
5. 1.39 - 1.87 : 1 zoom lens
6. 1.87 - 2.56 : 1 zoom lens
7. Other lenses (next page)
8. 2.56 - 4.17 : 1 zoom lens
9. 4.17 - 6.95 : 1 zoom lens
10. 6.93 - 10.34 : 1 zoom lens



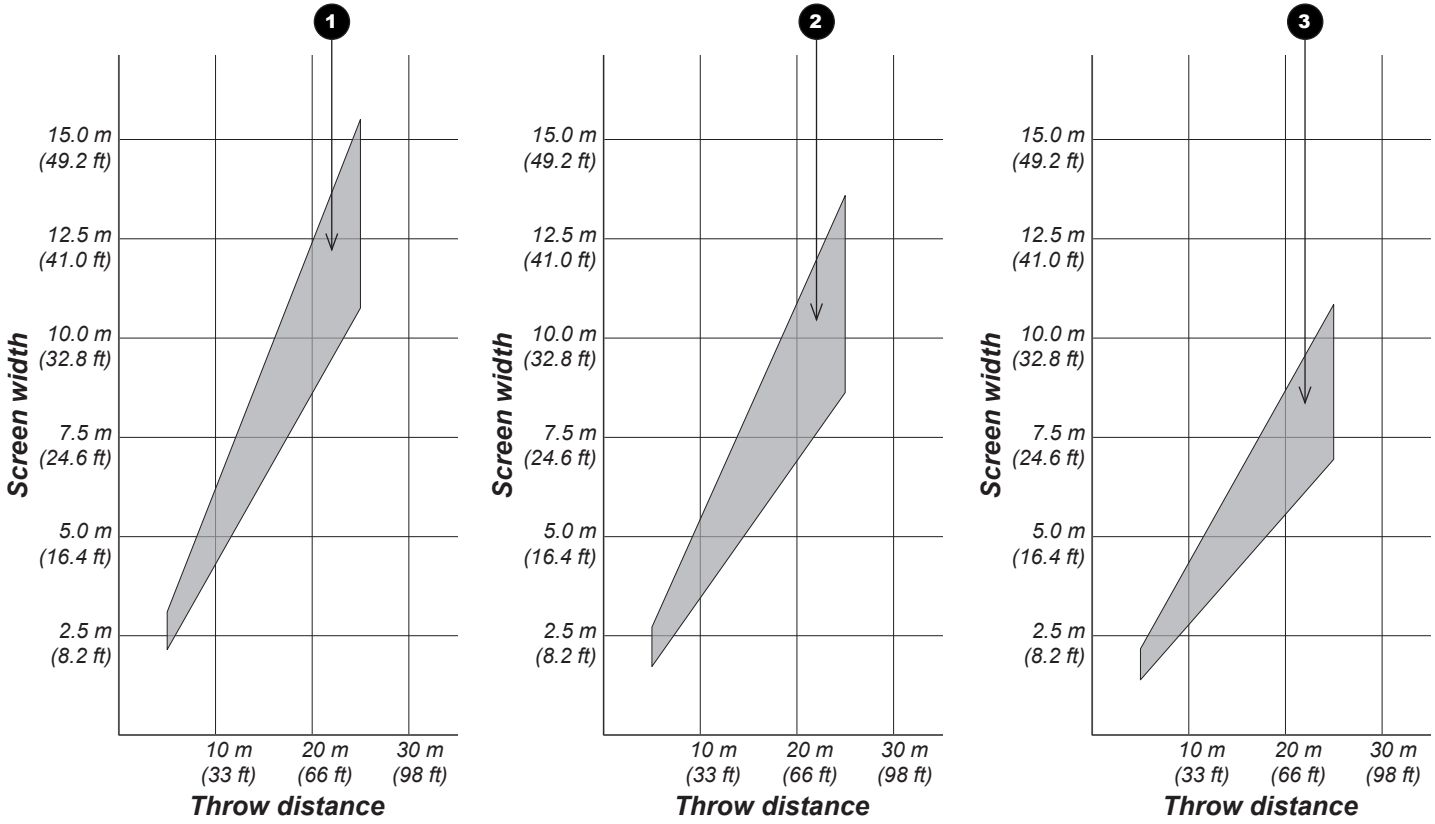
Notes

This chart has a TRC of 1.07, for use with the following images:

1.66:1 (Vista)

For information about individual lens part numbers, see ***Appendix A: Lens Part Numbers****.*

DMD™ resolution 1080p, 1.66:1 images (continued)



1. **1.50 - 2.17 : 1 zoom lens**
2. **1.72 - 2.71 : 1 zoom lens**
3. **2.15 - 3.36 : 1 zoom lens**

Notes

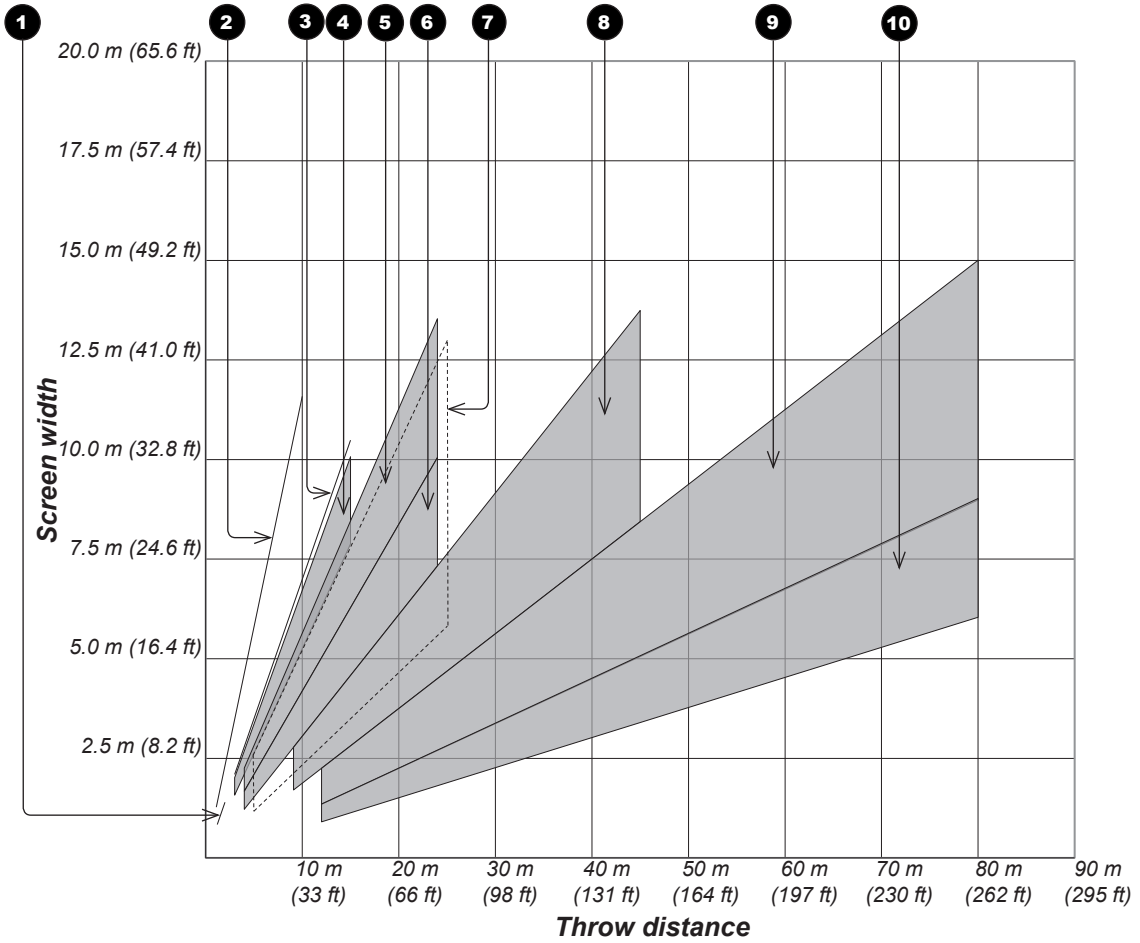
This chart has a TRC of 1.07, for use with the following images:

1.66:1 (Vista)

For information about individual lens part numbers, see ***Appendix A: Lens Part Numbers****.*

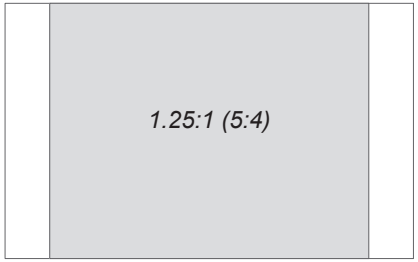
DMD™ resolution WUXGA, 1.25:1 images

1. 1.12 : 1 fixed lens (short)
2. 0.67 : 1 fixed lens
3. 1.12 - 1 fixed lens
4. 1.16 - 1.49 : 1 zoom lens
5. 1.39 - 1.87 : 1 zoom lens
6. 1.87 - 2.56 : 1 zoom lens
7. Other lenses (next page)
8. 2.56 - 4.17 : 1 zoom lens
9. 4.17 - 6.95 : 1 zoom lens
10. 6.93 - 10.34 : 1 zoom lens



