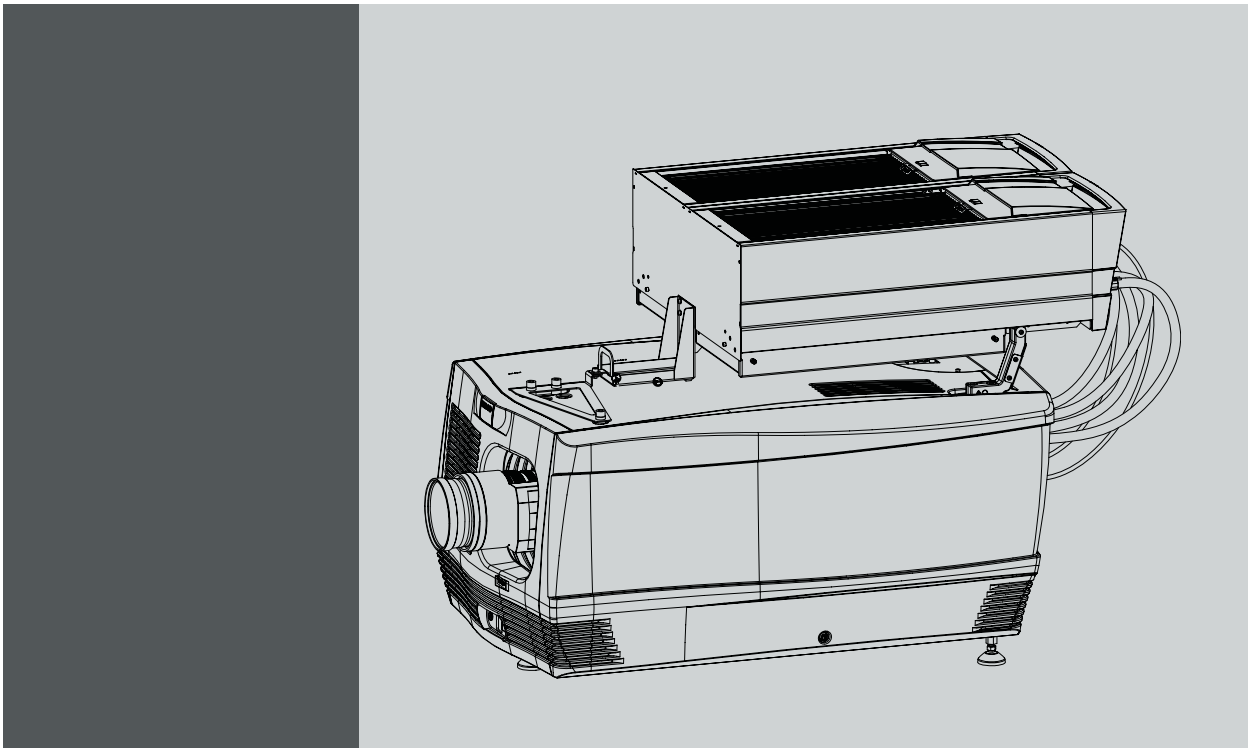
DP2K CLP series



User and Installation manual

R5905907/04
13/12/2016

BARCO

Visibly yours

Barco NV
President Kennedypark 35, 8500 Kortrijk, Belgium
Phone: +32 56.36.82.11
Fax: +32 56.36.883.86
Support: www.barco.com/en/support
Visit us at the web: www.barco.com

Printed in Belgium

Changes

Barco provides this manual 'as is' without warranty of any kind, either expressed or implied, including but not limited to the implied warranties or merchantability and fitness for a particular purpose. Barco may make improvements and/or changes to the product(s) and/or the program(s) described in this publication at any time without notice.

This publication could contain technical inaccuracies or typographical errors. Changes are periodically made to the information in this publication; these changes are incorporated in new editions of this publication.

The latest edition of Barco manuals can be downloaded from the Barco web site www.barco.com or from the secured Barco web site https://www.barco.com/en/signin.

Copyright ©

EMC statements

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.

GB9254 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.

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

Guarantee and Compensation

Barco provides a guarantee relating to perfect manufacturing as part of the legally stipulated terms of guarantee. On receipt, the purchaser must immediately inspect all delivered goods for damage incurred during transport, as well as for material and manufacturing faults Barco must be informed immediately in writing of any complaints.

The period of guarantee begins on the date of transfer of risks, in the case of special systems and software on the date of commissioning, at latest 30 days after the transfer of risks. In the event of justified notice of complaint, Barco can repair the fault or provide a replacement at its own discretion within an appropriate period. If this measure proves to be impossible or unsuccessful, the purchaser can demand a reduction in the purchase price or cancellation of the contract. All other claims, in particular those relating to compensation for direct or indirect damage, and also damage attributed to the operation of software as well as to other services provided by Barco, being a component of the system or independent service, will be deemed invalid provided the damage is not proven to be attributed to the absence of properties guaranteed in writing or due to the intent or gross negligence or part of Barco.

If the purchaser or a third party carries out modifications or repairs on goods delivered by Barco, or if the goods are handled incorrectly, in particular if the systems are operated incorrectly or if, after the transfer of risks, the goods are subject to influences not agreed upon in the contract, all guarantee claims of the purchaser will be rendered invalid. Not included in the guarantee coverage are system failures which are attributed to programs or special electronic circuitry provided by the purchaser, e.g. interfaces. Normal wear as well as normal maintenance are not subject to the guarantee provided by Barco either.

The environmental conditions as well as the servicing and maintenance regulations specified in this manual must be complied with by the customer.

Trademarks

Brand and product names mentioned in this manual may be trademarks, registered trademarks or copyrights of their respective holders. All brand and product names mentioned in this manual serve as comments or examples and are not to be understood as advertising for the products or their manufacturers.

TABLE OF CONTENTS

1. GENERAL

About this chapter

Read this chapter before installing your DP2K CLP-series projector. It contains important information concerning installation requirements for the DP2K CLP-series projector, such as minimum and maximum allowed ambient temperature, humidity conditions, required safety area around the installed projector, required power net, etc.

Furthermore, careful consideration of things such as image size, ambient light level, projector placement and type of screen to use are critical to the optimum use of the projection system.

About DP2K CLP-series projectors

This manual can be used for the following projectors :

- DP2K-15CLP
- DP2K-20CLP

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.

Overview

- Installation requirements
- About the delivered packages
- Unpacking
- Communicator Touch Panel
- Communicator PC version
- Commander & Web Commander

1.1 Installation requirements

Environmental conditions

The table below summarizes the physical environment in which the DP2K CLP series projector may be safely operated or stored.

Environment	Operating	Non-Operating
Ambient Temperature	10°C (50°F) to 35°C (95°F)	-15°C (5°F) to 60°C (140°F)
Air cleanliness	Clean office environment (equivalent with cleanroom standard ISO 14644-1 ISO Class 9)	n.a.
Humidity	5% to 85% RH Non-condensed	5% to 95% RH Non-Condensed
Altitude	-60 (-197Ft) to 3000m (9843Ft)	-60 (-197Ft) to 10000m (32810Ft)

Let the projector acclimatize after unpacking. Neglecting this may result in a startup failure of the Light Processor Unit.

Use in high altitude conditions

When 3000 m environmental condition is combined with the highest permissible temperature (35°C ambient), the projector may be expected to go into warning status. Hence, for high altitude conditions, we advise max 30°C ambient condition (25°C is preferred).

Furthermore, to avoid temperature warnings on laser banks, we advise in high altitude to set cooler fans to 100%.

Cooling requirements

For functionality and reliability, the projector requires accurate temperature control and cooling. Therefore a liquid cooling system is provided consisting of liquid circuits inside the projector which are connected via hoses to external coolers. Only coolers and hoses exclusively developed for this application and approved by Barco are allowed to be used.

Power requirements

The DP2K CLP-series projector operates from a nominal mono phase power net with a separate earth ground PE. A label on the projector indicates the nominal line voltage for which the projector was set at the factory.

Projector	Power requirements
DP2K-15CLP	200–240 VAC, 50–60 Hz, 12A
DP2K-20CLP	200–240 VAC, 50–60 Hz, 15A

The power cord required to connect the projector with the power net is not delivered with the projector. It is the responsibility of the customer to provide the correct type of power cord. The cross-sectional area of the conductors in the power supply cord shall not be less than 4 mm² or 10 AWG, minimum 300V.

To protect operating personnel, the National Electrical Manufacturers Association (NEMA) recommends that the instrument panel and cabinet be grounded. In no event shall this projector be operated without an adequate cabinet ground connection.

The AC supply must be installed by a qualified electrician in conformance to local codes. Hardware, wire sizes and conduit types must comply with local codes.

UPS requirements

The Uninterruptible Power Supply (UPS), also known as a Continuous Power Supply (CPS), must have an output voltage of 200-240V at 50-60Hz and must be capable of delivering an output current of 5,5 amperes.

The connection between the UPS unit and the UPS inlet of the projector must be done with a certified AC power supply cord of minimum 0,75 mm² or 18 AWG and minimum 300V.

CAUTION: The 200–240V power outlet (UPS OUTLET) of the projector may not be used to provide the UPS unit with power! The UPS OUTLET of the projector may only be used for connection to the UPS INLET of the projector.

The DP2K CLP-series projector does not have a built in UPS unit.

Projector weight

Do not underestimate the weight of the Barco DP2K CLP-series projector.

The projector weights are without lens and without cooler. Be sure that the pedestal on which the projector has to be installed is capable of handling the complete load of the system.

Projector	Weight
DP2K-15CLP	±110 kg (±243 lb)
DP2K-20CLP	±110 kg (±243 lb)

The cooler weights ±32 kg (±70.6 lb).

Barco offers a pedestal for the DP2K CLP series projector. This universal pedestal allows a solid and easy setup of the projector. The universal pedestal has a separate compartment to install the UPS unit for the DP2K CLP series projector. Futhermore, the universal pedestal contains a standard 19" rack to build in the projector peripherals such as alternative content switchers.

1.2 About the delivered packages

General

The complete projection system is delivered in 2 packages:

- Projector
- Top pack accessories (Option 1).
  or
  Stand alone pack accessories (Option 2).

The customer can choose between top pack (Option 1) or stand alone (Option 2) cooler.

The top pack accessories (Option 1) contain the following content:

- 2 cooling units, each 1000W
- Cooling unit base plate
- Cooling unit housing
- 2 Cooling unit air filters
- Top pack hoses (4x) and cables (4x)

The stand alone accessories (Option 2) contain the following content:

- 2 cooling units, each 1000W
- Cooling unit base plate
- Cooling unit housing
- 2 Cooling unit air filters
- Stand alone frame
- Stand alone hoses (4x) and cables (4x)

The stand alone cooler kit is available with 3 lengths of hoses: 8m (std), 5m and 2.5m.

Overview

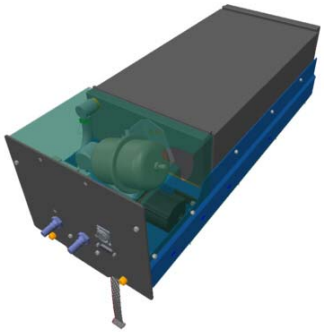


Image 1-1
Cooling unit

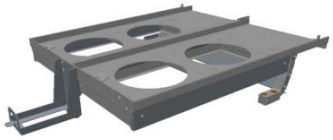


Image 1-2
Base plate (non-contractual photo, the fastening system may vary depending on the type of projector)

Image 1-3
Cooling housing

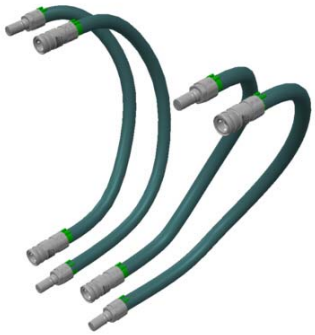


Image 1-4
Hoses (non-contractual photo, the length of the hoses may vary depending on the selected kit.)

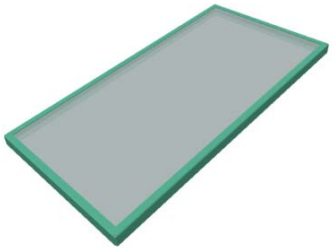


Image 1-5
Cooling filter

Option

An optional accessory called exhaust adapter could be added on the top of the cooler.

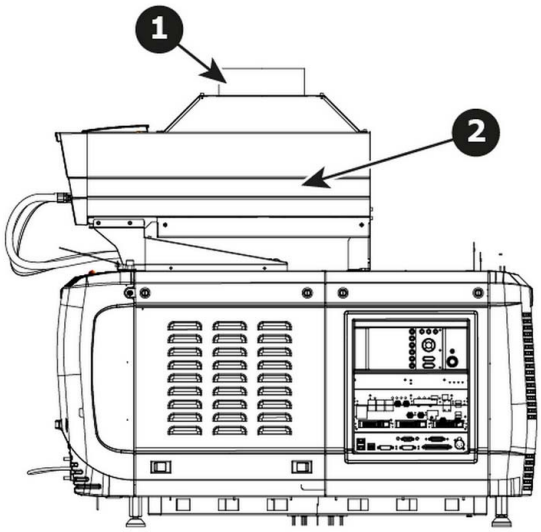


Image 1-6
1 Exhaust adapter
2 Cooler

The exhaust adapter allows the customer to fix an air extraction system to extract air (heat) coming from the top pack or the stand alone cooler.

1.3 Unpacking

What has to be done ?

At delivery the projector is packed in a carton box upon a wooden pallet and secured with banding and fastening clips. Furthermore, to provide protection during transportation, the projector is surrounded with foam. Once the projector has arrived at the installation site, it has to be removed from the carton box and wooden pallet in a safe manner without damaging the projector.

Unpack the cooler accessories to assemble the cooler unit.

After unpacking let the projector acclimate to the room temperature which must be higher then 10°C (50°F) and lower then 35°C (95°F). Neglecting this may result in a start up failure of the Light Processor Unit.

Necessary tools

- 8 mm Allen wrench.
- 13 mm open end wrench.
- 17 mm open end wrench.

How to unpack the projector

1. Remove the banding around the carton box, by releasing the fastening clips as illustrated, and open the box.
2. Remove the smaller carton box (reference 1) as illustrated.
   Note: *The smaller carton box contains the manual.*
3. Remove the carton box and the foam around the projector.
   Note: *The projector is still attached to a wooden plate, which is secured to the below pallet.*
4. Loosen the four nuts which secure the pallet as illustrated. Use a 13 mm open end wrench.
5. Rotate the wooden support plate with projector 90° and slide the front side over the edge of the pallet until the fixation screw is visible as illustrated.
6. Remove the hexagon socket head cap screw. Use an 8 mm Allen wrench.
7. Slide the rear side over the edge of the pallet unit the two fixation screws at the rear are visible.
8. Remove the two hexagon socket head cap screw. Use an 8 mm Allen wrench.
9. Remove the projector from the wooden support plate and finally remove the 3 extension tubes. Use a 17 mm wrench.

Save the original shipping carton and packing material, they will be necessary if you ever have to ship your projector. For maximum protection, repack your projector as it was originally packed at the factory.

The projector is delivered with a plastic cover inside the Lens Holder. This to prevent intrusion of dust and foreign particles.

The lens is delivered in a separate box. For lens installation, see section “Lens & lens holder”.

1.4 Communicator Touch Panel

Communicator Touch Panel for digital cinema projectors

The Communicator Touch Panel is designed for multi-user command and control. The Communicator enables users to learn quickly and operate efficiently - using an elegant and flexible Touch Panel interface. The interface’s commonality means that operators can intuitively use any model in the product line, without restriction, and its user-friendly nature translates directly into a short and enjoyable learning curve.

Image 1-7

Flexible Touch Panel interface

The Touch Panel interface can be mounted upon a swivel arm which easily fits on top of the DP2K CLP series projector. One central locking mechanism of the swivel arm allows instant fixation of the Touch Panel interface in any position.

The Touch Panel interface can also be installed further away from the DP2K CLP series projector. For this purpose an Ethernet cable up to 50 meter can be used to realize a direct data communication between the DP2K CLP series projector and the Communicator Touch Panel.

The Touch Panel interface can also be connected via a Local Area Network (LAN) in the same way as the DP2K CLP series projector. In this configuration both devices can communicate with each other as well.

The Touch Panel interface requires a voltage supply +12 VDC and 1,5 ampere. Note that the DP2K CLP series projector has a 12 VDC output which can be used to power up the Touch Panel interface. Nevertheless, the use of a separate +12 VDC adaptor (1,5 ampere minimum) is required in case the Touch Panel interface is installed more then a few meters away from the DP2K CLP series projector.

Parts location of the Touch Panel interface

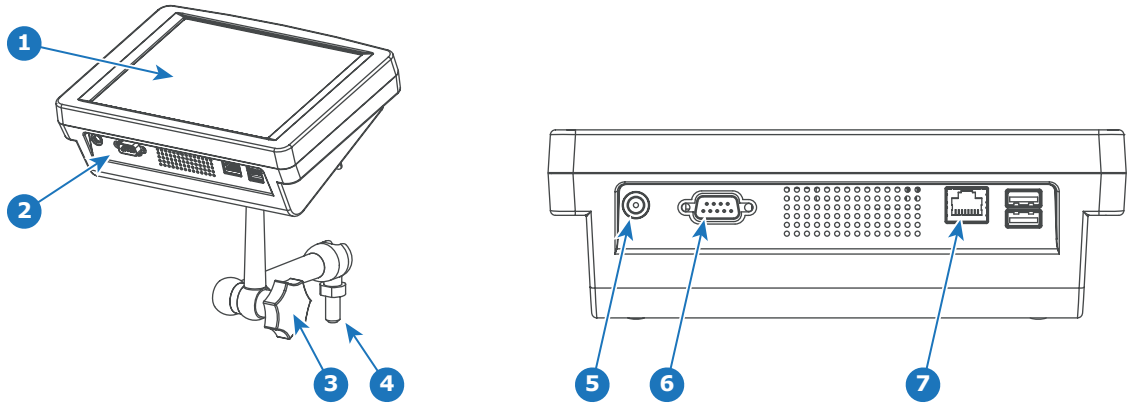


Image 1-8
1 Touch screen
2 Communication panel
3 Knob to operate central swivel clamp
4 Base of swivel arm
5 Power input 12 VDC, 1.5A
6 RS232 port (sub-D)
7 Ethernet port (RJ45)

Touch Panel power/data customized cable

Image 1-9
Customized cable to connect Touch Panel interface with the Barco projector.

The Communicator Touch Panel has its own user guide which latest version is available on the Barco website.

1.5 Communicator PC version

Configuration tool

A uniquely powerful and easy to use configuration tool for the Barco cinema projector. This Communicator software for PC provides all the necessary tools and only those tool necessary for the connected projector to setup and control this projector. A comprehensive array of easy to access menu pages provide the projectors digital input, output and screen display via a combination of simple buttons and displays.

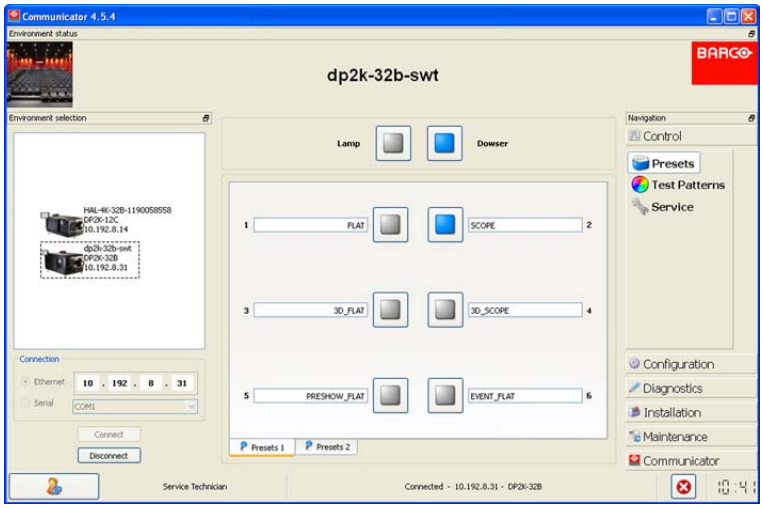


Image 1-10

Quick and Easy configuration

Clearly indicated tab pages allow the control of Projector connection, configuration, test, color calibration and configuration with an existing automation system. All actions can be activated by a simple click. Depending on the user level, functions are enabled or disabled in the software. The enabled functions are only accessible via a password entry and that prevents misalignment once everything is correctly aligned.

The Communicator PC version has its own user guide which latest version is available on the Barco website.

1.6 Commander & Web Commander

Commander

All Barco Alchemy projectors come with the 'Barco Commander' software that runs from a touch panel controller or PC.

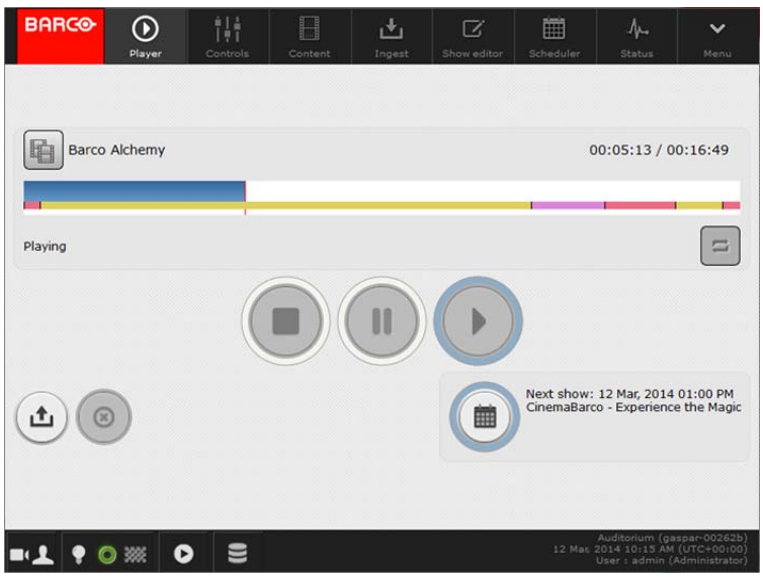


Image 1-11

Web Commander

All Barco Alchemy projectors come with the 'Barco Web Commander' screen management system featuring an intuitive user interface for simple operation.

The Barco Alchemy projectors have been carefully designed to greatly increase the level of operational efficiency. Projectionists can now enjoy a streamlined and intuitive user interface that seamless blends projector control with a full-fledged screen management system. The 'Barco Web Commander' user interface is readily available on the projector without any additional software installation.

It is accessed via a web browser and is also fully supported on iOS and Android tablets thanks to the free ‘Barco CineMate’ iOS and Android app.

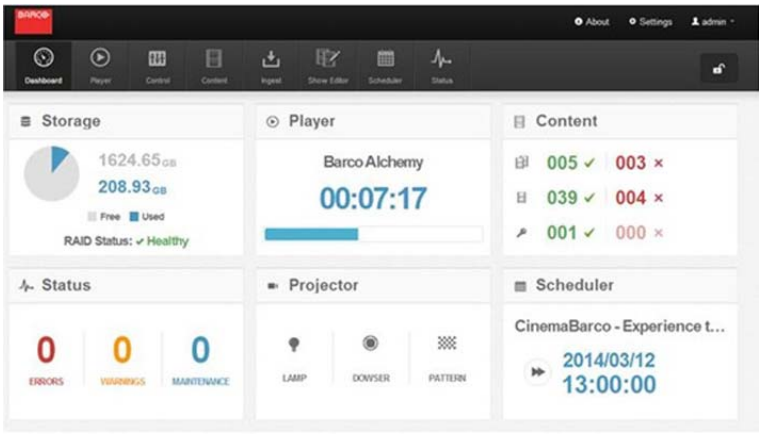


Image 1-12

The Commander and Web Commander have their own user guide which latest version is available on the Barco website.

2. INSTALLATION PROCESS

About the installation process

The installation of the complete system is split up in two parts, installation of the projector and the installation of the cooler unit as top pack or stand alone pack.

Overview

- Installation process projector
- Installation process top cooler
- Installation process stand alone cooler
- Software upgrade
- Starting up and adjusting the system

2.1 Installation process projector

Installation process from A to Z

1. **Check if all installation requirements are fulfilled** such as the environment conditions of the installation area, electrical facilities, etc. Note that a solid pedestal is required to support the projector. For more info see topic **installation requirements**.
2. **Physical installation of the projector** upon its pedestal.
3. **Electrical connection with the power net**. See chapter "Connecting the projector with the power net", page 17.
4. **Installation of the lens**. First select a lens with appropriate throw ratio covering the screen size and the projector - screen distance. Then install the lens in the lens holder of the projector. For more information about available lenses, lens selection and lens installation see chapter "Lens & lens holder", page 49.
   Caution: *The projector is delivered with a plastic cover inside the Lens Holder. Remove the cover prior to installing the lens.*
5. **Installation of the ICMP, IMB, IMS or HDSDI input module**. (only in case no ICMP, or IMB or IMS or HDSDI is factory installed).
6. **Installation of the HDDs.** In case the HDDs of the ICMP are delivered separated from the projector remove the protection tape from the HDD input slots and install all three HDDs as described in the procedure"Installing a HDD into the ICMP", page 84. Make sure that all HDDs in the ICMP HDD set have the same storage capacity. See label on top of the HDD to know the storage capacity.
7. **Installation of the Cooler.** In case of a top pack installation, see "Physical installation top cooler", page 23. In case of a stand alone combination, see "Physical installation stand alone cooler", page 39.
8. In a stand alone combination, **install** the optional Communicator touch panel on the projector.
9. Upgrade all software to the latest available version. See "Software upgrade", page 12.
10. Start up your projector and adjust the system. See "Starting up and adjusting the system", page 12.

2.2 Installation process top cooler

Installation process from A to Z

1. **Assembling** of the cooling **box housing**. The housing is delivered as a flat pack and should be assemble during the installation process.
2. **Mounting of the cooler housing** on its support.
3. **Mount the support on top of the projector** and foresee a gasspring to access to the projector.
4. **Insert the cooler units** and filters.
5. Establish the **hose connections** between the cooler and the projector. Connect also both **cables**.
6. If desired, **mount the Communicator touch panel** on the support foot of the cooler support and make the connections with the projector.

2.3 Installation process stand alone cooler

Installation process from A to Z

1. **Assembling** of the cooling **box housing**. The housing is delivered as a flat pack and should be assemble during the installation process.
2. **Mounting of the cooler housing** on its support.
3. **Mounting the empty cooler assembly** on the stand alone frame.
4. **Insert the cooler units** and filters.
5. Establish the **hose connections** (4x) between the cooler and the projector. Connect also the four **cables**.

2.4 Software upgrade

How to upgrade the software

1. Switch on the projector. The projector can now be switched on. Place the **ON/OFF** switch of the projector in the ”I” position. As a result the projector starts to initialize. The status lights of the projector lights up GREEN once the projector is initialized. In case the status lights up RED may indicate a tamper event during transport. If so, contact Barco customer service.
2. Download and install the latest version of Communicator. The program can be downloaded for free from Barco’s website, (URL: http://www.barco.com). Click on *myBarco* and login to get access to secured information. Registration is necessary.
   If you are not yet registered, click on *New to myBarco* and follow the instructions. With the created login and password, it is possible to login where you can download the software.
3. Download the latest firmware from Barco’s website in the same way as for Communicator.
4. Start Communicator and make a connection with the projector. For more information, consult the Communicator user guide.
5. Login as service technician and click on tab **Maintenance** and select **Software update**.
6. Click on **Launch DC update companion**.
7. Click **Next**, accept the license agreement and continue following the wizard.

2.5 Starting up and adjusting the system

Adjustment steps

1. **Select the corresponding lens parameters for the installed lens**. See user guide of the *Communicator* chapter *Installation* > *Advanced* > *Lens parameters*.
2. **Alignment of the projected image on the screen**. The image can be aligned with the screen size of the application. Follow the next steps to achieve that:
   a) Press the **STANDBY** button on the Local Keypad to activate the lamp.
   b) Press the **DOWSER** button on the Local Keypad to open the electronic dowser of the projector. The electronic dowser is open if the color of the DOWSER button is GREEN.
   c) Press the **TEST PATTERN** button on the Local Keypad to project one of the internal test patterns of the projector on the screen.
   d) Perform a “**Lens Homing**”. See user guide of the Communicator.
   e) Use the lens **ZOOM**, **SHIFT** and **FOCUS** buttons on the Local Keypad to match the projected image with the screen. Tilt the projector in case you can not SHIFT the image completely upon the screen. See "Positioning the DP2K CLP series projector at port window", page 15.
   See chapter "Local keypad of the DP2K-xxCx", page 56, for detailed description of the Local Keypad buttons.
3. **Adjusting the light path**. Normally the lens holder and the convergence of the projector are perfectly adjusted at the factory. Nevertheless, some applications require a readjustment of the lens holder, convergence or both. See procedure "Scheimpflug adjustment", page 95, and "Convergence", page 105.
4. **Creating screen files, lens files, and macro files for FLAT and for SCOPE**. See user guide of the Communicator.
5. Perform **Color calibration**. See chapter "Color calibration", page 113.
6. Create **light sensor calibration (LSC)** files. See user guide of the Communicator.
7. **Backup of all projector configuration files**. See user guide of the Communicator.
8. **Registration of the projector**. The DP2K CLP series projector is DCI compliant and should be registered.

9. **Projection of a digital cinema movie**.
   In case the projector is equipped with an ICMP, download the ICMP device certificate, request KDM and DCP from your content supplier, ingest KDM and DCP, and play out the movie. for detailed instructions see chapter "ICMP", page 65, and user guide of the Communicator and/or (Web) Commander.
   In case the projector is equipped with a HD-SDI input module apply a single or dual channel SMPTE (HD-SDI) source to the input ports of the HD-SDI input module and start up the projector. See chapter "Starting up", page 93. Use the Communicator (Touch Panel) to configure the applied source. See the user guide of the Communicator (Touch Panel) for more detailed information.
   In case the projector is equipped with an Integrated Media Block (IMB) or Integrated Media Server (IMS) see user guide of the IMB or IMS for detailed instructions.

3. PHYSICAL INSTALLATION PROJECTOR

Overview

- Positioning the DP2K CLP series projector at port window
- Connecting the projector with the power net
- Power loop through to the projector electronics
- Connecting a UPS with the projector electronics

3.1 Positioning the DP2K CLP series projector at port window

WARNING: The installation of the DP2K CLP series projector requires at least 4 persons.

General guide lines

- Use a solid pedestal to put the DP2K CLP series projector projector on. Ensure that the pedestal can handle the weight of the projector and that all feet of the projector are captured.
- The pedestal should be placed in front of the port window wall in a manner that the projector front cover is at a minimum distance of 20 centimeters from the port window.

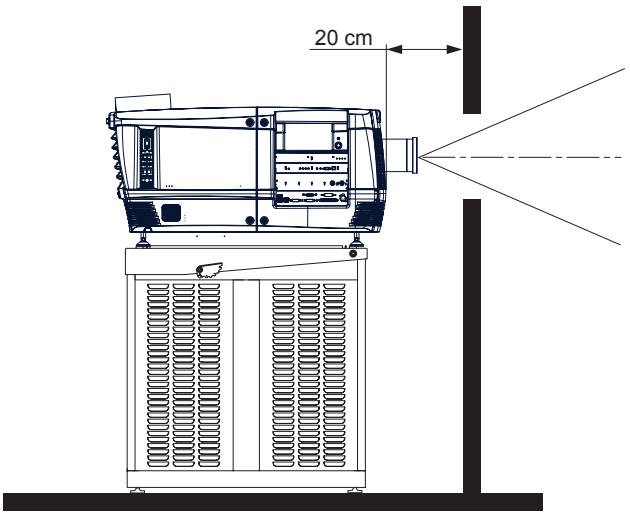


Image 3-1
Positioning at port window

Barco offers a pedestal for the DP2K CLP-series projector. This universal pedestal allows a solid and easy setup of the projector. The universal pedestal has a separate compartment to install the UPS unit (if available) for the DP2K CLP-series projector. Futhermore, the universal pedestal contains a standard 19" rack to build in the projector peripherals like alternative content switchers.

Necessary tools

- 14 mm wrench.
- 17 mm wrench.

Projector centering

1. If the projector is standalone in front of the port window, center the projector with the theatre screen (see ref A image 3-2).
2. If a film projector is already present (projector will be off-center), try to optimize aim (see ref B image 3-2).
   Note: *Unlike film projectors, it is best to keep the projector lens surface as parallel to the screen as possible, even if it is significantly above the screen center.*

The off-center position slightly increase side keystone, but will minimize horizontal lens offset required.

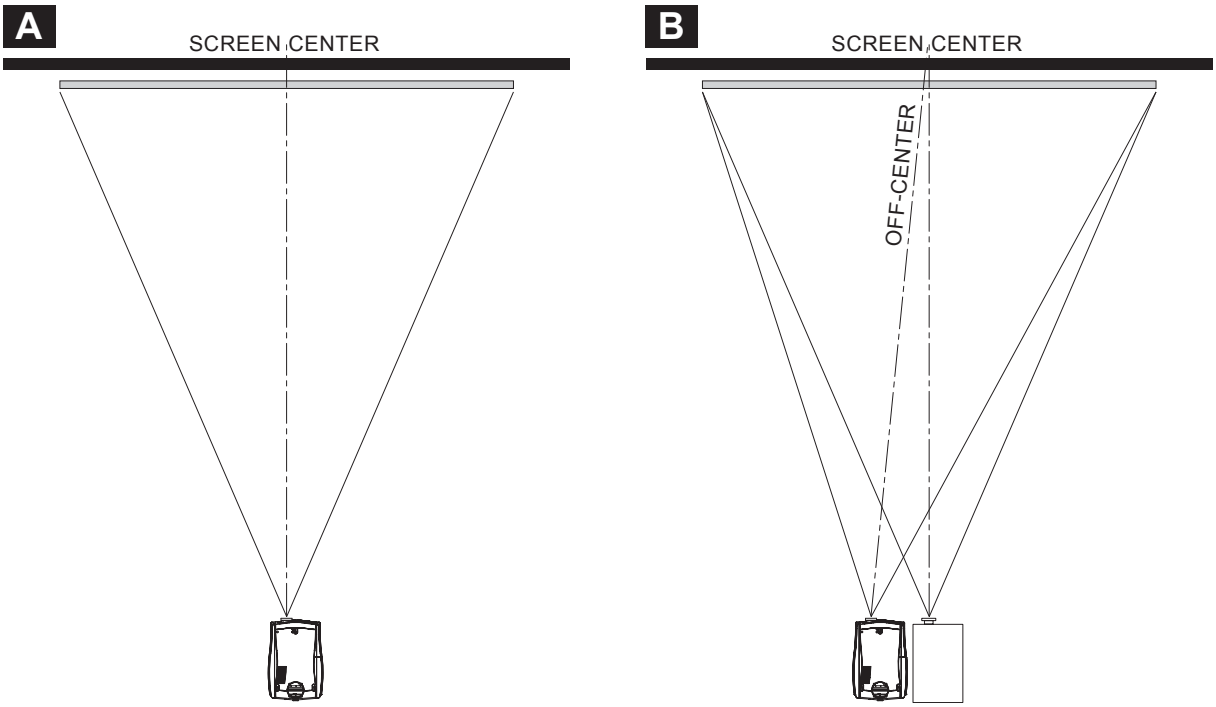


Image 3-2
Projector centering

3. Proceed to level the projector by adjusting the feet of the projector as follows:
   - Loosen the nut (reference 1 image 3-3) on the threaded rod of the three projector feet. Use a 17mm open wrench.
   - Adjust the height of the 3 legs to level the projector. Use a 14 mm wrench to adjust the height as illustrated (reference 2 image 3-3).
   - Secure the leg height by tightening the nuts (reference 1 image 3-3) of each projector foot.

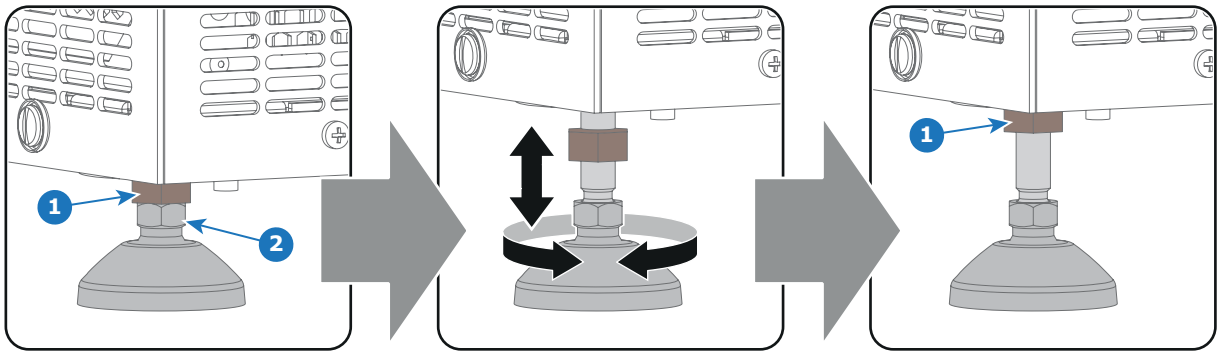


Image 3-3

4. Later, when the projector is up-and-running, adjust precise image geometry and placement.

Projector tilting

In an ideal installation, the DP2K CLP series projector lens surface is **centered with** and **parallel to** the screen. This orientation helps to ensure optimized lens performances with minimal offset. If this position is not possible (such as when the projector is significantly higher than the center of the screen), it is better to rely on **offset** rather than extra **tilt**.

1. Before adjusting tilt, make sure the projector is as well-centered with the theatre screen as possible for your installation area.
2. Check with theatre personnel for the degree of screen tilt, or measure this incline with a protractor at the screen.
3. Tilt the projector to closely match this screen tilt angle as follows:
   - Loosen the nuts (A), using a wrench of 17 mm, on the threaded rod.
   - Adjust the height of the legs until the projected image matches the projection port window and the screen tilt.
   - Secure the leg height by tightening the nuts (A).

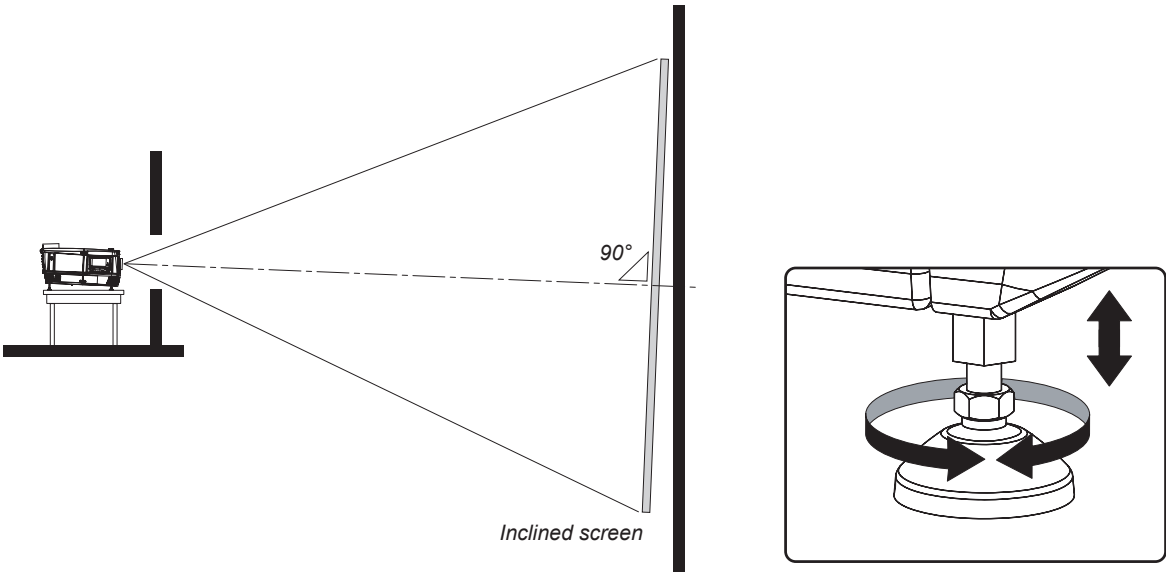


Image 3-4
Projector tilting

Barco offers a pedestal for the DP2K CLP-series projector. This universal pedestal allows you to easily tilt the projector forward up to 6°.

3.2 Connecting the projector with the power net

WARNING: The total electrical installation should be protected by an appropriate rated and readily accessible disconnect switch, circuit breakers and ground fault current interrupters. The installation shall be done according to the local electrical installation codes.

CAUTION: ALL POWER CONNECTIONS to the DP2K CLP series projector projector are made to the three-terminal strip located in a sealed compartment behind the rear cover of the projector.

CAUTION: The cross-sectional area of the conductors in the Power Supply Cord shall be not less than 4 mm² or AWG 10

Necessary tools

- Flat screw driver.
- Phillips screw driver PH2.

Necessary parts

- Two cable ties.
- Certified AC power supply cord 4.0 mm², 10AWG, min. 300V.

How to connect the main AC power with the DP2K CLP series projector projector?

1. Remove the rear cover and lamp cover of the projector.
2. Remove the cover of the main AC compartment by releasing the three captive thumb screws.

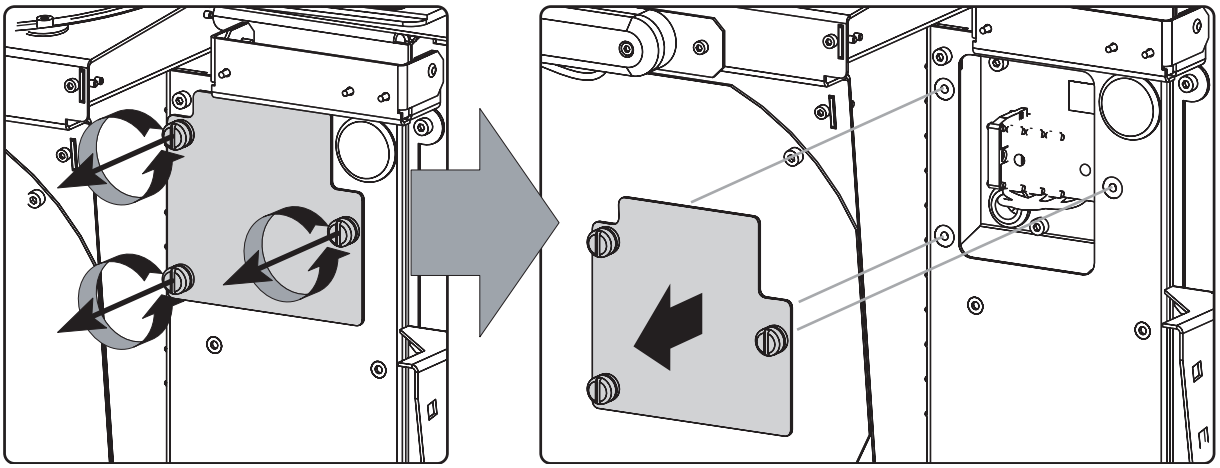


Image 3-5

3. Guide the AC power cord through the cable gland and connect the wires to the 3-terminal strip as illustrated.
   Warning: *Always connect first the PE wire.*

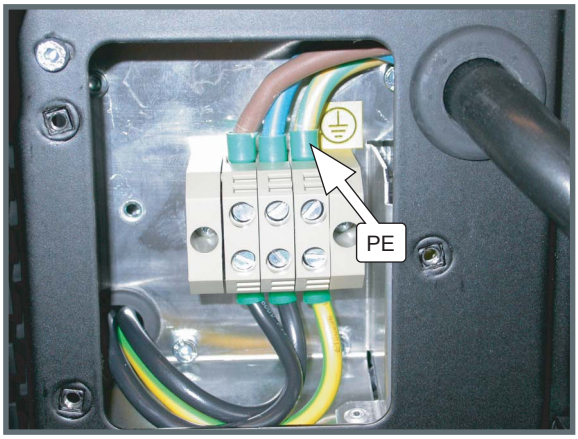


Image 3-6

4. Secure the power cord with the chassis of the projector by using two cable ties (A) and by fastening the cable gland (B) as illustrated.
   Use the appropriate screws, depending on the diameter of the cable (two sets of screws are delivered with the projector in a separate bag). Turn in both screws so that the end of the screws are far enough in the plastic part and that the feet of that part grip in the chassis. Check the fixation by pulling on the gland.

