FS40 MKII / FL40 MKII

User guide

ENABLING BRIGHT OUTCOMES

BARCO

Product revision

Software Revision: 2.1

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Table of contents

1 Safety

About this document

Read this document attentively. It contains important information to prevent personal injury while installing and using the FL40 projector. Furthermore, it includes several cautions to prevent damage to the FL40 projector. Ensure that you understand and follow all safety guidelines, safety instructions and warnings mentioned in this chapter before installing the FL40 projector.

Clarification of the term “FL40” used in this document

When referring in this document to the term “FL40” means that the content is applicable for following Barco products:

- FL40-WU
- FL40-4K
- FS40-WU
- FL40-4K

Model certification name

- GP5

Barco provides a guarantee relating to perfect manufacturing as part of the legally stipulated terms of guarantee. Observing the specification mentioned in this chapter is critical for projector performance. Neglecting this can result in loss of warranty.

1.1 General considerations

Notice on optical radiation FL40 Series

- Do not stare into Beam.
- This projector is Risk Group 2 (RG2) according to IEC EN 62471-5.
- Any operation or adjustment not specifically instructed by the user's guide creates the risk of hazardous light radiation exposure.
- Do not open or disassemble the projector as this may cause danger to unauthorized personnel

General safety instructions

- This product contains no user serviceable parts.
  Attempts to modify/replace mechanics or electronics inside the housing or compartments will violate any warranties and may be hazardous.
- Do not stare into beam when the projector is on. The bright light may result in permanent eye damage.
- Before operating this equipment please read this manual thoroughly and retain it for future reference.
- Installation and preliminary adjustments should be performed by properly trained and qualified personnel.
- All warnings on the projector and in the documentation manuals must be adhered to.
- All instructions for operating and use of this equipment must be followed precisely.
- All local installation codes should be adhered to.

Notice on safety

This equipment is built in accordance with the requirements of the international safety standards IEC60950-1, as basis for National safety regulation world wide. The safety standard covers information technology equipment including electrical business equipment intended to operate in "normal" environments (offices and homes). This safety standard imposes important requirements on the use of safety critical components, materials and insulation, in order to protect the user or operator against risk of electric shock and energy hazard and having access to live parts. Safety standards also impose limits to the internal and external temperature rises, radiation levels, mechanical stability and strength, enclosure construction and protection against the risk of fire. Simulated single fault condition testing reduce the risk of hazards and contribute to ensure the safety of the equipment to the user even when the equipment's normal operation fails.

Users definition

Throughout this manual, the term SERVICE PERSONNEL refers to Barco authorized persons having appropriate technical training and experience necessary to be knowledgeable of potential hazards to which they are exposed (including, but not limited to HIGH VOLTAGE ELECTRIC and ELECTRONIC CIRCUITRY and HIGH BRIGHTNESS PROJECTORS) in performing a task, and of measures to minimize the potential risk to themselves or other persons. Only Barco authorized SERVICE PERSONNEL, knowledgeable of such risks, are allowed to perform service functions inside the product enclosure. The term USER and OPERATOR refers to any person other than SERVICE PERSONNEL.

1.2 Important safety instructions

To prevent the risk of electrical shock

- This product should be operated from a mono phase AC power source.
- This apparatus must be grounded (earthed) via the supplied 3 conductor AC power cable. If none of the supplied power cables are the correct one, consult your dealer.
  If you are unable to insert the plug into the outlet, contact your electrician to replace your obsolete outlet. Do not defeat the purpose of the grounding-type plug.
  Never use 2- wire power cords, as this is dangerous and could lead to electrical shock. Always use a power connector with a ground terminal.
- Do not allow anything to rest on the power cord. Do not locate this product where persons will walk on the cord. To disconnect the cord, pull it out by the plug. Never pull the cord itself.
- Ensure that the main power cord complies with the national regulations at the site where the equipment is used.
- Do not use unauthorized replacements

- Do not operate the projector with a damaged cord. Replace the cord.
  Do not operate the projector if the projector has been dropped or damaged - until it has been examined and approved for operation by a qualified service technician.
- Position the cord so that it will not be tripped over, pulled, or contact hot surfaces.
- If an extension cord is necessary, a cord with a current rating at least equal to that of the projector should be used. A cord rated for less amperage than the projector may overheat.
- Never push objects of any kind into this product through cabinet slots as they may touch dangerous voltage points or short out parts that could result in a risk of fire or electrical shock.
- Make sure that no objects enter into the vents and openings of the set.
- Do not expose this projector to rain or moisture.
- The projector is designed for indoor use only. Never operate the unit outdoors.
- Do not immerse or expose this projector in water or other liquids.
- Do not spill liquid of any kind on this projector.
- Should any liquid or solid object fall into the cabinet, unplug the set and have it checked by qualified service personnel before resuming operations.
- Do not disassemble this projector, always take it to an authorized trained service person when service or repair work is required.
- Do not use an accessory attachment which is not recommended by the manufacturer.
- Lightning - For added protection for this video product during a lightning storm, or when it is left unattended and unused for long periods of time, unplug it from the wall outlet. This will prevent damage to the device due to lightning and AC power-line surges.

To prevent personal injury

- To prevent injury and physical damage, always read this manual and all labels on the system before connecting to the wall outlet or adjusting the projector.
- To prevent injury, take note of the weight of the projector.
- To prevent injury, ensure that the lens and all covers are correctly installed. See installation procedures.
- Warning: high intensity light beam. NEVER look into the lens! High luminance could result in damage to the eye.
- Always switch off the projector and disconnect from the mains power supply before attempting to remove any of the projector covers or access parts inside the projector.
- This product contains no user serviceable parts. Attempts to modify/replace mechanics or electronics inside the housing or compartments will violate any warranties and may be hazardous.
- Do not place this equipment on an unstable cart, stand, or table. The product may fall, causing serious damage to it and possible injury to the user.
- Only place the projector on a stable surface, or mount it securely using an approved ceiling-mount.

To prevent fire hazard

- Barco projection products are designed and manufactured to meet the most stringent safety regulations. This projector radiates heat on its external surfaces and from ventilation ducts during normal operation, which is both normal and safe. Exposing flammable or combustible materials into close proximity of this projector could result in the spontaneous ignition of that material, resulting in a fire. For this reason, it is absolutely necessary to leave an “exclusion zone” around all external surfaces of the projector whereby no flammable or combustible materials are present.
- Do not place flammable or combustible materials near the projector!
- Caution! Hot air is exhausted from the rear vent. Do not place objects that are sensitive to heat nearer than 25 cm (10”) to the exhaust vent.
- Slots and openings in this equipment are provided for ventilation. To ensure reliable operation of the projector and to protect it from overheating, these openings must not be blocked or covered.
- The openings should never be blocked by placing the projector too close to walls, or other similar surface. Allow for sufficient distance to walls and ceilings to avoid overheating. Minimum safety distance to the exhaust area of the unit must not be less than 25 cm (10”) and to the intake area, not less than 25 cm (10”).
- This projector should never be placed near or over a radiator or heat register.
- This projector should not be placed in a built-in installation or enclosure unless proper ventilation is provided.
- Do not cover the projector or the lens with any material while the projector is in operation. Keep flammable and combustible materials away from the projector at all times.

- Mount the projector in a well-ventilated area away from sources of ignition and out of direct sun light. Always allow ample airflow through the projector.
- Never expose the projector to rain or moisture. In the event of fire, use sand, CO2 or dry powder fire extinguishers.
- Never use water on an electrical fire.
- Always have service performed on this projector by authorized Barco service personnel. Always insist on genuine Barco replacement parts. Never use non-Barco replacement parts as they may degrade the safety of this projector.
- Projection rooms must be well ventilated or cooled in order to avoid heat buildup.
- Let the projector cool down completely before storing. Remove cord from the projector when storing.

To prevent projector damage

- To ensure correct airflow is maintained, the projector should only be operated when all of its covers in place. The exception from this is the front cover, that can be removed to give access to multiple anchor points. See User Guide for more detailed info regarding this issue.
- Always remove lens cap before switching on the projector. If the lens cap is not removed, it may melt due to the high energy light emitted through the lens. Melting the lens cap may permanently damage the surface of the projection lens
- Only connect the projector to signal sources and voltages as described in the technical specification. Connecting to unspecified signal sources or voltages may lead to malfunction and permanent damage of the unit.
- To ensure correct airflow is maintained, it should only be operated when all of its covers are in place.
- The projector must always be installed in a manner which ensures free flow of air into its air inlets and unimpeded evacuation of the hot air from its cooling system.
- Slots and openings in the cabinet are provided for ventilation. To ensure reliable operation of the product and to protect it from overheating, these openings must not be blocked or covered. The openings should never be blocked by placing the product on a bed, sofa, rug, or other similar surface. This product should never be placed near or over a radiator or heat register. The device should not be placed in a built-in installation or enclosure unless proper ventilation is provided. Ensure that nothing can be spilled on, or dropped inside the projector. If this does happen, switch off and unplug the mains supply immediately. Do not operate the projector again until it has been checked by Barco authorized service personnel.
- Do not block the projector cooling fans or free air movement around the projector. Minimum safety distance to the exhaust area of the unit must not be less than 25 cm (10”) and to the intake area, not less than 25 cm (10”).
- Do not use this equipment near water.
- Do not operate the projector outside its temperature and humidity specifications as this may result in overheating and malfunction.
- Never place the projector in direct sun light. Sun light on the lens can severely damage the Digital Mirror Devices™ in which case there is a loss of warranty.
- Save the original shipping carton and packing material. They will come in handy if you ever have to ship your equipment. For maximum protection, repack your set as it was originally packed at the factory.
- Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning. Never use strong solvents, such as thinner or benzine, or abrasive cleaners, since these will damage the cabinet. Stubborn stains may be removed with a cloth lightly dampened with mild detergent solution.
- To ensure the highest optical performance and resolution, the projection lenses are specially treated with an anti-reflective coating, therefore, avoid touching the lens. To remove dust on the lens, use a soft dry cloth. Do not use a damp cloth, detergent solution, or thinner.

On servicing

- Do not attempt to service this product yourself, as opening or removing covers may expose you to dangerous voltage potentials and risk of electric shock.
- Refer all servicing to qualified service personnel.
- Attempts to alter the factory-set internal controls or to change other control settings not specially discussed in this manual can lead to permanent damage to the projector and cancellation of the warranty.
- Replacement parts: When replacement parts are required, be sure the service technician has used original Barco replacement parts or authorized replacement parts which have the same characteristics as the Barco original part. Unauthorized substitutions may result in degraded performance and reliability, fire, electric shock or other hazards. Unauthorized substitutions may void warranty.

- Safety check: Upon completion of any service or repairs to this projector, ask the service technician to perform safety checks to determine that the product is in proper operating condition.

Malfunction unit

Remove all power from the projector and refer servicing to qualified service technicians under the following conditions:

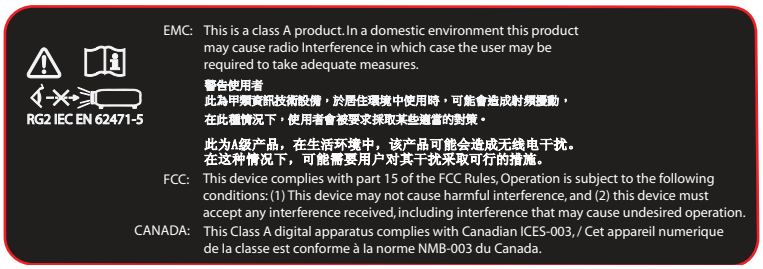
- When the power cord or plug is damaged or frayed.
- If liquid has been spilled into the equipment.
- If the product has been exposed to rain or water.
- If the product does not operate normally when the operating instructions are followed. Adjust only those controls that are covered by the operating instructions since improper adjustment of the other controls may result in damage and will often require extensive work by a qualified technician to restore the product to normal operation.
- If the product has been dropped or the cabinet has been damaged.
- If the product exhibits a distinct change in performance, indicating a need for service.

To prevent battery explosion

- Danger of explosion if battery is incorrectly installed.
- Replace only with the same or equivalent type recommended by the manufacturer.
- For disposal of used batteries, always consult federal, state, local and provincial hazardous waste disposal rules and regulations to ensure proper disposal.

1.3 Safety Symbols FL40 / FS40

Description of safety symbols used in product documentation or on product.

Image	Description
	Refer to user manual for further information!
	Caution! Do not stare into beam, RG2 product.
	No telephone! Do not connect to telephone lines.
	FL40 EMC Label
	FL40 RG2 Label

1.4 Location of labels

Label positions

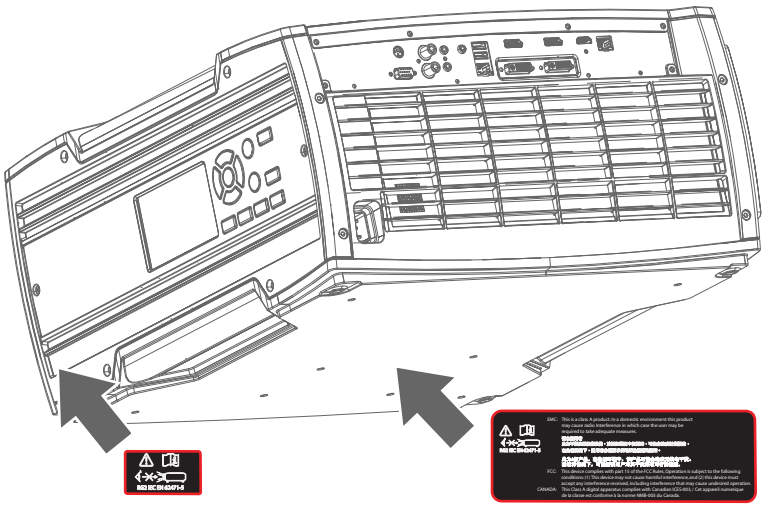


Image 1–1 Location of RG2 and EMC label.

2 Important notice

2.1 Mechanical noise during startup.

About

Note that a mechanical noise can be experienced during startup from ready-state to power ON-state every time the projector has been disconnected.

This mechanical noise is originating from the calibration process of the dimming disk during startup and is completely normal.

It might also be noticeable when dimming the LED power below 50% output.

Getting to know the projector.

3

3.1 Location of the main exterior components.

Defining of surfaces

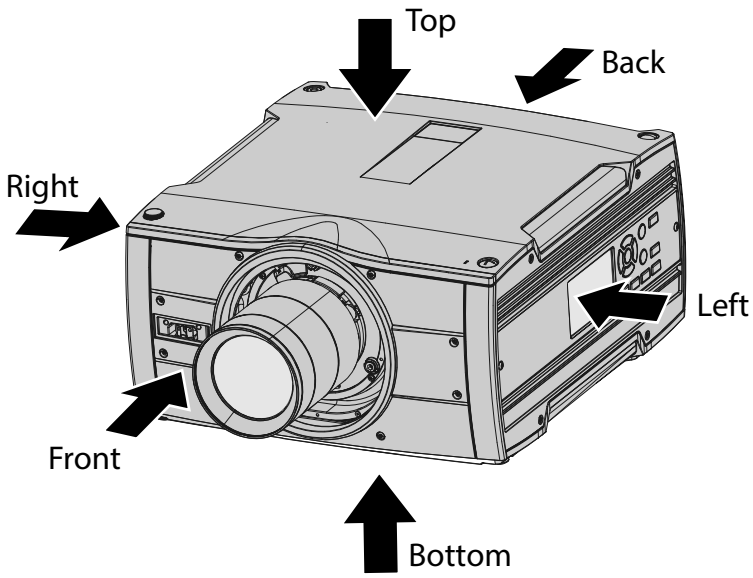


Image 3–1

Main Components

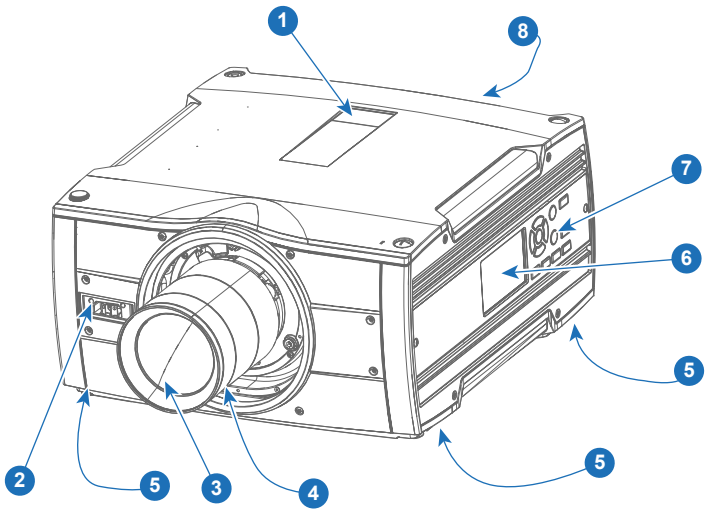


Image 3–2

Main exterior components matrix			
Item Number	**Component**	**Item Number**	**Component**
1	IR Receiver top	5	Projector feet (x4)
2	IR Receiver front	6	LCD Panel
3	Lens	7	Key Pad
4	Lens release handle	8	Back Panel / Connectors

3.2 Service and maintenance

General

The FL40 / FS 40 projectors does not have any user serviceable parts.

All service tasks must only be carried out by the manufacturer, or a Barco authorized service personnel or Barco technicians.

3.3 Power on / Standby button backlight indications

Indicator

In addition to the LED indicator, the projector also displays status indications in the backlight of the Power / Standby button.

The table below shows the details regarding this indications.

Operating Status	Indication Color / Behavior
On (active)	Blue
Wait on	Blue flashing
Standby (off)	White
Wait	White short flashing
Overheating	Red flashing
Configure/upgrade	White fast flashing
Standby ECO	White heartbeat
Software Lockup	Red
Severe errors	Red Flashing

When severe errors occur, the failure description will always be available in the notification page in the status menu.

3.4 LCD Panel

3.4.1 LCD panel general

About

The LCD panel (See chapter 2.6, Local Keypad) is located on the right side of the projector, and has two modes of indication; Mirror of the OSD, and Information display.

Toggle between the two indications by using the Menu button on the keypad, or on the remote control

1. When mirroring the OSD, the LCD showing the menus and adjustment information.
2. When in information mode, showing this Information regarding the status of the projector:
   - Projector status
   - Network address and status
   - Active source
   - Illumination Status
   - Current firmware version
   - Active functions (Enabled Functions).
   - Display Info, including Transport delay
   - Environment Info.

Use the navigation keys (arrows) to scroll the information menu.

The time before the LCD display fades out is user configurable.

3.4.2 LCD touch panel

The LCD menus can occasionally be slightly different in layout compared with the OSD menu, due to a more optimal layout regarding to the touch functionality of the LCD.

LCD touch panel functionality

In addition to the remote control and the keypad, it is also possible to navigate in the menus with the touch functionality in the LCD panel.

Press the icons to select the functions.

Select switches to toggle.

Select and drag sliders to adjust slider value.

3.4.3 LCD Status screens

Disclaimer on GUI images used in this manual

The GUI images in this manual are example illustrations and should be treated as such. While the name of the projector displayed in the illustrations may be different from the projector model you are currently using, the menu lay-out and functionality is identical.

About

When in information mode, shift between the different pages by using the left or right arrows on the keypad or the remote control. The different pages contain different information, shown in the figures below.

While the projector menu is not active, or the projector is Ready or Standby mode, the Status screens remain visible. These screens give an overview of the state of the projector and can be navigated through using the left and right arrow keys, or by swiping the screen left or right. The status screens are the following:

- **Dashboard**: The main overview. This screen displays all the chosen options on the projector (chosen source, blending/masking, display mode, etc).
- **About**: General info about the projector. This includes serial number, software version, mounted lens and light source runtime.
- **Notifications**: The error and/or warning messages that are currently active. If no messages are active, this list will be empty.
- **Preview**: A preview pane of the projected image. If no image is being projected, a test image is displayed instead.

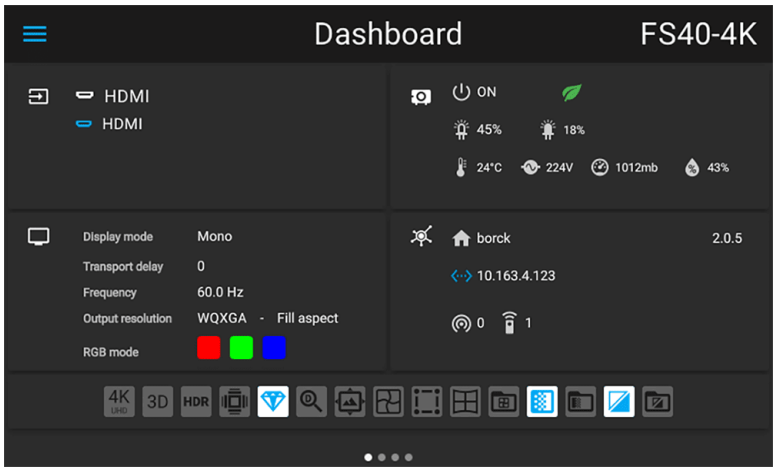


Image 3–3 Dashboard page

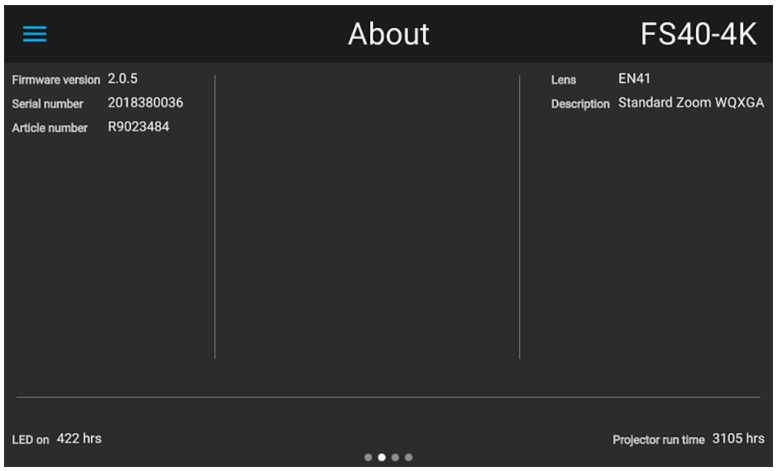


Image 3–4 About page

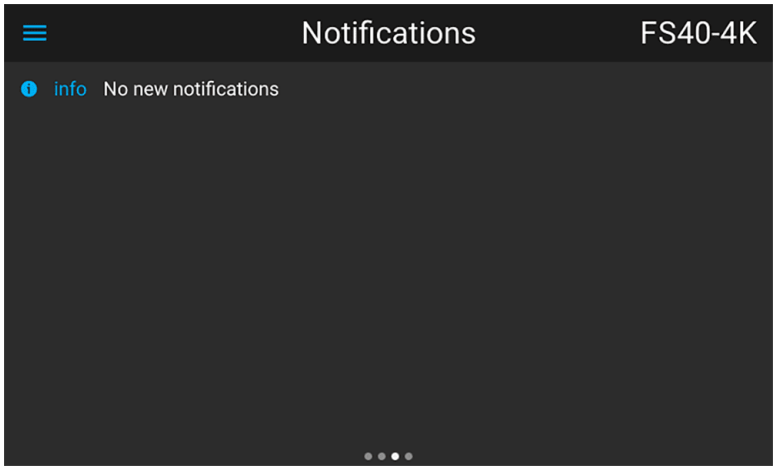


Image 3–5 Notifications page

Image 3–6 Preview page

Mirroring the source input. (Preview page).

This page in the information mode is useful for verifying the input signal connection without switching the projector (light source on).

This function shows the output of the currently active source on the LCD panel. The source content should be a picture without warp and blend applied. The picture will be limited by the LCD resolution, 800x480pixels.

The projector performance will drop when the LCD monitoring the input, due to use of resources. Exit the input monitoring when not in use.

3.4.4 OSD Menu mode

About.

This is the projector setup menus, explained in detail in their own chapters in this manual. (Source menu, Image menu, Installation menu, System Settings menu, Status menu).

3.4.5 LCD functionality in Ready Mode

About

When the projector is in Ready mode, it is possible to activate and navigate in the projectors menu on the LCD display, in order to set or check values and settings before the lamp is switched on.

Ready mode is enabled either when the power cable is connected (after the startup sequence), or when pressing the Power Off for 4 seconds when the projector is in On mode. See chapter 5.4 Power Mode Transitions for a graphic presentation of the ready mode.

Procedure

When in ready mode, press the Menu button either on the remote control, or the keypad to enter the menus. Navigate by using the arrow and OK keys, either on the remote control or the keypad.

3.5 Local keypad

About

The Keypad gives direct access to several functions, in addition to access to the menu system. The keypad and remote control functions are equal.

The keypad has a back light that can be switched on and off manually. The light turns off automatically after a preset time.

The Standby key is equipped with white, blue and red backlight depending on the status of the projector. See table in “Power on / Standby button backlight indications”, page 21 for info regarding this.

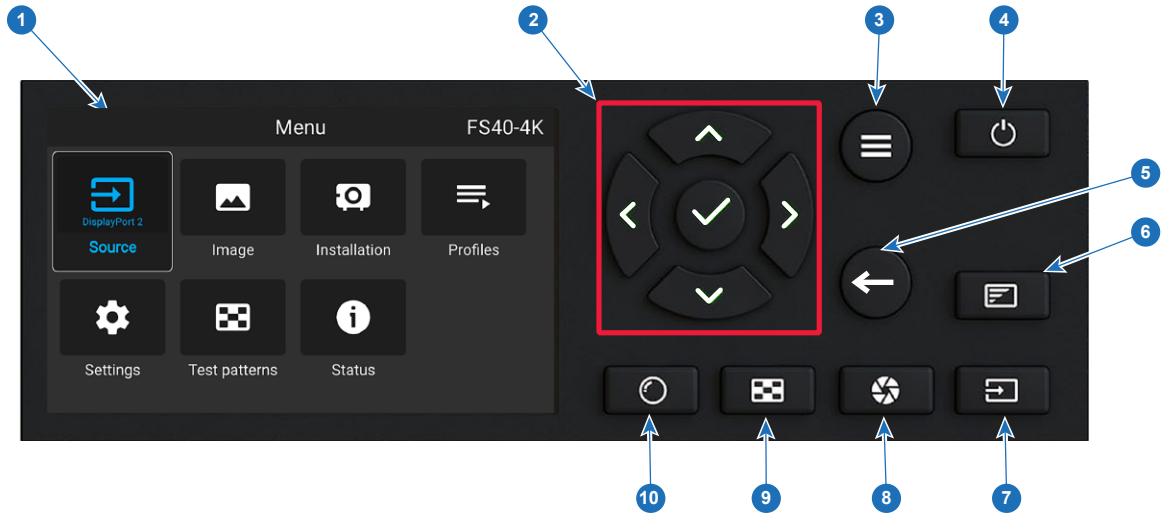


Image 3–7

Item No.	Name	Description
1	LCD Display	Shows navigation menu incl. sub menus and projector status screens (dashboard, notification, about and preview).
2	Navigation keys	Navigation arrows (up, down, left, right), confirm selection (✓)
3	Menu button	Toggle between OSD / Information menu.
4	Power button	Power on / standby / ready
5	Back	Back to previous screen.
6	OSD ON/OFF	Deactivate the On Screen Display (OSD). Only critical warnings will be displayed.
7	Input	Shortcut to input source menu on LCD. Use navigation keys to select and enable input.
8	Shutter	Enable and disable the lens shutter function. This is not a mechanical shutter, but it toggles the light source on and off. Backlight is red when the shutter are enabled.
9	Test Patterns	Shortcut to test pattern menu on LCD. Use navigation keys to select the desired pattern.
10	Lens	Shortcut to lens function. A test pattern displays on the OSD. LCD screen displays the navigation keys to manage and confirm actions.

3.6 Shortcut buttons

About the keypad shortcut buttons

On the keypad, there are three shortcut buttons; for lens function, test pattern selection, and input selection. See “Local keypad”, page 24 and “Platinum remote control unit”, page 27for location and description. (The remote control has only the test pattern shortcut button).

When the test pattern or input shortcut button is pressed, a pop up menu will show up on the LCD screen.

Make a selection by the arrow keys, and confirm.

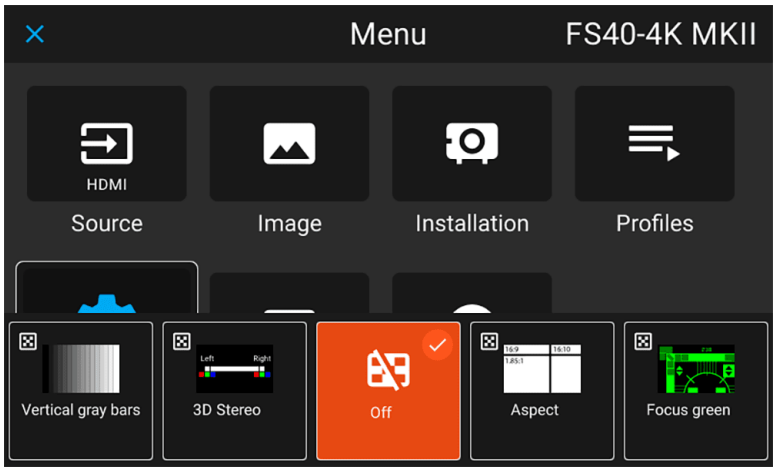


Image 3–8 Test pattern pop up menu

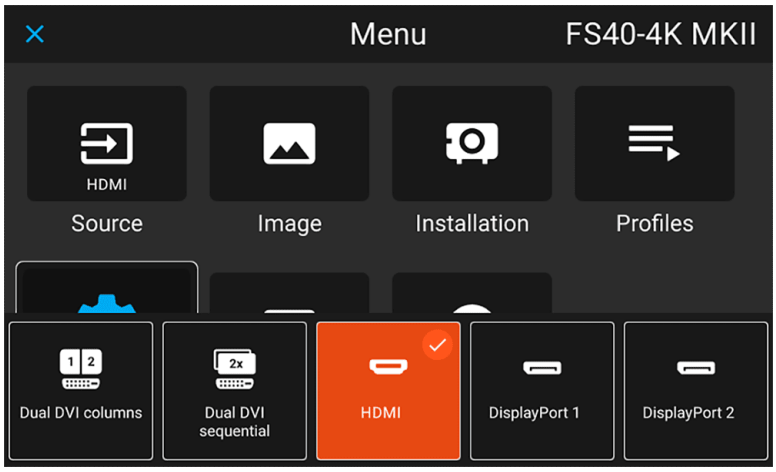


Image 3–9 Input source pop up menu

3.7 Basic remote control unit

About the basic remote

In order to make sure you can control your projector remotely, Barco has provided a basic remote control unit in case the Pulse RCU is not available to you. While this remote control has a more limited amount of available features, it will be able to help you out with basic controls.

Batteries are no longer included in the packaging. It is up to the user to purchase the correct batteries.
Use 2 AAA size (alkaline) batteries in the remote control.

Battery placement & replacement

The wireless remote control is powered by two (2) standard AAA batteries. The needed batteries are not included in the packaging. The user has to buy batteries himself.

The battery compartment is on the back side of the remote control. The following image illustrates how to open the battery compartment.

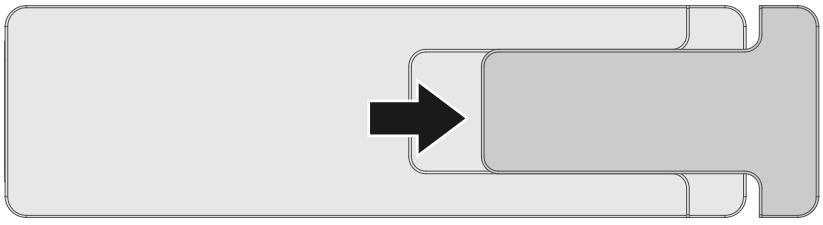
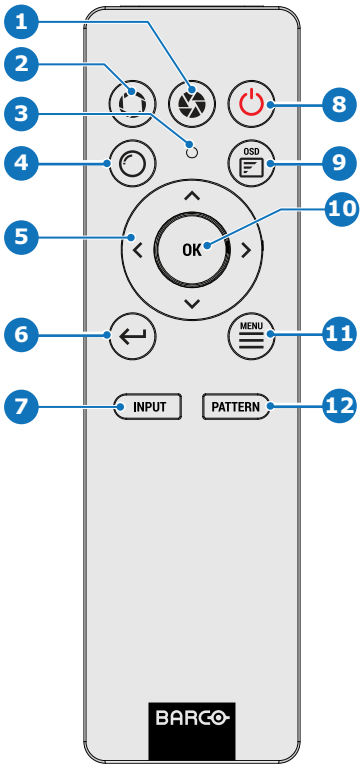


Image 3–10 How to open the battery compartment of the remote

CAUTION: Replace batteries with the correct battery type. Only use AAA size batteries. There is a risk of explosion if the battery is replaced with an incorrect type.
Make sure the polarities match the + and - marks, as depicted on the inside of the battery compartment. There is a risk of explosion if the batteries are installed incorrectly.

Functions

Image	Nr	Description
	1	Close shutter
	2	Open shutter
	3	Button pressed indicator
	4	Open *Lens* menu
	5	Menu navigation keys
	6	Move back one level in menu system
	7	Open *Source* menu
	8	Power on / Power off **Note**: Only shifts power between Ready and ON mode.
	9	OSD menu on / off
	10	Menu confirmation
	11	Activate or deactivate the GUI menu. **Note**: If pressed while the projector is in stand-by mode, this will also power up the projector.
	12	Open *Test pattern* menu

3.8 Platinum remote control unit

3.8.1 Remote control, battery installation

Batteries are no longer included in the packaging. It is up to the user to purchase the correct batteries.
Use 2 AA size (alkaline) batteries in the remote control.

How to install

1. Push the battery cover tab with the fingernail a little backwards (1) and pull, at the same time, the cover upwards (2).

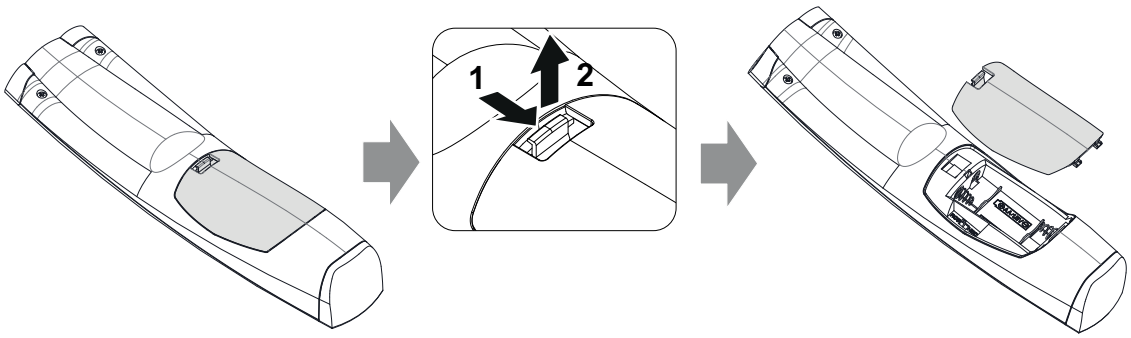


Image 3–11

2. Insert the two AA size batteries, making sure the polarities match the + and - marks inside the battery compartment.

Tip: Use alkaline batteries for optimum range and lifetime.

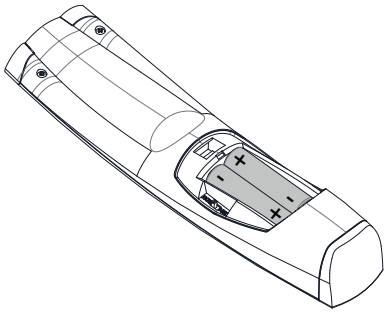


Image 3–12

3. Insert (1) both lower tabs of the battery cover in the gaps at the bottom of the remote control, and press (2) the cover until it clicks in place.

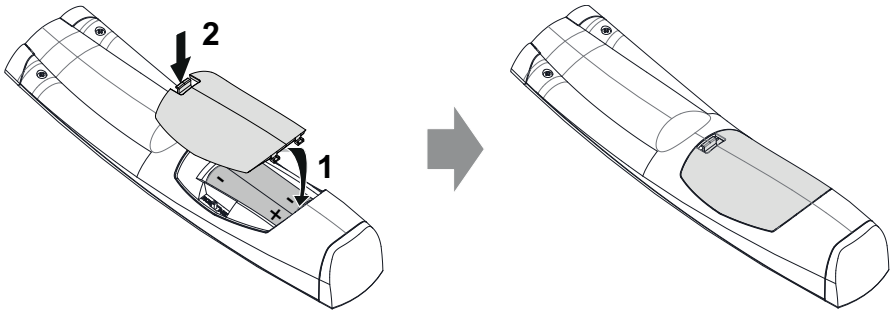


Image 3–13

When replacing batteries, the broadcast address of the RCU will be reset to its default value '0'.

CAUTION: Replace with the correct battery type. Use two AA size batteries

3.8.2 Remote control, protocol setup

Pulse Remote Control Units produced from April 2023 onwards will only support the NEC protocol. There will no longer be a switch in the battery compartment to select the legacy RC5 protocol.

About the used protocol

The protocol is the code send out by the remote control when a button is pressed. Depending on this code, the projector can decode the signals. The remote control can be used with two different protocols, RC5 and NEC. Depending on the projector to control, the remote control can be switched between these protocols.

Which protocol to use

- The **NEC** protocol have to be used for Barco projectors based on the Pulse platform: Loki, Balder, F40. F70, F80, F90, HDX 4K, UDX, UDM and more..
- The **RC5** protocol have to be use all other Barco projectors: HDX W, HDF W, HDQ 2K, ... (legacy products)

How to set

1. Remove the battery cover.
2. Place the switch in the NEC position.

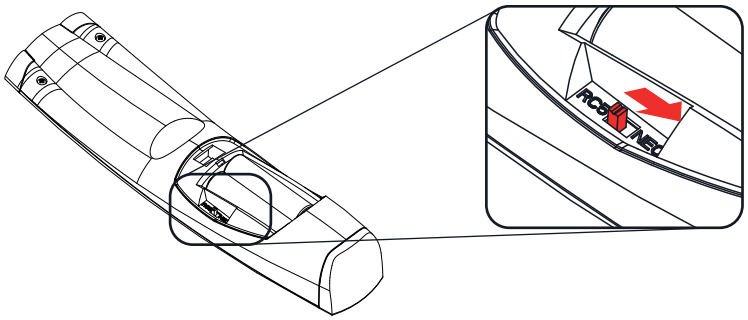


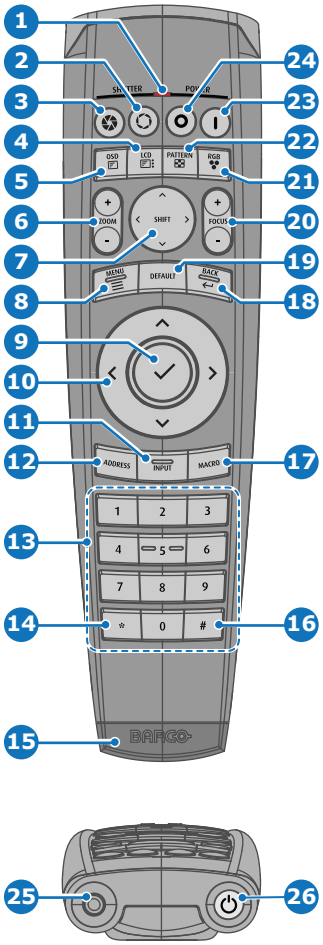
Image 3–14

Remark with RC5 protocol

Not all buttons of the Pulse RCU are one-to-one compatible with the legacy Barco RCU. Button pairs SHUTTER open/close and POWER on/off emit the same code (per pair) when in RC5 mode, because the legacy RCU's only had 1 button for Shutter and 1 button for Standby.

3.8.3 Functionality overview

Remote Control Unit buttons



1. Button pressed indicator.
2. Shutter Open.
3. Shutter Close.
4. Touch Panel On/Off. (Not in use).
5. OSD On/Off.
6. Lens Zoom.
7. Lens Shift.
8. Menu Activation.
9. Menu Selection, OK button.
10. Menu Navigation.
11. Input Selection.
12. Address button.
13. Numeric buttons.
14. Backspace (while entering values)
15. XLR connector.
16. Decimal mark (while entering values)
17. Macro button. (Not in use)
18. Menu Back.
19. Default button. (Not in use).
20. Lens Focus.
21. RGB Button.
22. Test Patterns.
23. Power On.
24. Power Off.
25. Stereo Jack.
26. RCU On/Off.

The projector remote control is a full feature wireless remote control, powered by two (2) standard AA batteries. The battery compartment is on the back side of the remote control.

The remote control is backlit for use in dark environments. It also has an Jack connector for wired connection to the projector. When the wire is connected, the IR beam is switched off.

3.8.4 Pulse RCU, function of the on/off button

Function of the remote control on/off button

The Pulse remote control unit has at the front side an on/off switch (reference 1 Image 3–15). Switching off the remote control prevents that unwanted commands are send due to an accidental key press. Furthermore, switching the RCU off will extend the battery lifetime of the remote control.

To activate the remote control, press the on/off button. The button pressed indicator will light up.

To deactivate the remote control, press the on/off button again.

For Remote Control Units produced from April 2023 onward, press the on/off button until the button pressed indicator will turn off (3-5 seconds).
Remote Control Units produced before this moment only require a short press of the on/off button.

Default after (re)placing batteries, is “ON”.

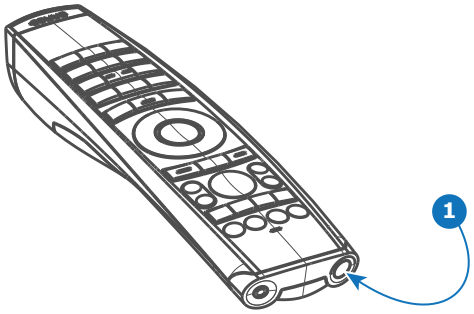


Image 3–15

3.8.5 Pulse RCU, function of the “RGB filter” button

Filtering the color of the projected image

By pressing the RGB filter button on the RCU you can place a color filter on the output of the projector. This feature can be useful during the installation and configuration of a multi-projector or multi-channel setup. By having one projector project a red image and another project a green image, it is easier to spot and adjust the overlap section.

By pressing this button multiple times, you will have different active filters, in the following cycle:

- Red + Green + Blue (default)
- Red only
- Green only
- Blue only
- Red + Green
- Green + Blue
- Red + Blue
- Red + Green + Blue
- etc

After powering up, the colors will always revert back to full RGB.

3.8.6 Enable / Disable Remote Control

About

This function is for disabling the IR sensors for the remote control. Either front or rear, or both.

Select the menu path *Settings/Communication/IR control*

Image 3–16

When all sensors are turned off, the projector will not receive any signals from the remote control. To enable the sensors again, use the keypad on the projector.

Select which sensors to be disabled.

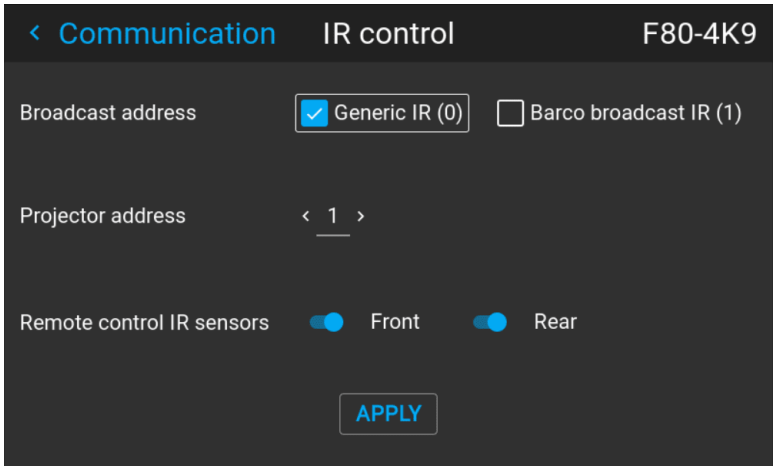


Image 3–17

Enter the Apply button to confirm the action

3.8.7 Wired RC connection

About

The remote control can also be directly wired to the projector from the stereo jack connector on the remote, (See “Functionality overview”, page 29), to the RC connector on the back panel of the projector.(See section “Connector Panel”)

In this mode, the projector will not be affected by signals from other non-wired remote controls.

When using wired remote control, the broadcast address must be set to “Generic ID (0)”. See the menu in “Enable / Disable Remote Control”, page 30.

It is not possible to program the remote control in wired mode. (Directly connected, no sense in programming).

3.9 Projector Address

Projector address
Address installed in the projector to be individually controlled.

Broadcast address
Projector will always execute the command coming from a RCU programmed with that broadcast address.

3.9.1 Controlling the projector

Why a projector address?

As more than one projector can be installed in a room, each projector should be separately addressable with an RCU or computer. Therefore each projector has its own address.

Set up an individual Projector Address

The set up of a projector address can be done via the software.

Projector controlling

When the address is set, the projector can be controlled now:

- with the RCU: only for addresses between 1 and 31.

Broadcast Address

Every projector has a broadcast (common) address '0' or '1'. The default address is '0'.

The choice between '0' and '1' can be selected in the GUI: "*System Settings*" → "*Communication*" →"*IR Control* ".

Placing new batteries in the remote control or plugging the remote to a projector via a cable will automatically reset the address back to its default value '0'.

3.10 Connector panel

General

The source input panel is located at the back of the projector. For source specifications, see table below.

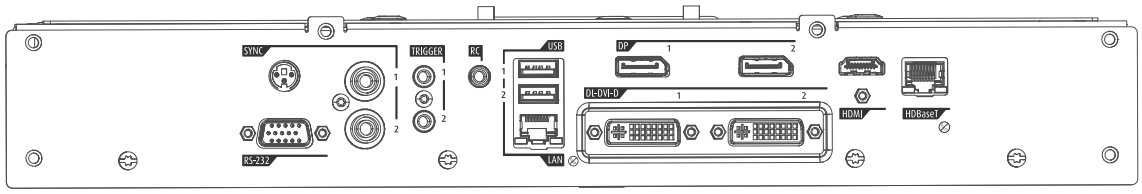
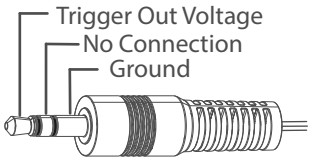


Image 3–18

Name	Pcs	Description	Purpose
RS-232	1	9–pin DB9 connector	For Projector Control. Allows for wired remote control and monitoring of many projector functions used in installation environments
Sync	3	BNC Sync Port IN/OUT; Bidirectional mini-DIN (1x 3D sync Out, and 2x Sync In/Out)	For Projector ControlThis is mainly used in multiple projector installations with requirement of synchronization between the units
Trigger	2	12VDC - 0,5A (6W)  	For Controlling Peripherals, like motorized screens, curtains etc. Give 12V output when activated. See API manual for activation info. **NOTE Disconnect the projector power cable before connecting or removing the trigger cable**
RC	1	Jack connector for wired remote	For Projector Control
USB	2	USB 2.0 type A, 4 pin	For Software upgrade
LAN	1	Standard RJ45 connector	For Projector Control

Name	Pcs	Description	Purpose
DP	2	Standard display port	For Projector Input
DL-DVI-D	2	Dual DVI-I 1.0 (DVI_D Functionallity).	For Projector Input. These connectors can also be used to form one uniform image by feeding half of the image into each connector. HDCP compliant for sources up 165 Mhz
HDMI	1	Standard HDMI 2.0	For Projector Input
HDBaseT	1	Standard RJ45 8P8C Connector	For Projector Input

Getting the projector started

4

4.1 Projector source and control connections

4.1.1 Input source connections

The source switching time is variable and could take few seconds..

Source signal connectivity

The connector panel at the back of the projector is used for all source connections.

Source signal connectivity on the projector is:

- 2x Dual Link DVI-I (DVI-D functionality)
- 2x DisplayPort 1.2
- 1x HDMI 2.0
- 1x HDBaseT

4.1.2 Connector Specifications

4.1.2.1 Specifications DVI-I inputs

Specifications

Parameter	Value
Connector	DVI- I female digital RGB (DVI-D functionality)
Signal characteristics	DVI 1.0, Digital, TMDS
Max. cable length	25 m (24 AWG)
Max. pixel rate	330 MHz (dual link), 165 MHz (single link)
Scan format	Progressive
Max. input data resolution	1920x1200 60Hz (Single link) 2560x1600 60Hz (Dual Link) 1920x1200 @120 Hz (Dual link) 1920x2400 @60Hz
Bit depth	8 bit
EDID	Supported
HDCP	Supported

4.1.2.2 Display Port 1.2

Specifications

Parameter	Value
Connector	Standard Display port
Signal characteristics	DP 1.2
Functionality	Mandatory
Max. cable length	2 m (24 AWG) - RBR; 2 m (24 AWG) – HBR1, HBR2
Supported Link Rate	RBR, HBR1, HBR2
Scan format	Progressive

Parameter	Value
Max. input data resolution	2560x1600@120Hz WQXGA / 3840x2400 @60Hz (4K) Max
Bit depth	8, 10, 12 bit
EDID	Supported
HDCP	Supported

4.1.2.3 Specifications HDMI 2.0

Specifications

Regarding HDMI 2.0: The decryption protocol HDCP 2.2 are enabled and valid in this unit.