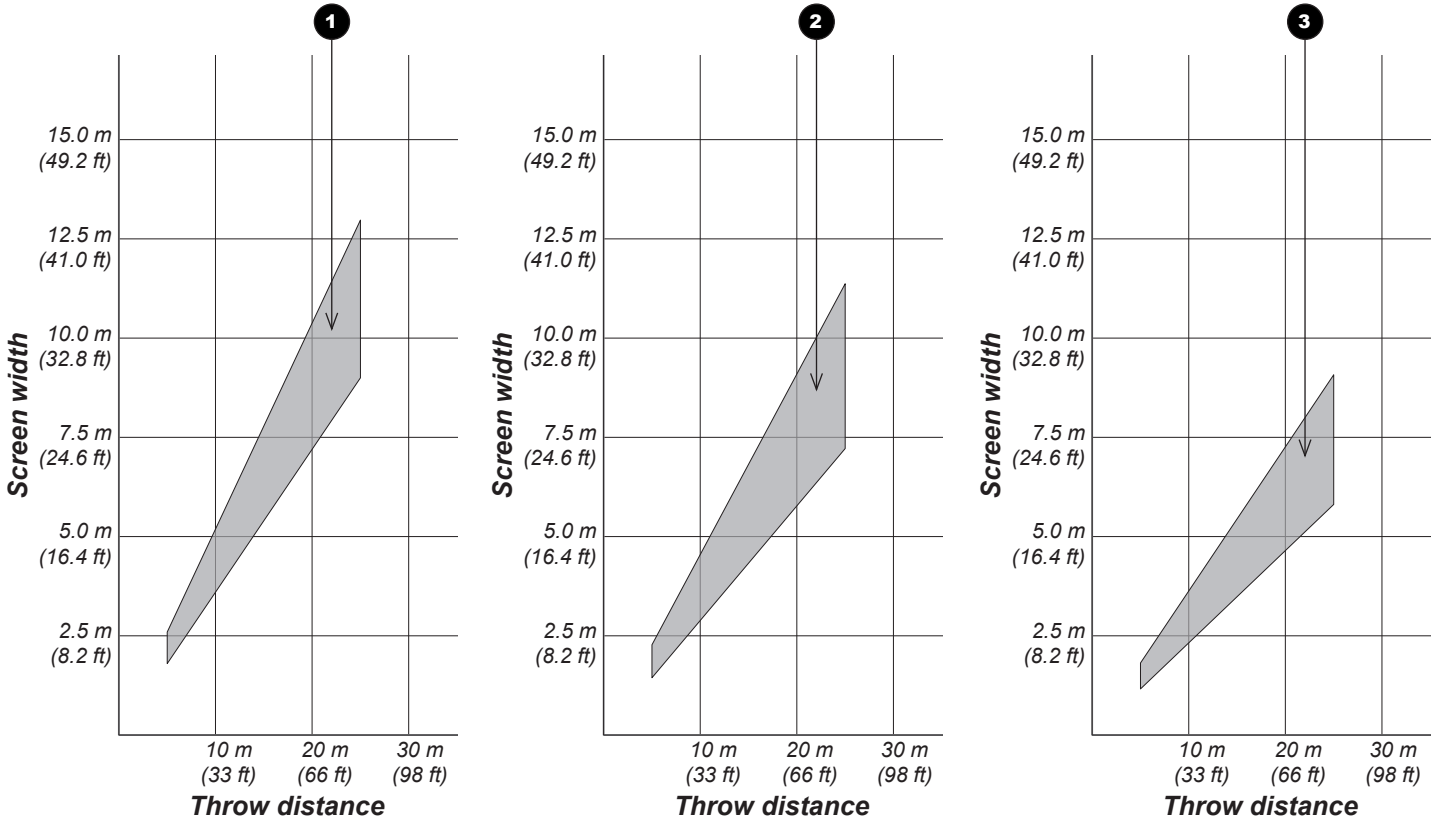
Notes

This chart has a TRC of 1.28, for use with the following images:



For information about individual lens part numbers, see ***Appendix A: Lens Part Numbers***.

DMD™ resolution WUXGA, 1.25:1 images (continued)



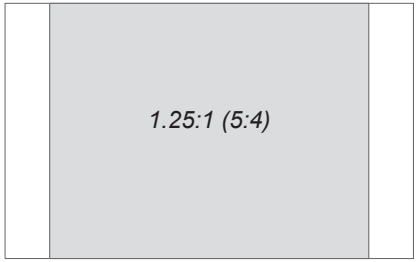
1 **1.50 - 2.17 : 1 zoom lens**

2 **1.72 - 2.71 : 1 zoom lens**

3 **2.15 - 3.36 : 1 zoom lens**

Notes

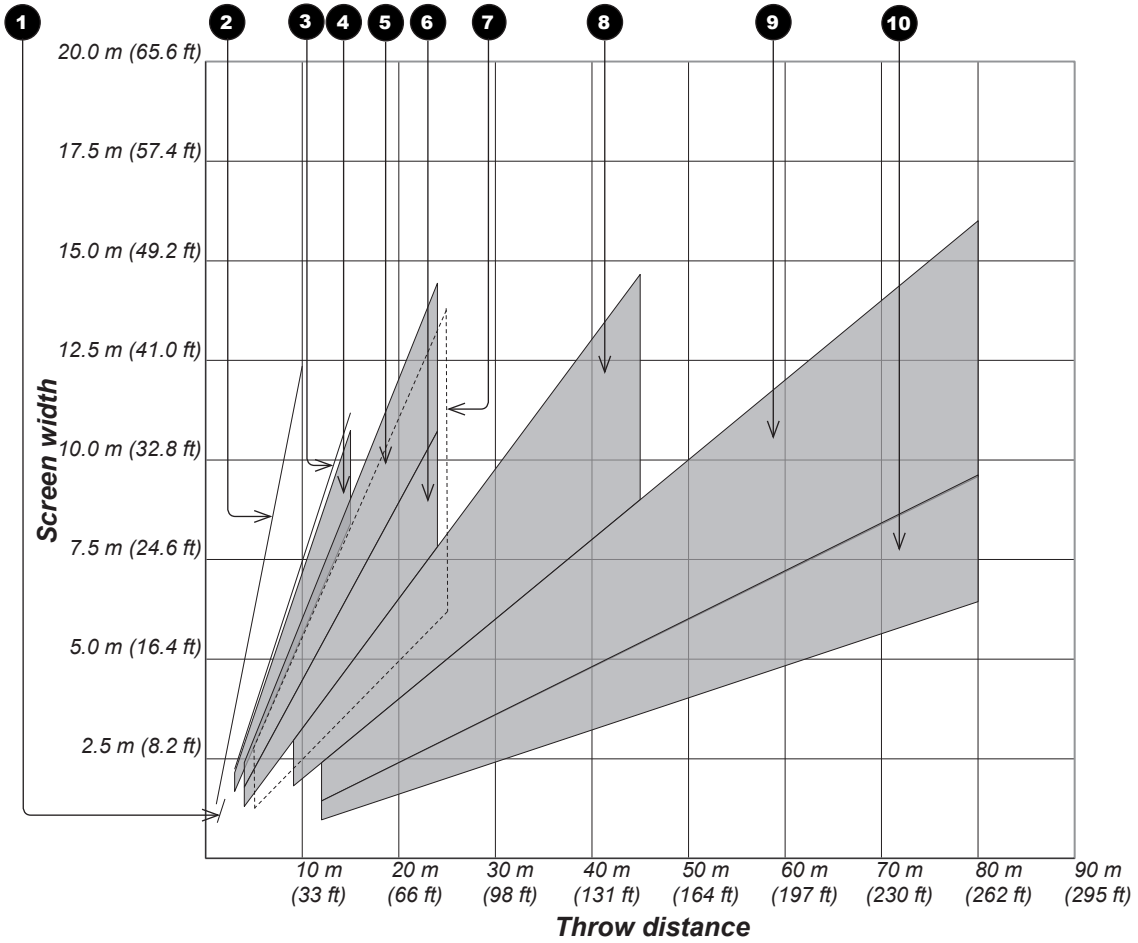
This chart has a TRC of 1.28, for use with the following images:



For information about individual lens part numbers, see ***Appendix A: Lens Part Numbers****.*

DMD™ resolution WUXGA, 1.33:1 images

1. 1.12 : 1 fixed lens (short)
2. 0.67 : 1 fixed lens
3. 1.12 - 1 fixed lens
4. 1.16 - 1.49 : 1 zoom lens
5. 1.39 - 1.87 : 1 zoom lens
6. 1.87 - 2.56 : 1 zoom lens
7. Other lenses (next page)
8. 2.56 - 4.17 : 1 zoom lens
9. 4.17 - 6.95 : 1 zoom lens
10. 6.93 - 10.34 : 1 zoom lens



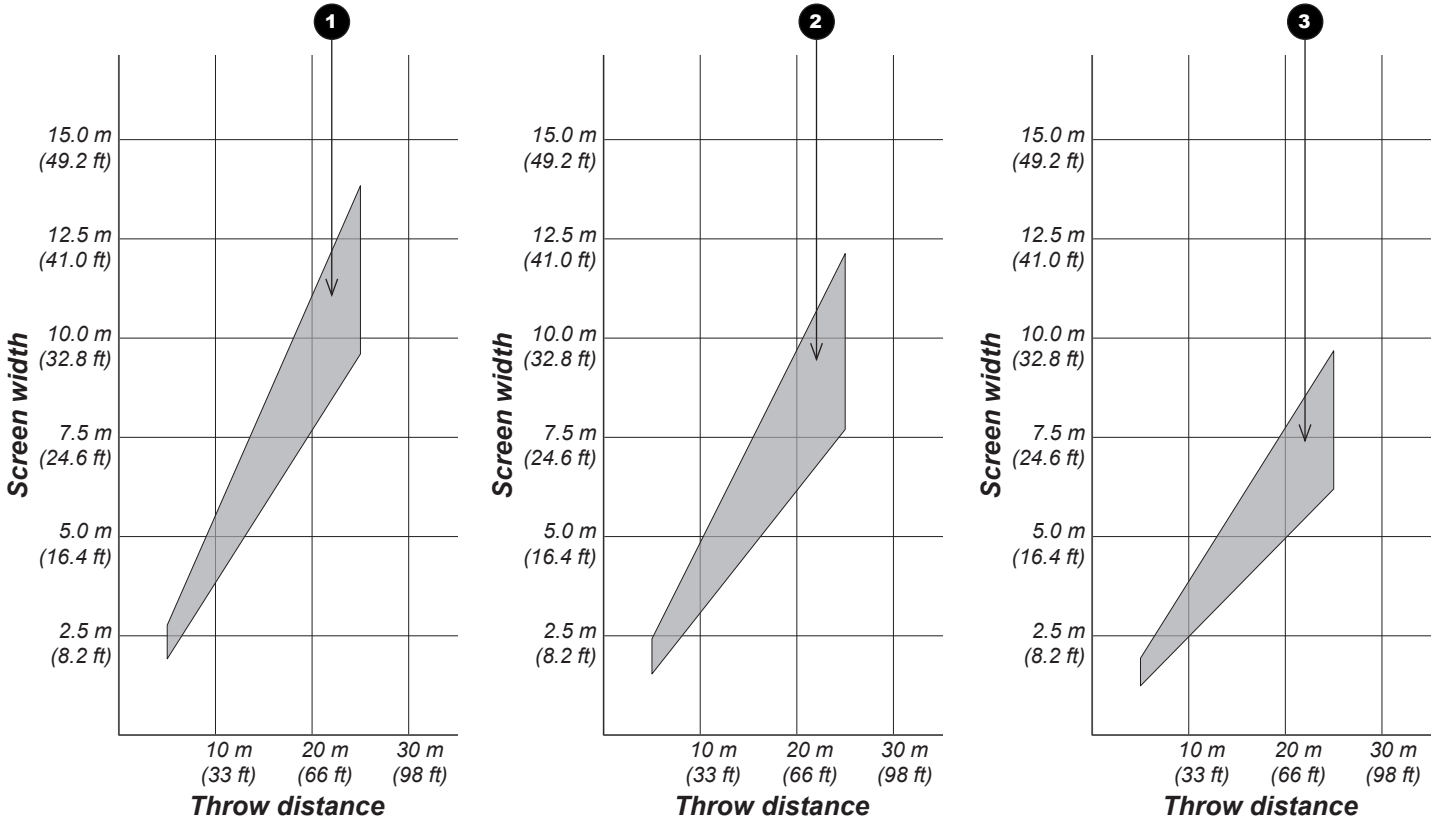
Notes

This chart has a TRC of 1.2, for use with the following images:

1.33:1 (4:3)

For information about individual lens part numbers, see ***Appendix A: Lens Part Numbers****.*

DMD™ resolution WUXGA, 1.33:1 images (continued)



1 **1.50 - 2.17 : 1 zoom lens**

2 **1.72 - 2.71 : 1 zoom lens**

3 **2.15 - 3.36 : 1 zoom lens**

Notes

This chart has a TRC of 1.2, for use with the following images:

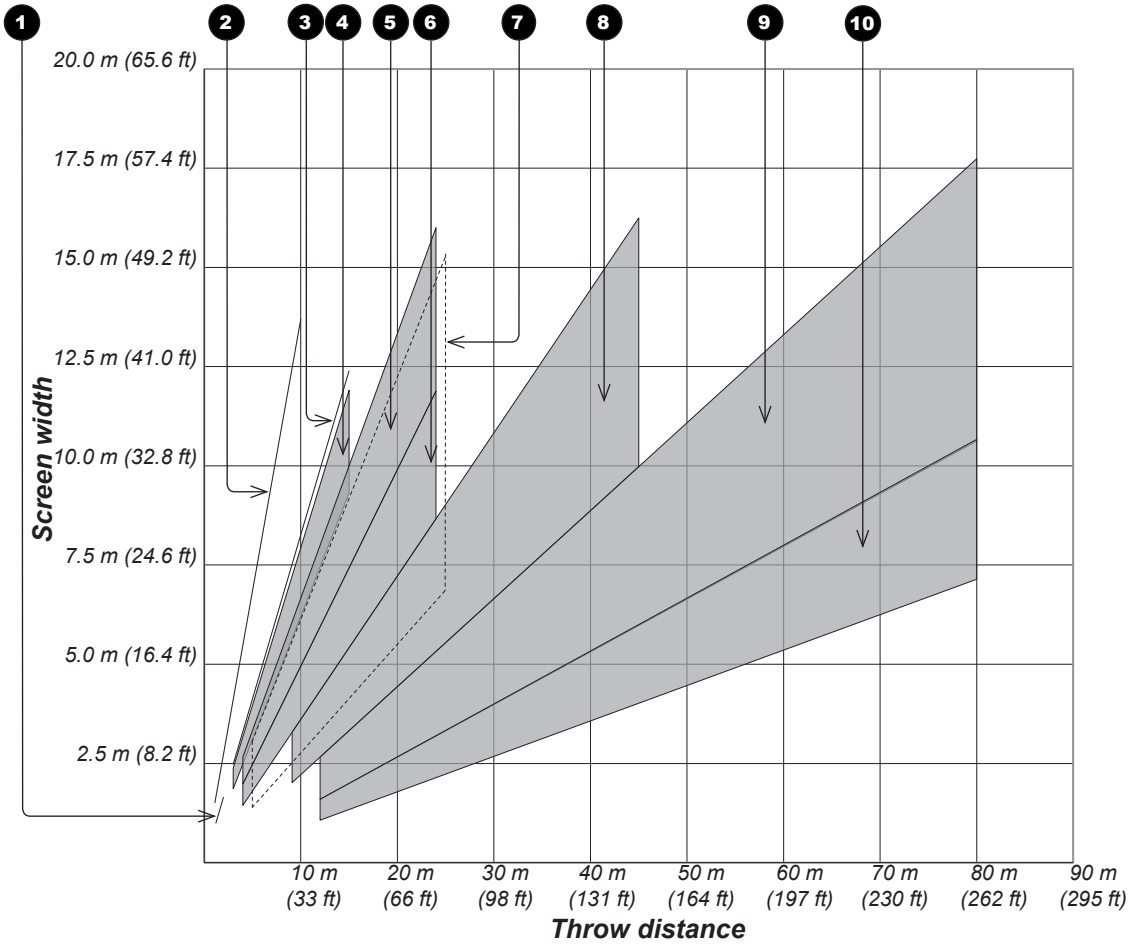
1.33:1 (4:3)

For information about individual lens part numbers, see ***Appendix A: Lens Part Numbers****.*

DMD™ resolution SX+, full width images

For SX+, full width images are 2.35:1 (Scope), 1.85:1 (Flat) 1.78:1 (16:9), 1.66:1 (Vista), 1.6:1 (16:10), and 1.33:1 (4:3, native aspect ratio).

1. **1.21 : 1 fixed lens (short)**
2. **0.73 : 1 fixed lens**
3. **1.21 - 1 fixed lens**
4. **1.26 - 1.61 : 1 zoom lens**
5. **1.5 - 2.02 : 1 zoom lens**
6. **2.02 - 2.77 : 1 zoom lens**
7. **Other lenses (next page)**
8. **2.77 - 4.51 : 1 zoom lens**
9. **4.51 - 7.53 : 1 zoom lens**
10. **7.5 - 11.2 : 1 zoom lens**



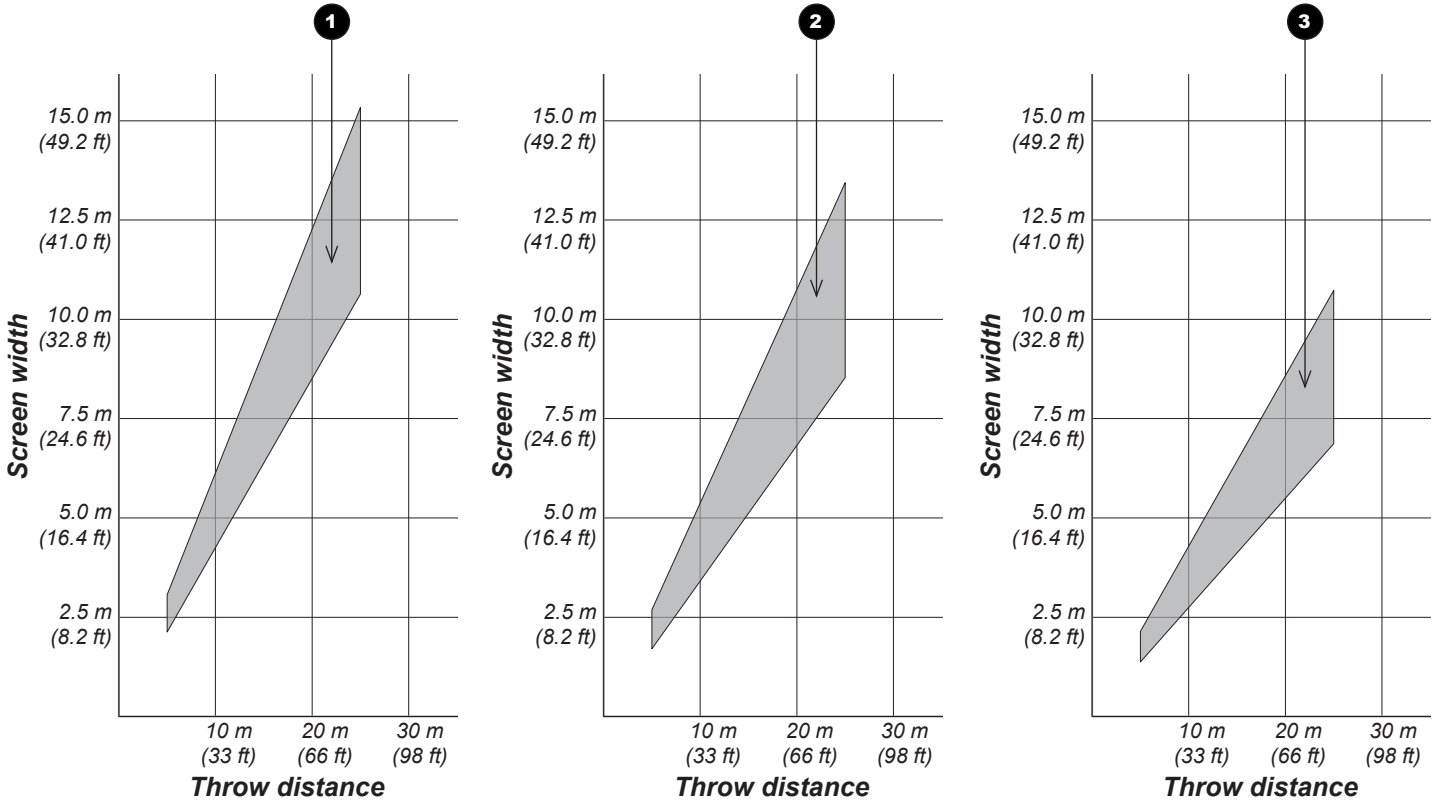
Notes

This chart has a TRC of 1.0, for use with the following images:

2.35:1 (Scope), 1.85:1 (Flat), 1.78:1 (16:9), 1.66:1 (Vista), 1.6:1 (16:10) and 1.33:1 (native)

For information about individual lens part numbers, see ***Appendix A: Lens Part Numbers****.*