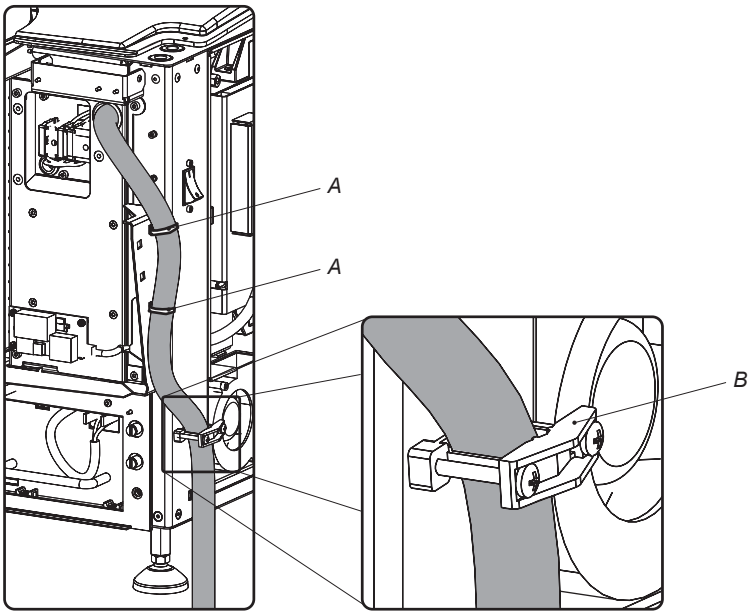


Image 3-7

5. Reinstall the cover of the main AC compartment.

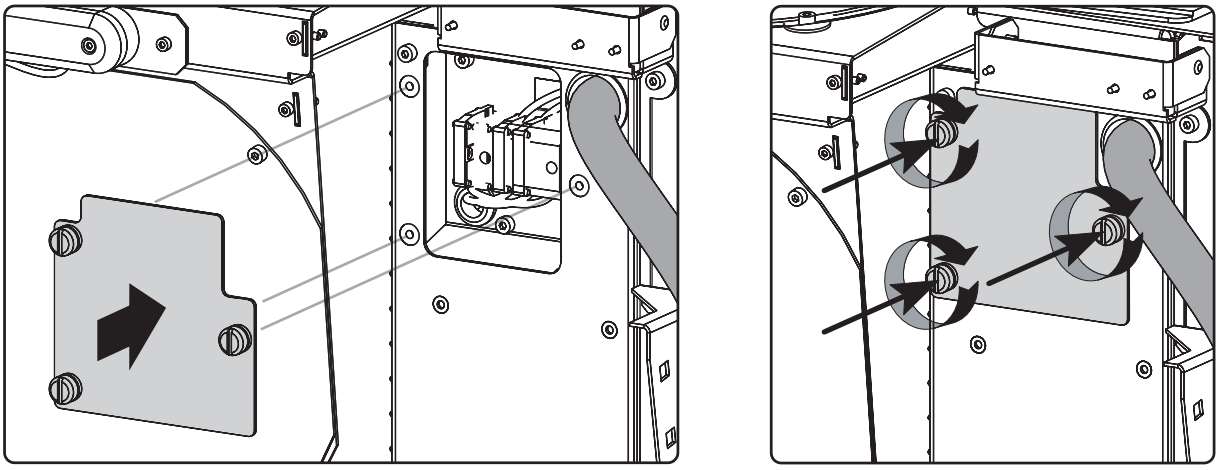


Image 3-8

6. Reinstall the rear cover and lamp cover of the projector.

3.3 Power loop through to the projector electronics

This procedure explains how to provide the projector electronics with power in case no UPS unit is used. Note that the projector is by default configured for use without UPS. So, the short power link cable is already installed.

INLET/OUTLET fixation accessories

The plugs of the power cable which are inserted in the power INLET or OUTLET socket of the projector have to be secured. The projector is equipped with fixation accessories as illustrated below.

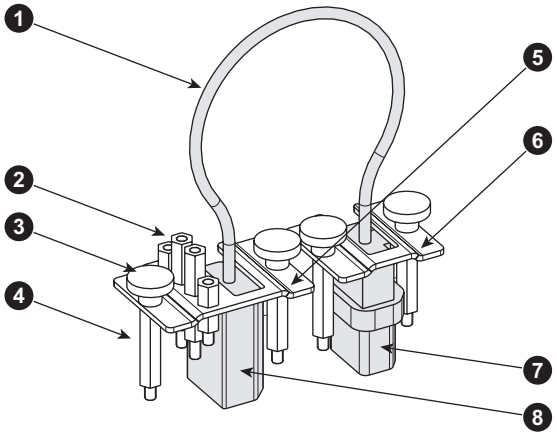


Image 3-9
1 Short power link cable (loop through).
2 Spare spacers with different length.
3 Thumbscrews.
4 Long spacers.
5 Fixation bracket for the female plug (OUTLET).
6 Fixation bracket for the male plug (INLET).
7 Male plug.
8 Female plug.

Necessary parts

Short power link cable with plug type C13/C14.

How to loop through the power to the projector electronics?

1. Make sure that a long spacer (reference 1) is mounted above and below each power socket (reference 2 &3).
2. Plug in the short power cable (reference 4) which was delivered with the projector.
   Warning: *Always use the Barco short power cable which is delivered with the projector.*

3. Secure both plugs of the short power cable with a fixation plate. Use two thumbscrews (reference 5) per fixation plate. Note that the smallest fixation plate (reference 7) has to be used upon the upper socket (INLET, reference 2). The large fixation plate (reference 6), which holds the spare spacers, has to be mounted upon the lower socket (OUTLET, reference 3).

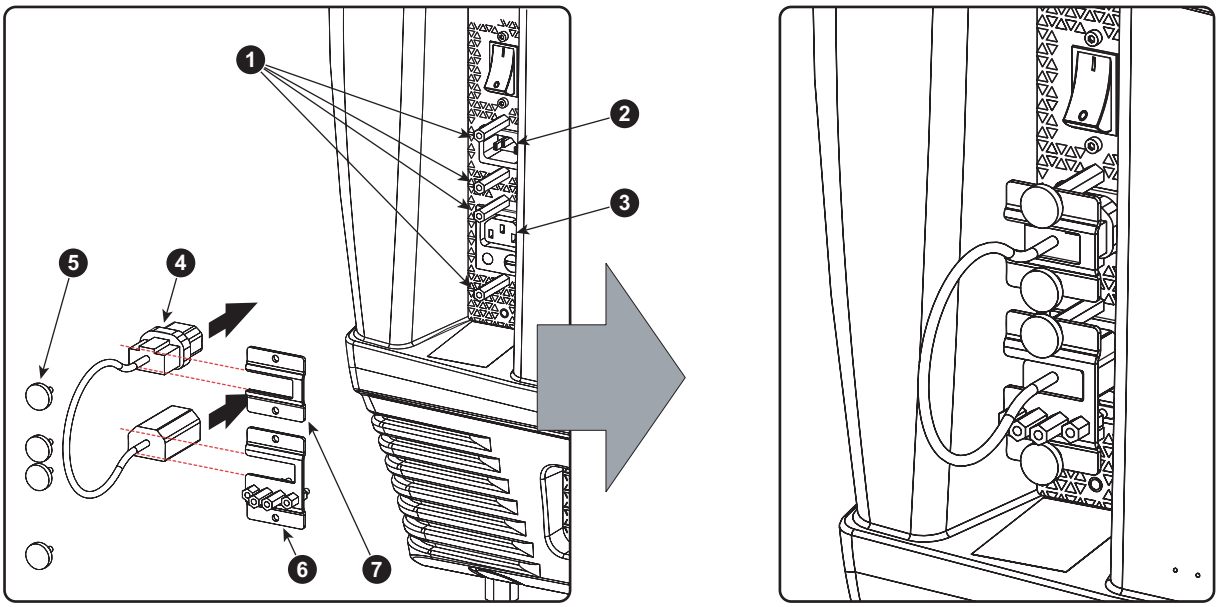


Image 3-10

3.4 Connecting a UPS with the projector electronics

WARNING: Only use UPS units which are suitable for the DP2K CLP-series projector. See chapter *Installation requirements*, for more information about the requirements of the UPS.

How to connect a UPS unit with the projector electronics?

1. Install the UPS unit according to the instructions of the manufacturer and the local regulations.
2. Connect the power output cord (reference 1) from the UPS unit with the UPS INLET socket of the projector (upper socket).
3. Secure the UPS INLET socket using the small fixation plate and two thumbscrews. Use appropriate spacers to ensure that the plug is captured without play.
4. Install the large fixation plate (reference 2) upon the power OUTLET socket of the projector (lower socket). This to prevent losing the fixation parts.

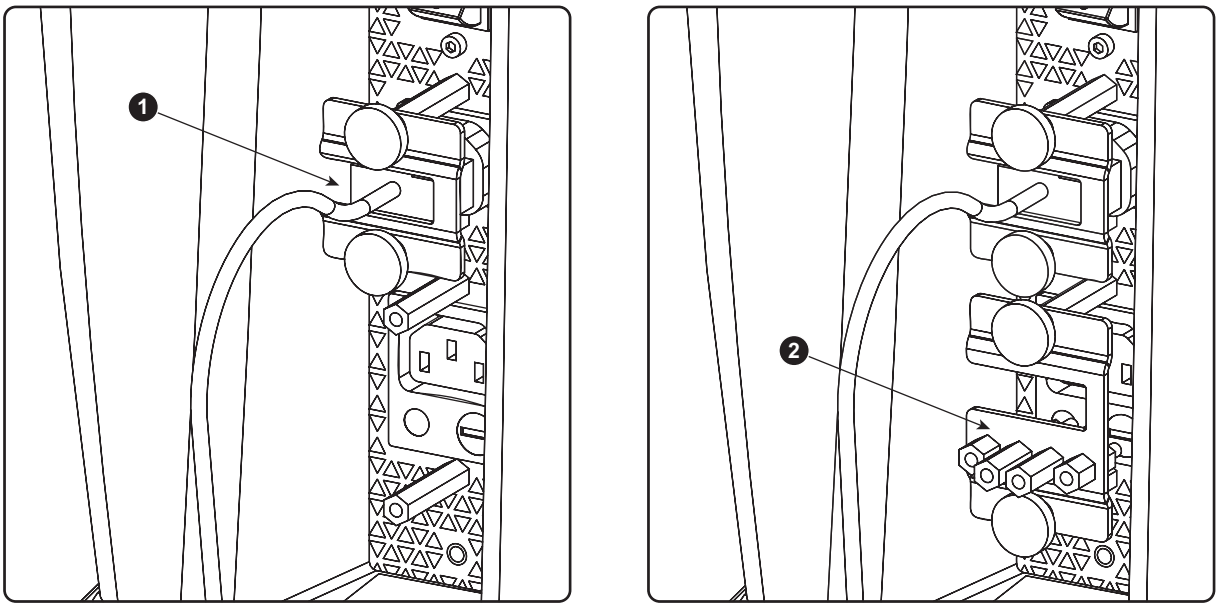


Image 3-11

CAUTION: The electrical connection with the UPS INLET socket of the projector must be done with a certified AC power supply cord (minimum 0,75 mm² or 18 AWG and minimum 300V)

CAUTION: Do not use the power OUTLET socket of the projector to provide power to other equipment!

4. PHYSICAL INSTALLATION TOP COOLER

Overview

- Assembling the housing
- Mounting the housing on the frame
- Mounting the front support
- Mounting the gasspring
- Mounting the front fixation
- Mount cooling frame on the projector
- Insert cooling units
- Mount the filters
- Cabling and tubing

4.1 Assembling the housing

Housing parts

The housing parts are delivered as a flat pack and should be mounted together at the customers side.

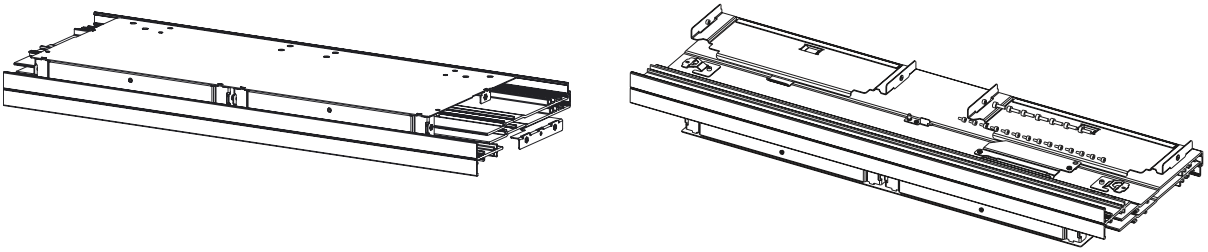


Image 4-1

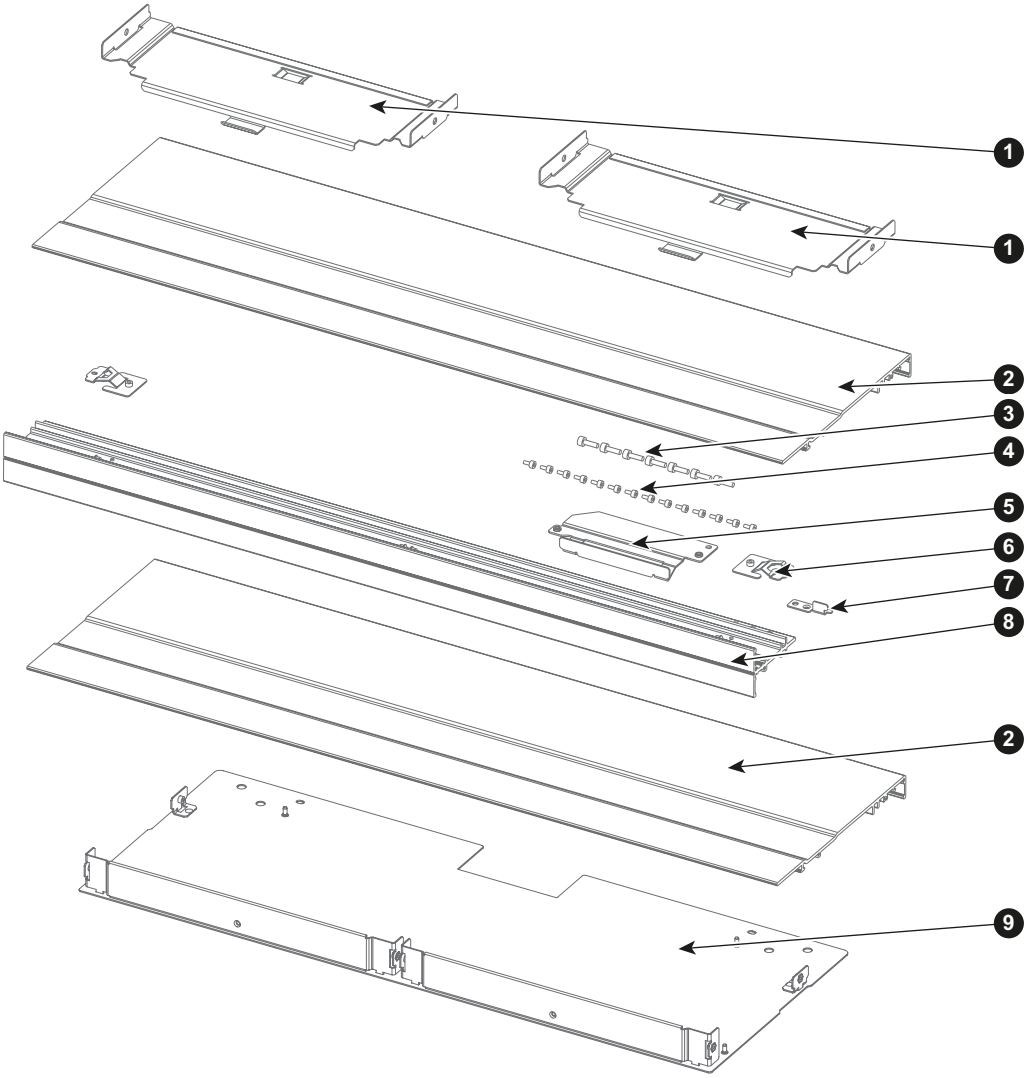


Image 4-2

This flat pack contains the following parts:

1	Top plate
2	Side covers
3	M4 Hex Screws
4	M3 Hex Screws
5	Support for middle bracket
6	Side fixation
7	Position plate
8	Middle bracket
9	Front plate

overview:

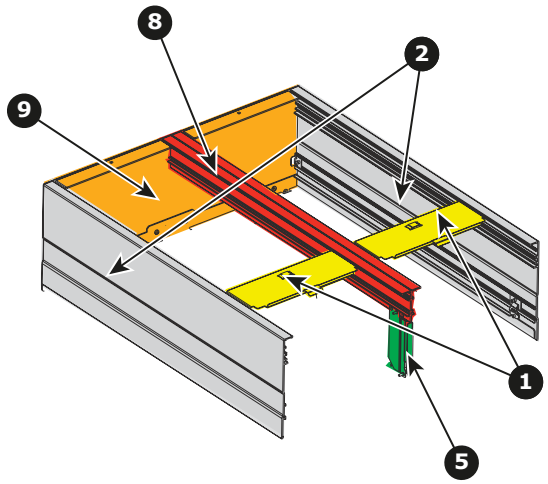


Image 4-3

Necessary tools

- Allen wrench 2.5 mm
- Allen wrench 3 mm

First, turn all the screws in the inserts before starting to assemble.

Into the drawings used in this procedure, orientation of the unit is indicative. Don't hesitate to change the unit orientation to facilitate the mounting of parts. By example, it could be more easy to lay flat the front plate upon the table when you installing the both side covers.

How to assemble

1. Insert the side fixation on both side covers. Slide it in for about 4 cm.
   Make sure you insert the side fixation for the left side cover on the opposite side.
   Turn in a set screws (M3) on each side but do not fasten it yet.

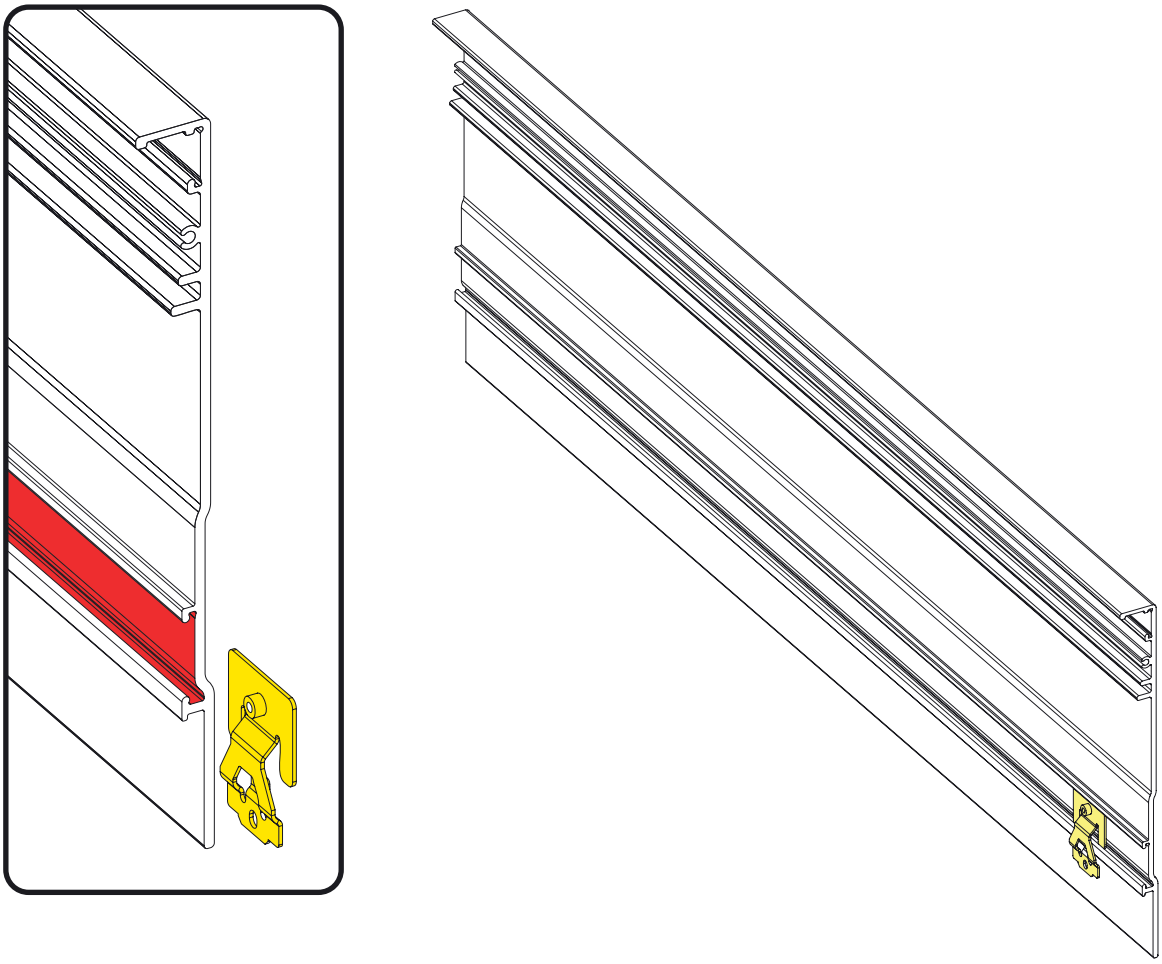


Image 4-4

2. Slide the front plate with both fixation brackets fully on both side covers.
   Turn in the 4 set screws (M3) and tighten them fully until the brackets are pushed strongly against the ribs in the cover.
   Note: *There may be paint job markings left on the internal side of the side covers (e.g. in the grooves for the positioning pin). These markings are no thread nor should they be mistaken for such.*

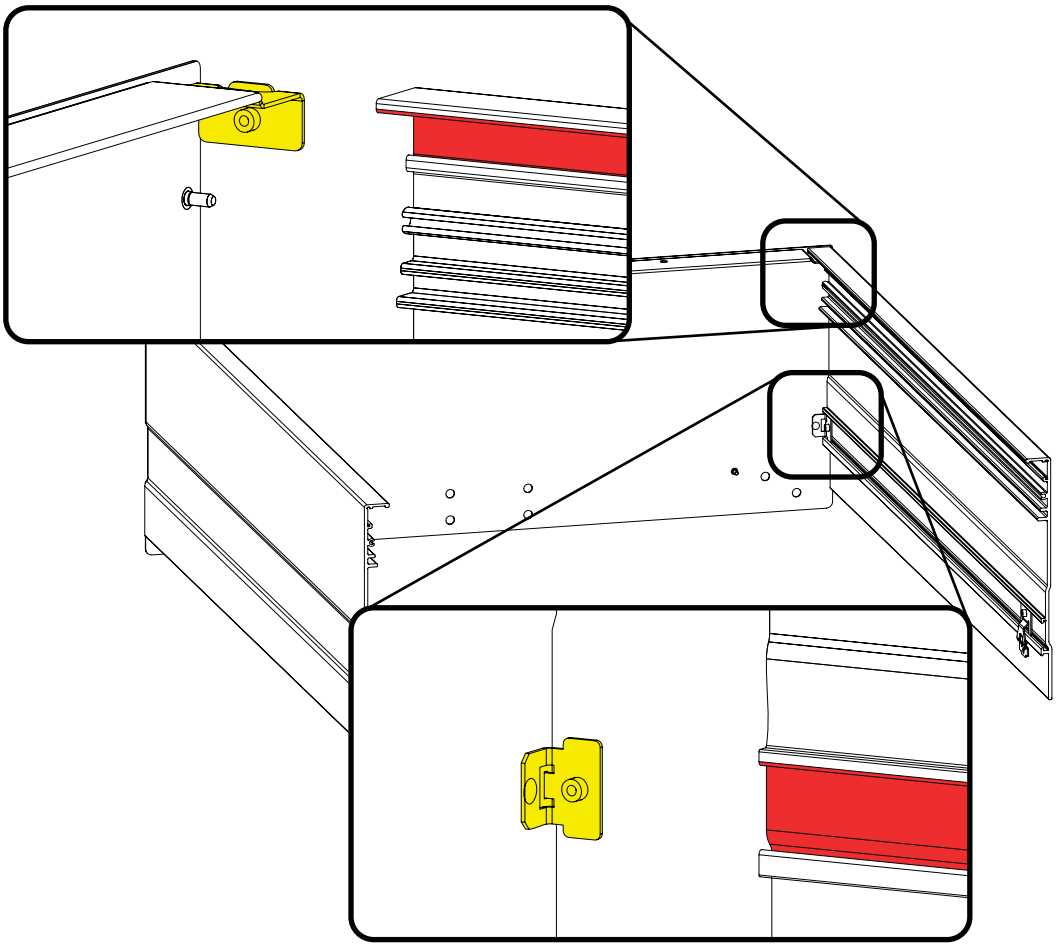


Image 4-5

3. Install the position plate onto the middle bracket as illustrated. Tighten the plate with an M4 hex screw.

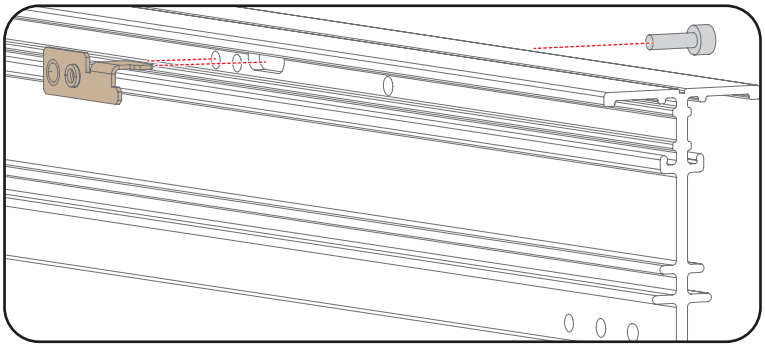


Image 4-6

4. Slide the middle bracket into the grooves of the front plate. Pay careful to orient the middle bracket like indicated in the drawing below (the three holes at the below of the bracket must be placed at the opposite to the front plate). Turn in a set screw (M3) as indicated in reference 1.

   Tip: *Put in place the screws, without tightening them, before slide the middle bracket. It is more easy to positioning the screws when the middle bracket is not in place.*

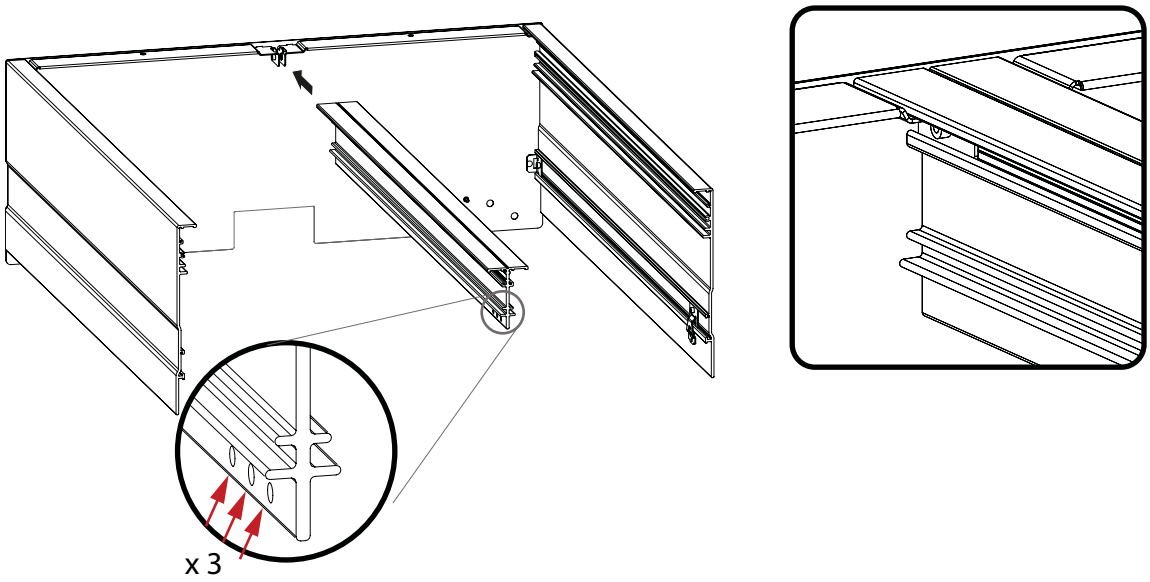


Image 4-7

5. Slide both top plates as indicated into the grooves. Slide until you reach the position plate and the hole matches the hole in the brackets. Use one screw (M3) on each side of the top plates and tighten them fully until the brackets are pushed strongly against the ribs in the cover and middle bracket.
   Tip: *Put in place the screws, without tightening them, before slide the top plates. It is more easy to positioning the screws when the top plates are not in place.*

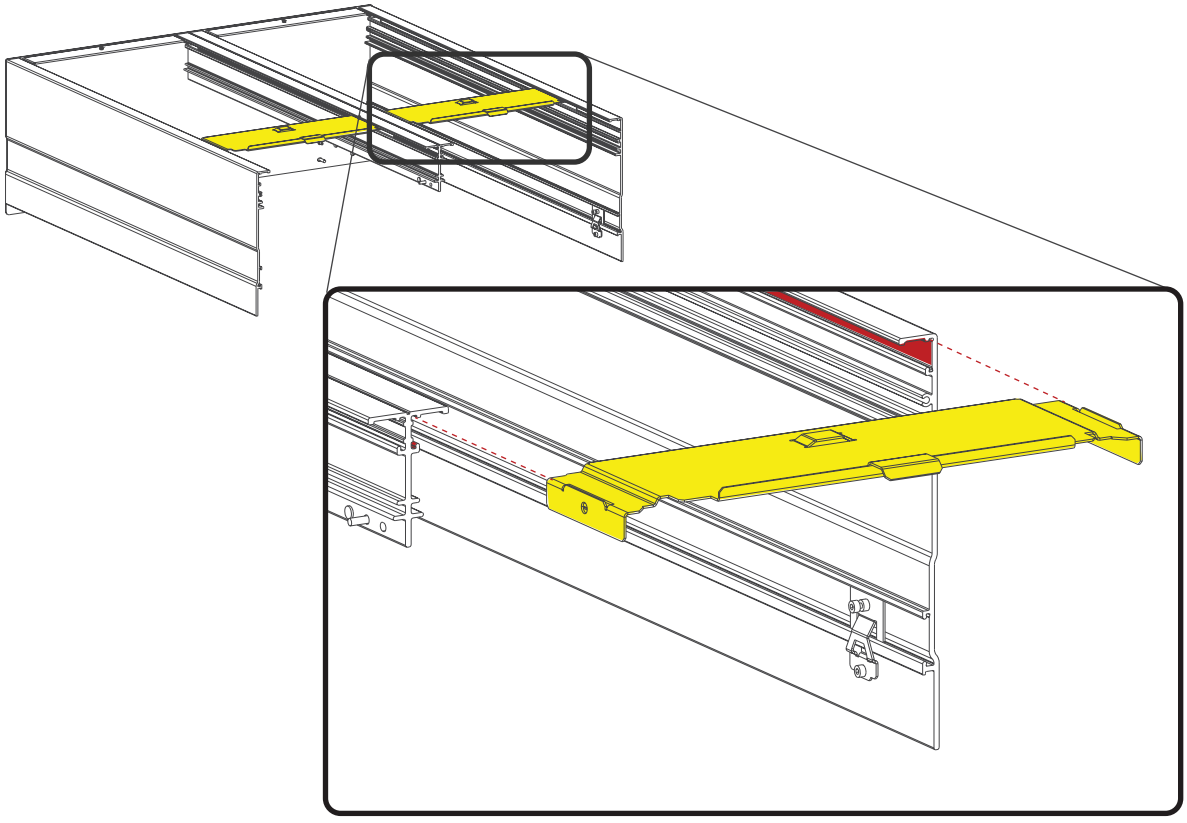


Image 4-8

6. Hook the middle bracket support into the middle bracket.
   Turn in the fixation screw (M4).

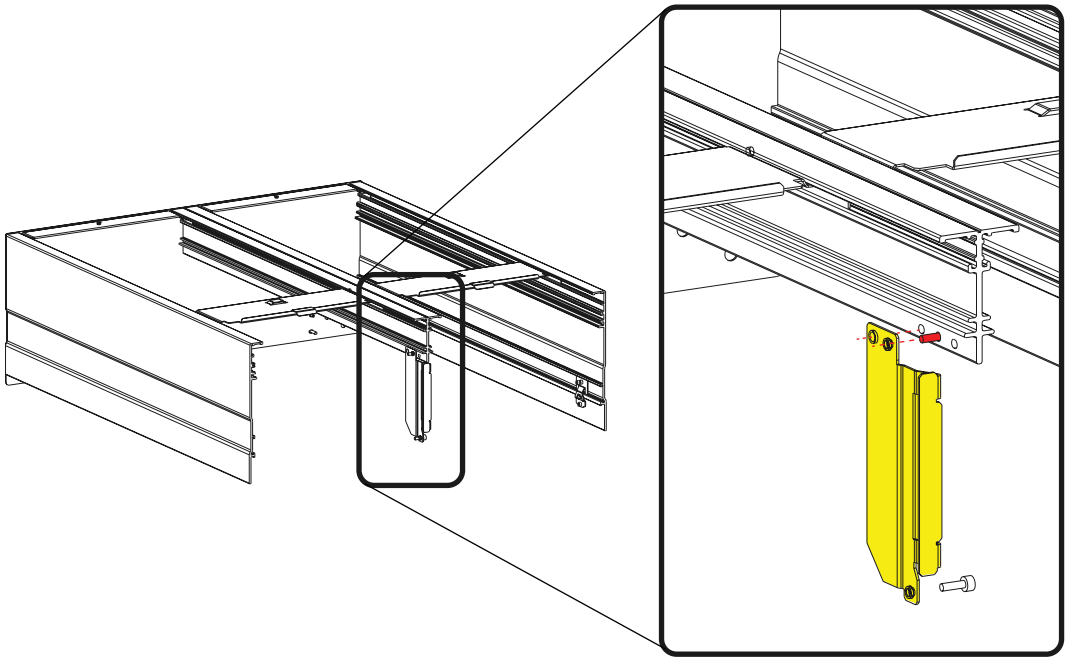


Image 4-9

The housing is ready to be mounted on the frame.

4.2 Mounting the housing on the frame

Necessary tools

Allen key 3 mm

How to mount

1. Place the housing on the cooler frame so that both positioning pins (1) on the housing match the notches in the frame.

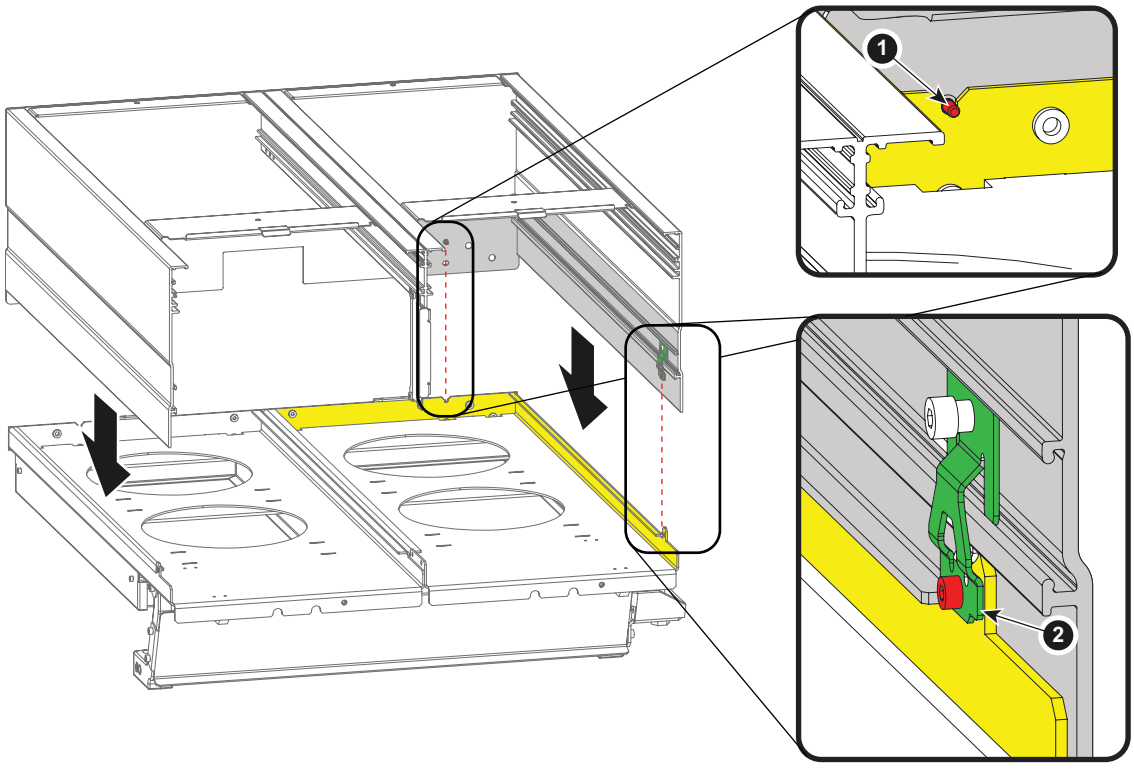


Image 4-10

2. Also make sure that the frame fits behind the clamp (2). If necessary, slide the clamp a little bit in the housing. Fixate the clamp fully so that it fits behind the rib on the housing.
   Drive in a screw (M3) to connect the clamp to the frame.
   Repeat for the other side.
3. Place the support for the middle bracket on the frame as indicated.
   Drive in the fixation screw (M4).

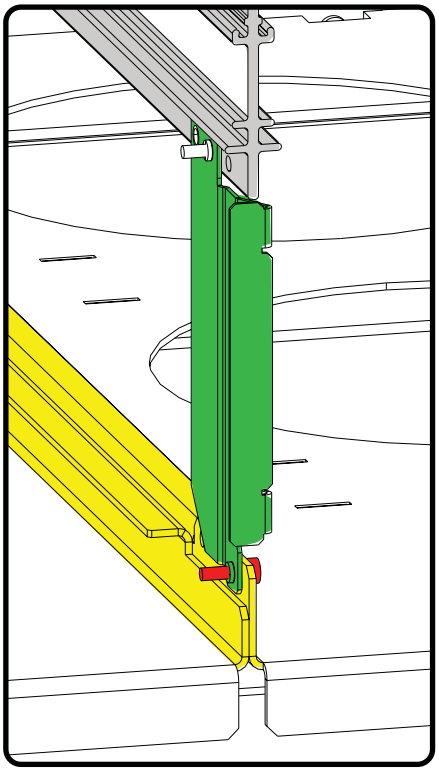


Image 4-11

4. On the front side, drive in the 2 screws (M4), one at the left and one at right.

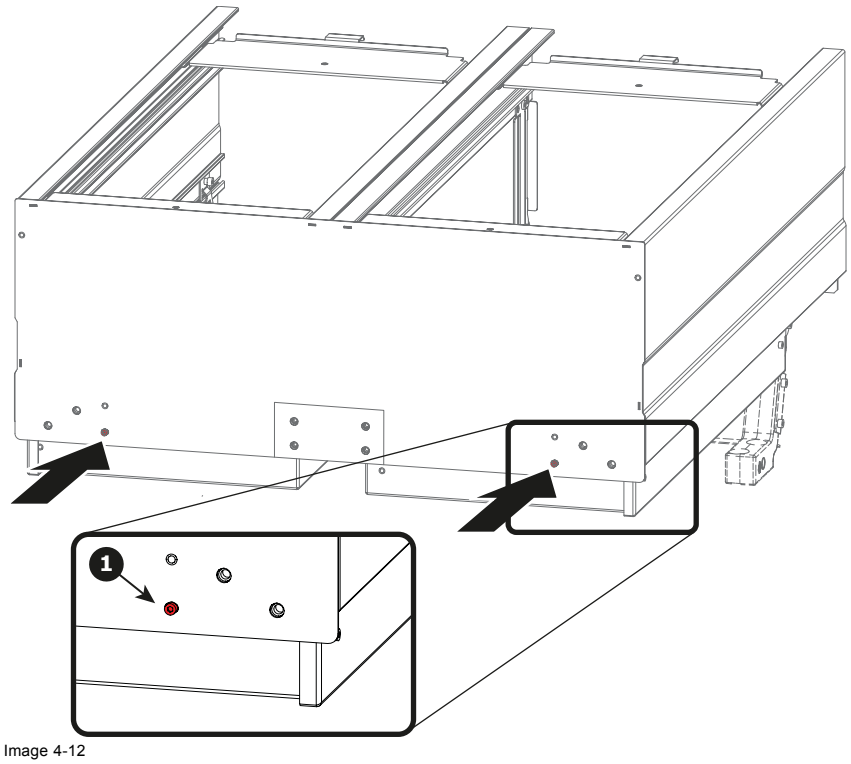


Image 4-12

Note: *Only the hole referenced 1 must be used. The other holes around are not used at this step of the procedure.*

4.3 Mounting the front support

Necessary tools

Allen key 3 mm

Necessary parts

- Front support
- 6 screws

How to mount

1. Slide the front support bracket under the cooler frame so that holes in the upstanding plate matches the holes in the cooler housing assembly.