Parameter	Value
Connector	Standard HDMI
Signal characteristics	Digital, TMDS
Max. cable length	2 m (24 AWG)
Max. pixel rate	594 MHz
Max. input data resolution	3840x2160 @60Hz
Bit depth	8, 10, 12 bits
EDID	Supported
HDCP	Supported
Ethernet	No
Audio return	No
HDCP	Supported

4.1.2.4 Specifications HDBase T input

The HDBaseT standard allows the link to also be used as a regular network port. In addition to carrying video data, it can also be connected to regular ethernet network without carry out any video data.
Due to limitations in the projector and network standards, only the LAN and the HDBaseT should be used for network traffic, but not both simultaneously. If both are connected simultaneously it might lead to undefined behavior where traffic is not being sent on the link indicated by the IPaddress.
This is only valid when the projector has a firmware version 2.1 or higher installed.

Specifications

Parameter	Value
Reference specification	HDBaseT 1.0 Specification, June 2010
Connector	Standard RJ-45, 8P8C
Signal characteristics	HDBaseT
Max. cable length (1080p/48b/60Hz)	100 m (Cat5e/6), Pixel Clock <=225HHz, Video Datarate <=5.3Gbps 70 m (Cat5e/6), Pixel Clock >225HHz, Video Datarate >5.3Gbps

Parameter	Value
	100 m (Cat6a/7), Pixel Clock >225HHz, Video Datarate >5.3Gbps
Max TMDS Clock Frequency	270 MHz
Max video resolution supported	4096x2160 @30Hz
HDCP Pass-Through	Yes, from Source to Projector
IR Extension	Not Supported
RS-232 Extension	Not Supported
10/100Mbps Ethernet Pass-Through	Not Supported
Fallback to 100BaseTx, IEEE 802.3u	Not Supported
USB Over Centre Tap	Not Supported
Power Over Ethernet	Not Supported
Audio	Not Supported
LEDs - HD Base Status	Operation: Green, Left Link/Mode: Yellow, Right

4.1.3 Control Interfaces

The HDBaseT input can also be used as a regular network port. See “Connector Specifications”, page 36, HDBaseT specification.

HDBaseT as network input

About

The following control interfaces are available on the projector:

- 1x RS-232 (for projector control)
- 1x LAN/Ethernet (for projector control
- 2x USB-A ports

4.1.3.1 RS-232

Specifications

Parameter	Value
RS-232 connector	1 female DB9 connector (RS232-in) for projector control and debug

4.1.3.2 LAN/Ethernet

Specifications

Parameter	Value
Ethernet connector	1 RJ45 Connector for projector control (not content)
Protocols	DHCP, TCP/IP, UDP/P
Speed	10/100 Mbit/1000Mbit

4.1.3.3 USB-A port

Specifications

Parameter	Value
USB connector	Type A
Function	Firmware upgrade using USB sticks
Power	Power 5V, max 1,5A (out)
Standard	USB 2.0

4.2 Power up the projector

CAUTION: Sources should always be connected before the projector is powered up

CAUTION: Ensure that the main power cord complies with the national regulations where the equipment is used.
Do not use unauthorized replacements.
Do not use power cords which are damaged.

Power up the projector using the keypad or remote

1. Connect the line cord to the projector.
2. Plug the 3–pronged cord into a grounded AC outlet.

   The projector will begin warming up, and the backlight of the Standby /power button are flashing white.
3. When the backlight on the standby button are constant white, the projector are in standby mode, ready to be switched on.
4. Press the standby button on the keypad or the power button on the remote to bring the projector up to on mode.

   The power button backlight on the keypad will flash blue while the projector is warming up.
5. When the power button backlight is steady blue, the projector is ready for use.

4.3 Power down the projector

Power down using the keypad or remote

1. Depress and hold the power button on the keypad or remote for four (4) seconds.

   The Projector is now in cooling down phase.
2. Wait 2 minutes before disconnecting the power cord. (If disconnecting is required).

WARNING: There is a risk of reducing the expected lifetime of the projectors DMD device if the power cord is removed too early, due to the device's shutdown sequence.

4.4 Power mode transitions

4.4.1 General

Transition Diagram

This diagram shows all modes available on the projector (unplug, ON, READY, ECO), and the actions necessary to change mode.

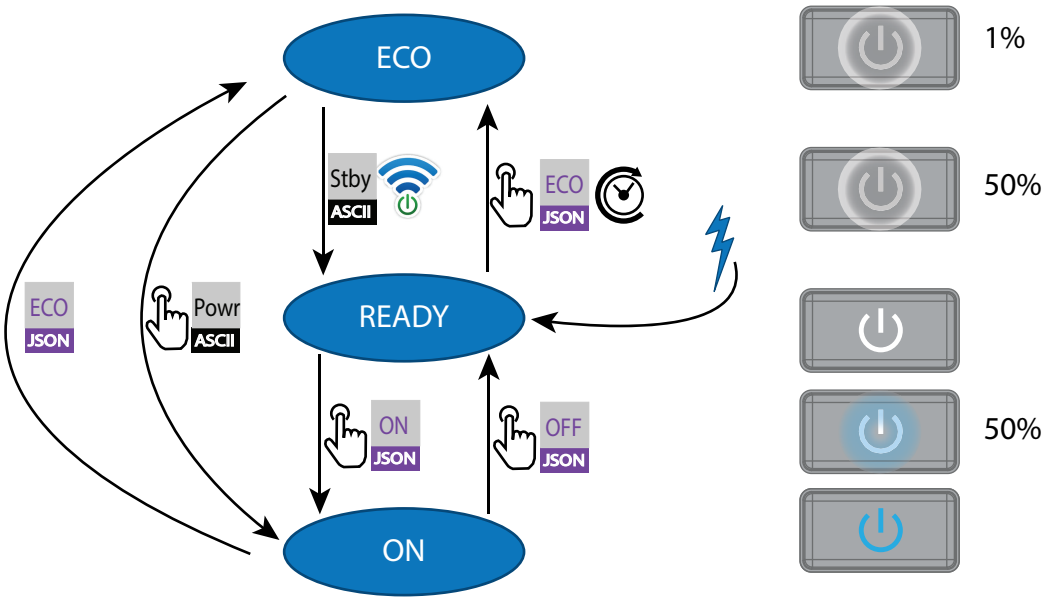


Image 4–1

- Projector mains powered
- Auto transition after x minutes if ECO mode enables
- Press power On/Off button, remote On/Off button

4.4.2 Power on projector

If not already connected, connect the female side of the power cord with the power input socket of the projector. For more details see section dedicated to the power cord installation.

Description

Plug the 3-prong plug of power cord into a grounded AC outlet. The projector will go to **READY** mode. During this stage the system boots and performs the internal check of the boards. The Power *On/Off button* will BLINKING WHITE until **READY** mode is achieved. Once in **READY** mode, the *Power On/Off* button will be lit WHITE.

4.4.3 Going from READY to ON

Description

Press the *Power On/Off* button on the projector, or the *Power On* button on the remote control. The projector will power **ON**. The *Power On/Off* button will BLINK BLUE during the transition from **READY** to **ON**. Once the projector is on, the *Power On/Off* button will be lit BLUE.

4.4.4 Going from ON to READY

Description

Press and hold the *Power on/off* button on the projector for 4 seconds, or press the *Power Off* button on the remote control. The projector will power down through a cool down phase. The *Power on/off* button will BLINK WHITE during the transition from **ON** to **READY**. Once the projector is in **READY**, the*Power on/off* button will be lit WHITE.

4.4.5 Going from READY to ECO standby

Description

If ECO Standby mode is enabled in the service menu (refer to the section "GUI - system settings/Standby ECO", in User Guide) the projector will automatically go to **ECO** standby mode after a time-out (default 15 minutes). All electronics (including fans, pumps,...) go down except for a very small wake up controller. The *Power on/off* button will FLASH WHITE every second.

4.4.6 Going from ECO to ON

Description

Press the *Power on/off* button on the projector, or the *Power On* button on the remote control. The projector goes from **ECO** directly to **ON**. The projector will go through the same booting phase as on power plugging, then do the transition from **READY** to **ON**. Of course startup-time will be longer then from **READY** to **ON**.

4.4.7 Wake On LAN (WOL)

About

The projector has WOL functionality, that can be used for the projector to go from ECO mode to READY mode. Use a json command for transition from READY to ON.

The WOL is performed by sending a Magic Packet followed by the projectors MAC address. The MAC address is found in the *Menu / Settings / Communication / LAN.* menu. The MAC address is similar to the HW address that is shown in this menu path.

The LAN cable must be connected when the projector enter the ECO mode, in order to obtain the Wake on LAN function.

Wake-On-LAN (WOL)
The link speed of the projector network interface in ECO mode is reduced to 10Mbit/s. This is standard practice in the industry to not waste power. Hence, the network connected with the projector must support such a low link speed to enable the remote wake up of the projector. This implies that all peripherals (switchers, routers...) in the network path must support WOL and configured correctly to support WOL.

4.5 Power modes

General

The table below details the projector power modes.

Mode	Description
Normal	Projector is booted up and the light source is on
Ready	Projector is booted up but the light source is off
ECO Standby	Light source is switched off and projector electronics are powered down

4.6 Customize projector settings

About

The projector display, behavior and user interface can be adjusted to meet individual requirements.

Options include:*Menu/Settings/Themes*

- Adjust the OSD menu color

4.7 User interface

4.7.1 On Screen Display (OSD)

About

The projector on screen display (OSD) is the primary user interface (UI). From here, you can review and adjust all projector and display settings.

The OSD interface uses tabs to display the main menu. Topics are then further sorted and displayed by function: main (topic) — sub (function) — sub (function).

There are seven main menu tabs: Source, Image, Installation, Profiles, Settings, Test pattern and Status.

The OSD can be disabled by pressing the OSD on/off button.

In order to show the OSD, the OSD On/Off button must be disabled. (White backlight on the button). When the button have blue illumination, the OSD will not appear, and the display information are only visible on the LCD Display. Only Critical warnings will be displayed.

User access levels

The projector's software platform uses access levels to define what each user can do.

There are two user access levels: Standard User and Power User. In addition, there is a Service user access for certified Service personnel.

A standard user has access to all projector functionality and OSD menu items. A power user has, in addition to access to all projector functionality and OSD menu items, access to a number of advanced functions. Access to power user features is password-protected. Contact your projector supplier for more information.

Navigation

You can navigate the OSD using the local keypad or the remote control.

Press the MENU button to display the OSD. (The OSD must be enabled, press OSD button to enable.)

Use the arrow keys to navigate left, right, up and down.

Press the OK button to select a menu topic and get more options.

Use the numeral keys to enter values, or use the arrow keys to move the barscale up or down.

Press MENU again to exit the menu system.

Press the OSD button to deactivate the OSD on the screen. Only critical warnings will be displayed.

Some menu options are reserved for Power or Service Users; these will be grayed out and not available for selection when in standard user mode. To access these features, enter your Power or Service Code in the Service Menu or contact your support representative for more information.

Define values

Menu settings are displayed using checkboxes, barscale sliders, and selection boxes, depending on the type of menu.

To set a value:

- Press OK to select or deselect a checkbox (turn a function ON or OFF).
- Use the arrow keys to move the barscale slider up or down on the value line. For a barscale 0-9, each step will equal 10% of the total value.
- To enter the value as a direct number, press ENTER, input the digit(s), and then Press ENTER again to execute and exit cursor mode e.g. ENTER 79 ENTER.

Changes to values are implemented dynamically.

Menu memory

The OSD menu remembers the last selected sub–item as long as the projector is running. The menu memory is reset when restarting the projector from standby.

Source menu

5

About the Source menu

This menu is used to select, review and configure sources into the projector. Enables either via the source menu, or the shortcut key.

By navigate through the Source menu, it will be visible also on the OSD.

By using the shortcut key, the menu occurs only on the LCD display.

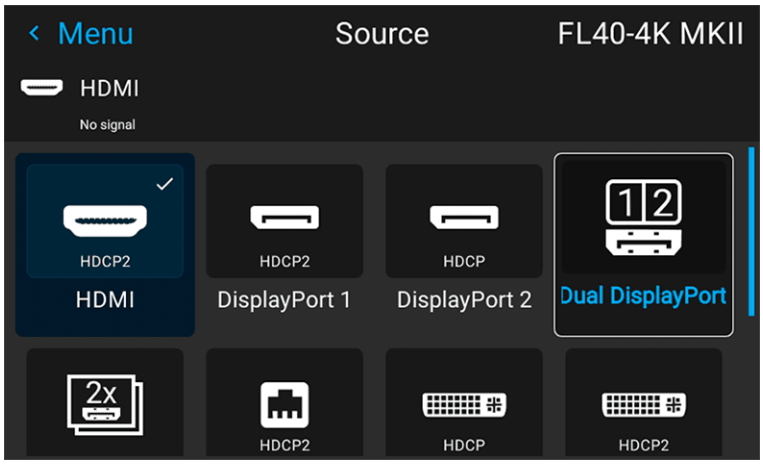


Image 5–1

5.1 Connector selection

About

Menu/Source

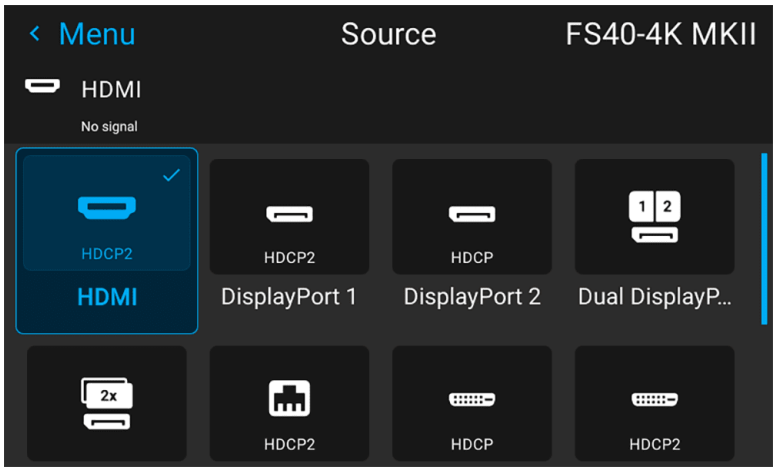


Image 5–2

Click on the relevant input connector icon to swap or activate the source.

The icon for the active source is highlighted.

The list of displayed sources can be adjusted to include other connectors.

The default selection of connectors displayed is:

- HDMI
- Display Port 1
- Display Port 2
- Dual Displayport Columns
- Dual Displayport Sequential
- HDBaseT
- DVI 1
- DVI 2
- Dual DVI Columns
- Dual DVI Sequential

5.2 Connector settings

About connector settings

The Connector Settings menu allows you to change settings for each input connector of the projector.

By default all options for every connector are set to automatic, together with the native Extended Display Identification Data (EDID).

When entering the menu for each input connector, you can change the following:

- Color Space
- Signal Range
- EDID

How to configure a connector

1. Press **Menu** to activate the menus and select *Source*.

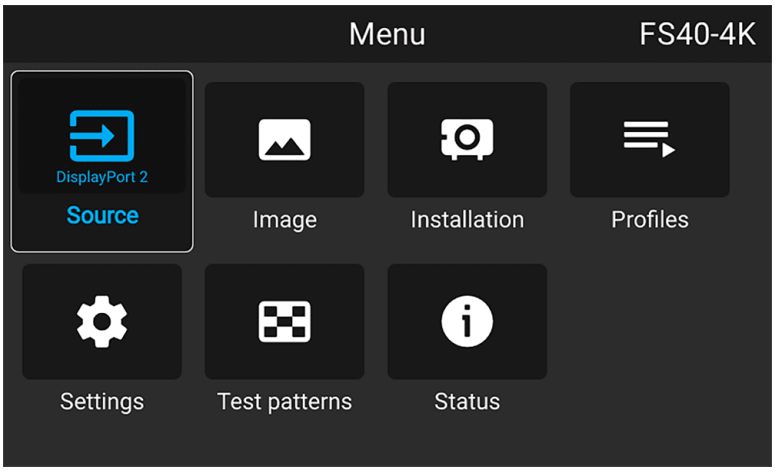


Image 5–3 Select source

2. Press **OK**.

   The *Source* menu is displayed with the actual available sources filled out.

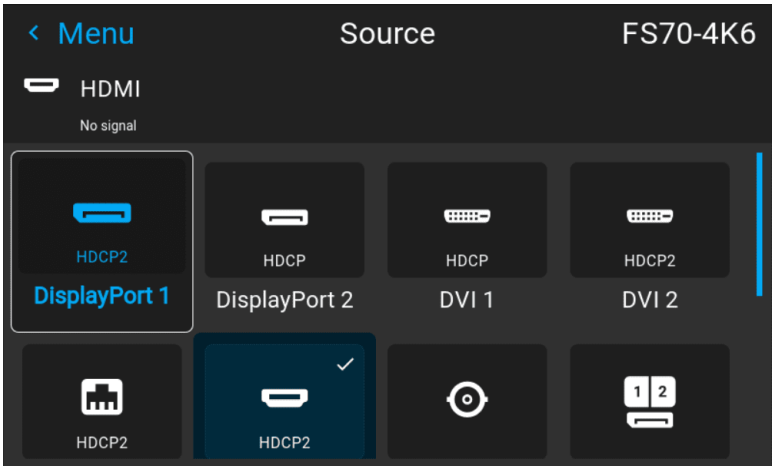


Image 5–4 Source menu

3. Scroll down to the bottom of the list of available sources and select *Connector Settings*.

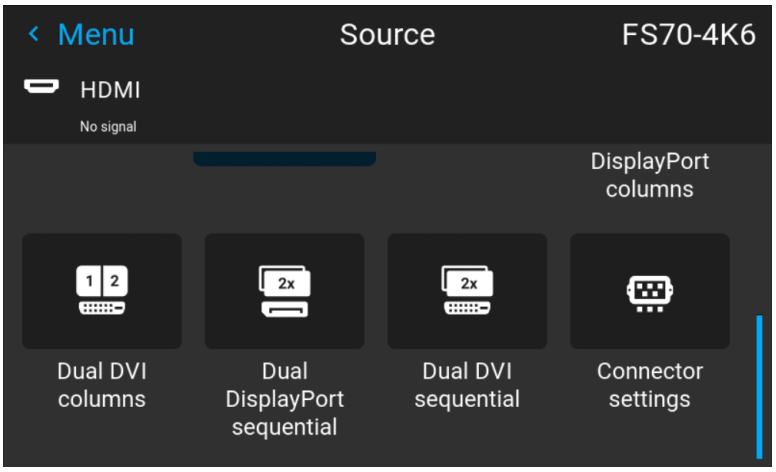


Image 5–5

   The available input connectors are displayed.

4. Select the desired connector.

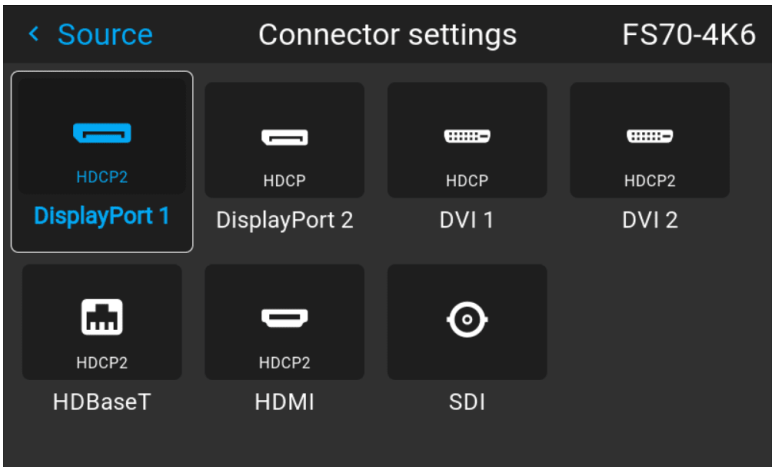


Image 5–6

The **Connector Settings** menu for this connector will be displayed.

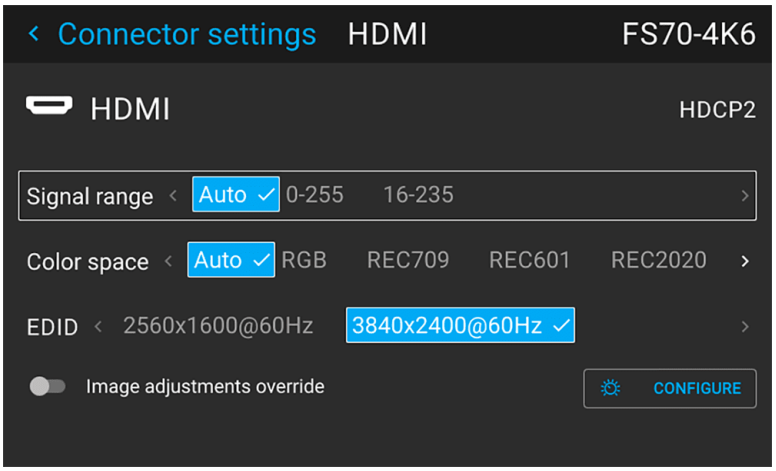


Image 5–7 Example of connector settings of an Displayport Connector.

5. You can change the following:
   - To force a limit on the color space, select one of the available *color spaces*.
   - To force a limit on the used signal range, select one of the available *signal ranges*.
   - To set a video timing other than the one native for the connector, select one of the options under *EDID*.

Note: You cannot change the EDID for SDI connectors.

5.3 Using dual inputs

Dual Input.

For extended flexibility to connect high resolution sources with a pixel clock over 330 MHz, the projector is supporting a dual input mode. In this mode, the left and the right half of the image can be connected to the DVI-1 and DVI-2 respectively, or DP1 and DP2.

To enable this mode, select the source that fits in the *Menu/Source*

Dual input modes

There are four ways to connect dual input.

- Dual Displayport Columns
- Dual Displayport Sequential
- Dual DVI Columns
- Dual DVI Sequential

For Images to be displayed in this mode, the resolution must be the same on both channels

Signal source setup.

When using dual inputs, it is important that the signal sources are set up correctly, with the correct resolution. Please refer to the manual for the source itself (PC, Graphic driver card..) in order to obtain a correct setup. If the setup is wrong, no picture will be visible in dual mode.

The resolution for each dual column channel can be up to 1920x2400 pixels.

The resolution for each dual sequential channel can be up to 2560x1600 pixels. (4K)

Change the EDID for each channel to the correct value. See chapter “Connector Settings” for EDID setup.

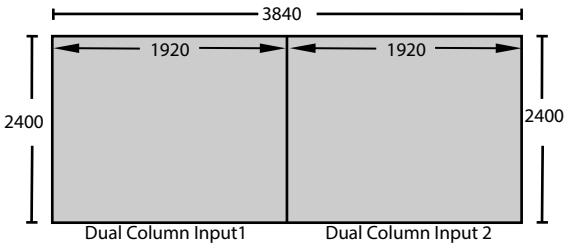


Image 5–8 Dual Column Setup

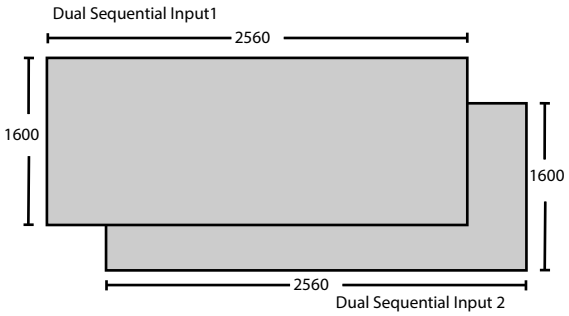


Image 5–9

5.4 No source image

What happens when no valid signal is selected

If no source with valid signal is selected, by default a black image will be projected instead.

From Pulse 2.3.8 onward, you can customize the projected image when no source is selected. You can select one of the predefined backgrounds (full Black or full Blue), or upload a custom image using an external tool like Projector Toolset (e.g. project a company logo instead).

From Pulse 2.3.x onward, while no source with an active signal is selected and the OSD is not projected on screen, the light source power will be reduced to 50% after 10 seconds as a light source power saving feature. This power saving feature can be disabled in the Auto dim menu. For more info, see

How to change

1. Press **Menu** to activate the menus and select *Source*.

Image 5–10 Main menu, Source

2. Press **OK**.

   The *Select Source* menu is displayed with the actual available sources filled out.

3. Scroll down the list of available sources and press **No source image**.

Image 5–11 Source menu, No Source image

The *No source image* menu is displayed.

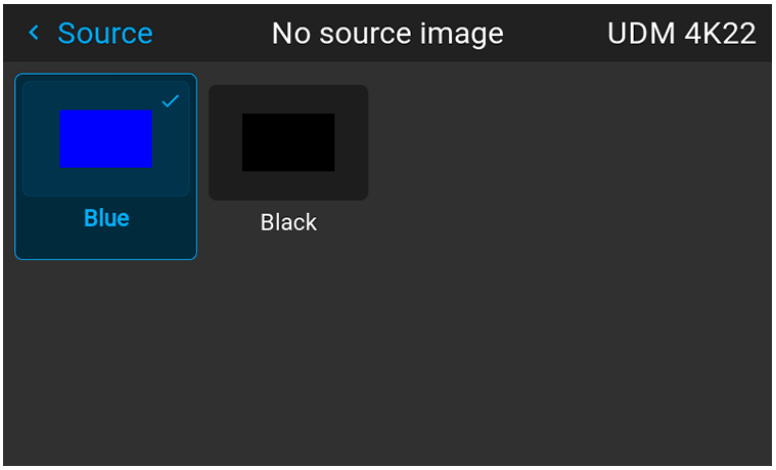


Image 5–12 Example of the No source image menu

4. Select the desired image to project when no source image is available.

When custom background images have been uploaded using an external tool, they will be listed after the predefined images.

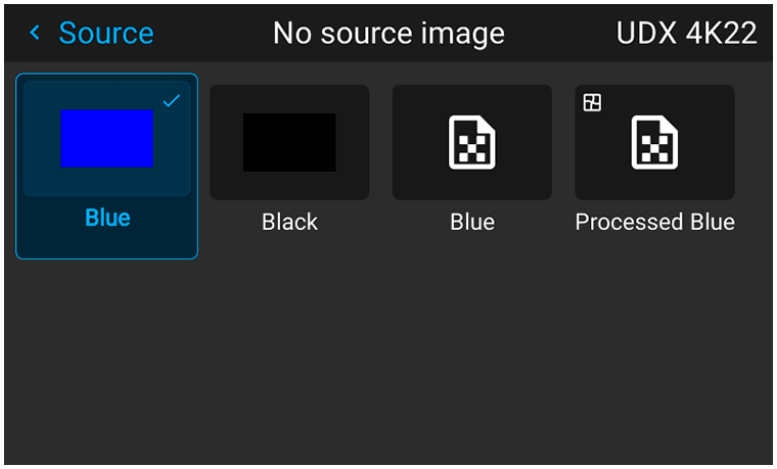


Image 5–13 Example of the No source image menu with two custom background images.

6 Image menu

About Image adjustment menus

There are different menu pictures showing up for the LCD display and the OSD. For the LCD display, the menu is shown below. The OSD menu is shown in the different topics below, and is visible in the lower left corner of the screen. The operation of the menus can be done with both the remote control or the arrows on the keypad. It is also possible to switch between the different adjustments by using the up and down arrows, instead of exit one menu and then enter the next one.

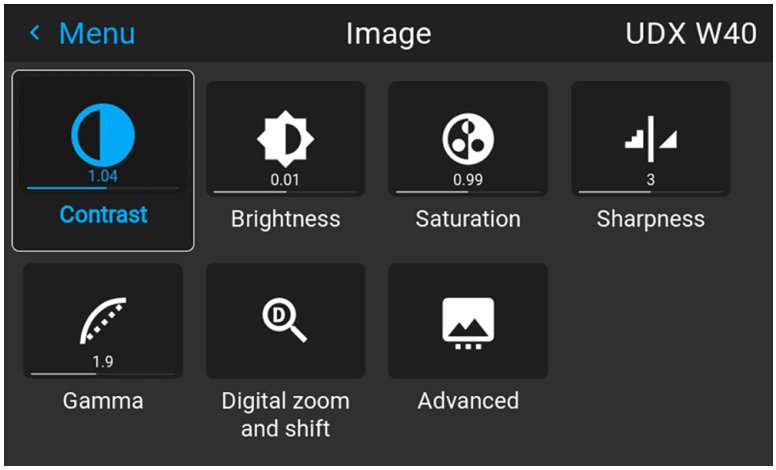


Image 6–1

Entering Contrast, Brightness, Saturation, Sharpness or Gamma menus from the keypad.

When entering any of these menus from the Keypad, the screen below will show up in the LCD panel. Use the arrow keys to select and adjust the values.

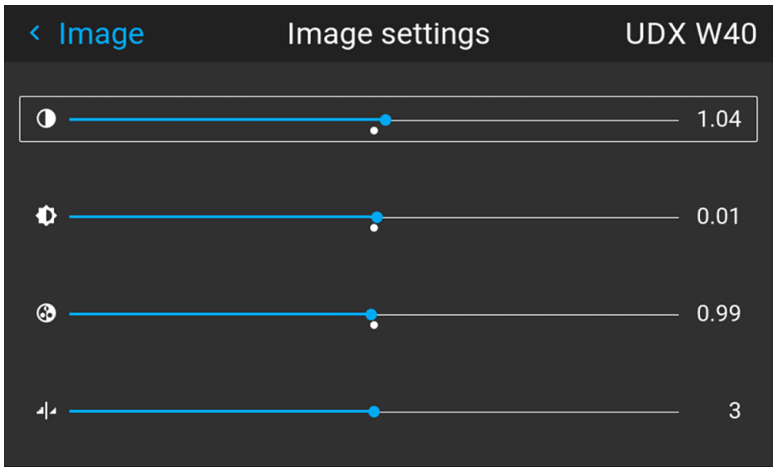


Image 6–2

When pressing enter on the value slider, this icon will show up on the OSD (depending which setting that is enabled, contrast showed here). When in this mode, use the up and down arrow keys to navigate between the different settings.

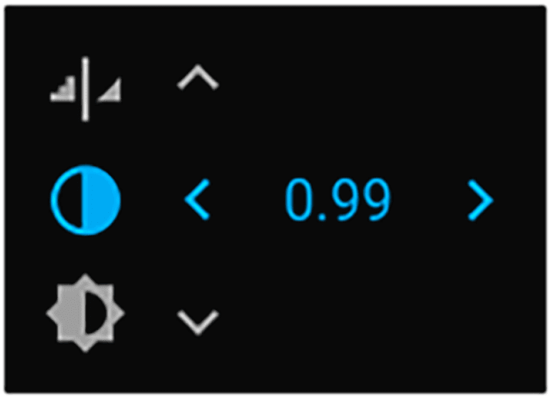


Image 6–3 OSD menu

6.1 Contrast

About

Image / Contrast

Used to adjust the contrast ratio of the displayed image by applying gain to the red, green and blue signals.

Available range: 0.00 to 2.00

Default value: 1.00

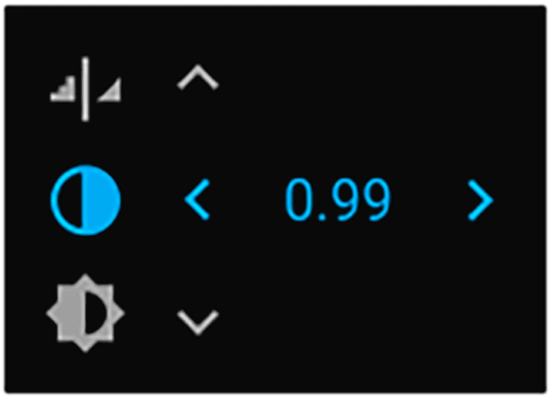


Image 6–4

When inside this menu, it is possible to change to the other image adjustments (Brightness, Saturation, Sharpness and Gamma) by using the up and down arrows on the remote control or keypad.

6.2 Brightness

About

Image / Brightness

The brightness function is used to adjust the black level in the input picture. It adds or subtracts an offset, or bias in to the red, green and blue signals.

Available range: –1.00 to 1.00

Default value: 0.00

Image 6–5 Brightness OSD menu

6.3 Saturation

About

Image / Saturation

Saturation levels impact on the white levels and the intensity of the color display; the higher the value, the more vivid the color display will be.

Available range: —1.00 to 2.00

Default value: 1.00

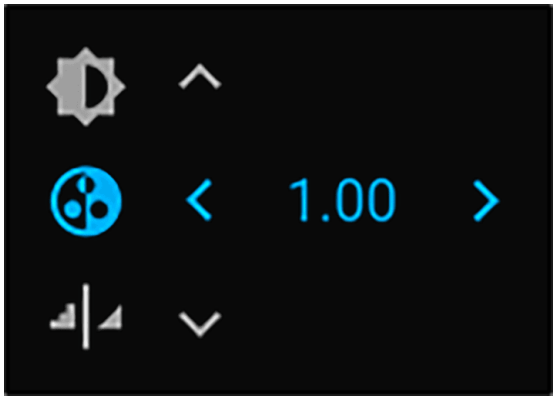


Image 6–6 Saturation OSD menu

6.4 Sharpness

About

The sharpness adjustment amplifies the high frequency components in the picture, meaning that by increase the sharpness, the picture will be perceived as sharper, and if decreased, the picture will be perceived as more blurry.

Increasing the sharpness will have the best effect in high contrast images, eg a table with text and borders.

In a natural picture, high sharpness can be perceived as noise, as all details in the picture will be amplified.

Available range —2 to 8.

Default value: 0

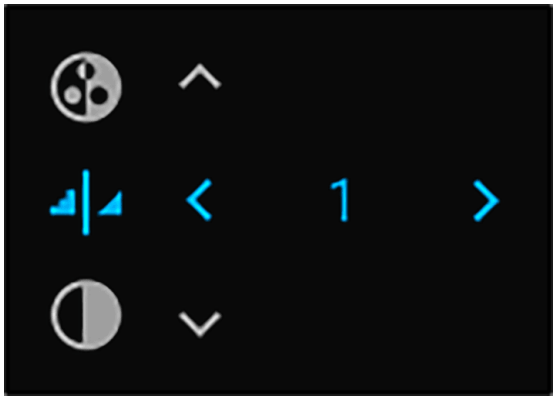


Image 6–7 Sharpness OSD menu

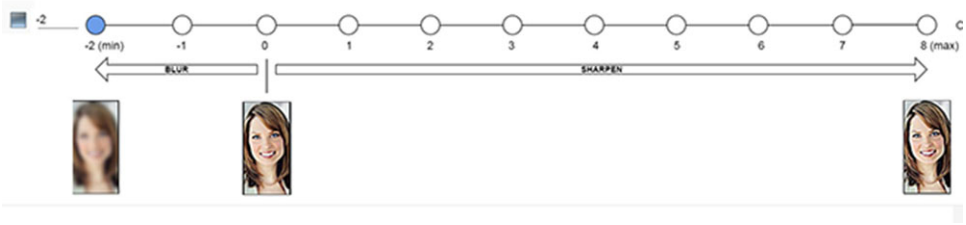


Image 6–8 Effect of sharpness adjust

6.5 Gamma adjustment

About gamma correction.

Gamma compensation, or gamma correction, is a way of adjusting the signal input to light output characteristics of a display or projector in order to suit the eye's sensitivity to different light levels and to compensate for non-linearities in displays. Without gamma compensation, images may look too dark or too bright, lack detail or depth. By adjusting the amount of gamma compensation changes, you change only the perceived brightness levels.

Different types of displays have different gamma factors that need to be corrected in order to look and be perceived the same. For example, an MS Windows generated image displayed on a CRT monitor will require a gamma correction value of about 2.5 to avoid color bleaching and burning.

The gamma curve correction formula is based on output level ∝ input level ^ gamma.

How to adjust

1. Enter the *Image* menu, and select Gamma.

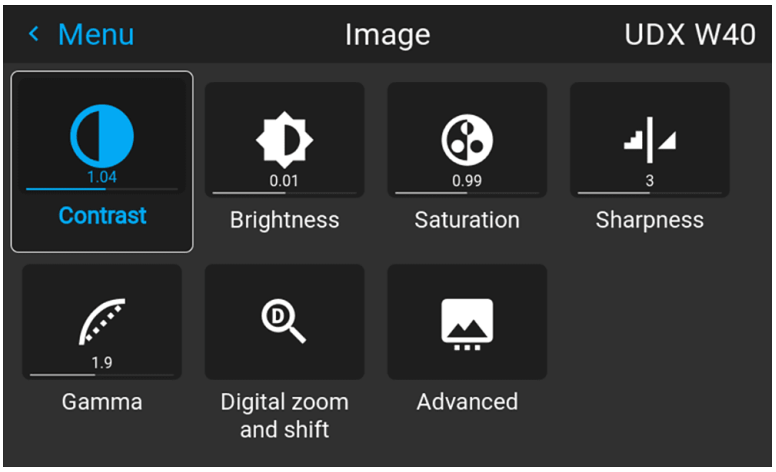


Image 6–9

2. Use the arrow keys to select the most suitable gamma type.
3. Select the gamma slider and tune the gamma value.

Note: The Gamma slider in the Gamma menu will be disabled when DICOM, SIM or SRGB values is selected.

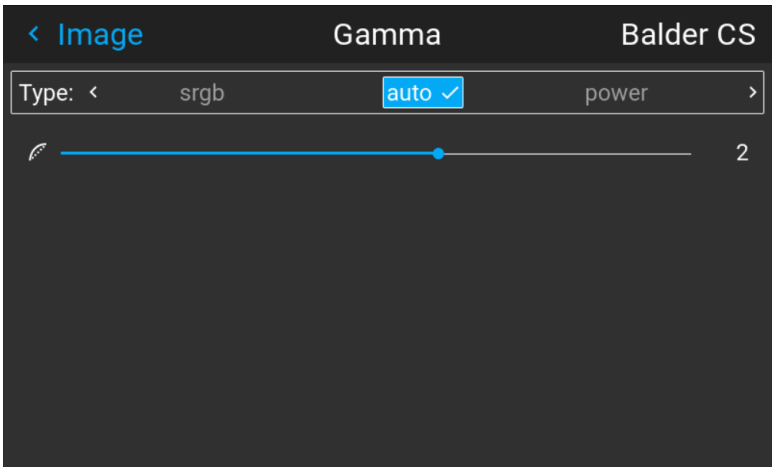


Image 6–10

6.6 Gamma Types

6.6.1 Predefined Gamma types

About

The Gamma Type selection contains several predefined Gamma settings for the most common user cases.

How to select Gamma type

1. Enter the menu *Image / Gamma*
2. Press enter, and scroll horizontally in the menu and select the proper Gamma value.
3. Select the gamma type that match the setup in the source to obtain an optimal rendering.

6.6.2 DICOM Gamma

This function is not intended for determination of medical diagnoses.

Purpose

DICOM gamma type will not make the projector a fully certified as a medical display. For that purpose, a type of calibration must be performed, which the projector does not support.. Because of that, this function is mainly intended for educational and lecture purposes.

The DICOM function is used to simulate DICOM gammas at a few selected max light outputs, and assumes that both ambient light and the projector black is 0 cd/m2.

How to select the optimal DICOM Gamma

1. Enter the menu *Image/Gamma*
2. Scroll horizontally in the menu and select a DICOM value that is closest to the value from the source. (If the source is set up with a value of 270, select DICOM 250 from the drop down menu). Higher numeric value represent a brighter environment.

   Note: The Gamma slider in the Gamma menu will be disabled when DICOM, SIM or SRGB values is selected.

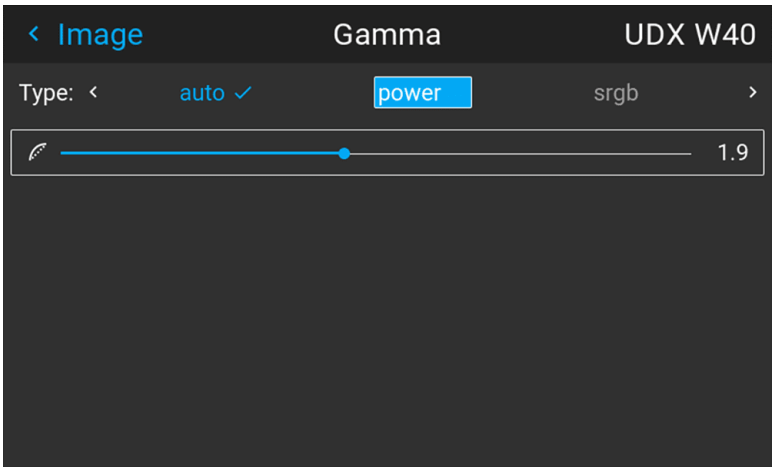


Image 6–11

3. Verify that the selected value gives a proper rendering of the image. If not, select another value.

6.7 Digital Zoom Shift

About

The digital zoom and Digital Shift functions are both entered from the same menu. The menu shows how to toggle between zoom and shift adjustment.

Enter the menu shown below, either via the Remote control or the keypad.

The combined menu is showed below.

The symbols on the lower part of the menu are symbols showing how to operate the keypad / remote control for the digital shift / digital zoom modes..

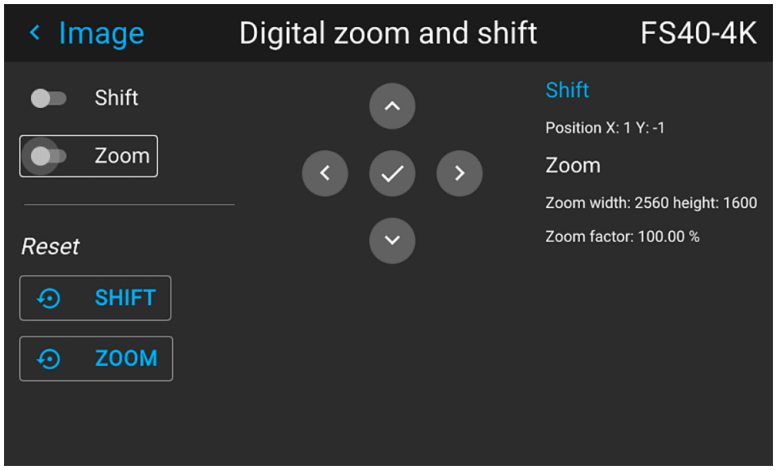


Image 6–12

6.7.1 Digital Zoom

Digital Zoom

This function will zoom the picture digitally. When zooming in, the center of the image will increase in size. This means that the outer part of the picture will be outside the projectors picture frame. When zooming out, the result is that the picture will be smaller than the projectors picture frame. The area outside the rendered picture will then be black.

See the illustrations below. The red lines in the figures represent the DMD outline.

Enter the menu showed above and toggle the Digital zoom switch. Select the slider according to the instructions in the menu and move it to the desired zoom level.

The numbers on the right side of the menu represent the “new” resolution of the picture (assuming that the whole picture should be visible) in pixels. The aspect ratio will not be affected by the zoom function.

This function can also be used in combination with digital shift.

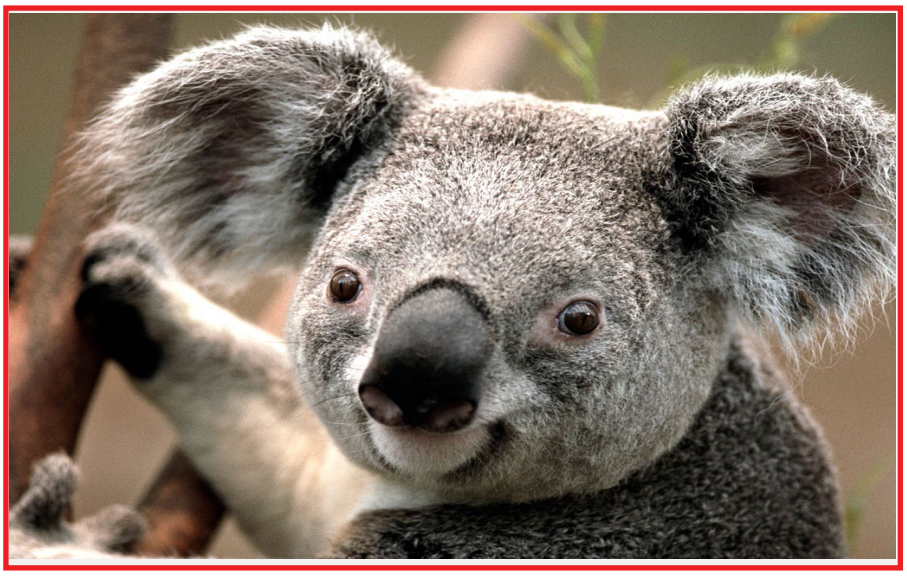


Image 6–13 Originally picture, not digitally zoomed

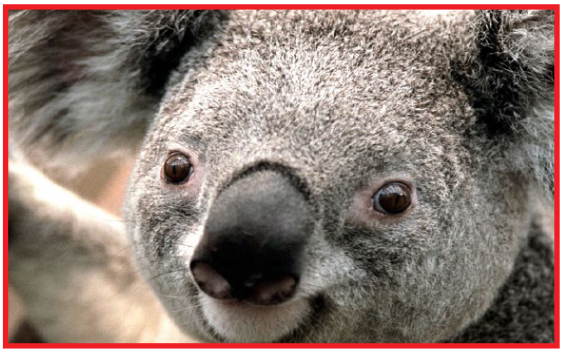


Image 6–14 Picture digitally zoomed in

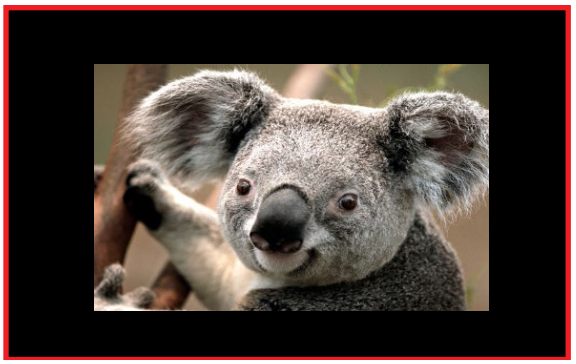


Image 6–15 Picture digitally zoomed out

6.7.2 Digital Shift

Digital Shift

This function will shift the picture digitally, meaning that the picture will be moved in any direction. As a result, some parts of the picture might be shifted outside the DMD range.

See the illustrations below. The red lines in the figures represent the DMD outline

Enter the menu showed above and toggle the Digital shift switch. Select the slider according to the instructions in the menu and move it to the desired shift level.

The numbers on the right side of the menu represent the movement (shift) of the picture in pixels referred to the “no shift” position. Positive numbers are shift right/down, and negative numbers are shift left/up.

This function can also be used in combination with the Digital zoom function.