DMD™ resolution SX+, full width images (continued)



1. 1.63 - 2.35 : 1 zoom lens
2. 1.86 - 2.93 : 1 zoom lens
3. 2.33 - 3.64 : 1 zoom lens

Notes

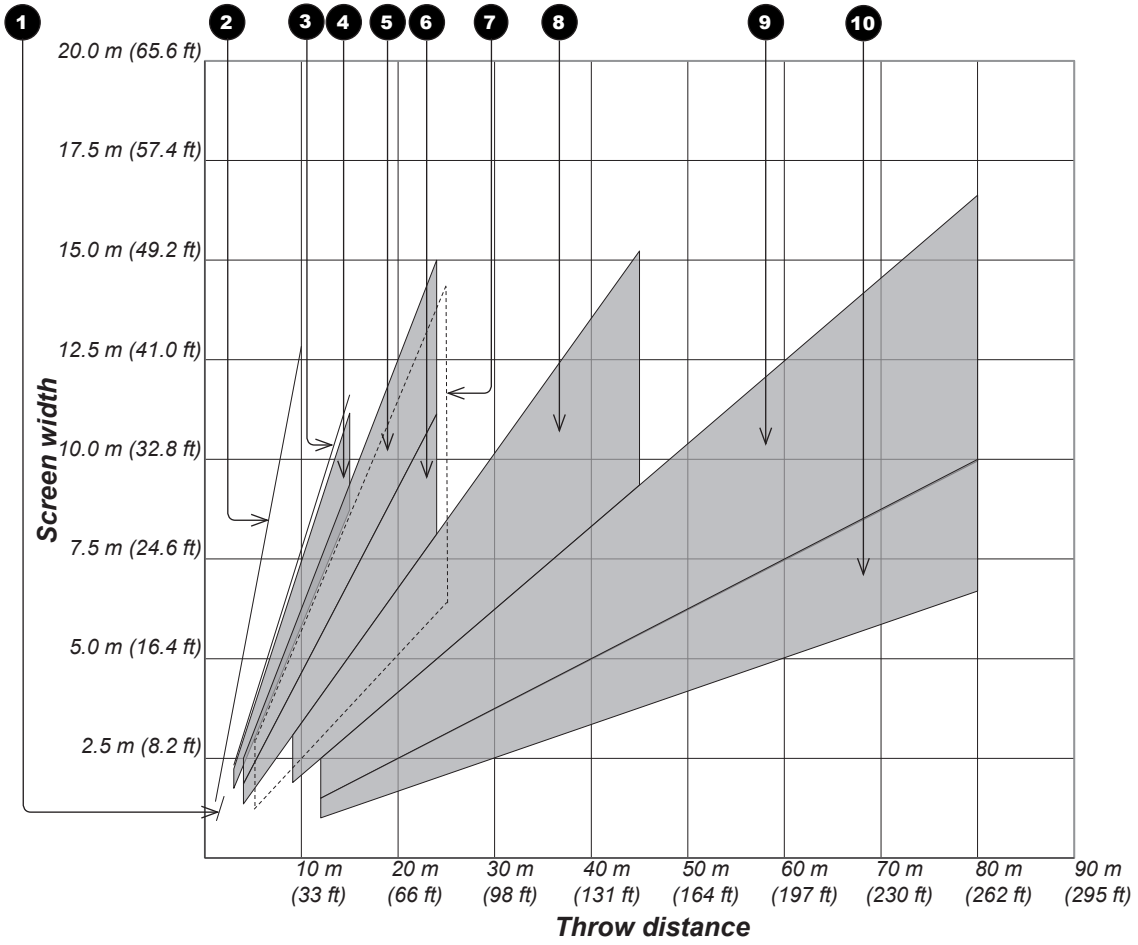
This chart has a TRC of 1.0, for use with the following images:

2.35:1 (Scope), 1.85:1 (Flat), 1.78:1 (16:9), 1.66:1 (Vista), 1.6:1 (16:10) and 1.33:1 (native)

For information about individual lens part numbers, see ***Appendix A: Lens Part Numbers****.*

DMD™ resolution SX+, 1.25:1 images

1. 1.21 : 1 fixed lens (short)
2. 0.73 : 1 fixed lens
3. 1.21 - 1 fixed lens
4. 1.26 - 1.61 : 1 zoom lens
5. 1.5 - 2.02 : 1 zoom lens
6. 2.02 - 2.8 : 1 zoom lens
7. Other lenses (next page)
8. 2.77 - 4.51 : 1 zoom lens
9. 4.51 - 7.53 : 1 zoom lens
10. 7.5 - 11.2 : 1 zoom lens



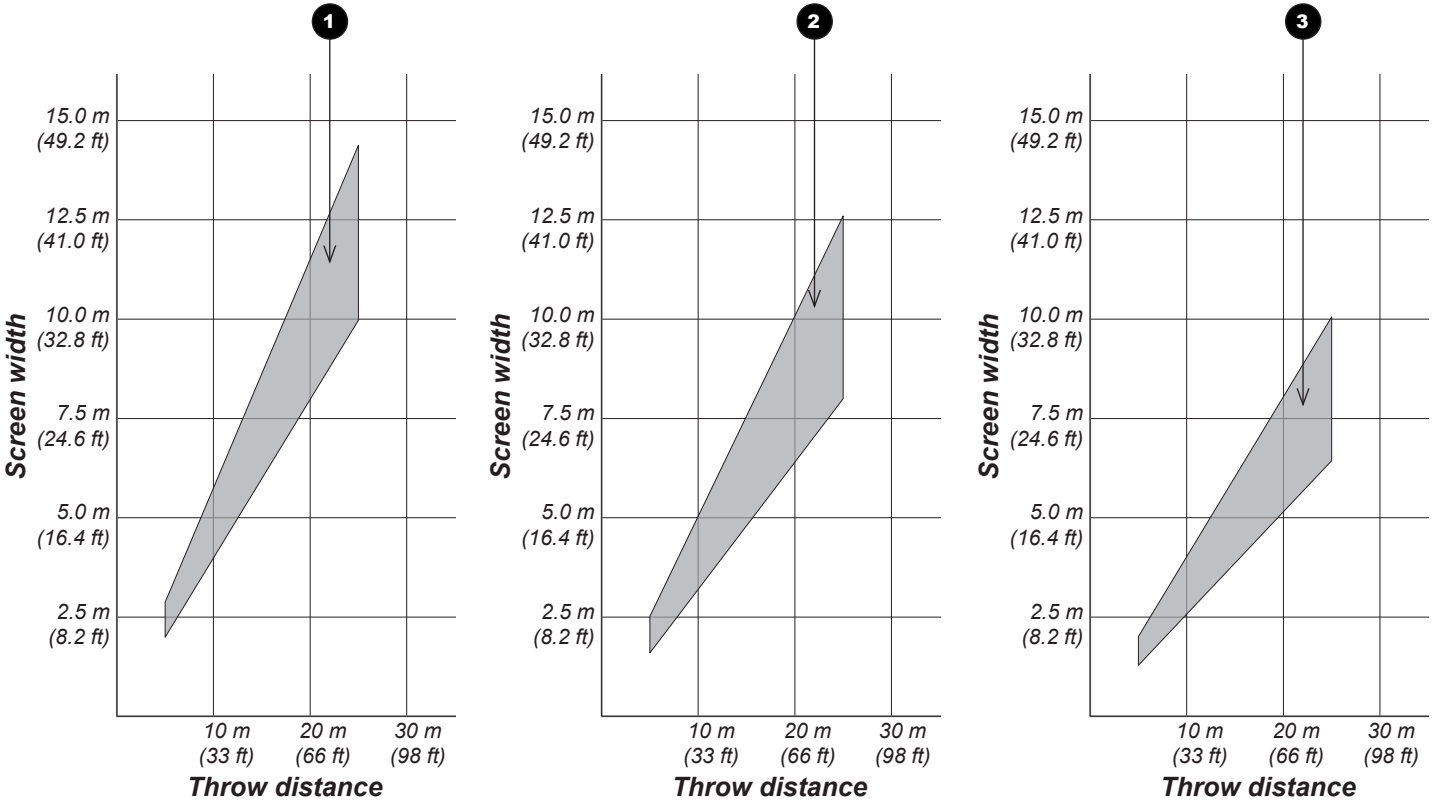
Notes

This chart has a TRC of 1.07, for use with the following images:

1.25:1 (5:4)

For information about individual lens part numbers, see ***Appendix A: Lens Part Numbers****.*

DMD™ resolution SX+, 1.25:1 images (continued)



Notes

This chart has a TRC of 1.07, for use with the following images:

1.25:1 (5:4)

For information about individual lens part numbers, see ***Appendix A: Lens Part Numbers***.

Appendix C: Supported Signal Input Modes

2D input modes

Standard		Resolution	Vertical Frequency (Hz)	Total number of lines	Horizontal Frequency (kHz)	Composite 1 & 2 / S-Video	Component	DVI-A / VGA	DVI-D / HDMI	3G-SDI
SDTV	480i	720 x 480	59.94	525	15.73	✓	✓			✓
	576i	720 x 576	50.00	625	15.63	✓	✓			✓
EDTV	480p59	720 x 480	59.94	525	31.47		✓		✓	✓
	480p60	720 x 480	60.00	525	31.50		✓		✓	✓
	576p50	720 x 576	50.00	625	31.25		✓		✓	✓
HDTV	720p50	1280 x 720	50.00	750	37.50		✓		✓	✓
	720p59	1280 x 720	59.94	750	44.96		✓		✓	✓
	720p60	1280 x 720	60.00	750	45.00		✓		✓	✓
	1080s23	1920 x 1080	23.98	1125	26.97		✓		✓	✓
	1080p23	1920 x 1080	23.98	1125	26.97		✓		✓	✓
	1080s24	1920 x 1080	24.00	1125	27.00		✓		✓	✓
	1080p24	1920 x 1080	24.00	1125	27.00		✓		✓	✓
	1080p25	1920 x 1080	25.00	1125	28.13		✓		✓	✓
	1080p29	1920 x 1080	29.97	1125	33.72		✓		✓	✓
	1080p30	1920 x 1080	30.00	1125	33.75		✓		✓	✓
	1080i50	1920 x 1080	50.00	1125	28.13		✓		✓	✓
	1080p50	1920 x 1080	50.00	1125	56.25		✓		✓	✓
	1080i59	1920 x 1080	59.94	1125	33.72		✓		✓	✓
	1080p59	1920 x 1080	59.94	1125	67.43		✓		✓	✓