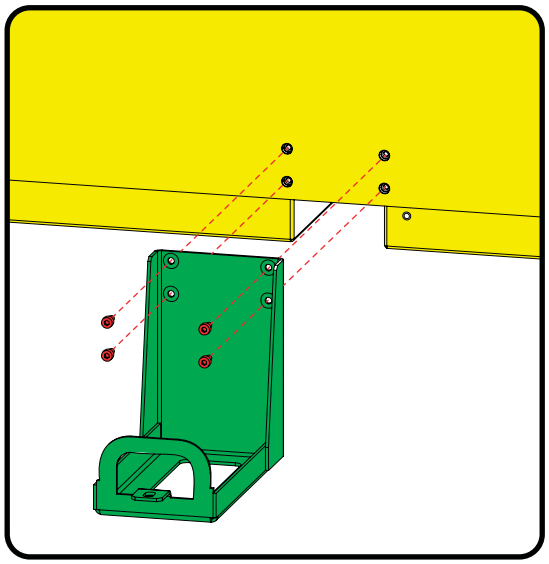


Image 4-13

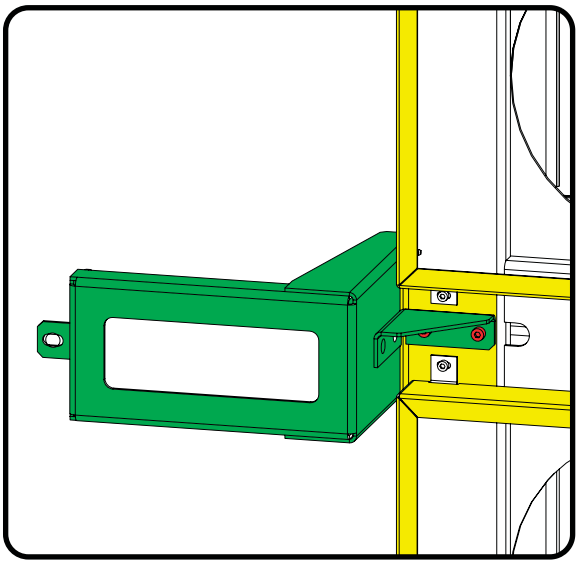


Image 4-14

2. Drive in the 4 screws at the front.
3. Turn the assembly on its side and drive in both fixation screws (image 4-14).

4.4 Mounting the gasspring

Necessary tools

Allen key 5 mm

Necessary parts

- Ball hinge bracket
- Gasspring
- 2x screws M6 x 12

How to mount

1. Place the ball hinge bracket on the top of the projector as indicated.

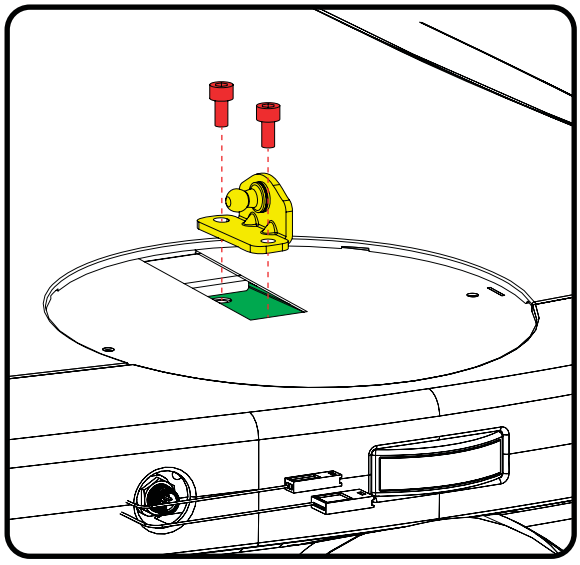


Image 4-15

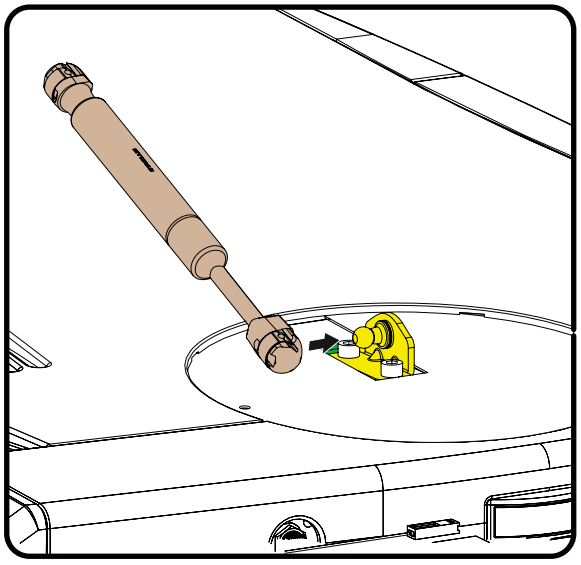


Image 4-16

2. Drive in both fixation screws.
3. Click the gasspring on the fixation unit.

4.5 Mounting the front fixation

Necessary tools

Allen key 8 mm

Necessary parts

- Front fixation
- 3x screw
- 3x washer

How to mount

1. Place the front fixation plate on the projector as indicated.

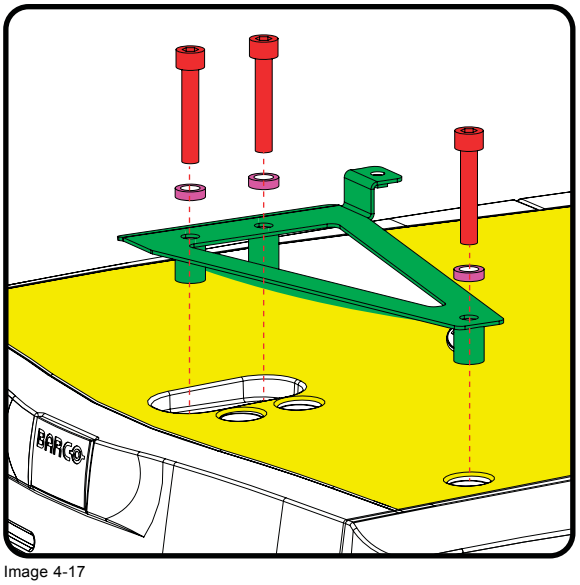


Image 4-17

2. Fixate this position with 3 screws. Insert a washer between each screw and the front fixation.

4.6 Mount cooling frame on the projector

Necessary tools

- Allen key 3 mm
- Allen key 8 mm

Necessary parts

- 4 x M4 x 10
- Touch panel holder
- 3 x M5 x 12

How to mount

1. Place the frame assembly on the projector as indicated. Make sure that the holes of both feet (1) matches the holes in the top plate of the projector.

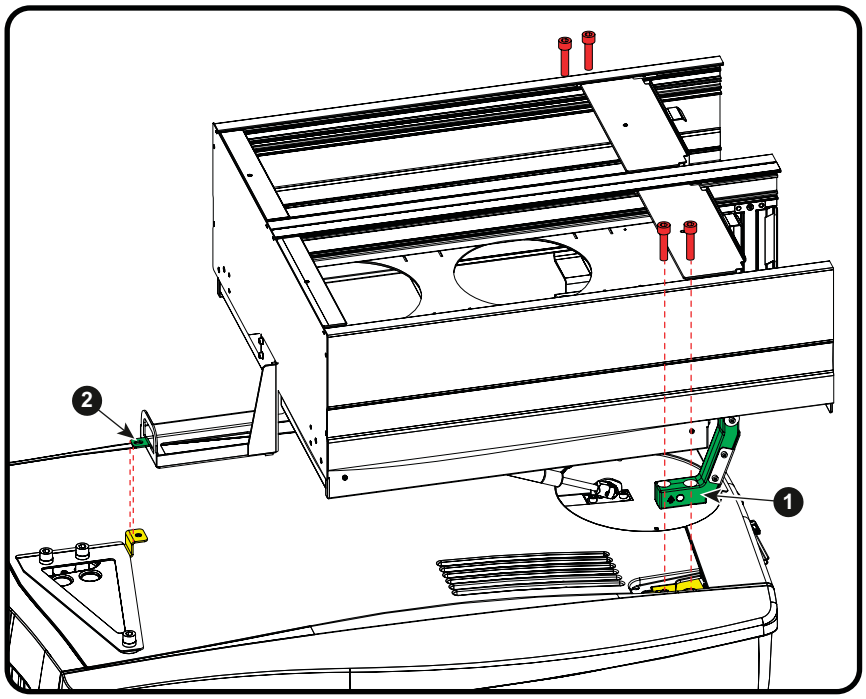


Image 4-18

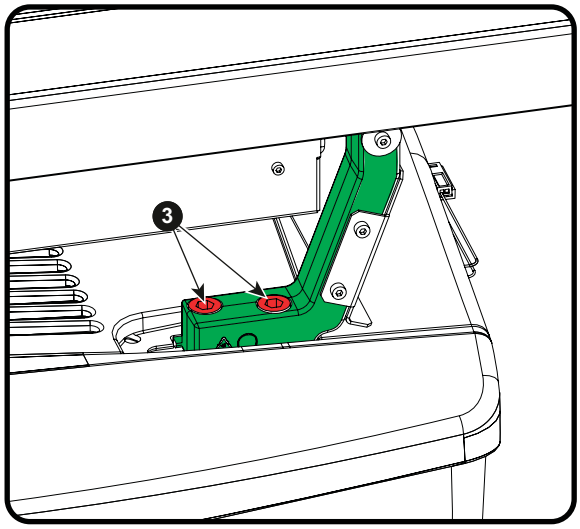


Image 4-19

2. Drive in both screws (3) on each side.
3. Pivot the cooler frame and click in the gasspring.

4. Pivot it back and drive in the front fixation screw.

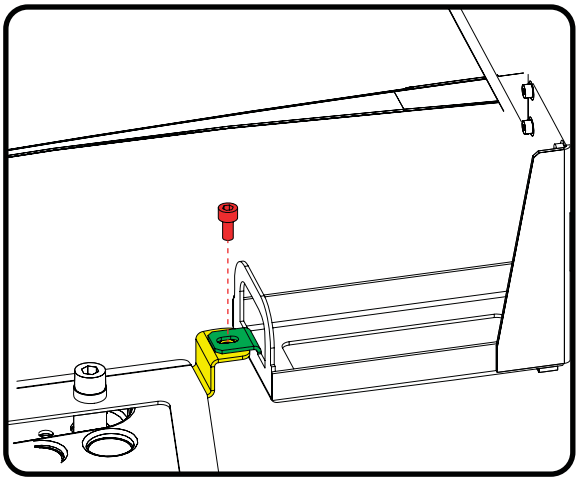


Image 4-20

5. Fixate the touch panel holder to the frame. Drive in the 3 fixation screws (4).

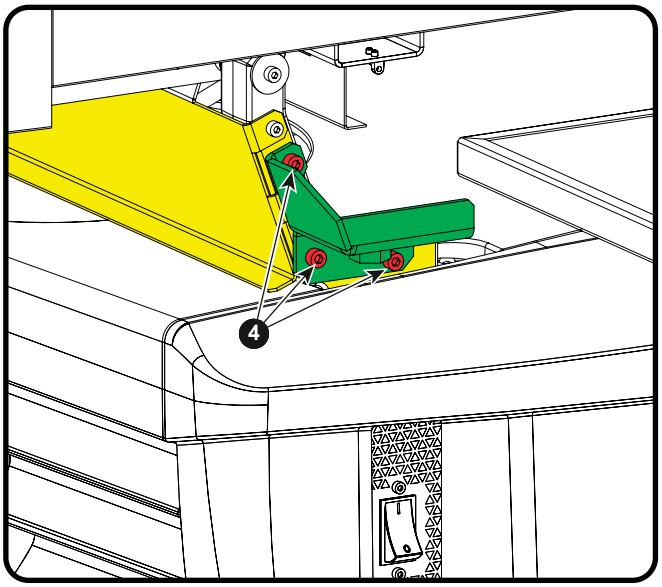


Image 4-21

4.7 Insert cooling units

About the cooling unit

Two identical cooling units must be installed in the cooling box.

Necessary tools

Flat screwdriver

Before you start

Check if the two indicated screws (reference 1) are present. If it is the case, remove this screws.

The use of these screws may become necessary to fixate the cooler in the cooler assembly when the captive screws (reference 2) does not work.

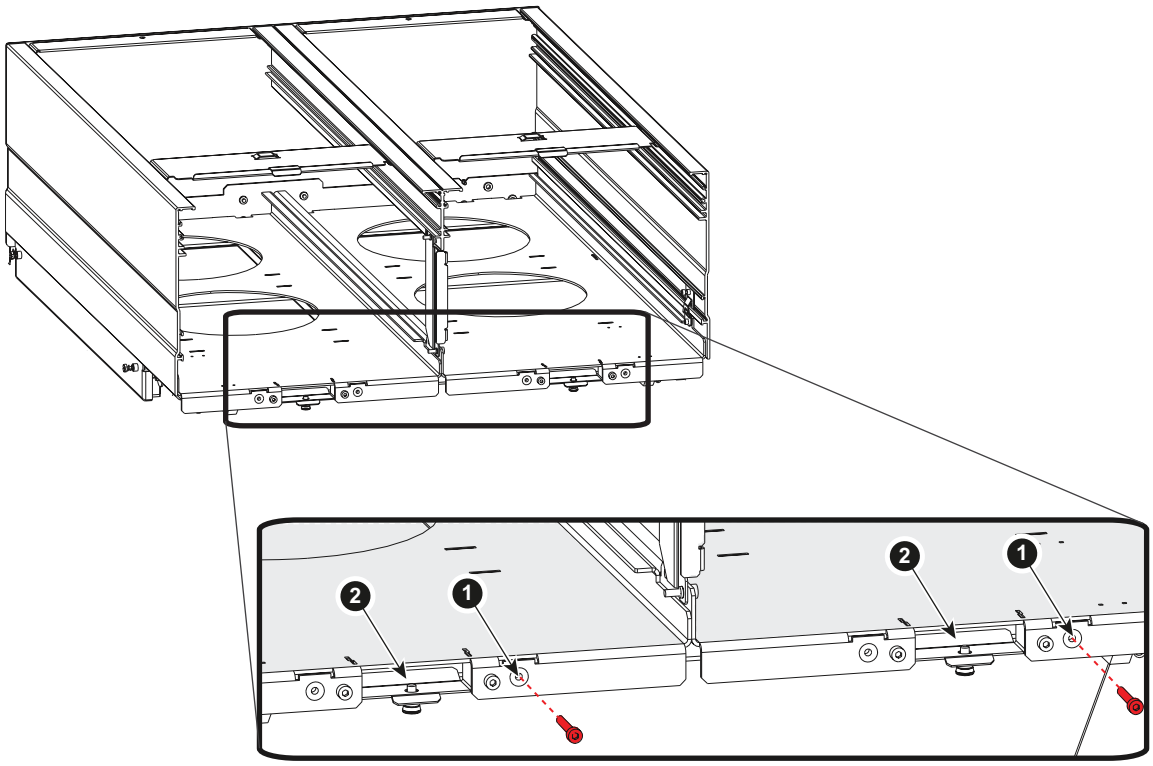


Image 4-22

How to insert

1. Slide the first cooler unit in the cooler housing.

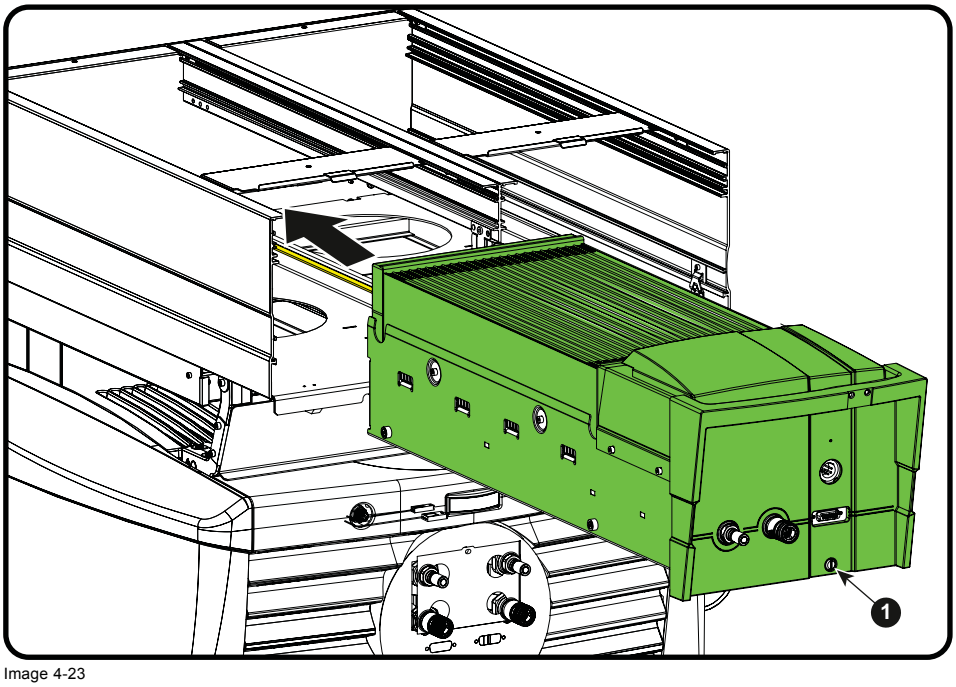


Image 4-23

2. Slide the second cooler unit in the cooler housing.
3. Fixate both units by closing the both captive screws (1).
   Note: *When sliding in the cooler units, it is possible that the captive screw cannot be closed. See work around.*

Work around for captive screw

1. Remove the captive screws of both cooler units.

Image 4-24

2. Remove the cooler units again.
3. Take both removed screws during the start of the assembling procedure and reuse them as fixation screws for the cooler units.
4. Slide in the cooler units again and fixate with both removed screws.

4.8 Mount the filters

About the filters

Two filters, one on each side are mounted below each cooling unit.

Necessary tools

Allen key 3 mm

Necessary parts

2 x filters

How to mount

1. Turn out both screws and remove the cover plate.

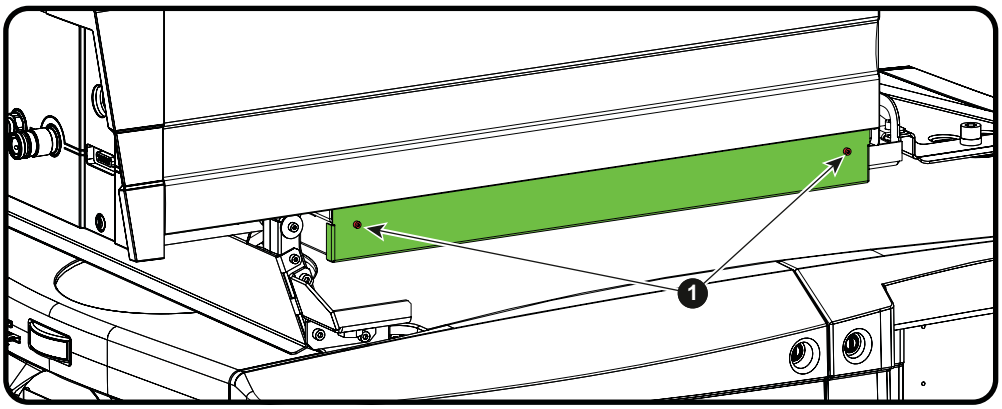


Image 4-25

2. Slide in a filter.
   Look to the airflow sticker for the correct orientation. Airflow is up.

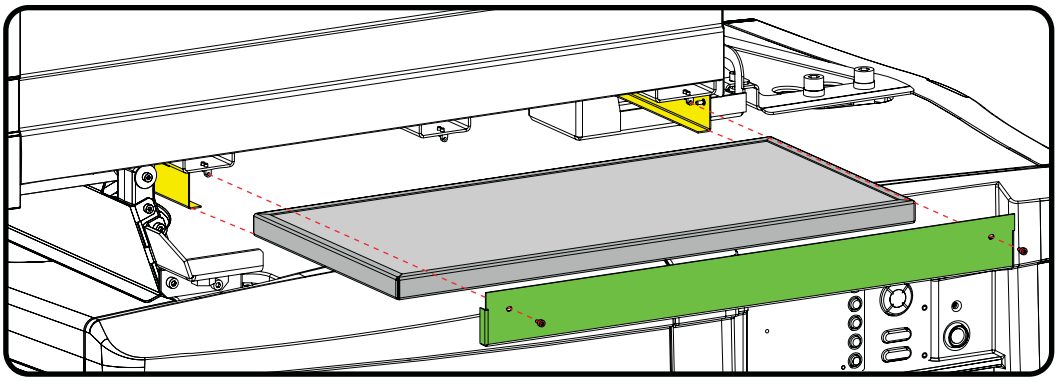


Image 4-26

3. Place the cover plate back on its location and drive in both fixation screws.

4.9 Cabling and tubing

Always connect the right cooler with right group of connector at the backside of the projector. Connect the left cooler with the left group of connectors at the backside of the projector.

Tubing

	From projector connector plate	To cooler
Tube 1	1f	1m
Tube 2	1m	1f
Tube 3	2f	2m
Tube 4	2m	2f

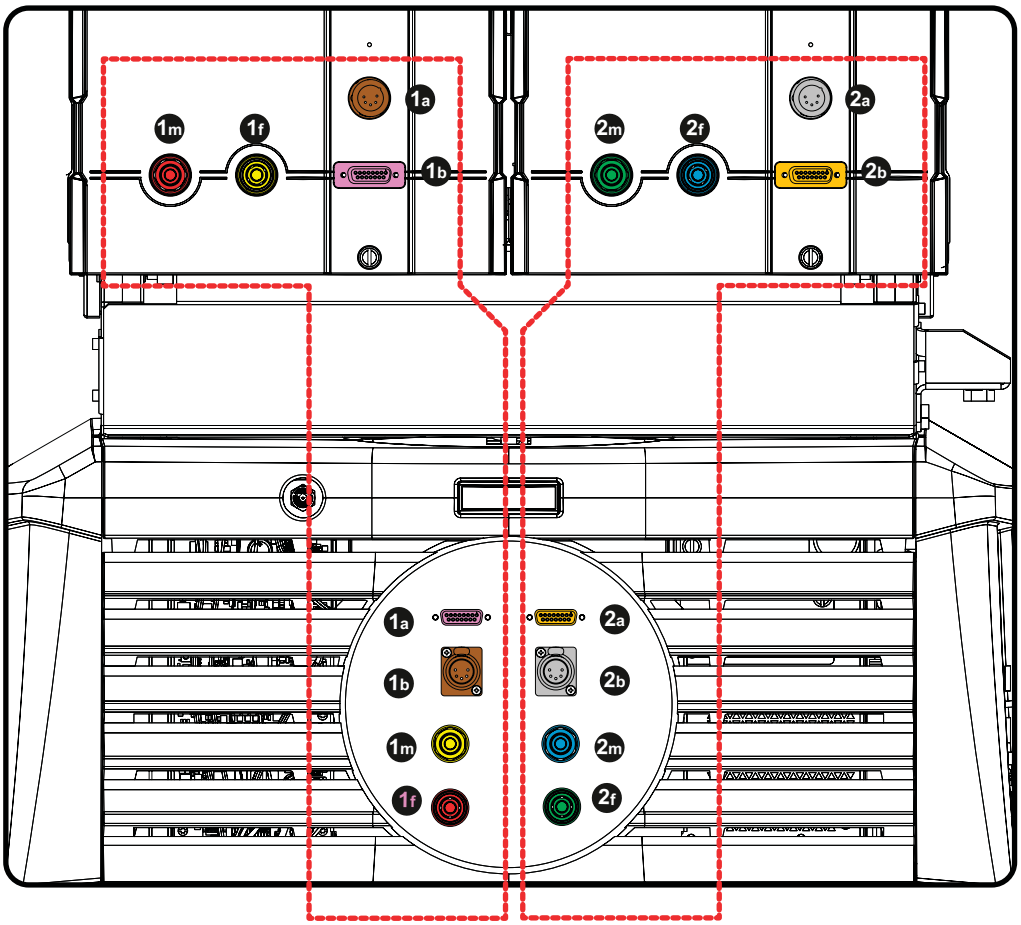


Image 4-27

Cabling

	From projector connector plate	To cooler
XLR cable 1	1a	1a
Control cable 1	1b	1b
XLR cable 1	2f	2m
Control cable 2	2b	2b

5. PHYSICAL INSTALLATION STAND ALONE COOLER

Overview

- Supported mounting position
- Assembling the cooler housing
- Mounting the cooler housing on the cooler frame
- Preparing the stand alone frame
- Installing the brackets on the cooler housing
- Mounting the cooler housing on the frame
- Insert the cooler units
- Mount the filters
- Cabling and tubing

5.1 Supported mounting position

General

The Standalone cooler can be positioned flat on a solid surface (Floor Mounting) or fixed onto the wall in portrait or landscape modes (Wall mounting).

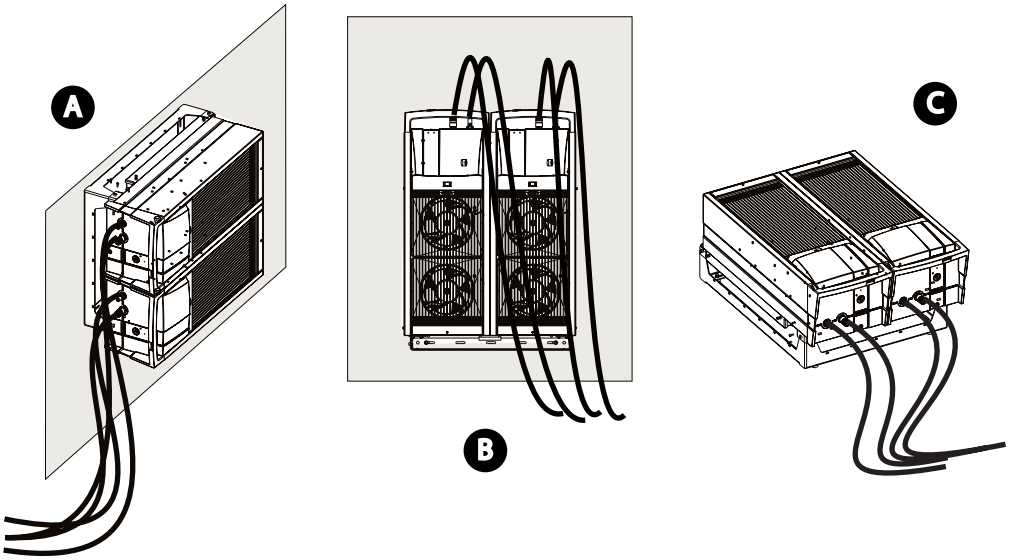


Image 5-1
A Wall Mounting (Landscape).
B Wall Mounting (Portrait).
C Floor Mounting.

Details and limitations

Depending the mounting option chosen, some limitations must be considered:

- **Floor mounting**: When this option is chosen, the cooler is installed on a flat and stable surface, in horizontal position. Four feet correctly distributed (2 on each side) allow stabilize the device. The cooler could be tilted forward or backward, but for security reasons it is strongly recommended to let the unit in horizontal position, the best way to avoid the potential hazards of falls and slips.

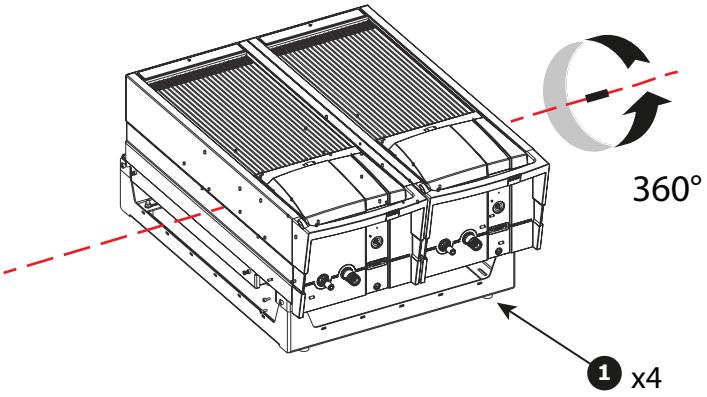


Image 5-2

1 Four feet allow stabilize the unit.

Stacking Standalone coolers: It is NOT allowed to stack multiple cooler modules on top of each other. The air intake of the upper cooler would take in the “hot” air of the lower cooler, even at a distance of 1m apart.

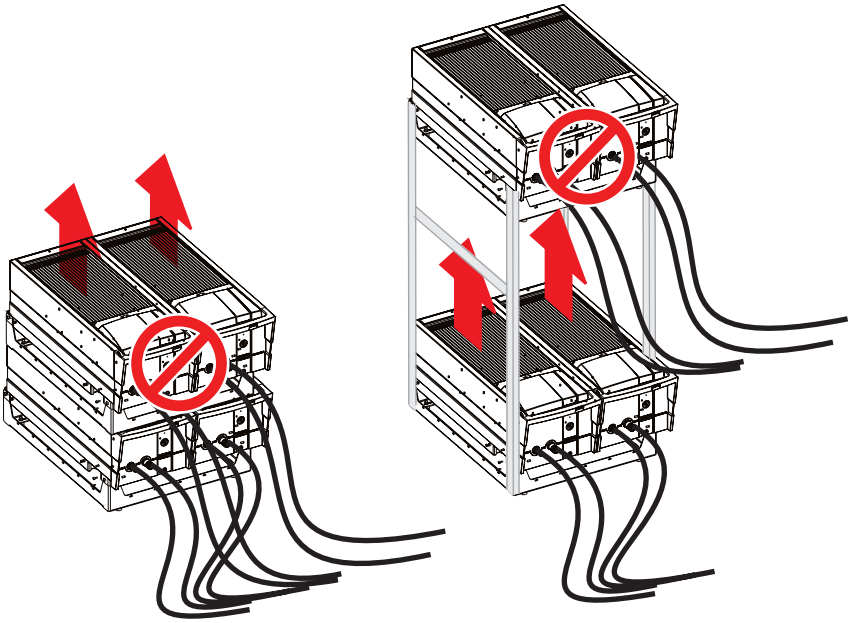


Image 5-3

A Stack of cooler positioned on their sides may be considered, but in this case, the direction of the entire coolers need to be the same, in order to forcing air flow in the same direction.

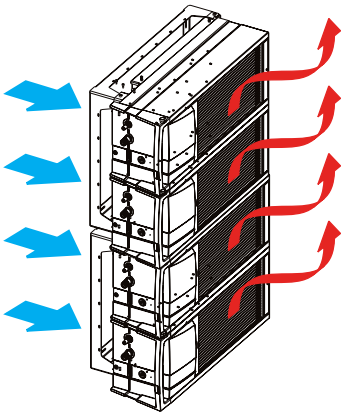


Image 5-4

Note: This positioning must be secularized with an adapted structure.

- **Wall mounting**: When this option is chosen, the cooler must be fixed on the wall in portrait mode or in landscape mode. In portrait mode, the cooler must be mounted with the cooling tubes up. The other position (cooling tubes down) is not authorized because coolers are heavy (more or less 15kg) and if the safety clic fails and the cooler screw is not fixed, the cooler will simply fall to the ground! In this orientation it is also less practical to remove a cooler for service.

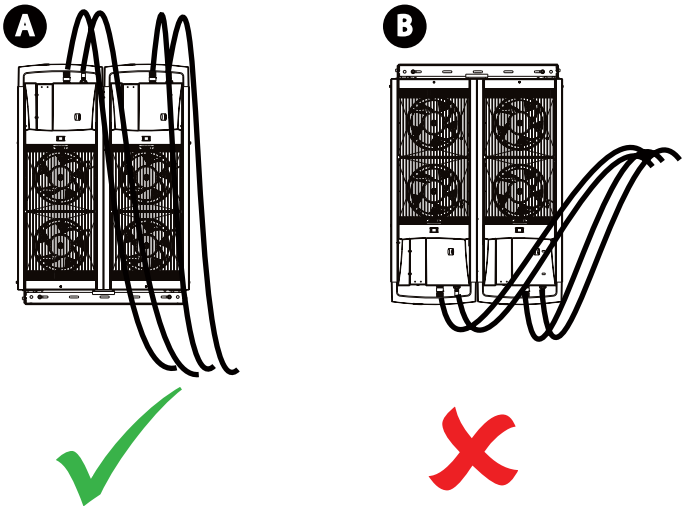


Image 5-5
A Portrait Mode with cooling tubes to the top.
B Portrait Mode with cooling tubes down (not authorized)

In landscape mode the cooler must be mounted with the cooling tubes to the left. The other position (cooling tubes to the right) is not authorized due to technical constraints. Functioning and lifetime of internal pump could be impacted if the unit is installed in this position.

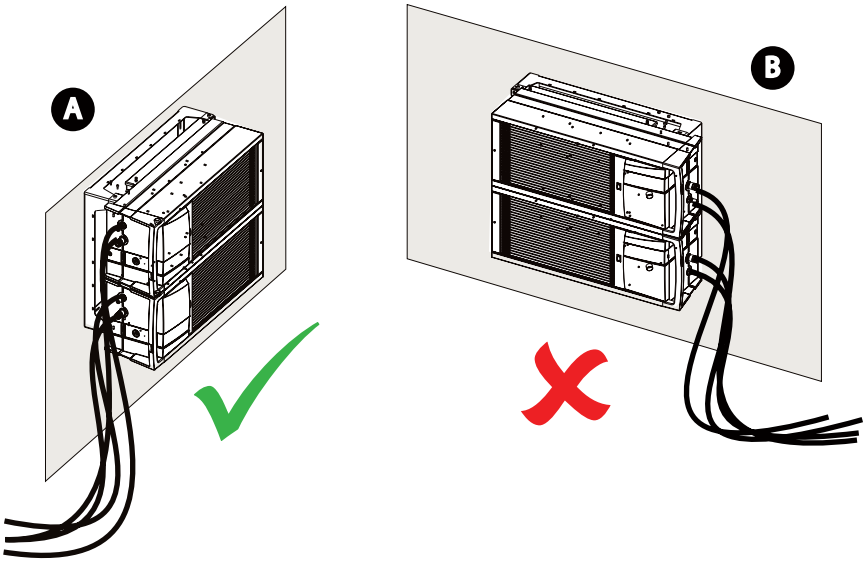


Image 5-6
A Landscape Mode with cooling tubes to the left (only one authorized position).
B Landscape Mode with cooling tubes to the right (not authorized).

5.2 Assembling the cooler housing

What has to be done?

The cooler housing is delivered as a kit and must be assembled during installation.

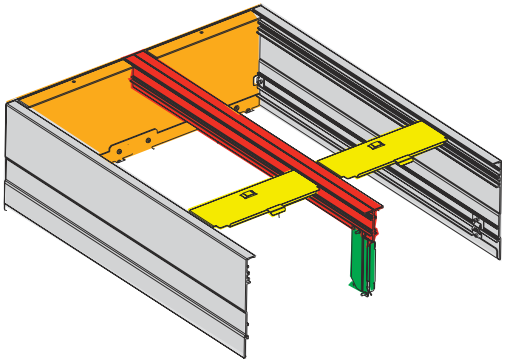


Image 5-7

For more info about how to assemble the cooler housing, see "Assembling the housing", page 23.

5.3 Mounting the cooler housing on the cooler frame

What has to be done?

The cooler housing must be placed on the cooler frame and correctly fixed on it. For more info about how to mount the cooler housing on the cooler frame, see "Mounting the housing on the frame", page 29.

5.4 Preparing the stand alone frame

Necessary tools

- Allen key 3 mm
- Nut driver

Necessary parts

- Stand alone frame
- 4 feet (floor mounting option)

Floor mounting

To install the standalone cooler in floor mounting mode follow this procedure:

1. Mount the 4 feet in such a way that the frame can stand stable. E.g. 2 on each short side or 2 on each long side.

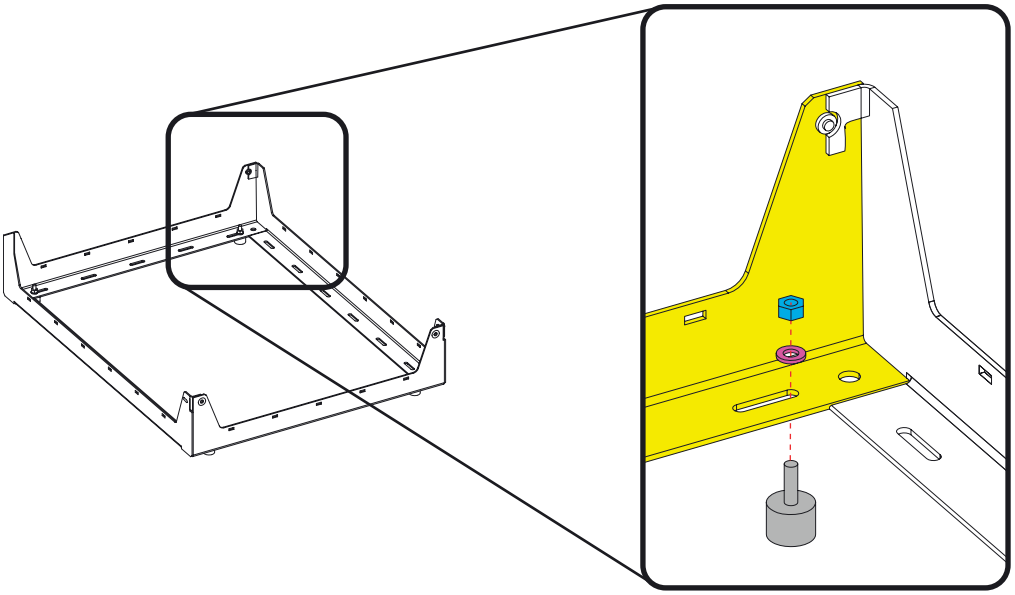


Image 5-8

2. Push the threat axle through one of the holes and secure with a washer and a nut.

   Continue with "Installing the brackets on the cooler housing", page 43.

Wall mounting

To install the standalone cooler in wall mounting mode follow this procedure:

1. Place the stand alone frame against the wall (side indicated with 1) and mark the drilling hole. Any hole in the frame can be used as fixation point but make sure to divide the fixation point over the complete frame.
   It can be mounted in portrait mode (A) or in landscape mode (B).
   Note: In portrait mode the coolers must be mounted with the cooling tubes up. In landscape mode the cooler must be mounted with the cooling tubes to the left.

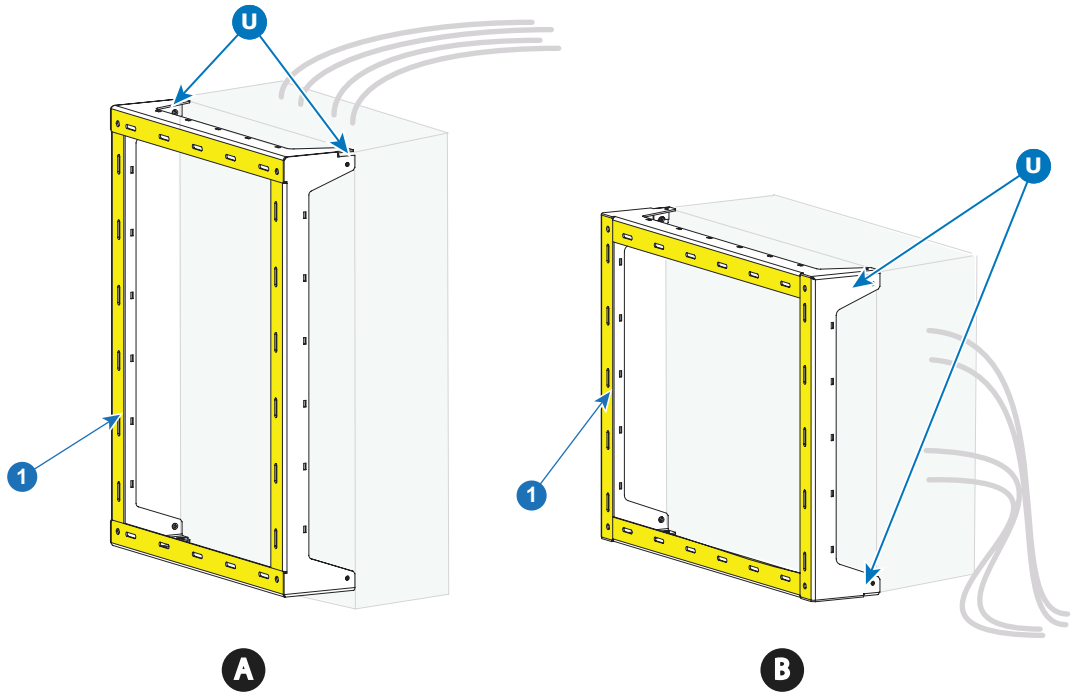


Image 5-9
1 Wall side
U U brackets location
A Portrait mode
B Landscape mode

When mounting the cooler assembly, the U brackets which will be mounted on the housing must be fixed to the indicated position (U) on the frame.

- For portrait mode the U brackets must be mounted on top (cooling tubes will be facing upwards) .
- For landscape mode the U brackets are mounted on the left side (cooling tubes will be facing to the left).

Continue with "Installing the brackets on the cooler housing", page 43.

5.5 Installing the brackets on the cooler housing

Necessary parts

- 2 front brackets (U-brackets)
- 2 equal rear brackets
- 4 Hex Screws M5x8
- 4 Hex Screws M5x12

How to install the brackets

1. Fixate the U-bracket (on both sides) to the side of the cooler housing with 2 screws (M5x12).

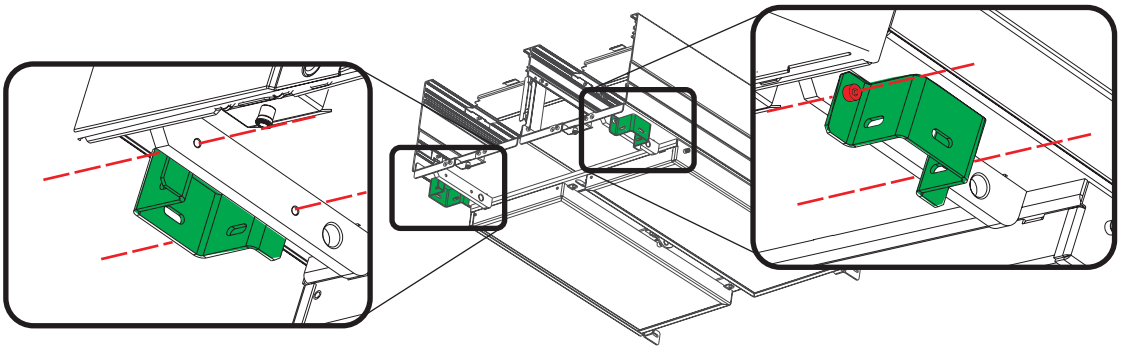


Image 5-10

2. Fixate the rear brackets to the backside of the cooler housing with 2 screws (M5x8) each.

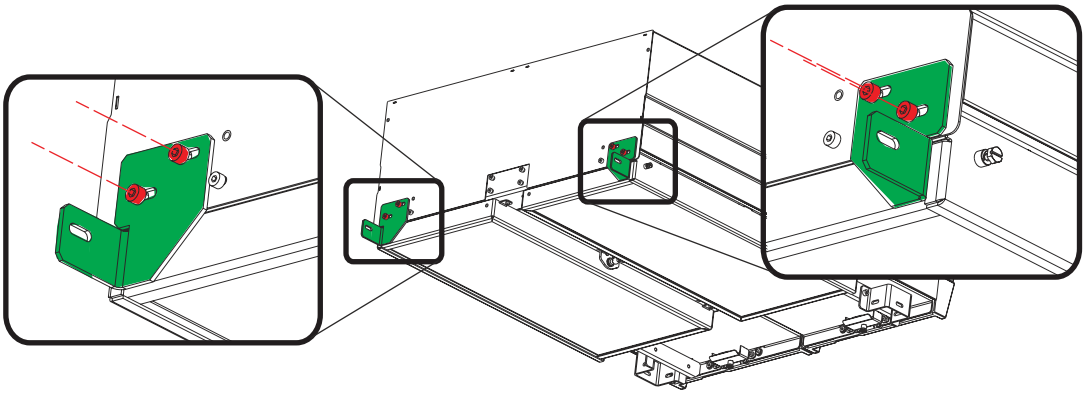


Image 5-11

5.6 Mounting the cooler housing on the frame

Necessary parts

- Cooler housing already assembled
- Frame
- 5 Hex Screws M5x8

At this step of the procedure, the frame is considered as being in its final position, and already fixed, if the wall mounting option has been chosen. See chapter dedicated to the standalone frame preparation.