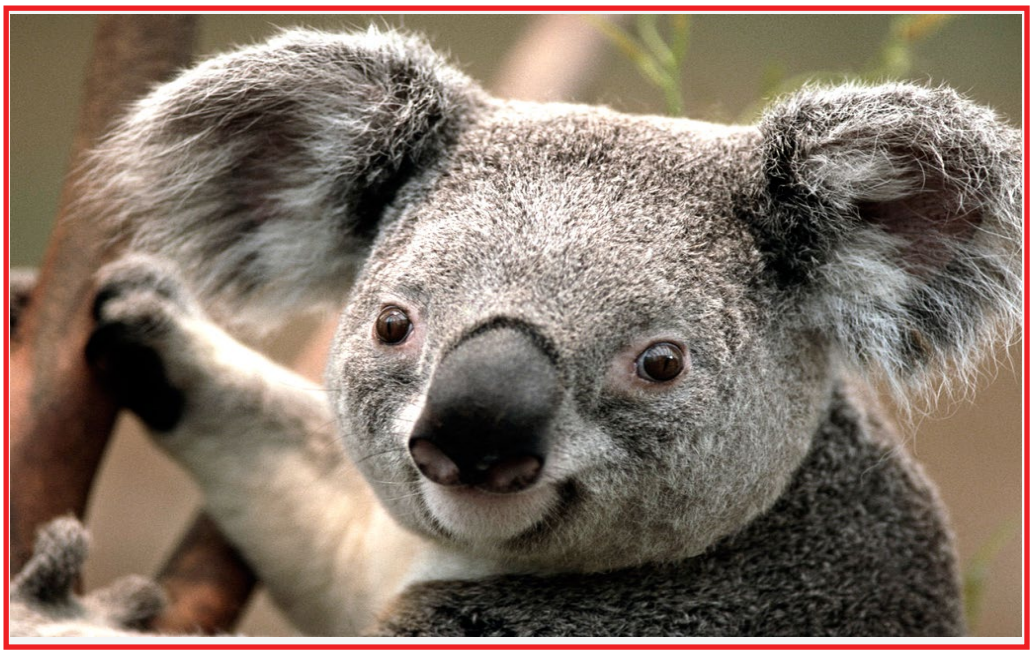


Image 6–16 Original Picture, not digitally shifted

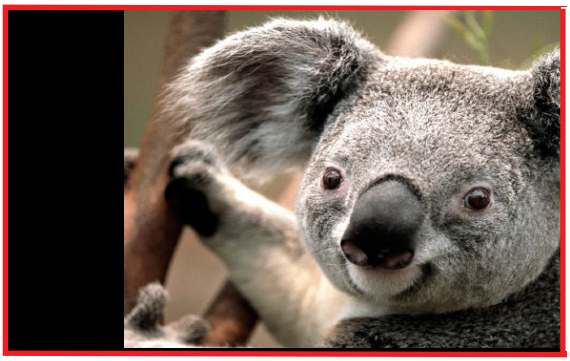


Image 6–17 Picture shifted horizontally

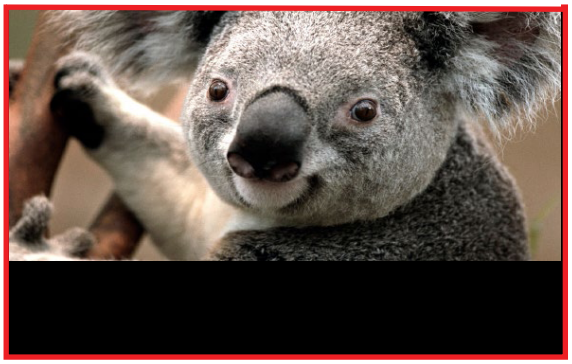


Image 6–18 Picture shifted vertically

6.8 Advanced image adjustments

6.8.1 P7 Realcolor

Purpose

When blending images from multiple projectors, the perceived color coordinates of each projector can be altered to a desired common level, so that the projected colors are identical over all projectors used.

Alternatively, if you are unfamiliar with how adjusting the Colors to a specific setting, there are also a certain number of presets available, which forces the color output to specific color standards.

The selection of the presets will vary, depending on the projector type, and the color wheel installed.

How to choose one of the P7 presets

1. In the main menu, select *Image* → *Advanced* → *P7 Realcolor*.

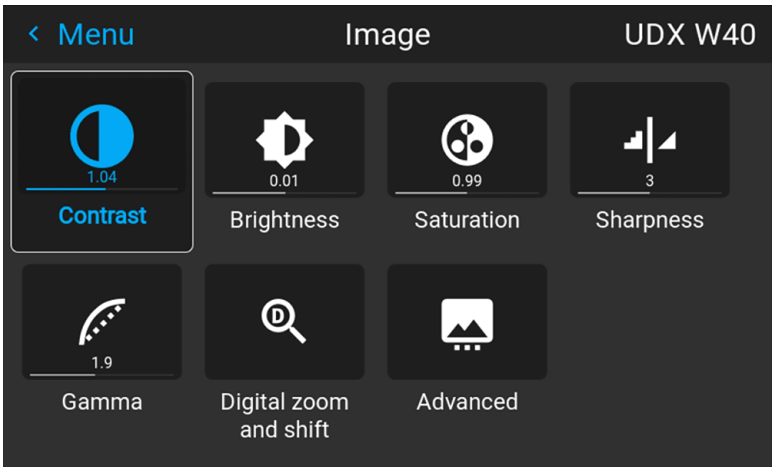


Image 6–19

Image 6–20

The P7 menu is displayed.

2. Choose one of the pre-defined presets:
   - **Native**: Projector native color settings. Default setting
   - **EBU**: European color standard for broadcasting
   - **SMPTE-C**: American color standard for broadcasting.
   - **Rec. 709**: Color standard for high-definition televisions (HDTV).

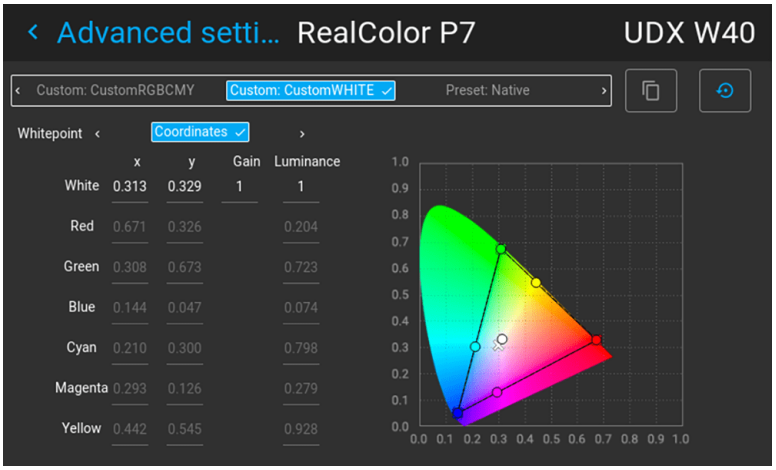


Image 6–21

Note: When choosing one of the presets, All other options in the P7 menu are disabled.

How to set custom P7 values

1. In the main menu, select *Image* → *Advanced* → *P7 Realcolor*.

Image 6–22

The P7 menu is displayed.

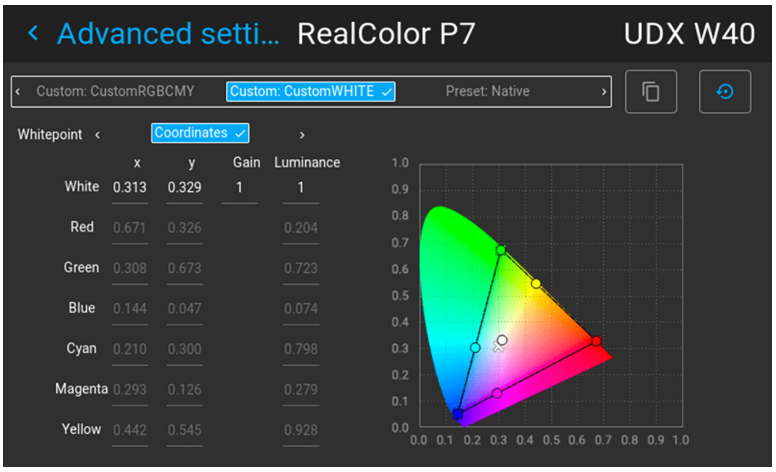


Image 6–23

2. Select the desired *Mode*. Choose one of the following *custom* options:
   - **Custom RGB**: 3–point color configuration.
     In RGB mode, the C, M and Y coordinates will be calculated automatically based on the R, G and B coordinates.
   - **Custom RGBCMY**: 6–point color configuration (both RGB and CMY).
     In RGBCMY mode, each color can be given a specific coordinate within the measured color triangle.
   - **Custom WHITE**: Configure only the White temperature.
3. Define the coordinates for each available color.

   Click on a coordinate value and select the current value. Enter the desired value with the numeric keys.

   Note: You can only pick coordinates within the measured color triangle.

4. For **Custom White**, click on White point and choose one of the following:
   - **Coordinates**: Configure the white point via specific coordinates.
     The white point is specified using an x, y coordinate in the CIE 1931 Chart.
   - **Temperature**: Configure the white point via a color temperature slider.
     The white point is specified on a Kelvin scale between 3200K and 13000K tracking along the black body curve.

You can reset all coordinates to the default values (to native) by selecting Reset modes to native. Press **OK** button to reset.

6.8.2 Edit the RealColor presets.

Editing presets

The different presets in the Real Color menu can be edited to obtain an optimal rendering of the picture.

Enter the *Menu/Image/Advanced/P7 Realcolor.*

menu.

Select the desired preset mode (EBU, Rec709 or SMPTE-C) and select the coordinate within each color component that has to be corrected. Enter the desired value either by:

- Using the keypad to increase /decrease the selected value by the arrow keys.

- Using the remote control: Erase the existing value with the “ * ” key, and enter the new value by the numeric keys.

The values are stored for the preset, until the “Reset” button is enabled, or when a factory reset is performed.

There is also a possibility to store the values in the custom presets.. Press the “Copy preset to custom” button to save.

The edited presets can be reset to the original values by enter the Reset button. There is also a possibility to copy the values to the custom preset.

To reset the values in Custom presets, enter the “Reset to native” button when in Custom mode

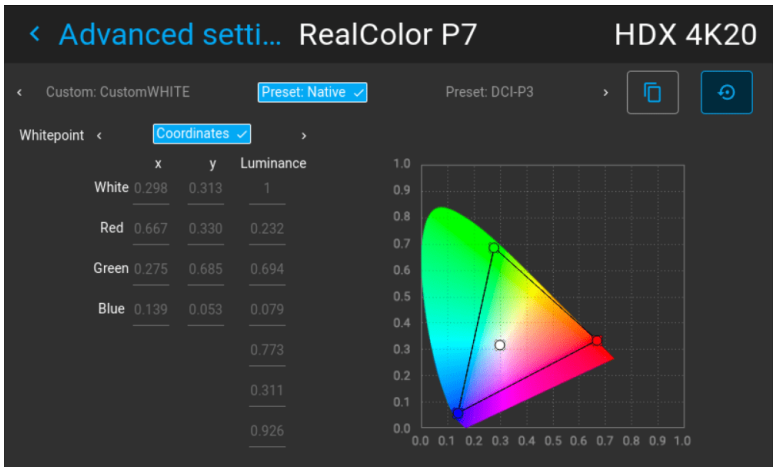


Image 6–24 Preset Native selected

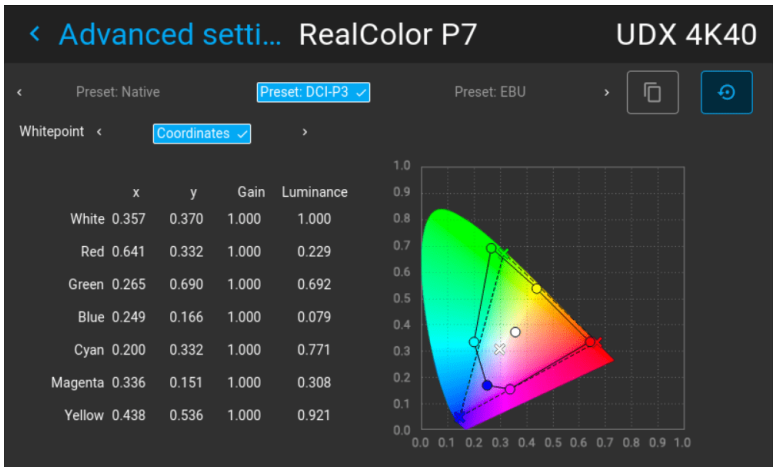


Image 6–25 Editable values

6.8.3 Output resolution 4K

About

With this function, the projector output resolution can be changed between 4K UHD resolution and WQXGA resolution.

Refer to the chapter “Projector source and control connections” regarding use of input sources in 4K mode.

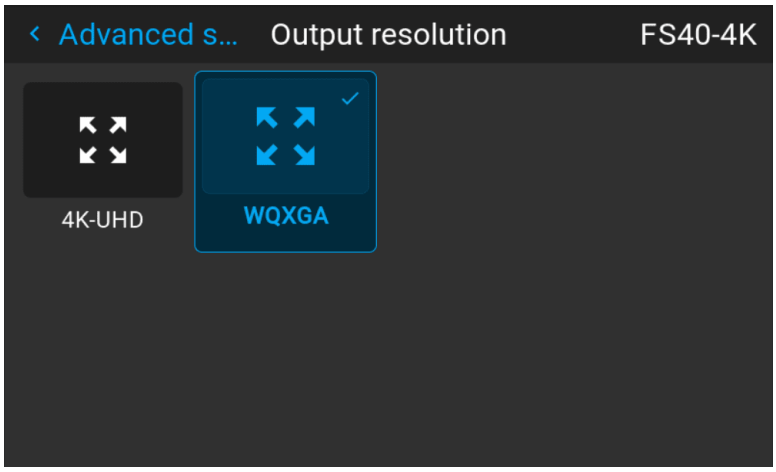


Image 6–26 Output resolution menu

6.8.4 Smear reduction

About

Smear is a phenomenon that typically occur when objects in the picture moves in high speed over the screen. It appears like there is a “tail” behind the object, or a lag in the moving parts of the picture.

In order to avoid this, there has been developed a Smear Reduction Process (SRP™), that reduces this perceived rendering. Select the option that give the best result.

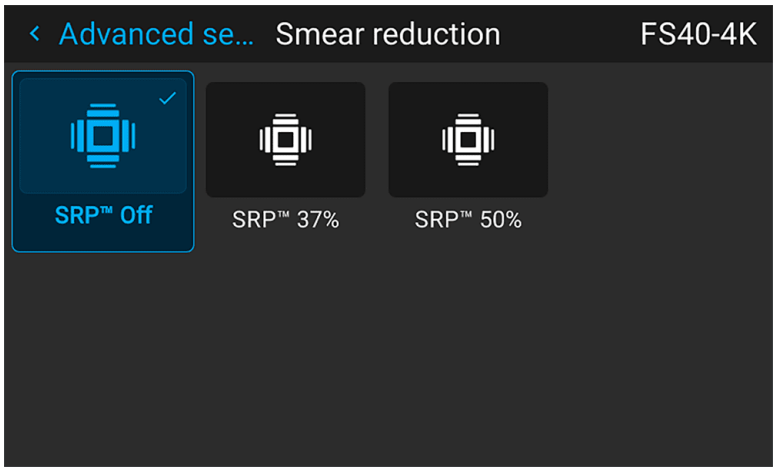


Image 6–27

6.8.5 Brilliant color

About

Optimizes the color rendering, by adjusting the light intensity. This has the effect of changing the color intensity, and by that also the perceived light intensity.

Enter the menu, and select the option that give the best result

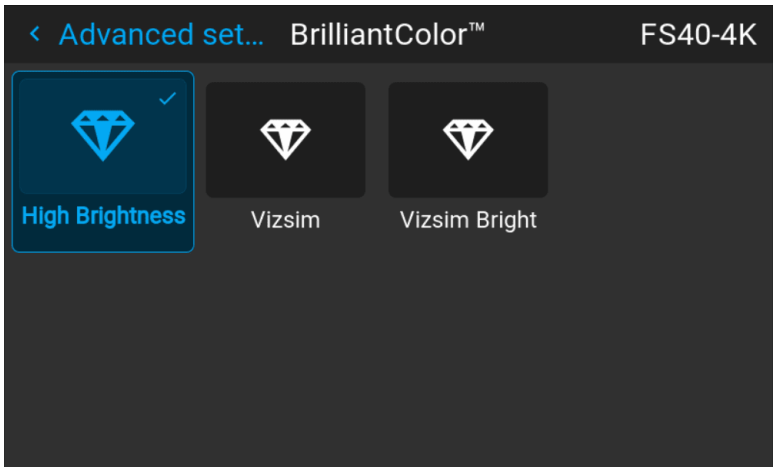


Image 6–28

6.8.6 Displaying HDR content– Perceptual Quantizer (PQ)

About PQ

Perceptual Quantizer (PQ) is a non–linear electro-optical transfer function (EOTF) that allows for the display of High Dynamic Range (HDR) content with a luminance level of up to 10 000 cd/m² and can be used with the Rec. 2020 color space.

How to properly display HDR content?

If your provided HDR content has been mastered with PQ (e.g. HDR10 and Dolby Vision), a few changes can be made in order to project the intended mastering on screen. These changes are necessary because HDR content has been mastered specifically for HDR capable displays that are watched in living rooms. These conditions are different from a non-HDR projector and darker cinema-like environments.

The projected HDR content depends on the following factors:

- **Mastering luminance**: This is content-specific and cannot be changed.
- **Screen luminance**: Every projection screen has a specific luminance (measured in nits or foot-lambert). Entering this luminance in the projector will adapt the content towards the intended HDR result.
- **HDR Boost**: A variable “booster” that may amplify or downplay the HDR output.

How to set the PQ?

1. In the main menu, select *Image* / Advanced settings / HDR

   The HDR menu is displayed.
2. Select the desired Unit (nits or foot-lambert).
3. Enter the Screen luminance (either in nits or foot-lambert).
4. Alter the HDR boost if necessary. You can modify this value to somewhere between 0.8 and 1.2.

6.8.7 HDR Status.

About HDR status

When an active source is HDR, an icon is visible in the status menu.

The HDR icon will also be visible in the “Source signal popup” icon in the lower right corner on the screen.

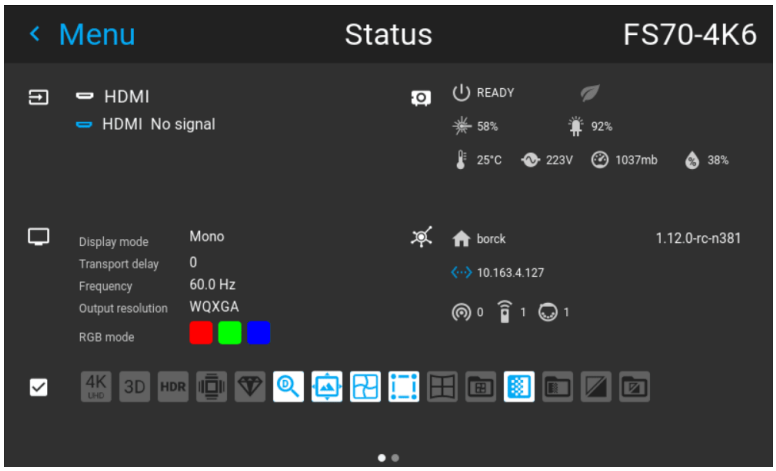


Image 6–29 HDR Icon.

Image 6–30 Source signal popup icon.

6.8.8 Night vision

About

When using e.g. displayport 1 as daylight image input, and displayport 2 as night vision input, this option make it possible to swap these two channels in the image processing in order to synchronize with the NV goggles.

This function is only available for the FS variants of the projector.

How to swap channels

Select the *Menu/ Image / Advanced / Night Vision.*

menu

Toggle the Swap channel function on / off by pressing the OK button on the remote control or the keypad.

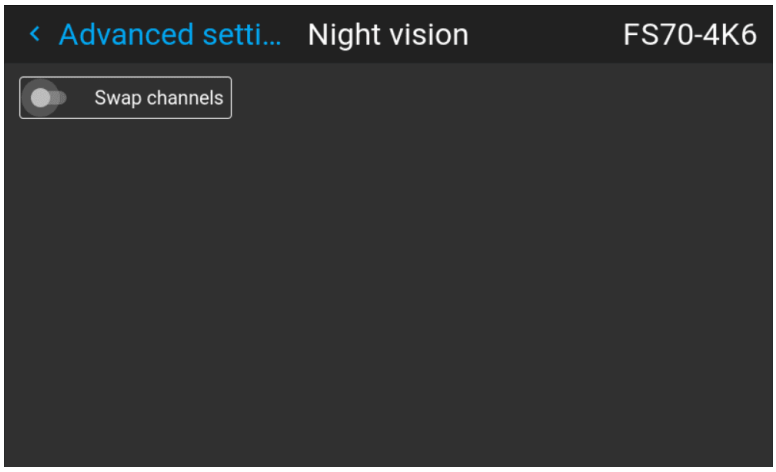


Image 6–31

Installation menu 7

Menu overview

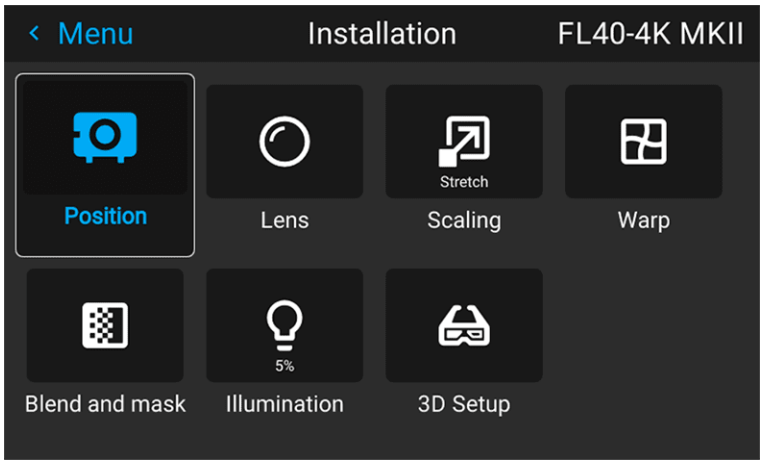


Image 7–1

7.1 Position

7.1.1 Orientation

What can be done?

The way of physical installation of the projector can be defined to the projector.

The following installation are possible:

- **Desktop front**: Projected image will not be flipped or mirrored.
- **Desktop rear**: Projected image will be flipped horizontally (left side switches to the right side).
- **Ceiling front**: Projected image will be flipped vertically (top side switches to the bottom side).
- **Ceiling rear**: Projected image will be flipped both vertically and horizontally.
- **Auto front**: The tilt sensor will detect if the projector is desktop or ceiling mounted and will project a readable image accordingly.
- **Auto rear**: The image will be flipped horizontally. The tilt sensor will detect if the projector is desktop or ceiling mounted and will project a readable image accordingly.

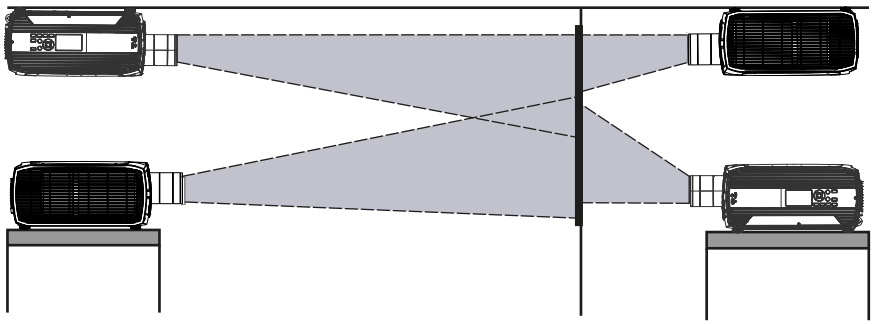


Image 7–2

How to set the correct orientation

1. In the main menu, select *Installation* → *Position* → *Orientation*.

Image 7–3 Installation menu, orientation

The Orientation menu is displayed.

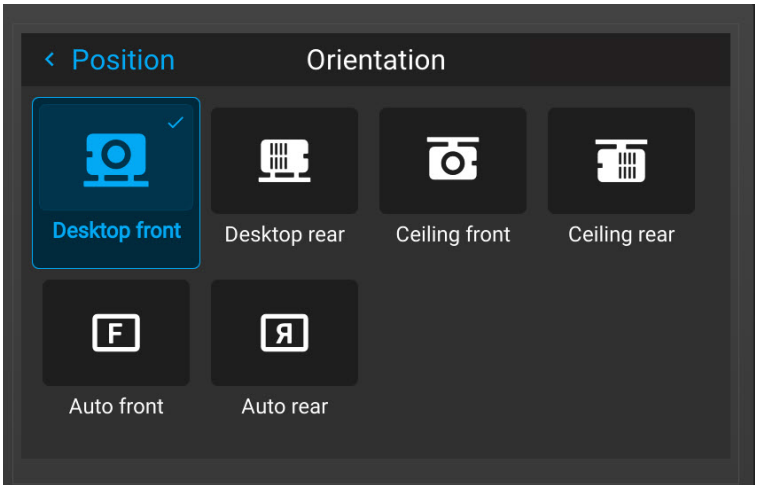


Image 7–4 Example of the orientation menu

2. Use the ◄ or ► keys to select the projector orientation mode and press **OK** to activate.

7.1.2 Projector tilt indication

When to use the tilt sensor menu

The projector has a built-in tilt sensor that detects the angle at which the projector is mounted. If you are in a situation where you need to fine-tune the projector because you want to achieve a picture at a specific angle (e.g. perfectly level, or a perfect fit in a multi-projector setup), you can use the tilt sensor menu as an aide when adjusting the projector feet, rigging frame or other used mounting mechanisms.

About the tilt sensor menu

The *Pitch* and the *Roll* is indicated in degrees.

Pitch tilt: A positive value for the Pitch means that the projector is projecting upwards when compared to the beam axis. A negative value means the projector is projecting downwards.

Roll tilt: Seen from the front of the projector, a positive value means that it rolls to the right. A negative value means the projector has rolled to the left.

Get an overview

1. In the main menu, select *Installation* → *Position* → *Tilt sensor*.

Image 7–5 Lens menu, Tilt sensor

The Tilt sensor indication menu opens.

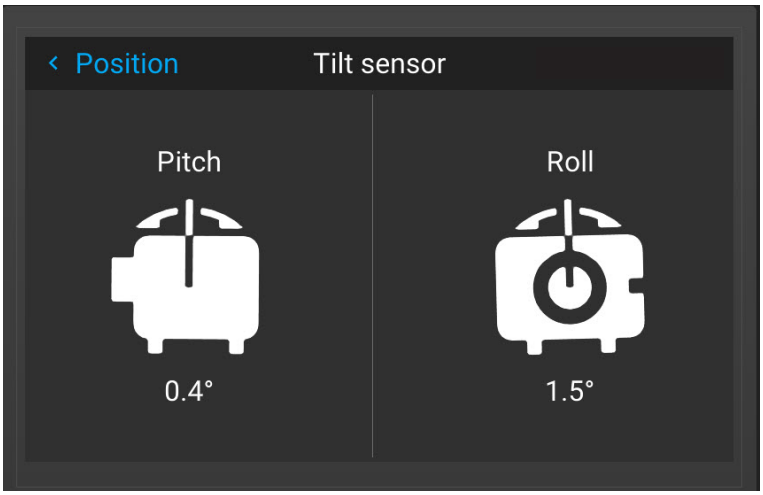


Image 7–6 Tilt sensor indication

If you notice the tilt sensor isn't working correctly (e.g. when compared to a level), you can calibrate the sensor in the settings menu. For more info, see "Advanced settings – Tilt sensor calibration", page 162.

7.2 Lens

7.2.1 Zoom / Focus

Zoom and focus

Enter the menu *Installation / Lens / Zoom Focus*

Use either the keypad arrows, or the remote control for this operation.

Use the navigational arrows, up and down, to adjust zoom.

Use the navigational arrows, left and right, to adjust focus.

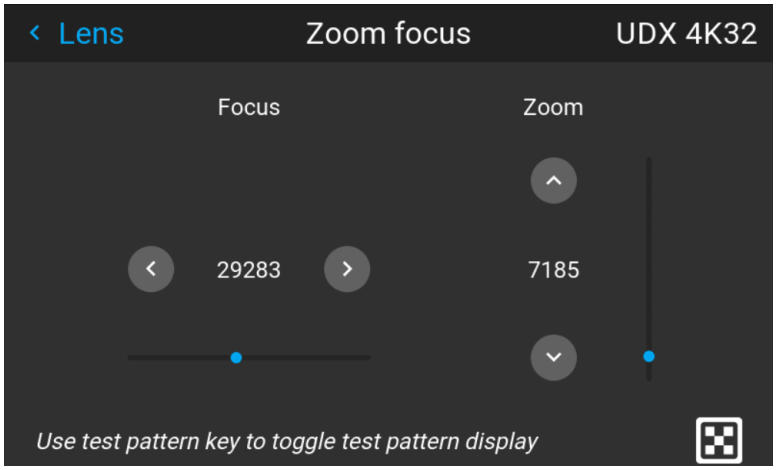


Image 7–7

General

Zoom controls the size of the projected image.

Focus controls the sharpness of the projected image.

Lens zoom and focus adjustments are motorized. You can use the remote control, local keypad, OSD and/or RS-232 commands to adjust the lens zoom and focus positions.

Not all lenses have zoom or iris control. The matrix below shows what controls are available per lens.

	E-N11	E-N12	E-N13	E-N14	E-N15	E-N16	E-N33	E-N41	E-N42	E-N43	E-N44	E-N45	E-N46	E-N47
Iris	✓	✓	✓	✓	✓	✓	✖	✓	✓	✓	✓	✓	✓	✓
Zoom	✓	✖	✓	✓	✖	✓	✖	✓	✖	✓	✓	✓	✓	✖
Focus	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

For best results, lens adjustments should be done in the following order: zoom, focus and then iris (where applicable).

7.2.2 Shift

General

The lenses can be shifted vertically and horizontally to facilitate precise image positioning in single and multiple projector systems. The projector allows for horizontal and vertical shift in both directions. Always place the projector perpendicular to the screen, and use the lens shift to align the picture.

Use the Remote control or the keypad on the Projector to adjust the lens shift mechanism.

Use the left, right, up and down navigational arrows to adjust the lens shift in four directions. This feature moves the picture optically within the shift range of the lens optics.

Press the right key to enable shift, and use the arrow keys on the remote control, or the keypad to move the picture in vertical and horizontal directions.

If not possible to align the projector perpendicular to the screen, due to environment of other, see chapter “Warp – 4 Corners adjustment”, page 78

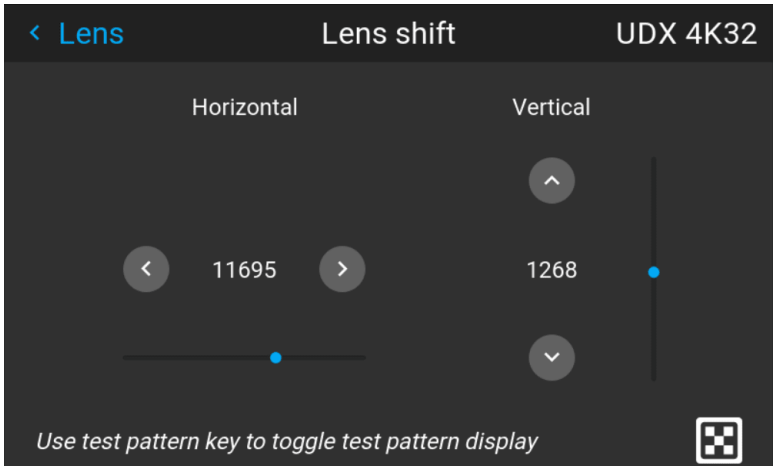


Image 7–8

When EN 68 lens is installed in the projector, there are some limitations in the lens shift range, in order to avoid damage to the lens.
This limitation will be identified as an reduction in the output light from the projector when the shift position exceeds the defined range. The output light will then be reduced to 20% of max.

7.2.3 Shift to center

From remote control

This function adjust the lens position to the mechanical mid position.

Enter the *Menu/installation/Lens/Shift to center*

menu.

Confirm with the ✓ button on the remote control, and the “Lens shift to center position?” pop up windows shows up.

Move the highlighted rectangle to “OK”, and confirm with the ✓ key.

When EN68 lens is installed:
Due to restrictions in light output for the EN 68 lens, the mid position for this lens will not be the mechanical mid position, but the mid position of the area where max light output is allowed.

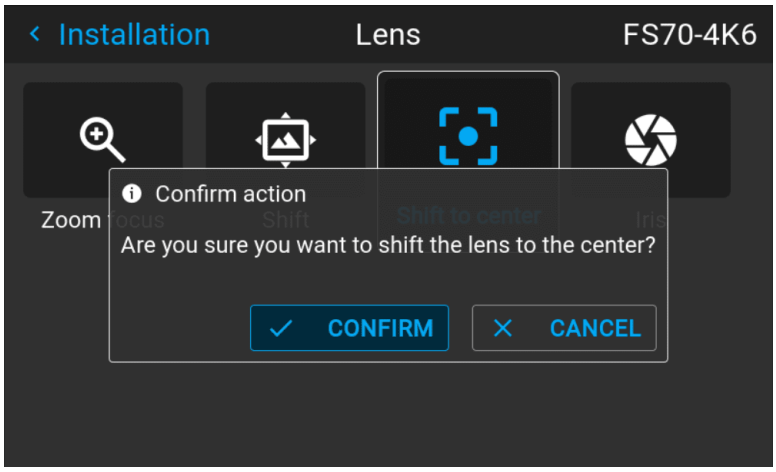


Image 7–9

From the keypad

Press the Lens button on the keypad. A menu picture as shown below shows up.

Press the ✓ button for 3 seconds.

7.2.4 Iris

General

Iris controls the contrast and focus depth of the image, and will also have an impact of the output light.

Decreasing the iris opening will increase contrast and image depth, at the same time as it decreases the output light.

The FL40 / FS40 projectors has two irises; One in the lens, and one in the illumination path. They have both mainly the same function, but with a small difference.

Lens iris

Located in the lens, and will increase the contrast and depth of the focus area when used. Will also have an effect of the output light

Illumination iris

Located in the illumination path, and has less, but still an effect on the contrast and the depth of the focus area, but will to a greater extent have an effect on the amount of output light.

How to adjust iris

Iris control is, as for the zoom and focus control, motorized, and is operated by the remote control or local keypad.

To enter Iris control, enter the *MenuInstallation -> Lens -> Iris*

menu.

The adjustment of the iris is infinitely adjustable.

Use the arrow keys to adjust Iris until preferred rendering is obtained. The numeric value in the menu indicates the degree of opening of the iris.

Value = 0, full opening. (No iris activated).

Increased numeric value indicates decreasing in the iris opening. (Iris activated).

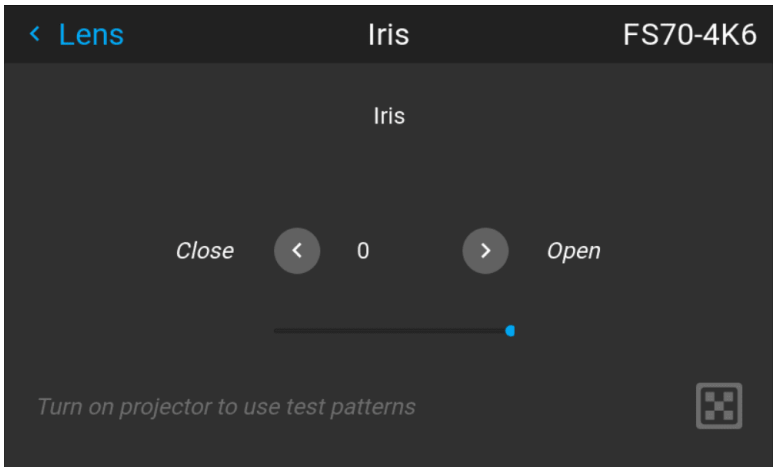


Image 7–10 Iris adjustment shown for illumination iris.

7.3 Scaling modes

General

For the modes Fill Screen and Stretch, the screen size must be defined, see chapter “Warping Screen Size”.

The purpose of the scaling mode is to adapt the image on the screen in an optimal way, based on the desired rendering. The examples below shows a screen format of 2,35:1, and a DMD format 16:10. (WQXGA).

The scaling mode function has four different presets:

- Fill aspect
- 1:1
- Fill Screen
- Stretch.

The illustrations below shows the resolution for WQXGA, and a screen aspect ratio of 2,35:1 (Cinemascope format. But the principle is the same also for other resolutions and screen sizes.(4K, WUXGA / 16:10, 16:9..)

Mode Fill aspect

This mode utilizes as much as possible of the native size of the DMD, and keeps the aspect ratio.

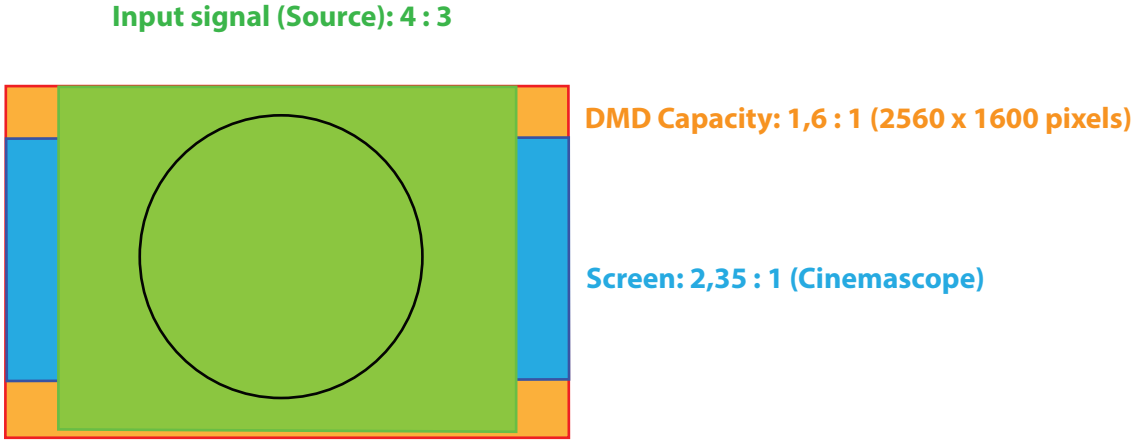


Image 7–11

1:1

This mode is an exact rendering of the source signal, pixel by pixel

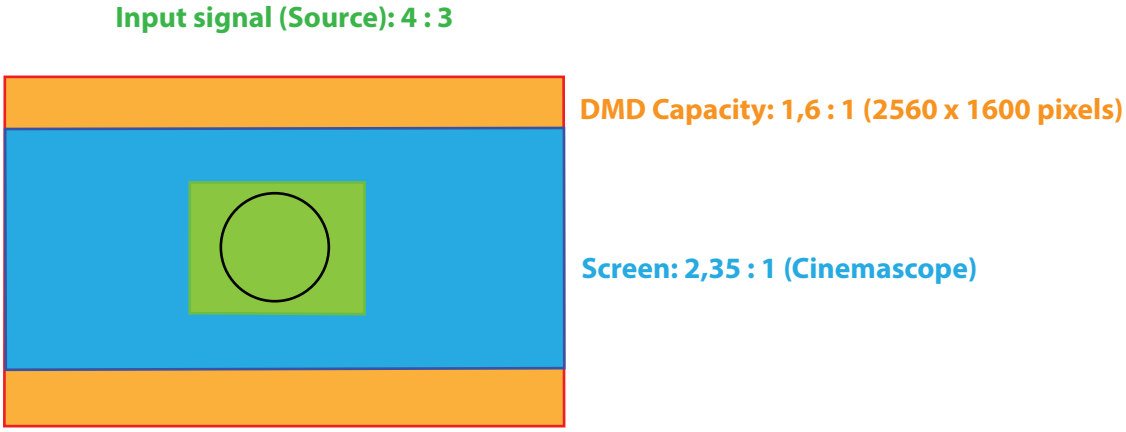


Image 7–12

Fill Screen

This mode utilizes the defined screen size, and keeps the aspect ratio.

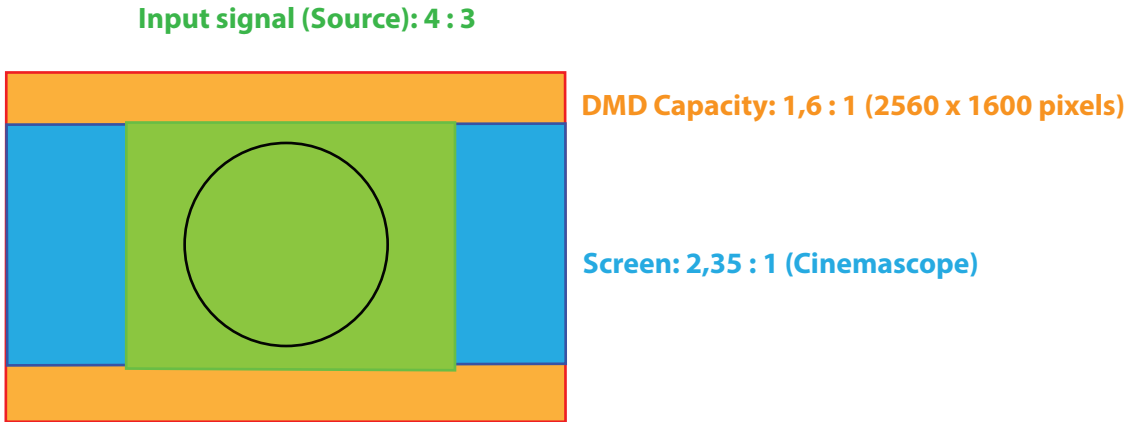


Image 7–13

Stretch

This mode stretch the rendered picture to utilizes the defined screen size. The rendered picture will then be stretched / distorted compared with the source signal.

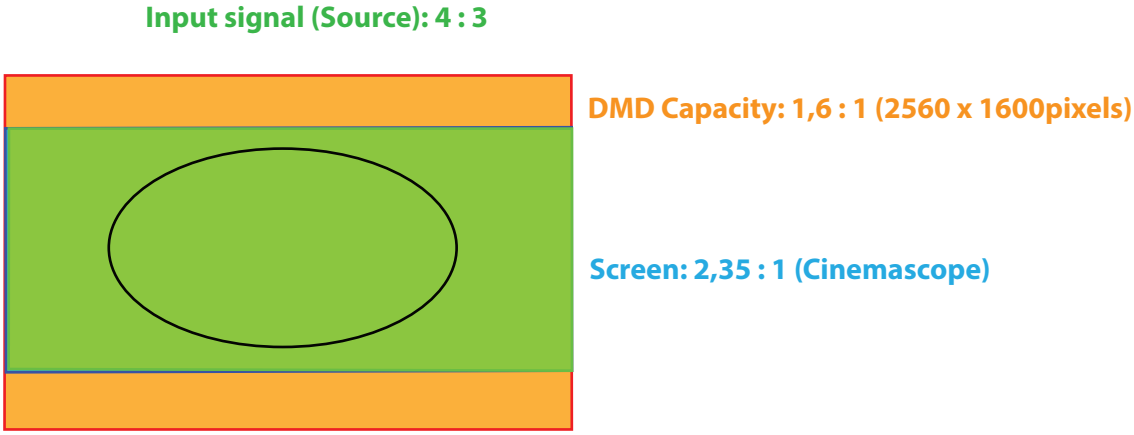


Image 7–14

How to enter.

Enter the *Menu/Installation/Scaling*

menu.

Select the desired mode and press OK button on the remote control or keypad.

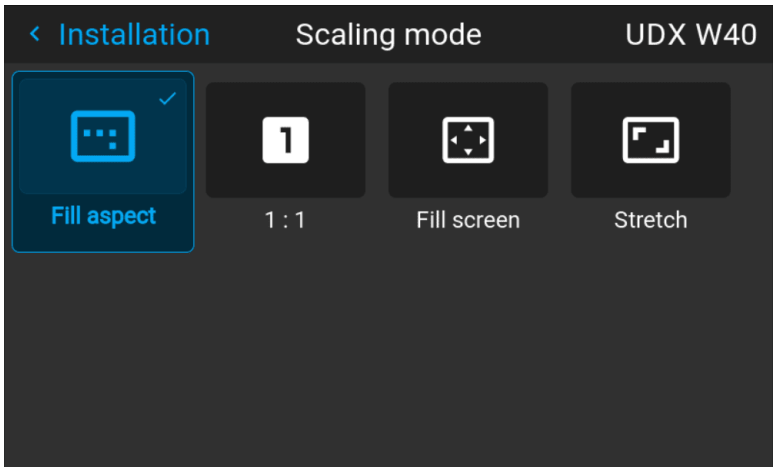


Image 7–15

7.4 Warping

7.4.1 About warping

About

Image warping is the process of digitally manipulating an image to compensate for the distortion of the screen, typically by non perpendicular alignment of the projector versus the screen. The image will then typically occur as shown inImage 7–16.

While an image can be transformed in various ways, pure warping doesn't affect the colors.

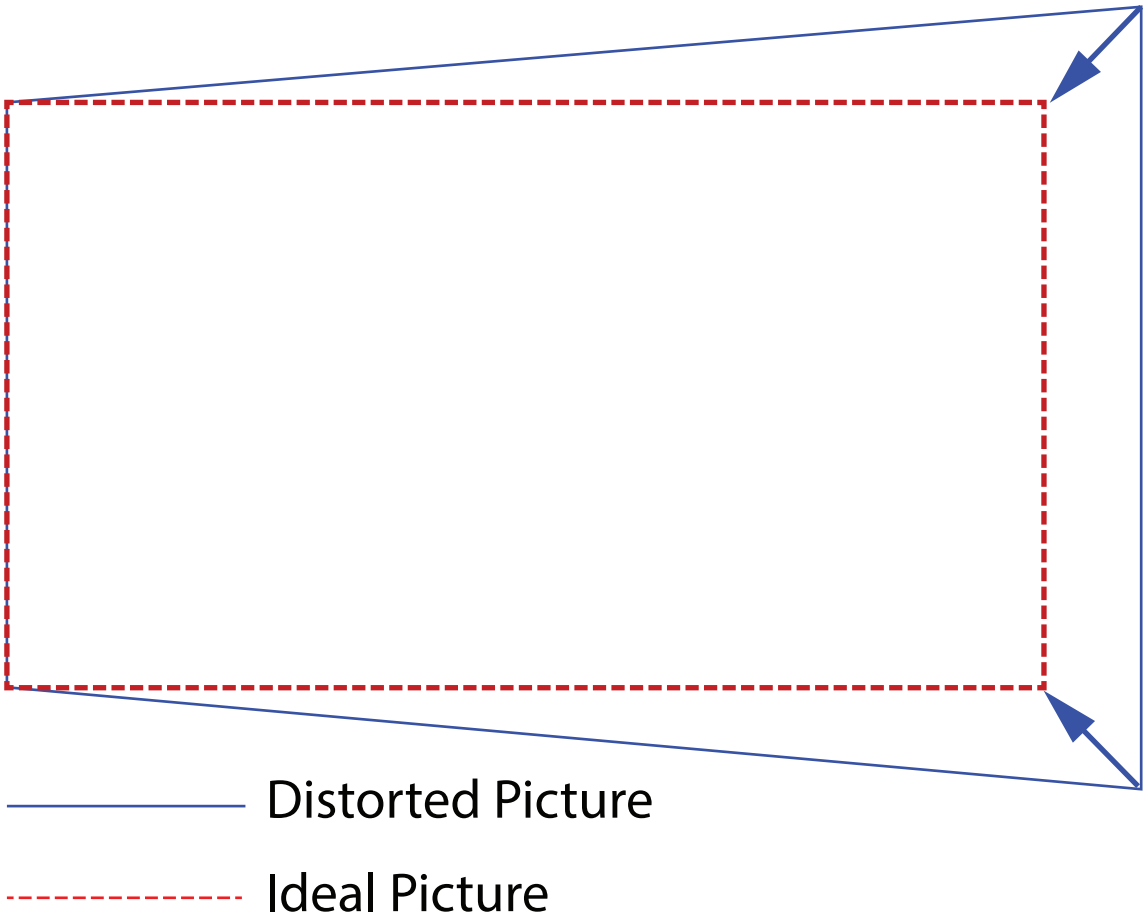


Image 7–16

7.4.2 Warping – On/Off

About warping on/off

By toggling between on and off the warping functionality can be enabled or disabled.

How to toggle

1. In the main menu, select *Installation* → *Warp*.

Image 7–17 Installation menu, warp

The Warp menu is displayed.

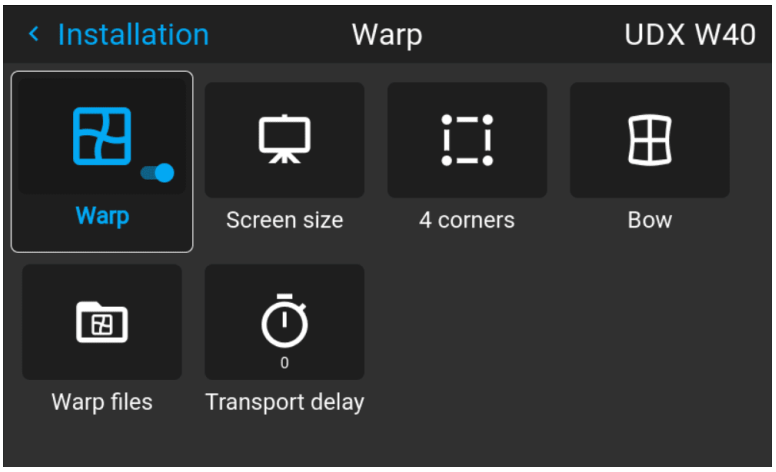


Image 7–18 Example of the Warp menu

2. In the Warp menu, click *Warp* to toggle between *On* and *Off*.

Image 7–19

Image 7–20

7.4.3 Warping – Screen size

About (Warp) Screen Size adjustment

If the used screen aspect ratio is different than the projector aspect ratio, e.g. source is 16:9 and projector is 16:10, then black bars will be projected. In the example case a black bar on top and bottom of the image will be projected. The warp area contains not only the image information but also the black bars. If we want to position e.g. the active left top corner exactly on the screen using 4 corner warp, then it is very hard to do that as we are moving the black left top corner and we do not have control over the exact position of image left top corner. By moving the outline of the warp screen size to the active image information, the corner points of the warp area are now exactly on the corner points of the active image information and makes warping much easier.