Notes

Standard		Resolution	Vertical Frequency (Hz)	Total number of lines	Horizontal Frequency (kHz)	Composite 1 & 2 / S-Video	Component	DVI-A / VGA	DVI-D / HDMI	3G-SDI
HDTV continued	1080i60	1920 x 1080	60.00	1125	33.75		✓		✓	✓
	1080p60	1920 x 1080	60.00	1125	67.50		✓		✓	✓
COMPUTER	VGA59	640 x 480	59.94	525	31.47			✓	✓	
	VGA60	640 x 480	60.00	525	31.50			✓	✓	
	MACI	640 x 480	66.67	525	35.00			✓	✓	
	VGA72	640 x 480	72.81	520	37.86			✓	✓	
	VGA75	640 x 480	75.00	500	37.50			✓	✓	
	DOS70	720 x 400	70.09	449	31.47			✓	✓	
	SVGA50	800 x 600	49.92	621	31.00			✓	✓	
	SVGA56	800 x 600	56.25	625	35.16			✓	✓	
	SVGA60	800 x 600	60.32	628	37.88			✓	✓	
	SVGA72	800 x 600	72.19	666	48.08			✓	✓	
	SVGA75	800 x 600	75.00	625	46.88			✓	✓	
	MACII	832 x 624	75.08	1120	49.10			✓	✓	
	XGA50	1024 x 768	49.98	793	39.63			✓	✓	
	XGA60	1024 x 768	60.00	806	48.36			✓	✓	
	XGA70	1024 x 768	70.07	806	56.48			✓	✓	
	XGA75	1024 x 768	75.03	800	60.02			✓	✓	
	XGA+70	1152 x 864	70.01	912	63.85				✓	
	XGA+75	1152 x 864	75.00	900	67.50				✓	
	MAC2	1152 x 870	75.06	915	68.68			✓	✓	
	SUN1166	1152 x 900	66.00	937	61.85			✓	✓	

Notes

Standard		Resolution	Vertical Frequency (Hz)	Total number of lines	Horizontal Frequency (kHz)	Composite 1 & 2 / S-Video	Component	DVI-A / VGA	DVI-D / HDMI	3G-SDI
COMPUTER continued	WXGA50	1280 x 720	49.83	744	37.07				✓	
	WXGA60	1280 x 720	59.86	748	44.77				✓	
	WXGA50	1280 x 768	49.92	793	39.59				✓	
	WXGA60	1280 x 768	59.87	798	47.78				✓	
	SXGA-60	1280 x 960	60.00	1000	60.00				✓	
	SXGA50	1280 x 1024	49.84	1057	52.68			✓	✓	
	SXGA60	1280 x 1024	60.02	1066	63.98			✓	✓	
	SXGA75	1280 x 1024	75.02	1066	79.98			✓	✓	
	HD50	1360 x 768	49.89	793	39.56				✓	
	HD60	1360 x 768	59.80	798	44.72				✓	
	SXGA+50	1400 x 1050	49.97	1083	54.12			✓	✓	
	SXGA+60	1400 x 1050	59.98	1089	65.32			✓	✓	
	WSXGA50	1536 x 960	49.93	991	49.48				✓	
	WSXGA60	1536 x 960	59.91	996	59.67				✓	
	UXGA50	1600 x 1200	49.92	1238	61.78			✓	✓	
	UXGA60	1600 x 1200	60.00	1250	75.00			✓	✓	
	WSXGA+60	1680 x 1050	59.95	1089	65.29				✓	
	FHD50	1920 x 1080	49.92	1114	55.62			✓	✓	
	FHD60	1920 x 1080	59.93	1125	66.59			✓	✓	
	WUXGA50	1920 x 1200	49.93	1238	61.81			✓	✓	
	WUXGA60	1920 x 1200	59.95	1235	74.04			✓	✓	

Notes

3D input modes

Standard	Resolution	Vertical Frequency (Hz)	Total number of lines	Horizontal Frequency (kHz)	Main / DVI	Sub / HDMI	Dual Pipe	DVI-A / VGA / Component	DVI-D / HDMI	3G-SDI
720p50 Frame Packing	1280 x 720	50.00	1470	37.50	✓	✓				
720p59 Frame Packing	1280 x 720	59.94	1470	44.96	✓	✓				
720p60 Frame Packing	1280 x 720	60.00	1470	45.00	✓	✓				
720p50 Top-and-Bottom	1280 x 720	50.00	750	37.50	✓	✓		✓	✓	✓
720p59 Top-and-Bottom	1280 x 720	59.94	750	44.96	✓	✓		✓	✓	✓
720p60 Top-and-Bottom	1280 x 720	60.00	750	45.00	✓	✓		✓	✓	✓
1080p23 Frame Packing	1920 x 1080	23.98	2205	26.97	✓	✓				
1080p24 Frame Packing	1920 x 1080	24.00	2205	27.00	✓	✓				
1080i50 Side-by-Side (Half)	1920 x 1080	50.00	1125	56.25	✓	✓		✓	✓	✓
1080i59 Side-by-Side (Half)	1920 x 1080	59.94	1125	67.43	✓	✓		✓	✓	✓
1080i60 Side-by-Side (Half)	1920 x 1080	60.00	1125	67.50	✓	✓		✓	✓	✓
1080p50 Side-by-Side (Half)	1920 x 1080	50.00	1125	56.25	✓	✓		✓	✓	✓
1080p59 Side-by-Side (Half)	1920 x 1080	59.94	1125	67.43	✓	✓		✓	✓	✓
1080p60 Side-by-Side (Half)	1920 x 1080	60.00	1125	67.50	✓	✓		✓	✓	✓
1080p50 Top-and-Bottom	1920 x 1080	50.00	1125	56.25	✓	✓		✓	✓	✓
1080p59 Top-and-Bottom	1920 x 1080	59.94	1125	67.43	✓	✓		✓	✓	✓
1080p60 Top-and-Bottom	1920 x 1080	60.00	1125	67.50	✓	✓		✓	✓	✓
1080p50 Frame Sequential	1920 x 1080	50.00	1125	56.25	✓	✓		✓	✓	✓
1080p59 Frame Sequential	1920 x 1080	59.94	1125	67.43	✓	✓		✓	✓	✓
1080p60 Frame Sequential	1920 x 1080	60.00	1125	67.50	✓	✓		✓	✓	✓
1080p23 Dual Pipe	1920 x 1080	23.98	1125	26.97			✓			
1080p24 Dual Pipe	1920 x 1080	24.00	1125	27.00			✓			

Notes

3D may not be present on some models.

Only the Sub / HDMI input supports HDMI 1.4 3D formats.

Geometric correction is only available when using frame sequential formats on the DVI-A / VGA / Component / DVI-D / HDMI / 3G-SDI inputs.

Standard	Resolution	Vertical Frequency (Hz)	Total number of lines	Horizontal Frequency (kHz)	Main / DVI	Sub / HDMI	Dual Pipe	DVI-A / VGA / Component	DVI-D / HDMI	3G-SDI
1080p25 Dual Pipe	1920 x 1080	25.00	1125	28.13			✓			
1080p30 Dual Pipe	1920 x 1080	30.00	1125	33.75			✓			
1080p50 Dual Pipe	1920 x 1080	50.00	1125	56.25			✓			
1080p59 Dual Pipe	1920 x 1080	59.94	1125	67.43			✓			
1080p60 Dual Pipe	1920 x 1080	60.00	1125	67.50			✓			

Notes

3D may not be present on some models.

Only the Sub / HDMI input supports HDMI 1.4 3D formats.

Geometric correction is only available when using frame sequential formats on the DVI-A / VGA / Component / DVI-D / HDMI / 3G-SDI inputs.

Appendix D: Menu Map

Main Menu — ***Sub Menus***

Input Selection

All models: *Composite 1, Composite 2, S-Video, Component, VGA, 3G-SDI, DVI, HDMI, Test Pattern*
3D models only: *Main/DVI, Sub/HDMI, Dual Pipe*

Test Pattern

Gray V Bars, Gray H Bars, Aspect Test, Alignment Grid, Warp Adjust, SMPTE, Chequerboard, White Field, Black Field, Convergence, Screen Layout

Lens

Zoom In *(command)*
Zoom Stop *(command)*
Zoom Out *(command)*
Focus Near *(command)*
Focus Stop *(command)*
Focus Far *(command)*
Calibrate Zoom *(command)*
Calibrate Focus *(command)*
Center Lens *(command)*
Nudge
- Up *(command)*
- Down *(command)*
- Left *(command)*
- Right *(command)*

Lens Presets
- Save 1 *(command)*
- Save 2 *(command)*
- Save 3 *(command)*
- Save 4 *(command)*
- Save 5 *(command)*
- Recall 1 *(command)*
- Recall 2 *(command)*
- Recall 3 *(command)*
- Recall 4 *(command)*
- Recall 5 *(command)*

Notes

Some of the information in this menu map is summarised. See the actual menu on the projector for full detail.

The underlined text represents the factory default value for each setting.

Main Menu	*Sub Menus*
Image	
	Brightness *(slider, value range -50 ~ 50 [0])*
	Contrast *(slider, value range -50 ~ 50 [0])*
	Gamma *, 1.0, 1.8, 2.0, 2.2, 2.4, 2.6, 2.8*
	Hue *(slider, value range -50 ~ 50 [0])*
	Saturation *(slider, value range -50 ~ 50 [0])*
	Black Level Offset *0 IRE, 7.5 IRE*
	V Position *(slider, value range 0 ~ 200 [100])*
	H Position *(slider, value range 0 ~ 200 [100])*
	Video Filters
	Sharpness *(slider, value range -50 ~ 50 [0])*
	Detail *(slider, value range 0 ~ 3)*
	Luma Sharpness *(slider, value range 0 ~ 2)*
	Chroma Sharpness *(slider, value range 0 ~ 2)*
	Recursive NR *(slider, value range 0 ~ 3)*
	Mosquito NR *(slider, value range 0 ~ 3)*
	Cross Color Suppression *Off, On*
	VGA Setup
	Phase *(slider, value range -50 ~ 50 [0])*
	Total H Samples *(slider, value range -50 ~ 50 [0])*
	Auto Setup *(command)*
Color	
	Gamut *Peak, HDTV, SDTV, 3200k, 5400k, 6500k, 8000k, 9000k, User 1, User 2*
	Red Black Level *(slider, value range -50 ~ 50 [0])*
	Green Black Level *(slider, value range -50 ~ 50 [0])*
	Blue Black Level *(slider, value range -50 ~ 50 [0])*
	Red Gain *(slider, value range -50 ~ 50 [0])*
	Green Gain *(slider, value range -50 ~ 50 [0])*
	Blue Gain *(slider, value range -50 ~ 50 [0])*

Notes

Some of the information in this menu map is summarised. See the actual menu on the projector for full detail.