How to mount

1. Place the housing on the frame.

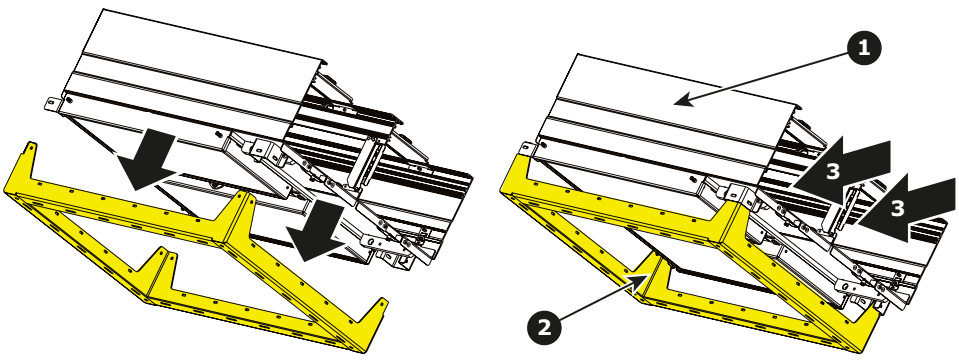


Image 5-12
1 cooler housing
2 Frame
3 cooler inputs

2. Fixate the first U-bracket to the frame with 2 screws (M5x8) as shown in the following drawing.

Note: The two U-Brackets are not fixed in same manner. Here, the concerned U-bracket, is situated in the lower left corner of the housing when you look at the device on the side of the cooler inputs.

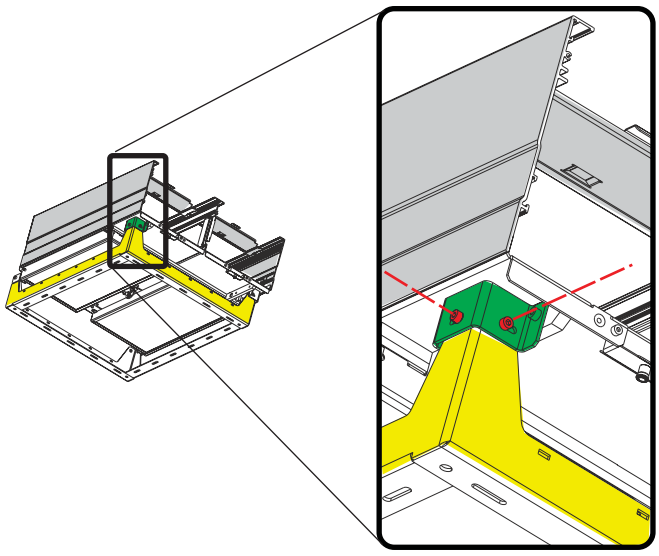


Image 5-13

3. Fixate the second U-bracket to the frame with only one screws (M5x8) as shown in the following drawing. There is a space of more or less 2 centimeters between the frame side and the bracket.
   Note: The two U-Brackets are not fixed in same manner. Here, the concerned U-bracket, is situated in the lower right corner of the housing when you look at the device on the side of the cooler inputs.

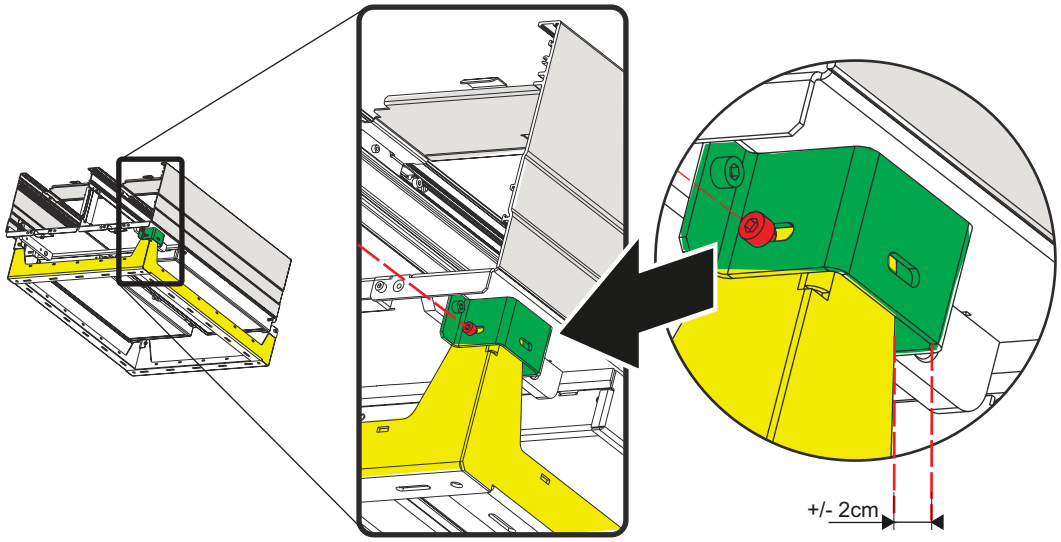


Image 5-14

4. Fixate the bracket situated to the backside of the cooler housing with only one screws (M5x8) each.

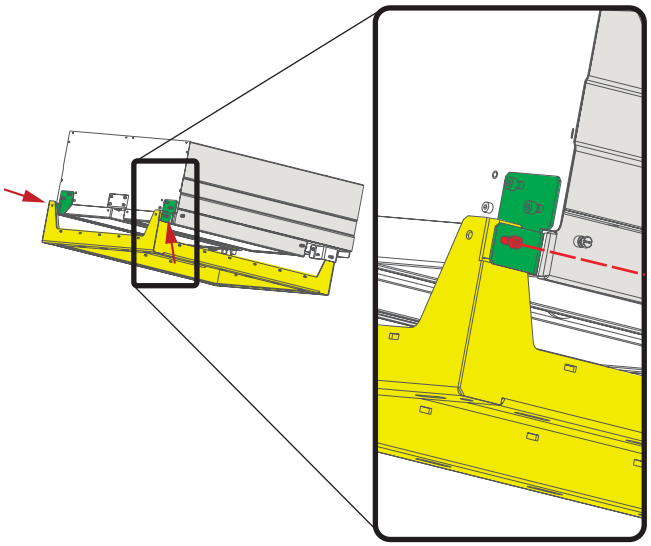


Image 5-15

5.7 Insert the cooler units

Necessary tools

Flat screwdriver

Before you start

Check if the two indicated screws (reference 1) are present. If it is the case, remove this screws.

The use of these screws may become necessary to fixate the cooler in the cooler assembly when the captive screws (reference 2) does not work.

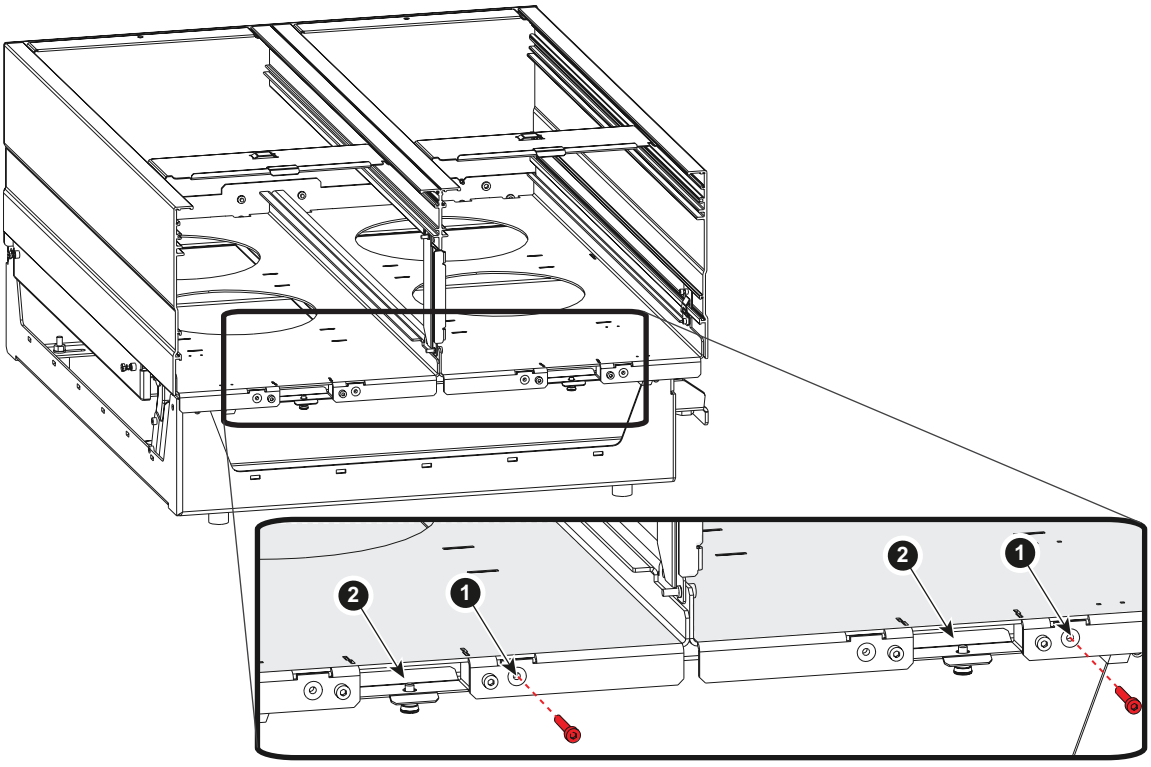


Image 5-16

How to mount

1. Slide the first cooler unit in the cooler housing.

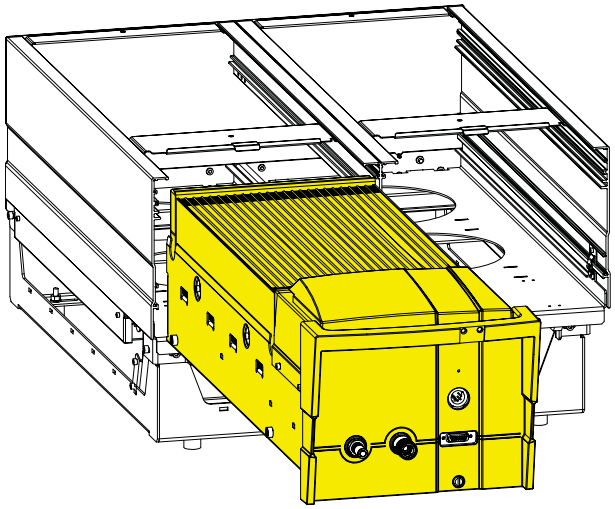


Image 5-17

2. Slide the second cooler unit in the cooler housing.
3. Fixate both units by closing the both captive screws.

5.8 Mount the filters

Necessary tools

Flat screw driver (if screws are too difficult to loosen by hand)

Necessary parts

2 x filters

How to insert

1. Turn out both screws and remove the cover plate.

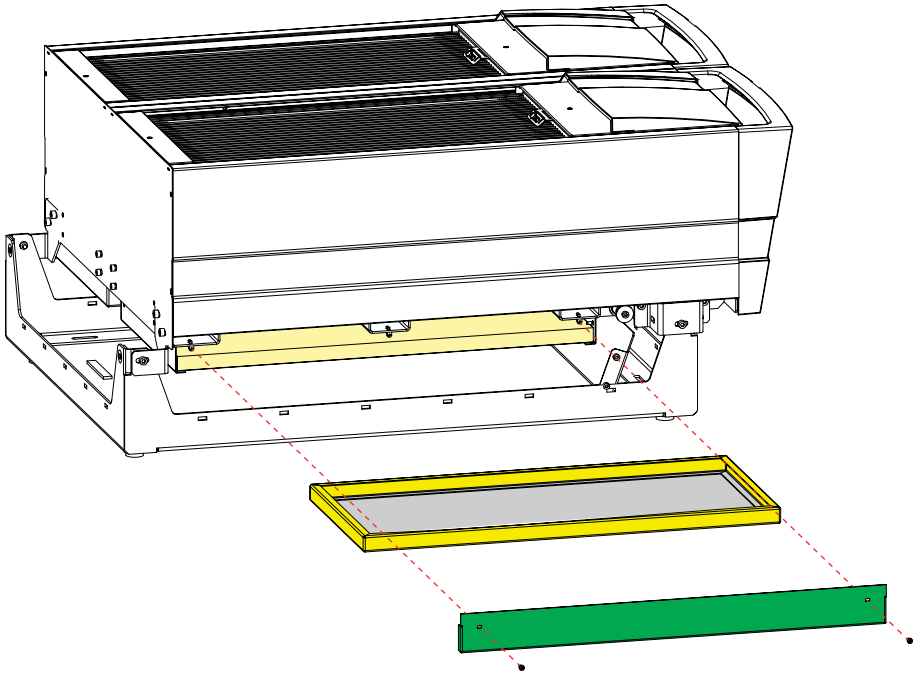


Image 5-18

2. Slide in a filter.
   Look to the airflow sticker for the correct orientation. Airflow is up.

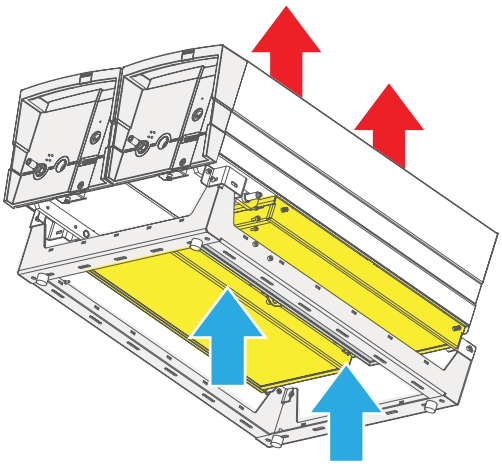


Image 5-19

3. Place the cover plate back on its location and drive in both fixation screws by hand.
   Note: *Please, don't use any tool! Only hand tighten these screws.*

5.9 Cabling and tubing

Always connect the right cooler with right group of connector at the backside of the projector. Connect the left cooler with the left group of connectors at the backside of the projector.

Tubing

	From projector connector plate	To cooler
Tube 1	1f	1m
Tube 2	1m	1f
Tube 3	2f	2m
Tube 4	2m	2f

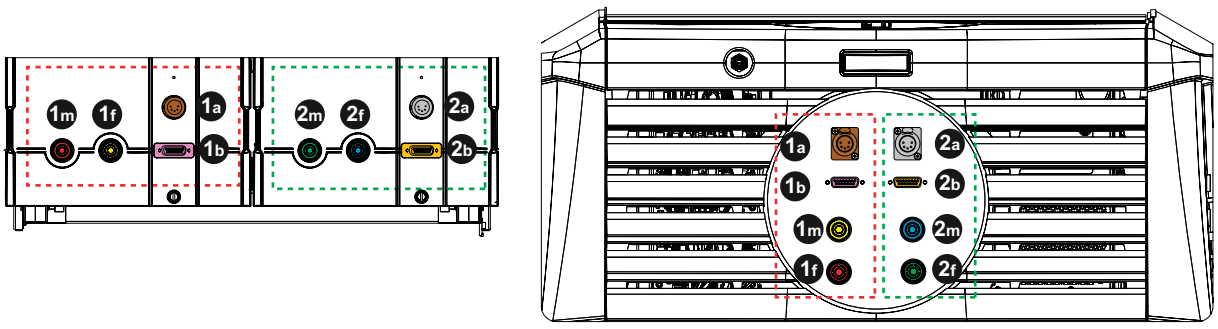


Image 5-20

Cabling

	From projector connector plate	To cooler
XLR cable 1	1a	1a
Control cable 1	1b	1b
XLR cable 1	2f	2m
Control cable 2	2b	2b

6. LENS & LENS HOLDER

About this chapter

This chapter gives an overview of available lenses for the DP2K CLP series projectors and explains how you can select the best suited lens for your specific situation using the lens calculator. Also, it is explained how to install and remove a lens from the projector lens holder and how you can shift, zoom and focus the lens. Furthermore, it is described how you can perform the Scheimpflug adjustment.

CAUTION: Never transport the projector with a Lens mounted in the Lens Holder. Always remove the Lens before transporting the projector. Neglecting this can damage the Lens Holder and Prism.

Each time a lens is manipulated (e.g. removed and installed in a projector), it needs to be homed and returned.

Overview

- Available lenses
- Lens selection
- Lens removal
- Lens installation
- Lens shift, zoom & focus

6.1 Available lenses

Which lenses are available for my projector?

The table below is subject to changes and was last updated on 01/06/2012. Consult my.barco.com for the most recent information about available lenses.

Product Number	Type	Zoom range	Image
R9855957	Motorized	1,2 – 1,81	image 6-1
R98559571	Manual	1,2 – 1,8	
R9855931	Motorized	1,4 – 2,05	image 6-2
R98559311	Manual	1,4 – 2,05	
R9855932	Motorized	1,6 – 2,5	image 6-3
R9855933	Motorized	1,6 – 2,5	image 6-4
R98559321	Manual	1,6 – 2,5	image 6-5
R98559331	Manual	1,6 – 2,5	
R9855934	Motorized	1,95 – 3,2	image 6-6
R9855935	Motorized	1,95 – 3,2	image 6-7
R98559341	Manual	1,95 – 3,2	image 6-8
R98559351	Manual	1,95 – 3,2	
R9855936	Motorized	2,4 – 3,9	image 6-9
R98559361	Manual	2,4 – 3,9	

Image 6-1
R9855957

Image 6-2
R9855931

Image 6-3
R9855932

Image 6-4
R9855933

Image 6-5
R98559321

Image 6-6
R9855934

Image 6-7
R9855935

Image 6-8
R98559341

Image 6-9
R9855936

6.2 Lens selection

Which lens do I need?

1. Go to Barco's website on www.barco.com and click on myBarco
2. Login on.
   If you are not yet registered create a login and password. With the created login and password, it is possible to enter myBarco.

   When your login is correct, the start page is displayed.
3. Click the **Support** tab, then **Digital cinema calculator** (on the left of the screen) and select the appropriate lens calculator.

The lens calculator (see screenshot, image 6-10) will be displayed.

The lens calculator allows you to have an overview of which lenses are suitable for your specific projector setup. Just make your selection of parameters and all possible configurations are displayed.

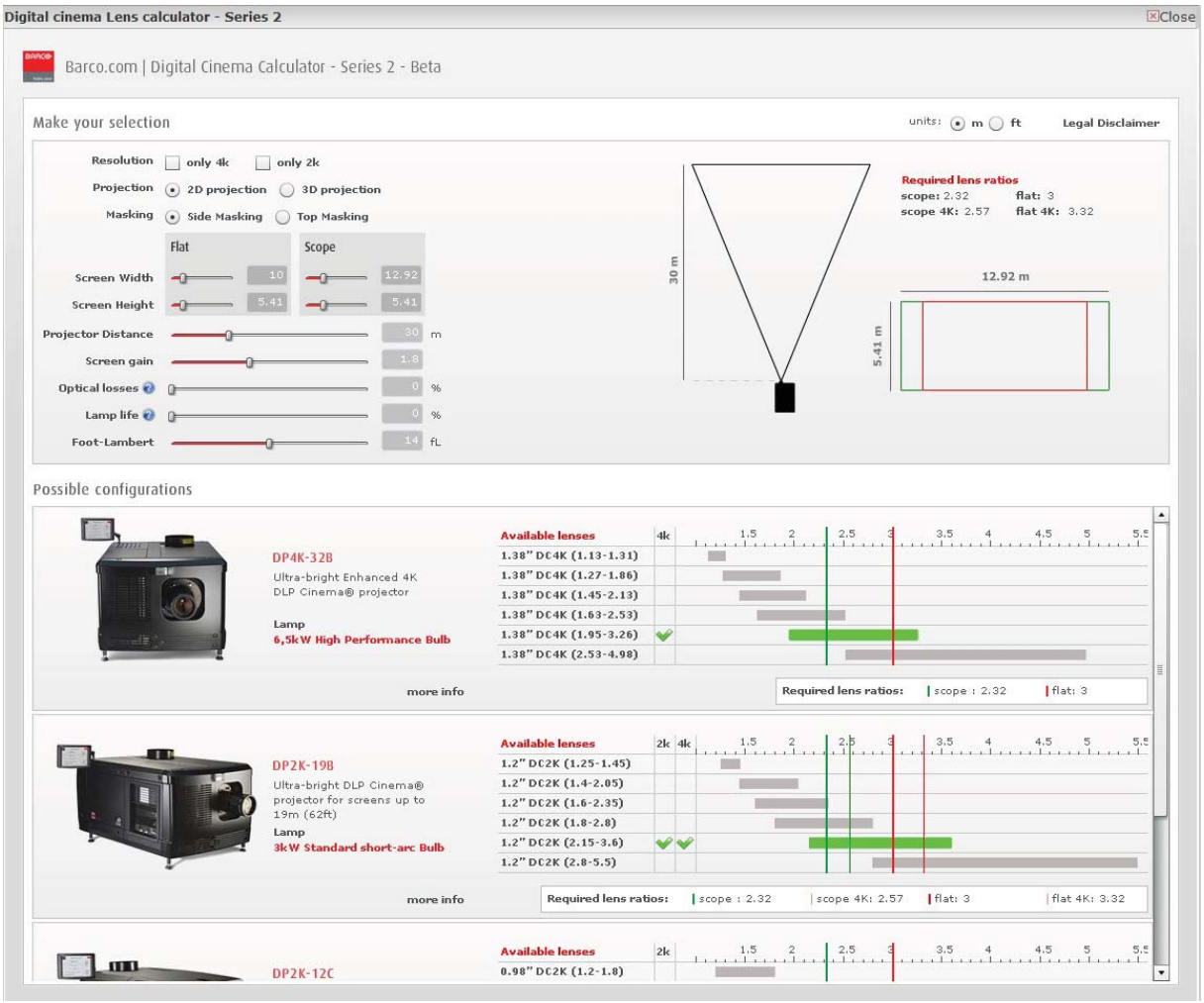


Image 6-10
Digital cinema lens calculator

Take into account that when the projector is tilted the Screen Width you have to fill in should be larger than the physical screen width due to the keystone distortion of the projected image. How much larger depends on the amount of tilt.

Due to production tolerances the real distances can differ by 2% from the calculated values.

For critical situations (fixed installs that use the lens at one of its extreme zoom positions) this should be taken into account.

6.3 Lens removal

How to remove a lens from the projector lens holder ?

1. Support the lens with one hand while you unlock the lens holder by sliding the lock handle towards the “unlocked” position as illustrated.

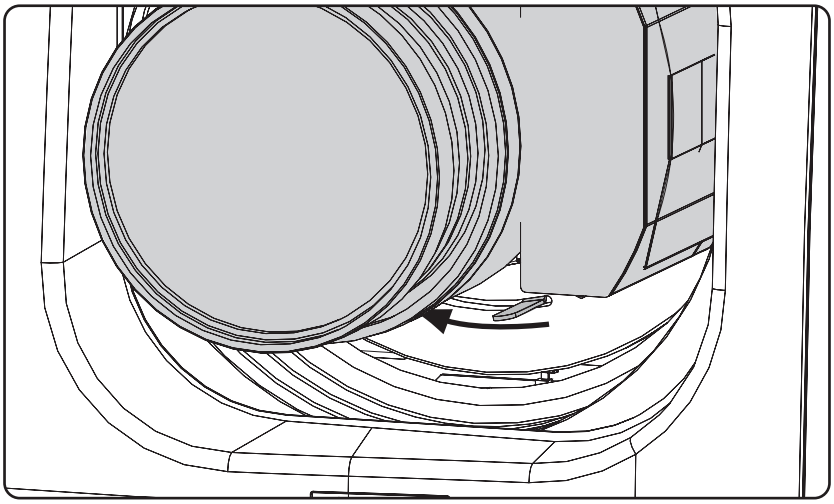


Image 6-11

2. Gently pull the lens out of the lens holder.

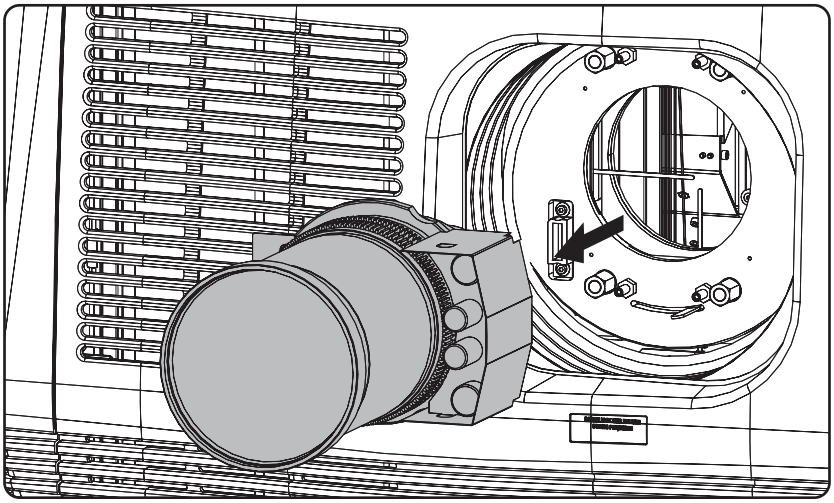


Image 6-12
Remove lens

It's recommended to place the Lens caps of the original Lens packaging, back on both sides of the removed Lens to protect the optics of the Lens.

It's recommended to place the foam rubber of the original projector packaging, back into the Lens opening to prevent intrusion of dust. Note that this foam rubber is packed in a plastic bag to prevent the dust, emitted by the foam, from entering the projector.

6.4 Lens installation

How to install a lens into the projector lens holder ?

1. Remove the foam rubber in the opening of the lens holder if not removed yet.
2. Take the lens assembly out of its packing material and remove the lens caps on both sides.
3. Close the lens locking mechanism prior to lens insertion (1). Lens locking mechanism is closed by pushing the lens lock to the right.

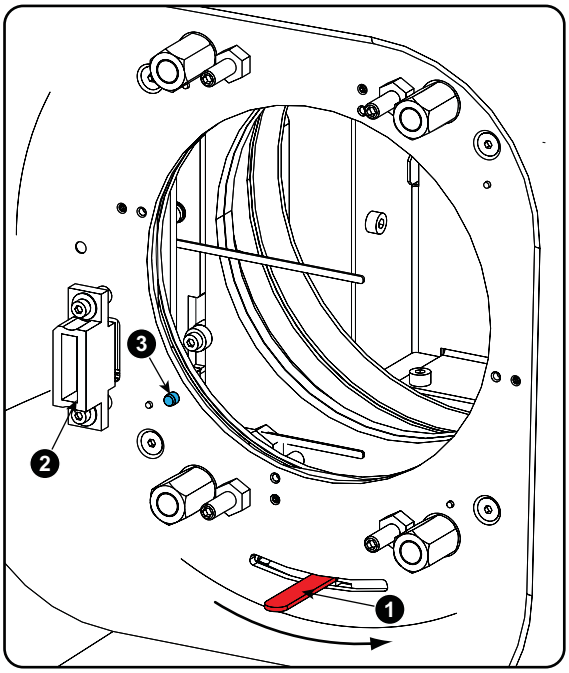


Image 6-13
1 Lens holder lock
2 Power connector lens
3 Alignment pin

4. Ensure that the lens holder stands in the On-Axis position (horizontal and vertical mid position).
   Note: *The lens holder is placed default in the On-Axis position at factory.*

5. Gently insert the lens in such a way that the lens connector matches the socket (B).

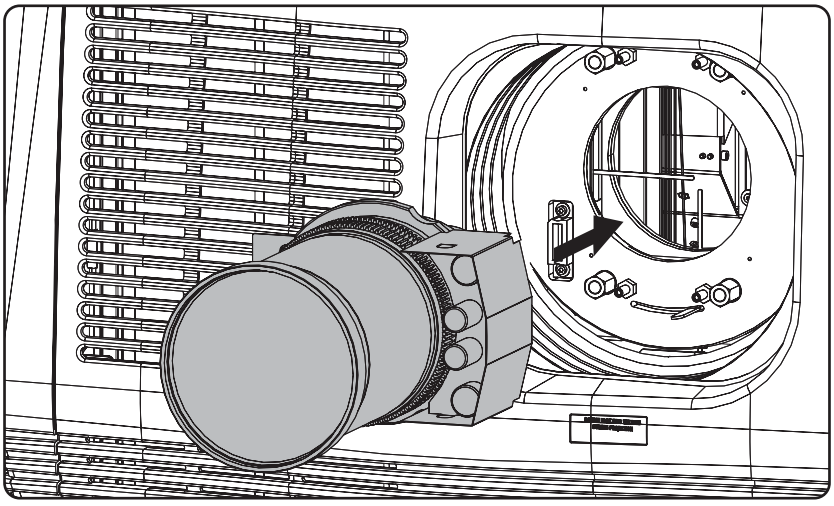


Image 6-14

6. Insert the lens until the connector seats into the socket.
   Warning: *Do not release the Lens yet, as the Lens may fall out of the Lens Holder.*

   A clear “click” should be heard when the retainer springs engage into the slot provided on the lens. Besides the clear click, the springs actually help to guide the lens into position and hence prevent jamming.

7. Check if the lens is really secured by trying to pull the lens out of the lens holder.

CAUTION: Never transport the projector with a Lens mounted in the Lens Holder. Always remove the Lens before transporting the projector. Neglecting this can damage the Lens Holder and Prism.

6.5 Lens shift, zoom & focus

Motorized lens adjustment

The DP2K CLP series projector is equipped with a motorized lens shift functionality and a motorized zoom & focus functionality.

Maximum shift range

The lens can be shifted with respect to the DMD which result in a shifted image on the screen (Off-Axis). A 100% shift means that the centre point of the projected image is shifted by half the screen size. In other words, the centre point of the projected image falls together with the outline of the image in an On-Axis projection. Due to mechanical an optical limitations the shift range is limited as well.

All DC2K lenses have a shift range of 50% up/down and 15% left/right. This range is valid for all throw ratios. Only the 0.98" DC2K Zoom (1.95–3.2 : 1) lenses with item numbers **R9855934** and **R98559341** have a larger shift range of 128% up/down.

The Lens Holder of the projector can be mounted in a lower position so that the lens can be shifted 100% down (0% up).

How to shift the lens of the DP2K CLP series projector?

1. Use the **up and down** arrow keys on the local keypad to shift the lens **vertically** and use the **left and right** arrow keys on the local keypad to shift the lens **horizontally**.

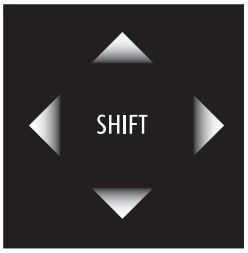


Image 6-15

How to zoom in or out?

1. Is the projector equipped with a motorized zoom & focus?
   If yes, use the “+” and “-” **zoom keys** on the local keypad to zoom in or out.

Image 6-16

   If no, use the **zoom barrel** on the lens to zoom in or out.

How to focus?

1. Is the projector equipped with a motorized zoom & focus?
   If yes, use the “+” and “-” **focus keys** on the local keypad to focus the image on the screen.

Image 6-17

   If no, use the **focus barrel** on the lens to focus the image on the screen.

Take into account that the lens focus may slightly drift while the lens is warming up from cold to operation temperature. This is a typical phenomenon for projection lenses used with high brightness projectors. The operation temperature of the lens is reached after approximately 30 minutes projection of average video.

7. INPUT & COMMUNICATION

About this chapter

This chapter describes the functionality of the Local Keypad, the projector Status Light (tail light) and the different input and communication ports of your DP2K CLP series projector.

Note that all information about the ICMP is gathered into one separated chapter called ICMP.

Overview

- Introduction
- Local keypad of the DP2K-xxCx
- Integrated Cinema Processor (ICP)
- HD-SDI Input Module (optional)
- Integrated Media Block/Server (optional)
- Cinema Controller of the DP2K-xxCx

7.1 Introduction

General

The Input & Communication side of the DP2K-xxCx consists of a Local Keypad and a card cage with four slots. The rear side of the projector is equipped with a tail light which reflects the status of the projector.

Depending on the projector configuration the projector card cage is equipped with an ICP or ICMP. See illustration below. In case an ICP is installed then an IMB, IMS, or HDSDI input module can be optionally inserted into the slot below the ICP. Note that all information about the ICMP is gathered into one separated chapter called ICMP.

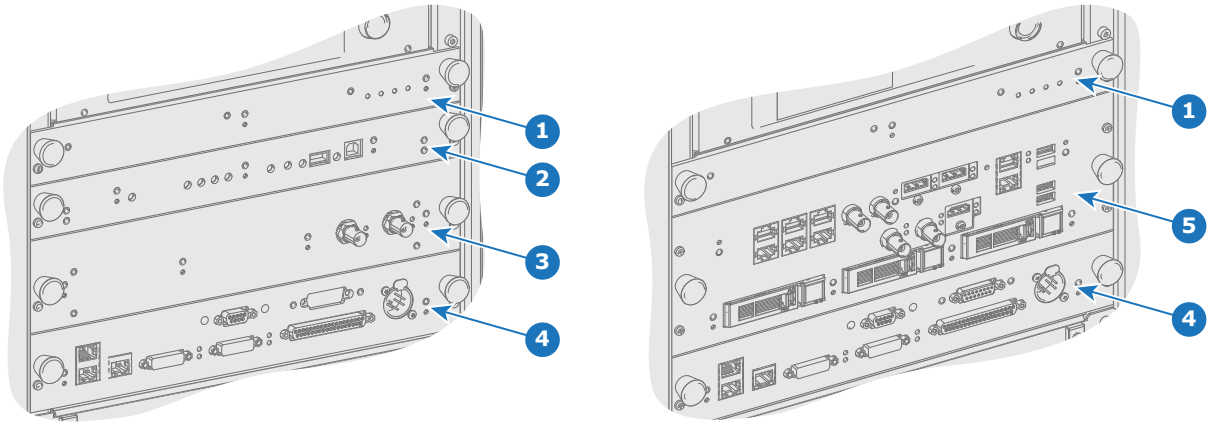


Image 7-1
1 Fan Control Board (FCB).
2 Integrated Cinema Processor (ICP).
3 Optional slot for either IMB, IMS or HD-SDI input module.
4 Barco Cinema Controller.
5 Barco ICMP (inserted in ICP slot and optional slot).

CAUTION: A unit may only be removed from the card cage by qualified service personnel. Removing one of the boards (except for the Cinema Controller) will result in an authorization request upon starting.

7.2 Local keypad of the DP2K-xxCx

Identification of the keys

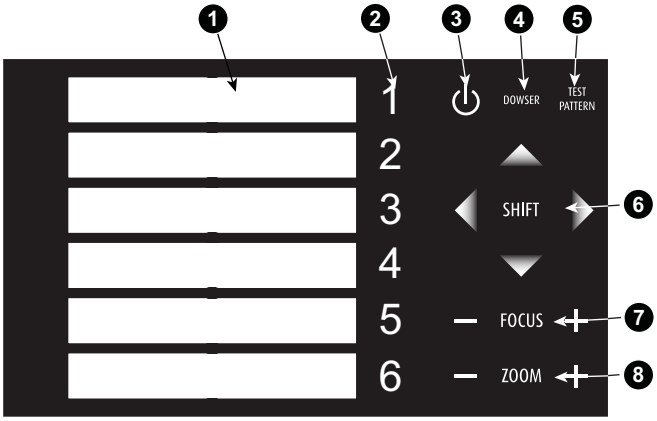


Image 7-2
Local keypad

1 Marker area for macro name

2 Numeric keyboard

3 Standby key

4 Dowser open/close switch

5 Test pattern toggle switch

6 Lens shift up/down, left/right

7 Lens focus

8 Lens zoom

Numeric keys

All the numeric keys (2) of the local keypad have a blue backlight during normal operation. When the authorization process is activated with the security key, the backlight color of the numeric keys 1 to 6 changes to orange. Each key can be linked to a macro which allows you to setup the projector to your requirements with one push of a button. Note that each numeric key has a marker area (1) where you can write down the name of the macro.

Standby key

Standby key (3) switches ON or OFF the lamp and lamp electronics. The lamp cooling fans remain active for about 5 minutes. The speed of the other fans is reduced. The backlight color of the standby key remains red in standby mode and changes to green in operation mode.

Dowser key

The dowser key (4) opens or closes the dowser. The backlight color of the dowser key is green when the dowser is open and red when the dowser is closed.

Test pattern key

The test pattern key (5) gives you direct access to the internal test patterns of the projector.

Shift keys

The shift keys (6) allow you to shift the lens up/down or left/right. This functionality is only available in case of a motorized lens shift.

Focus keys

The focus keys (7) allow you to focus the projected image on the screen. This functionality is only available in case of a motorized lens and lens holder.

Zoom keys

The zoom keys (8) allow you to zoom in or out the projected image on the screen. This functionality is only available in case of a motorized lens and lens holder.

7.3 Integrated Cinema Processor (ICP)

In case the projector is equipped with a Barco ICMP no ICP board is inserted. All ICP functionality is integrated in the Barco ICMP.

LEDs and ports on the Integrated Cinema Processor

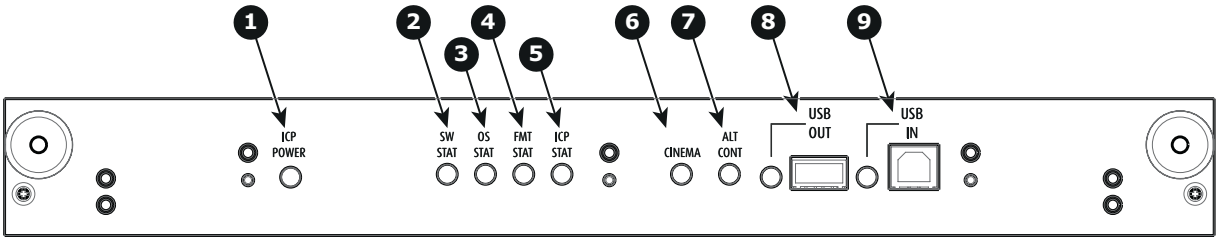


Image 7-3
1 ICP is powered.
2 ICP software state, normal operation is green blinking.
3 ICP operating system state, normally full green .
4 ICP FMT configuration state, normally full green.
5 ICP MAIN configuration state, normally full green.
6 CINEMA port selected. When on, LED 7 will be out.
7 ALTERNATIVE port selection. When on, LED 6 will be out. (note that this function is disabled. Led never lights up)
8 USB, for future use.
9 USB, for future use.

LED diagnostic

State description	Normal operation	Error state
Software state (LED reference 2)	flashing green	red or orange
Operating System state (LED reference 3)	green	off, red or yellow
FMT FPGA state (LED reference 4)	green	red : unable to configure the FPGA yellow : FPGA is loaded with the Boot application
ICP FPGA state (LED reference 5)	green	red : unable to configure the FPGA yellow : FPGA is loaded with the Boot application

ICP functions:

- Stores all projector files. When board is replaced; clone package must be reloaded.
- Stores and generates test patterns.
- Scaling to native resolution, re-sizing, masking, line-insertion de-interlacing, subtitle overlay, color space conversion, de-gamma, color correction
- Source Selection between alternative content and cinema content.
- Stores a Certificate and Private Key needed for Playback validation
- Contains a real time clock, which must be synchronized with the GMT/UTC time stored in the link decryptor module or Integrated Media Block (see Communicator software)
- Handles unpacking of special video formats

The ICP board spare part kit is not default programmed for a DP2K CLP series projector projector. When using this board in a DP2K CLP series projector projector the software must be re-installed after installation of the board.

When installing a new ICP board in a DP2K CLP series projector projector the Spatial Color Calibration file must be reloaded and activated. See chapter .

CAUTION: Make sure not to short circuit the battery on the board. That will destroy the board completely !

7.4 HD-SDI Input Module (optional)

Depending on the projector configuration the projector card cage is either equipped with an ICP or ICMP. In case an ICP is installed then an IMB, IMS, or HDSDI input module can be optionally inserted into the slot below the ICP. This is not the case if the ICMP is installed. For more information about the ICMP see chapter called ICMP.

Location of the source input ports

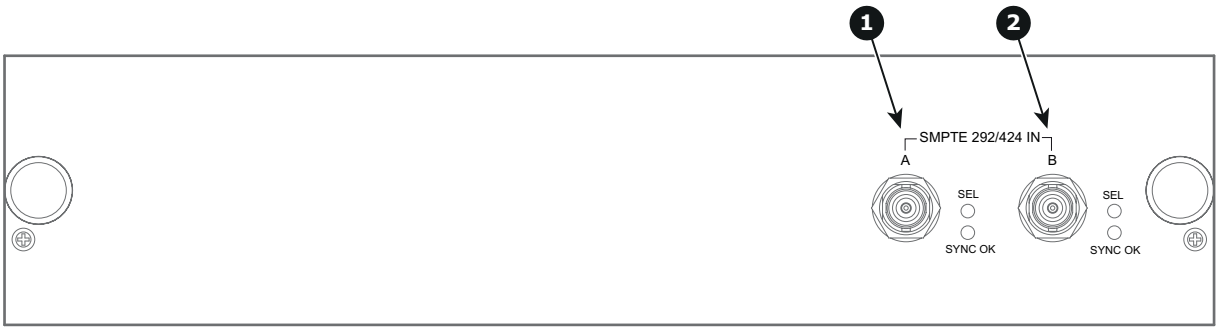


Image 7-4
1 SMPTE 292/424 input, port A (maximum cable length of 30 m allowed)
2 SMPTE 292/424 input, port B (maximum cable length of 30 m allowed)

SMPTE

Society of Motion Picture and Television Engineers - A global organization, based in the United States, that sets standards for baseband visual communications. This includes film as well as video standards.