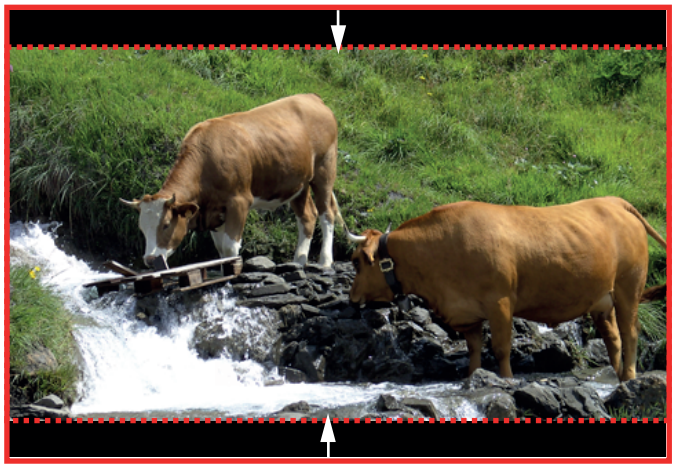


Image 7–21 Warp outline example

How to adjust the image?

1. In the main menu, select *Installation/Warp/Screensize*.

The Screen Size menu is displayed.

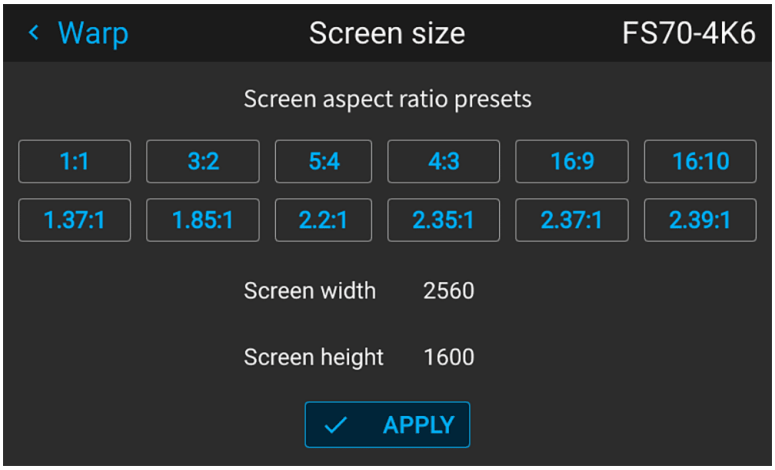


Image 7–22

2. Select the pre defined aspect ratio that suits the aspect ratio of the screen.
3. Set the screen size width and height to match the measurement of the screen.

Note: It is only the ratio between the width and height that is used, so the values may be entered as the screen aspect ratio or actual measurement in cm, inches or any other unit.

Tip: A red border will be projected along with the current image. The border is a visual tool, showing the result of the adjusted outline.

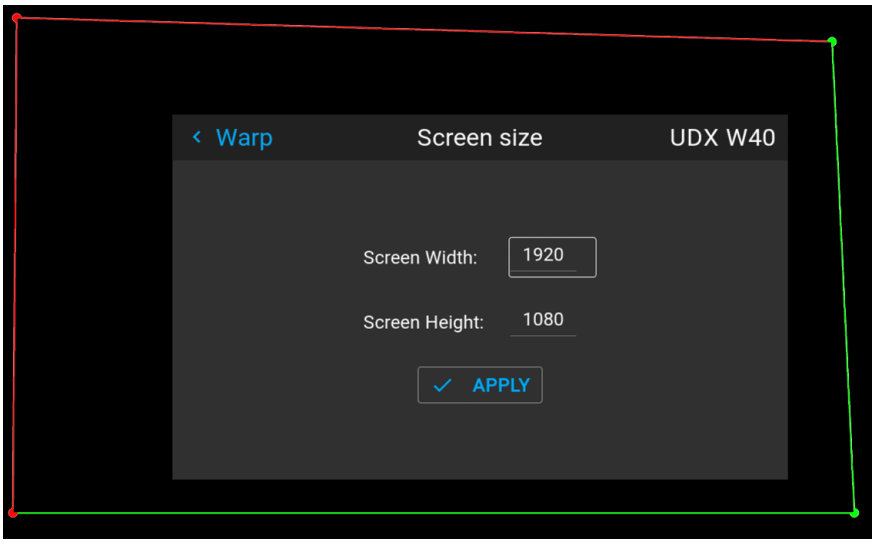


Image 7–23

Tip: The value can also be entered by the numeric keys on the remote control. Press * to delete existing numbers, and enter the new value by the numeric keys.

4. Click **Apply**.

7.4.4 Warp – 4 Corners adjustment

About 4 Corners adjustment

Basically, this type of warping adjusts each of the four image corners in the X and Y direction, if you have a typical trapezoid picture of the screen as shown below.

To have a successful Warp correction, the size of the screen must be entered. See “Warping – Screen size”, page 77

Some examples of pictures when the projector axis is not perpendicular to the screen.:

Image 7–24

How to adjust the image.

1. From the warp menu, select the menu *Installation/Warp/4 Corners*.
2. Select and enter the Helper lines slider. A yellow frame will be visible.
3. To enable the 4 Corners Warping, Set the Warp slider to the right position. (Select and enter).
4. Enable the corner that must be warped (Select and enter). If need for warping several corners, select and adjust the corners one by one.
5. Adjust the value by the arrow keys. The X value is adjusted by the left/right arrows on the remote control, and the Y vale is adjusted by the up/down arrow in the remote control. The value represent the movement of the X and Y coordinates for each corner. When the warping is complete, exit the menu by using the “Back” button.

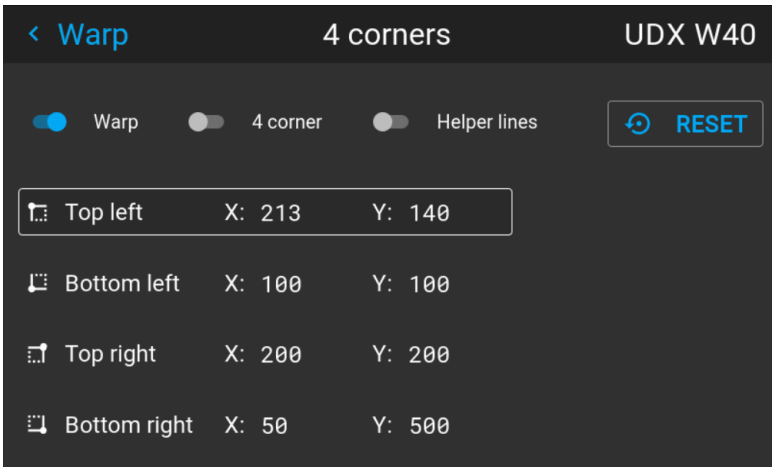


Image 7–25

6. If the picture still has a trapezoid shape, warp is not enabled. Select the *Installation / Warp* menu, and press enter. The slider moves to the right, and the warp status changes to “On”.

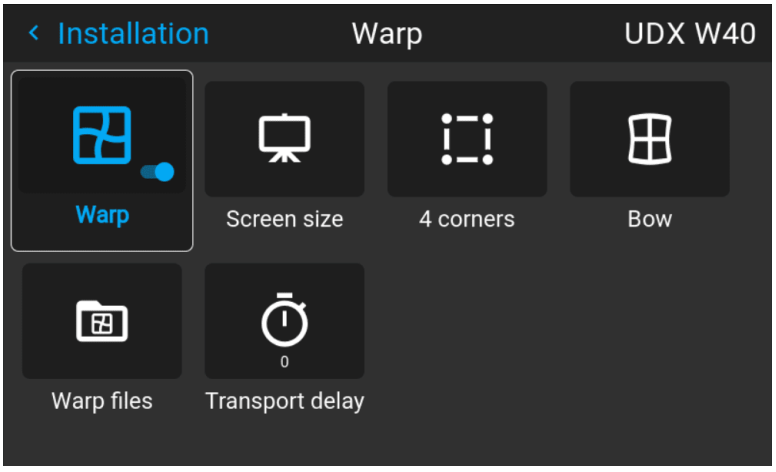


Image 7–26

7.4.5 Warping – Bow

About bow adjustment

A bow distortion can be adjusted so that a normal image is displayed. Positive adjustments angles introduce more outside bow distortion. Negative adjustments introduce more inside bow distortion.

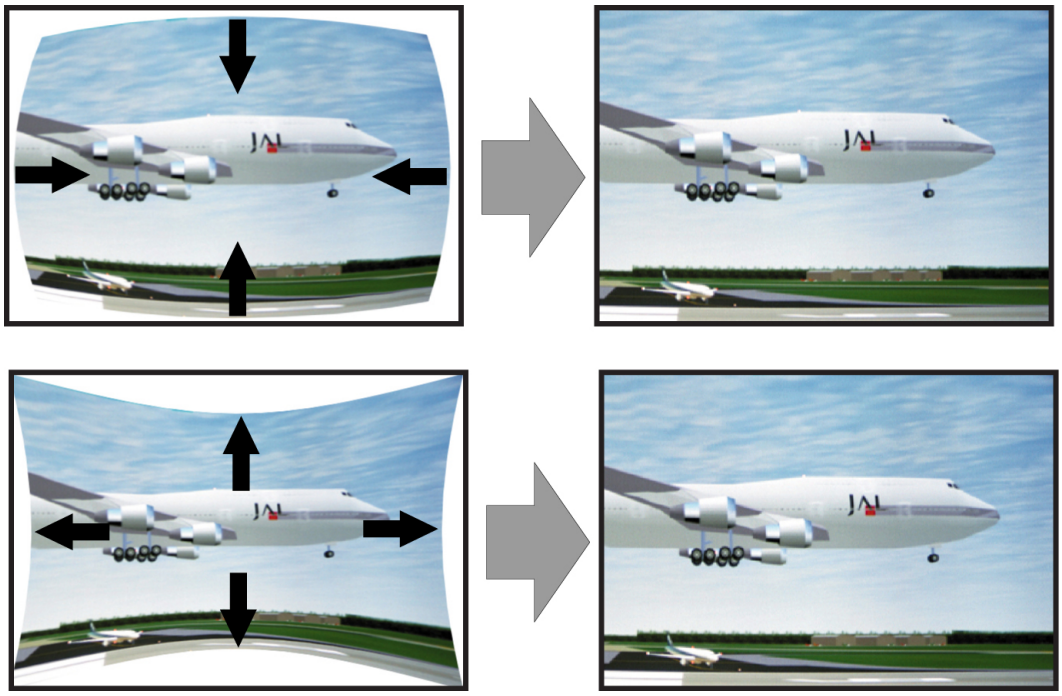


Image 7–27 Bow distortion

Symmetric bow correction

1. In the main menu, select *Installation/Warp*.

Image 7–28 Installation menu, Warp

2. In the Warp menu, select *Bow*.

Image 7–29 Warp menu, Bow

A check symbol at the bottom right corner indicates that the bow function is activated.

When the bow menu is selected, a grid will occur in the screen picture in order to visualize the adjustments performed.

3. To enable Bow correction, make sure the *Bow* slider is set to *On*.

The slider is enabled when set to the right and when it is highlighted blue.

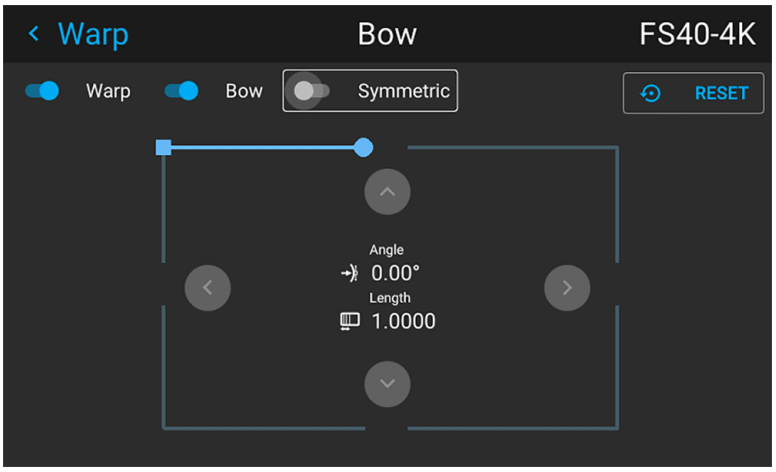


Image 7–30 Symmetric Bow correction.

4. To enable a symmetric adjustment, make sure the *Symmetric* slider is set to *On*.

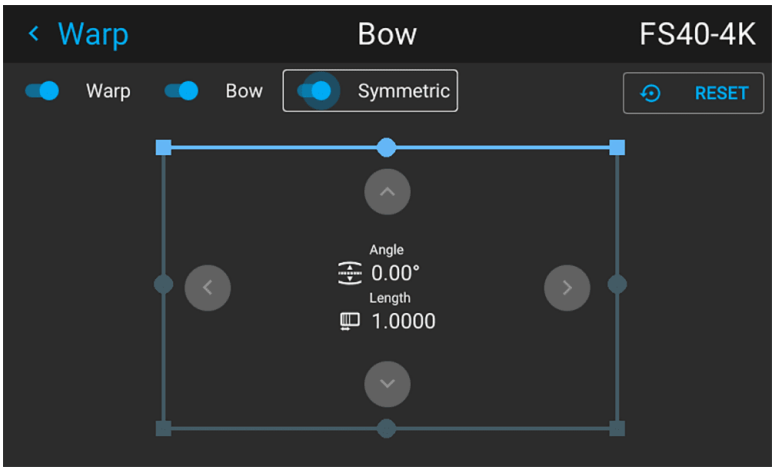


Image 7–31

The slider is enabled when set to the right and when it is colored blue.

5. Select the side of the picture to be bow corrected, confirm by pressing enter, and use the arrow keys to adjust the angle and linearity (length) of the vectors.

   The angle is adjusted by the up and down arrows on the remote control, and the linearity is adjusted by the left and right arrows.

   The correction will occur symmetrically on each side of the center of the highlighted side.

   When corrected with the values in the image above, the picture will occur as shown below.

   Repeat this step for all sides of the picture that has to be corrected.

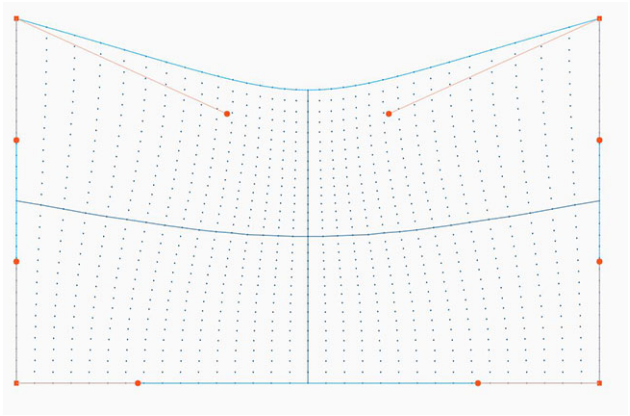


Image 7–32 Symmetric bow corection

Non symmetric bow correction

1. Enter the Bow menu, and disable the symmetric slider.
2. There are now two vectors on each side of the picture that can be adjusted individually. Select each of them, and adjust angle and linearity (length) individually to obtain the correct correction.

   The angle is adjusted by the up and down arrows on the remote control, and the linearity is adjusted by the left and right arrows

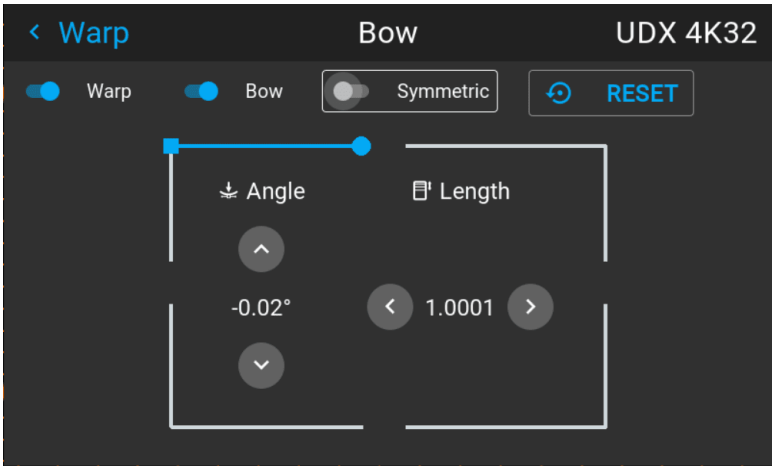


Image 7–33 Left vector of the upper side of the picture.

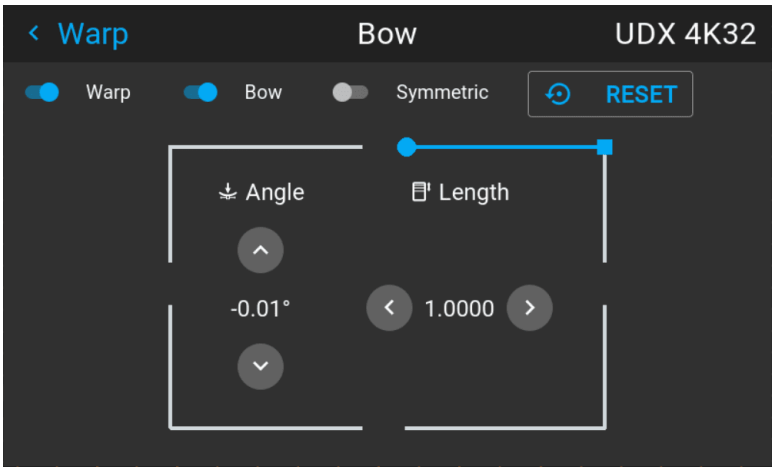


Image 7–34 Right vector of the upper side of the picture.

3. When corrected with values in the illustrations above, the picture will occur as shown below. Observe that the upper side of the picture now has an asymmetric correction.

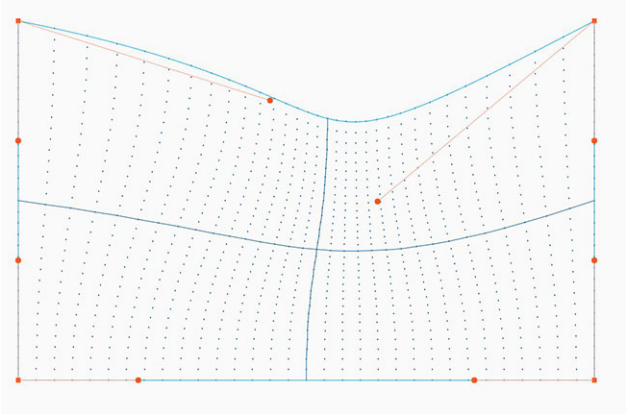


Image 7–35 Asymmetric bow correction

4. Repeat the step for each side of the picture that must be corrected.

Definition of angle and linearity (length) in the bow warp procedure

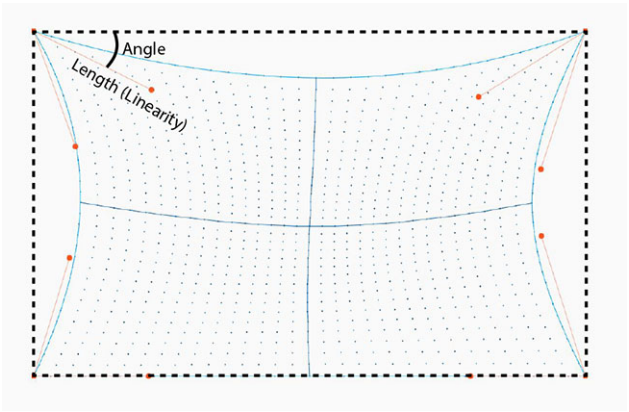


Image 7–36

To reset the bow adjustments, select *Reset* and press the **OK** button.

7.4.6 Warping – Warp files

About custom Warp Files

Next to setting your specific warp configuration in the GUI, you can also upload or download a custom warp grid in XML format to/from the projector. This is a time-saving option when multiple projectors need an identical Warp configuration.

To upload or download warp files you can use Projector Toolset or Prospector tool to upload/download the warp grid in the format of an XML file. Alternatively, you can contact the “file endpoint” directly via the curl program or some other tool that supports http upload.

For more information on uploading/downloading Warp files using the Projector Toolset, refer to the Projector Toolset user manual.

For more information on uploading/downloading Warp files using curl or other tools that supports HTTP upload, refer to the Pulse API Reference Guide.

When uploading a warp file that is too big, or with warp parameters outside the limits of the projector, some irregularities can occur. It will show up in two ways:
1: No warp enabled, picture still unwarped.
2: Distortions and artifacts in the edges of the picture.
There will be no error messages or warnings in the display when this occurs. The above mentioned symptoms is the only indication of this case.

How to activate an uploaded Warp grid?

1. In the main menu, select *Installation* → *Warp*.

Image 7–37 Installation menu, Warp

2. In the Warp menu, select *Warp files*.

Image 7–38 Warp menu, Warp files

The Warp Files menu is displayed.

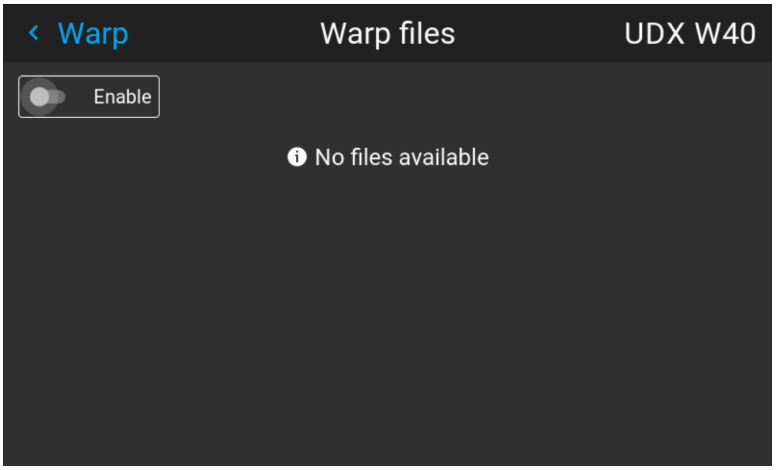


Image 7–39 Example of the Warp files menu

3. Make sure the Enable slider is set to right.
4. Select the desired warp file.

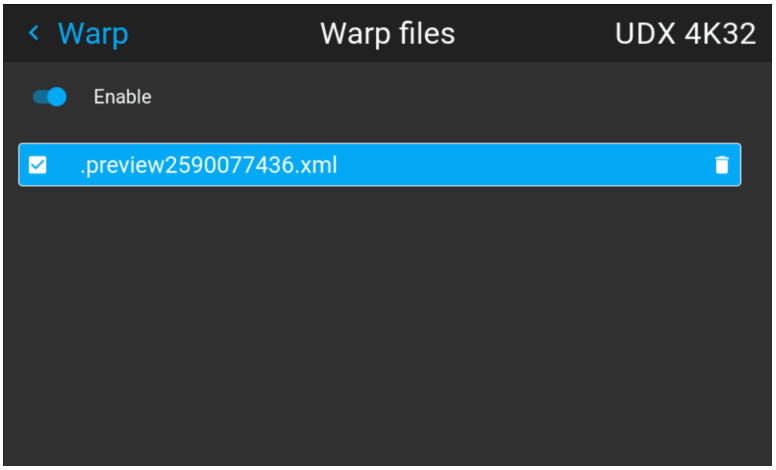


Image 7–40 Example of the Warp files menu

7.4.7 Warping – Latency control in a multi projector setup

Transport latency
The added delay in the image processing chain. The value is the number of lines relative to the output resolution.

Latency
The total time from the first pixel is coming in on an input source, until the first light representing that pixel is visible on the screen. This includes the transport delay. The value is normally given in milliseconds.

Functional description

Every projector in a multi–projector setup will have a different latency. This latency depends on the amount of warp and on the frequency of the projected image. In order to have no visible difference in the overall projected image, the user needs to be able to control the latency of each projector.

The latency value can be read out in the status menu for each individual projector.

How to configure transport delay?

1. Read out and note the latency of each projector in the multi-projector setup. You can find this latency under **Transport delay** in the status menu for each projector.

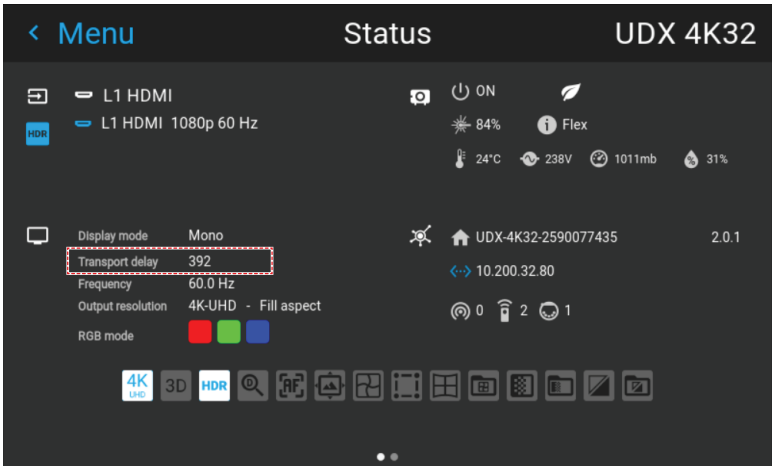


Image 7–41 Example of the Transport delay in the status menu

2. Identify the projector with the longest delay.
3. For each projector in the setup, select *Installation* → *Warp* in the main menu.

Image 7–42 Installation menu, Warp

4. In the Warp menu, select *Transport Delay*.

Image 7–43 Warp menu, Transport delay

The *Transport delay* menu is displayed.

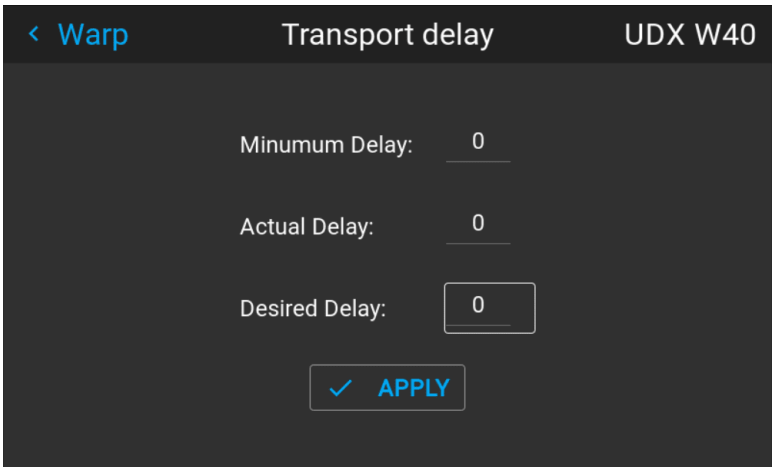


Image 7–44 Example of the Transport delay menu

5. Enter the value either by the arrow keys (one step at a time) or directly by the numeric keys on the remote control.
6. Click *Apply* to confirm the value.
7. Repeat this process for every projector in the setup.

7.5 Blending

7.5.1 Introduction to blend functions

When to use blend functions

When two projectors are used together to make one picture on the screen, the blend function must be activated. This blend function ensures a seamless transition of the images between the two projectors.

The principle is that the light intensity in the blend zone from each projector will be adjusted individually, so that the rendering on the screen are perceived as from one projector.

The blend function can be enabled for both pictures over/under, and pictures side by side.

The blend will not be affected by the projector's warp.

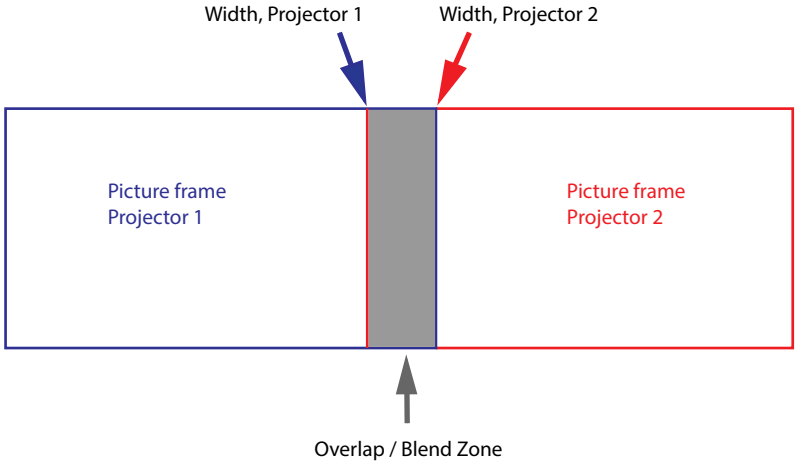


Image 7–45

The Mask adjustments.

The offset adjustments are used to cut the image on each side. Normally used to hide parts of the picture that shall not be shown on the screen. An example can be: If the source is a pc, you may want to hide the menu bar at the bottom of the screen.

7.5.2 Set up the system

How to set up the system

In this chapter, the setup procedure for the projectors is explained, but a setup procedure must also be performed for the picture source.

In order to obtain a satisfying result for the Blend function, the overlap / Blend zone are recommended to be at least 10% of the picture width.

The basic principle is that the overlap setup in the source shall correspond with the blend width setup for the projector. That means that if the overlap zone for the source is set to 500 pixels, the width of the blend zone for the projector also must be set to 500 pixels.

First step is to align the image from the projectors as accurate as possible in a mechanical way, meaning without any optical corrections. At the same time, establish an overlap in the pictures between the two screens.

Then adjust the remaining irregularities by using the shift and warp features in the projectors to obtain the last fine tuning of the alignment.

Setup the source to a blend which corresponds with the preset overlap on the screen. There are different ways to do this, depending on the source. Refer to the source unit's manual for this issue.

Adjust the Blend for the projectors as described below.

7.5.3 Blend mask setup procedure

Blend mask introduction

The blend mask function blends out an area on the outer edges in the picture. This function is applicable when e.g. icons in the toolbar in an image from a pc is to be projected.

The blend mask area will be defined in the blend mask setup process.

Blend mask adjustment procedure

1. Enter the menu *Installation/Blend/Blend mask*

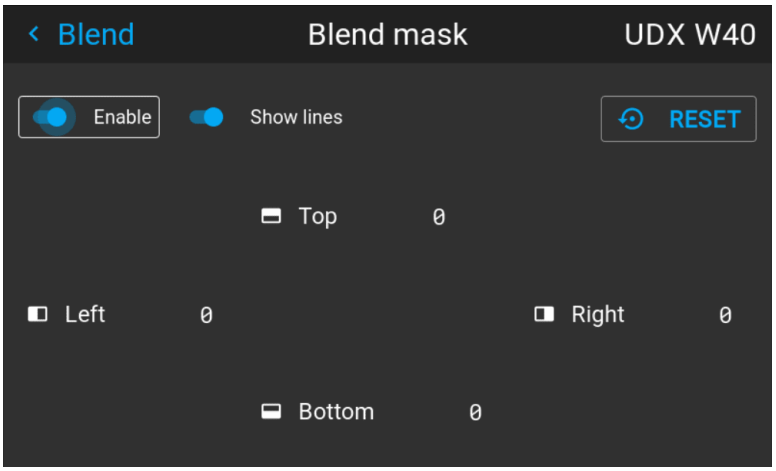


Image 7–46

2. By the arrow keys, place the display cursor on respectively the “Enable” zone and the “Show Lines” zone and activate them by pressing enter.
3. Use the arrow keys to move the cursor to the position that must be masked. and press enter.
4. Adjust the mask area (width) by pressing the arrow keys on the remote control. By pressing the key arrow constantly, the blend value will increase rapidly. The numeric value of the width is shown on both the LCD screen and the OSD. (The number entered represent the blend width expressed in number of pixels).
5. Use the enter key to move the cursor to the next position that has to be masked.

6. Adjust the value by using the arrow keys. (See note below).
7. Repeat step 4 and 5 to adjust the rest of the blending zones.
8. Exit the menu by using the exit button on the remote control.

7.5.4 Basic blend setup procedure

Basic blend adjustment procedure

Entering the Basic blend Adjustment from the *Menu/Installation//Blend and mask/Basic blend* menu, either by the remote control, or the keypad on the projector.

The “Enable” button enables/disables the blend function. The “Show Lines” enables alignment lines on the screen, in order to visualize the overlap/blend zone.

Use the up/down/left/right arrow key on the remote control or key pad to navigate in the menu.

Basic blend introduction

The basic blend function introduce an gradual transition of the light intensity between the edge of the picture and the line defined in the basic blend setup process.

When a blend mask is introduced, the gradient will start from the defined edge of the blend mask.

Basic blend adjustment procedure. Side by side configuration.

1. In the menu select *Installation/Blend/Basic blend*. The Basic blend menu is displayed.

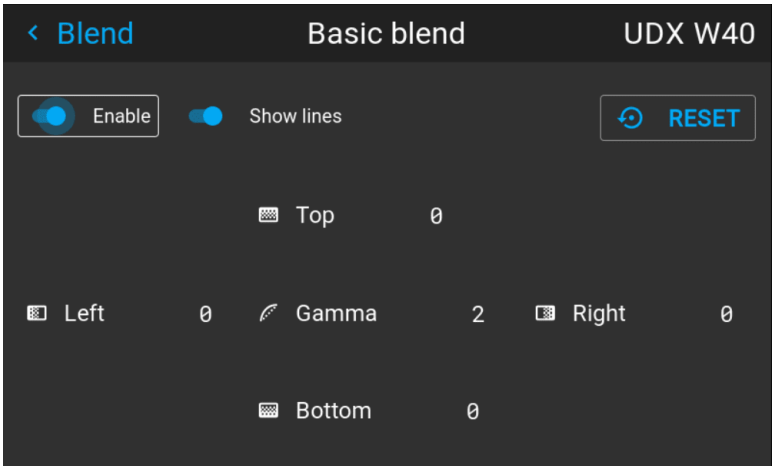


Image 7–47

2. Starting with the left picture: By the arrow keys, place the display cursor on respectively the “Enable” zone and the “Show Lines” zone and activate them by pressing enter.
3. Use the arrow keys to move the cursor to the position that must be blended. and press enter.
4. Adjust the width value by using the arrow keys (See note below), one step at a time. By pressing the key arrow constantly, the blend value will increase rapidly. The numeric value of the width is shown on both the LCD screen and the OSD. (The number entered represent the blend width expressed in number of pixels).
5. Use the enter key to move the cursor to the next position that has to be blended.
6. Adjust the value by using the arrow keys. (See note below).
7. Repeat step 4 and 5 to adjust the rest of the blending zones.
8. Exit the menu by using the exit button on the remote control.

For horizontal blending, use the left/right arrow keys to adjust.
For vertical blending, use the up/down arrow keys to adjust.

Adjustment procedure in over / under configuration.

For Blend adjustments in over / under configuration, the procedure is the same as for side by side, but use the Top and Bottom height instead, and perform a similar procedure.

Use the numeric keys instead of the arrow key to set the values.

Instead of adjusting the lines by the arrow keys, the value can also be typed directly using the numeric keys on the remote control.

To remove or undo the entered numbers, use the * key on the remote control.

7.5.5 Black level setup procedure

Black level introduction

The Purpose of the black level adjustment is to adjust the black levels in the non overlapped areas with the black level in the overlapped areas (Blend Zone).

This is a necessary function, due to the fact that the black level will be brighter in the blend zones, since multiple projectors will add light in these zones.

The width of the black level area shall ideally be slightly larger than the width of the blend zone in order to also compensate for the “sea of mirrors” phenomenon.

The figure below shows how this occurs in a side by side configuration without any correction of the black level.

Image 7–48

Black level adjustment procedure

1. Select the menu *Installation/Blend and mask/Black level.*
2. Enable the ”Black level” and “Show lines” buttons. A line that indicates the blend zones will be visible on the screen when “Show lines” is enabled.

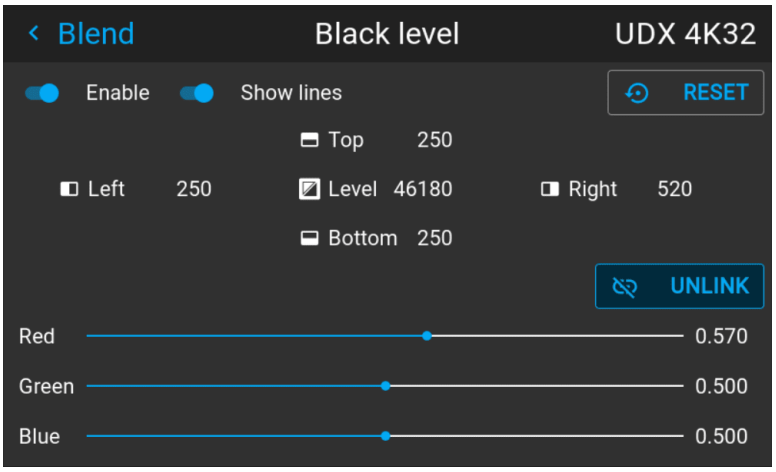


Image 7–49

3. Move the cursor to the side where the overlapped area occurs. (Left/right/top/bottom.) For the left projector, this will typically be the right side in the menu as an example.
4. Press enter, and adjust the value with the arrow keys. The icon shown below will appear on the OSD when the side is selected. The value shall typically be the same as for the basic blend line. (Same numeric value).

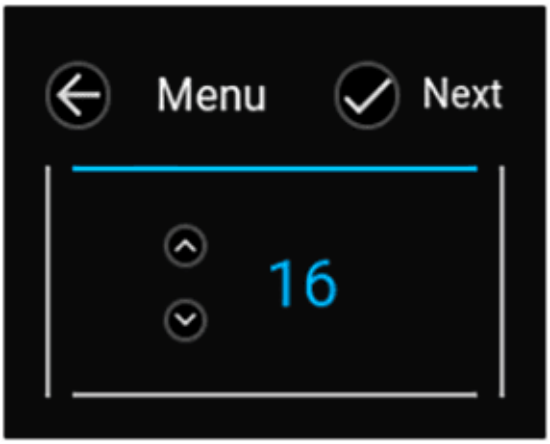


Image 7–50

5. When the value is ok, press enter on the remote control, and the icon on the OSD will jump to the next side. Adjust, and repeat for all sides.
6. When all sides are completed, press “Back” button on the remote control.
7. Move the cursor to “Level”, press enter and adjust this level until the black level equals the level in the blend zone.

   Note: In addition to the black level itself, it is also possible to adjust the color saturation in order to align the projectors in the layout, see procedure “Adjusting the color level” below.

8. Repeat the same procedure for the other projector,
9. Disable the “Show lines” when the Black level adjustment is completed.

7.5.6 Color level adjustment procedure

Color level introduction

When using several projectors in a complete setup, there will always be a slightly difference in the color saturation between the projectors. This is not visible

The purpose of black level correction is to ensure a uniform black level in multi projector setups. Even when two projectors are of the same type, different projectors will output slightly different colors for black due to minor variations in their optical components. So if the projected image of the projectors overlap, there will be 3

different black levels: one for the zone where only the picture of the left projector (zone 1), one for the Blend zone (zone 2), and one for the zone where there is only the picture of the right projector (zone 3).

Image 7–51

How to perform an RGB adjustment

1. In the main menu, select *Installation* / *Blend and mask* / *Black Level* for all projectors in the setup.

   The Black level menu is displayed, containing the sliders for color adjustment.

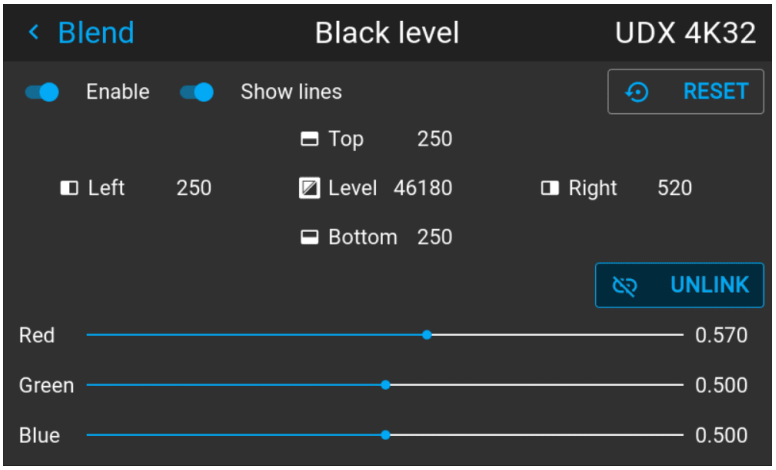


Image 7–52

2. Use “black” test picture for the projectors.
3. Observe manually the color saturation from each projector unit, and identify the difference.
4. If one projector, as an example, has more red in the test picture, select the red slider in the black level menu for this projector and adjust the slider with the arrow keys to obtain a similarity in the rendering.
5. Repeat for every projector and color until the desired result is achieved on screen.

7.5.7 Black level files

Black Level Files introduction

Next to setting your specific Black Level Adjustment in the GUI, you can also upload or download a custom Black Level adjustment file in png, jpeg or tiff format to/from the projector.

To upload or download Black Level masks you can use the Prospector tool. Alternatively, you can contact the “file endpoint” directly via the curl program or some other tool that supports http upload.

For more information on uploading/downloading Black Level files using the Prospector, refer to the Prospector user manual.

For more information on uploading/downloading Black Level files using curl or other tools that supports HTTP upload, refer to the Pulse API Reference Guide.

How to activate an uploaded Black Level adjustment file?

1. In the main menu, select *Installation / Blend and mask / Black level files*

Image 7–53 Blend menu, Black Level Files

The Black Level Files menu is displayed. Files will be listed in this window

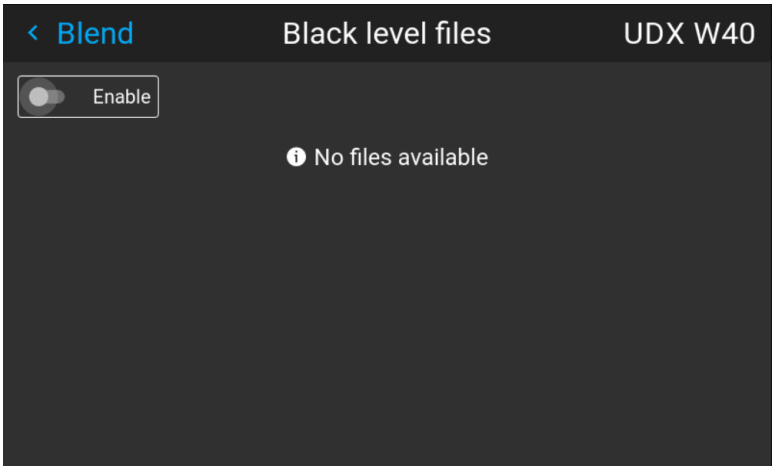


Image 7–54

2. If any custom Black Level adjustment files are available, select the desired file.
3. Click on the on/off button on top to activate the selected Black Level adjustment file.

7.5.8 Blend files

Blend files introduction

Next to setting your specific Blending configuration in the GUI, you can also upload or download a custom Blend configuration file in png, jpg or tiff format to/from the projector. This is a timesaving option when multiple projectors need an identical blending configuration.

To upload or download Blend masks you can use the Prospector tool.

Alternatively, you can contact the “file endpoint” directly via the curl program or some other tool that supports http upload.

For more information on uploading/downloading Blend files using the Prospector, refer to the Prospector user manual.

For more information on uploading/downloading Blend files using curl or other tools that supports HTTP upload, refer to the Pulse API Reference Guide.

How to activate an uploaded Blend configuration file?

1. In the main menu, select *Installation / Blend and mask / Blend files*

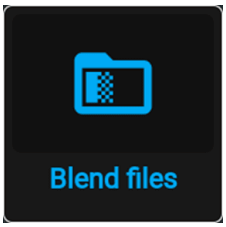


Image 7–55 Blend menu, Blend Files

The Blend Files menu is displayed.

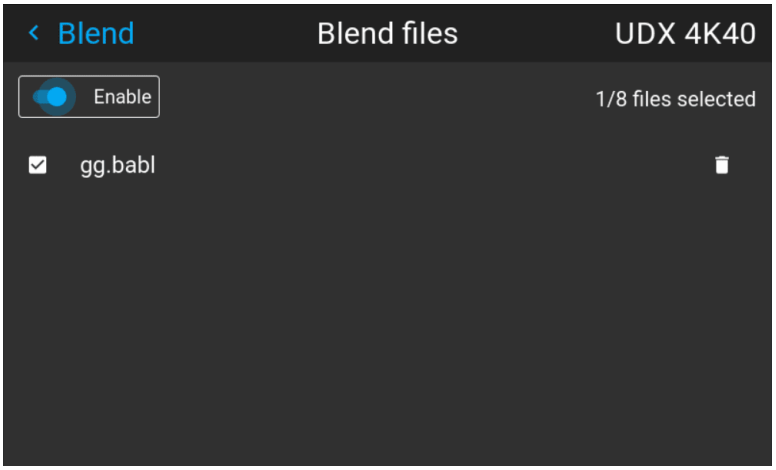


Image 7–56

2. If any custom Blend files are available, select the desired file.
3. Click on the on/off button on top to activate the selected Blend file.

7.5.9 Advanced blend

Description

The Advanced Blend Function is intended for blending in complex shapes in multiprojector installations.

Due to the complexity, a separate manual has been prepared for this subject, and can only be performed by an authorized installer. There is no user interface for this function.

7.6 CLO feature

7.6.1 Introduction

Introduction

The CLO (Constant Light Output) is a Barco Pulse software feature for maintaining a stable light output from the projector over time, by automatically adjusting the light source. The CLO feature utilizes a light sensor placed internally in the projectors light path.

7.6.2 Placement of the light sensor

Placement of the light sensor

The light sensor is placed after the illumination iris. This means that the CLO feature will be impacted by the illumination iris position. The lens iris, due to its placement in the lens outside the projector, does not impact the light sensor, and thus neither the CLO. Changing the lens iris will have an impact on the light output of the projector for which the CLO cannot compensate.

7.6.3 Using the CLO features

7.6.3.1 CLO feature in the OSD, Prospector and API

CLO feature in the OSD

Navigate to *Installation — Illumination*

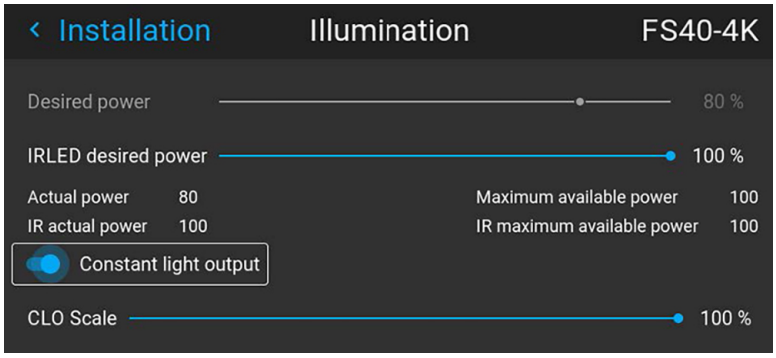


Image 7–57

CLO feature from Prospector

Navigate to *Settings — Illumination*

Image 7–58

CLO feature from API

- illumination.clo.engage
  - Enables the CLO and creates a new set-point for the CLO
- illumination.clo.enable
  - Enable the CLO: “value”:true
  - Disable the CLO: “value”:false
  - This command enables the CLO while keeping the previous set-point for the CLO

7.6.3.2 Notifications applicable for the CLO feature

Info

- L8000b Illumination clo mode {0}
  - Modes: Enabled or Disabled
- L8000c Illumination CLO target set to 0
  - Value refers to the set-point of the CLO

Warning

- L8000a Illumination clo unable to maintain the desired light output
  - Explanation: The light source power is at its maximum and can no longer maintain the desired light output
- L8000d Illumination cli light measuring failed
  - Explanation: The CLO failed while trying to measure the light on the light sensor, either when enabling the CLO or during CLO operation

7.6.3.3 Example for using the CLO feature for maintaining brightness over time

Maintaining the brightness

- Adjust lightsource power to desired setting, e.g. 80%
- Enable the CLO
- The projector will maintain the brightness at 80%

The CLO adjusts the power to the light source to maintain the light output over time. As there is a degradation over time in both optical components and light source, the time frame the CLO can maintain the light output is dependent on how much initial headroom is available. I.e. if the power is set to 90%, the initial headroom will be more quickly spent by the degradation and the time frame for which the CLO can keep the desired brightness will be lower than for e.g. starting at 80%. See example below.