The underlined text represents the factory default value for each setting.

Main Menu ***Sub Menus***

Geometry

Aspect Ratio *Source, Fill Display, Fill & Crop, Anamorphic, TheaterScope*

Overscan *(slider, value range 0 ~ 3)*

Size & Position

- Enable *Off, On*
- Setting *Global, Per Mode*
- H Position *(slider, value range -100 ~ 100 [0])*
- V Position *(slider, value range -100 ~ 100 [0])*
- H Size *(slider, value range 25 ~ 400 [100])*
- Aspect Lock *On, Off*
- V Size *(slider, value range 25 ~ 400 [100])*
- Reset *(command)*

Blanking

- Enable *Off, On*
- Top *(slider, value range 0 ~ 100 [0])*
- Bottom *(slider, value range 0 ~ 100 [0])*
- Left *(slider, value range 0 ~ 255 [0])*
- Right *(slider, value range 0 ~ 255 [0])*

Geometry Engine *Off, Keystone, Cornerstone, Rotation, Warp*

H Keystone *(slider, value range -50 ~ 50 [0])*

V Keystone *(slider, value range -50 ~ 50 [0])*

Pincushion / Barrel *(slider, value range -30 ~ 30 [0])*

Rotation *(slider, value range -90 ~ 90 [0])*

Warp Map *Off, 1, 2, 3, 4, 5, 6, 7, 8*

Cornerstone

- Upper Left X *(slider, value range -500 ~ 500 [0])*
- Upper Left Y *(slider, value range -500 ~ 500 [0])*
- Upper Right X *(slider, value range -500 ~ 500 [0])*
- Upper Right Y *(slider, value range -500 ~ 500 [0])*
- Lower Left X *(slider, value range -500 ~ 500 [0])*
- Lower Left Y *(slider, value range -500 ~ 500 [0])*
- Lower Right X *(slider, value range -500 ~ 500 [0])*
- Lower Right Y *(slider, value range -500 ~ 500 [0])*

Notes

Some of the information in this menu map is summarised. See the actual menu on the projector for full detail.

The underlined text represents the factory default value for each setting.

Main Menu ***Sub Menus***

Edge Blend

Array Width *(slider, value range 1 ~ 4)*

Array Height *(slider, value range 1 ~ 4)*

Array H Position *(slider, value range 0 ~ 3)*

Array V Position *(slider, value range 0 ~ 3)*

S-Curve Value *(slider, value range 10 ~ 25)*

Blending Off, On, Align Pattern

Segmentation Off, On

Blend Width

- Top Blend Region *(slider, value range 0 ~ 999)*
- Bottom Blend Region *(slider, value range 0 ~ 999)*
- Left Blend Region *(slider, value range 0 ~ 999)*
- Right Blend Region *(slider, value range 0 ~ 999)*
- Apply Blend Regions *(command)*

Black Level Uplift

- Unblended Region *(slider, value range 0 ~ 63)*
- Upper Left *(slider, value range 0 ~ 63)*
- Upper Middle *(slider, value range 0 ~ 63)*
- Upper Right *(slider, value range 0 ~ 63)*
- Middle Left *(slider, value range 0 ~ 63)*
- Middle Right *(slider, value range 0 ~ 63)*
- Lower Left *(slider, value range 0 ~ 63)*
- Lower Middle *(slider, value range 0 ~ 63)*
- Lower Right *(slider, value range 0 ~ 63)*
- Apply Uplift *(command)*

Reduce Black Level Uplift Width

- Upper Left X *(slider, value range 0 ~ 200)*
- Upper Left Y *(slider, value range 0 ~ 200)*
- Upper Right X *(slider, value range -200 ~ 0)*
- Upper Right Y *(slider, value range 0 ~ 200)*
- Lower Left X *(slider, value range -200 ~ 0)*
- Lower Left Y *(slider, value range -200 ~ 0)*
- Lower Right X *(slider, value range 0 ~ 200)*
- Lower Right Y *(slider, value range -200 ~ 0)*
- Apply Uplift *(command)*

Notes

Some of the information in this menu map is summarised. See the actual menu on the projector for full detail.

The underlined text represents the factory default value for each setting.

PIP *and* **Edge Blend** *are mutually exclusive modes of operation. When in PIP mode, Edge Blend is not available, and vice versa.*

Main Menu ***Sub Menus***

PIP

Option *Off, PIP, PAP, POP*
Input *Composite 1, Composite 2, S-Video, Component, VGA, 3G-SDI, DVI, HDMI*
Size *Small, Medium, Large*
Position *Top Left, Top Right, Bottom Left, Bottom Right, Custom*
Custom H Position *(slider, value range 0 ~ 100 [5])*
Custom V Position *(slider, value range 0 ~ 100 [5])*

3D

3D Enable *Off, On*
Frame Rate Multiplier *x1, x2, x3*
3D Type *Auto, Sequential, Frame Packing, Top-and-Bottom, Side-by-Side (Half)*
Dark Time *Minimum, 650 µS, 1300 µS, 7500 µS*
Sync Offset 000 µS *(slider, value range -15 ~ 15 [0])*
Output Sync Polarity *Positive, Negative*
Source Dominance *Left, Right*

Lamps

Operation (quad lamp models): *All Lamps, Auto 3, Auto 2, Auto 1*
Operation (dual lamp models): *Lamp 1 + Lamp 2, Lamp 1, Lamp 2, Auto 1*
Power *(slider, value range 80 — 100)*
Compensation*: Auto, Manual*
Compensation*: (slider, value range 0 ~ 200 [100])*
Conditioning (Titan Super Quad, Titan Quad 2000 and Titan 930 only): *On, Off*

Notes

Some of the information in this menu map is summarised. See the actual menu on the projector for full detail.

The underlined text represents the factory default value for each setting.

PIP *and* **Edge Blend** *are mutually exclusive modes of operation. When in PIP mode, Edge Blend is not available, and vice versa.*

The **3D** *menu is not available with 2D projectors*

Main Menu ***Sub Menus***

Setup

Orientation *Desktop Front, Desktop Rear, Ceiling Front, Ceiling Rear*

Latency *Lowest, Best Video*

Input Configuration

DVI Boost EQ *Off, On*
DVI / HDMI Color Space *RGB, YPbPr, Auto*
DVI / HDMI Range *Full, Limited, Auto*
DVI-I Port *Digital, Analog*
Main / DVI Operation *Single Link A, Single Link B, Auto*
Main / DVI Range *Full, Limited*
Component Color Space *RGB, YPbPr*
Component Sync Type *3 Wire, 4 Wire, Auto*
3G-SDI Level B Stream *Stream 1, Stream 2*

Network

Control

DHCP *Off, On*
IP Address (*numeric input)*
Subnet (*numeric input)*
Information: *MAC Address*

LAN

DHCP *Off, On*
IP Address (*numeric input)*
Subnet (*numeric input)*
Apply Settings *(command)*
Information: *DHCP Status, IP Address, Subnet, MAC Address*

On Screen Display

Language *US English, UK English*
Timeout *5 sec, 10 Sec, 15 sec, 20 sec, 25 sec, 30 sec, infinite*
Position *Center, Top Left, Top Right, Bottom Left, Bottom Right*
Messaging *Off, On*

Notes

Some of the information in this menu map is summarised. See the actual menu on the projector for full detail.

The underlined text represents the factory default value for each setting.

Main Menu	*Sub Menus*
Setup (continued)	
	System
	Configuration *PIP, Edge Blend*
	IR Address *(slider, value range 0 ~ 99)*
	Feature Control
	Shutter Open *(command)*
	Shutter Close *(command)*
	Power On *(command)*
	Power Off *(command)*
	Reset Default Settings *(command)*
Information	
	Lamps
	Quad lamp models: *Lamp 1 Hours, Lamp 1 Starts, Lamp 2 Hours, Lamp 2 Starts, Lamp 3 Hours, Lamp 3 Starts, Lamp 4 Hours, Lamp 4 Starts*
	Dual lamp models: *Lamp 1 Hours, Lamp 1 Starts, Lamp 2 Hours, Lamp 2 Starts*
	Lamp Voltages
	Quad lamp models: *Lamp 1, Lamp 2, Lamp 3, Lamp 4*
	Dual lamp models: *Lamp 1, Lamp 2*
	Configuration
	Serial Number, Scaler, Interface, Hardware, Firmware, Factory ROM, OSD, Lens, 3D Hardware, 3D Firmware, Sequences
	Input
	Standard
	Control IP
	LAN IP

Notes

Some of the information in this menu map is summarised. See the actual menu on the projector for full detail.

Do NOT reset the settings unless you are sure that you want to restore ALL the current settings to their factory defaults.

3D configuration information is not available with 2D projectors

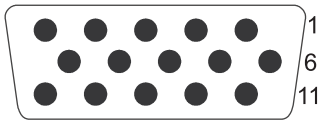
Appendix E: Wiring Details

Signal inputs and outputs

Input 1: VGA

15 way D-type connector

1	R
2	G
3	B
4	unused
5	Digital Ground (H Sync)
6	R Ground
7	B Ground
8	G Ground
9	+5V
10	Digital Ground (V Sync/DDC)
1	unused
12	SDA
13	H Sync
14	V Sync
15	SCL



VGA: pin view of female connector

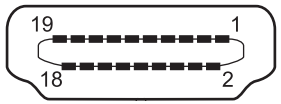
Notes

*For full details of all input settings, see **Input Configuration** in the **Operating Guide**.*

Input 2: HDMI

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

Output: SPDIF

RCA Phono

Digital audio output from the HDMI input stream.