HD-SDI settings

Source: 2K						
	General settings			Advanced settings		
Port	**Port type**	**Mode**	**Scan type**	**Color space**	**Pixel mapping**	**Calibration**
A or B	HDSDI Single link	4:2:2 10 bits/color	Progressive	YCbCr	HDSDI-Single link	Single
			Progressive - field bit normal			
			Progressive - field bit inverted			
			Progressive SF - 2nd field dominant			
			Progressive SF - 1st field dominant			
	3GSDI link	4:2:2 12 bits/color	Progressive	YCbCr	3G-level A-Single link	Single
					3G-level B-Dual link	
		4:4:4 10 bits/color	Progressive	RGB	3G-level A-Single link	
					3G-level B-Dual link	
		4:4:4 12 bits/color	Progressive	XYZ/RGB	3G-level A-Single link	
					3G-level B-Dual link	

Source: 2K						
	General settings			Advanced settings		
Port	**Port type**	**Mode**	**Scan type**	**Color space**	**Pixel mapping**	**Calibration**
A+B	HDSDI Duallink AB	4:4:4 10 bits/color	Progressive	RGB	HDSDI-Dual link	Single
			Progressive - field bit normal			
			Progressive - field bit inverted			
			Progressive SF - 2nd field dominant			
			Progressive SF- 1st field dominant			
		4:4:4 12 bits/color	Progressive	XYZ/RGB		
			Progressive - field bit normal			
			Progressive - field bit inverted			
			Progressive SF- 2nd field dominant			
			Progressive SF- 1st field dominant			

Source: 2K-3D						
	General settings			Advanced settings		
Port	**Port type**	**Mode**	**Scan type**	**Color space**	**Pixel mapping**	**Calibration**
A or B	3GSDI link - 3D	4:2:2 10 bits/color	Progressive	YCbCr	3G - Level B - Dual stream	Single
						Dual (separate left / right eye)
			Progressive SF- 1st field dominant	YCbCr	3G - Level B - Dual stream	Single
						Dual (separate left / right eye)
			Progressive SF - 2nd field dominant	YCbCr	3G - Level B - Dual stream	Single
						Dual (separate left / right eye)
A+B	HDSDI 3D	4:2:2 10 bits/color	Progressive	YCbCr	HDSDI - Interleaved	Single
						Dual (separate left / right eye)
			Progressive SF- 1st field dominant	YCbCr	HDSDI - Interleaved	Single
						Dual (separate left / right eye)
			Progressive SF - 2nd field dominant	YCbCr	HDSDI - Interleaved	Single
						Dual (separate left / right eye)
	3GSDI 3D	4:2:2 12 bits/color	Progressive	YCbCr	3G - Level A - Interleaved	Single
						Dual (separate left / right eye)
					3G - Level B - Interleaved	Single
						Dual (separate left / right eye)
		4:4:4 10 bits/color	Progressive	RGB	3G - Level A - Interleaved	Single
						Dual (separate left / right eye)

Source: 2K-3D						
	General settings			Advanced settings		
Port	**Port type**	**Mode**	**Scan type**	**Color space**	**Pixel mapping**	**Calibration**
					3G - Level B - Interleaved	Single
						Dual (separate left / right eye)
		4:4:4 12 bits/color	Progressive	XYR/RGB	3G - Level A - Interleaved	Single
						Dual (separate left / right eye)
					3G - Level B - Interleaved	Single
						Dual (separate left / right eye)

Source: 2K-HFR						
	General settings			Advanced settings		
Port	**Port type**	**Mode**	**Scan type**	**Color space**	**Pixel mapping**	**Calibration**
A or B	3GSDI link - HFR	4:2:2 10 bits/color	Progressive	YCbCr	3G - Level B - Dual stream	Single
					3G - Level B - Single link	
A+B	HDSDI HFR	4:2:2 10 bits/color	Progressive	YCbCr	HDSDI - Interleaved	Single
			Progressive SF- 1st field dominant			
			Progressive SF - 2nd field dominant			
	3GSDI HFR	4:2:2 12 bits/color	Progressive	YCbCr	3G - Level A - Interleaved	Single
					3G - Level B - Interleaved	
		4:4:4 10 bits/color	Progressive	RGB	3G - Level A - Interleaved	Single
					3G - Level B - Interleaved	
		4:4:4 12 bits/color	Progressive	XYZ/RGB	3G - Level A - Interleaved	Single
					3G - Level B - Interleaved	

Source: 3D-HFR						
	General settings			Advanced settings		
Port	**Port type**	**Mode**	**Scan type**	**Color space**	**Pixel mapping**	**Calibration**
A+B	3GSDI 3D HFR	4:2:2 10 bits/color	Progressive	YCbCr	3G - Level A - Interleaved	Single
						Dual (separate left / right eye)
			Progressive SF- 1st field dominant	YCbCr	3G - Level A - Interleaved	Single
						Dual (separate left / right eye)
			Progressive SF- 2nd field dominant	YCbCr	3G - Level A - Interleaved	Single
						Dual (separate left / right eye)

7.5 Integrated Media Block/Server (optional)

Depending on the projector configuration the projector card cage is either equipped with an ICP or ICMP. In case an ICP is installed then an IMB, IMS, or HDSDI input module can be optionally inserted into the slot below the ICP. This is not the case if the ICMP is installed. For more information about the ICMP see chapter called ICMP.

Integrated Media Block (IMB)

Image 7-5
Example of IMB powered by Doremi.

Integrated Media Server (IMS)

Image 7-6
Example of IMS powered by Doremi.

Configuration and operation instructions for IMB and IMS are not included in this document. See manufacturers website of the installed IMB/IMS for technical documentation and support.

7.6 Cinema Controller of the DP2K-xxCx

Location of the communication ports

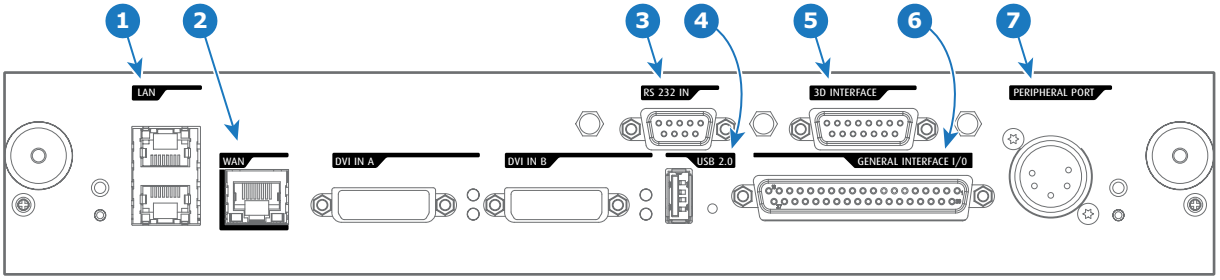


Image 7-7

Functionality

1 **Local Area Network (LAN: 10/100/1000 base-T) port**

Local Area Network (LAN: 10/100/1000 base-T) with built-in Ethernet switch (port 1 and port 2). Use for projector control and automation. E.g. Touch Panel, content server, ... (not for content streaming!)

As there is a need to daisy chain projectors when they are on an Ethernet network, an Ethernet switch is built in. the incoming network is hereby available for the internal PC and for the next device in the chain. In this way a 'star' network interconnection can be avoided. The switch used is a stand alone 10/100/1000Mbit Ethernet switch. This assures no influence on the network speed. Furthermore, this Ethernet switch remains operational when the projector is in Standby mode.

The connectors used for these Ethernet ports are of the type RJ45, which is compatible with standard RJ45 cable connector. Straight (most common) as well as cross linked network cables can be used. The 2 ports are functionally identical. Both ports are connected via the projector switch (Auto sensing enabled).

2 **Wide Area Network (WAN) port**

Wide Area Network (WAN: 10/100/1000 base-T). Use this Ethernet port (reference **2** image 7-7) to connect the network which contains the DHCP server.

The DP2K CLP series projector can be connected to a WAN (Wide area network) (reference **2** image 7-7). Once connected to the WAN, users can access the projector from any location, inside or outside (if allowed) their company network using the Communicator software. This software locates the projector on the network if there is a DHCP server or the user can insert the correct IP-address to access the projector. Once accessed, it is possible to check and manipulate all the projector settings. Remote diagnostics, control and monitoring of the projector can then become a daily and very simple operation. The network connectivity allows detection of potential errors and consequently improves service time.

3 **RS232 IN port**

This female DB-9 connector allows you to use a standard serial cable up to 10 meter to connect the touch panel interface with the projector. Note that the RS232 protocol is used on this connection.

4 **USB OUT port**

The Cinema Controller is equipped with a USB port, type "A" connector, (reference **4** image 7-7) which can be used to power handheld devices within USB spec (MAX 500mA/5V]. No other functionality supported (Future expansion). The USB OUT port remains operational in Standby mode.

5 **3D INTERFACE port**

3D interface port (reference **5** image 7-7. Can be used to connect external 3D devices to the projector. All signals necessary for 3D projection can be provided via this connector. The 3D interface port is disabled if the projector is in Standby mode.

6 **GENERAL PURPOSE INPUT/OUTPUT (GPIO) port**

This 37 pin connector (reference **6** image 7-7) can be used to send or receive trigger signals from other devices. These input/output pins can be programmed by macros created with the Communicator software. See user's guide of the Communicator, section Macro editor, for more information about this functionality. Note that the General Purpose Inputs accept 24 volt maximum. The GPIO remains operational when the projector is in Standby mode. So, if the factory predefined macro to wake up the projector is assigned to one of the free GPI input pins the projector can be awakened via GPIO.

Enter or leave Standby mode can also be done with GPIO via two predefined Macros (not editable).

7 **PERIPHERAL port**

For future use.

RS232

An Electronic Industries Association (EIA) serial digital interface standard specifying the characteristics of the communication path between two devices using either D-SUB 9 pins or D-SUB 25 pins connectors. This standard is used for relatively short-range communications and does not specify balanced control lines. RS-232 is a serial control standard with a set number of conductors, data rate, word length and type of connector to be used. The standard specifies component connection standards with regard to computer interface. It is also called RS-232-C, which is the third version of the RS-232 standard, and is functionally identical to the CCITT V.24 standard. Logical '0' is > + 3V, Logical '1' is < -3V. The range between -3V and +3V is the transition zone.

Location of the source input ports (DVI)

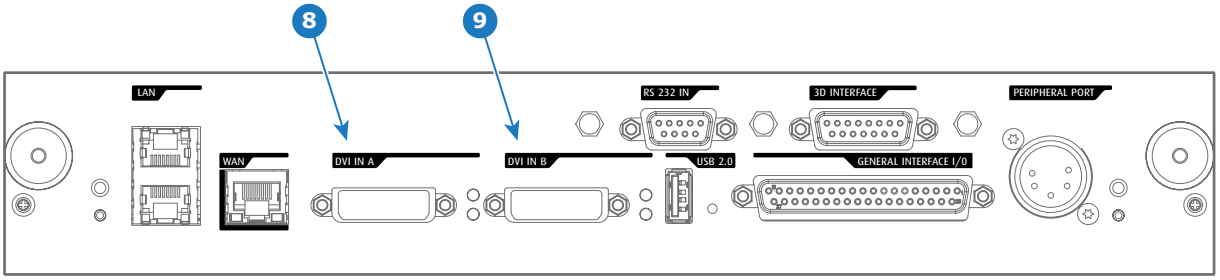


Image 7-8

Legende

8 **DVI-D input, port A, Single link + HDCP**

9 **DVI-D input, port B, Single link + HDCP**

In case an ICMP is installed the DVI ports of the Cinema Controller are not operational. Use a DVI-to-HDMI adapter and connect the DVI source with the HDMI port of the ICMP.

DVI

Digital Visual Interface is a display interface developed in response to the proliferation of digital flat panel displays.

The digital video connectivity standard that was developed by DDWG (Digital Display Work Group). This connection standard offers two different connectors: one with 24 pins that handles digital video signals only, and one with 29 pins that handles both digital and analog video. This standard uses TMDS (Transition Minimized Differential Signal) from Silicon Image and DDC (Display Data Channel) from VESA (Video Electronics Standards Association).

DVI can be single or dual link.

DVI Input formats

Input	Source standard	Vertical rate	Scan type	Color space	Sampling	Color depth
Single DVI	VESA (640x480)	60	Progressive	RGB	4:4:4	8 bit
Single DVI	VESA (640x480)	72	Progressive	RGB	4:4:4	8 bit
Single DVI	VESA (800x600)	60	Progressive	RGB	4:4:4	8 bit
Single DVI	VESA (800x600)	72	Progressive	RGB	4:4:4	8 bit
Single DVI	VESA (1024x768)	60	Progressive	RGB	4:4:4	8 bit
Single DVI	VESA (1024x768)	70	Progressive	RGB	4:4:4	8 bit
Single DVI	VESA (1280x1024)	60	Progressive	RGB	4:4:4	8 bit
Single DVI	1280x720	60	Progressive	RGB	4:4:4	8 bit
Single DVI	1920x1080	60	Progressive	RGB	4:4:4	8 bit
Single DVI	2048x1080	50/60	Progressive	RGB	4:4:4	8 bit
Single DVI	1920x1080i	50/60	Interlaced	RGB	4:4:4	8 bit
Twin DVI	ACS (2048x1080)	50/59.94	Progressive	RGB	4:4:4	10 bit
Twin DVI	ACS (2048x1080)	50/59.94	Progressive	RGB	4:4:4	12 bit
DVI-3D	3D (2048x1080)	24	Progressive	RGB	4:4:4	2x8 bit
DVI-3D	3D (2048x1080)	25	Progressive	RGB	4:4:4	2x8 bit
DVI-3D	3D (2048x1080)	30	Progressive	RGB	4:4:4	2x8 bit

8. ICMP

About this chapter

This chapter describes the ICMP in general, the HDDs, the input ports and the communication ports. Furthermore, the status LEDs are described and the importance of the device certificate is illustrated.

Image 8-1

Overview

- ICMP introduction
- ICMP HDD
- ICMP communication ports
- ICMP source input ports
- ICMP source input ports
- ICMP DisplayPort specifications
- ICMP SDI specifications
- ICMP HDMI 1.4 specifications
- ICMP status LEDs
- ICMP HDD status LEDs
- ICMP device certificate
- ICMP device certificate for China
- ICMP configuration via Communicator
- ICMP reset
- Obtaining the Barco ICMP certificate
- Removing a HDD from the ICMP
- Installing a HDD into the ICMP

8.1 ICMP introduction

About ICMP

The ICMP is a removable electronic assembly situated in the Card Cage of the projector. The ICMP stores, decrypts and decodes DCI cinema content and delivers it to the projector in a usable format, all integrated into a single assembly placed directly in the projector. ICMP is a fully integrated assembly so expected by the operators to facilitate their daily business.

The standard Integrated Cinema Processor functionality from Texas Instruments® is fully integrated into the ICMP. So, the ICMP replaces the ICP board as well.

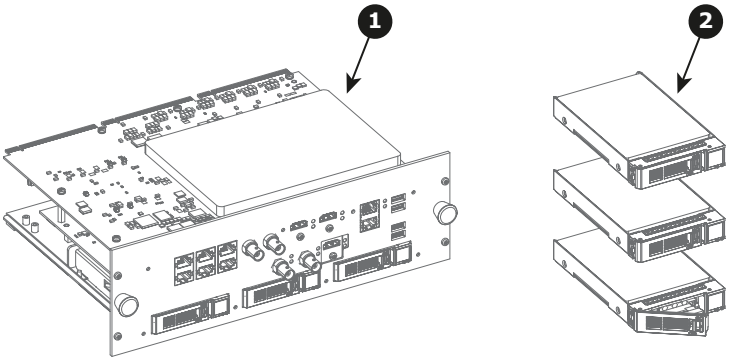


Image 8-2
1 ICMP
2 HDDs for ICMP

As an integrated component of the projector, installation and maintenance of the ICMP requires the same skills and the same precautions as an intervention on the projector itself.

For order info see www.barco.com.

Front face of the ICMP

The last produced model is equipped with two HDMI 2.0 as video source.

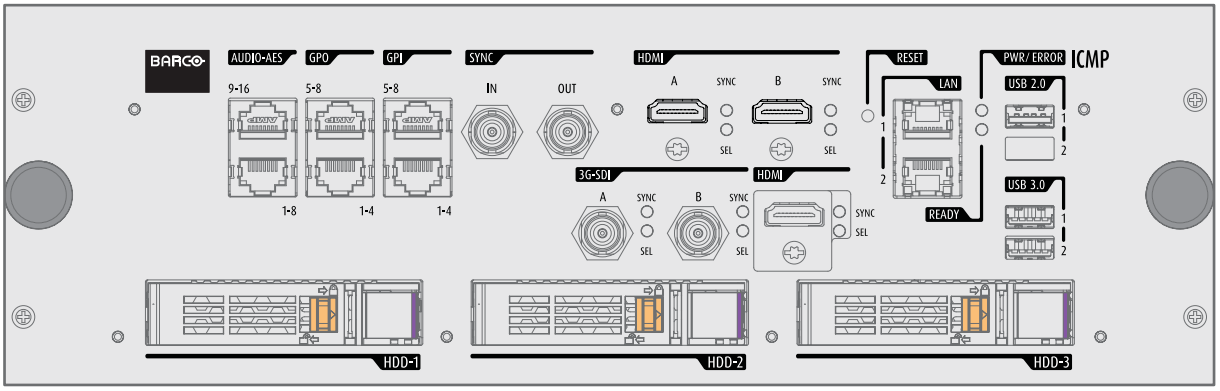


Image 8-3
Front face ICMP (with HDMI 2.0).

Some models with DisplayPorts are still present on the field.

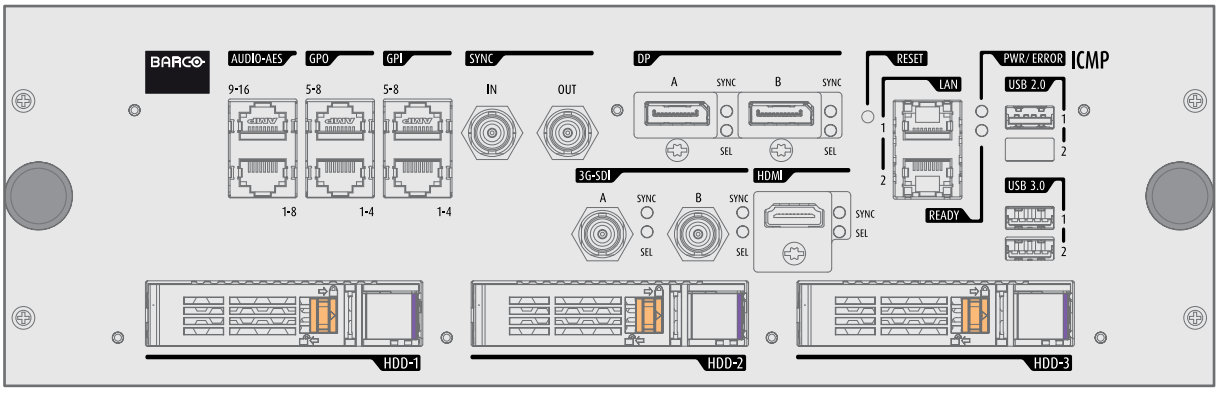


Image 8-4
Front face ICMP (with DisplayPort).

Card Cage slot location

The Card Cage can be different depending the projector type but it always consists of a button module and several removable units. The ICMP (reference 1) is inserted into the former ICP slot and IMB slot above the Barco Cinema Controller (reference 2).

ICMP location in the Card Cage of a B-series, C-series, or L-series projector.

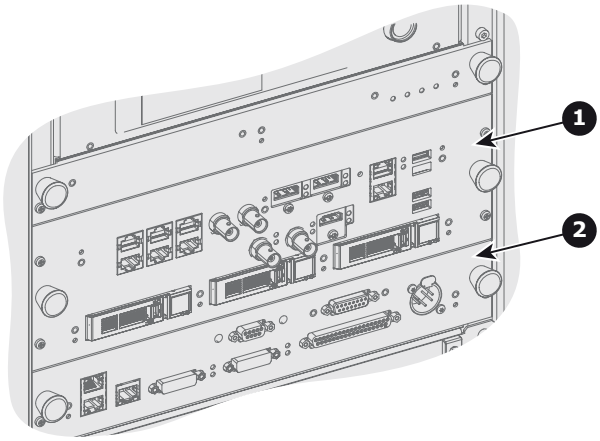


Image 8-5

8.2 ICMP HDD

About ICMP HDD

The three HDDs (local storage) in the ICMP, are set up in a RAID 5 configuration. This storage technique, that combines multiple HDD components into a logical unit, manages enough redundancy information to continue to operate properly after the loss of one HDD.

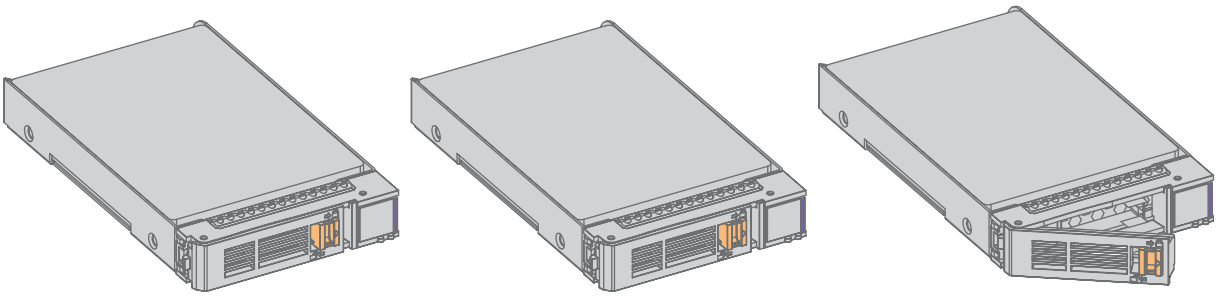


Image 8-6

CAUTION: A RAID 5 configuration with three HDDs allows a maximum loss of one disk. With the simultaneous loss of more than one HDDs, data is lost and the RAID must be completely initialized again after replacement of the defect HDDs with new HDDs!

About degraded mode

When a RAID array experiences the failure of one disk, it enters in degraded mode. Content storage and playback remains available on the ICMP.

CAUTION: The loss of one disk causes no serious consequences on the ICMP. But action must be taken quickly because the loss of a second disk will make the RAID system broken. The main cause of the total loss of RAID is due in most cases to the loss of the second disk while the first has not been rebuilt!

A failed drive should be replaced as soon as possible.

About “RAID recovery” process

The restoration from degraded to normal condition of the RAID 5 system is done automatically. When the RAID controller detects a new HDD to replace the failed disk the recovery procedure starts automatically.

CAUTION: The automatic process does not work if more than one disk is lost. In that case the RAID must be completely initialized again!

About RAID broken

When more than one HDD is out of order, the RAID is considered as 'broken' and the content is lost. The failed HDDs must be changed and a new RAID must be created.

Exchange or re-use of a disk set

It's possible to have several sets of disks with one ICMP or to reuse a complete set of disks coming from another projector with ICMP. It is sufficient to insert the three HDDs, from a valid RAID array, and let the system explore the new RAID. The mounting order of the HDDs and the HDD slots do not matter. Of course, when using HDDs from another ICMP it is necessary to retrieve from the content distributor the KDMs corresponding to the content and the new ICMP.

HDD storage capacity

Make sure that all HDDs in the ICMP HDD set have the same storage capacity. See label on top of the HDD to know the storage capacity.

HDD storage

The maximum recommended storage period for the drive in a non-operational environment is 90 days. Drives should be stored in the original unopened shipping packaging whenever possible. Once the drive is removed from the original packaging the recommended maximum period between drive operation cycles is 30 days. During any storage period the drive non-operational temperature, humidity, wet bulb, atmospheric conditions, shock, vibration, magnetic and electrical field specifications should be followed.

8.3 ICMP communication ports

Location of the communication ports

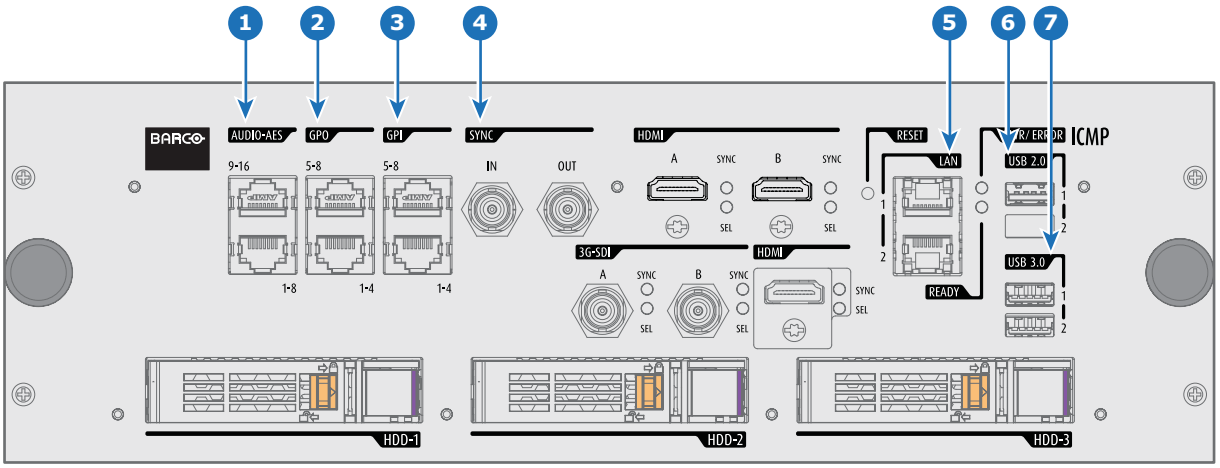


Image 8-7
ICMP (with HDMI 2.0).

Functionality

1 AUDIO-AES 1-8 (9-16)

ICMP outputs sixteen audio signals equitably distributed over these two RJ45 connectors, which can be configured independently. The mapping of audio channels (content) on each audio output (AES outputs of the ICMP) is performed by configuring the ICMP via the Communicator software. Please refer to the Communicator user guide for further information.

2 GPO 1-4 (5-8)

These RJ45 connectors can be used to send trigger signals to other devices. The mapping of user Cues (output Cues) on each General Purpose Output (GPO) is configured via the Communicator software. Please refer to the Communicator user guide for further information.

3 **GPI 1-4 (5-8)**

These RJ45 connectors can be used to receive trigger signals from other devices. The mapping of the General Purpose Input (GPI) on each input Cues is configured via the Communicator software. Please refer to the Communicator user guide for further information.

4 **SYNC IN / OUT**

Synchronization signal IN and OUT: Reserved for multiple-projector projection. Use a 50 Ohm coaxial cable to connect the sync signal from projector to projector.

5 **LAN 1 (2)**

The ICMP can be connected to a LAN (local area network) using one of the Ethernet ports. These LAN port are used for 'content' transfer.

NOTE: These ports are optionally used to connect to external content storage sources. Control of the ICMP is done via the same IP address as the projector.

6 **USB 2.0**

The ICMP can be connected to a USB 2.0 Media to load content. The USB port can be used to load content (DCP) or keys (KDM).

NOTE: It is recommended to use the USB 3.0 ports for faster ingest.

7 **USB 3.0**

The ICMP can be connected to a USB 3.0 Media to load content. The USB port can be used to load content (DCP), or keys (KDM), or software update.

NOTE: These ports are recommended for fast ingest when connected to an appropriate USB 3.0 source.

USB

Universal Serial Bus (USB) is an industry standard developed in the mid-1990s that defines the cables, connectors and communications protocols used in a bus for connection, communication, and power supply between computers and electronic devices. **USB 2.0** (also called "Hi-Speed"), adding higher maximum signaling rate of 480 Mbit/s (effective throughput up to 35 MB/s or 280 Mbit/s), in addition to the "USB 1.x Full Speed" signaling rate of 12 Mbit/s.[16] USB 2.0 connectors are usually colored black. **USB 3.0** defines a new SuperSpeed mode with a signaling speed of 5 Gbit/s and a usable data rate of up to 4 Gbit/s (500 MB/s). A USB 3.0 port is usually colored blue, and is backwards compatible with USB 2.0.

8.4 ICMP source input ports

Location of the source input ports

The last produced model is equipped with two HDMI 2.0 (Reference 8 image 8-8) as video source.

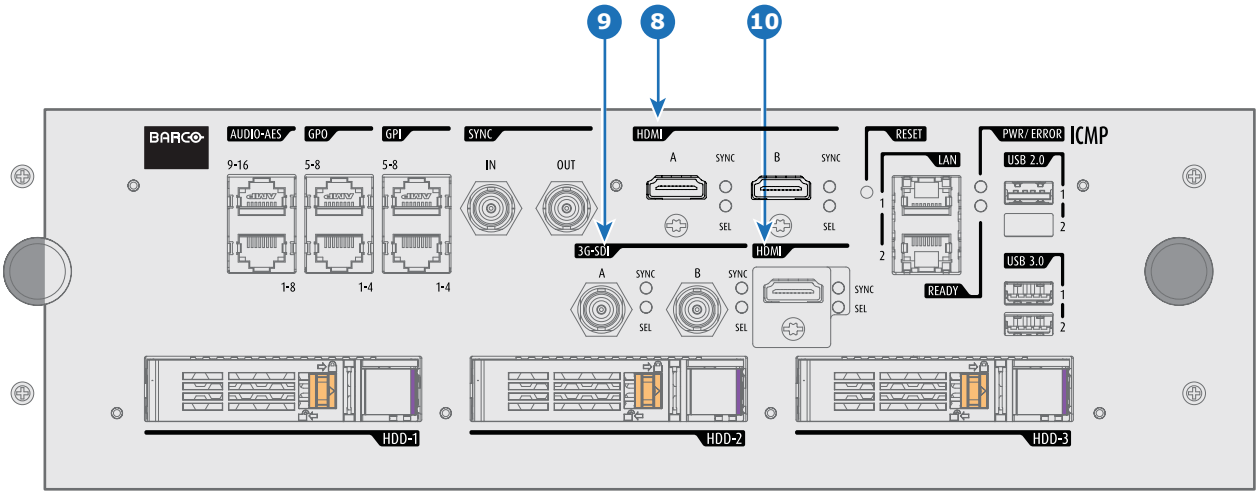


Image 8-8
ICMP (with HDMI 2.0).

Some models with DisplayPorts (Reference 11 image 8-9) are still present on the field.

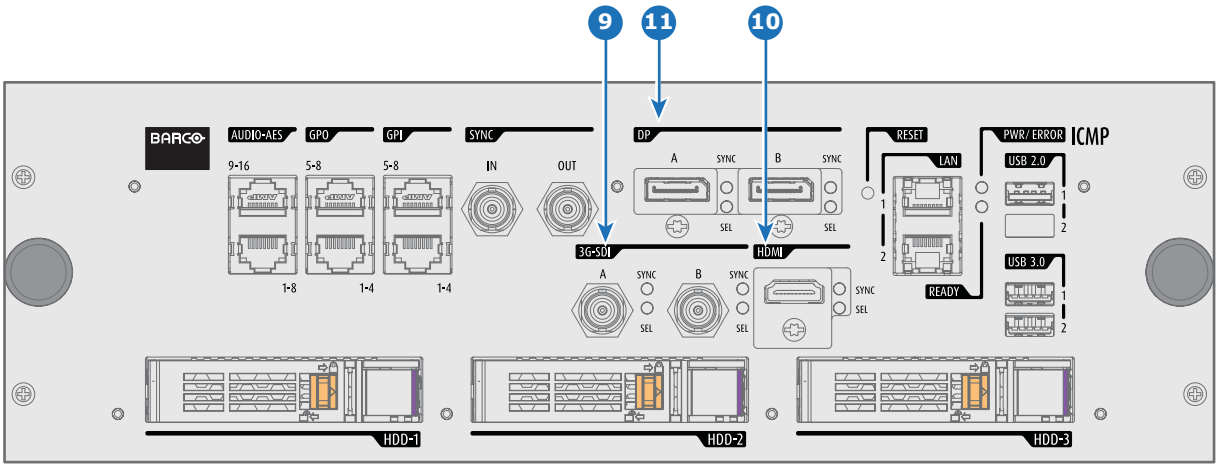


Image 8-9
ICMP (with DisplayPort).

Functionality

8 **HDMI A (B)**

HDMI 2.0 connector to connect a video source.

NOTE: It is recommended to use the HDMI 2.0 ports for faster transfer of video and audio data.

9 **3G-SDI A (B)**

SDI connector to connect a video source.

10 **HDMI**

HDMI 1.4 connector to connect a video source.

11 **DisplayPort A (B)**

DisplayPort connector to connect a video source.

8.5 ICMP source input ports

Location of the source input ports

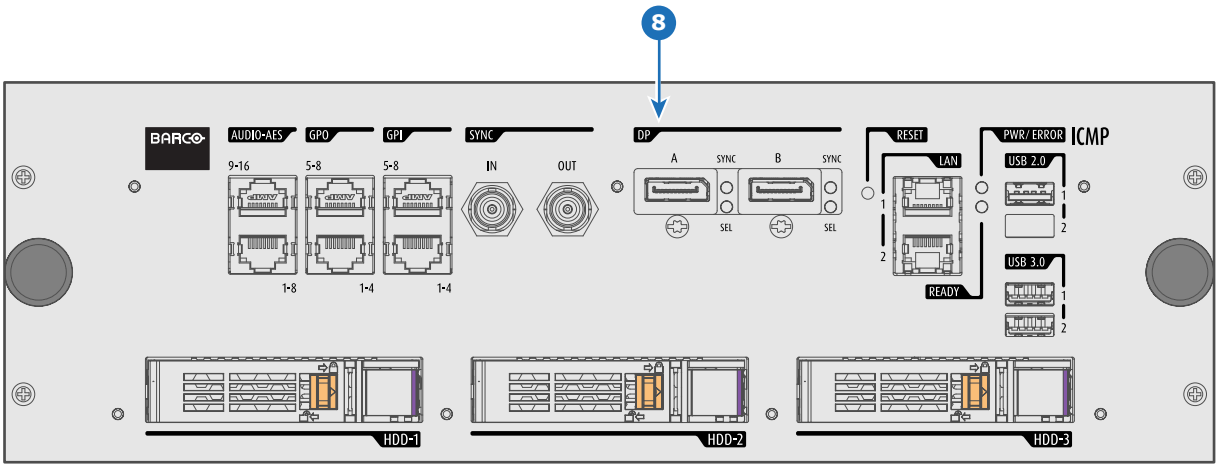


Image 8-10

Functionality

8 **DisplayPort A (B)**

DisplayPort connector to connect a video source.

8.6 ICMP DisplayPort specifications

DisplayPort

Digital display interface developed by the Video Electronics Standards Association (VESA). This royalty-free interface is primarily used to connect a video source to a display device such as a computer monitor, though it can also be used to transmit audio, USB, and other forms of data. VESA designed it to replace VGA, DVI, and FPD-Link. Backward compatibility to VGA and DVI by using active adapter dongles enables users to use DisplayPort fitted video sources without replacing existing display devices.

HDCP

High-bandwidth Digital Content Protection is a form of digital copy protection developed by Intel Corporation to prevent copying of digital audio and video content as it travels across DisplayPort, Digital Visual Interface (DVI), High-Definition Multimedia Interface (HDMI), Gigabit Video Interface (GVIF), or Unified Display Interface (UDI) connections, even if such copying would be permitted by fair use laws. The specification is proprietary, and implementing HDCP requires a license.

DisplayPort specifications

Supported Modes:

- DP1.1a, 4-lanes RBR/HBR
- Audio : yes
- Content Protection : HDCP1.4
- Color Depth : 8 bit/component and 10 bit/component.
- 3D-stereo mode : frame sequential (embedded stereosync on DP required from the source)

DisplayPort A and DisplayPort B accept the following video-timings:

2D Formats / Single DP	Color depth	Port	Display Mode
640 x 480 @ 60 fps	8 bpc, 10 bpc	Single	2D
800 x 600 @ 60 fps	8 bpc, 10 bpc	Single	2D
1600 x 1200 @ 60 fps	8 bpc, 10 bpc	Single	2D
1280 x 800 @ 60 fps	8 bpc, 10 bpc	Single	2D
1280 x 720 @ 60 fps	8 bpc, 10 bpc	Single	2D
1680 x 1050 @ 60 fps	8 bpc, 10 bpc	Single	2D
1920 x 1080 @ 60 fps	8 bpc, 10 bpc	Single	2D
1920 x 1200 @ 60 fps	8 bpc, 10 bpc	Single	2D
2048 x 1080 @ 48, 60 fps	8 bpc, 10 bpc	Single	2D
2048 x 1536 @ 60 fps	8 bpc, 10 bpc	Single	2D
2048 x 2160 @ 30, 48, 50, 60 fps	8 bpc, 10 bpc	Single	2D
3840 x 2160 @ 24 fps	8 bpc, 10 bpc	Single	2D

3D Formats / Single DP	Color depth	Port	Display Mode
1920 x 1080 @ 60 fps	8 bpc, 10 bpc	Single	3D
2048 x 1080 @ 60 fps	8 bpc, 10 bpc	Single	3D

4K Horizontal SPAN 2D - Full	Color depth	Port	Display Mode
2048 x 2160 @ 30, 48, 50, 60 fps	8 bpc, 10 bpc	A+B span	2D

4K Horizontal SPAN 2D - Flat	Color depth	Port	Display Mode
1920 x 2160 @ 30, 48, 50, 60 fps	8 bpc, 10 bpc	A+B span	2D

4K Horizontal SPAN 3D	Color depth	Port	Display Mode
2048 x 2160 @ 60 fps	8 bpc, 10 bpc	A+B span	3D

Audio formats

- 2 channels / LPCM / 16 bits / 32 kHz, 44.1 kHz, 48 kHz, 88.2 kHz, 96 kHz
- 5.1 format / LPCM / 24 bits / 48 kHz
- 7.1 format / LPCM / 20 bits / 48 kHz

Notes:

- DisplayMode = Single : is applicable to both DisplayPort A, and DisplayPort B input, separately.
- DisplayMode = A+B : inputs DisplayPort A and DisplayPort B are combined to 1 larger image; in this case the 2 DisplayPort links need to be genlocked (= synchronous and in phase).
- In all cases :
  - Color Space - Color Sampling:
    - YCbCr - 4:4:4
    - YCbCr - 4:2:2
    - RGB - 4:4:4
  - Scan Type = progressive.
- Both Nvidia and AMD GPU's will not support color depths of 10 bits/color while in 3D-stereo mode.
- Some Graphical Cards may not permit 10 bits/color at all video timings, because of bandwidth restrictions.
- DisplayPort A and DisplayPort B automatically detect:
  - Active Pixels, and Active Lines
  - Vertical Refresh
  - 8 bits/color - 10 bits/color
  - Frame locked
- All input resolutions are scaled towards the desired resolution specified in the screen presentation file.
- Fractional frame rates = (Hz*1000)/1001

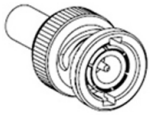
8.7 ICMP SDI specifications

3G-SDI

Serial Digital Interface (SDI) is a serial link standardized by ITU-R BT.656 and the Society of Motion Picture and Television Engineers (SMPTE). SDI transmits uncompressed digital video over 75-ohm coaxial cable within studios, and is seen on most professional video infrastructure equipment. The first revision of the standard, SMPTE 259M, was defined to carry digital representation of analog video such as NTSC and PAL over a serial interface and is more popularly known as standard-definition (SD) SDI. The data rate required to transmit SD SDI is 270 Mbps. With the advent of high-definition (HD) video standards such as 1080i and 720p, the interface was scaled to handle higher data rates of 1.485 Gbps. The 1.485-Gbps serial interface is commonly called the HD SDI interface and is defined by SMPTE 292M, using the same 75-ohm coaxial cable. Studios and other video production facilities have invested heavily on the hardware infrastructure for coaxial cable and have a vested interest in extending the life of their infrastructure. Fortunately, SMPTE recently ratified a new standard called SMPTE 424M that doubles the SDI data rates to 2.97 Gbps using the same 75-ohm coaxial cable. This new standard, also called 3-Gbps (3G)-SDI, enables higher resolution of picture quality required for 1080p and digital cinema.

SDI terminology

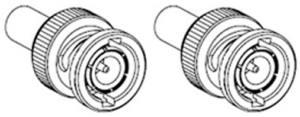
Standard HD-SDI signal

Single Link		
	1.5Gb/s	HD 4:2:2

Standard HD-SDI allows for a single 4:2:2 image to be carried on one cable at 1.485 Gb/s. The image uses the Y Cb Cr colorspace and uses a bit depth of 10 bit per color component.

Due to the data rate limitations only 23.976, 24, 25, 29.970 and 30 fps streams are achievable.

Dual-Link HD-SDI signal

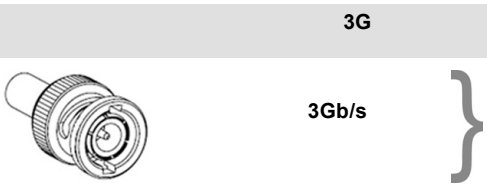


Dual-Link HD-SDI is mainly two standard HD-SDI signals carrying a single image stream split between the two cables. The main advantage is that color subsampling is no longer required, and the image can be transmitted in 4:4:4 quality, which then also allows the RGB (or XYZ) color space to be used.

The main link will contain a standard HD-SDI signal, the second (enhancement) link contains the missing Cb and Cr samples.

Depending on the implementation the enhancement link could also contain extra information to increase the bit depth.

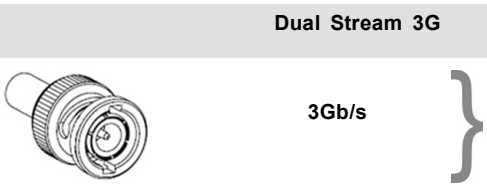
3G HD-SDI signal



3G HD-SDI uses a higher data rate (2.97 Gb/s). This allows a single cable interface to achieve the same capabilities of a Dual-Link HD-SDI implementation.

In direct mapping (level A) this is used to achieve higher frame rates. (50, 59.940 and 60 fps streams are supported).

Dual Stream 3G HD-SDI signal



Dual Stream 3G is a specific variant of the 3G signal which combines two completely separate 4:2:2 image streams into a single 3G signal. This can be used to transmit stereoscopic streams by keeping the left and right eye signals together.

SMPTE 292M STANDARD 1.485 Gb/s HD-SDI SIGNALS

Standard HD-SDI (SMPTE 292M) formats

SMPTE Standard	Source Resolution	Frame Rate	Display Rate	Scan Type
SMPTE 296M	1280 x 720	23.976	23.976	Progressive
		24	24	Y Cb Cr 4:2:2 10-Bit
		25	25	
		29.970	29.970	
		30	30	
		50	50	
		59.940	59.940	
		60	60	
SMPTE 274M	1920 x 1080	23.976	23.976	Progressive
SMPTE 428-8	2048 x 1080	24	24	Y Cb Cr 4:2:2 10-Bit
		25	25	
		29.97	29.97	
		30	30	

1. Not supported in Alchemy

SMPTE Standard	Source Resolution	Frame Rate	Display Rate	Scan Type
SMPTE 274M	1920 x 1080	23.976	23.976	Segmented frame
SMPTE 428-9	2048 x 1080	24	24	Y Cb Cr 4:2:2 10-Bit
(SMPTE RP211)		25	25	
		29.97	29.97	
		30	30	
SMPTE 274M	1920 x 1080	25	50	Interlaced
		29.970	59.940	Y Cb Cr 4:2:2 10-Bit
		30	60	

Dual-Link HD-SDI (SMPTE 372M) formats

SMPTE Standard	Source Resolution	Frame Rate	Display Rate	Scan Type
SMPTE 274M	1920 x 1080	23.976	23.976	Progressive
SMPTE 428-8	2048 x 1080	24	24	Y Cb Cr 4:2:2 12-Bit only
		25	25	Y Cb Cr 4:4:4 10 or 12-Bit
		29.970	29.970	RGB (XYZ) 4:4:4 10 or 12-Bit
		30	30	
SMPTE 274M	1920 x 1080	23.976	23.976	Segmented frame
SMPTE 428-9	2048 x 1080	24	24	Y Cb Cr 4:2:2 12-Bit only
(SMPTE RP211)		25	25	Y Cb Cr 4:4:4 10 or 12-Bit
		29.970	29.970	RGB (XYZ) 4:4:4 10 or 12-Bit
		30	30	
SMPTE 274M	1920 x 1080	25	50	Interlaced
		29.970	59.940	Y Cb Cr 4:2:2 12-Bit only
		30	60	Y Cb Cr 4:4:4 10 or 12-Bit
				RGB (XYZ) 4:4:4 10 or 12-Bit

Standard HD-SDI (2 × SMPTE 292M) formats[2]

SMPTE Standard	Source Resolution	Frame Rate	Display Rate	Scan Type
SMPTE 292M	1920 x 1080	23.976	47.952	Progressive
SMPTE 428-8	2048 x 1080	24	48	Y Cb Cr 4:2:2 10-Bit
		25	50	
		29.97	59.940	
		30	60	
SMPTE 292M	1920 x 1080	23.976	47.952	Segmented frame
SMPTE 428-9	2048 x 1080	24	48	Y Cb Cr 4:2:2 10-Bit
(SMPTE RP211)		25	50	
		29.97	59.940	
		30	60	

The standard HD-SDI interfaces support the Y Cb Cr colorspace (both legal and full range) using 4:2:2 color subsampling.