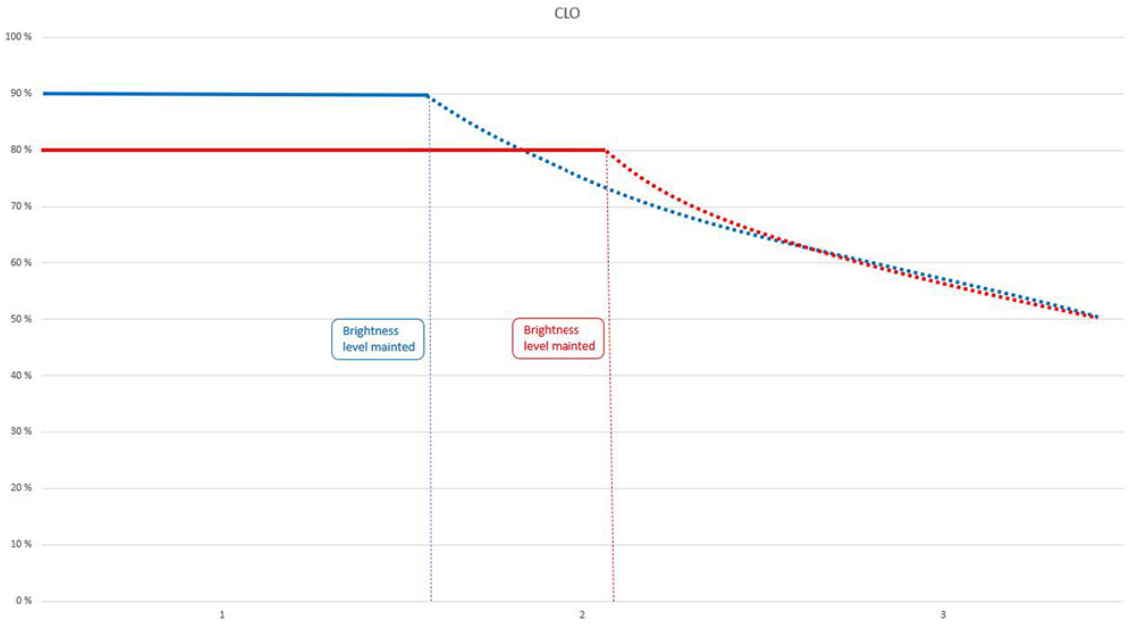


Image 7–59 The time scale is only used as an example and does not represent real-life data.

The time scale is only used as an example and does not represent real-life data.

7.6.4 CLO scale

7.6.4.1 CLO scale

CLO scale

The CLO scale feature enables linear dimming. The light source power of the projector is not linear, so adjusting it to e.g. 50% could result in a different light output than the desired 50% of the initial light output. The lack of linearity could result in it deviating up to 5% from the desired target. The CLO scale ensures that the dimming scale is linear, meaning that the desired output level of the light source will be the same as the setting in the projector.

Having the light source power dimming linear also enables it to be used to set the same power value to multiple projectors.

The same prerequisites apply for this feature regarding the degradation of the light source and the initial set-point chosen for the light source power.

The CLO scale can be set and / or monitored using the property:

- illumination.clo.scale

CLO, typical user cases

To linearly dim the projectors and / or using the same dim value on all projectors in a multi-channel configuration when e.g. going from a day scene to a night scene.

7.6.4.2 Example: CLO scale with one projector

Example: CLO scale with one projector

- Light output: 5000lm.
- Adjust the light output from the projector to 80%.
  - The projector now has a maximum light output of 4000 lm
- Enable CLO scale
- Light output at different CLO scale settings
  - 100: 4000 lm
  - 75: 3750 lm
  - 50: 2000 lm

7.6.4.3 Example: CLO scale with 3 projectors

Example: CLO with 3 projectors

- Light output:
  - Projector 1: 5000 lm
  - Projector 2: 4900 lm
  - Projector 3: 4800 lm
- Match the light output of the projectors using the standard light source power feature.
  - Using 80% of Projector 3 in this example, all projectors now have a light output of 3840 lm
- Enable CLO.
- The CLO scale can now be used to set the light output to the same value on all projectors as the CLO has been enabled on the same actual light output from all 3 projectors.
  - Note that the CLO scale value must be sent separately to all 3 projectors.

7.6.5 CLO stable signal

Signal stability

The light sensor, providing the CLO feature with data, requires time to stabilize when changing the light source power in large steps using the CLO scale, e.g. from 80% to 20% when going from a day scene to a night scene. This could cause an issue if the projector is used for training before the light output has stabilized.

When the CLO is enabled, a signal called hasstabilized will be available. The signal tells the user if the CLO is stable or is still in a state of change, trying to obtain a stable light output.

The CLO hasstabilized signal only works when actively changing the CLO scale.

Rationale:

The CLO will change the light source power in small steps given the criteria: "average of measurements the last 10 seconds shall not differ more than 0.75% from the set-point". This to maintain the desired light output. From a user perspective no interaction has been made with the projector, so a change to the hasstabilized signal in this case would not make sense.

The functionality presented in a Given-When-Then format.

Given	When	Then
CLO is enabled	No adjustment to CLO scale is done	hasstabilized = true, even when internal adjustment is needed to obtain the current setpoint for the CLO
CLO is enabled	CLO scale value is being changed	hasstabilized = false, while adjusting CLO scale
CLO is enabled	CLO scale value has been changed	hasstabilized = true, when the CLO output has stabilized

The hasstabilized signal can be monitored using the property:

- illumination.clo.hasstabilized
  - "result": true
  - "result": false
- Requires power user access

7.6.6 EWMA

EWMA

This is the average of the measurements on the light sensor, used for controlling the CLO feature.

EWMA can be monitored using the property:

- illumination.clo.ewma
  - “result”: a value, without a defined unit

7.6.7 Setpoint

Setpoint

This feature enables the user to set the desired value directly. As no max value is given Barco recommends using the CLO scale if different output power settings are needed when using the CLO.

The setpoint can be set and/or monitored using the property:

- illumination.clo.setpoint

7.6.8 CLO (Light sensor) calibration

This process is only implemented for the F70 and F90 series projectors, valid from SW 2.2.

Light sensor calibration

The CLO is calibrated from the factory and re-calibration is not expected to be necessary. In the unlikely event that the CLO would need to be re-calibrated, please log in as a Power user in Prospector and go to Service→Light sensor calibration and follow the steps to calibrate the CLO.

7.7 IR / Night vision functionality

About

IR / Night Vision functionality is only available for the FS40 variant of the projector..

In combination with Night Vision Goggles (NVG), this will give a realistic rendering of the environment. This will visualize in a realistic way, night time, dusk and dawn, and limited visibility scenarios.

The IR light source has a wavelength of 740nm

How to enable IR/Night Vision.

To set up the IR illumination, enter the menu*Menu/Installation/Illumination*menu. This menu shows two sliders; one for the LED Desired power (daylight), and one for the IR LED Desired power (Night Vision). The sliders are scaled from zero – 100% power.

Image 7–60

Select the Desired power slider, and move the slider to the left by the arrow keys to nearly 0% to reduce the light intensity. (Daylight visibility). By this, the IR LED will be dominant, and the image on the screen will be visible with the Night Vision Goggles. Put on the goggles, and adjust the IR LED slider to obtain an optimal night vision rendering.

By mixing the intensity (power) of both the Desired power and the IR LED, it is also possible to simulate other visibility scenarios, such as evening / early night vision.

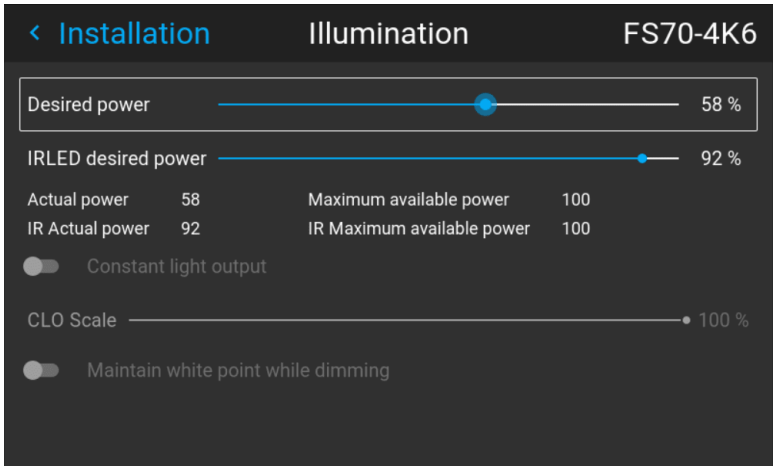


Image 7–61

When enabling IR mode (Night Vision), the Vizsim Bright will be set as default. If another approach to IR (Night Vision), is performed, e.g. by selecting Auto Stereo Mode and at the same time turn off the LED's, Vizsim Bright must be set manually."Brilliant color", page 63 If not then set to Vizsim Bright, the picture will be distorted.

Disable this functions in IR mode

The Vizsim Bright mode will not cause this distortion.

Lightsource and DMD lifetime versus ambient temperature.

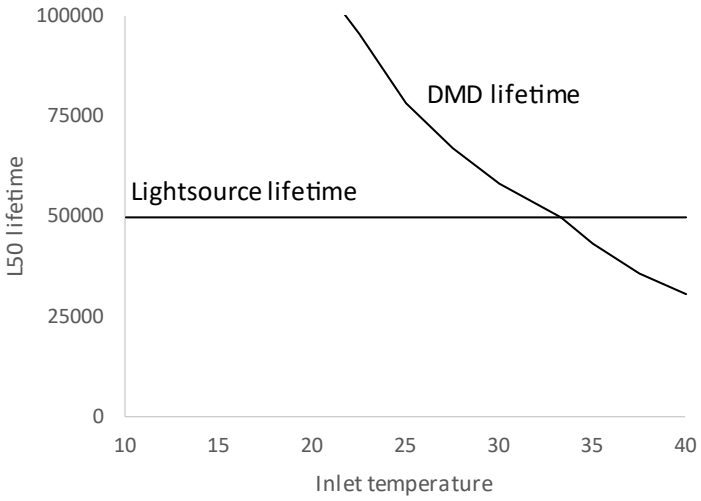


Image 7–62

7.8 Illumination

About

The LED slider is only available for the FS variant of the projector..

How to reduce the output light

In the menu, select:*Installation -> Illumination*

The actual illumination setting is indicated in the menu.

Enter the menu, and use the sliders to adjust.

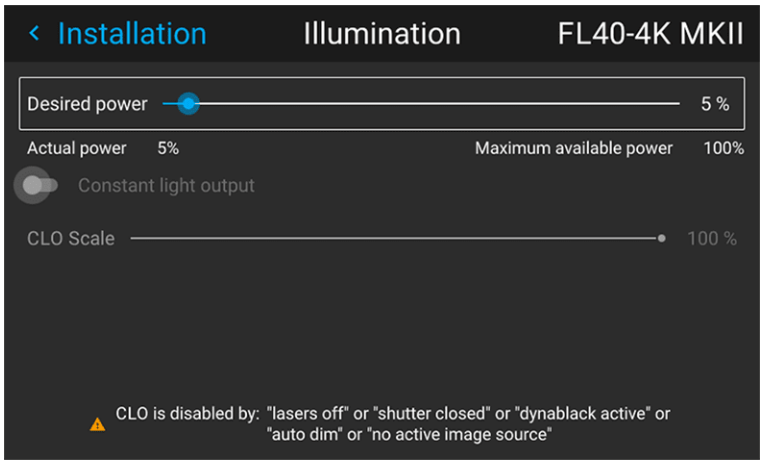


Image 7–63

7.9 3D setup / IG pixel shift

About

All sub-menus, except from the IG Pixel shift, are described in other topics in this manual, where they more naturally belong.

7.9.1 IG pixel shift

General

IG pixelshift is a feature where the Image Generator can process the image in two channels.

This two input channels have different positions of the pixelshift module. Channel 1 is displayed with module position 1, and channel 2 is displayed with position 2. The result is a 4K rendering of the displayed image.

Max frequency pr channel is 60 Hz.

Only DVI or Displayport inputs on the projector can be used for this purpose.

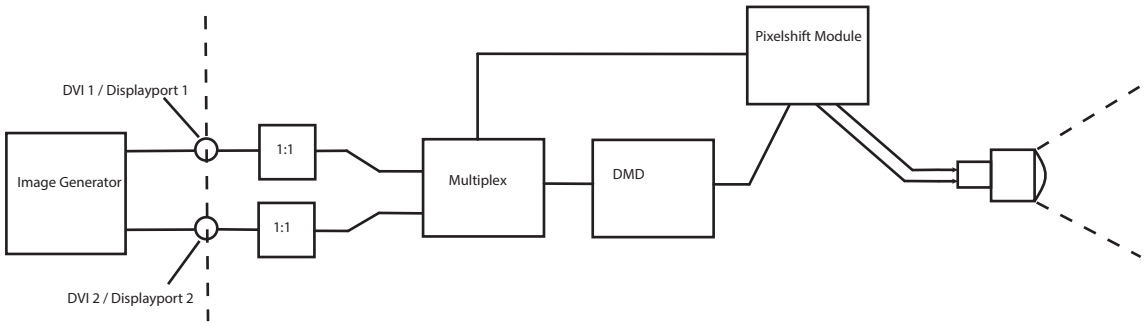


Image 7–64 IG Pixelshift. Principle of operation.

Preparations

Perform the necessary setup of the external image source. (Image Generator).

Connect to DVI 1/2 or Displayport 1/2.

Enable IG pixel shift

1. Enter the menu *Installation/ 3D setup*

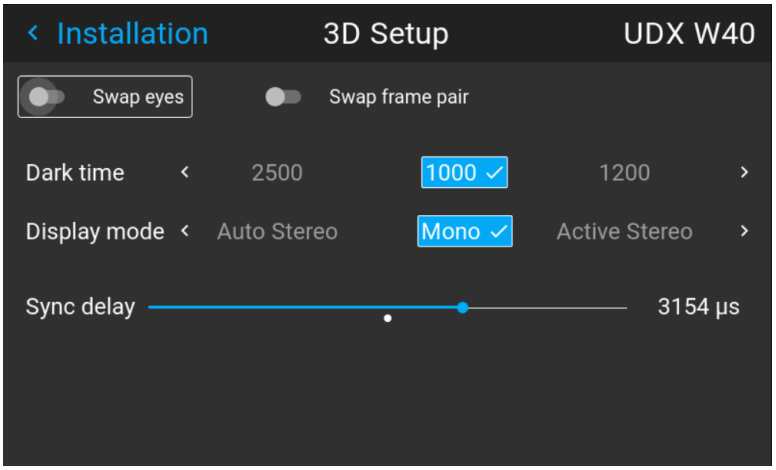


Image 7–65 Display setup Menu

2. Use the up / down arrow keys on the remote control to move the cursor to the “Display mode” position.
3. Use the left/right arrow key to scroll to IG pixelshift.
4. Select by pressing enter.

Status menu

When IG pixelshift is enabled, it will be visible in the Status Menu. (Scroll down a bit to see it), and also in the LCD Information display.

7.9.2 IG Pixelshift Night Vision

General

In addition to IG pixelshift for daytime environment, the IG pixelshift Night Vision (NV) also includes the functionality for running the pixel shift module when one of the input channels are used for IR content visible through NV goggles.

This also includes a function of swapping visible light / IR light between the two inputs. This switch is default set to IR channel being DVI1/DP1 and visible light being DVI2/DP2 as it is today This can be useful to swap those two due to the fact that the input DVI1/DP1 has a lower latency than the DVI2/DP2.

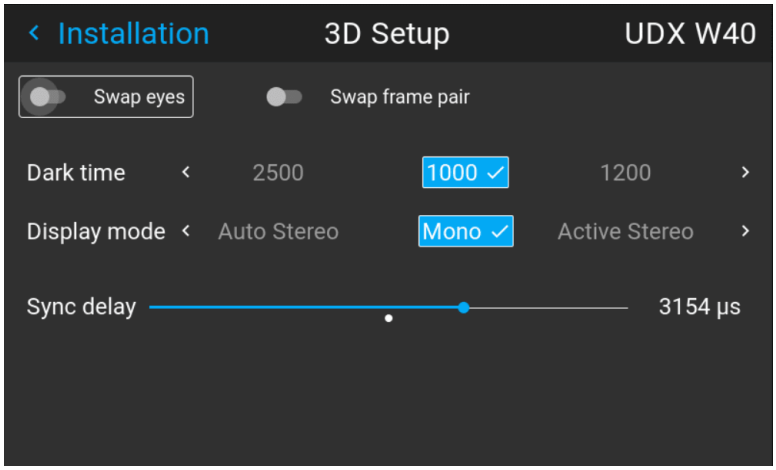


Image 7–66

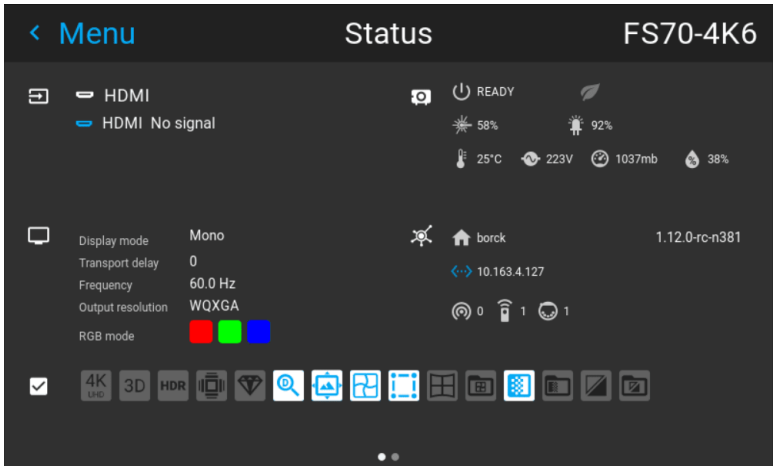


Image 7–67

7.9.3 AutoStereo (3D) Setup

Enabling 3D mode

See chapter “3D”, page 135 for 3D mode setup

8 GUI – Profiles

8.1 Profiles introduction

About Profiles

The profile function makes it possible to store different profiles / projector setups for different use cases, and quickly recall them when needed. This means that it is not necessary to enter a lot of different menus to adjust the projector setup for specific recurring use cases. Due to the limited nature of this function and to avoid terminology confusion with more complex macro's, these are not called "macro's", but "profiles".

A few examples of different user cases are:

- Building temporary gaming setups in bright auditorium-level environment, versus a darker "gaming room" or "cave".
- Playing content from an old DVD versus playing the latest release from an HDR-coded Blu-Ray.
- A rental projector that can be rented out for business presentations, concerts and other events that have different but recurring forms of content.

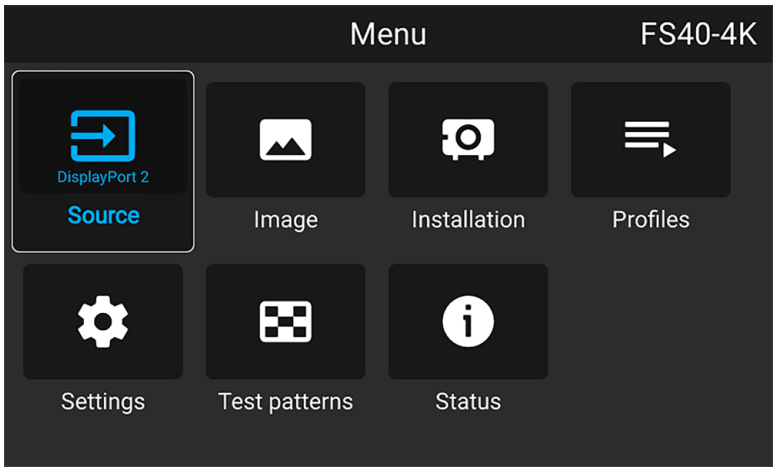


Image 8–1

Available profile settings

The following projector settings can be saved to a projector profile:

Profile domain name	Settings saved
Illumination	• Illumination power of light source • Light sensor enabled / disabled • Light sensor set point
Source	Active source selection & EDID
Image	• Contrast • Brightness • Saturation • Sharpness • Gamma • Used gamma type • Digital zoom (width / height / factor + enabled/disabled) • Digital shift (x / y + enabled / disabled) • Output resolution
Display (3D settings)	• 3D Display mode used • Swap eyes on / off • Swap frame pair on / off • Dark time and sync delay values
Realcolor™	• Brilliant Color mode (if available) • P7 desired values • P7 measured values

Profile domain name	Settings saved
Warp	• Warp status enabled / disabled • Screen size • Warp file selected (if available) • Transport delay **Note**: Bow and 4 corners warp cannot be saved.
Blend	• Blend mask enabled / disabled • All Masks (top / bottom / left / right) and heights (top / bottom / left / right) • Blend files enabled / disabled (if available) • Blend file selected (if available)
Black level	• Black level file enabled / disabled • Black Level file selected (if available) • Basic black level enabled / disabled • Black level settings (top / bottom / left / right) • RGB gain values (Red, Green and Blue values)
HDR	• Screen luminance (unit and value) • HDR Boost value • DynaBlack mode
Installation	• Lens parameters (lens zoom, focus, shift and iris (if available))[1] • Orientation (mounting & projection) • Scaling mode • Position of motorized frame (if used). • Shutter status (open or closed).
Cooling[2]	Selected Cooling mode
Operational mode[3]	Selected Operational mode

8.2 Saving the current projector settings in a profile

Make sure the projector is fully configured as desired before saving the settings.

How to save the current projector settings?

1. In the main menu, select *Profiles* → *Edit*.

Image 8–2 Profiles menu, edit

The Profile edit menu is displayed.

1. only valid if recalled with same lens
2. Only if external cooler is installed
3. Only for applicable models

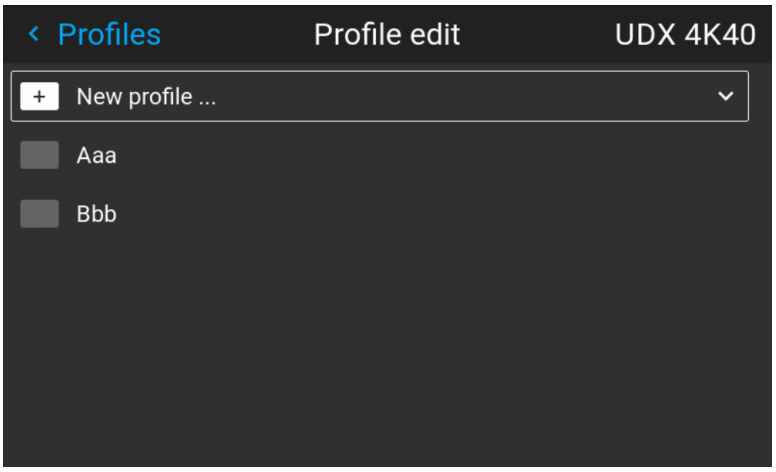


Image 8–3 Profile edit menu

2. Use the arrow keys to select *New Profile...* and confirm.

   The New Profile pane is expanded and fully displayed.

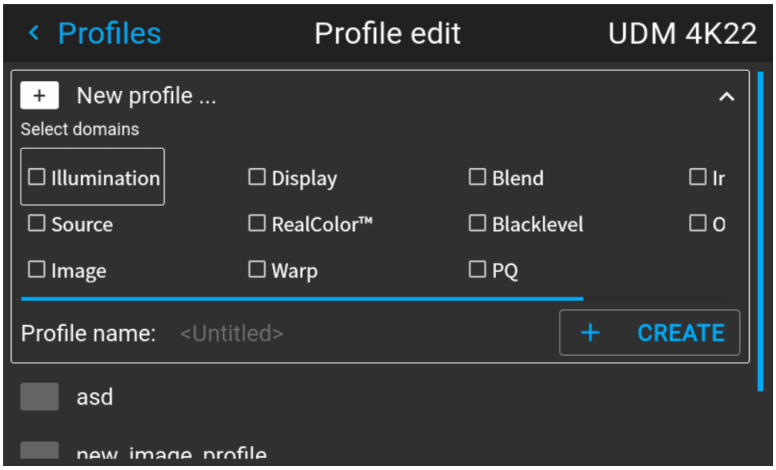


Image 8–4 Example of the new profile pane

3. Use the arrow keys and the **OK** key to select any of the settings you wish to save in this macro.
4. Select the field next to *Profile Name* and confirm with the **OK** key to make a keyboard prompt on the projector display.
5. Use the keyboard on the display to enter a valid macro name. Confirm with the enter key once completed.
6. Select *CREATE* and confirm to save the current profile settings.

8.3 Assigning a created projector profile to a preset

This procedure assumes you have created at least one projector profile. .

How to assign a projector profile to a preset

1. In the main menu, select *Profiles* → *Edit*.

Image 8–5 Profiles menu, edit

The edit menu is displayed.

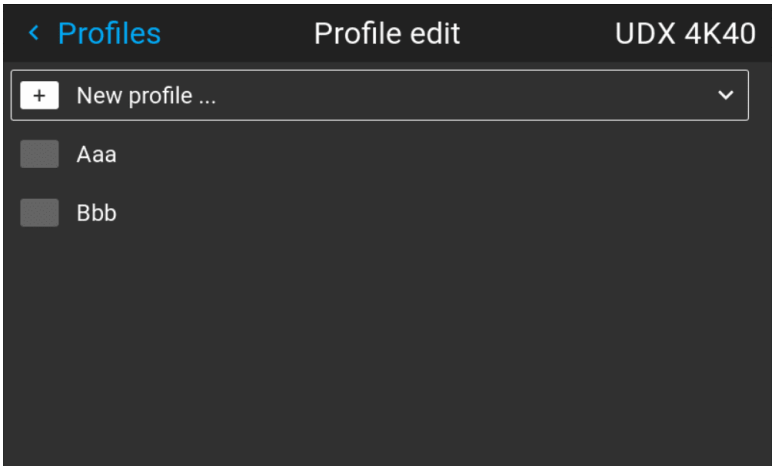


Image 8–6 Example of the Profile edit menu

2. Select the desired projector profile from the list and confirm.

   The profile pane for the selected profile will expand.

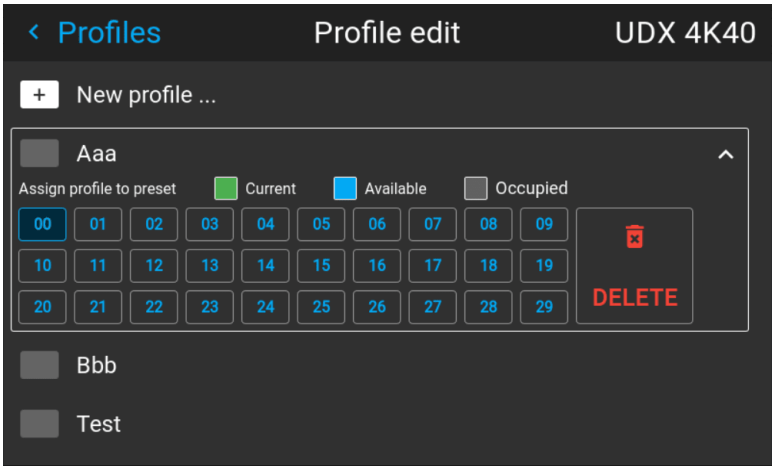


Image 8–7 Example of a projector profile with available preset slots

3. Use the arrow keys to select a preset slot and confirm with the **OK** key.

   The selected preset slot is now shown next to the profile name.

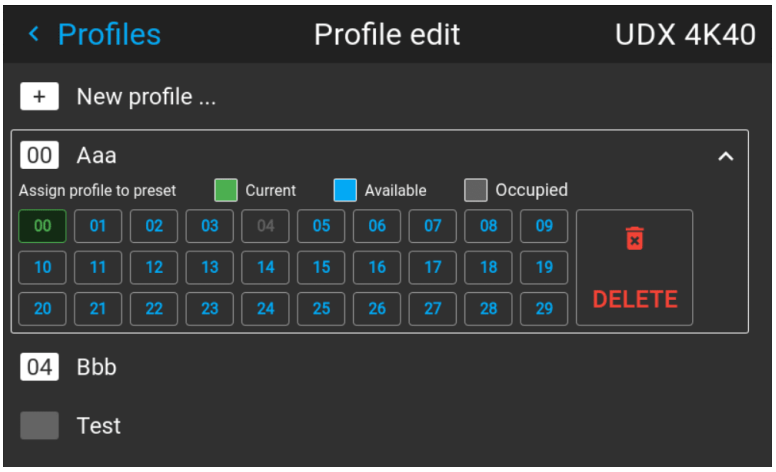


Image 8–8 Example of projector profiles allocated to preset slots (here slot 00 and 04)

8.4 Deleting a projector profile

How to delete a profile

1. In the main menu, select *Profiles* → *Edit*.

Image 8–9 Profiles menu, edit

The edit menu is displayed.

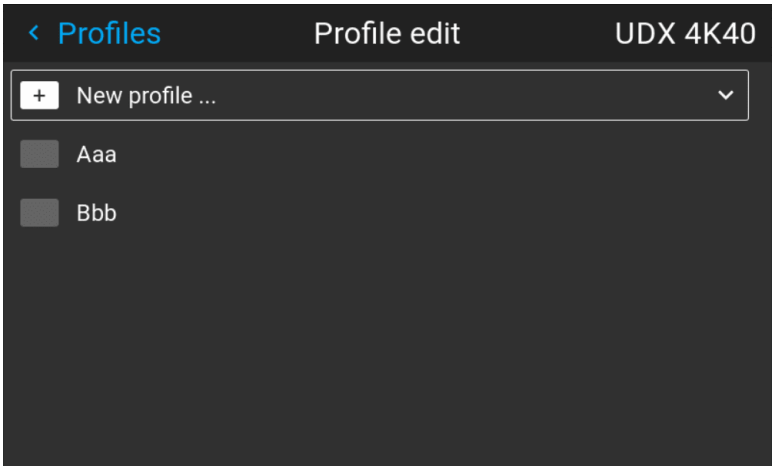


Image 8–10 Profile edit menu

2. Select the undesired projector profile and confirm to expand it.

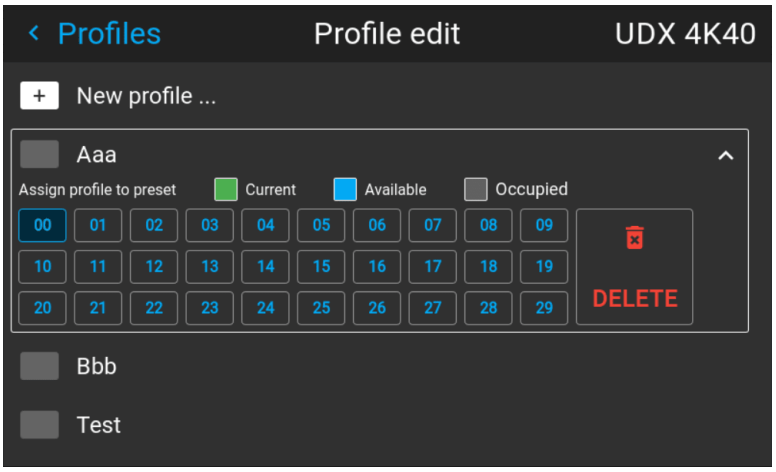


Image 8–11 Example of a projector profile with available preset slots

3. Use the arrow keys to select *Delete* and confirm. confirm the delete action.

System settings menu

9

Menu overview

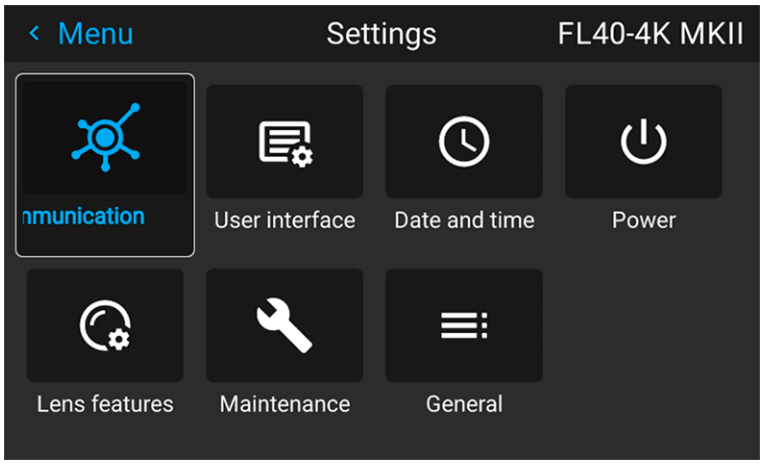


Image 9–1

9.1 Communication

9.1.1 Communication

About

Settings / Communication / LAN

Network connection is required to communicate with the projector via LAN or Internet.

Current Ethernet communication information is given, and can be edited in this menu.

Default mode for Ethernet communications are: Automatic ON / IP Version 4 DHCP mode.

Setting	Description
Automatic	
ON	DHCP enabled
OFF	Static
IP version 4	
Static mode	Set address, subnet mask and default gateway according to network specification.
DHCP mode	Assigned IP address, subnet mask and gateway.

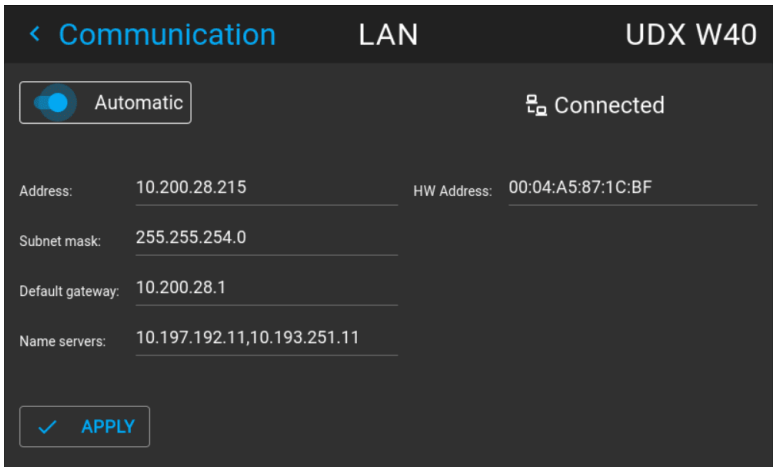


Image 9–2

Manually set up the IP adress

Go to the menu *Settings / Communication / LAN*

Enable the Auto zone on the display and press enter. The Auto zone will change to “Manual”.

Scroll down, and modify the desired fields. When in the desired fields, press “Enter” to enable the virtual keyboard, enter the desired values, and press “Enter” again to confirm the change.

9.1.2 Remote control

9.1.2.1 Broadcast address

About broadcast address

Broadcast address is a common address that can be set on the projector. That can be “0” or “1”. The default broadcast address is '0'.

Any command coming from an RCU programmed with that common address will be executed.

How to the broadcast address

1. In the main menu, select *Settings* → *Communication* → *Remote control*.

Image 9–3 Communication menu, Remote Control

The Remote control menu is displayed.

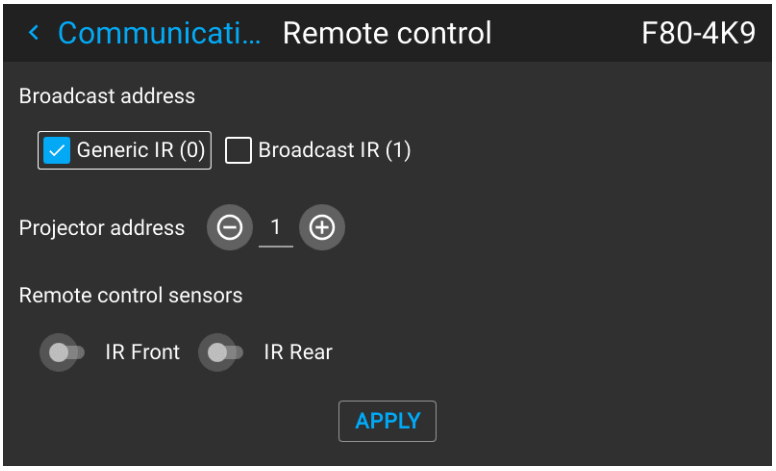


Image 9–4 Example of the Remote control menu

2. To change the broadcast address select the radio button of your choice.

   The following choices are possible:

   - Generic IR (address 0)
   - Broadcast IR (address 1)

3. Select **APPLY** and click **OK** to apply the changes.

9.1.2.2 Projector address

About individual projector address

As more than one projector can be installed in a room, each projector should be separately addressable with an RCU or with a computer using serial communication. Therefore each projector has its own address. The factory default individual projector address is ‘0’.

When the address is set, the projector can be controlled with the RCU. Only addresses between 0 and 31 are supported for the RCU.

Next to an individual projector address, each projector has also a broadcast address for group control.

How to change

1. In the main menu, select *Settings* → *Communication* → *IR control*.

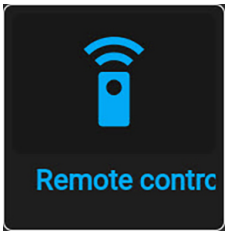


Image 9–5 Communication menu, Remote Control

The Remote control menu is displayed.

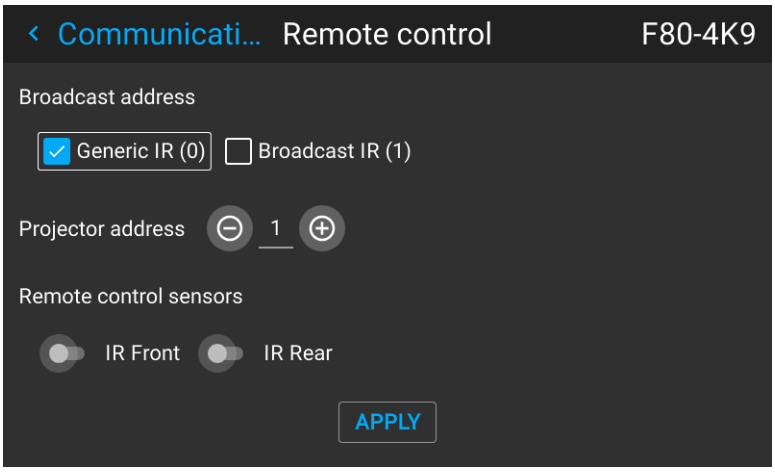


Image 9–6 Example of the Remote control menu

2. Select the *projector address* and select a new address.
3. Select **APPLY** and click **OK** to apply the changes.

   From now on the projector will only listen to this new address and to its broadcast address.

9.1.2.3 IR sensors

What can be done?

The projector has IR sensors on different sides of the projector. However, when the projector is used in combination with other devices that emit or receive IR signals (e.g. a 3D emitter), this can cause interference. In this case, it can be useful to disable one or more IR sensors.

The IR sensors are enabled by default. Each IR sensor can be individually disabled or enabled.

When all IR sensors are disabled, the projector will no longer respond to IR signals from the remote control. You will only be able to use the remote control while its connected with the wired connector.

How to disable

1. In the main menu, select *Settings* → *Communication* → *Remote control*.

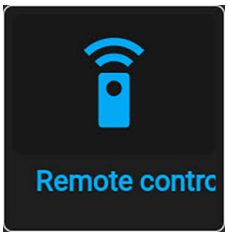


Image 9–7 Communication menu, Remote Control

The IR control menu is displayed.

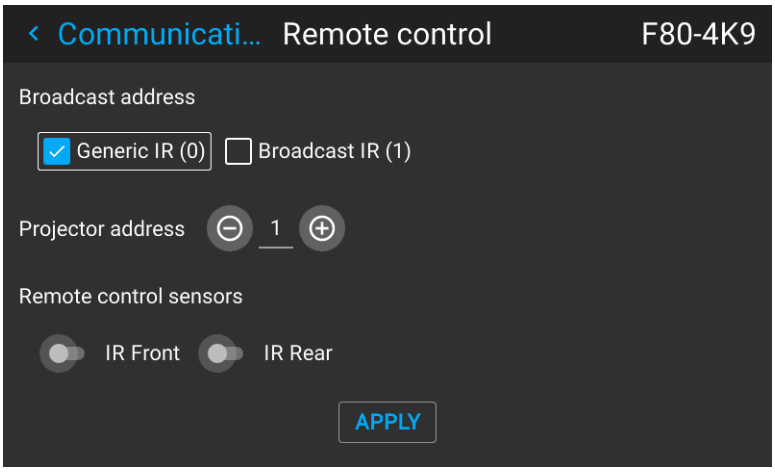


Image 9–8 Example of the Remote control menu

2. To disable an IR sensor, select the slider and drag to the left.

   Tip: A blue slider means an active IR sensor.
   A gray slider means an inactive IR sensor.

3. Select **APPLY** and click **OK** to apply the changes.

9.1.3 Host name - custom projector name setup

What can be done?

The default host name of the projector is the projector type along with the serial number of your projector (e.g. “UDX-4K40-0123456789”).

You can change this name to make it easier to spot in a network with multiple devices or projectors

How to set a different Host name

1. In the main menu, select *Settings* → *Communication* → *Host name*.

Image 9–9 Communication menu, Host name

The Host name menu is displayed.

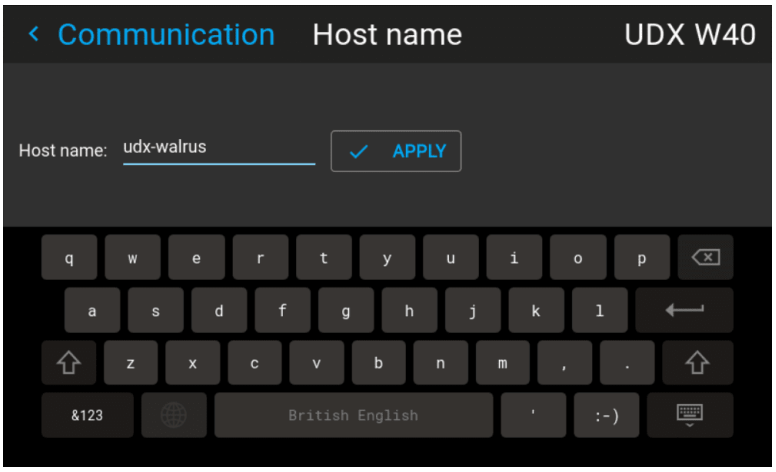


Image 9–10 Example of the host name menu

2. Press confirm to edit the *Host name* field.
3. Use the digital keyboard to change the Host name to the desired custom name.
4. Press the *OK* key, or press the enter icon to confirm the typed name. Click *Apply to update the host name.*

9.1.4 Trigger

About

There are 3 trigger outputs (2 on the F40 series) on the projector; one in the front and two on the back panel.

These outputs can be used for controlling external equipment.

The trigger outputs can be individually set to active low or active high by entering the menu *Settings / Communication / Triggers*

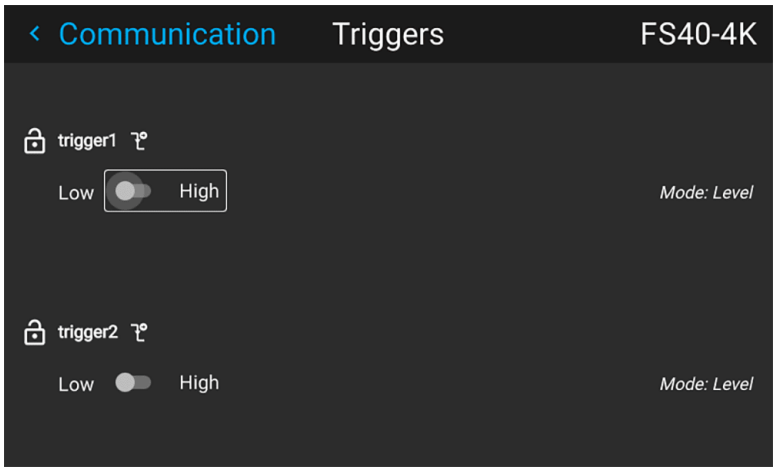


Image 9–11 F40 series trigger menu

The time of trigger output is defined via an API code. Contact Barco support for detailed info.

9.2 User interface

9.2.1 Language

Setting the menu language

The menu language can be changed to a suitable language.

Enter the menu *Settings / User Interface / Language*

Use the arrow keys on the remote to select a language.

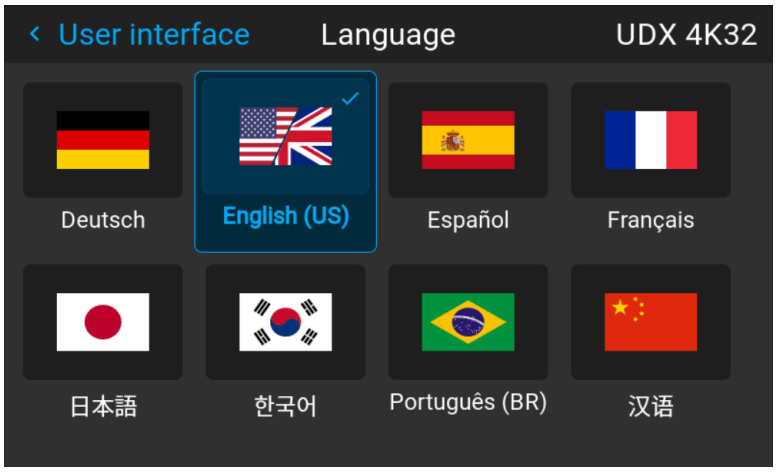


Image 9–12

All menus and icons will change to the selected language.

9.2.2 Themes

About

Enter the menu *Settings / User interface /Themes*

Themes are used to apply a predefined functionality to the OSD display. There are two options: light (default) or dark. (From software version 1.5, the “Dark” theme is the default.)

It is the “Dark” option that is shown in the menu screenshots in this manual, as this gives a better rendering.

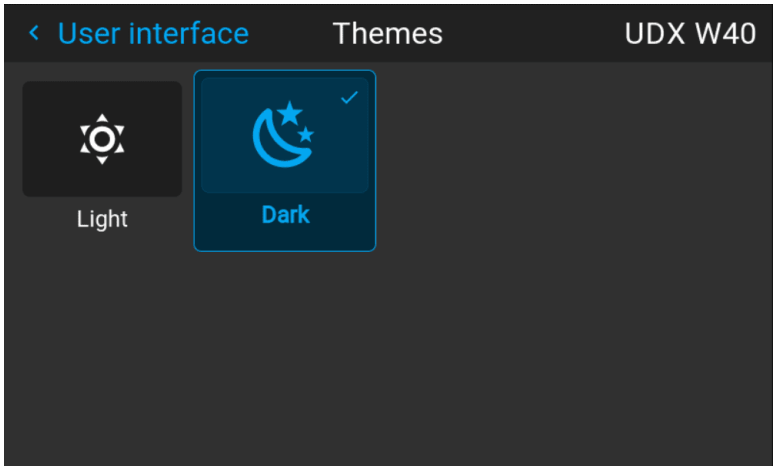


Image 9–13 Select theme, dark or light.

9.2.3 Units

About

Enter the menu *Settings / User interface / Units*

Units are used to set the preferred units of measurements for temperature and distance.

Enter the menu and select the preferred units by the arrow keys on the remote control.

Temperature units: Celsius (C) and Fahrenheit (F).

Distance units: Meter (M), Centimeters (C), Feet (FT) and Inches (IN)

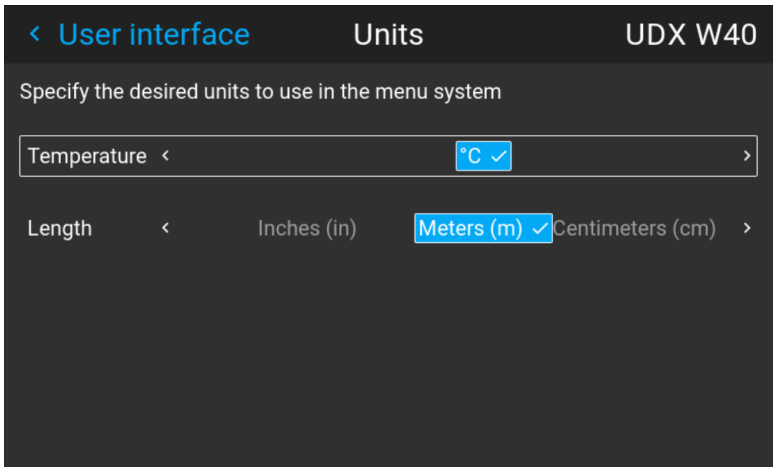


Image 9–14 Select temperature unit

9.2.4 Backlight / Stealth mode

About backlight settings

Enter the menu *Settings / User interface / Backlight*

The backlight menu shows up.