SPDIF connector

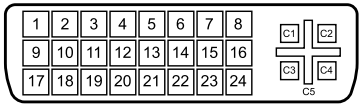
Notes

*For full details of all input settings, see **Input Configuration** in the **Operating Guide**.*

Input 3: DVI

24 way D-type connector

Pin 1	TMDS data 2−	Digital red− (link 1)
Pin 2	TMDS data 2+	Digital red+ (link 1)
Pin 3	TMDS data 2/4 shield	
Pin 4	TMDS data 4−	Digital green− (link 2)
Pin 5	TMDS data 4+	Digital green+ (link 2)
Pin 6	DDC clock	
Pin 7	DDC data	
Pin 8	Analog vertical sync	
Pin 9	TMDS data 1−	Digital green− (link 1)
Pin 10	TMDS data 1+	Digital green+ (link 1)
Pin 11	TMDS data 1/3 shield	
Pin 12	TMDS data 3-	Digital blue− (link 2)
Pin 13	TMDS data 3+	Digital blue+ (link 2)
Pin 14	+5 V	Power for monitor when in standby
Pin 15	Ground	Return for pin 14 and analog sync
Pin 16	Hot plug detect	
Pin 17	TMDS data 0−	Digital blue− (link 1) and digital sync
Pin 18	TMDS data 0+	Digital blue+ (link 1) and digital sync
Pin 19	TMDS data 0/5 shield	
Pin 20	TMDS data 5−	Digital red− (link 2)
Pin 21	TMDS data 5+	Digital red+ (link 2)
Pin 22	TMDS clock shield	
Pin 23	TMDS clock+	Digital clock+ (links 1 and 2)
Pin 24	TMDS clock−	Digital clock− (links 1 and 2)
C1	Analog red	
C2	Analog green	
C3	Analog blue	
C4	Analog horizontal sync	
C5	Analog ground	Return for R, G, and B signals



DVI: pin view of female connector

Notes

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

For full details of all input settings, see ***Input Configuration*** *in the* ***Operating Guide****.*

Input 4: 3G-SDI

75 ohm BNC

3G-SDI connector

Input 5: Composite 1

75 ohm BNC

Composite 1 connector

Input 6: S-Video

4 pin mini-DIN

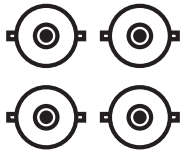
1	Y Ground
2	C Ground
3	Luminance (Y)
4	Chrominance (C)

S-Video: pin view of female connector

Input 7: Component

4 x 75 ohm BNC

	RGsB	RGBS	YPrPb
Pb/B	B	B	Pb/Cb
Y/G	G + Sync	G	Y
Pr/R	R	R	Pr/Cr
SYNC		Sync	



Component

Input 8: CVBS

RCA Phono

CVBS connector

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.

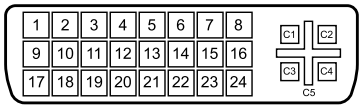
In choosing cable length and connectors for any installation the frequency response loss in decibels should be proportional to √f, from 1MHz, to 3GHz.

*For full details of all input settings, see **Input Configuration** in the **Operating Guide**.*

Input 9: MAIN/DVI

24 way D-type connector

Pin 1	TMDS data 2−	Digital red− (link 1)
Pin 2	TMDS data 2+	Digital red+ (link 1)
Pin 3	TMDS data 2/4 shield	
Pin 4	TMDS data 4−	Digital green− (link 2)
Pin 5	TMDS data 4+	Digital green+ (link 2)
Pin 6	DDC clock	
Pin 7	DDC data	
Pin 8	Analog vertical sync	
Pin 9	TMDS data 1−	Digital green− (link 1)
Pin 10	TMDS data 1+	Digital green+ (link 1)
Pin 11	TMDS data 1/3 shield	
Pin 12	TMDS data 3-	Digital blue− (link 2)
Pin 13	TMDS data 3+	Digital blue+ (link 2)
Pin 14	+5 V	Power for monitor when in standby
Pin 15	Ground	Return for pin 14 and analog sync
Pin 16	Hot plug detect	
Pin 17	TMDS data 0−	Digital blue− (link 1) and digital sync
Pin 18	TMDS data 0+	Digital blue+ (link 1) and digital sync
Pin 19	TMDS data 0/5 shield	
Pin 20	TMDS data 5−	Digital red− (link 2)
Pin 21	TMDS data 5+	Digital red+ (link 2)
Pin 22	TMDS clock shield	
Pin 23	TMDS clock+	Digital clock+ (links 1 and 2)
Pin 24	TMDS clock−	Digital clock− (links 1 and 2)
C1	Analog red	
C2	Analog green	
C3	Analog blue	
C4	Analog horizontal sync	
C5	Analog ground	Return for R, G, and B signals



MAIN/DVI: pin view of female connector

Notes

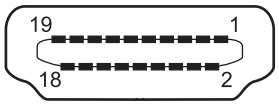
High-bandwidth Digital Content Protection (HDCP) is supported on this input.

*For full details of all input settings, see **Input Configuration** in the **Operating Guide**.*

Input 10: SUB/HDMI

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

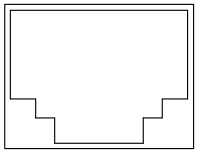
Notes

*For full details of all input settings, see **Input Configuration** in the **Operating Guide**.*

Control connections

Update port

RJ45 socket

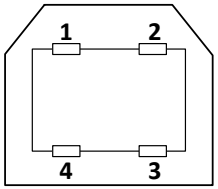


Update port

Service port

USB type B socket

Pin 1	VCC (+5 V)
Pin 2	Data−
Pin 3	Data+
Pin 4	Ground

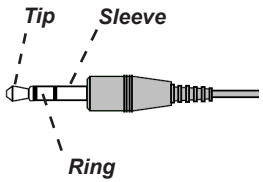


Service port:
pin view of female connector

Wired remote control

3.5mm mini jack

Tip	Power
Ring	Signal
Sleeve	Ground



pin view of female connector

Notes

*For full details of all network settings, see **Network** in the **Operating Guide**.*

Plugging in the remote control cable will disable the infra-red.

RS232

9 way D-type connector

1 unused

2 Received Data (RX)

3 Transmitted Data (TX)

4 unused

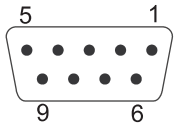
5 Signal Ground

6 unused

7 unused

8 unused

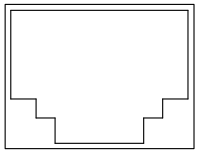
9 unused



RS232:
pin view of female connector

LAN connection

RJ45 socket



LAN connection

Notes

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

For full details of all network settings, see ***Network*** *in the* ***Operating Guide****.*

Appendix F: Glossary Of Terms

Notes

1080p

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

3D active glasses

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

3D passive glasses

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

Align pattern

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

Anamorphic lens

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

Aperture

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

Aspect ratio

The proportional relationship between the width and the height of the projected image. It is represented by two numbers separated by a colon, indicating the ratio of image width and height respectively: for example, 16:9 or 2.35:1.

Not to be confused with ***resolution***.

Blanking (projection)

The ability to intentionally turn off, that is, set to black, areas around the edges of the projected image. It is sometimes referred to as “curtains” since it can be used to blank an area of image that literally falls on the curtains at the side of the screen in a movie theater. Usually no image resizing or geometric correction takes place and the “blanked” part of the image is lost.

Not to be confused with horizontal and vertical ***blanking (video signal)***.

Blanking (video signal)

The section of the video signal where there is no active video data.

Not to be confused with ***blanking (projection)***.

Blend region

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

Brightness (electronic control)

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

Brightness (optical)

Describes how ‘bright’ an image that is projected onto a screen appears to an observer.

C

See ***Chrominance***.

Notes

Chrominance

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

Cold mirror

A mirror that preferentially reflects or transmits infra-red light. In a projector, a cold mirror is used to reflect the visible component of the lamp beam into the illumination optics and transmit the unwanted infrared radiation into an absorber.

Color difference

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

Color gamut

The spectrum of color available to be displayed.

Color temperature

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

ColorMax

A method of accurately color-matching projectors together.

Component video

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

Composite video

A signal line that carries *luminance*, *chrominance*, *synchronization* pulses and *blanking*.

Notes

Contrast (electronic control)

The adjustment of the white point of the image without affecting the black point. This increases the intensity range of the displayed image.

Contrast (optical)

The intensity difference between the darkest and lightest areas of the screen.

Cr, Cb

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

Crop

Remove part of the projected image.

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

Dark time

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

DDC (Display Data Channel)

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

Deinterlacing

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

DHCP (Dynamic Host Configuration Protocol)

A network protocol that is used to configure network devices so that they can communicate on an IP network, for example by allocating an IP address.

Notes

DMD™ (Digital Micromirror Device™)

The optical tool that transforms the electronic signal from the input source into an optical image projected on the screen. The DMD™ of a projector has a fixed ***resolution***, which affects the ***aspect ratio*** of the projected image.

A Digital Micromirror Device™ (DMD™) consists of moving microscopic mirrors. Each mirror, which acts as a ***pixel***, is suspended between two posts by a thin torsion hinge. It can be tilted to produce either a bright or dark pixel.

Edge blend

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

Edge tear

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

EDID (Extended Display Identification Data)

Information stored in the projector that can be read by the source.

EDID is used on the HDMI, DVI and VGA inputs, allowing the source to automatically configure to the optimum display settings.

EDTV (Enhanced Definition Television)

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

Field

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

Frame

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

Notes

Frame rate

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

Frame rate multiplication

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

Gamma

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

Ghosting

An artifact in 3D image viewing. Ghosting occurs when an image intended for one eye is partially seen by the other eye.

Ghosting can be removed by optimizing the ***dark time*** and sync delay.

Global setting

A projector setting that affects all inputs. In the ***OSD***, global settings are indicated with a globe icon.

HDCP (High-bandwidth Digital Content Protection)

An encryption scheme used to protect video content.

HDTV (High Definition Television)

A television system with a higher ***resolution*** than ***SDTV*** and ***EDTV***. It can be transmitted in various formats, notably ***1080p*** and 720p.