The Dual-Link HD-SDI interface can be used to carry a single 4:4:4 image, having a color depth of 10 or 12 bit per component. Both RGB (XYZ) and Y Cb Cr color spaces are supported.

2. mainly used to carry stereoscopic images.

SMPTE 424M 3G HD-SDI 2.970 Gb/s SIGNALS

3G HD-SDI (SMPTE 425) formats

SMPTE Standard	Source Resolution	Frame Rate	Display Rate	Scan Type
SMPTE 296M	1280 x 720	23.976 24 25 29.970 30 50 59.940 60	23.976 24 25 29.970 30 50 59.940 60	Progressive Y Cb Cr 4:4:4 10-Bit RGB (XYZ) 4:4:4 10-Bit
SMPTE 274M[3]	1920 x 1080	50 59.940 60	50 59.940 60	Progressive Y Cb Cr 4:2:2 10-Bit
SMPTE 274M	1920 x 1080	23.976 24 25 29.97 30	23.976 24 25 29.97 30	Progressive Y Cb Cr 4:2:2 12-Bit only Y Cb Cr 4:4:4 10 or 12-Bit RGB (XYZ) 4:4:4 10 or 12-Bit
SMPTE 274M	1920 x 1080	50 59.940 60	50 59.940 60	Interlaced Y Cb Cr 4:2:2 12-Bit only Y Cb Cr 4:4:4 10 or 12-Bit RGB (XYZ) 4:4:4 10 or 12-Bit
SMPTE 428-9	2048 x 1080	23.976 24	23.976 24	Progressive Y Cb Cr 4:4:4 12-Bit RGB (XYZ) 4:4:4 12-Bit

Dual Stream 3G HD-SDI (SMPTE 425) formats

SMPTE Standard	Source Resolution	Frame Rate	Display Rate	Scan Type
SMPTE 292M SMPTE 428-9	1920 x 1080 2048 x 1080	23.976 24 25 29.970 30	47.952 48 50 59.940 60	Progressive Y Cb Cr 4:2:2 10-Bit

8.8 ICMP HDMI 1.4 specifications

HDMI

HDMI (High-Definition Multimedia Interface) is a compact audio/video interface for transferring uncompressed video data and compressed/uncompressed digital audio data from a HDMI-compliant device ("the source device") to a compatible computer monitor, video projector, digital television, or digital audio device. HDMI is a digital replacement for existing analog video standards.

HDMI 1.4 specifications

HDMI1.4a, including HDCP1.4

3. only supported in 3G level A mapping, others formats are supported in both level A and level B mapping.

2K Video-timings:

- 640 x 480p @ 60 fps
- 720 x 480p @ 60 fps
- 720 x 576 @ 50 fps
- 800 x 600p @ 60 fps
- 1024 x 768p @ 60 fps
- 1280 x 720p @ 50, 60 fps
- 1280 x 960p @ 60 fps
- 1280 x 1024p @ 60 fps
- 1400 x 1050p @ 60 fps
- 1920 x 1080 @ 24, 25, 30, 50, 60 fps
- 1920 x 1080i @ 50, 60 fields/second

4K Video timings (ICMP 1.2.0)

- 3840 x 2160 @ 24, 25, 30 fps
- 4096 x 2160 @ 24, 25, 30 fps

3D Video timings (ICMP 1.2.2)

- Frame packing:
  - 1920 x 1080p @ 23.98 / 24 fps
  - 1280 x 720p @ 50 fps
  - 1280 x 720p @ 59.94 / 60 fps
- Top/Bottom:
  - 1920 x 1080p @ 23.98 / 24 fps
  - 1280 x 720p @ 50 fps
  - 1280 x 720p @ 59.94 / 60 fps
- Side by side (SbS)
  - Side by side : Half (same formats as for Top/Bottom encoding)

Color Space - Color Sampling:

- YCbCr - 4:4:4
- YCbCr - 4:2:2
- RGB - 4:4:4
- Color depth: supports 24, 30 and 36 bpp (8, 10 and 12 bpc).
  - Exception: in case of HDMI UHD / full 4K only 24 bpp (8 bpc) is supported.

Audio formats:

- 2 channels / LPCM / 16 bits / 32 kHz, 44.1 kHz, 48 kHz, 88.2 kHz, 96 kHz
- 5.1 format / LPCM / 24 bits / 48 kHz
- 7.1 format / LPCM / 20 bits / 48 kHz

Notes:

- Includes refresh rate = (Hz*1000)/1001
- All input resolutions are scaled towards the desired resolution specified in the screen presentation file.

8.9 ICMP status LEDs

ICMP status LEDs and Reset button

LEDs on ICMP front panel give information on the status of the device.

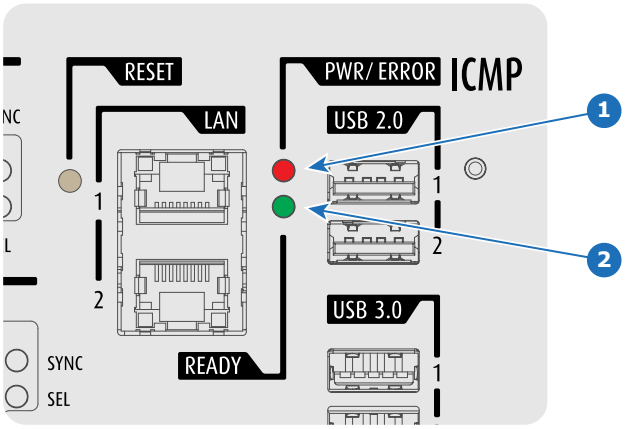


Image 8-11

Status overview PWR/ERROR and READY LEDs:

1 PWR/ERROR	2 READY	ICMP Status
Off	Off	Turned off
Red	Off	Board reset or FIPS error
Blinking Green	Off	Boot loader
Blinking Green	Blinking Orange	Operating System start up
Blinking Green	Orange	Security Manager - Image Integrity tests
Blinking Green	Blinking Yellow	Security Manager - Self Test
Blinking Green	Yellow	Security Manager - FPGA self-test
Green	Blinking Green	Starting Applications
Green	Green	Applications started in normal mode
Green	Orange	Applications started in degraded mode
Blinking Red	Off	FIPS error
Green	Blinking Orange	Update ongoing
Orange	Orange	Update done

8.10 ICMP HDD status LEDs

ICMP HDD status LEDs

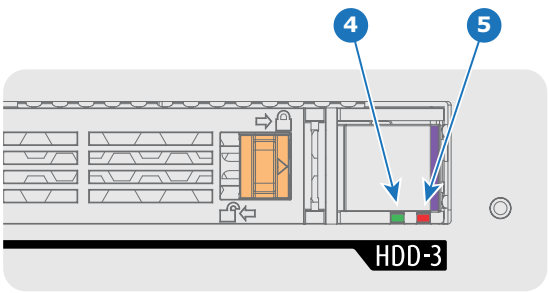


Image 8-12

Status overview PWR/ERROR and READY LEDs:

4 HDD I/O	5 RAID	ICMP HDD Status
Off	Off	HDD idle / Disk in RAID OK.
Blinking Green	Off	HDD I/O activity / Disk in RAID OK.
Blinking Green	Blinking Red	HDD I/O activity / RAID rebuilding.
Off	Red	HDD idle / Disk error. See troubleshooting table below for curative actions.

Troubleshooting

Situation	Solution
One disk failed (red LED) + **RAID degraded**. The ongoing event is not interrupted. **Note:** The disk status (RAID degraded) can be retrieved via the (Web) Commander. See user guide of the (Web) Commander.	1. Switch off the power. 2. Replace the defect HDD with an original HDD spare part. See procedure "Removing a HDD from the ICMP", page 83, and "Installing a HDD into the ICMP", page 84. Ensure to insert the HDD firmly. 3. Switch on the power. **Result:** As soon the new HDD is detected by the ICMP the rebuild of the RAID is started (Blinking red LED).
One disk failed (red LED) + Error 10580 "**local storage not available**". **Note:** The disk status (Error code) can be retrieved via the (Web) Commander. See user guide of the (Web) Commander.	1. Switch off the power. 2. Replace the defect HDD with an original HDD spare part. See procedure "Removing a HDD from the ICMP", page 83, and "Installing a HDD into the ICMP", page 84. Ensure to insert the HDD firmly. 3. Switch on the power. **Result:** As soon the new HDD is detected by the ICMP the rebuild of the RAID is started (Blinking red LED).
Multiple disks failed (multiple red LEDs) + **RAID broken**. **Note:** The disk status (RAID broken) can be retrieved via the (Web) Commander. See user guide of the (Web) Commander.	1. Switch off the power. 2. Replace all defect HDDs with original HDD spare parts. See procedure "Removing a HDD from the ICMP", page 83, and "Installing a HDD into the ICMP", page 84. Ensure to insert the HDDs firmly. 3. Switch on the power. 4. Start "RAID Initialize". See user guide of the Communicator. **Result:** a new empty RAID is created.
All HDD LEDs remain off + Error 10580 "**local storage not available**". **Note:** The disk status (Error code) can be retrieved via the (Web) Commander. See user guide of the (Web) Commander.	1. Switch off the power. 2. Reseat all HDDs. See procedure "Removing a HDD from the ICMP", page 83, and "Installing a HDD into the ICMP", page 84. Ensure to insert the HDDs firmly. 3. If problem remains try "RAID Initialize". See user guide of the Communicator. Note that all content will be lost! 4. If problem remains contact Service for further instructions.

In case the ICMP has to be returned to factory (e.g. for repair) the non defective HDDs should be removed and kept.

8.11 ICMP device certificate

Purpose of the Barco ICMP device certificate

The device certificate (*.pem) of the Barco ICMP is a digital certificate signed by Barco which is required when ordering the KDM to play a DCP that is ingested on the ICMP. The device certificate is stored inside the ICMP and on a web server.

The (WEB) Commander or Communicator can be used to retrieve the device certificate directly from the ICMP. To retrieve the device certificate from the website the QR (Quick Response) code can be used. See procedure "Obtaining the Barco ICMP certificate", page 82.

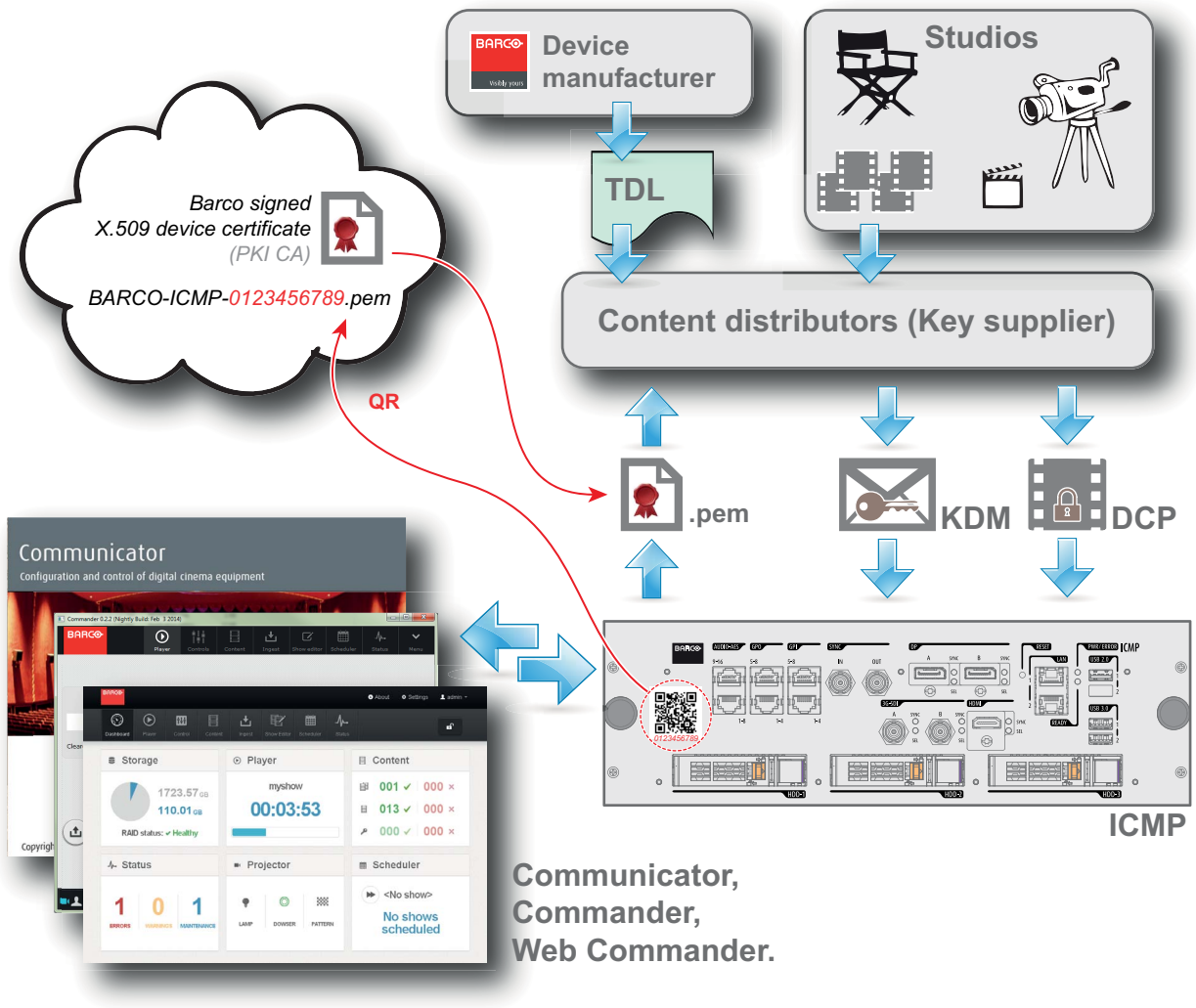


Image 8-13

Trusted Device List (TDL)

The Goal of the TDL is to maintain timely and accurate information on participating auditoriums so that participating subscribers can obtain information needed to issue KDMs. The TDL has several data sources: Device manufacturers, Exhibitors, Deployment Entities, Integrators, Service Providers (interacting with Exhibitors), regional authorities and Support.

Public Key Infrastructure (PKI)

PKI is a framework for creating a secure method for exchanging information based on public key cryptography. The foundation of a PKI is the certificate authority (**CA**), which issues digital certificates that authenticate the identity of organizations and individuals over a public system such as the Internet. The certificates are also used to sign messages, which ensures that messages have not been tampered with.

***.pem**

Privacy-enhanced Electronic Mail. File format used to distribute digital signed certificates. Base64 encoded DER certificate, enclosed between "-----BEGIN CERTIFICATE-----" and "-----END CERTIFICATE-----"

Key Delivery Message (KDM)

The security key for each movie is delivered in a unique KDM for each digital cinema server. The security key is encrypted within the KDM, which means that the delivery of a KDM to the wrong server or wrong location will not work, and thus such errors cannot compromise the security of the movie. The KDM is a small file, and is typically emailed to the exhibitor. To create the correct set of KDMs for a site requires knowledge of the digital certificate in the projection system´s media block.

Digital Cinema Package (DCP)

A Digital Cinema Package (DCP) is a collection of digital files used to store and convey Digital Cinema (DC) audio, image, and data streams. The term has been defined by Digital Cinema Initiatives (DCI). General practice adopts a file structure that is organized into a number of usually multi-gigabyte size Material eXchange Format (MXF) files, which are separately used to store audio and video streams, and auxiliary index files in XML format. The MXF files contain streams that are compressed, encoded, and encrypted, in order to reduce the huge amount of required storage and to protect from unauthorized use. The image part is JPEG 2000 compressed, whereas the audio part is linear PCM. The adopted (optional) encryption standard is AES 128 bit in CBC mode. The newer SMPTE standards are used to conform the recommendations among different tool vendors and producers. Interop, the legacy DCP standard, is still required to be supported by DCP players.

Digital Cinema Initiatives (DCI)

DCI is a joint venture of Disney, Fox, Paramount, Sony Pictures Entertainment, Universal and Warner Bros. Studios. DCI's primary purpose is to establish and document voluntary specifications for an open architecture for digital cinema that ensures a uniform and high level of technical performance, reliability and quality control. Note that the DCI specification is not a standard. Standards for digital cinema are the domain of the Society of Motion Picture and Television Engineers (SMPTE). "DCI compliant" is a term used to describe products that conform to the DCI specification. Products that have been tested per the DCI Compliance Test Plan (CTP) are posted at the DCI compliance web site. Notably, DCI compliance does not require compliance to the full set of SMPTE DCP standards. A copy of the most recent DCI specification can be downloaded from the DCI website (http://dcimovies.com).

8.12 ICMP device certificate for China

About the ICMP device certificate

The device certificate (*.pem) of the Barco ICMP is a digital certificate signed by Barco which is required when ordering the KDM to play a DCP that is ingested on the ICMP.

Please contact your film lab for certificate retrieval.

8.13 ICMP configuration via Communicator

About ICMP configuration

Following parameters are available to configure the ICMP:

- Global settings: allows defining name of the ICMP, host name (network identifier) and IP address which can be used for communication with external content devices.
- User settings: definition of all users allowed on the ICMP.
- Server settings: definition of access to servers and storage libraries of content (movies, KDM, etc.).
- Player settings: Audio delay and audio output frequency.
- Audio channel: allows defining the mapping of audio channels (content) on each audio output (AES outputs of the ICMP).
- Scheduler setting: Enable/Disable scheduler at startup, delays allowed in scheduler mode and length of schedule history.
- Devices: allows defining communication ports settings, to access external devices controlled by the automation.
- Automation Cues: event cues that are triggered from different sources and to which can be assigned actions to be executed by the automation engine.
- Verify internal clock of the ICMP.

All installation and maintenance operations on the ICMP are performed via Communicator, the Barco configuration software. Please refer to the Communicator user guide for further information.

About Default settings

The restore of factory setting is a feature that allows removing all settings performed on the ICMP and replaces them with the default values set at the factory. Please refer to the Communicator user guide for further information.

About the ICMP internal clock

The crystal on the ICMP board that manages the clock shows a certain drift (all crystals do). With the Communicator the internal clock can be adjusted. This maintenance action should be repeated every 3 months. When neglected the system will locks up.

From ICMP software version 1.2.1 onwards it is possible to enable NTP (Network Time Protocol). You have to configure (at installation) an IP address where the ICMP can find a sync signal. From then on, and as long as the connection is active, the ICMP will automatically keep its clock correct. For detailed instructions see user guide of the Communicator.

8.14 ICMP reset

This procedure requires that ICMP version 1.2.4 or later is installed.

ICMP reset possibilities

- The Star button on the local keypad (Not for C- and B-series)
- The ICMP reset button in the GUI of the Communicator.
- The ICMP reset button in the GUI of the Commander.
- The ICMP reset button in the GUI of the Web Commander.
- The ICMP hardware reset button located on the front panel of the ICMP (Not recommended, use only when all other reset possibilities are exhausted!)

How to reset the ICMP?

1. Click on the ICMP **reset button** in the GUI of the **Web Commander**
   Or,
   Click on the ICMP **reset button** in the GUI of the **Commander**
   Note: *It can be that the Commander or WEB-Commander is not able to send the reset command.*

   Or,
   click on the ICMP **reset button** in the GUI of the **Communicator** (recommended)
   Or,
   press the **Star button** on the **local keypad** for a few seconds (Not for C- and B-series)

   As a result the projector is safely prepared for the ICMP reboot. All ongoing events on the ICMP (e.g. ingest) are requested to end. After a few seconds the ICMP is requested to restart. The READY LED on the front panel of the ICMP starts to blink orange.

   In case the ICMP is installed in DP4K-L series projector the lasers are switched off and the projector remains in the same mode (e.g. Conditioned). The Star button on the local keypad starts blinking green. After the reset of the ICMP the lasers are switched on again.

   Once the READY LED lit continuous green the ICMP is up and running.

2. Did the reset of the ICMP fail?
   If yes, perform a hardware reset as follows:
   a) switch off the lasers of the projector or switch of the projector lamp.
   b) press the ICMP **hardware reset button** a few seconds (reference 3 image 8-14) .

   Warning: *Resetting the ICMP with the hardware reset button may cause damage to the content on the HDDs. A re-configuration of the whole system may be required!*

   As a result the projector is safely prepared for the ICMP reboot. All ongoing events on the ICMP (e.g. ingest) are stopped immediately and the ICMP restarts.

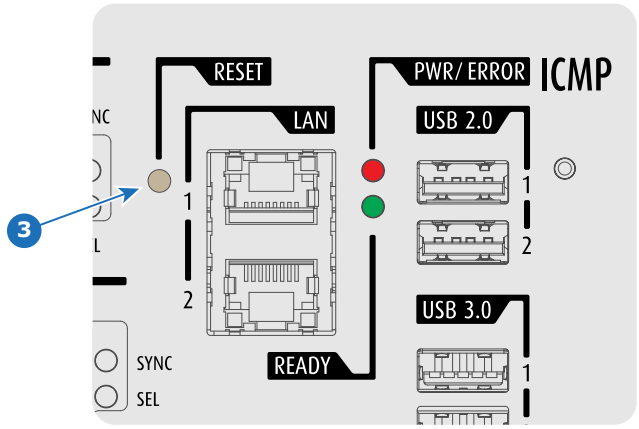


Image 8-14

WARNING: Resetting the ICMP with the hardware reset button may cause damage to the content on the HDDs. A re-configuration of the whole system may be required!

8.15 Obtaining the Barco ICMP certificate

Necessary tools

Smartphone (with auto-focus) or control software (e.g. Communicator, Commander or WEB Commander)

Using the CertID label to download the ICMP certificate

1. Scan the QR code (reference 1) on the front face of the ICMP with a smartphone. It's recommended to use a smartphone with auto-focus. The QR reader will automatically redirect to the ICMP certificate download page on the web server.
   Note: *Instead of downloading the ICMP certificate you can use the CertID number (reference 2), located below the QR code, in communication with your KDM supplier. Certified KDM suppliers can use this CertID number to retrieve the ICMP certificate directly.*

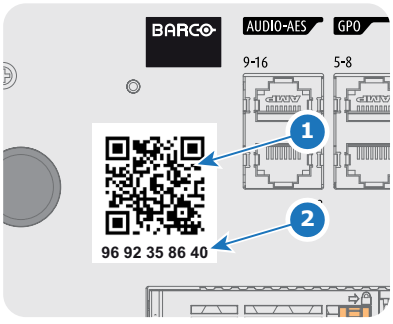


Image 8-15

Using control software to obtain the ICMP certificate

1. Use the **WEB Commander** to download the ICMP certificate from the ICMP main board. For detailed instructions see user guide of the WEB Commander.
   Or,
   use the **Commander** to download the ICMP certificate from the ICMP main board. For detailed instructions see user guide of the Commander.
   Or,
   use the **Communicator** to download the ICMP certificate from the ICMP main board. For detailed instructions see user guide of the Communicator.

8.16 Removing a HDD from the ICMP

In case the ICMP has to be returned to factory (e.g. for repair) the non defective HDDs should be removed and kept.

How to remove a HDD ?

1. Switch off the projector.
2. Moving the latch towards the left.

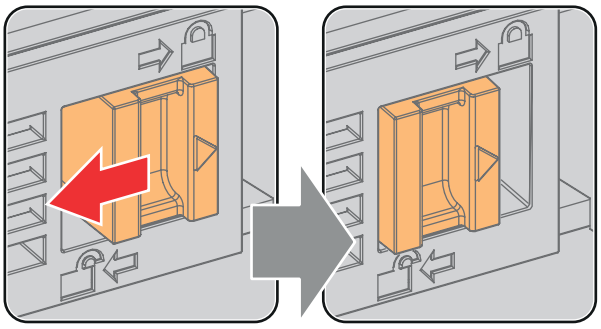


Image 8-16

3. Push the unlock button to open the handle.

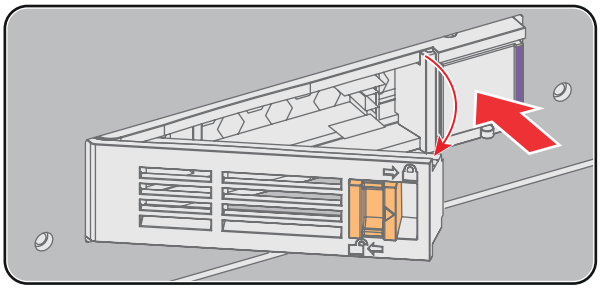


Image 8-17

4. Pull the HDD out of its slot.

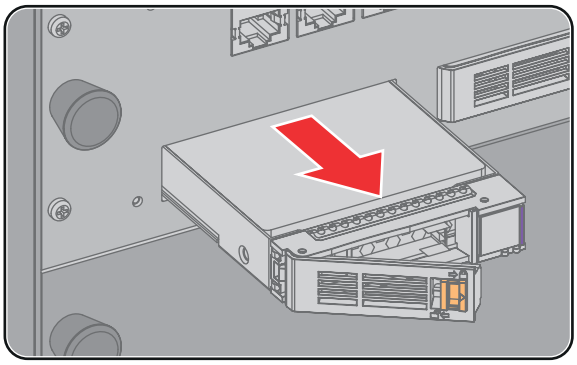


Image 8-18

To install the HDD see procedure "Installing a HDD into the ICMP", page 84.

8.17 Installing a HDD into the ICMP

This procedure assumes that the HDD slot of the ICMP is empty. If not, see procedure "Removing a HDD from the ICMP", page 83.

CAUTION: Always use a new empty spare part HDD from Barco to replace a malfunction HDD. Do not use a HDD from another ICMP HDD set.

CAUTION: Always make sure that all HDDs in the ICMP HDD set have the same storage capacity. See label on top of the HDD to know the storage capacity.

How to install a HDD ?

1. Ensure that the projector is switched off.
2. Prepare the HDD for insertion by moving the latch towards the left and push the unlock button to open the handle.

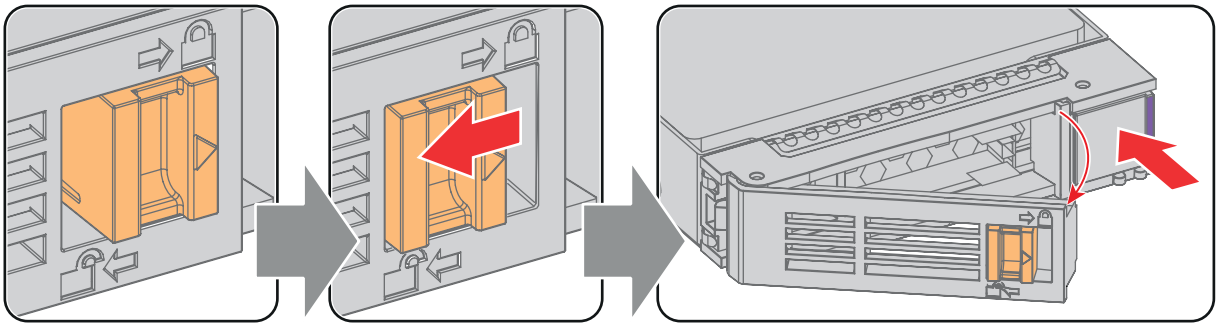


Image 8-19

3. Insert the HDD into the HDD slot. Ensure that the handle is sufficiently open so that the hook (reference 1) of the handle can pass the front plate of the ICMP.

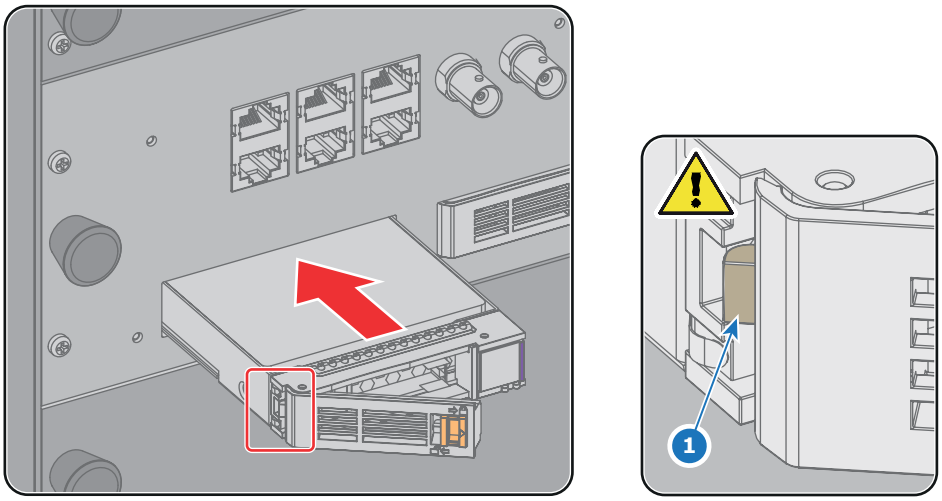


Image 8-20

4. Push the HDD completely and firmly inside its slot, close the handle, and move the latch towards the right.

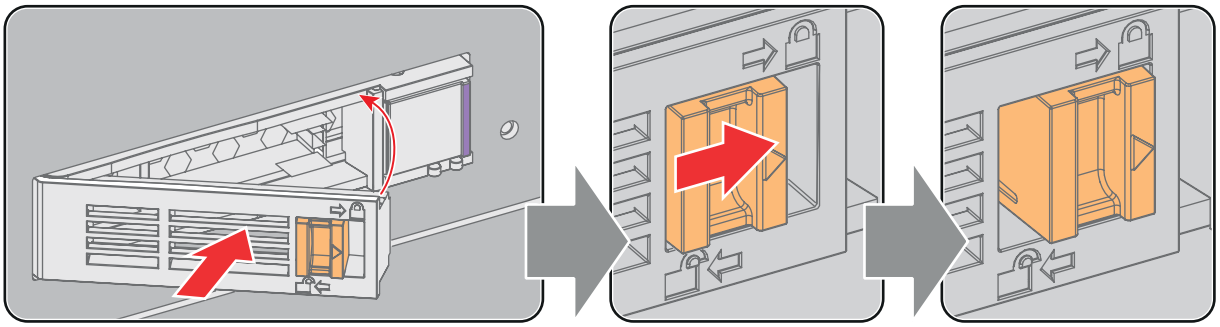


Image 8-21

5. Switch on the projector.

In case you replace one HDD (e.g. degraded mode) the ICMP automatically starts with the RAID recovery process. The red LED of the HDD which has to be rebuilt is blinking. This process takes about 200 GB per hour. Once the RAID is completed the red LED turns off.

CAUTION: It's strongly recommended to complete the RAID recovery process prior to starting a show. This to ensure that the content integrity is preserved and that the show is not interrupted.

9. COMMUNICATOR TOUCH PANEL

Overview

- Introduction
- Installing the touch panel interface
- Reposition the touch panel interface

9.1 Introduction

Communicator Touch Panel for digital cinema projectors

The Communicator Touch Panel is designed for multi-user command and control, the Communicator enables users to learn quickly and operate efficiently - using an elegant and flexible touch panel interface. The interface's commonality means that operators can intuitively use any model in the product line, without restriction, and its user-friendly nature translates directly into a short and enjoyable learning curve.

Image 9-1

Flexible touch panel interface

The touch panel interface can be mounted upon a swivel arm which easily fits on top of the DP2K CLP series projector. One central locking mechanism of the swivel arm allows an instant fixation of the touch panel interface in any position.

The touch panel interface can also be installed further away from the DP2K CLP series projector. For that you can use a serial (RS232) cable up to 10 meter or an Ethernet cable up to 50 meter to allow a direct data communication between the DP2K CLP series projector and the Communicator Touch Panel.

The touch panel interface can also be connected with a Local Area Network (LAN) just like the DP2K CLP series projector. In this case both devices can communicate with each other as well.

The touch panel interface requires a +12 VDC voltage, 1,5 ampere. The use of a separate +12 VDC adaptor (1,5 ampere minimum) is required.

Parts location of the touch panel interface

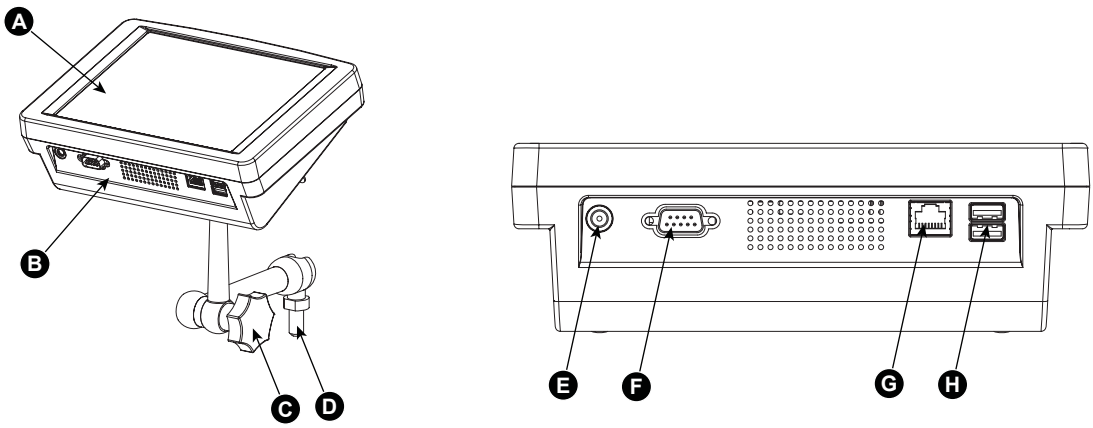


Image 9-2
Communicator touch panel

A Touch screen

B Communication panel

C Knob to operate central swivel clamp

D Base of swivel arm

E Power input 12 VDC, 1.5A

F RS232 port (sub-D)

G Ethernet port (RJ45)

CAUTION: For more information about the use of the Communicator Touch Panel, consult its user guide.

9.2 Installing the touch panel interface

Installation for projector with standalone cooler

1. Assemble the mounting plate and the swivel arm together as illustrated. First place the nut (N) upon the rod of the mounting plate, then add the lock washer (L), then fasten the mounting plate and the swivel arm together. When the arm is mounted, turn nut (N) against the arm to secure the position.

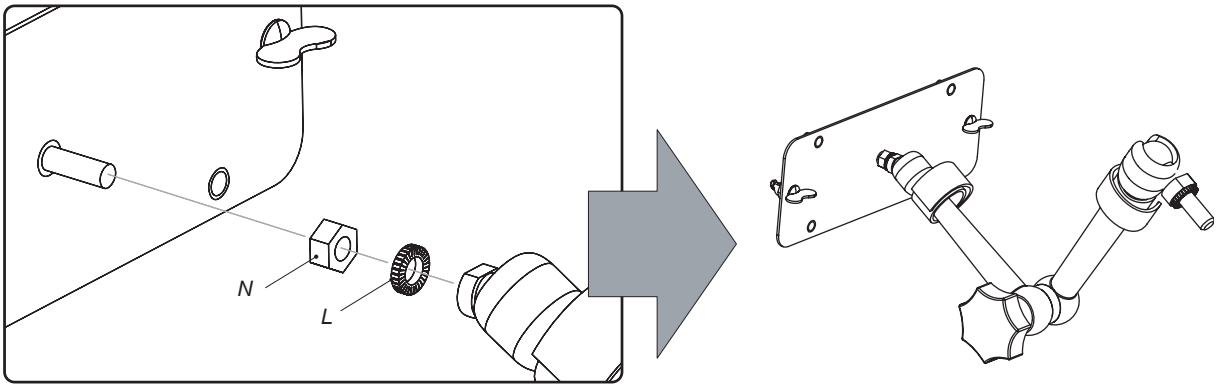


Image 9-3
Assemble swivel arm

2. Slide a washer (M) over the base of the swivel arm and Insert the base of the swivel arm into the mounting hole at the top of the DP2K CLP series projectoras illustrated.

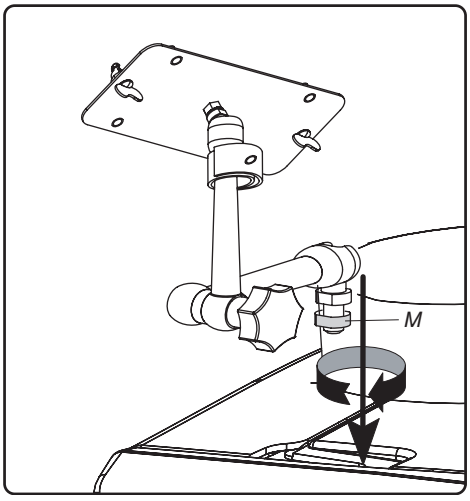


Image 9-4
Mount swivel arm

3. Place the touch panel interface upon the mounting plate of the swivel arm and fasten the two wing nuts (W) as illustrated.

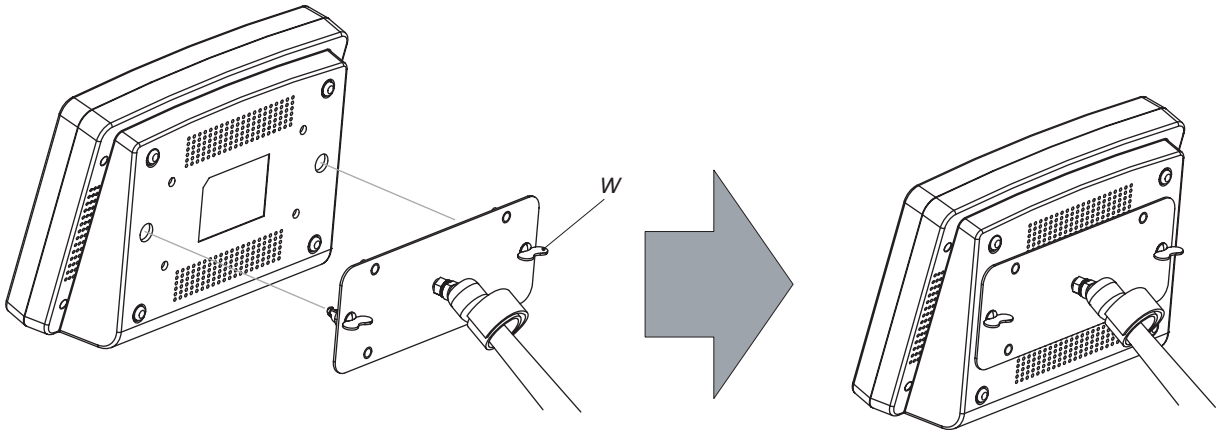


Image 9-5
Mount touch panel

4. Connect the circular plug of the multi cable with the circular socket at the rear side of the DP2K CLP series projector.

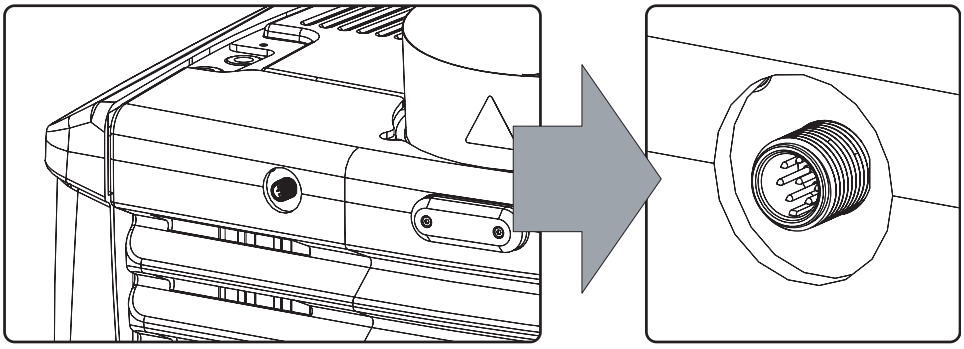


Image 9-6
Connections

5. Attach the multi cable to the swivel arm using the two Velcro strips.

6. Connect the DC plug, the RJ45 Ethernet plug and the D-SUB plug into their respective sockets on the touch panel interface.

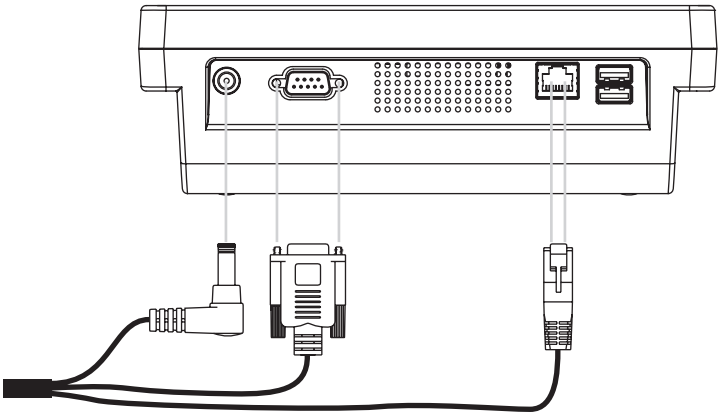


Image 9-7
Connections

Installation for a top cooler projector

The top cooler has a support for the swivel arm of the touch panel. Mount this swivel arm on that support in the same way as described in "*Installation for projector with standalone cooler*".

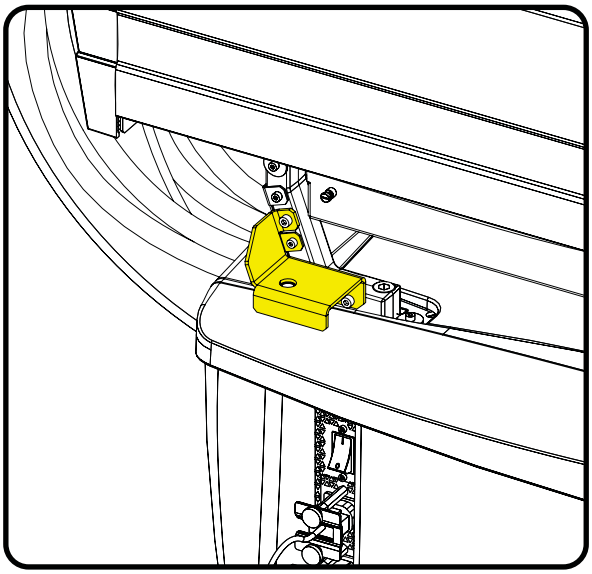


Image 9-8

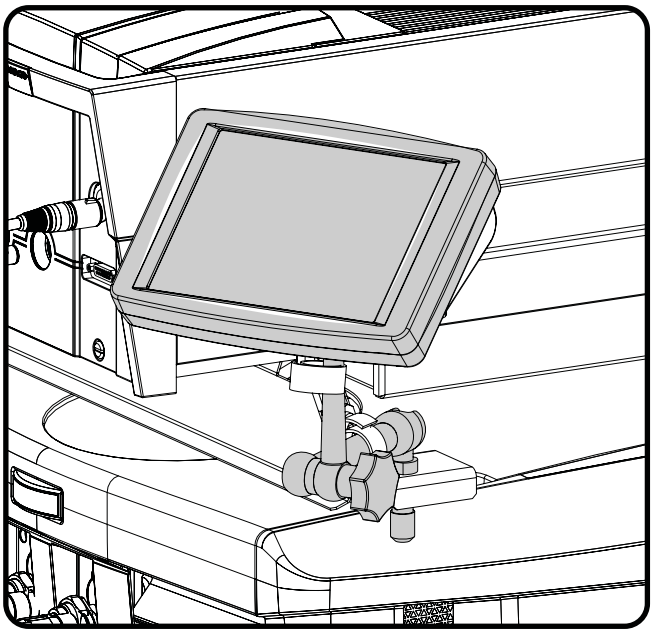


Image 9-9

Continue with the connections in the same way as for "*Installation for projector with standalone cooler*".