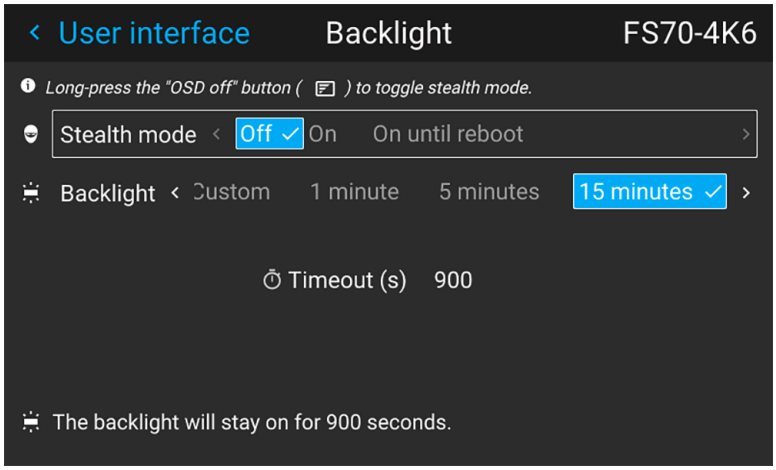


Image 9–15

Back light

Defines for how long the LCD and buttons backlight will be in on state. Use the navigation arrow keys to select and confirm the selection.

Stealth mode

The Stealth mode can be enabled via the OSD and API. Prospector can also be used when available. (Q423).

In addition, the Stealth mode can be enabled/disabled by pressing the OSD on/off button on the keypad for 5 seconds.

Use the navigation arrow keys to select, and confirm the selection.

When enabled, the backlight of the LCD and keypad buttons and the LED indicators on the back of the projector is turned off

- **Stealth mode Off:**: Stealth mode is not enabled
- **Stealth mode On:** Stealth mode is enabled. When rebooting or upgrading SW the Stealth mode will be off until the projector reaches Ready. This allows the user to get feedback on e.g. the progress of the SW update

- **Stealth mode On until reboot:** Stealth mode is enabled until the projector is rebooted or in power transition cycle (on/ready state to eco mode, and back again).. After a reboot the Stealth mode will be off. The reboot can happen either from a power recycle, through the API or when upgrading SW.

9.3 Date and time

9.3.1 Date and time setup - manually

About date and time

The date and time setting can be set manually or automatically via an NTP server based on region and city location.

Date is displayed by default as: day / month / year.
Time is displayed by default as: hour : minutes : seconds, in the 24–hour clock.

How to set manually

1. In the main menu, select *Settings* → *Date and time*.

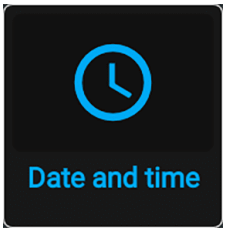


Image 9–16 Settings menu, Date and time

The Date and time menu is displayed.

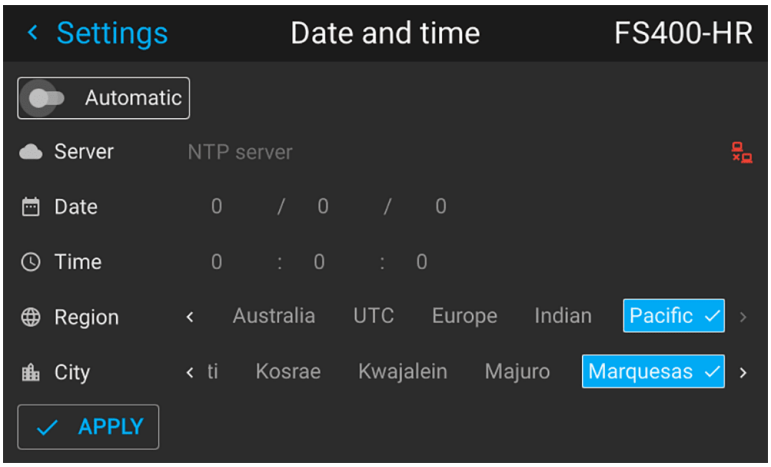


Image 9–17 Example of the Date and time menu

2. Disable the *Automatic* slider.

   Gray slider: automatic is off

   Blue slider: automatic is on

3. Select *Date*

   The Date dialog is prompted. The active day is selected by default.

4. Slide the *Day*, *Month* and *Year* slider up or down until the desired date is obtained.

   or

   Alternatively, use the up, down and OK buttons on the RCU or control panel until the desired date is obtained.

5. Select *Time*.

   The Time dialog is prompted. The active time is selected by default.

6. Slide the Hour, Minute and second slider up or down until the desired time is obtained.

   or

   Alternatively, use the up, down and OK buttons on the RCU or control panel until the desired time is obtained.

7. Select **Apply** to activate.

9.3.2 Date and time setup - automatically

Date is displayed by default as: day / month / year.
Time is displayed by default as: hour : minutes : seconds, in the 24–hour clock.

To set date and time automatically

1. In the main menu, select *Settings* → *Date and time*.

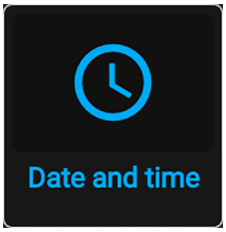


Image 9–18

   The Date and time menu is displayed.

2. Enable the *Automatic* slider.

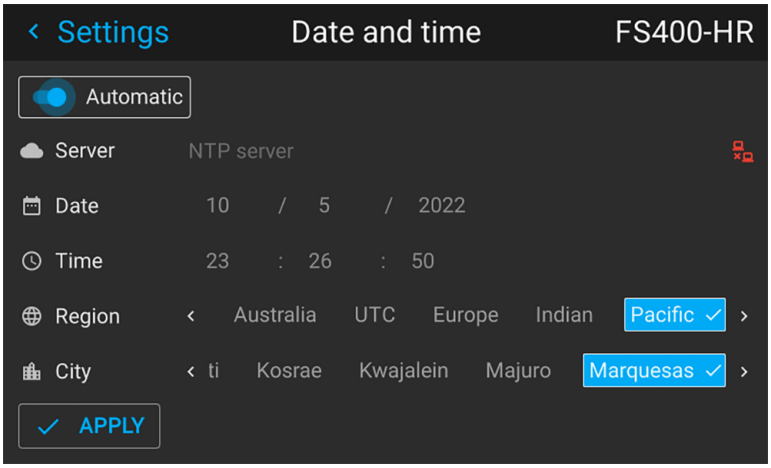


Image 9–19

   Gray slider: automatic is off

   Blue slider: automatic is on

3. Select *Server* and click **OK**.

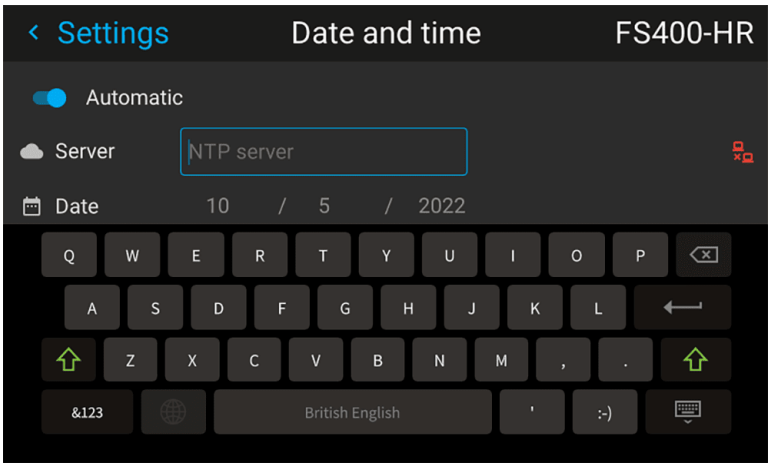


Image 9–20

4. Enter the name or the IP address of the NTP server.

   Tip: In case you cannot connect to an external NTP server although you can PING this server, the connection is blocked by the local firewall policy. Contact your IT system administrator.

   In case the connection is successful, a green icon appears at the right side of the server line.

5. Select *Region* and select with the arrow keys the region where the projector is installed.

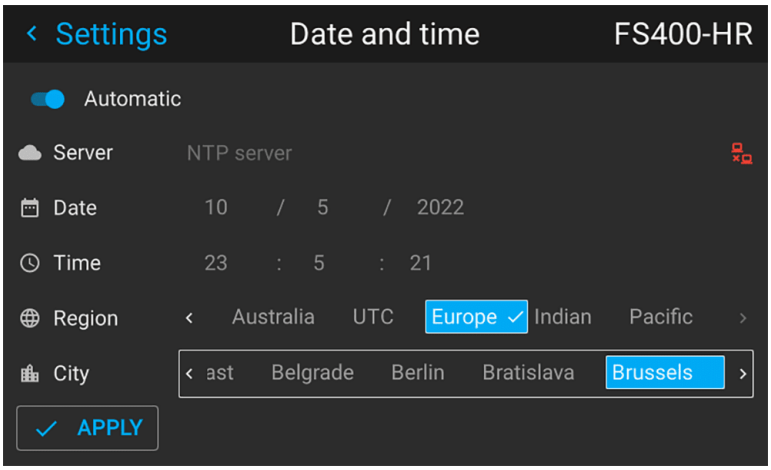


Image 9–21

The list of cities is updated according the selected region.

6. Select *City* and select the city corresponding with your time line.
7. Select **Apply** to activate.

9.4 Power saving settings

About the power saving features

In the aspect of continuous improvement, Barco has added several power saving features to the projector, which will extend the lifetime of your projector and light source in particular.

From Pulse software 2.3.x onward, the following power saving features are available:

Feature	Description	Enabled / disabled
Auto Dimming	When no source with active signal is connected to the projector, the OSD is not being projected, and no test pattern is active, the light source will be dimmed to 50%.	Enabled by default after the first upgrade to 2.3.x or newer.
Auto light source off	When no source with active signal is connected to the projector, the OSD is not being projector and no test pattern is active, the light source will be turned OFF after a configurable time-out period. The projector will transition to Ready mode. Most of the projector features will remain available while in Ready mode.	Disabled by default
Auto standby	When the projector is in Ready mode and is not actively being used (e.g. browsing through the projector GUI), the projector will transition to either Standby or Standby ECO mode after a configurable time-out period.	Disabled by default

The difference between the Standby and Standby ECO mode is the following:

- **Standby mode**: After a set time-out, the projector disables most functionality to save power, safe the communication options. This allows the projector to be awoken either using the local keypad, the RCU or remotely using Projector Toolset or automation controllers (e.g. using DMX).
- **Standby ECO mode**: After a set time-out, the projector disables almost all functionality to save power, safe a single small wake-up controller. This allows the projector to be awoken **only** using the local keypad or the RCU. The projector can not be awoken remotely using this method.

How to change the power saving feature?

1. In the main menu, select *Settings* → *Power*.

Image 9–22 Settings menu, Power

2. To enable or disable Auto dimming, proceed as follows:
   a) In the Power menu, click *Auto dim*.

Image 9–23 Power menu, Auto dimming

The Auto dimming menu is displayed.

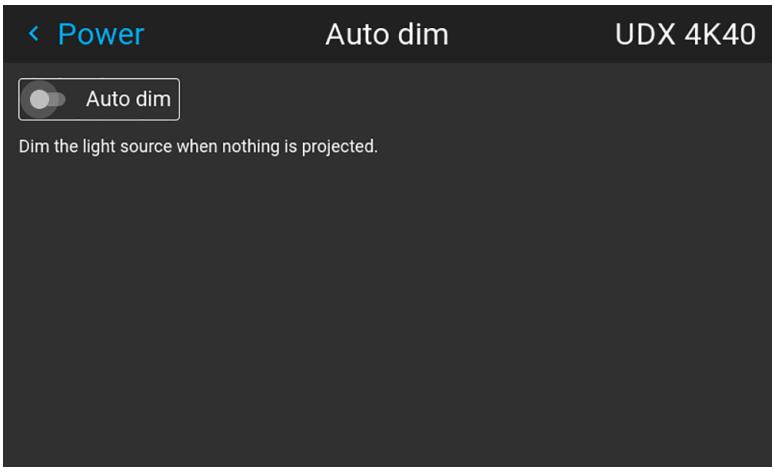


Image 9–24 Example of the Auto dim menu

b) Enable or disable the *Auto dim* slider to respectively enable or disable the Auto dimming feature.

3. To enable or disable the Auto light source off feature, proceed as follows:

a) In the Power menu, click *Auto light source off*.

Image 9–25 Power menu, Auto light source off

The *Auto light source off* menu is displayed.

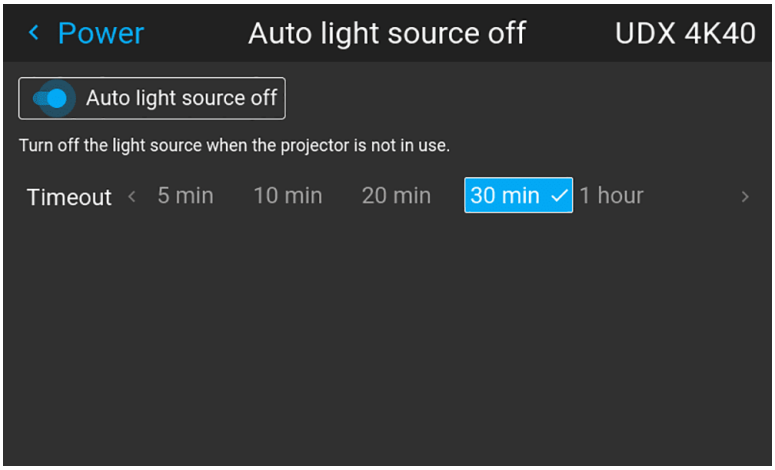


Image 9–26 Example of the Auto light source off menu

b) Enable or disable the *Auto light source off* slider to respectively enable or disable this power saving feature.

c) When enabled, select the timeout period after which the light source will be turned off.

4. To enable or disable the Auto standby feature, proceed as follows:

a) In the Power menu, click Auto standby.

Image 9–27 Power menu, Auto standby

The Auto standby menu is displayed.

Image 9–28 Example of the Auto standby menu

b) Enable or disable the Auto standby slider to respectively enable or disable this power saving feature.
c) When enabled, select the timeout period after which the projector will go into standby or standby ECO mode.
d) When enabled, choose which version of the Standby mode: regular standby mode, or standby ECO mode.

9.5 Lens features

About

In order to prevent unintentional lens adjustments, especially after e.g. a completed setup and adjustment, there is a possibility to disable certain lens adjustment functions. These functions are directly accessible via the remote control, and can by that easily be adjusted by accident.

Enter the menu shown below, and disable the desired functions by toggling the desired buttons. The menu below shows all lens options in enabled position.

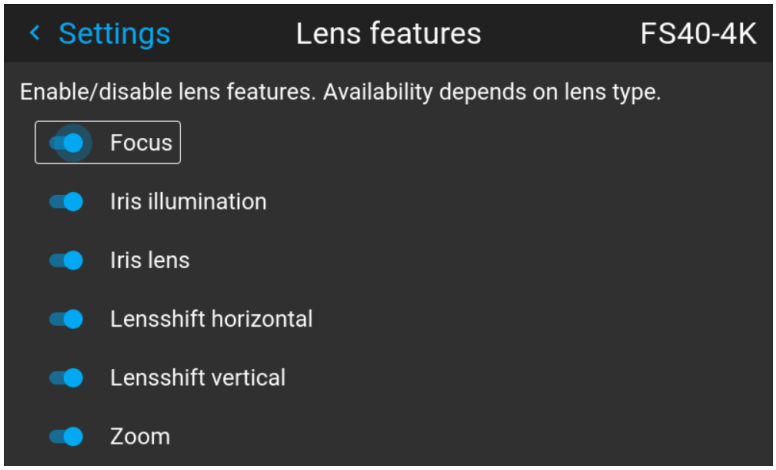


Image 9–29

9.6 Maintenance

About

Settings / Maintenance

The Maintenance Menu is for service personnel and / or advanced users only. Sub –menus are Reset and Lens Calibration.

By entering a service code (or advanced user code), more features are available. This features will be visualized via the new tiles that shows up after entering the code.

See the Service Manual for detailed information regarding service issues.

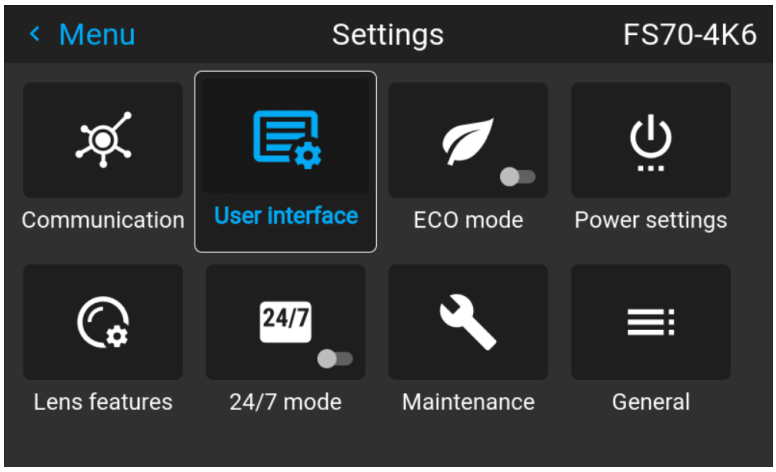


Image 9–30 Maintenance Menu

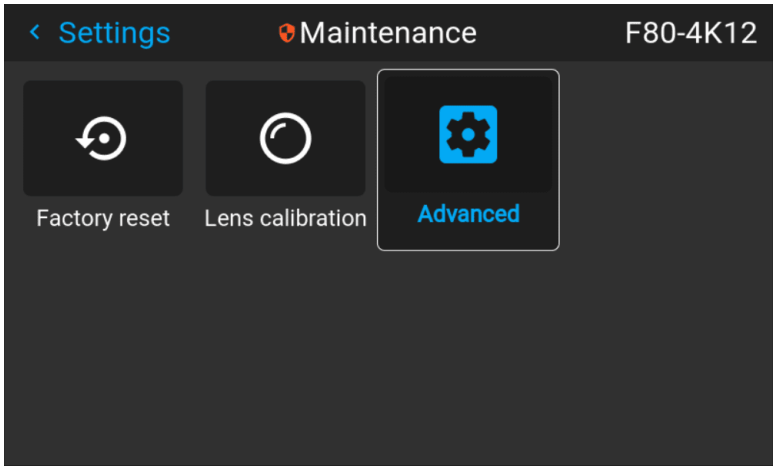


Image 9–31 Maintenance Sub-menu

9.7 Lens calibration

About calibration

This function will calibrate the position of the iris and the horizontal and vertical lens shift. The purpose is to have an accurate feedback to the system

Calibration

1. Enter the menu *Settings / Maintenance / Lens calibration.*
2. Select the feature that shall be calibrated, and press enter on the remote control

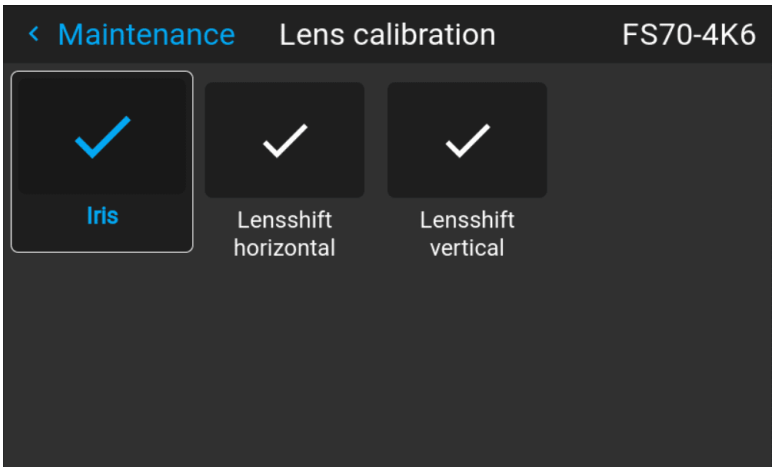


Image 9–32

3. Press enter to execute.

9.8 Reset

What can be done?

All settings and values on the projector can be reset to its default values. This can be done for one or more settings separately, or all settings together (factory reset).

Default settings

The following settings are default settings:

Topic	Setting	Default value
UserInterface	Theme	Dark
Network	Communication	LAN, Automatic settings
System	Eco Mode (if applicable)	Available
Screen	Screen luminance - Unit	nits
Optics	High Contrast	Off
Illumination	Power	100%
ImageConnector	Color Space	auto
	Signal Range	auto
ImageResolution	Output Resolution (if applicable)	4K UHD
ImageWarp	Screen size	5120x3200 / 2560x1600
	4 corner Bow	Warp off, no warp
	Warp files	Disabled, no files selected
ImageBlend	Blend/Mask size Black Level	disabled, all value to zero
	Black Level Files Blend Files	Disabled, no files selected
ImageRealColor	P7 Realcolor	all set to native
ImageStereo	Sync delay	0 µs

Topic	Setting	Default value
	Swap eye	Off
	Dark time	lowest value available
ImageDisplay	Display mode	AutoStereo
ImageOrientation	Orientation	Table, Front
ImageSource	Source files	Standard
ImageFeatures	Contrast	mid value
	Brightness	mid value
	Saturation	mid value
	Sharpness	mid value
	Gamma	mid value
	Cropping (if applicable)	Off
	Aspect Ratio (if applicable)	16:9

How to reset all projector settings

1. In the main menu, select *Settings / Reset*.
2. In the Reset menu, select *RESET ALL* and click **OK**.

How to reset one or more projector settings

1. In the main menu, select *System Settings → Reset*.
   The Reset menu is displayed.

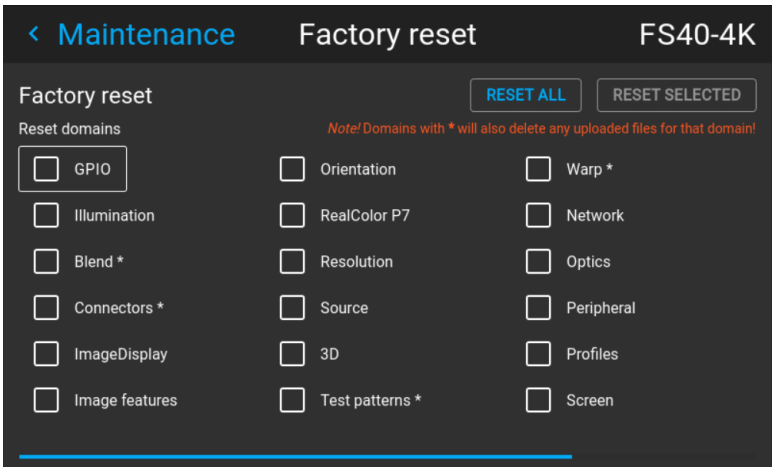


Image 9–33 Reset menu

2. Navigate to the checkbox next to the settings that need to be reset and press **OK**.
   Multiple selections are possible.
3. Select **RESET** and press **OK** to reset all selected settings.

Domains with * will also delete any uploaded files for that domain.

9.9 Controlling the backlight of the LCD Display

What lighting can be controlled?

You can choose how quickly the backlight of the LCD turns off. You can select one of the default values, or enter a custom value.

Stealth Mode

Alternatively, you can turn on **Stealth Mode** instead. By activating this mode, the backlight of the LCD, the backlight of all the buttons of the keypad and the indication LEDs for the LAN and HDbaseT inputs will be disabled.

Stealth Mode is enabled and disabled by pressing the OSD button on the remote control for 3 seconds.

How to set the backlight

1. In the main menu, *Settings* → *User interface* → *Backlight*.

Image 9–34 Settings menu, backlight

The Backlight menu will be displayed.

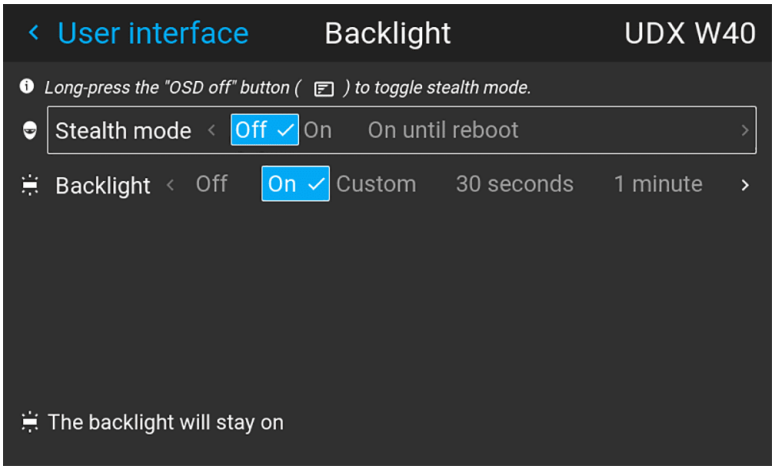


Image 9–35 Example of the backlight menu

2. Choose the desired setting for the backlights. Select one of the predetermined options, or a custom value.

10 Scheduler

10.1 About scheduler

About the scheduler

From Pulse software 2.3 onward, the projector scheduler is now available to use. The projector scheduler allows you to automate the weekly schedule of the projector. This includes:

- Powering up the projector
- Selecting and activating a predefined projector profile.
- Powering down the projector

10.2 Open the scheduler

1. In the main menu, select *Scheduler*

Image 10–1 Main menu, Scheduler menu icon

2. The current scheduler will be displayed.

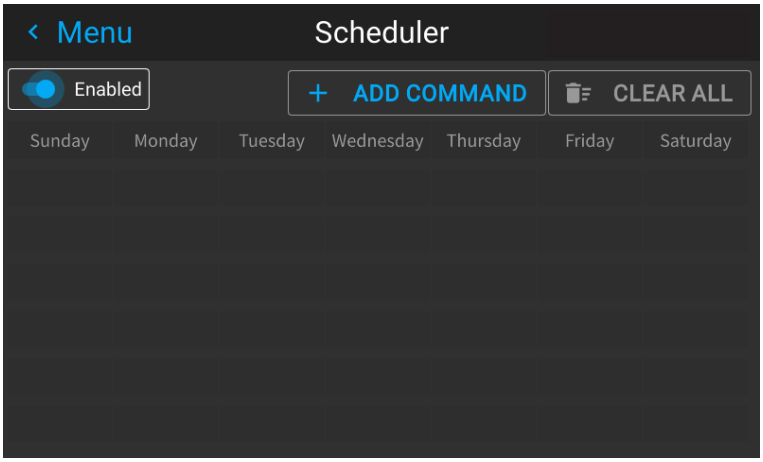


Image 10–2

Tip: Make sure the *Enabled* slider is set to the right and lit blue. If not, the Scheduler will not be active.

10.3 Adding new command

How to add a new command

1. In the Scheduler menu, select *Add Command*.

   The *Add Command* page is displayed.

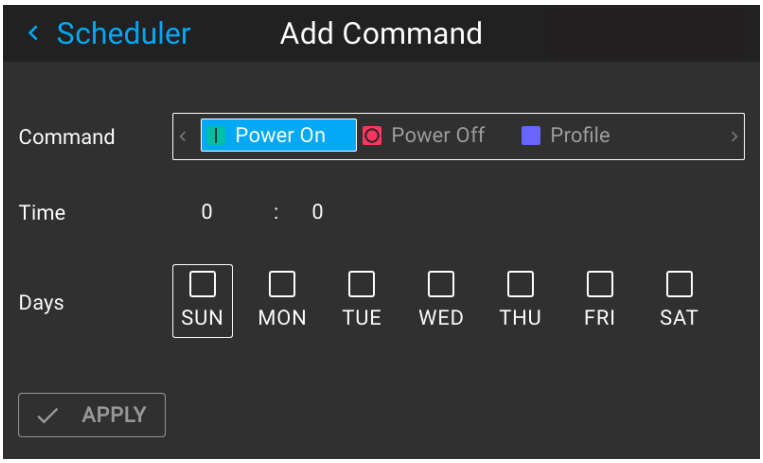


Image 10–3 Example of the Add Command window

2. Select the type of command you would like to add to add. You have the following options
   a) Power On (ON mode).
   b) Power Off (Ready and or Standby mode).
   c) Activate a projector profile.

Tip: In order to activate a projector profile in the scheduler, a minimum of one projector profile will need to be configured beforehand. If no profile is available, the “Profile” option will not be available in the “Add Command” window.

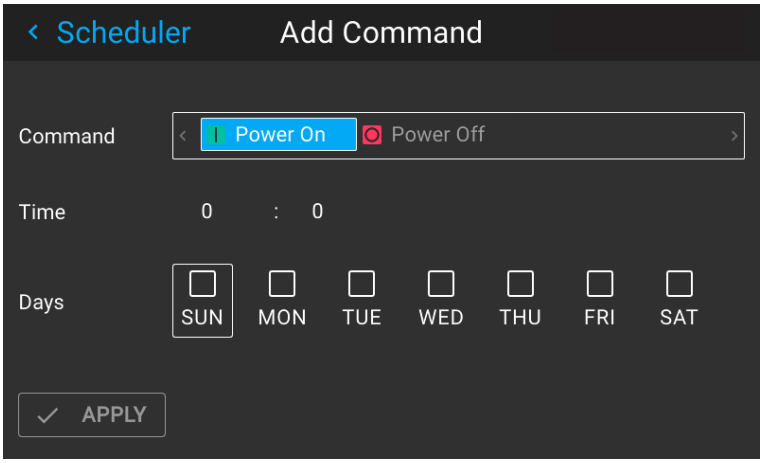


Image 10–4

For more info on creating Projector Profiles, see “GUI – Profiles”, page 103

If *Profile* is selected, the currently available projector Profiles will be listed in the menu.

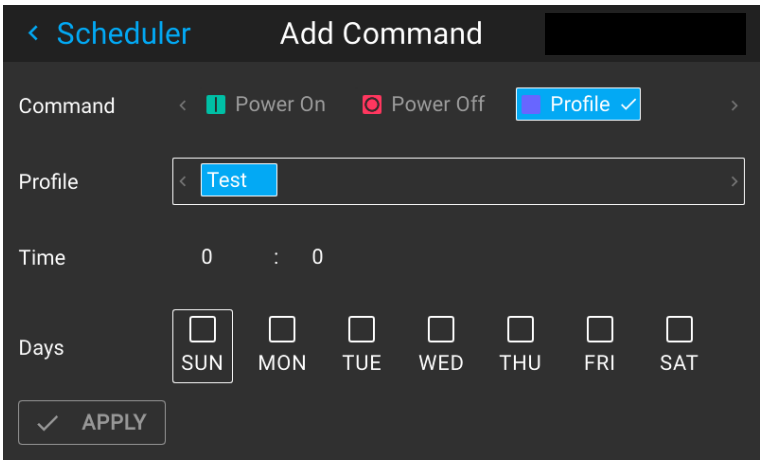


Image 10–5 Example of the Add Command window with the available profiles listed

3. If you selected *Profile*, select the desired profile you want to activate.
4. Select the desired *Time* the command will need to activate (in hours and minutes of the day).

   Note: Make sure the projector time is correctly configured. For more info, see “Date and time setup - automatically”, page 120 and “Date and time setup - manually”, page 119.

   Tip: If you click or tap on the hour and minute marker, a time slider will pop up. Use the hours and minutes sliders to select the desired timeframe and confirm.

5. Select the desired days of the week when this command will need to activate. Use the arrow keys to select the desired days and confirm.

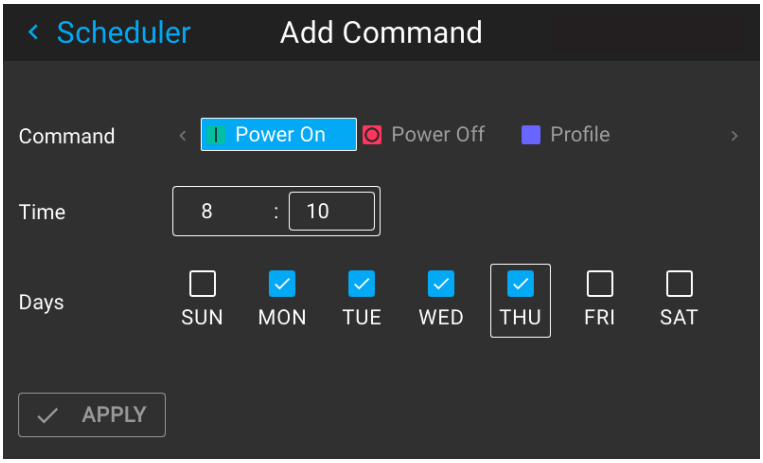


Image 10–6 Example of the Add Command menu with command, time and days of the week selected.

6. Click **Apply** to add the new command to the scheduler.

   The new command is added to the Scheduler.

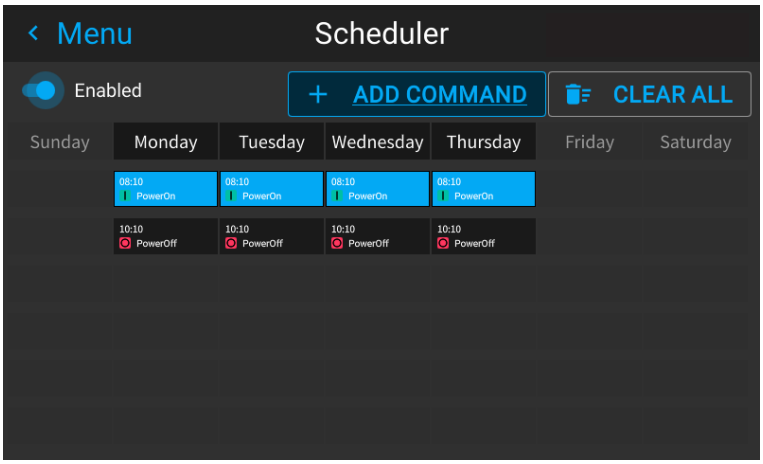


Image 10–7 Example of the Scheduler menu, with Power On being added.

10.4 Edit or delete

How to edit or delete a command

1. In the Scheduler menu, select and confirm an existing command.

   The Edit Command window will be prompted.

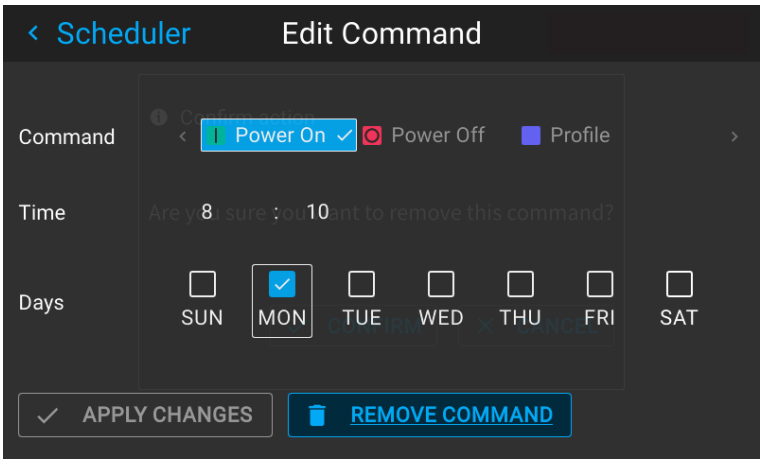


Image 10–8 Example of the Edit Command window

2. Edit the desired settings of the Command.
3. Once all changes have been made, select the **Apply Changes** button and confirm.
4. If you want to delete the command instead, select **Remove Command** button and confirm.

10.5 Clear the scheduler

How to clear up the entire scheduler

1. In the Scheduler menu, click **Clear All**.

   A warning dialog will be prompted, asking to confirm the clearing of the entire schedule.

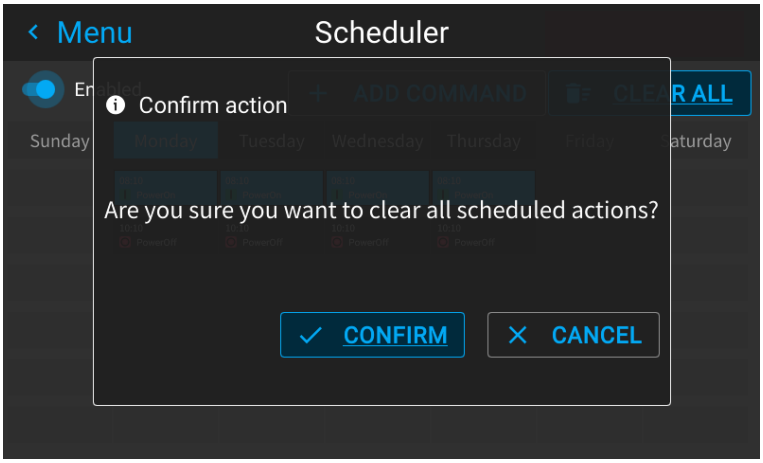


Image 10–9 Example of the warning dialog

2. Confirm the action by clicking **Confirm**.

   Note: If you clicked the **Clear All** button by accident, click **Cancel** instead to cancel and return to the Scheduler menu.

   All actions in the Scheduler will be deleted.

11 3D

3D setup

The projector is capable of displaying 3D images and movies in both active and passive stereo 3D input mode.

Setup of a 3D installation requires an advanced understanding of the 3D systems, both for the projector, and also for the signal source.

Regarding setup of the signal source, refer to the user manual for the specific unit.

In 3D setup, it is crucial that the projected images are perfectly synchronized through the whole signal path, from the signal source to the picture viewed through the 3D goggles.

See instructions in this chapter to set up the projector for this feature.

Active stereo input.

One channel input. (One cable). Update frequency @ 120 Hz. Extra sync. signal must be used when DVI source is used. For Displayport source, the sync signal is present in the signalcable, but external sync can also be used when necessary.

Passive stereo input.

Use two channel input (two cables), one for each eye. Update frequency limited to 60 Hz for each channel. Dual Sequential input source (DVI or Displayport) must be used. No external sync signal required.

11.1 Setup 3D mode.

Setup 3D mode.

1. Enter the Source menu, and select the desired input source. See “Source menu”, page 45
   - For active stereo input, select Displayport 1, DVI-1, HD BaseT or HDMI.
   - For passive stereo input, select Dual displayport sequential, or Dual DVI sequential
2. Enter the menu *Installation/ 3D setup*

   When in 'auto stereo' display mode, the product shall automatically switch to 'active stereo' mode and project synchronously at n times the input frequency - where n is as high as possible on the individual products.
3. Roll down in the menu and select the Auto stereo selection in the Display mode menu.
4. When a HDMI 3D source is detected, it is shown in the source status that this is a 3D source.

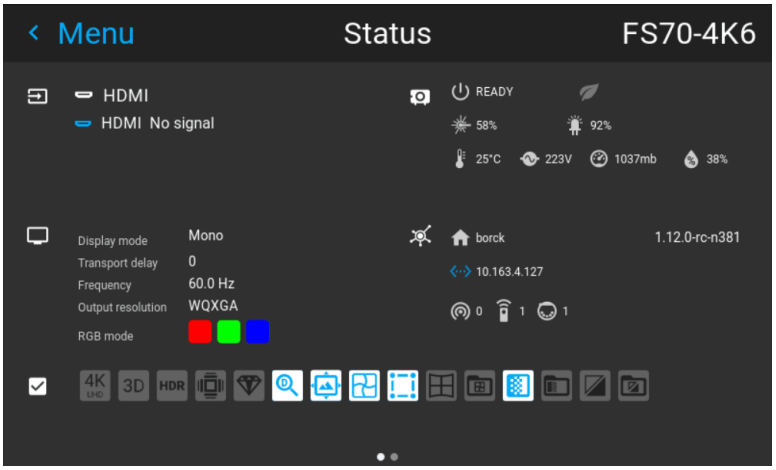


Image 11–1

5. Select the dark time.
6. Run a 3D image or movie from the source.

   Put on the 3D goggles, and verify by looking through the goggles with one eye at the time that only one image is visible in each eye. A double picture or a shade of the picture from the other side shall not be observed. Repeat for both sides, and adjust the Sync Delay slider until a “clean” picture is visible in each eye.

   If the 3D picture looks a bit “strange” through the 3D goggles, the solution is to swap eyes by enabling the Swap eyes button in the menu.

   Note: There is also a 3D test pattern available. Go to the menu *Test Patterns/Internal* Select the 3DSTEREO pattern.
   The test pattern menu also have a shortcut key on the remote control and the keypad.

Why change the 3D setup?

While Barco can provide a 3D emitter and active shutter glasses as options to this projector, you are also free to use a 3D emitter and active shutter glasses of your own choice. Since glasses and emitter can have various specifications compared to the ones Barco can provide, the 3D setup menu allows you to configure the output image to the specifications of your glasses and emitter. The following can be configured:

- **Swap Eye**: You can choose to invert the stereo Sync output signal (depending on the chosen 3D emitter and glasses).
- **Swap frame pair**: You can choose to invert the stereo input signal (depending on the chosen source input).
- **Dark time**: Pre defined, select between 0µS and 1600µS.
- **Stereo glasses**: Active 3D glasses must be used.

- **Sync Delay**: You can increase or decrease the sync delay. The scale goes from –10 000 µs to +10 000 µs with a step of 100 µs.

12 Lenses

12.1 Available lenses

Available lenses

This table contains the lenses that are within the certification of the projector.

Partnumber	Lens Name	Description (WQXGA)
R9801211	EN44	FLD+ 2.5 - 4.6 : 1
R9801220	EN45	FLD+ Long Focus 0.8 - 1.21 : 1
R9802241	EN61	FLDX 1.7- 2.5: 1
R9802010	EN62	FLDX 0.8:1
R9802242	EN63	FLDX 1.2 - 1.7 : 1
R9802243	EN66	FLDX 0.8 - 1.21 : 1
R9802232	EN68	FLD+ 0.28:1
R9802003	EN76	FLDX 0.9:1.3
R9801832		FLDX lens 0.38:1 UST 90º

Lenses other than above listed may also be used, but the maximum throw ratio will be limited to 7.2:1.
All lenses up to 7.2:1 belong to RG2.

The EN76 has an internal iris which can be closed to F/9, which is further than other, similar projection lenses. When the lens iris is closed fully, the amount of light hitting the iris must be within certain limits in order to reduce the risk of outgassing.
When using this lens, the illumination iris must be closed in tandem with the projection lens iris for the F40 series. This is an automatic process performed by the projector.

WARNING: When the projector is in a position where persons have access underneath, the lens must be secured with a safety cable. See “Installing the lens safety cable”, page 144 for details.
For UST lens, see “Mounting a safety cable to the FLDX lens (0.38:1) UST lens”, page 154 for details.

12.2 Replace a lens

Lens lever

The L40 lens mount and lens lever is designed to prevent damage to the lens board while providing an easy and stable lens change procedure.

The lens lever, located at the bottom of the lens mount, slides between two positions, far left (default position — unlocked) and far right (locked).

Always activate the projector shutter before attempting to remove or install a lens.
To do this, press the **shutter** button on the keypad, or shutter Close on the remote, to activate the shutter. The keypad button will illuminate red when the shutter is activated.
Press the **shutter** button again, or shutter Open on the remote, to deactivate the shutter and resume normal operation. The keypad button will illuminate white when the shutter is deactivated.

When changing from a lens with motorized Iris, zoom and focus positioning functionality, to a lens without this functionality (e.g. from a EN 63 to a EN42 lens), it is recommended to power down, and pull the AC cord. This is because the memory of the iris position will not be reset, but will show the position in LCD or OSD for the lens that was removed. When rebooting the projector, the memory will be reset.

The reverse scenario will happen when changing from a lens with no motorized positioning support, to a lens with motorized positioning support. The iris position will not be showed with a correct value. The functionality is still present, but the displayed value is not correct.

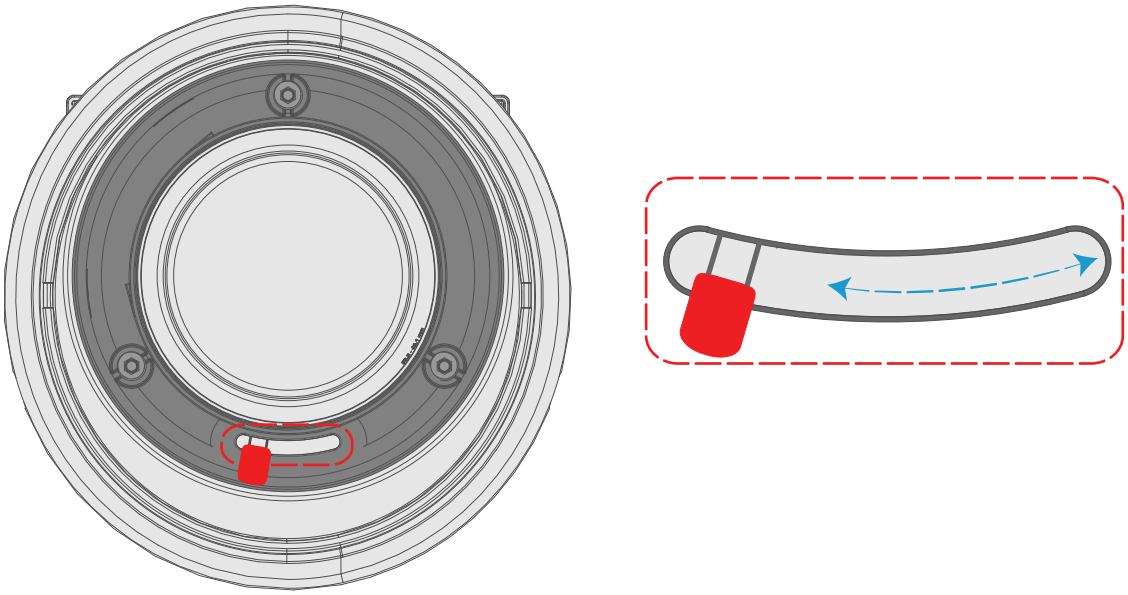


Image 12–1

Install a lens

1. Verify that the projector shutter is activated (shutter is activated when the shutter icon on the projector keypad is red).
2. Verify that the lens release lever is in its default position at the far left of the slide, as illustrated.
3. Remove the protective cap at the lens bayonet end
4. Align the lens so that the red marking on the bayonet is facing upwards.
5. Position the lens bayonet into the projector lens mount and support in place with one hand.
6. Slide the lens lever to the far right.
7. Verify that the lens is firmly in place before removing your hand from the lens.

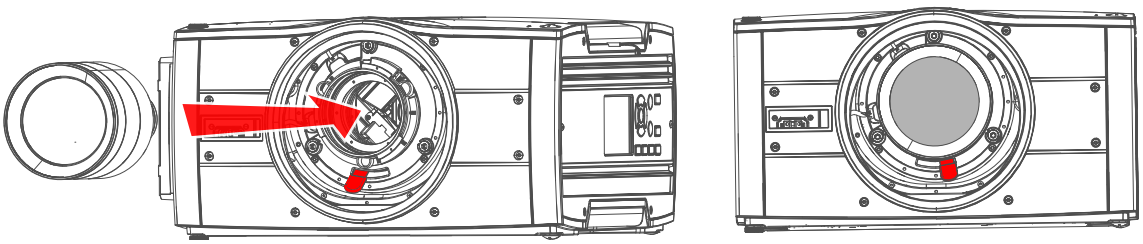


Image 12–2

8. In case the projector is mounted above people, it is mandatory to have a lens safety cable installed, see “Installing the lens safety cable”, page 144

Remove a lens

1. Remove the lens safety cable, if installed.
2. Support the lens with one hand.
3. Use the other hand to slide the lens release lever to the far left position.
4. Pull the lens straight out of the projector lens mount.
5. Replace with another lens, or install the projector lens cap.

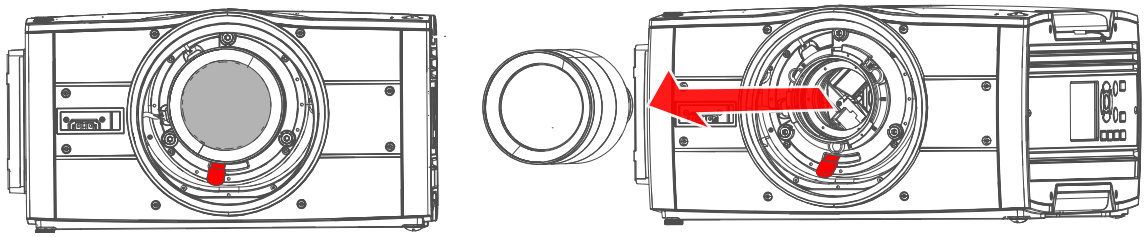


Image 12–3

12.3 Locking the lens position

About

The projector has the feature of mechanically lock the lens position in both horizontal and vertical position.

This is particularly important in moving platform applications in order to avoid that the lens comes out of position during operation. This topic describes the procedure for this operation.

CAUTION: It is of great importance to disable the Lens Shift function when the mechanically lens lock is performed. If not, the shift mechanism will be possible destructed if lens shift accidentally is performed from the remote control, keypad, and also via API command, when the mechanism is mechanically locked.