Hertz (Hz)

Cycles per second.

Notes

Horizontal Scan Rate

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

Hs + Vs

Horizontal and vertical ***synchronization***.

Hue

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

Interlacing

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

Interleaving

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

IRE

A unit used to show the range from black to white in ***Composite Video*** signals.

LED (Light Emitting Diode)

An electronic component that emits light.

Lens extension

The distance between the front of the projector and the front of the mounted lens. When a long lens is intended to cover a relatively short ***throw distance***, lens extensions should be taken into account when calculating the ***throw ratio*** as the error margin for such calculations should not exceed 5%.

Notes

Letterboxing

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

Lumen

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

Luminance

Also known as '***Y***', this is the part of an ***S-Video*** or ***Component Video*** signal which affects the brightness, i.e. the black and white part.

Modal setting

A projector setting that only affects the currently displayed input.

Noise

Electrical interference displayed on the screen.

NTSC (National Television Standards Committee)

The United States standard for television - 525 lines transmitted at 60 ***interlaced fields*** per second.

OSD (on-screen display)

The projector menus allowing you to adjust various ***global*** and ***modal settings***.

Overlapping region

See ***blend region***.

PAL (Phase Alternate Line)

The television system used in the UK, Australia and other countries - 625 lines transmitted at 50 ***interlaced fields*** per second.

Notes

Pillarboxing

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

Pixel

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

Pond of mirrors

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

Pr, Pb

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

Primary colors

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

Progressive scanning

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

Pulldown

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

Resolution

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

Notes

RGB (Red, Green and Blue)

An uncompressed ***Component Video*** standard.

S-curve

A factor applied during ***edge blend*** to gradually reduce the light output within the ***blend region*** so the combined light output of all overlapping images remains a constant. Without an s-curve overlapping areas would be brighter than the rest of the image due to accumulated light from more than one projector.

S-Video

A video signal which has separate ***Y*** and ***C*** signals.

Saturation

The amount of color in an image.

Scope

An ***aspect ratio*** of 2.35:1.

SDTV (Standard Definition Television)

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

SECAM (Sequential Color with Memory)

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

Segmentation

The process of splitting a source image into segments. In ***edge blending***, segmentation may be used to assign a different segment to each projector in the array. Segmentation can be carried out within the projectors (each projector receives the whole image and only projects its own segment), or externally (each projector receives its own segment).

Notes

SPDIF

Sony/Philips Digital Interface. A digital audio interface standard.

SX+

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

Synchronization

A timing signal used to coordinate an action.

Test pattern

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

TheaterScope

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

Throw distance

The distance between the screen and the projector.

Throw ratio

The ratio of the ***throw distance*** to the screen width.

Notes

TRC (Throw ratio correction)

A special number used in calculating ***throw distances*** and ***throw ratios*** when the image does not fill the width of the ***DMD™***.

TRC is the ratio of the ***DMD™ aspect ratio*** to the image source aspect ratio:

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

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

UXGA

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

Vertical Scan Rate

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

Vignetting

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

Vista

An ***aspect ratio*** of 1.66:1.

Warp

A set of projector functions that allow you to intentionally distort the image, for example in order to fit an arbitrarily shaped screen.

WUXGA

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

Notes

Y

This is the ***luminance*** input (***brightness***) from an ***S-Video*** or ***Component Video*** signal.

YUV

See ***Pr, Pb***.

ZScreen

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

Notes

Technical Specifications

Digital Projection reserves the right to change product specifications without prior notice.

Models

The specifications on these pages refer to the following projectors:

Series name(s)	Lamps	Resolution	Part number, 3D	Part number, 2D	Lumens	Contrast ratio
Titan Super Quad, Titan Quad 2000	4 x 465 W High Intensity Discharge	WUXGA	113-104	n/a	20,000	2,000:1
		1080p	113-103	n/a	20,000	2,000:1
		SX+	113-102	n/a	20,000	2,000:1
Titan Quad HB	4 x 400 W HID High Intensity Discharge	WUXGA	111-875	113-134	16,000	2,000:1
		1080p	111-872	113-132	16,000	2,000:1
		SX+	111-869	113-130	16,000	2,000:1
Titan Quad UC	4 x 400 W HID High Intensity Discharge	1080p	112-145	n/a	8,000	5,000:1
Titan 930	2 x 465 W HID High Intensity Discharge	WUXGA	114-441	114-435	15,000	2,000:1
		1080p	114-440	114-434	14,500	2,000:1
		SX+	114-439	114-433	15,000	2,000:1
Titan 800	2 x 400 W HID High Intensity Discharge	WUXGA	112-489	113-128	12,000	2,000:1
		1080p	112-487	113-126	12,000	2,000:1
		SX+	112-485	113-124	12,000	2,000:1

Color system: 3-chip DLP®

Display type: 3 x 0.95” DarkChip™ DMD™

DMD specification (native):

WUXGA	1080p	SX+
1920 x 1200 pixels	1920 x 1080 pixels	1400 x 1050 pixels

+/- 12° tilt angle

Fast transit pixels for smooth greyscale and improved contrast.

Notes

HB (High Brightness) projectors are designed to produce maximum light output and should be used with HB lenses. UC (Ultra Contrast) models produce maximum contrast and should be used with UC lenses.

Inputs and outputs

Type	Connector	Qty
Video & Computer (all models)		
DVI-D / DVI-A	DVI-I	1
HDMI 1.3	HDMI	1
3G-SDI	BNC	1
VGA / Analog RGB	15-pin D-Sub	1
Component Video	4 x BNC	1
S-Video	4-pin Mini DIN	1
Composite Video	RCA	1
Composite Video	BNC	1
Video & Computer (3D models)		
Main - Dual Link DVI-D	DVI-I	1
Sub - HDMI 1.4	DVI-I	1
Audio (all models)		
SPDIF Digital Output	RCA	1

Type	Connector	Qty
Communication & Control		
3D Sync Out	BNC	1
3D Sync In	BNC	1
LAN	RJ45	1
RS232	9-pin D-Sub	1
Wired Remote In	3.5 mm Stereo Jack	1
Wired Remote Out	3.5 mm Stereo Jack	1
Update Port	RJ45	1
Service Port	USB Type B	1

Bandwidth

- 170 MHz on analog RGB
- 165 Megapixels per second on HDMI and DVI
- 297 Megapixels per second on Dual Link DVI

Remote control and keypad

- Addressable IR remote control, wireless and wired with loop-through.
- On-board keypad

Automation control

- RS232
- LAN

Color temperature

- User selectable from 3200 to 9000 K

Notes

Lamps

Series	Lamp type	Part numbers	Typical lamp life (full power)	Typical lamp life (Eco mode)
Titan Super Quad, Titan Quad 2000	4 x 465 W High Intensity Discharge	113-628 (single lamp) 113-715 (lamp & filter kit, 4 lamp) 113-714 (lamp & filter kit, 2 lamp)	1500 hours Up to 6000 hours in lamp sequential mode	2000 hours Up to 8000 hours in lamp sequential mode
Titan Quad	4 x 400 W HID High Intensity Discharge	111-896 (single lamp & housing)	1500 hours Up to 6000 hours in lamp sequential mode	2000 hours Up to 8000 hours in lamp sequential mode
Titan 930	2 x 465 W HID High Intensity Discharge	113-628 (single lamp) 113-714 (lamp & filter kit, 2 lamp)	1500 hours Up to 3000 hours in lamp sequential mode	2000 hours Up to 4000 hours in lamp sequential mode
Titan 800	2 x 400 W HID High Intensity Discharge	111-896 (single lamp & housing)	1500 hours Up to 3000 hours in lamp sequential mode	2000 hours Up to 4000 hours in lamp sequential mode

Notes

Lenses

Detailed information about available lenses can be found in ***Appendix A: Lens Part Numbers***.

Further information about lens offsets can be found in ***Positioning The Image > Maximum offset range***.

Lens mount

- Motorised and programmable shift, zoom and focus. Intelligent lens memory with 5 user-definable preset positions.

Mechanical mounting

- Front/Rear Table
- Front/Rear Ceiling
- Adjustable Front/Rear Feet
- Rugged, staging tolerant chassis with integrated handles.
- Optional RapidRig™ frame with integrated pitch, roll and yaw adjustments.

Orientation

- **Table Top or Inverted:** Yes
- **Pointing Down:** No
- **Roll (Portrait):** No

Notes

Information on lenses in this guide:

- ***Appendix A: Lens Part Numbers*** *- detailed descriptions of available lenses.*
- ***Maximum offset range*** *- lens offsets.*
- ***Choosing A Lens*** *- a step-by-step guide on calculating throw ratios.*
- ***Appendix B: Lens Charts*** *- quick reference charts showing throw distances for commonly used aspect ratios.*

See also the lens calculator on the Digital Projection website.

Electrical and physical specifications

- **Power requirements** 200-240 VAC for Quad, Super Quad and Quad 2000 series
  220 VAC for Titan 930 series
  100-240 VAC for Titan 800 series
  50-60 Hz (single phase)
- **Power Consumption** 2400 W for Super Quad and Quad 2000 series
  2100 W for Quad series
  1160 W for Titan 930 series
  1220 W for Titan 800 series
- **Thermal Dissipation** 8191 BTU/hr for Super Quad and Quad 2000 series
  7165 BTU/hr for Quad series,
  3960 BTU/hr for Titan 930 series,
  4164 BTU/hr for Titan 800 series
- **Fan Noise** 48 dBA
- **Operating Temperature** 0°C to 40°C (32 to 104F)
- **Storage Temperature** -10°C to 50°C (14 to 122F)
- **Operating Humidity** 20% to 80% non-condensing
- **Weight** approximately 39 kg (86 lbs) without lens
- **Dimensions** L: 68.8 cm; W: 58.5 cm; H: 25.8 cm;
  (L: 27.1 in; W: 23.1 in; H: 10.2 in;)

Safety & EMC regulations

- CE, FCC Class A, CCC

Accessories

Accessory	Relevant model(s)	Part number
RapidRig™ Frame	All	111-265
Ceiling Mount Kit w/ plate & 500 mm pole	All	112-937
Infrared Remote (Replacement)	All	105-023

Notes