9.3 Reposition the touch panel interface

How to reposition the touch panel interface?

1. Hold fast the touch panel interface.
2. Release the central swivel clamp by turning the big black knob (K) counterclockwise.

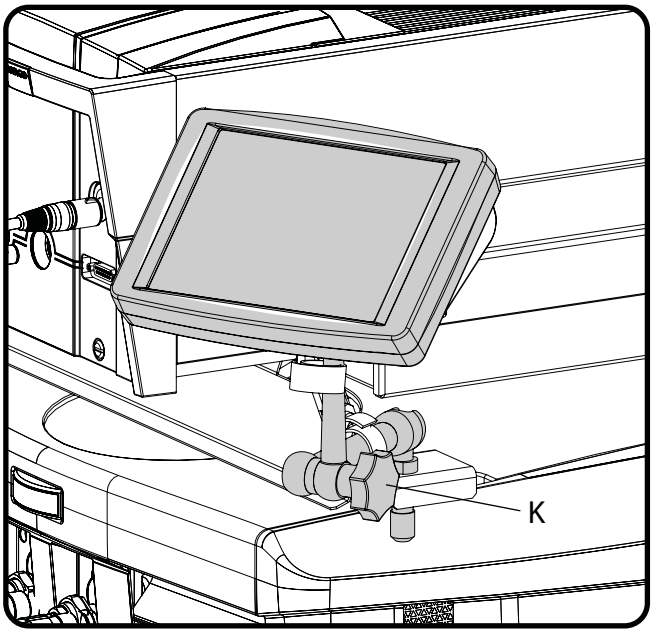


Image 9-10

3. Move the touch panel interface into the desired position.
4. Fasten the central swivel clamp by turning the big black knob clockwise.

CAUTION: Never release the central swivel lock without supporting the Touch Panel interface.

10. STARTING UP

About this chapter

This chapter contains the switch ON and switch OFF procedures of the DP2K CLP-series projector. These procedures enumerate all the important points which have to be checked prior to switching ON the projector. This is to ensure a safe start up of the projector.

Overview

- Switching ON the DP2K CLP-series projector
- Switching OFF the DP2K CLP-series projector

10.1 Switching ON the DP2K CLP-series projector

How to switch ON

1. Make sure that the DP2K CLP series projector projector is installed upon a stable pedestal. See chapter "Installation process", page 11.
2. Make sure that the right lens is installed for your application. See chapter "Available lenses", page 49.
3. Make sure the projector is correctly connected to the power net. See chapter "Connecting the projector with the power net", page 17.
4. Check if a video source is connected with the projector. See chapter "Input & communication", page 55.
5. Check if the communicator touch panel is installed. See chapter "Communicator touch panel", page 87.
6. Press the power switch to switch ON the projector. As a result the projector starts up in standby. So, the laser unit is OFF and the dowser closed. No internal pattern is selected. The communicator touch panel starts its initialization procedure.
   - When ’0’ is visible, the projector is switched OFF.
   - When ’1’ is visible, the projector is switched ON.
7. Press the **STANDBY** button on the local keypad or use the Communicator Touch Panel to activate the lasers.
8. Press the **DOWSER** button on the local keypad or use the Communicator Touch Panel to open the dowser. As a result the applied source will be displayed.

10.2 Switching OFF the DP2K CLP-series projector

How to switch OFF

1. Press the standby button on the local keypad or use the Communicator Touch Panel to switch the projector from operation to standby. As a result the lasers turn off but the fans remain turning and the cooling unit remains working to cool down the projector.
2. Let the projector cool down at least 5 minutes or until the speed of the fans decreases.
3. Switch OFF the projector with the power switch.

11. SCHEIMPFLUG

About this chapter

This chapter explains the Scheimpflug principle and when to apply Scheimpflug correction upon your DP2K CLP series projector. In addition to the procedure for Scheimpflug adjustment the procedure to adjust the Back Focal Length is also included in this chapter.

Scheimpflug principle

The "plane of sharp focus" can be changed so that any plane can be brought into sharp focus. When the DMD plane and lens plane are parallel, the plane of sharp focus will also be parallel to these two planes. If, however, the lens plane is tilted with respect to the DMD plane, the plane of sharp focus will also be tilted according to geometrical and optical properties. The DMD plane, the principal lens plane and the sharp focus plane will intersect in a line below the projector for downward lens tilt.

Overview

- Scheimpflug adjustment
- Fixation of the Lens Holder front plate
- Back Focal Length adjustment

11.1 Scheimpflug adjustment

What has to be done ?

The lens holder has to be adjusted so that the “sharp focus plane” of the projected image falls together with the plane of the screen (Fp1→Fp2). This is achieved by changing the distance between the DMD plane and the lens plane (Lp1→Lp2). The closer the lens plane comes to the DMD plane the further the sharp focus plane will be. It can sometimes happen that you won’t be able to get a complete focused image on the screen due to a tilt (or swing) of the lens plane with respect to the DMD plane. This is also known as Sheimpflug’s law. To solve this the lens plane must be placed parallel with the DMD plane. This can be achieved by turning the lens holder to remove the tilt (or swing) between lens plane and DMD plane (Lp3→Lp4).

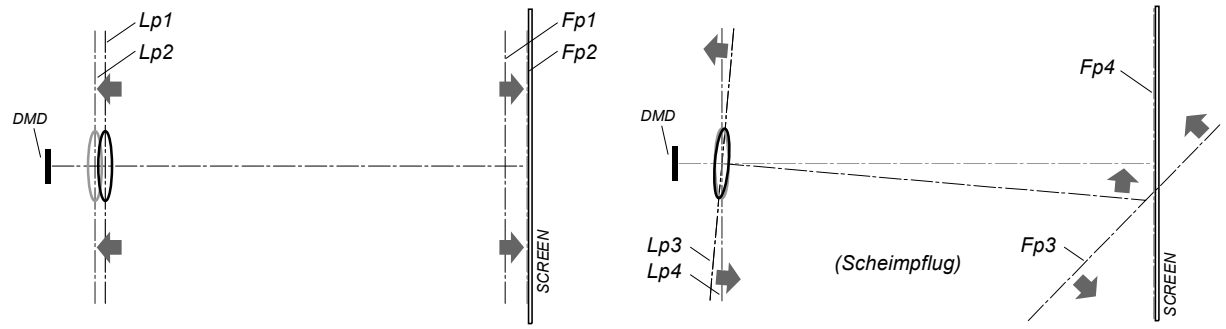


Image 11-1
Scheimpflug principle

Scheimpflug principle

The "plane of sharp focus" can be changed so that any plane can be brought into sharp focus. When the DMD plane and lens plane are parallel, the plane of sharp focus will also be parallel to these two planes. If, however, the lens plane is tilted with respect to the DMD plane, the plane of sharp focus will also be tilted according to geometrical and optical properties. The DMD plane, the principal lens plane and the sharp focus plane will intersect in a line below the projector for downward lens tilt.

Scheimpflug adjustment points

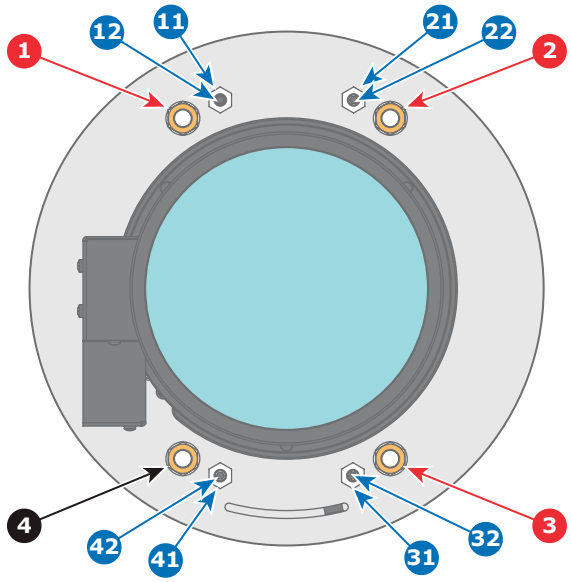


Image 11-2
1 Scheimpflug adjustment nuts No1: Influences the sharp focus plane in the lower left corner of the projected image.
2 Scheimpflug adjustment nuts No2: Influences the sharp focus plane in the lower right corner of the projected image.
3 Scheimpflug adjustment nuts No3: Influences the sharp focus plane in the upper right corner of the projected image.
4 Scheimpflug nut No 4: without adjustment functionality.
11 Set screw for nut No1.
12 Set screw for nut No2.
13 Set screw for nut No3.
14 Set screw for nut No4.
21 Lock nut.
22 Lock nut.
23 Lock nut.
24 Lock nut.

When to apply Scheimpflug?

Only apply a Scheimpflug correction in case the overall focus of the projected image is not equally sharp (can be caused if the projector is **NOT in parallel** with the screen or a previous misaligned Scheimpflug) . Take into account that the consequence of applying Scheimpflug correction upon a screen not in parallel with the projector is that the projected image differs from the rectangle shaped image. In other words “**distortion**” of the projected image occurs. **Masking** will be required to solve the distortion.

The disadvantage of Masking is loss of content. Therefore it is strongly **recommended** to place the projector **in parallel** with the projection screen and use the **SHIFT** functionality of the Lens Holder to match the projected image with the projection screen. In case the SHIFT range is not sufficient then the projector can be tilted and Scheimpflug can be applied.

Preparation steps:

1. Ensure that the throw ratio of the installed lens matches the requirements of the application (projection distance and screen size).
2. Ensure that the correct lens parameters are activated. (See user guide of the *Communicator* chapter *Installation* > *Advanced* > *Lens parameters*)
   Note: *Selecting the wrong lens parameters will result in an unexpected behavior of the lens when using macros for switching between FLAT and SCOPE (change in picture size and focus).*
3. Perform a lens **HOME & RETURN** operation. (See user guide of the *Communicator* chapter *Installation* > *Advanced* > *Lens parameters*)
4. Project the green focus test pattern.

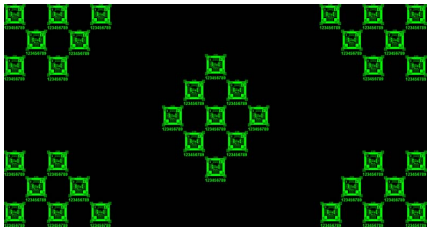


Image 11-3

5. Zoom the lens for maximum image on the screen (**WIDE**).
6. Is it possible to focus the center of the projected image?
   If yes, the Back Focal Length is OK. Proceed with the next step.
   If no, the Back Focal Length needs realignment. Proceed with the procedure "Back Focal Length adjustment", page 99.

7. Unlock and turn out the 4 set screws (reference 11) of the Lens Holder by 1 centimeter. Use a 10mm nut driver for the lock nuts (reference 21) and use a 3mm Allen wrench for the set screws.

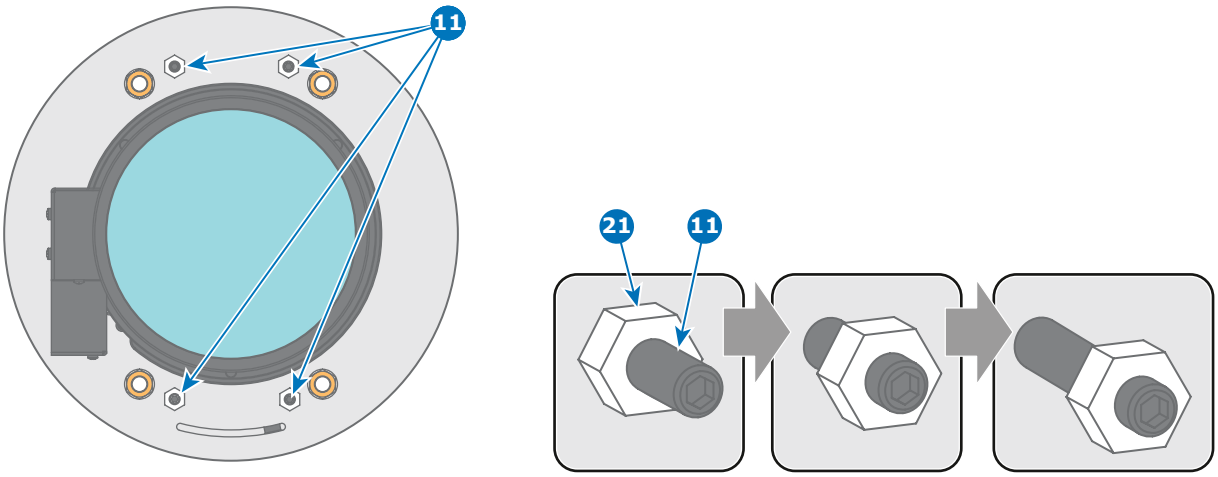


Image 11-4

8. Fully loosen the Scheimpflug nut at the lower left of the Lens Holder (reference 4). Use a 13mm nut driver.
9. Optimize the focus of the projected image in the center of the screen (F) using the motorized focus control (Local Keypad).

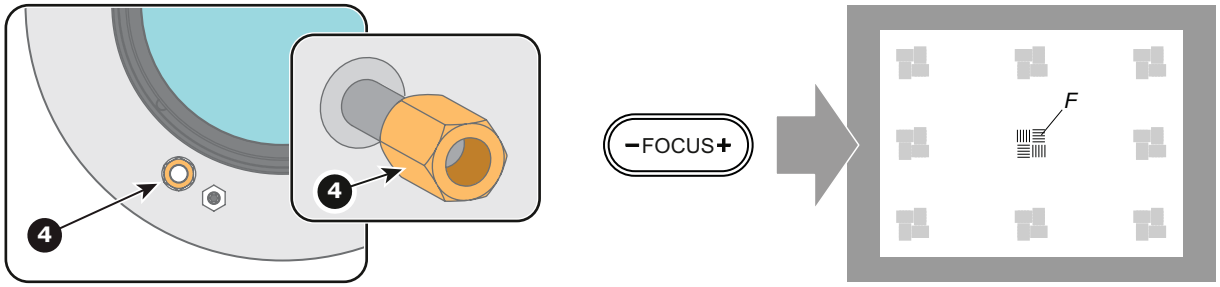


Image 11-5

Scheimpflug adjustment steps:

1. Sharpen the image at the bottom left corner of the screen by turning the upper left Scheimpflug adjustment nut (reference 1). As a result the focus in the center will fade a bit but that's normal.
   Caution: *Do not remove any of the Scheimpflug adjustment nuts completely from the threaded rod. Otherwise the lens holder front plate with lens will fall off.*

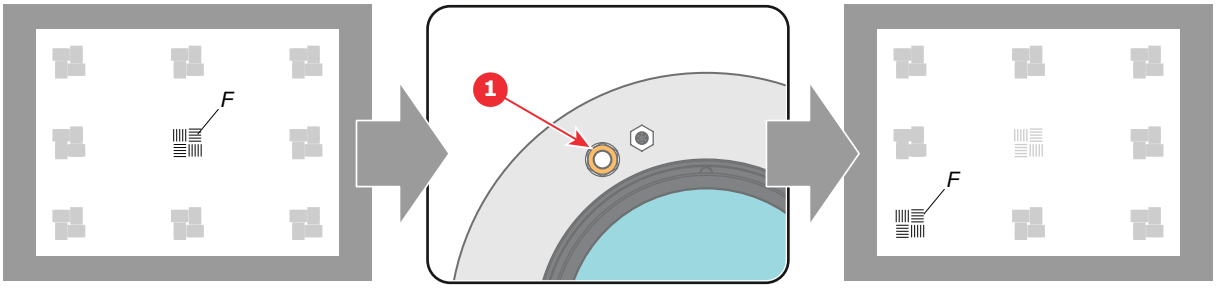


Image 11-6

2. Sharpen the image at the top right corner of the screen by turning the lower right Scheimpflug adjustment nut (reference 3).

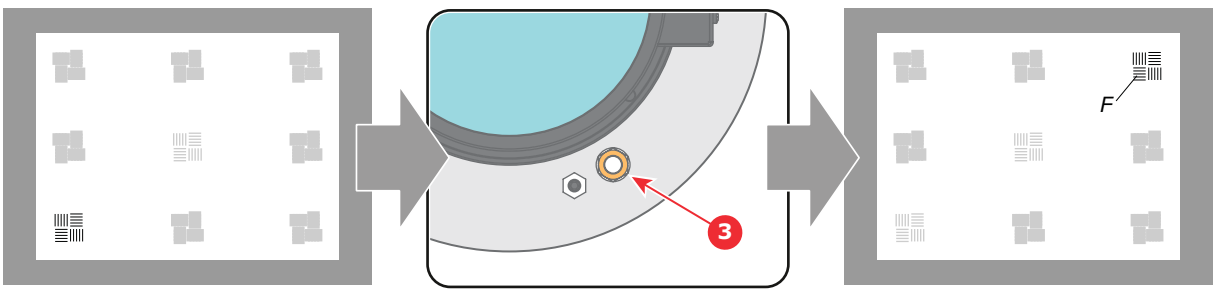


Image 11-7

3. Sharpen the image at the bottom right corner of the screen by turning the upper right Scheimpflug adjustment nut (reference 2).

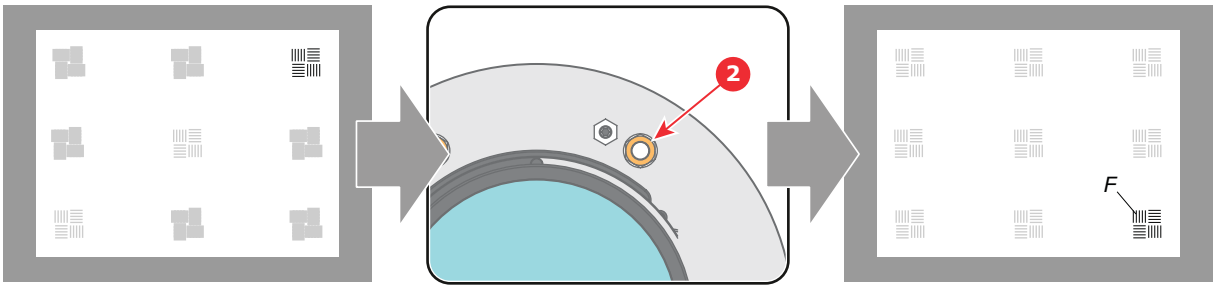


Image 11-8

4. Optimize the focus of the projected image in the center of the screen using the motorized focus control (Local Keypad).

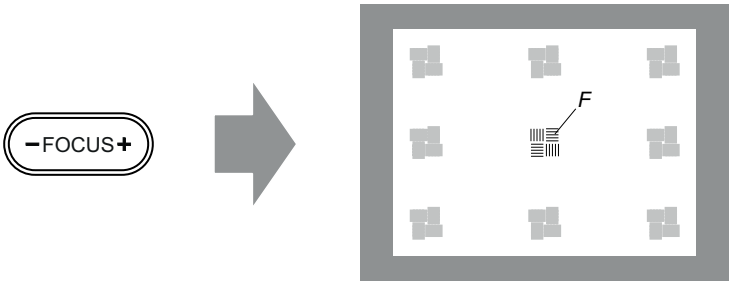


Image 11-9

5. Repeat from step 1 until the projected focus pattern is as sharp as possible in the center, left, right, top and bottom of the screen.
6. Proceed with the procedure "Fixation of the Lens Holder front plate", page 98.

11.2 Fixation of the Lens Holder front plate

When fixing the Lens Holder front plate

After performing the procedure for Scheimpflug adjustment or Back Focal Length adjustment the Lens Holder front plate must be secured in such a way that it doesn't disturb the result of the adjustment.

Necessary tools

- 10mm nut driver.
- 3mm Allen wrench.
- 13mm nut driver.

How to fix the Lens Holder front plate

Start the fixation as follows (steps must be followed strictly) :

1. Project the framing test pattern for FLAT & SCOPE.
2. Zoom the projected image until the edges of the projected test pattern matches with the edges of the projection screen.

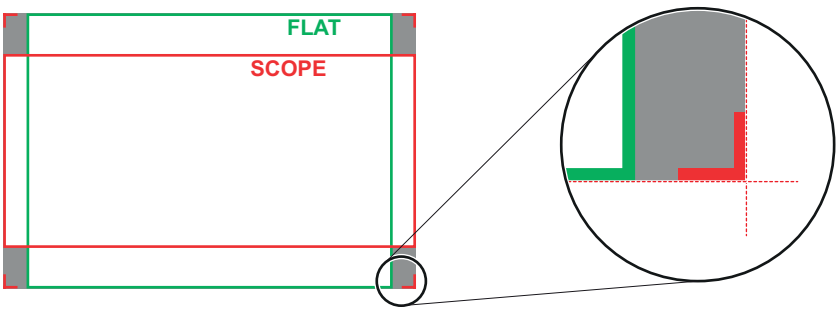


Image 11-10

3. Turn in the three set screws indicated with reference 11 image 11-11 without disturbing the projected image. Tighten lightly . Do not turn in the set screw at the lower left of the Lens Holder!
   Note: *Ensure that the edges of the projected test pattern remain in place on the screen. Any movement of the image will affect the Scheimpflug adjustment.*
4. Fasten the lock nut (reference 21 image 11-11) of the three set screws. Use a 10mm nut driver. Ensure the image doesn't move.

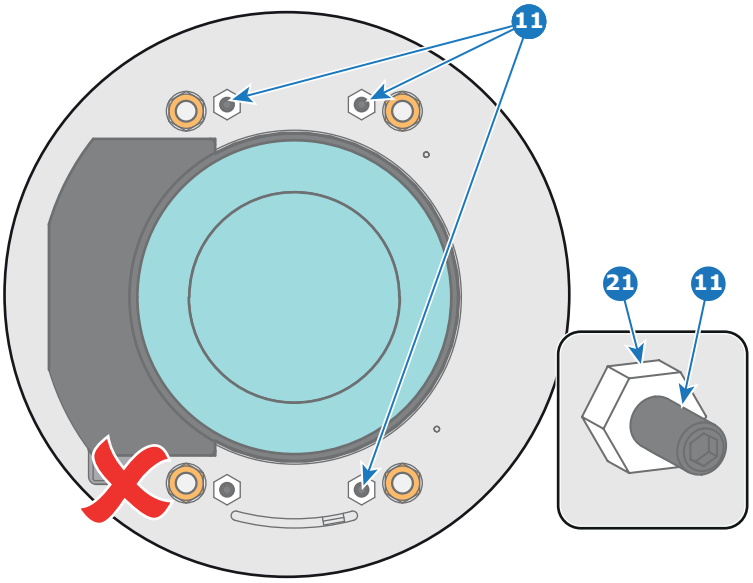


Image 11-11

5. Gently turn (by hand) the Scheimpflug adjustment nut at the lower left of the Lens Holder (reference 4 image 11-12) against the Lens Holder front plate without disturbing the projected image.
6. Turn in the set screw at the lower left of the Lens Holder (reference 14 image 11-12) without disturbing the projected image. Use a 3mm Allen wrench.
   Note: *Ensure that the edges of the projected test pattern remain in place on the screen. Any movement of the image will affect the Scheimpflug adjustment.*

   Tip: *Fasten the set screw and the Scheimpflug nut alternately, without disturbing the projected image, until the Scheimpflug nut and set screw are completely tightened.*

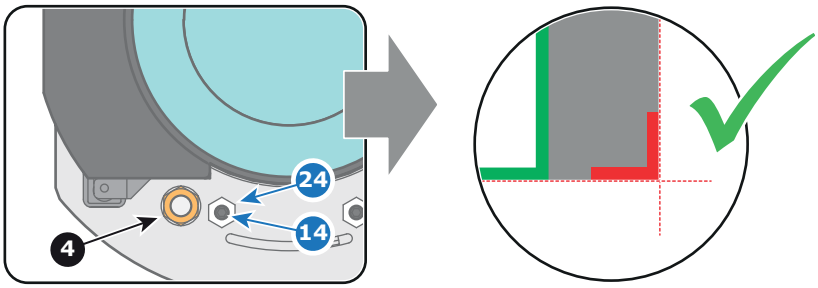


Image 11-12

7. Fasten the lock nut at the lower left of the Lens Holder. Use a 10mm nut driver.

11.3 Back Focal Length adjustment

When to adjust the Back Focal Length?

If a lens is used with a throw ratio suited for the application, (lens selection depends on projection distance and screen size) typically one would NEVER need to adjust the Back Focal Length of the projector.

A Back Focal Length adjustment is only required in case the Focus range of the installed lens does not capture the projection screen either for FLAT and/or for SCOPE. In other words, when it is impossible to focus the image on the screen for FLAT and/or for SCOPE. Note that the lenses for the DP2K CLP-series projector are varifocal. So, switching between FLAT and SCOPE (zoom action) requires a readjustment of the focus.

What is Back Focal Length adjustment?

Back Focal Length adjustment means moving the lens plane (Lp), thus the Lens Holder front plate, closer to or further from the DMD plane. The closer the lens plane to the DMD plane the further the focus range (Fr) of the lens will be.

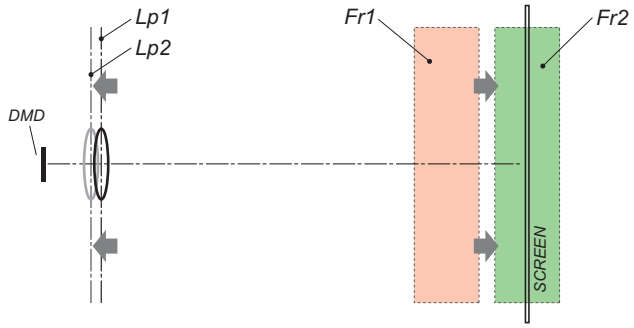


Image 11-13

Do not abuse the Back Focal Length adjustment of the Lens Holder. Neglecting this will result in loss of image quality because of the lens design. Cases requiring Back Focal Length adjustment normally indicate incorrect lens choice (throw ratio).

Necessary tools

- Nut driver 10mm.
- Allen wrench 3mm.
- Nut driver 13mm.

How to check the Back Focal Length

1. Ensure that the throw ratio of the installed lens matches with the requirements of the application (projection distance and screen size).
2. Ensure that the correct lens parameters are activated. (See user guide of the *Communicator* chapter *Installation* > *Advanced* > *Lens parameters*)
   Caution: *Not using the correct lens parameters could result in lens damage.*
3. Perform a lens **HOME & RETURN** operation. (See user guide of the *Communicator* chapter *Installation* > *Advanced* > *Lens parameters*)
4. Project the green focus test pattern. (screen file “no masking” or “no “crop”)

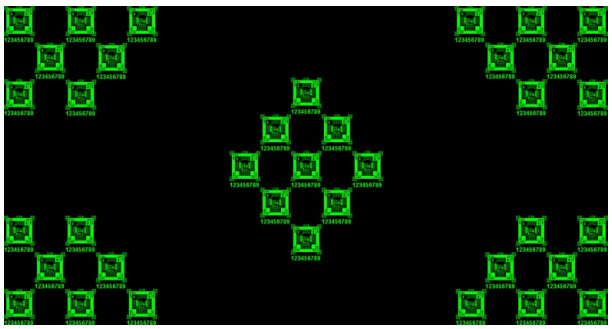


Image 11-14

5. Zoom the lens for maximum image on the screen (**WIDE**).
6. Is it possible to focus the center of the projected image?
   If yes, the Back Focal Length is OK.
   If no, the Back Focal Length needs realignment. Proceed with the next procedure.

How to adjust the Back Focal Length?

1. Unlock and loosen the 4 set screws (reference 11 image 11-15) of the Lens Holder by 1 centimeter. Use a 10mm nut driver for the lock nuts (reference 21 image 11-15) and use a 3mm Allen wrench for the set screws.

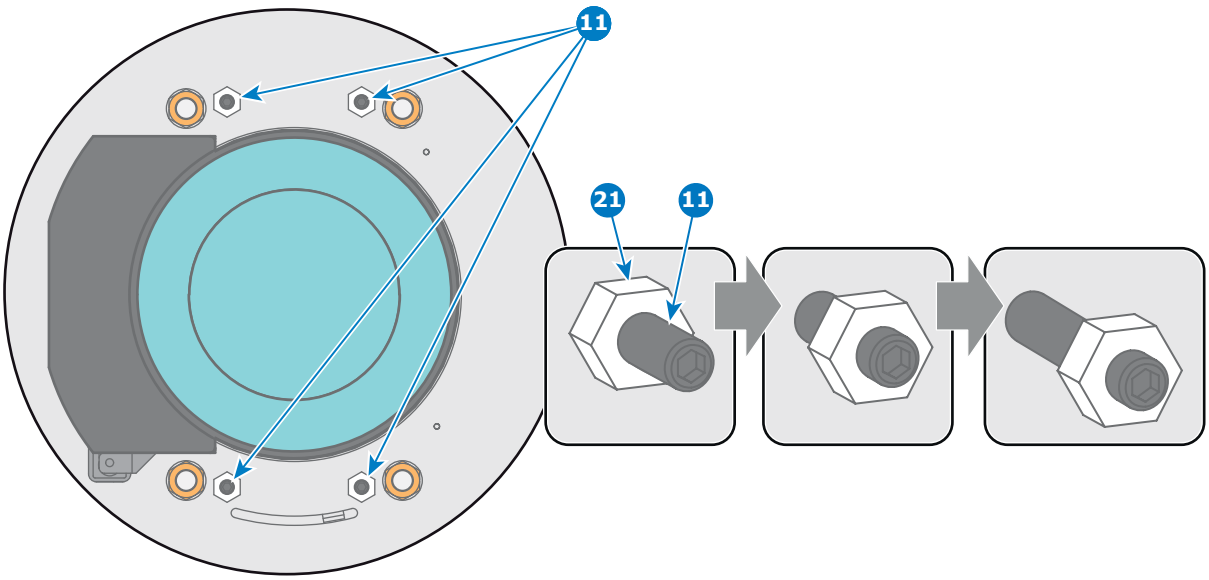


Image 11-15

2. Fully loosen the Scheimpflug nut at the lower left of the Lens Holder (reference 4 image 11-16). Use a 13mm nut driver.

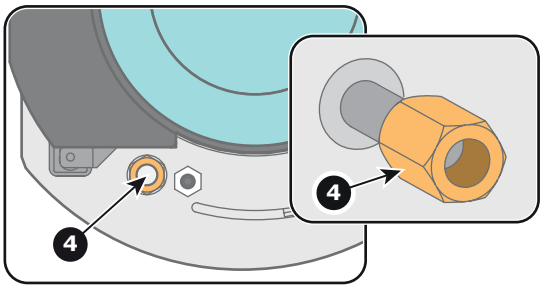


Image 11-16

3. Turn the three Scheimpflug adjustment nuts, reference 1, 2 and 3 image 11-17, until the front of the nut (reference 5 image 11-17) is equally aligned with the front of the threaded rod (reference 6 image 11-17). Use a 13mm nut driver.
   Note: *This is the nominal position of the Lens Holder.*

   Caution: *Do not remove any of the Scheimpflug adjustment nuts completely from the threaded rod. Otherwise the lens holder front plate with lens will fall off.*

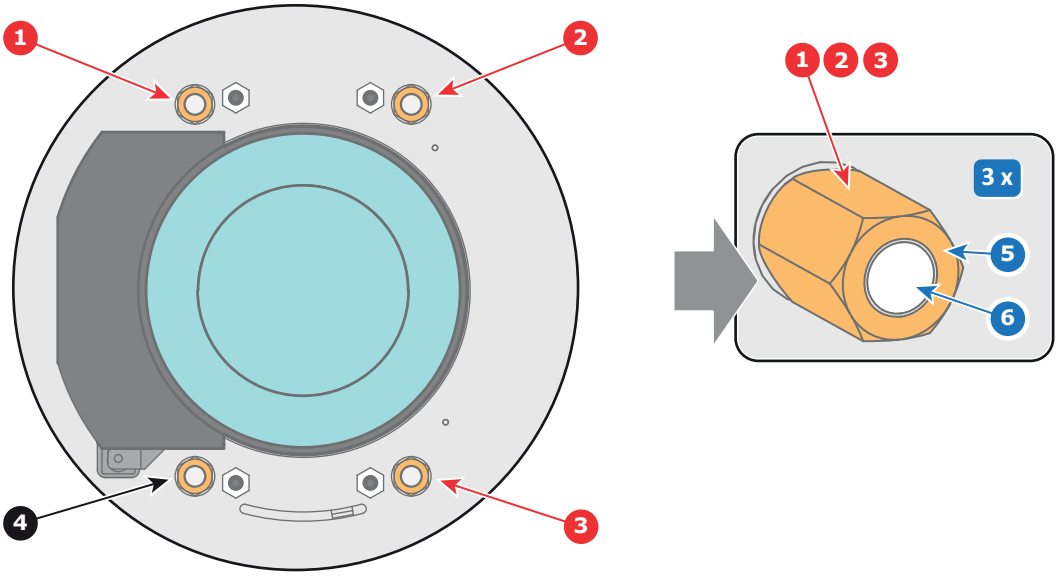


Image 11-17

4. Zoom the lens for maximum image on the screen (**WIDE**) and focus the center of the projected image using the motorized focus control (Local Keypad).

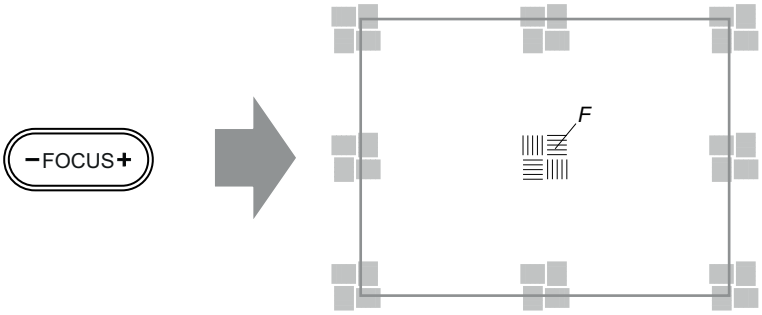


Image 11-18

5. Is it possible to focus the center of the projected image using the motorized focus control (Local Keypad) ? Ensure that the lens is zoomed for maximum image on the screen (**WIDE**).
   If yes, nominal position is good for sharp focus in the middle of the projected image. Proceed with step 6.
   If no, obtain the best possible focus in the center of the projected image using the motorized focus control and then turn the three Scheimpflug adjustment nuts, reference 1, 2 and 3 image 11-19, equally in or out until the center of the projected image is sharp. **Attention:** Keep in mind the turning direction of the Scheimpflug adjustment nuts for further adjustment instructions in this procedure.

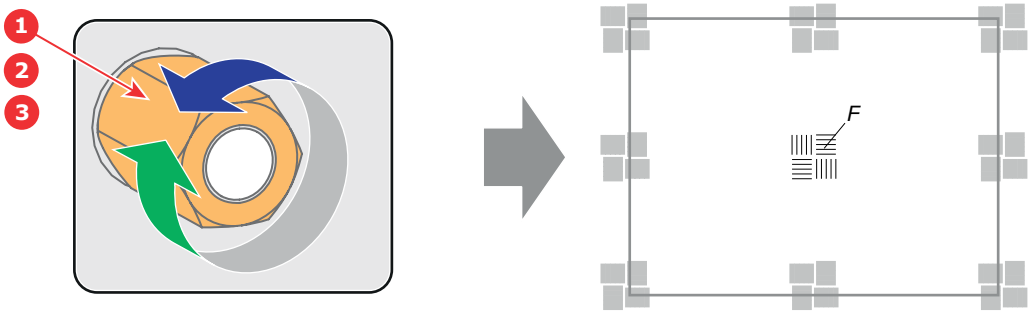


Image 11-19

6. Zoom the lens for minimum image on the screen (**TELE**) and focus the center of the projected image using the motorized focus control (Local Keypad).

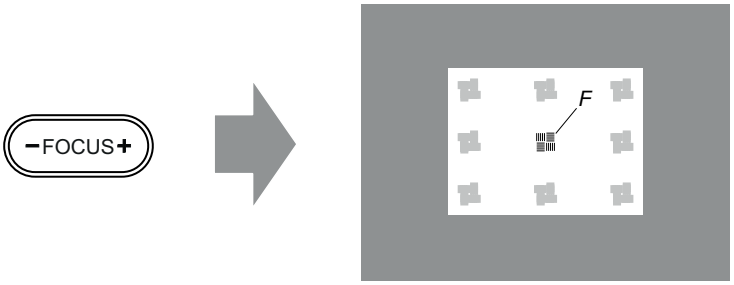


Image 11-20

7. Is it possible to focus the center of the projected image using the motorized focus control (Local Keypad) ? Ensure that the lens is zoomed for minimum image on the screen (**TELE**).
   If yes, no further adjustment actions required. Proceed with step 8.
   If no, obtain the best possible focus in the center of the projected image using the motorized focus control and then turn the three Scheimpflug adjustment nuts, reference 1, 2 and 3 image 11-21, equally in or out until the center of the projected image is sharp.
   Note: the same turning direction as in step 5 is applicable.

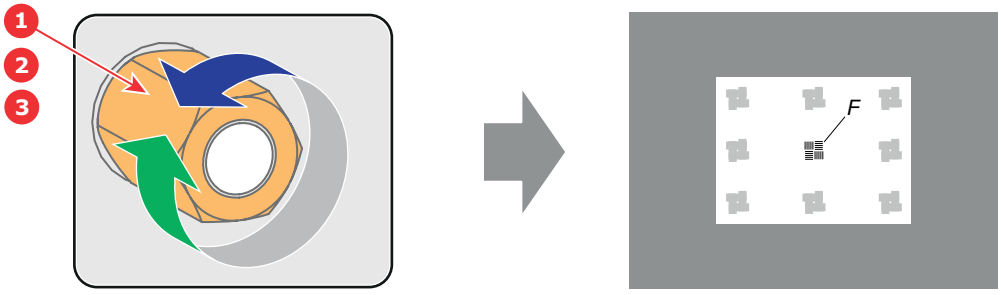


Image 11-21

8. Check if it is possible to focus the center of the projected image using the motorized focus control (Local Keypad) for **WIDE** and for **TELE**.

If yes, the Back Focal Length is correctly adjusted.
If no, repeat with step 4.

9. Is the projected image in the corners as sharp as in the middle?
   If yes, proceed with the procedure "Fixation of the Lens Holder front plate", page 98.
   If no, Scheimpflug adjustment is required. See procedure "Scheimpflug adjustment", page 95, prior to fixate the Lens Holder front plate. **CAUTION**: Skip the action, in the Scheimpflug adjustment procedure, to turn the three Scheimpflug adjustment nuts until the front of the nut is equally aligned with the front of the threaded rod!

12. CONVERGENCE

About this chapter

This chapter describes how to prepare the projector for convergence adjustment and how to adjust the convergence.

Overview

- Convergence controls
- Preparing the convergence adjustment
- Red on Blue convergence
- Green on Blue convergence

12.1 Convergence controls

Extended control knobs

As the DMD of the blue channel is not accessible in the projector, the image of this DMD will be taken as reference. Red and green will be aligned on blue when a small convergence drift is recognized. So, the DMD of the blue channel is fixed and can not be adjusted. The red and green channel is equipped with three extended control knobs for convergence adjustment. The adjustment knobs are numbered from 1 to 6 and have the same color as the channel which they effect (1, 2 and 3 for red and 4, 5 and 6 for green).