Tools needed

- Screwdriver Tx25
- Wrench or Socket wrench 8mm, OR allen key 4mm

Lens lock screw

The lens lock screws has a special design that allows use of two different tools for tightening; 4mm Allen key or 8mm wrench.

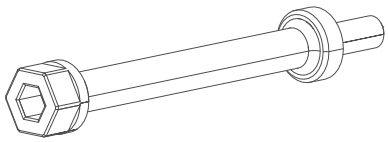


Image 12–4 Lens lock screw

Maximum tightening torque: 2.0 Nm.

Lens lock procedure.

1. Move the lens to the optimal horizontal and vertical position.
2. Disable the lens shift function by entering the menu *Home / System Settings / Service / Lens features*

   Select the function to disable by the arrow keys, and disable the function by pressing the OK button.

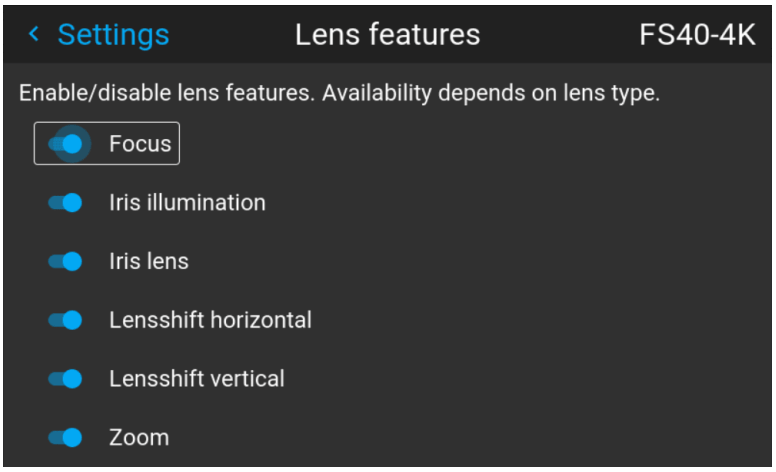


Image 12–5

3. Release 8 screws in front of the projector indicated in the figure below.

   Remove the front cover

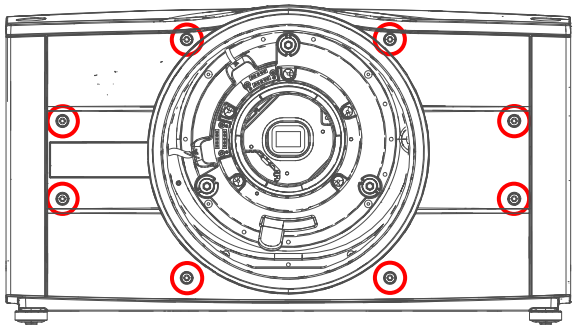


Image 12–6

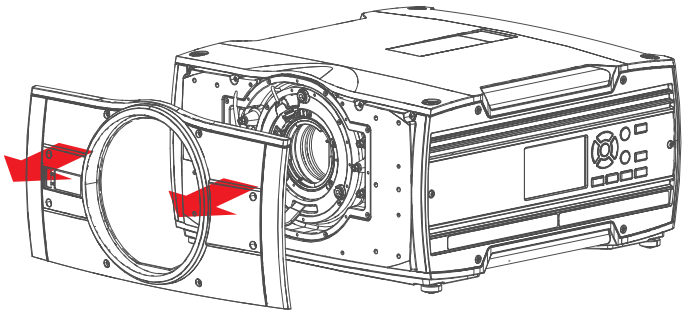


Image 12–7

4. Tighten the screws indicated below.

   Tighten the screws indicated by the **red** circles for locking the **vertical** movement

   Tighten the screws indicated by the **blue** circles for locking the **horizontal** movement

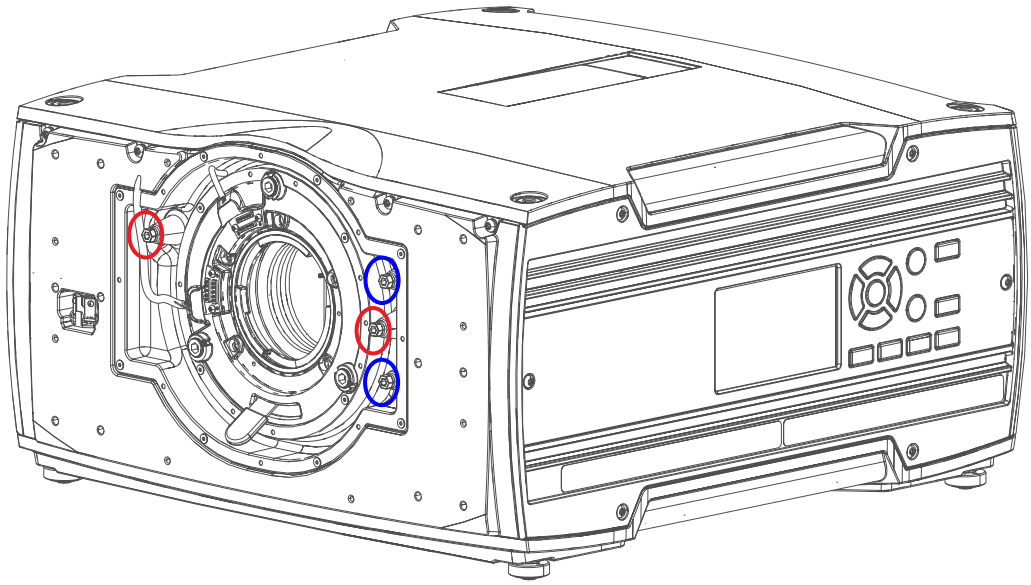


Image 12–8

5. Reassemble the front cover.

12.4 Installing the lens safety cable

When to use the lens safety cable

The lens safety cable must be used in any circumstance where the projector is mounted above people. Do this to secure the mounted lens in the lens holder.

Content of the lens safety cable kit (R9801196)

- Safety Cable (750 mm, Ø3 mm)
- Cable clamp M4 (U-bolt)
- Shackle 7x70 mm
- 20 x Cable clip (16x16 mm, Ø4 mm)[4]

4. Only four pieces are needed to assemble the safety cable to a lens. When the safety cable is used on another lens, you should not remove the cable clips. Instead, use four new ones. There are enough cable clips in the kit to secure up to five different lenses.

Image 12–9

How to install the lens safety cable

1. Ensure that the safety cable and its accessories are in good condition (not damaged)
2. Paste four cable clips on the lens body between motor block and lens flange as illustrated (reference 1). Orient the open side of the clips towards the front of the lens.

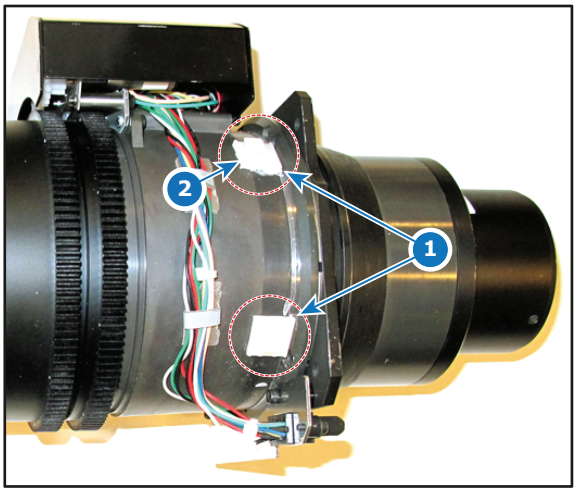


Image 12–10

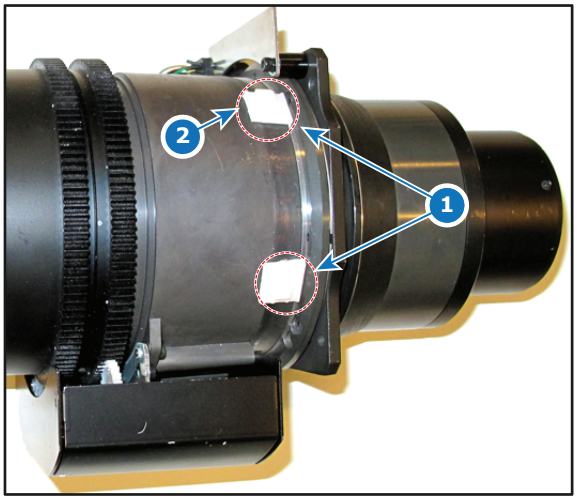


Image 12–11

3. Snap the first loop end of the safety cable into one of the following clips and let the loop end point downwards.
   1. Configuration A: Use the upper clip on the side of the cable bundle (reference 2, Image 12–10).
   2. Configuration B: Use the upper clip on the non-wired side (reference 2, Image 12–11).
4. Slide the rest of the cable around the lens counterclockwise. Click the cable into every clip it passes in this loop.

   Note: Make sure the cable passes between the lens and the cable bundle.

5. Slide the cable through the loop end at the beginning of the cable to create a lasso..

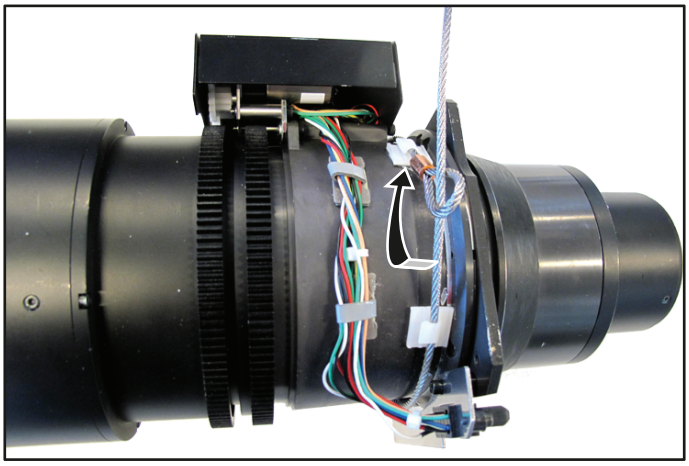


Image 12–12 Example of configuration A

6. Pull the lasso tight around the lens body and install the U-bolt on the lens holder, with the open ends oriented outwards (reference 3). Make sure that both a part of the loop end and the outgoing part of the safety cable are placed in the enclosure.

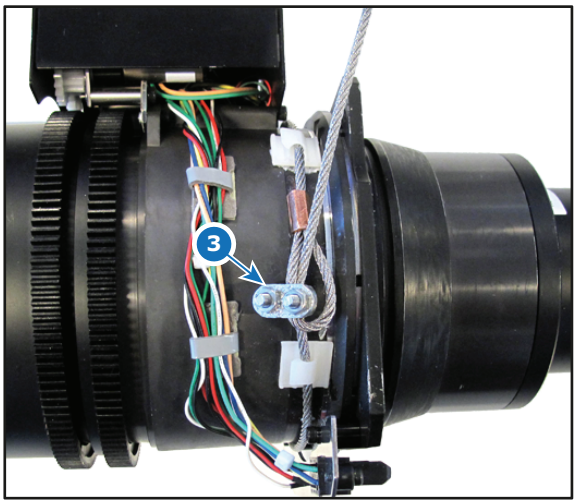


Image 12–13 Example of Configuration A

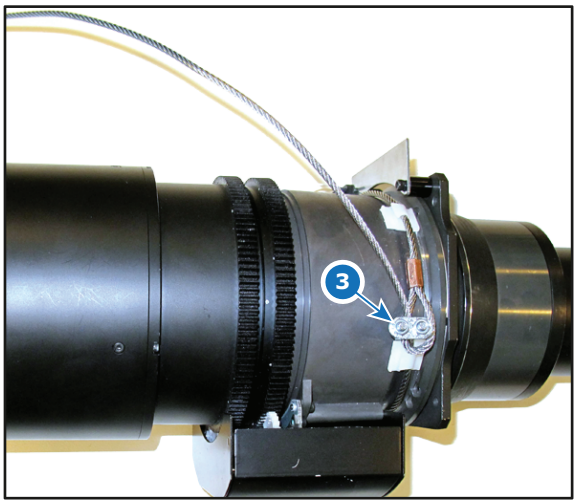


Image 12–14 Example of Configuration B

7. Close the U-bolt and tighten it.

Note: Make sure the safety cable is tightened around the lens before tightening the U-bolt nuts.

8. Place the shackle through the free loop end of the safety cable.
9. Connect the shackle on the truss or rigging frame.

Caution: The safety cable is mounted as backup so that the drop distance is as small as possible. Keep the possible drop distance of the lens as short as possible!

How to mount the cable to a short barrel lens

1. Paste two cable clips on both sides of the lens as illustrated (reference 1). Orient the open side of the clips towards the outside of the lens.

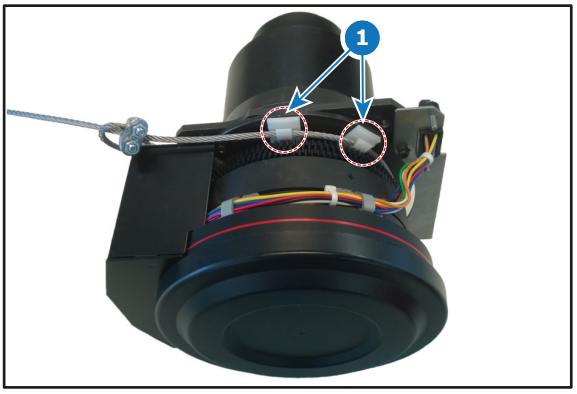


Image 12–15

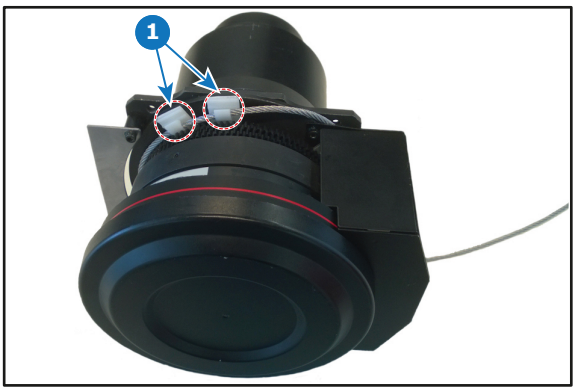


Image 12–16

2. Paste two extra cable clips on the motor block of the lens. Orient the open side to the outside of the lens.

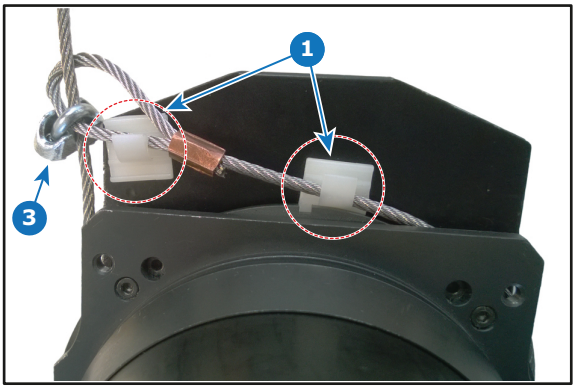


Image 12–17

3. Carefully slide the safety cable through the cable clips. Make sure the cable is placed between the motor block and the cover plate.
4. Slide the cable through the loop end at the beginning of the cable.
5. Mount a U-bolt on the cable, with the open ends oriented outwards (reference 3, Image 12–17). Make sure that both a part of the loop end and the outgoing part of the safety cable are placed in the enclosure.
6. Close the U-bolt and tighten it.

Note: Make sure the safety cable is tightened around the lens before tightening the U-bolt nuts.

The result should look similar to the following example.

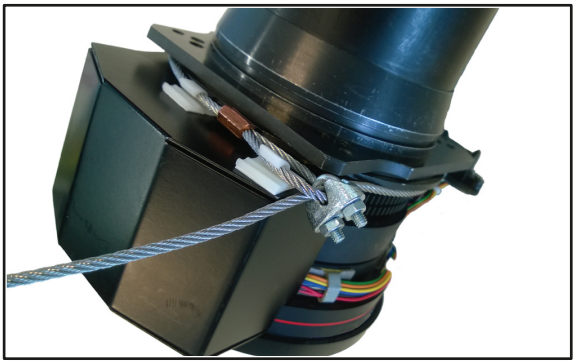


Image 12–18

7. Lead the cable end with the shackle around rigging frame bar or truss bar
8. Snap the shackle to the straight part of the cable.

   Secure the shackle by screwing the safety ring of the shackle over the open end.

12.5 Preparing the FLDX lens (0.38:1) UST

Preparation of the lens

This lens can be mounted facing up, to the left and to the right. (Not indicated in the draing).

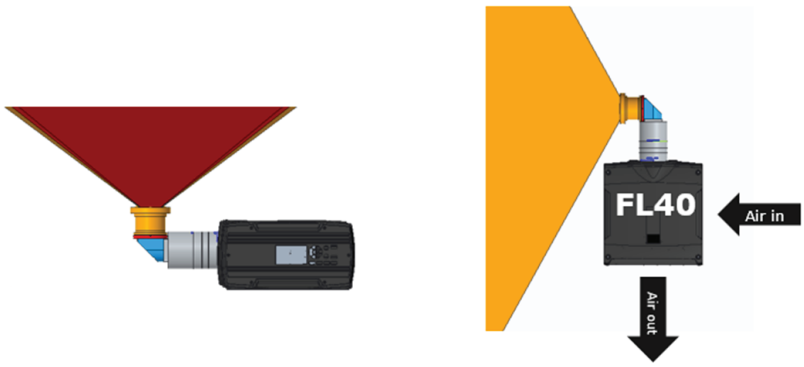


Image 12–19

Required tools

Allen key 2 mm with long shaft (delivered with the kit)

How to prepare the lens

1. Place the lens on a table. Turn out the 6 screws (1). Use an Allen key with a long shaft so that you do not damage the screw head. These screws will not be reused.

Note: Always use the correct tool (delivered with the kit) to avoid damage to the screw heads !

Image 12–20

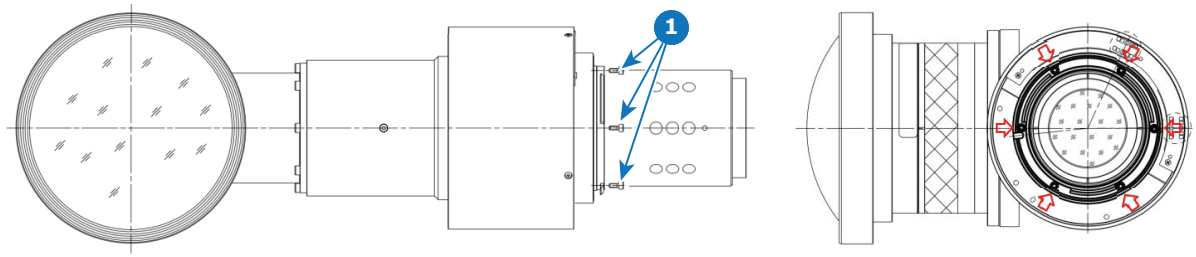


Image 12–21

2. Slide the motor housing a few mm to the backside of the lens (2) to disengage focusing gear and motor gear.

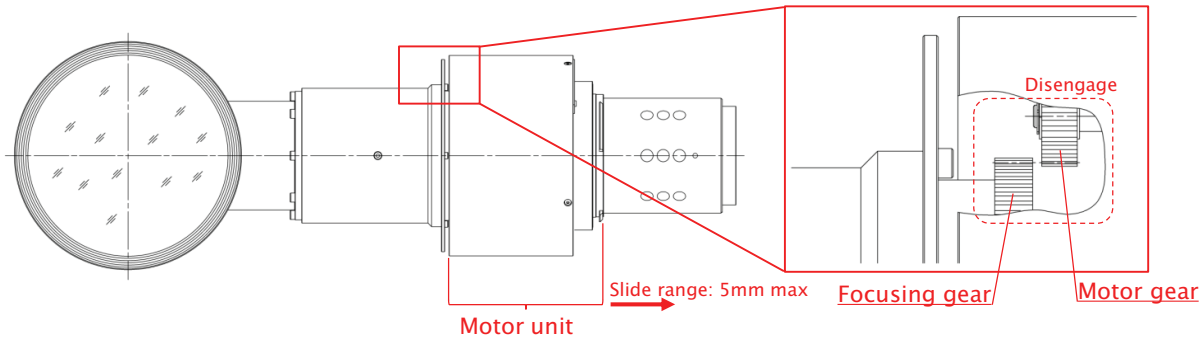


Image 12–22

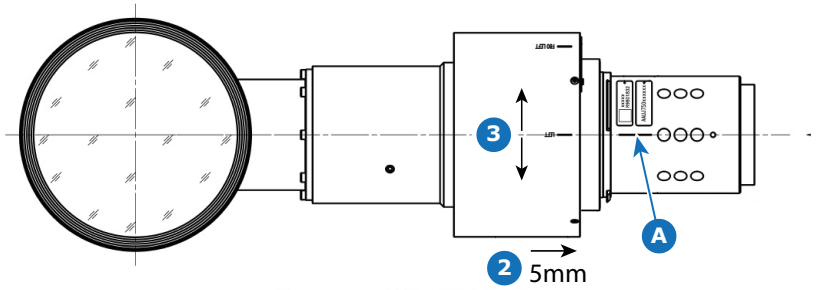
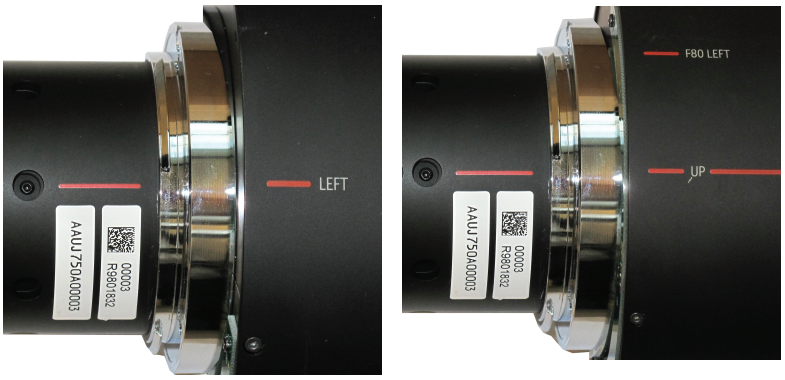


Image 12–23

A reference marking

3. Rotate the motor housing until the chosen marker on the housing corresponds with the reference marking on the lens body (steps of 30°). See if the mounting holes matches the holes in the lens body.

   E.g. for an FS40 projector, you want to project to the left, then turn the motor housing until the left marking on the motor housing corresponds with the reference marking on the lens housing.



A B

Image 12–24

A Project LEFT
B Project UP

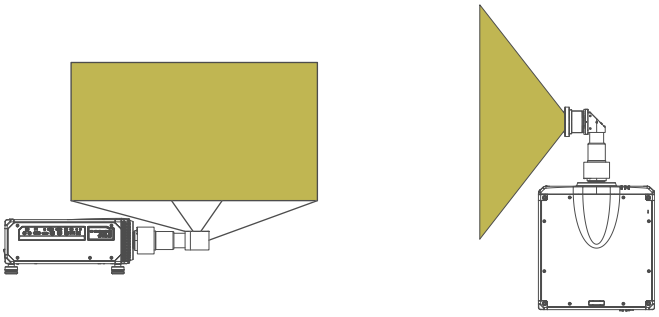
4. Slide the motor housing back to the front of the lens to re-engage focusing gear and motor gear.
5. Turn in 6 **new** Allen screws with glue (screws are delivered with the kit). These screws can be multiple times reused. The turned out old screws can be thrown away.

   Use again a tool with a long shaft (Allen key 2 mm, delivered with the kit).

   The lens is ready to be mounted on the projector.

How your image is displayed

Projection to the side for any projector:

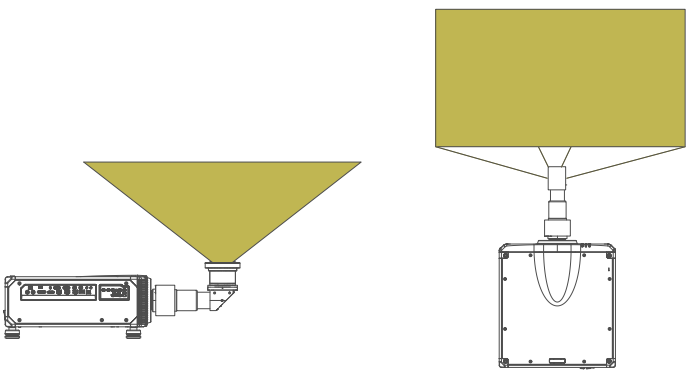


A B

Image 12–25

A Side view
B Top view

Up projection for any projector:



C D

Image 12–26

C Side view
D Bottom view

12.6 Mounting the FLDX lens (0.38:1) UST lens with a lens support

How to mount the lens support

1. Turn the projector on its side or on its top cover.
2. Place the bottom support plate on the bottom plate of the projector. Make sure that the fixation holes match the holes in the bottom plate.

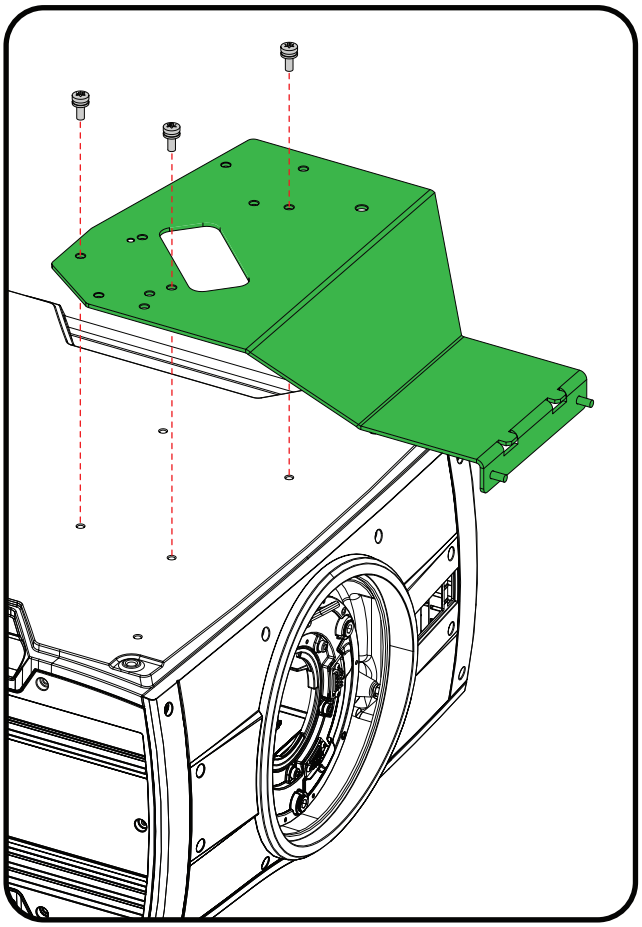


Image 12–27 Mount bottom plate

3. Turn in the 3 M6 screws.
4. Turn the projector back on its feet.

   Slide the lens locking system to the left.

   Insert the lens. Make sure the electric contact points (C) on the lens match the contact points on the lens holder.

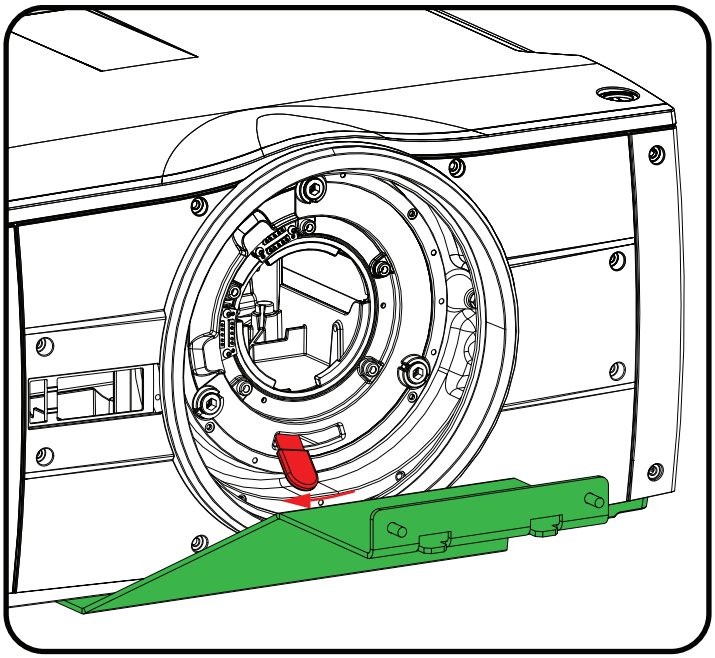


Image 12–28 Open locking system

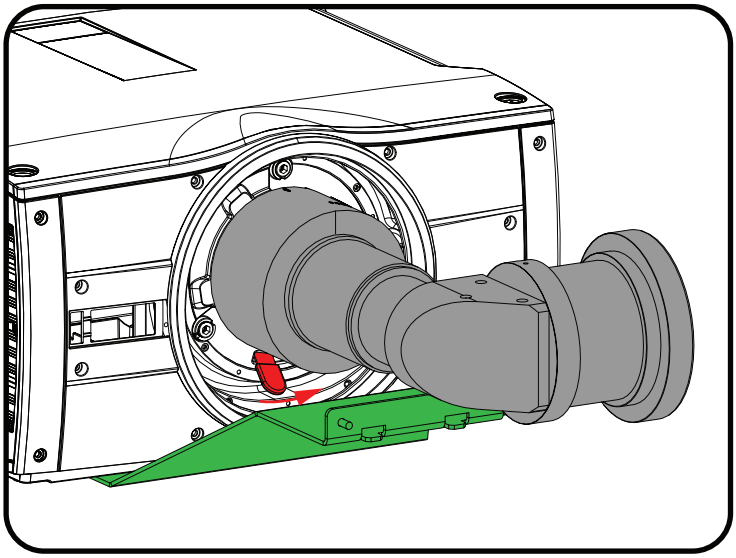


Image 12–29 Mounting lens

Image 12–30

5. When the lens is on its place, close the lens locking system by moving the handle from the left to the right.
6. Project an image and adjust the shift. See projector's user manual for more information about lens shift.

   Note: Shift cannot be adjusted anymore after full installation of the complete kit.

7. Slide plate 2 on both threaded rods and turn a nut on each rod. Do not fasten yet! It must be possible to move the plate a little bit while mounting the other plates.

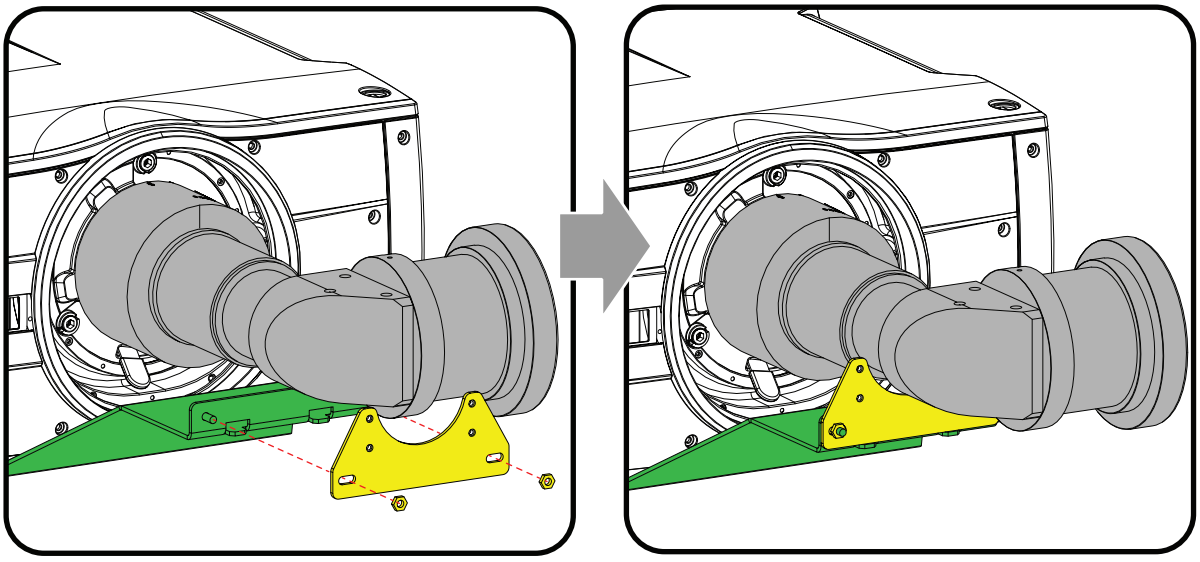


Image 12–31 Mount the 2nd plate

8. Mount the 3th plate on the 2nd plate. Use the lower mounting holes in the 2nd plate.

   Drive in both screws but do not fasten yet.

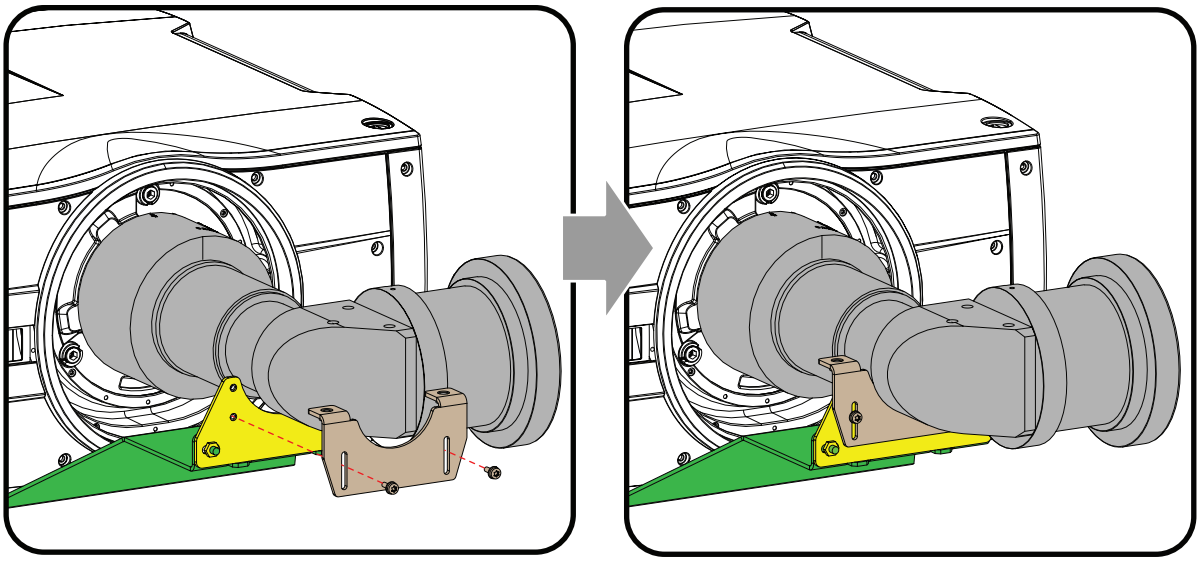


Image 12–32 Mount the 3th plate

9. Place the clamping bracket on the lens so that the fixation holes matches the holes in the support.

   Drive in both fixation screws. If necessary, move the 3th plate a little bit until it fully match with the lens.

   Fully secure both screws.

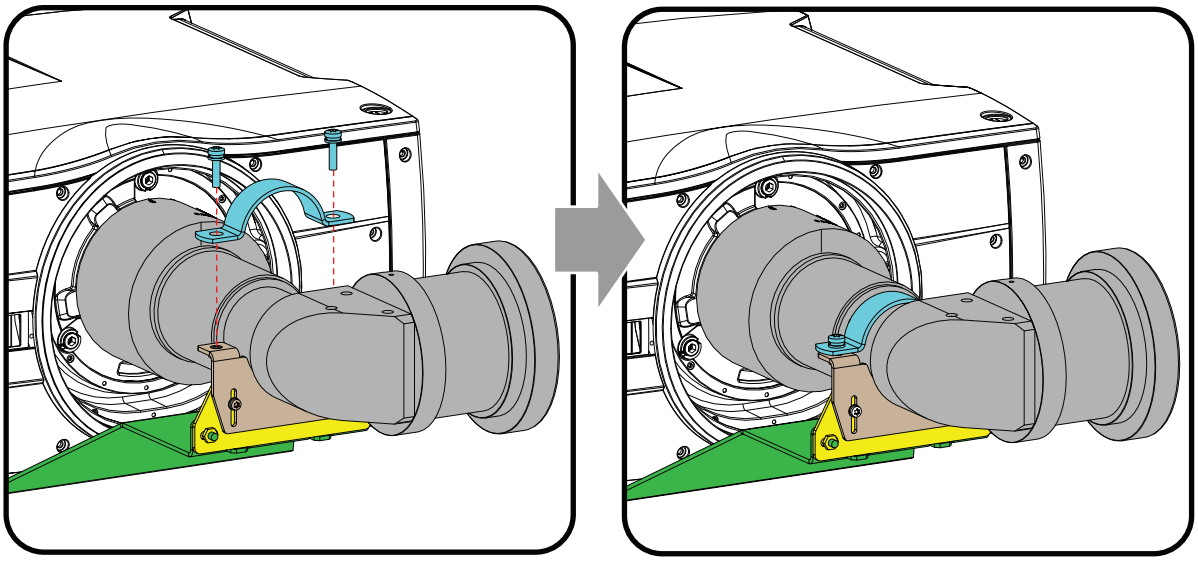


Image 12–33 Mount clamp bracket

10. Fully fasten the screws of the 3th plate and the nuts of the 2nd plate so that the support is fully assembled.

    The projector is ready for use.

12.7 Mounting a safety cable to the FLDX lens (0.38:1) UST lens

When to use the safety cable

While it is strongly recommended to use the specifically designed mounting support for this lens in combination with this lens, it is not mandatory.

When mounting the UST lens in a projector without using the mounting support (not recommended), it is mandatory to use the safety cable set provided by Barco instead. Failing to use either the correct type of safety cable or the mounting support may damage the lens and/or projector, and can also cause serious injury to persons.

How to prepare the lens with the safety cable

1. Stick 3 to 4 clips on the surface of the lens body (1).
2. Snap the first loop end of the safety cable into one of the clips.

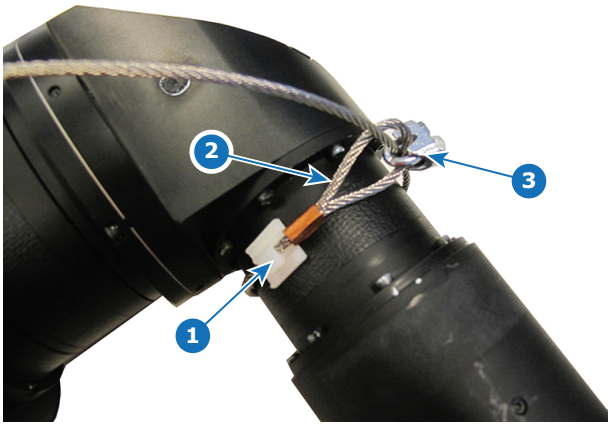


Image 12–34

3. Slide the rest of the cable around the lens. Click the cable into every clip it passes in the loop.
4. Slide the cable through the loop end at the beginning of the cable (2).
5. Install an U-bolt on the lens holder with the open ends oriented outwards (3). Make sure that both a part of the loop end and the outgoing part of the safety cable are placed in the enclosure.
6. Close the U-bolt and tighten it.

Note: Make sure the safety cable is tightened around the lens before tightening the U-bolt nuts.

7. Place the shackle through the free loop end of the safety cable.
8. Mount the lens in the projector.
9. Secure the safety cable around the truss and secure the shackle by turning the safety ring of the shackle over the open end.

Upgrade projector firmware

13

13.1 Upgrade procedure

CAUTION: Do NOT power down or remove mains power supply when an upgrade is in progress.

Once initiated, the upgrade procedure can take up to 20 minutes to complete.
The LCD display will show the progression and status of the upgrade during the process.

Update

- Go to www.barco.com and select your product. All available firmware downloads are filed under the Technical Downloads tab.
- Download the firmware. Extract and save the file to a USB stick with FAT file system. Use the eject function on your PC to safely remove the device from the computer.
- Place the projector in Ready mode (status indicator is steady White).
- Insert the USB Stick in to the rear USB port on the projector.
  After a few seconds, the status indicator will flash. (rate: 3 Hz/180 FPM). This signals that the upgrade is in progress. If the upgrade file is corrupt or invalid, the status indicator will turn red and the upgrade process will stop. Note! The upgrade will not be installed in this instance, and the upgrade process must be restarted with a full and correct file. The projector may restart several times during the upgrade process
- The LCD display will show the progress of the update procedure, and also when the USB stick can be removed. The projector will return to standby mode (status indicator is steady amber) once the upgrade is completed successfully.

14 Calibration routines

About color calibration

When a service or replacement of an optical component has been performed, a color calibration must be performed. The purpose with this calibration is to maintain the projectors whitepoint and color space.

14.1 Voltage calibration

About voltage calibration

This procedure must be performed when the LED's or the drivers are replaced. This is to ensure that the LED's has maximum performance.

How to calibrate the voltage

1. Enter Prospector diagnostic tool, and log in with the service code.
2. Navigate to *Service* > *Light sensor calibration* menu.
3. Follow the sequence described in the Prospector menu.

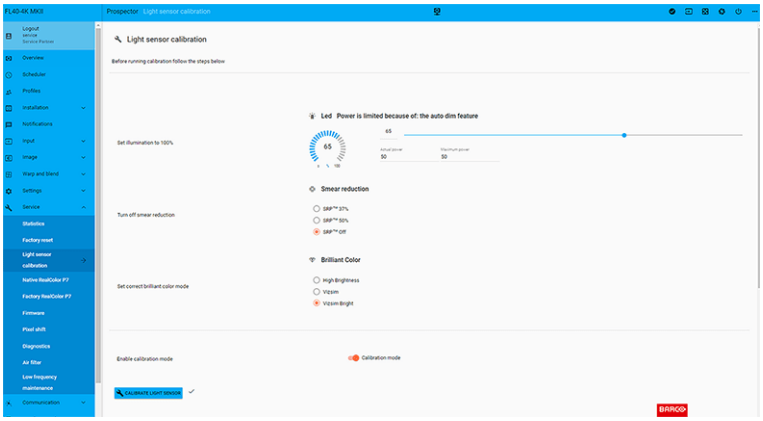


Image 14–1

14.2 Color calibration

About color calibration

When a service or replacement of an optical component has been performed, a color calibration must be performed. The purpose with this calibration is to maintain the projectors whitepoint and color space.

How to perform a color calibration

1. Set up the Color spectrum meter, measuring in the middle of the screen.
2. Enter Prospector diagnostic tool, and log in with the service code.
3. Navigate to Service —>Native RealColor P7 menu
4. In Prospector, enable the calibration mode switch, reference 4 in Image 14–2.
5. In Prospector, activate the white test pattern by check off the radio button, reference 5 in Image 14–2.
6. Enable the Test pattern switch, reference 6 in Image 14–2.

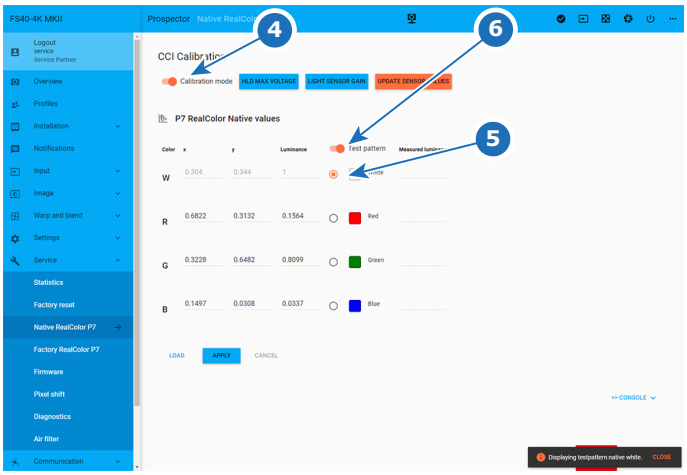


Image 14–2

7. In Prospector, activate the red test pattern by enabling the radio button. Measure the x- and y coordinates, and the luminance (Y) values. Replace the red x and y coordinates in Prospector with your measured values, reference 8.

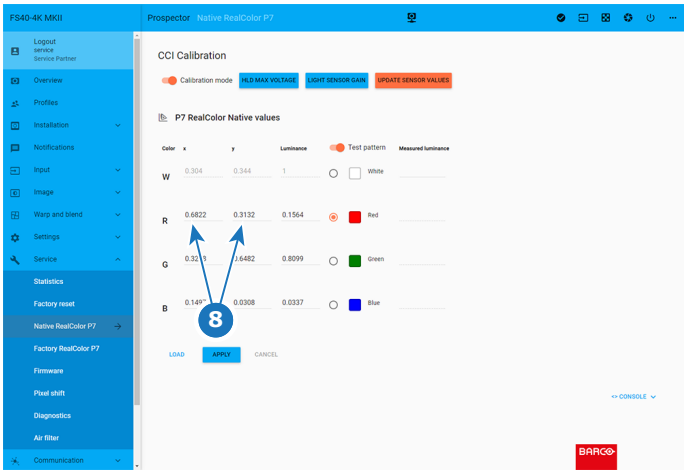


Image 14–3

8. To enter the red luminance value, divide the red measured luminance value by the sum of RGB luminance value. Insert this value in the red luminance cell, reference 9.

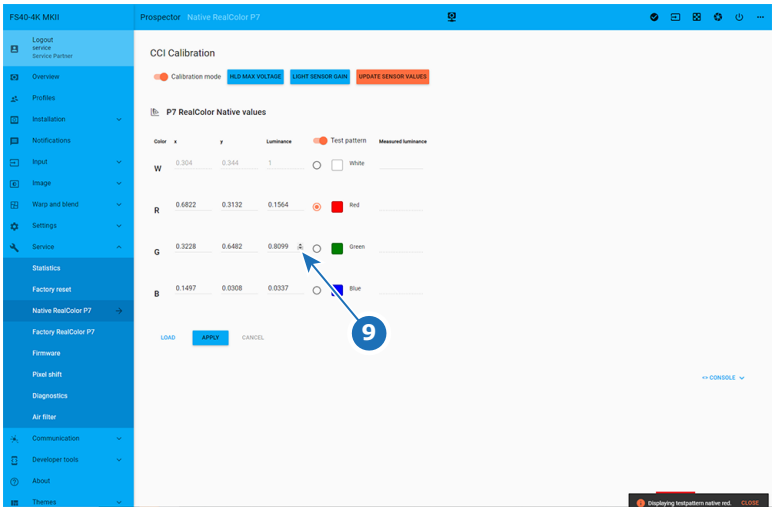


Image 14–4

9. Repeat the steps 8 and 9 for the Green and Blue colors.
10. Click the Update Sensor Value buttom at the top of the Prospector window.

Note: This action must be performed right after the measurement of the RGB values.

11. Click the Apply button at the bottom of the Prospector window.

14.3 Advanced settings – Tilt sensor calibration

CAUTION: The calibration procedure resets the values of the tilt sensor to 0 in the current position of the projector. For the optimal working of the tilt sensor it is important to make sure the projector is perfectly level when performing this procedure. If not, the tilt sensor will not function as desired once the calibration has been completed.

Required tools

Level

How to calibrate the tilt sensor?

1. Place the projector on a flat surface and make sure it is positioned level in all directions. Use a level tool to help ensure this.
2. In the main menu, navigate to *Settings* → *Maintenance* → *Advanced*, while you are logged in.

Image 14–5 Maintenance menu, Advanced

3. Enter the service code.
4. In the *Service* menu, select *Tilt sensor calibration*.

Image 14–6 Advanced menu, Tilt sensor calibration

5. Confirm your action.

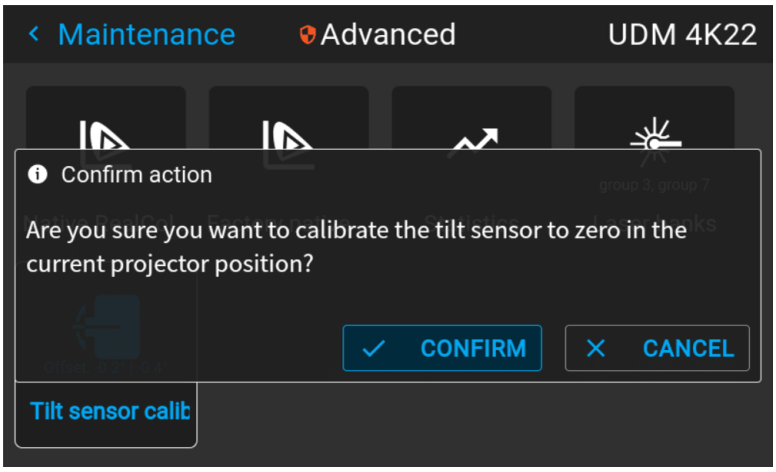


Image 14–7 Example of the Advanced menu with the Tilt sensor menu

The tilt sensor will be set to zero in the current position of the projector.

User maintenance — Cleaning the projector

15

15.1 Projector lenses

General guidelines for cleaning projector lenses

Blow off dust with clean compressed air (or pressurized air cans) .

Use lens cleaner and a clean lens cleaning cloth to remove the dust and contamination.

Wipe in broad strokes, in one direction only.

Warning: Do not wipe back and forwards across the lens surface as this tends to grind dirt into the coating.

Use a dry clean lens cleaning cloth to remove left liquid or stripes. Polish with small circles.

If there are still fingerprints on the surface, repeat with lens cleaner and a clean lens cleaning cloth, then polish again with a dry cloth.

If smears occur when cleaning lenses, replace the cloth. Smears are the first indication of a dirty cloth.

15.2 Projector cabinet

WARNING: Always disconnect the projector from the mains power net before attempting to clean the projector cabinet.

General guidelines for cleaning the projector cabinet (exterior only)

Clean the housing of the projector with a damp cloth. Stubborn stains may be removed with a cloth lightly dampened with a mild detergent solution.

15.3 Filters

General info

This equipment is intended to operate in a “normal” environment, without any exposure to extreme amounts of dust or moisture. and by that also shipped without any kind filters for the air intake.

There are filters for extreme environments available, contact your dealer for more info.

Technical specifications 16

16.1 FL40-4K MKII

Brightness	2,870 Typical ANSI Lumens
Contrast ratio	1800-6000:1
IR for NVG	no
Brightness uniformity	90%
Aspect ratio	16:10
Projector type	1DLP RGB LED
Resolution	3,840 x 2,400 (4K) / 2,560 x 1,600 (native)
Lens type	FLD+/FLDX
Optical lens shift	Vertical up to 146%, depending on lens Horizontal up to 70%, depending on lens Motorized zoom and focus (+ lens memory FLDX lenses) Motorized lens shift (with position memory on all lenses)
Color correction	P7 RealColorTM
CLO (constant light output)	Yes
Light source	RGB LED
Light source lifetime	Up to 50,000 hours
Sealed DLP™ core	Yes
Orientation	360° rotation, no restrictions
3D	Active stereoscopic 3D
Image processing	Embedded warp & blend engine
Keystone correction	Yes
Inputs	2x DP1.2 2x dual link DVI-I HDBaseT upgradable HDMI 2.0 (HDCP2.2, HDR10) RJ 45 Ethernet RS232 in 2x USB 12v out
Input resolutions	Including and up to: 3,840 x 2,400 @ 60Hz 3,840 x 2,160 @ 60Hz 4,096 x 2,160 @ 60Hz 2,560 x 1,600 @ 120Hz
Input color depth	**DVI:** Including and up to 2560x1600@60Hz 8 bit RGB and 3840x2400@50Hz 8 bit RGB **DisplayPort:** Including and up to 2560x1600@120Hz 12 bit RGB and 3840x2400@60Hz 8 bit RGB
Software tools	Projector Toolset
Control	IR, RS232, RJ45

Network connection	IR, RS232, RJ45
Power requirements	100-240V / 50-60Hz
Power consumption	500 W typical, 570 W maximum
BTU per hour	1,707 BTU/h typical, 1,945 BTU/h max
Noise level (typical at 25°C/ 77°F)	33 dB(A)
Operating temperature	10 - 40 °C (sea level)
Storage temperature	-20 to 60 °C
Operating humidity	20 - 80% RH
Storage humidity	10 - 90% RH
Dimensions (WxLxH)	450 x 457 x 244 mm / 17,7 x 18,0 x 9,6 in
Weight	21,5 kg / 47,4 lbs
Standard accessories	Power cord, wireless remote control
Certifications	CE, FCC Class A and cNus
Warranty	Limited 5 years parts and labor, extendable

16.2 FL40-WU MKII

Brightness	3,200 Typical ANSI Lumens
Contrast ratio	1800-6000:1
IR for NVG	no
Brightness uniformity	90%
Aspect ratio	16:10
Projector type	1DLP RGB LED
Resolution	1920 x 1200 (native)
Lens type	FLD/FLD+/FLDX
Optical lens shift	Vertical up to 134%, depending on lens Horizontal up to 70%, depending on lens Motorized zoom and focus (+ lens memory FLDX lenses) Motorized lens shift (with position memory on all lenses)
Color correction	P7 RealColorTM
CLO (constant light output)	Yes
Light source	RGB LED
Light source lifetime	Up to 50,000 hours
Sealed DLP™ core	Yes
Orientation	360° rotation, no restrictions
3D	Active stereoscopic 3D

Image processing	Embedded warp & blend engine
Keystone correction	Yes
Inputs	2x DP1.2 2x dual link DVI-I HDBaseT upgradable HDMI 2.0 (HDCP2.2, HDR10) RJ 45 Ethernet RS232 in 2x USB 12v out
Input resolutions	Including and up to: 1,920 x 1200 @ 60Hz 1,920 x 1,200 @240Hz
Input color depth	**DVI:** Native including and up to 1920x1200@120Hz 8 bit RGB. Non-native including and up to 2560x1600@60Hz 8 bit RGB and 3840x2400@50Hz 8 bit RGB **DisplayPort:** Native including and up to 1920x1200@120Hz 12 bit RGB, and 1920x1200@240Hz 8 bit RGB. Non-native including and up to 2560x1600@120Hz 12 bit RGB and 3840x2400@60Hz 8 bit RGB
Software tools	Projector Toolset
Control	IR, RS232, RJ45
Network connection	IR, RS232, RJ45
Power requirements	100-240V / 50-60Hz
Power consumption	500 W typical, 570 W maximum
BTU per hour	1,707 BTU/h typical, 1,945 BTU/h max
Noise level (typical at 25°C/ 77°F)	33 dB(A)
Operating temperature	10 - 40 °C (sea level)
Storage temperature	-20 to 60 °C
Operating humidity	20 - 80% RH
Storage humidity	10 - 90% RH
Dimensions (WxLxH)	450 x 457 x 244 mm / 17,7 x 18,0 x 9,6 in
Weight	21,5 kg / 47,4 lbs
Standard accessories	Power cord, wireless remote control
Certifications	CE, FCC Class A and cNus
Warranty	Limited 5 years parts and labor, extendable

16.3 FS40-4K MKII

Brightness	2,870 Typical ANSI Lumens
Contrast ratio	1800-6000:1

IR for NVG	Yes
Brightness uniformity	90%
Aspect ratio	16:10
Projector type	1DLP RGB LED
Resolution	3,840 x 2,400 (4K) / 2,560 x 1,600 (native)
Lens type	FLD+/FLDX
Optical lens shift	Vertical up to 146%, depending on lens Horizontal up to 70%, depending on lens Motorized zoom and focus (+ lens memory FLDX lenses) Motorized lens shift (with position memory on all lenses)
Color correction	P7 RealColorTM
CLO (constant light output)	Yes
Light source	RGB LED
Light source lifetime	Up to 50,000 hours
Sealed DLP™ core	Yes
Orientation	360° rotation, no restrictions
3D	Active stereoscopic 3D
Image processing	Embedded warp & blend engine
Keystone correction	Yes
Inputs	2x DP1.2 2x dual link DVI-I HDBaseT upgradable HDMI 2.0 (HDCP2.2, HDR10) RJ 45 Ethernet RS232 in 2x USB 12v out
Input resolutions	Including and up to: 3,840 x 2,400 @ 60Hz 3,840 x 2,160 @ 60Hz 4,096 x 2,160 @ 60Hz 2,560 x 1,600 @ 120Hz
Input color depth	**DVI:** Including and up to 2560x1600@60Hz 8 bit RGB and 3840x2400@50Hz 8 bit RGB **DisplayPort:** Including and up to 2560x1600@120Hz 12 bit RGB and 3840x2400@60Hz 8 bit RGB
Software tools	Projector Toolset
Control	IR, RS232, RJ45
Network connection	IR, RS232, RJ45
Power requirements	100-240V / 50-60Hz
Power consumption	500 W typical, 570 W maximum

BTU per hour	1,707 BTU/h typical, 1,945 BTU/h max
Noise level (typical at 25°C/ 77°F)	33 dB(A)
Operating temperature	10 - 40 °C (sea level)
Storage temperature	-20 to 60 °C
Operating humidity	20 - 80% RH
Storage humidity	10 - 90% RH
Dimensions (WxLxH)	450 x 457 x 244 mm / 17,7 x 18,0 x 9,6 in
Weight	21,5 kg / 47,4 lbs
Standard accessories	Power cord, wireless remote control
Certifications	CE, FCC Class A and cNus
Warranty	Limited 5 years parts and labor, extendable

16.4 FS40-WU MKII

Brightness	3,200 Typical ANSI Lumens
Contrast ratio	1800-6000:1
IR for NVG	Yes
Brightness uniformity	90%
Aspect ratio	16:10
Projector type	1DLP RGB LED
Resolution	1920 x 1200 (native)
Lens type	FLD/FLD+/FLDX
Optical lens shift	Vertical up to 134%, depending on lens Horizontal up to 70%, depending on lens Motorized zoom and focus (+ lens memory FLDX lenses) Motorized lens shift (with position memory on all lenses)
Color correction	P7 RealColorTM
CLO (constant light output)	Yes
Light source	RGB LED
Light source lifetime	Up to 50,000 hours
Sealed DLP™ core	Yes
Orientation	360° rotation, no restrictions
3D	Active stereoscopic 3D
Image processing	Embedded warp & blend engine
Keystone correction	Yes
Inputs	2x DP1.2 2x dual link DVI-I

	HDBaseT upgradable HDMI 2.0 (HDCP2.2, HDR10) RJ 45 Ethernet RS232 in 2x USB 12v out
Input resolutions	Including and up to: 1,920 x 1200 @ 60Hz 1,920 x 1,200 @ 240Hz
Input color depth	**DVI:** Native including and up to 1920x1200@120Hz 8 bit RGB. Non-native including and up to 2560x1600@60Hz 8 bit RGB and 3840x2400@50Hz 8 bit RGB **DisplayPort:** Native including and up to 1920x1200@120Hz 12 bit RGB, and 1920x1200@240Hz 8 bit RGB. Non-native including and up to 2560x1600@120Hz 12 bit RGB and 3840x2400@60Hz 8 bit RGB
Software tools	Projector Toolset
Control	IR, RS232, RJ45
Network connection	IR, RS232, RJ45
Power requirements	100-240V / 50-60Hz
Power consumption	500 W typical, 570 W maximum
BTU per hour	1,707 BTU/h typical, 1,945 BTU/h max
Noise level (typical at 25°C/ 77°F)	33 dB(A)
Operating temperature	10 - 40 °C (sea level)
Storage temperature	-20 to 60 °C
Operating humidity	20 - 80% RH
Storage humidity	10 - 90% RH
Dimensions (WxLxH)	450 x 457 x 244 mm / 17,7 x 18,0 x 9,6 in
Weight	21,5 kg / 47,4 lbs
Standard accessories	Power cord, wireless remote control
Certifications	CE, FCC Class A and cNus
Warranty	Limited 5 years parts and labor, extendable

Regulatory information

A

A.1 Product compliance

Federal Communications Commission (FCC Statement)

This equipment has been tested and found to comply with the limits for a class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area may cause harmful interference, in which case the user will be responsible for correcting any interference at his own expense

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment

FCC responsible: Barco Inc.
3059 Premiere Parkway Suite 400
30097 Duluth GA, United States
Tel: +1 678 475 8000

UK Compliance

This product is fit for use in the UK.
Authorised Representative: Barco UK Ltd
Address: Building 329, Doncastle Road
Bracknell RG12 8PE, Berkshire, United Kingdom

EMC notices

EN55032/CISPR32 Class A MME (MultiMedia Equipment)

Warning : This equipment is compliant with Class A of CISPR 32. In a residential environment this equipment may cause radio interference.

GB/T 9254.1 A级ITE(信息技术设备)

警告：在居住环境中，运行此设备可能会造成无线电干扰。

BSMI Taiwan Class A statement:

警告使用者 : 此為甲類資訊技術設備，於居住環境中使用 ，可能會造成射頻擾動，在此情況下，使用者會被要求採取某些適當的對策。

EN55032/CISPR32 Class A MME (MultiMedia Equipment)

Warning : This equipment is compliant with Class A of CISPR 32. In a residential environment this equipment may cause radio interference.

Class A ITE (Information Technology Equipment)

Warning : This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

警告使用者: 此為甲類資訊技術設備，於居住環境中使用時，可能會造成射頻擾動，在此種情況下，使用者會被要求採取某些適當的對策。

EurAsian Conformity (EAC)

This product complies with the Safety of Low-Voltage Equipment (LVE Technical Regulation 004/2011, CU TR 004/2011) and the Electromagnetic Compatibility of Technical Products (EMC Technical regulation, CU TR 020/2011) and Restriction of use of Hazardous Substances in radio and electronic devices (RoHS Technical regulation, CU TR 037/2016).

A.2 Turkey RoHS compliance

Turkey RoHS compliance

Türkiye Cumhuriyeti: AEEE Yönetmeliğine Uygundur.

[Republic of Turkey: In conformity with the WEEE Regulation]

A.3 China RoHS compliance

中国大陆 RoHS (Information for China ROHS compliance)

根据中国大陆《电器电子产品有害物质限制使用管理办法》（也称为中国大陆RoHS），以下部分列出了Barco产品中可能包含的有毒和/或有害物质的名称和含量。中国大陆RoHS指令包含在中国信息产业部MCV标准：“电子信息产品中有毒物质的限量要求”中。

According to the “Management Methods for the Restriction of the Use of Hazardous Substances in Electrical and Electronic Products” (Also called RoHS of Chinese Mainland), the table below lists the names and contents of toxic and/or hazardous substances that Barco’s product may contain. The RoHS of Chinese Mainland is included in the MCV standard of the Ministry of Information Industry of China, in the section “Limit Requirements of toxic substances in Electronic Information Products”.

零件项目(名称) Component name	有毒有害物质或元素 Hazardous substances and elements					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr6+)	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
印制电路配件 Printed Circuit Assemblies	X	O	X	O	O	O
外接电(线)缆 External Cables	X	O	O	O	O	O
内部线路 Internal wiring	X	O	O	O	O	O
镜头支架 Lensholder	X	O	O	O	O	O
螺帽,螺钉(栓),螺旋(钉),垫圈, 紧固件 Nuts, bolts, screws, washers, Fasteners	X	O	O	O	O	O
电源供应器 Power Supply Unit	X	O	O	O	O	O
风扇 Fan	X	O	O	O	O	O

零件项目(名称) Component name	有毒有害物质或元素 Hazardous substances and elements					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr6+)	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
附電池遙控器 Remote control	X	O	O	O	O	O

本表格依据SJ/T 11364的规定编制

This table is prepared in accordance with the provisions of SJ/T 11364.

O: 表示该有毒有害物质在该部件所有均质材料中的含量均在 GB/T 26572 标准规定的限量要求以下.

O: Indicates that this toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in GB/T 26572.

X: 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 标准规定的限量要求.

X: Indicates that this toxic or hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in GB/T 26572.

在中国大陆销售的相应电子信息产品（EIP）都必须遵照中国大陆《电子电气产品有害物质限制使用标识要求》标准贴上环保使用期限（EFUP）标签。Barco产品所采用的EFUP标签（请参阅实例，徽标内部的编号使用于指定产品）基于中国大陆的《电子信息产品环保使用期限通则》标准。

All Electronic Information Products (EIP) that are sold within Chinese Mainland must comply with the “Marking for the restriction of the use of hazardous substances in electrical and electronic product” of Chinese Mainland, marked with the Environmental Friendly Use Period (EFUP) logo. The number inside the EFUP logo that Barco uses (please refer to the photo) is based on the “General guidelines of environment-friendly use period of electronic information products” of Chinese Mainland.

A.4 Taiwan RoHS compliance

限用物質含有情況標示聲明書 (Declaration of the Presence Condition of the Restricted Substances Marking)

	限用物質及其化學符號 Restricted substances and its chemical symbols					
單元 Unit	鉛 Lead (Pb)	汞 Mercu- ry (Hg)	鎘 Cadmi- um (Cd)	六價鉻 Hexava- lent chromi- um (Cr6+)	多溴聯苯 Polybromi- nated biphenyls (PBB)	多溴二苯醚 Polybromi- nated diphenyl ethers (PBDE)
印製電路板配件 Printed Circuit Assemblies	—	O	—	O	O	O
外接電（線）纜 External Cables	—	O	O	O	O	O
內部線路 Internal wiring	—	O	O	O	O	O
鏡頭支架 Lensholder	—	O	O	O	O	O
螺絲組件 Nuts, bolts, screws, washers, Fasteners	—	O	O	O	O	O

	限用物質及其化學符號 Restricted substances and its chemical symbols					
單元 Unit	鉛 Lead (Pb)	汞 Mercu- ry (Hg)	鎘 Cadmi- um (Cd)	六價鉻 Hexava- lent chromi- um (Cr6+)	多溴聯苯 Polybromi- nated biphenyls (PBB)	多溴二苯醚 Polybromi- nated diphenyl ethers (PBDE)
電源供應器 Power Supply Unit	—	O	O	O	O	O
風扇 Fan	—	O	O	O	O	O
遙控器 Remote control	—	O	O	O	O	O

備考1.〝超出0.1 wt %〞及〝超出0.01 wt %〞係指限用物質之百分比含量超出百分比含量基準值。

Note 1：“Exceeding 0.1 wt %” and “exceeding 0.01 wt %” indicate that the percentage content of the restricted substance exceeds the reference percentage value of presence condition.

備考2.〝O〞係指該項限用物質之百分比含量未超出百分比含量基準值。

Note 2：“O” indicates that the percentage content of the restricted substance does not exceed the percentage of reference value of presence.

備考3.〝—〞係指該項限用物質為排除項目。

Note 3：The “—” indicates that the restricted substance corresponds to the exemption.

備註: 此RoHS表格適用於以下產品型號: GP5

Hint: This RoHS table is suitable for following models: GP5

A.5 Contact information

Barco contact information

Registered office address: President Kennedypark 35, 8500 Kortrijk, Belgium

Contact address: Beneluxpark 21, 8500 Kortrijk, Belgium

Contact address (for Taiwan) :

公司名稱 (Company Name)：巴可股份有限公司

地址 (Address)：新北市板橋區新站路16號33樓

傳真 (Fax)：02-7715 0298

電話 (Tel)：02-7715 0299

E-mail：service.taiwan@barco.com

Importers contact information

To find your local importer, contact Barco directly or one of Barco's regional offices via the contact information given on Barco's web site, www.barco.com.

Contact information Norway factory

Barco Fredrikstad as

Habornveien 53, N1630 Gamle Fredrikstad, Norway

Phone: +476930 4550

Support: Support.fre@barco.com

A.6 Production address

Factories

Barco NV (BELGIUM)
President Kennedypark 35, B-8500 Kortrijk

CFG Barco (Beijing) Electronics Co., Ltd.
中影巴可（北京）电子有限公司*
No. 16, Changsheng Road Changping Park, Changping District, 102200, Beijing, P.R.C
北京市昌平区中关村科技园区昌盛路16号巴可工厂第三层：102200

Made in information

The made in country is indicated on the product ID label on the product itself.

Production date

The month and year of production is indicated on the product ID label on the product itself.

A.7 Product Info

Product info

Image A–1

product name 產品名稱:

projector 投影機

model 型號: GP5

A.8 Disposal Information

Disposal Information

Waste Electrical and Electronic Equipment (WEEE)

This symbol on the product indicates that, under the European Directive 2012/19/EU governing waste from electrical and electronic equipment, this product must not be disposed of with other municipal waste. Please dispose of your waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. To prevent possible harm to the environment or human health from uncontrolled waste disposal, please separate these items from other types of waste and recycle them responsibly to promote the sustainable reuse of material resources.

For more information about recycling of this product, please contact your local city office or your municipal waste disposal service. For details, please visit the Barco website at: *https://www.barco.com/about/sustainability/waste-of-electronic-equipment-customers*

WEEE Information

This product conforms to all requirements of the EU Directive on waste electrical and electronic equipment (WEEE). This product shall be recycled properly. It can be disassembled to facilitate proper recycling of it’s individual parts.

Consult your dealer or relevant public authority regarding drop-off points for collection of WEEE. For details, please visit the Barco website at: http://www.barco.com/en/ AboutBarco/weee.

A.9 Disposal of batteries

Disposal of batteries in the product

This product contains batteries covered by the Directive 2006/66/EC which must be collected and disposed of separately from municipal waste.

If the battery contains more than the specified values of lead (Pb), mercury (Hg) or cadmium (Cd), these chemical symbols will appear below the crossed-out wheeled bin symbol.

By participating in separate collection of batteries, you will help to ensure proper disposal and to prevent potential negative effects on the environment and human health.

Color component mapping

B

B.1 Introduction

This topic is only valid for the FS variant of the projector.

Introduction

In the FS-series projectors, one of the night vision modes is achieved by feeding the projector with two separate inputs, one with content for visible light (VL), and the other with content for the infrared (IR). Outside the projector, these two inputs may have the same content, achieved by a splitter or by cloning the output in the graphics adapter on the image generator (IG).

This topic describe some usage scenarios and the setup to use, to achieve the best performance. It should serve as a guide for how to set up the system or give guidance if the exact user case is not described here.

B.2 How infrared is displayed

How infrared is displayed

In night vision mode with 2 separate inputs, the projector displays the two inputs alternating every other frame. The output is displayed a double speed of the inputs, i. e. at 120Hz in case of 60Hz input. The DMD is illuminated with visible RGB light every other frame, while the IR “light” is illuminating the DMD all the time.

The display device (DMD) itself do not know whether it is displaying IR or VL. And this is causing problems when the actual image content is not carrying all 3 color components (full RGB). As an example, only the red color component is active on the input. The DMD is attempting to display this as an RGB image even if it is illuminated with IR. The result is that the DMD is active only approximately one third of the frame, thereby “wasting” a lot of the IR output power.

In Pulse release 2.1 and onwards, there is an option to create a Color Component mapping per connector input. This gives the flexibility on individual connector to connect DMD “colors” to input color channel.

B.3 Default setup

Default setup

In the default setup, the RGB components of the DMD fetches the content from the RGB component of the inputs. This mode of operation is best suited for when the VS and IR inputs both carries a full RGB image and specially the IR channel has full black/white content if displayed on a regular monitor. This is not a clone or spitted image even if the content in the example below indicates the same image on both inputs.

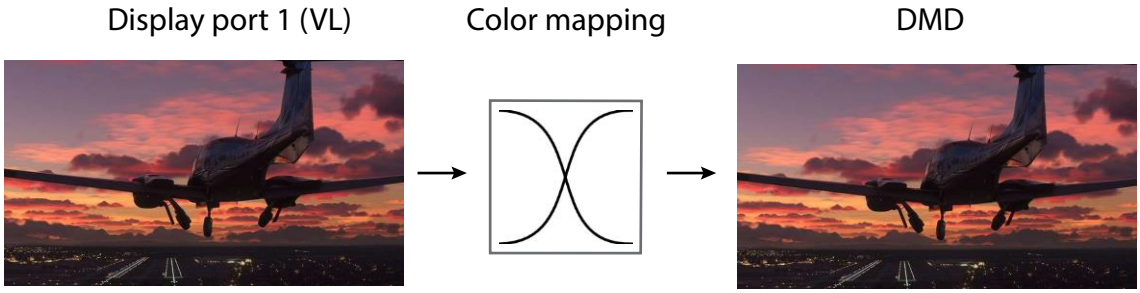


Image B–1

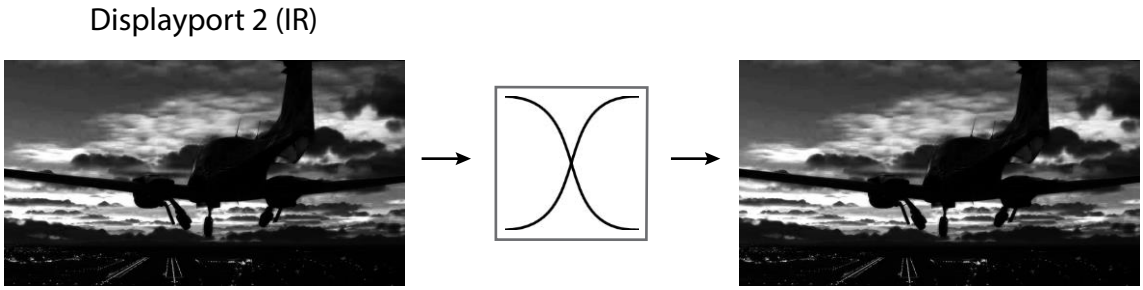


Image B–2

This is the default setup, and the properties of the input is as follows:

Property	Value
image.connector.displayport1.colorcomponent.red	RED_IN
image.connector.displayport1.colorcomponent.green	GREEN_IN
image.connector.displayport1.colorcomponent.blue	BLUE_IN
image.connector.displayport2.colorcomponent.red	RED_IN
image.connector.displayport2.colorcomponent.green	GREEN_IN
image.connector.displayport2.colorcomponent.blue	BLUE_IN

B.4 Cloned image with full RGB input

Cloned image with full RGB input

In this setup the image is rendered for visible light. It has full RGB information. In this setup there is also requested to take the red color component on the input for the IR channel and fully saturate the DMD with this component.

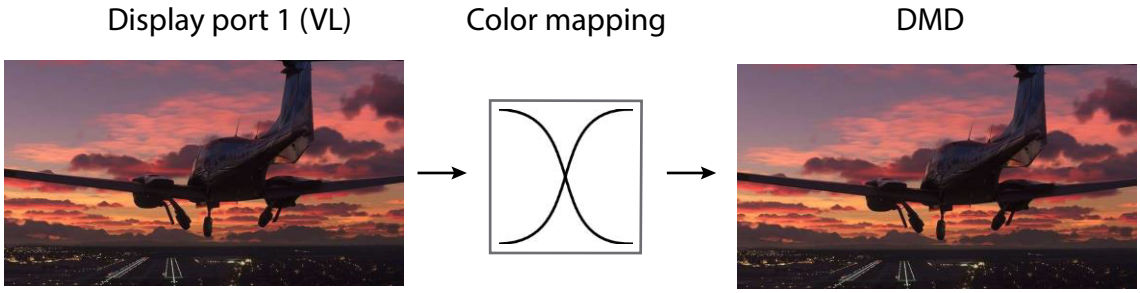


Image B–3

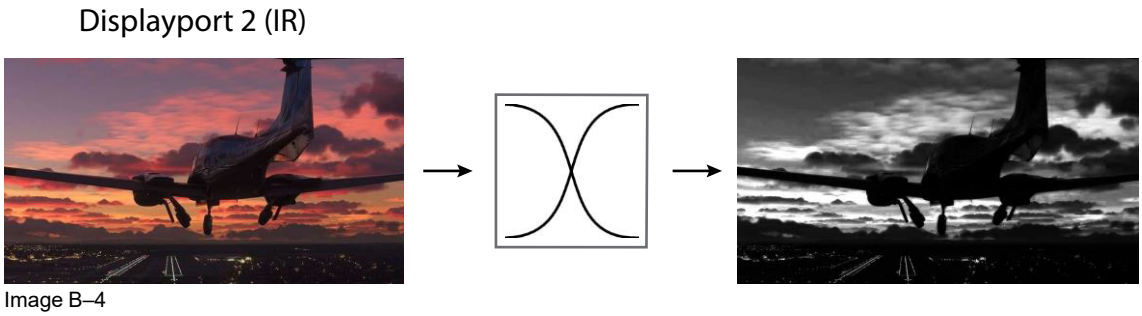


Image B–4

To achieve this result, use the following settings:

Property	Value
image.connector.displayport1.colorcomponent.red	RED_IN
image.connector.displayport1.colorcomponent.green	GREEN_IN
image.connector.displayport1.colorcomponent.blue	BLUE_IN
image.connector.displayport2.colorcomponent.red	RED_IN
image.connector.displayport2.colorcomponent.green	RED_IN
image.connector.displayport2.colorcomponent.blue	RED_IN

B.5 Cloned inputs with only green content for IR

Cloned inputs with only green content for IR

In this setup, the input is a fully saturated green and white image, well suited for the IR channel. In this setup, a portion of the green image is extracted and applied to the red channel for visible light also. Note that the power of the visible light source must be dimmed to achieve the desired effect.

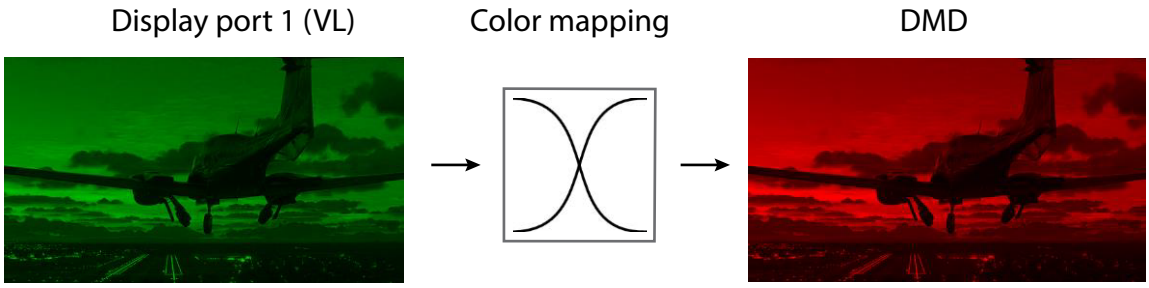


Image B–5

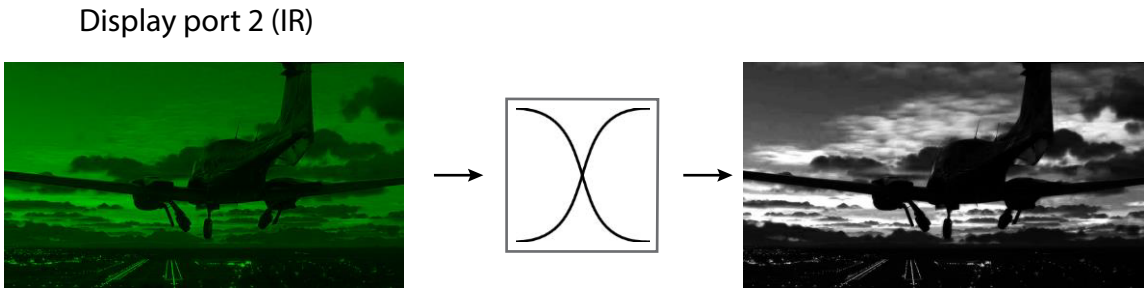


Image B–6

Property	Value
image.connector.displayport1.colorcomponent.red	GREEN_IN
image.connector.displayport1.colorcomponent.green	OFF
image.connector.displayport1.colorcomponent.blue	OFF
image.connector.displayport2.colorcomponent.red	GREEN_IN
image.connector.displayport2.colorcomponent.green	GREEN_IN
image.connector.displayport2.colorcomponent.blue	GREEN_IN

Image settings and adjustments for optimal latency

C

C.1 Introduction

Introduction

For projectors used in simulation, latency is always an important component. Barco strives to make latency as small as possible together with optimal image quality.

There are however some parameters of the installation and setup that affects latency. This white paper describes these conditions and gives guidance for how to optimize setup of the projector.

C.2 Latency

Latency

Latency is a measurement of the added time the projector needs to display an image. This is measured from when the first pixel (not v-sync) of an image arrives at the projector until the first light of the same image is being displayed by the projector. This time is measured in milliseconds. The latency is also referred to as transport delay.

Different projector settings affect latency. For example, the amount of warp applied to the image might affect latency since the projector has to wait longer for the required pixels to arrive at the input. As will be shown later, warping can in certain special settings reduce latency compared to a non-warped image.

In a multi projector setup, different projectors most often have different warp settings and thereby different latencies. To keep a full system at the same latency and in sync, each projector has the possibility to add to the latency (transport delay). In a multi-projector setup, all projectors should be set to the same latency as the projector with the highest transport delay.

C.3 DMD display device

DMD display device

Barco projectors uses a DMD device from Texas Instruments to display the image. A DMD device displays the intensity of a pixel by time multiplexing the time it is on over the frame time. If one pixel is 50% grey, it is on for 50% of the time for that frame. Since we also change the color of the light during the same frame period, all the DMD mirrors (pixels) must be displayed synchronously. This is done by dividing the image into bitplanes and sending the bitplanes one by one to all the mirrors simultaneously. As a simplistic explanation, consider an 8-bit pr. pixel image. First the LSB bitplane is loaded. All the pixels that has the LSB bit set, has the corresponding DMD mirror turned on for a short time. Next, the second to last bitplane is loaded, and all the DMD mirrors where this bit is set are displayed for twice as long. This continues until the MSB (bitiplane 8) is loaded and displayed.

Because of dividing the image into bitplanes, all pixels of an image must be loaded to the DMD before it can start to display any of the pixels.

C.4 Image display

Native image

Consider the following setup, where the incoming image has the same resolution as the DMD device.

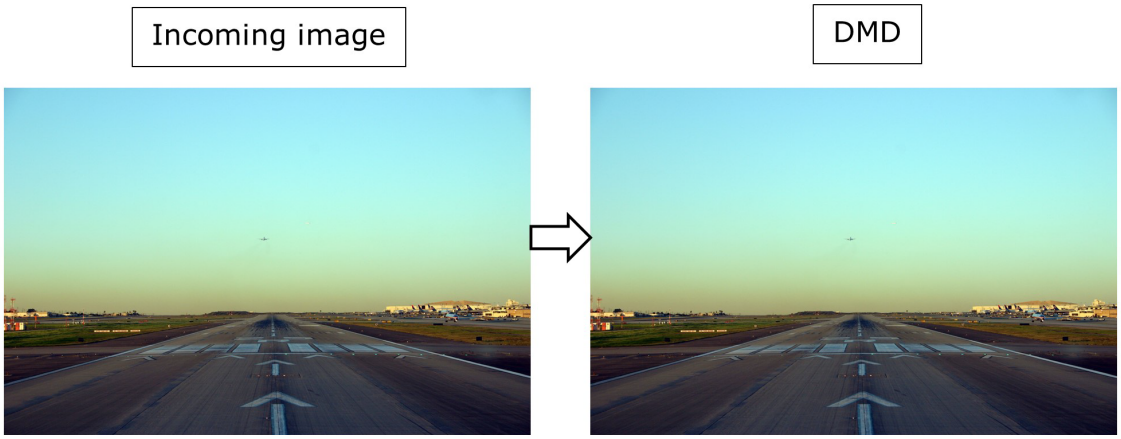


Image C–1

The image is sent to the projector, pixel by pixel, line by line from top left to bottom right. For 60Hz, it takes 16.6667ms for all the pixels to arrive at the projector (disregarding blanking pixels).

Theoretically, as soon as the first pixel arrives, it can be transmitted directly to the DMD. Since incoming and output pixels follow a one-to-one relation, when the last pixel arrives it is sent to the DMD and at that time the DMD can immediately start to divide the image into bitplanes and display the image. This means that the latency never can go below 16.6667ms.

There is more processing being done to the pixels (color analysis, memory handling etc.), so in real life, latency will never be this low.

Non-native image

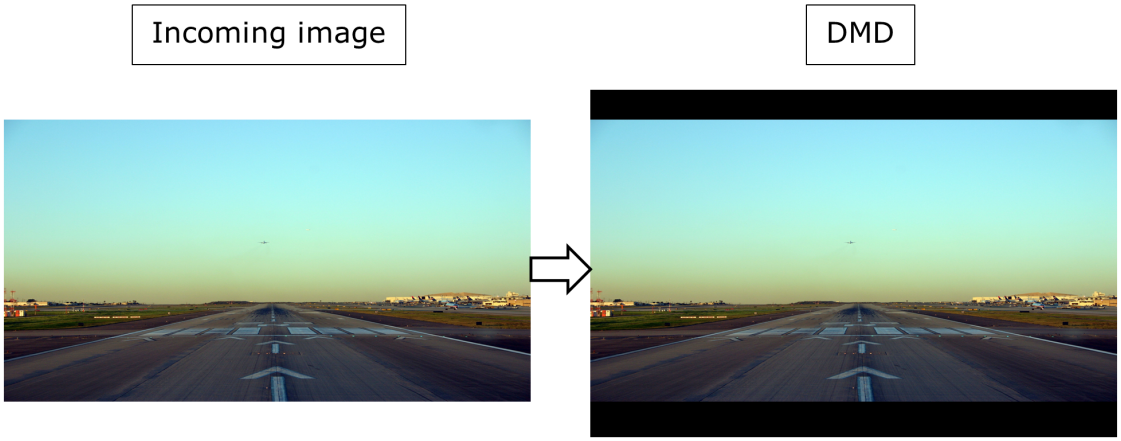


Image C–2

Consider this setup where the incoming image is smaller vertically than the DMD resolution. To maintain correct aspect, the image will be displayed by filling in black pixels above and below on the DMD. The DMD device needs to receive all the pixels it shall display, including the black ones.

In this case, the Pulse image processing will start to prefill the DMD with black pixels before the actual pixels arrive on the input. Then it follows a one-to-one pixel copy until the last incoming pixel has arrived. After that, the additional black pixels are transmitted until the DMD has received all the pixels for a full frame. It is not until then that the image can be displayed.

Therefore, the black pixels at the bottom of the image directly adds to latency since the image cannot be display until all the extra black pixels have been transmitted to the DMD.

C.5 Image positioning

Image positioning

From the discussion above, it follows that the incoming image should follow the DMD resolution as much as possible to reduce latency. If this is not possible, the image should be adjusted and positioned as close to the bottom edge (in desktop-front projection mode) of the DMD as possible to have minimum latency.

To position the image on the DMD, it's recommended that the digital image shift is used. This function shifts the image content and is done after the image has been warped. Shifting the image does not degrade pixel quality and no scaling is used for this functionality.

Another option is to use the warp settings itself, either the 4-corner coordinates of the warp mask or the warp grid calculated externally. Always adjust the warp grid to position it as close to the bottom of the image as possible.

A curious effect of this is when applying keystone warp to an image smaller than DMD resolution and the output is adjusted down as discussed above. In the following example some keystone (4-corner adjustment) is applied.

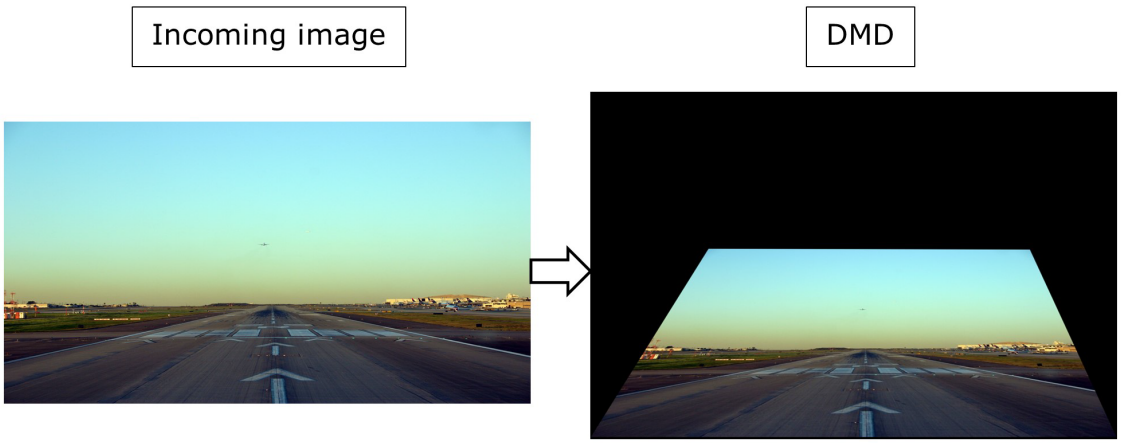


Image C–3

In this setup, the projector latency will in fact be lower than the uncorrected image. This is because the output image has fewer active lines than the incoming image. All the incoming lines are used in the warp calculations, but the resulting image consists of fewer active lines than the original. The projector can take advantage of this by preloading the DMD with black lines before the actual content. Note that for a 60Hz system, latency will never go below 16.66667ms because the DMD is displaying the image synchronously with the refresh of the incoming image.

Advanced blend

D

D.1 Advanced blend, file creation

About

The file format is JSON based and consists of a top-level object that has a **surfaces** member, containing an array of surfaces objects. Files containing this format are marked with the extension .babl (for Barco Advanced BLend).

File parameters

Invert	Renders the file with inverted colors when **true**

Surfaces		
Type	A string describing the type of surface	
	Coons	12 control points. A Coons Patch is described via 4 bezier curves, sharing the 4 corner points. These will be described as C1 to C4 , in this order: top-left, top-right, bottom-left, bottom-right. Each corner also has two handles, which describe the way each curve exits the corner point, these will be described as C1H1 to C4H2 where H1 is the horizontal handle, and H2 is the vertical handle. The order of the points in the points array is then as follows: C1, C1H1, C2H1, C2, C1H2, C2H2, C3H2, C4H2, C3, C3H1, C4H1, C4.
	Cubic	16 control points Bicubic Bezier surface
Points	An array of normalized 2D points (float,float).	
Colors	An array of exactly four normalized RGB values (float, float, float). These describe the color values used for each corner point, and are arranged in the same order as the corner points	

Type	Must contain the text value "babl" in order to declare this a drawing of the advanced blend type

Version	Must be set to the text value "1.0"

"presentation":
{
"stroke":1,
"points":true,
"bubbles":true
}
	Used by the UI tool when files are created and/or edited in this tool, and will be present in a file downloaded from the projector
	These parameters are not needed when creating a file

D.2 Example files

1 shape, coons


```
{
"invert": false,
"surfaces": [
{
"type":" coons",
"points": [
[0.25, 0.2], [0.4, 0.2], [0.6, 0.2], [0.8, 0.2],
[0.30, 0.4], [0.8, 0.3],
[0.30, 0.6], [0.8, 0.6],
[0.20, 0.8], [0.4, 0.8], [0.6, 0.8], [0.8, 0.8]
],
"colors": [
[1.0, 1.0, 1.0], [0.50, 0.50, 0.50],
[0.0, 0.0, 0.0], [0.98, 0.98, 0.98]
]
}
],
"type":"babl",
"version":"1.0"
}
```

2 shapes, coon


```
{
"invert": false,
"surfaces": [
{
"type": "coons",
"points": [
[0.50, 0.20], [0.28, 0.28], [0.23, 0.28], [0.03, 0.21],
[0.48 ,0.41], [0.07, 0.39],
[0.49 ,0.51], [0.07, 0.50],
[0.49, 0.71], [0.28, 0.66], [0.23, 0.67], [0.03, 0.72]
],
"colors": [
[1.0 ,1.0 ,1.0], [0.0 ,0.0 ,0.0],
[0.0, 0.0, 0.0], [1.0, 1.0 ,1.0]
]
},
{
"type": "coons",
"points": [
[0.98, 0.21], [0.78, 0.27], [0.73, 0.28], [0.53, 0.21],
[0.94, 0.37], [0.53, 0.38],
[0.94, 0.55], [0.53, 0.54],
[0.99, 0.71], [0.79, 0.67], [0.73, 0.67], [0.53, 0.71]
],
"colors": [
[0.0, 0.0 ,0.0], [0.95, 0.95, 0.95],
[1.0, 1.0, 1.0], [0.05, 0.05, 0.05]
]
} ],
"type":"babl",
"version":"1.0"
}
```

1 shape, cubic


```
{
"invert": false,
"surfaces": [
{
"type": "cubic",
"points": [
[0.08, 0.14], [0.29, 0.14], [0.70, 0.13], [0.90, 0.13],
[0.12, 0.37], [0.29, 0.14], [0.70, 0.13], [0.86, 0.33],
[0.12, 0.59], [0.28, 0.82], [0.71, 0.82], [0.86, 0.62],
[0.08, 0.82], [0.28, 0.82], [0.71, 0.82], [0.91, 0.82]
],
"colors": [
[1.0, 1.0, 1.0],[0.0, 0.0, 0.0],
[0.0, 0.0 ,0.0],[1.0 ,1.0 ,1.0]
]
}
],
"type":"babl",
"version":"1.0"
}
```


D.3 User interface

About

In Prospector there is a built-in UI for creating advanced blend files, located under Warp and blend -> Advanced blend.

The UI can be used to create new Advanced blend files and also to edit uploaded babl-files. Note that only coons shapes are supported in the UI-tool.

Advanced blend, UI guide

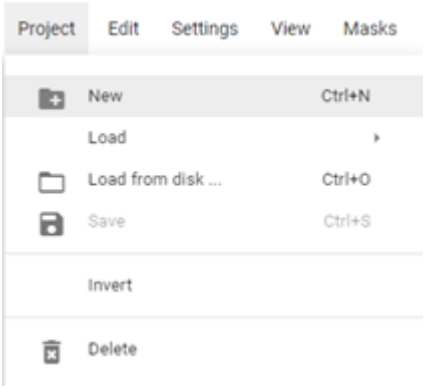


Image D–1

- **New**: Creates a new project
- **Load**: Switch between active projects.
  - Note: Make sure to save changes before switching to a new project
- **Load from disk**: Load saved project
- **Invert**: Inverts the current project
- **Save**: Saves current project

- **Delete**: Deletes the current project

Edit

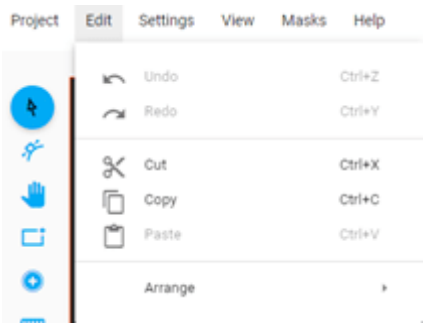


Image D–2

- **Undo:** Undo last action
- **Redo:** Redo the last action
- **Cut:** Cut out the selected surface
- **Copy:**Copy the selected surface
- **Paste:** Paste cut or copied surface
- **Arrange:** Select shapes to be in the foreground or background

Settings

Image D–3

- **Gamma:** Change the global gamma value

View

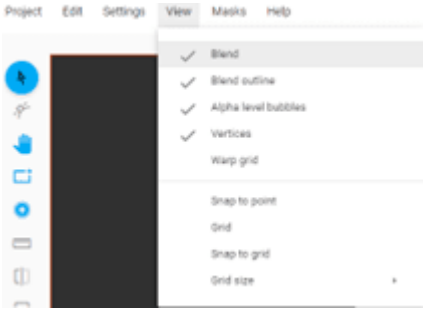


Image D–4

- **Blend:** Enable Blend file. To view changes on screen
- **Blend outline:** Enable the outline of the blend. View the outline of the blend surface(s)
- **Alpha level bubbles:** Enable alpha level bubbles. Indicates if a point goes towards white or black
- **Vertices:** Enable vertices. To see the vertex of lines in the blend
- **Warp grid:** Enable the warp grid on screen
- **Snap to point:** Snap to a point on another surface
- **Grid:** Enable the grid in the Advanced blend tool
- **Snap to grid:** Snap a point to the intersections of the grid in the Advanced blend tool
- **Grid size:** Choose the grid size

Masks

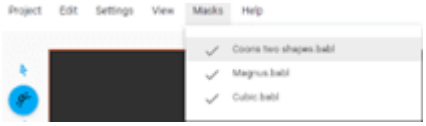


Image D–5

- Enable or disable active files

Help

Image D–6

Tools

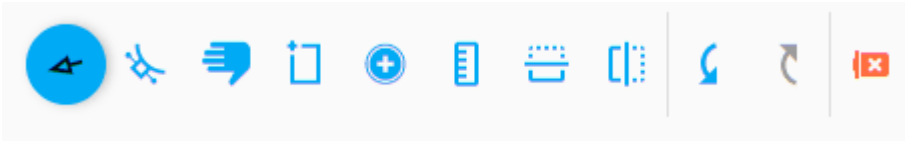


Image D–7

- **Move and select tool:** Select and move surfaces by clicking and dragging them
- **Edit curves:** Select a point and drag it to change the angle of the line
- **Create new surface:** Click in the design area to create a new rectangular surface
- **Create new circle:** Click in the design area to create a new circle
- **Straighten line:** First use the Move and select tool to select a point, click the straighten line tool and select a control point handle connected to the point to straighten the line
- **Mirror horizontal:** First use the Move and select tool to select a surface, then click Mirror horizontal to mirror the shape horizontally
- **Mirror vertial:** First use the Move and select tool to select a surface, then click Mirror vertical to mirror the shape vertically
- **Undo and Redo:** Undo or redo the last action
- **Delete selected surface:** Select the surface with the Move and select tool and click Delete selected surface

Image D–8

- **Shape outline color:**Change the color of the shape
- **Zoom:**Zoom the grid in and out
- **X,Y:** Position of the selected corner point
- **A:** Change the grey level of the selected point

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