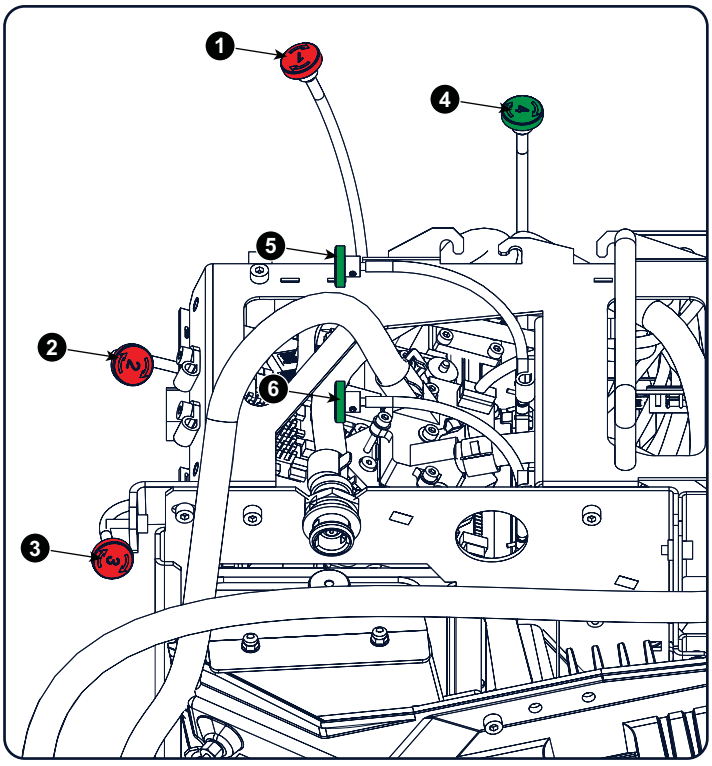


Image 12-1
Convergence knobs for DP2K-15C and DP2K-20C

1 Red channel, knob number 1
2 Red channel, knob number 2
3 Red channel, knob number 3
4 Green channel, knob number 4
5 Green channel, knob number 5
6 Green channel, knob number 6

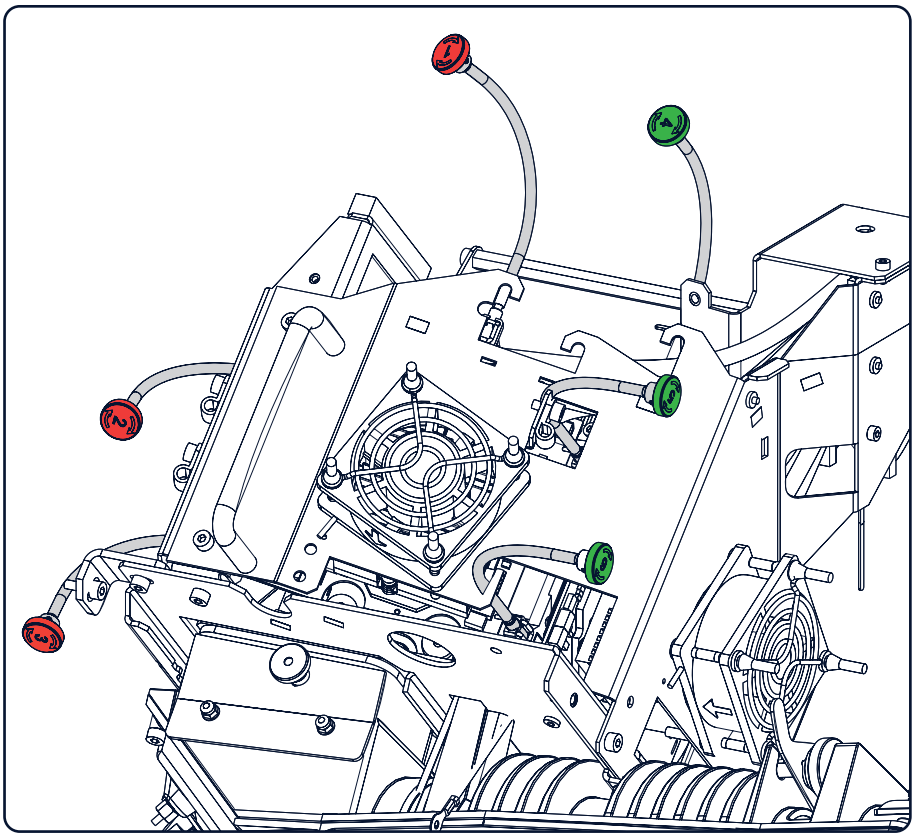


Image 12-2
Convergence knobs on a DP2K-12C

1 Red channel, knob number 1
2 Red channel, knob number 2
3 Red channel, knob number 3
4 Green channel, knob number 4
5 Green channel, knob number 5
6 Green channel, knob number 6

Convergence test pattern

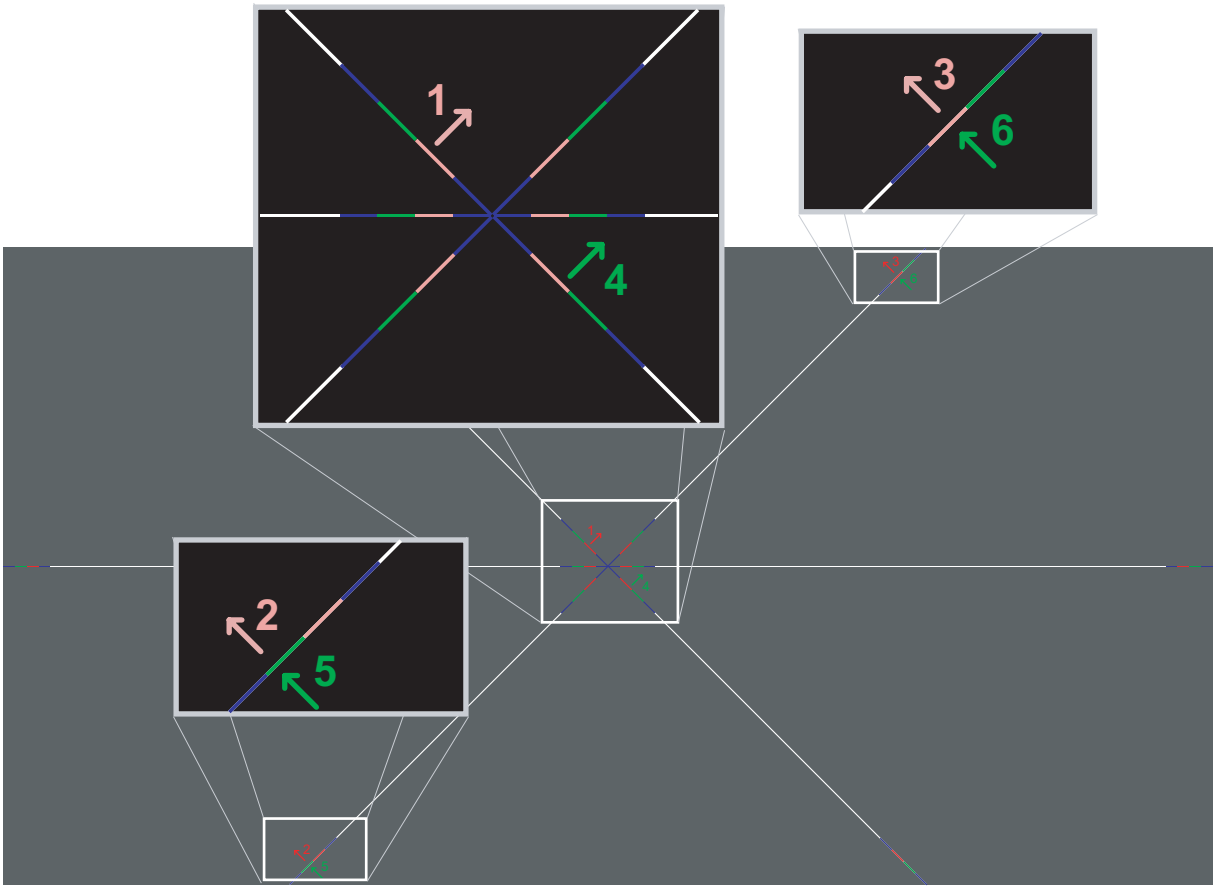


Image 12-3
Convergence test pattern

The test pattern illustrated above is specially designed for convergence purposes. The test pattern has three red arrows numbered from 1 to 3 and three green arrows numbered from 4 to 6. These numbers and colors correspond with the numbers and colors of the extended control knobs. The direction of the arrow shows the movement of the channel color (red or green) when turning the corresponding knob in the direction indicated by the arrow marked on the knob.

The three convergence control knobs of one channel stand in relation with each other. So, a change to one of them will also effect the adjustment results of the two others. Therefore, all three control knobs have to be alternately and repeatedly adjusted until the projected color is perfectly converged with the blue reference color of the test pattern.

Adjustment range

- The adjustment range is limited to approximately 30 pixels in both directions.
- One turn (360°) of a control knob relates to an approximately 30 pixel displacement on the screen.
- When changing the adjustment direction there will be some play of approximately one turn (360°).

12.2 Preparing the convergence adjustment

Necessary tools

Flat blade screwdriver

Prepare projector for convergence adjustment

1. Remove all side covers, see "Removal and installation of projector covers", page 117.
2. Is there a top mounted cooler assembly?
   If yes, For a top mounted cooler assembly, remove the cooler assembly fixation screws (1).
   Remove the 3 fixation screws (2) and remove the front fixation of the cooler assembly.
   Rotate the cooler assembly. The final position will be supported by the piston.

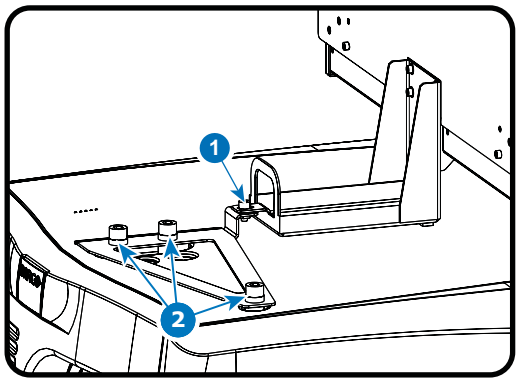


Image 12-4

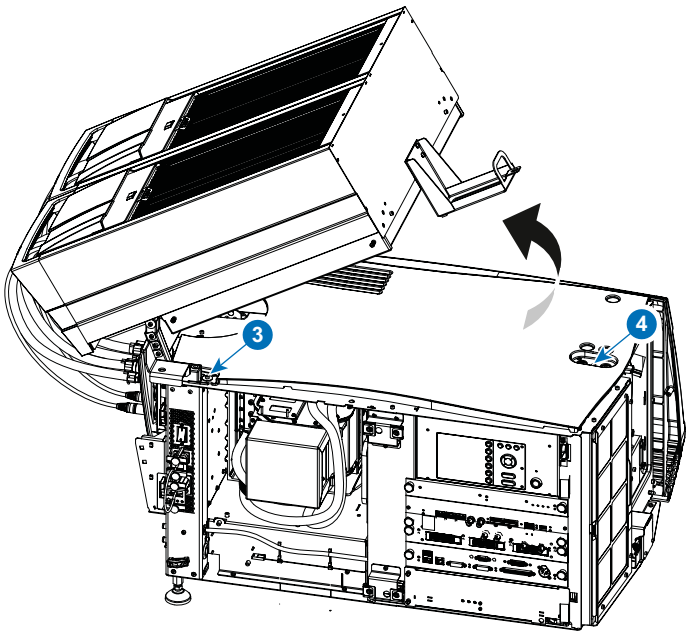


Image 12-5

If no, continue with the next step.

3. Remove all side covers and top cover of the projector, see "Removal and installation of projector covers", page 117.
4. Open the sealed compartment of the light processor.
5. Remove the convergence cover plate as follow:
   a) Loosen both screws (reference 1 and 2).
   b) Slide the plate forwards until all hooks at both sides of the plate become free.
   c) Take off the plate.

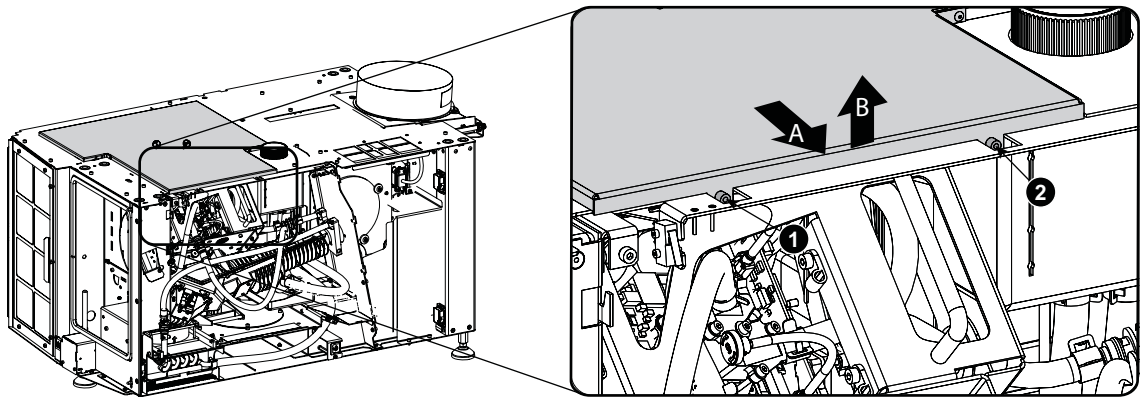


Image 12-6
Convergence cover plate

6. Reinstall the lens and start up the projector.

7. Use the Communicator software to activate the convergence test pattern.

Image 12-7
Convergence test pattern

12.3 Red on Blue convergence

This procedure can only be executed when all preparations are taken to converge the image.

Necessary tools

No tools.

How to converge

1. Slightly turn the red colored control knob number 1 until the red pattern in the center of the projected image converges with the blue pattern. Note that a turn of a few degrees corresponds with one full pixel.
   Note: *When start turning the knob, a little resistance can be felt. This resistance is part of the internal locking mechanism of the adjustment.*

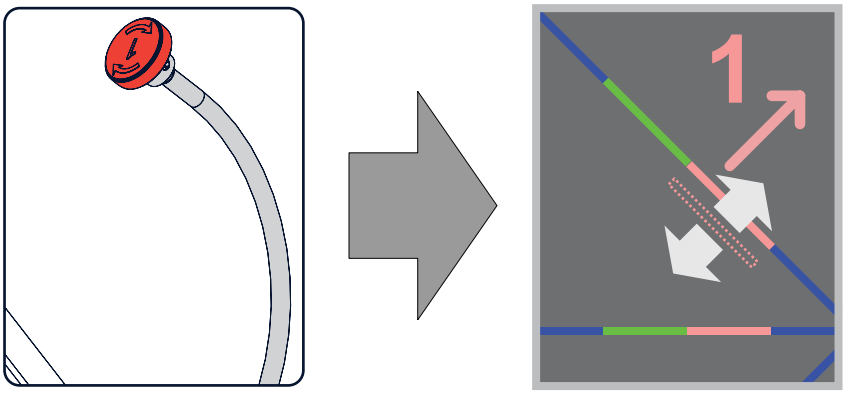


Image 12-8
Clockwise turning will move line downwards.

2. Slightly turn the red colored control knob number 2 until the red pattern in the lower left of the projected image converges with the blue pattern.

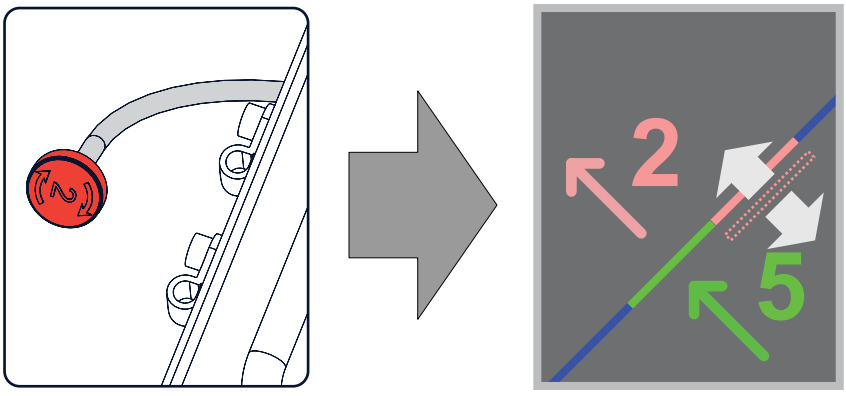


Image 12-9
Clockwise turning will move line upwards.

3. Slightly turn the red colored control knob number 3 until the red pattern in the upper right of the projected image converges with the blue pattern.

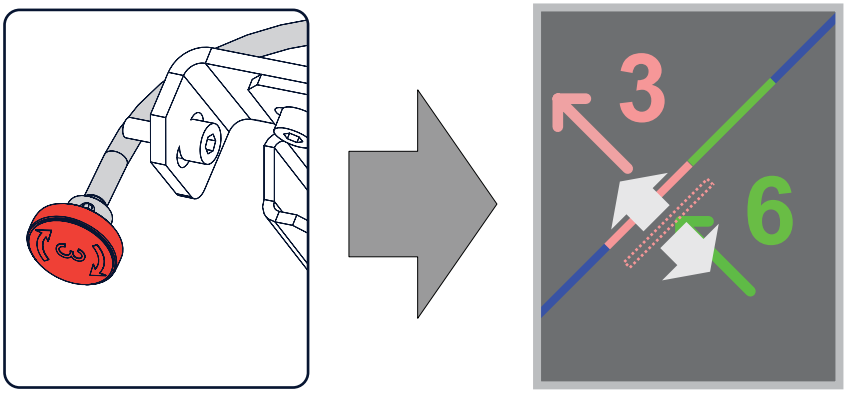


Image 12-10
Clockwise turning will move line upwards.

4. Repeat step 2 and step 3 until coincidence is obtained of the red pattern in the lower left and upper right of the projected image.
5. Repeat from step 1 until full coincidence is obtained of the red pattern in the center, lower left and upper right of the projected image.

12.4 Green on Blue convergence

This procedure can only be executed when all preparations are taken to converge the image.

Necessary tools

No tools.

How to converge

1. Slightly turn the green colored control knob number 4 until the green pattern in the center of the projected image converges with the blue pattern. Note that a turn of a few degrees corresponds with one full pixel.
   Note: *When start turning the knob, a little resistance can be felt. This resistance is part of the internal locking mechanism of the adjustment.*

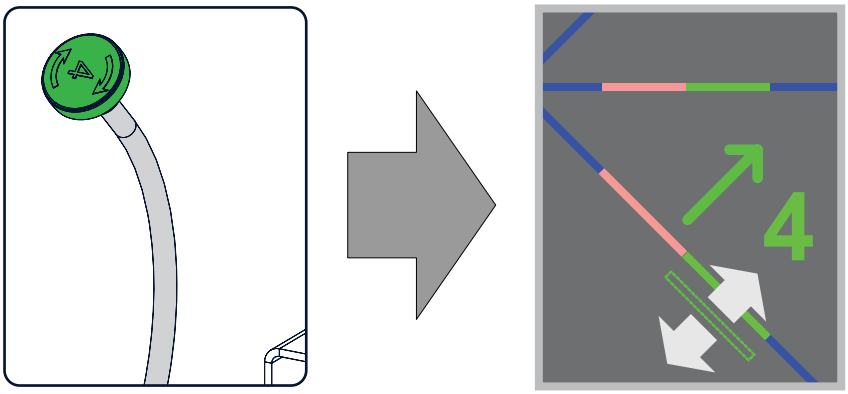


Image 12-11
Clockwise turning will move the line downwards.

2. Slightly turn the green colored control knob number 5 until the green pattern in the lower left of the projected image converges with the blue pattern.

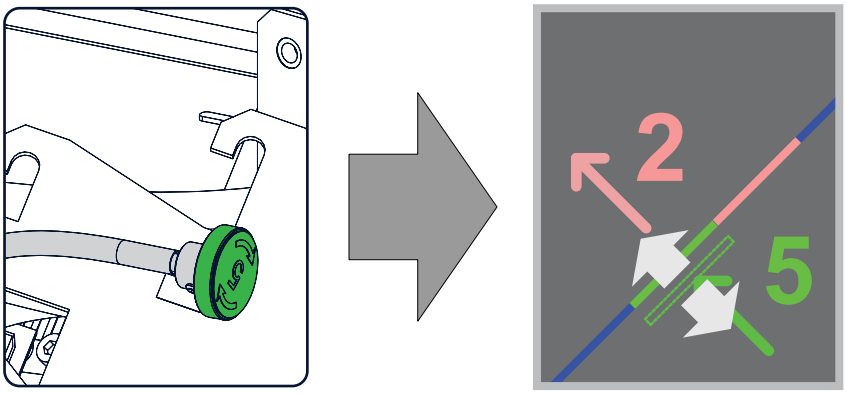


Image 12-12
Clockwise turning will move the line upwards.

3. Slightly turn the green colored control knob number 6 until the green pattern in the upper right of the projected image converges with the blue pattern.

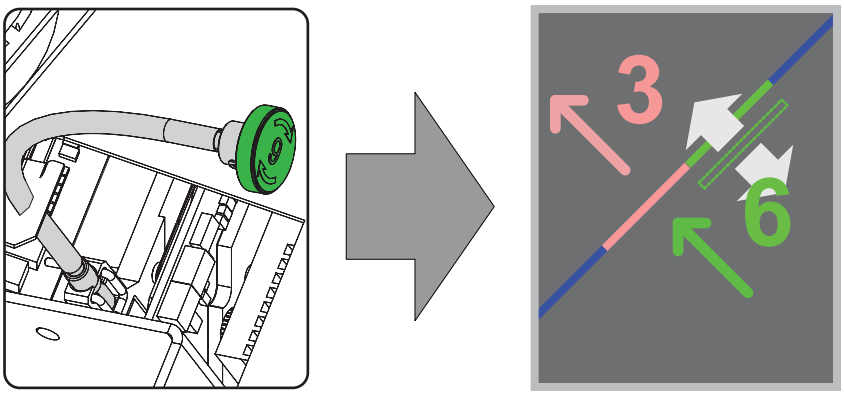


Image 12-13
Clockwise turning will move the line upwards.

4. Repeat step 2 and step 3 until coincidence is obtained of the green pattern in the lower left and upper right of the projected image.
5. Repeat from step 1 until full coincidence is obtained of the green pattern in the center, lower left and upper right of the projected image.
6. Close the sealed compartment and reinstall all covers of the projector.

13. COLOR CALIBRATION

About this chapter

This chapter describes the luminance and color calibration process for the DP2K CLP series. Where applicable references are made to the user guide of the Communicator for detailed menu navigation instructions. The first chapter describes the complete calibration process in chronological order.

Color calibration should be executed during the installation of the projector and also after some service actions as mentioned in the service manual.

Overview

- Calibration process
- White point calibration
- Color gamut calibration

13.1 Calibration process

Overview

1. Select the desired aspect ratio by activating the correct lens file.
   - **SCOPE** format
   - **FLAT** format
2. **Laser white point calibration**.
   The Communicator contains a wizard for white point calibration. See user guide of the Communicator for detailed menu navigation instructions.
3. **Color gamut calibration**. (electronic P7 correction). Measured values are saved in the Measured Color Gamut Data (MCGD) file. Needs to be done per format and per projection mode.
   - 2D
   - External 3D
4. **Select target colors**. The target colors are stored in the Target Color Gamut Data (TCGD) file. Several TCGD files are already available in the file system of the projector.
   For more info about color gamut calibration see "Color gamut calibration", page 114. The Communicator software contains a wizard for color gamut calibration. See user guide of the Communicator for detailed menu navigation instructions.
5. **Verify corrected colors**.
   For detailed instructions on how to verify corrected colors see user guide of Communicator.
6. **Arrange calibration files in macro**. To apply correct color calibration it is important that the MCGD file(s) and matching TCGD file(s) are activated after that the INPUT file and PCF file are activated. For that it is recommended to create a macro where the files are loaded one by one in the right order:
   a) First activate the **INPUT** file.
   b) then activate the **PCF** file (PCF already contains plane 1 information),
   c) then activate the **MCGD** and **TCGD** files.

   For detailed instructions on how to create a macro see Communicator's user guide.

13.2 White point calibration

About white point calibration

White point calibration should be executed to correct a color shift during dimming. The white point will be stabilized over the full dimming range.

Necessary tools

- Spectroradiometer.
- Communicator software.

Preparations

1. **Setup the ambient light conditions** as it should be during the play out of the movie. (e.g. only the stairs and emergency exit lighting is switched on).
   Note: *In an optimal setup less than 1% of light from any other source than the light from the projector should illuminate the screen.*
2. Configure the desired aspect ratio: e.g. FLAT or SCOPE (use most common aspect ratio). Do this by activating the correct LENS file.
3. Position the spectrometer perpendicular to the screen and measure in the center of the screen.
4. Start up Communicator and follow the laser white point calibration wizard.

After white point calibration proceed immediately with color gamut calibration.

13.3 Color gamut calibration

Color Gamut

Color Gamut is the entire range of reproducible colors by a particular device such as a projector. The entire range of reproducible colors are typically defined so that horizontal and vertical directions describe saturation and luminance changes, respectively. When a color is "out of gamut," it is not possible to reach that color by the device.

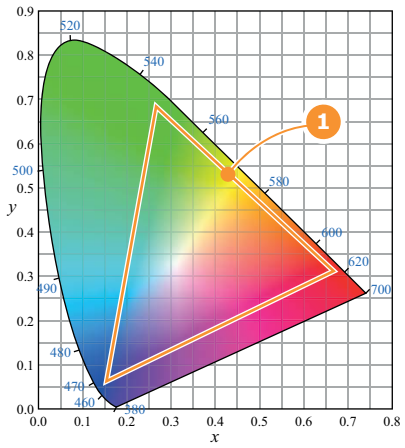


Image 13-1
Sample Chromaticity Diagram with Color Gamut of target device (1).

Why apply color correction?

During the post-production process of a film, a specific color space is applied. This color space is the Target Color Gamut Data (TCGD). All movie content operates under that gamut. To ensure that in the cinema theater the film is projected within the same color space as intended by the film industry, the color space of the projector has to be corrected accordingly.

What has to be done?

The color coordinates for the projected primary colors must be measured on the screen. The values can be different than those originally inside the projector due to reflection on the screen or due to the influence of the glass between the projection booth and the theatre and even the projected colors are different from setup to setup.

These measured color coordinates are references for the projector and will be entered so that the projector knows how its colors are projected on the screen. This reference measurement (MCGD), together with the delivered gamut file (TCGD) of the film will introduce a color correction so that the film will be projected with the desired color target.

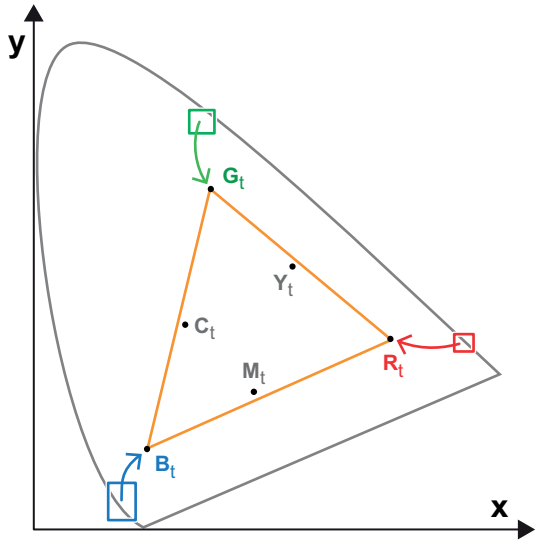


Image 13-2
Correction of native color gamut towards desired color gamut (electronic correction)

Electronic correction

The electronic correction adapt the native color gamut towards the desired (target) color gamut (e.g. DC28_DCI_Xenon.TCGD). This correction is introduced by the DMD drivers and is also called 'P7 correction'. The electronic correction takes place once the MCGD file of the projector is mapped with the TCGD file of the film.

Influence of aspect ratio

The aspect ratio of the projected image could have a small influence upon the measured xy coordinates. Therefore, it's recommended to save the xy coordinates per aspect ratio in separate MCGD files.

CAUTION: Prior to start with color gamut calibration ensure that the white point calibration is finalized successfully. See "White point calibration", page 113.

Color gamut calibration procedure:

1. Check if the white point calibration is done. If not see "White point calibration", page 113.
2. **Setup the ambient light conditions** as it should be during the play out of the movie. (e.g. only the stairs and emergency exit lighting is switched on).
   Note: *In an optimal setup less than 1% of light from any other source than the light from the projector should illuminate the screen.*
3. **Sequentially measure and enter the xy coordinates** of the three primary colors (red, green, blue) and full white. Use therefore the Communicator. Go to *Installation* > *Color calibration* > *Measure native colors*. For detailed instructions see user guide of the Communicator.
   Caution: *Ensure that the correct projection mode is selected: 2D or External 3D.*
   Caution: *In case of 3D, measure the xy coordinates once through the left eye glass of the 3D goggles and once through the right eye glass.*
   Tip: *When using the wizard for white point calibration you can immediately proceed with the electronic correction.*
4. Once all xy coordinates are measured and entered proceed by saving all measured values into a MCGD file.
   Tip: *Put in the MCGD file name the type of projection mode (2D or External 3D) and the aspect ratio (FLAT, SCOPE).*
5. Map the MCGD file with the TCGD file. Use for that the Communicator. Go to *Installation* > *Color calibration* > *Select target colors*. For detailed instructions see user guide of the Communicator.
6. In addition you can check if the corrected colors complies. Use therefore the Communicator. Go to *Installation* > *Color calibration* > *Verify corrected colors*. For detailed instructions see user guide of the Communicator.

14. REMOVAL AND INSTALLATION OF PROJECTOR COVERS

WARNING: Always switch off the projector and unplug the power cord before removing one of the covers, unless otherwise stated.

Overview

- Removal of the front cover
- Removal the rear cover
- Removal of the side cover
- Removal of the light unit cover and input covers
- Removal of the top cover
- Open the sealed compartment
- Close the sealed compartment
- Mounting the top cover
- Mounting the light unit cover and input cover
- Mounting the side cover
- Mounting the rear cover
- Mounting the front cover

14.1 Removal of the front cover

The input cover and the lens have to be removed before removing the front cover.

How to remove

1. Check if the input cover and the lens are removed.
2. Remove the rubber dust ring from the lens holder.
3. Release the captive screw at the middle bottom of the front cover, using a flat screw driver.

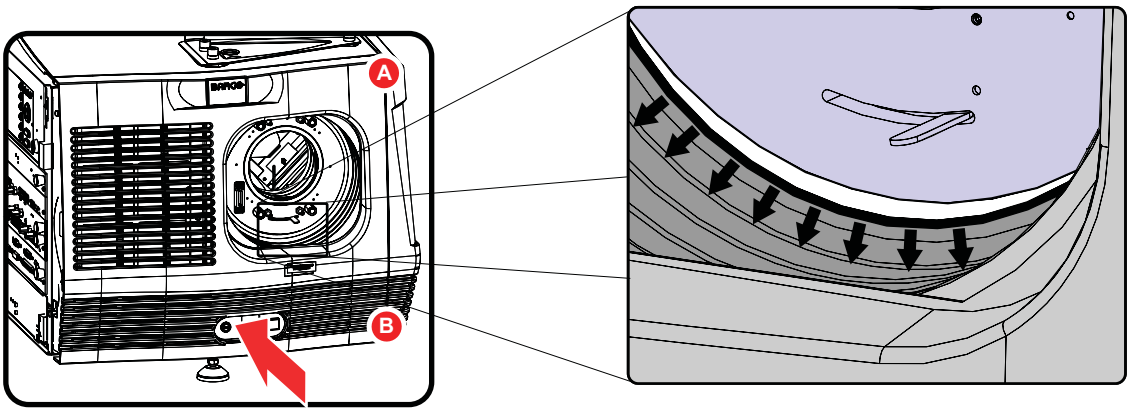


Image 14-1

4. Remove the front cover from the projector doing the following:
   a) standing in front of the projector, pull the upper right corner (A) of the front cover toward you until the latch releases,
   b) pull the lower right corner (B) of the front cover toward you until the latch releases,
   c) then move the front cover away from the projector.

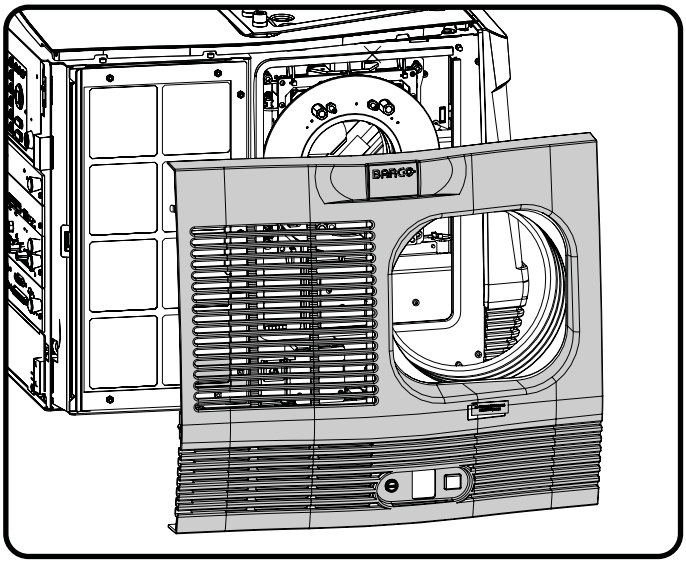


Image 14-2

14.2 Removal the rear cover

WARNING: This procedure may only be performed by qualified technical service personnel.

How to remove

1. Unlock the captive screws at the bottom corners of the rear cover.
2. Remove the rear cover of the projector doing the following:
   a) Gently pull the locking studs of the top corners out their sockets
   b) Remove the rear cover away from the projector.

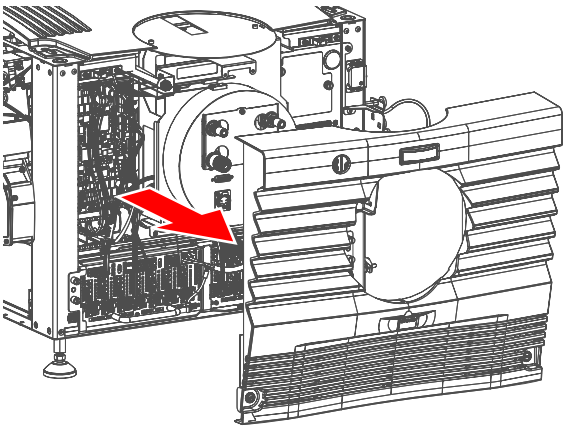


Image 14-3

14.3 Removal of the side cover

WARNING: This procedure may only be performed by qualified technical service personnel.

How to remove

1. Release the captive screw at the middle bottom of the side cover.

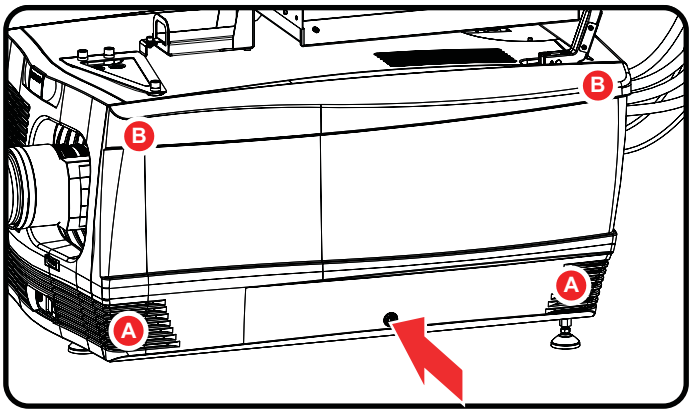


Image 14-4

2. Remove the side cover from the projector doing the following:
   a) gently pull out the bottom corners (A) of the side cover,
   b) then gently pull out the top corners (B) of the side cover,
   c) then move the side cover away from the projector.

14.4 Removal of the light unit cover and input covers

WARNING: This procedure may only be performed by qualified technical service personnel.

Necessary tools

Flat screwdriver

How to remove

1. Unlock the captive screws on the left side of the cover (6).
2. Remove the input cover of the projector doing the following:
   - Gently pull the locking studs on the right side (top and bottom) out their receivers (4-5).
   - Remove the input cover away from the projector.
3. Unlock the captive screws on the right side of the cover (3).
4. Remove the light unit cover of the projector doing the following:
   - Gently pull the locking studs on the right side (top and bottom) out their receivers (1-2).
   - Remove the light unit cover away from the projector.

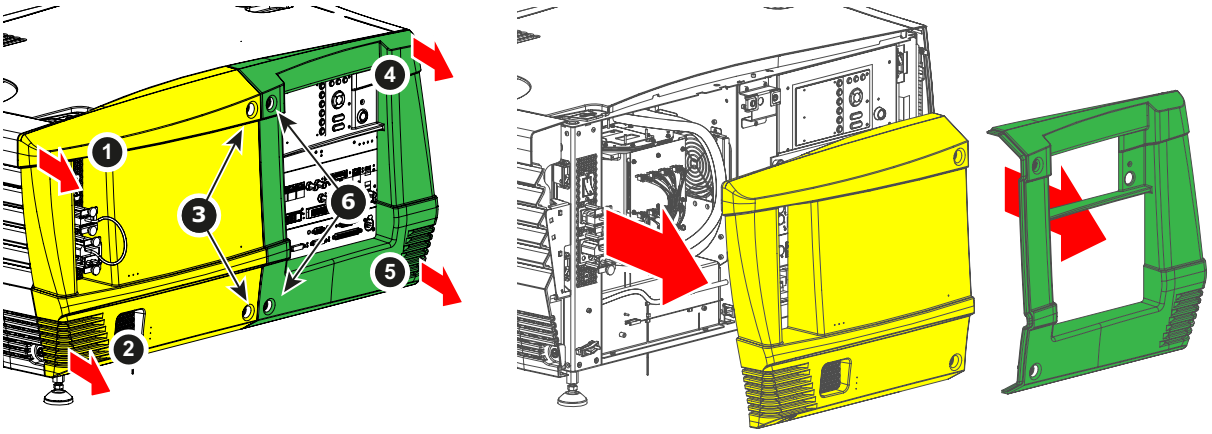


Image 14-5

14.5 Removal of the top cover

WARNING: This procedure may only be performed by qualified technical service personnel.

With top cooler

1. First remove lens, side covers and front cover.
2. Disconnect the tubes and the electrical connections on the back side of the projector.
3. Remove the back cover.
4. Remove the cooler assembly fixation screws (1).

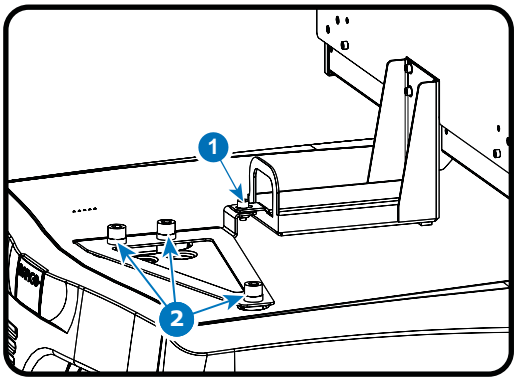


Image 14-6

5. Remove the 3 fixation screws (2) and remove the front fixation of the cooler assembly.
6. Rotate the cooler assembly. The final position will be supported by the piston.

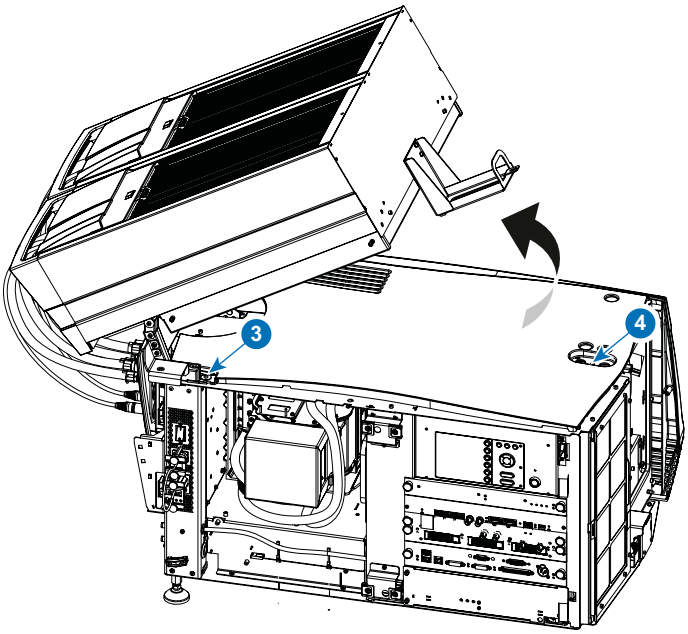


Image 14-7

7. At the back, turn out the fixation screws (3), one left and one right.
   Remove the fixation screws at the front.
   Take off the cover plate.

Without top cooler

1. First remove lens, side covers and front cover.
2. Disconnect the tubes and the electrical connections on the back side of the projector.
3. Remove the back cover.
4. Turn out the 3 fixation screws and take off the top cover (same screws as indicated on image 14-7.

14.6 Open the sealed compartment

This procedure assumes that the left side cover of the projector is already removed.

Necessary tools

Allen wrench 3 mm

How to open the sealed compartment of the Light Processor Unit?

1. Release the three hexagon head cap screws as illustrated. Use for that a 3 mm Allen wrench.
   Note: *A washer is mounted between the plate and the screw head.*

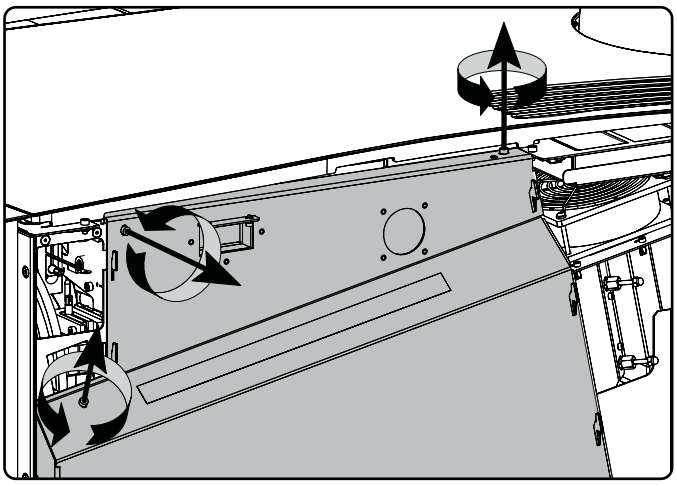


Image 14-8

2. Lift up the cover plate slightly, using the two lower lips provided, and then remove the cover plate away from the projector.

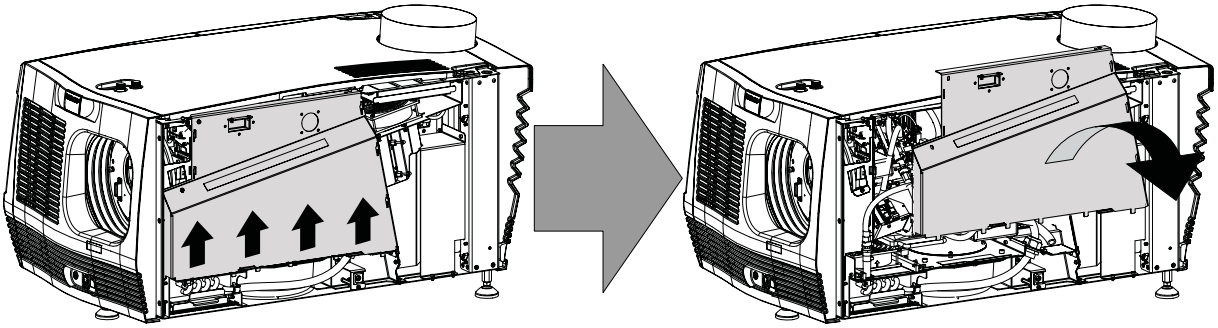


Image 14-9

14.7 Close the sealed compartment

Necessary tools

3 mm Allen wrench.

How to close the sealed compartment of the Light Processor Unit?

1. Place the cover plate in its place as illustrated.
   Caution: *Do not damage the micro switch at the top of the projector.*

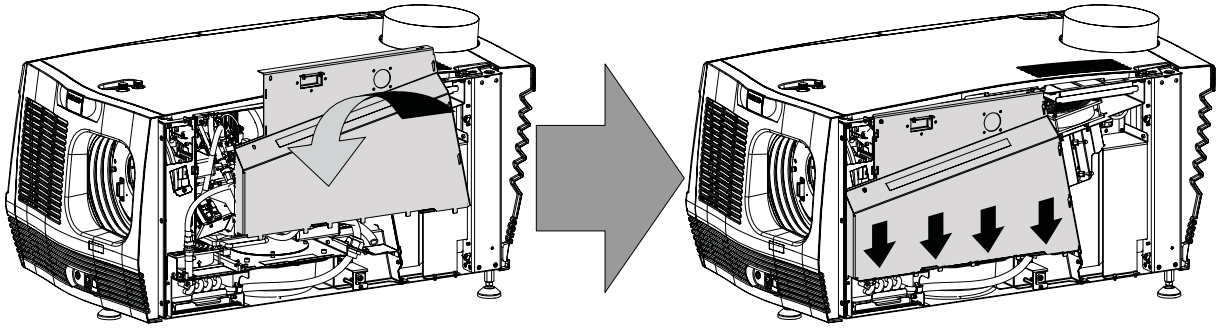


Image 14-10

2. Fasten the three hexagon head cap screws as illustrated. Use for that a 3 mm Allen wrench.
   Note: *Insert a washer between the each screw and the plate.*

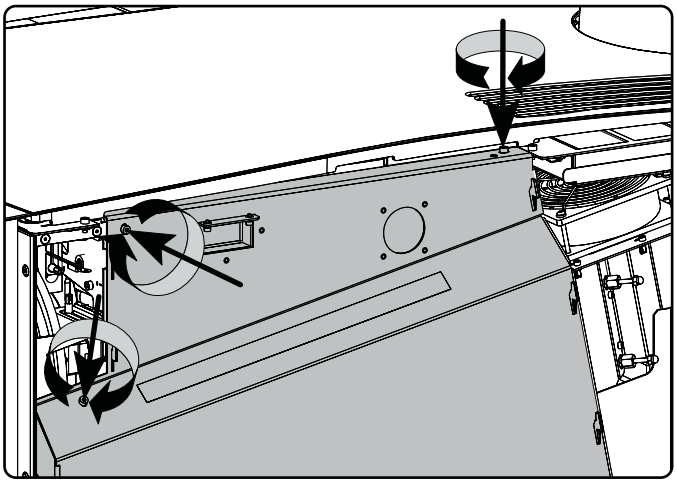


Image 14-11

14.8 Mounting the top cover

With top cooler

1. Make sure the cooler assembly is in the open position.
2. Place the top cover on the projector and turn in the 3 fixation screws (2 on the back side (3) and one on the front side (4), see image 14-7). Do not forget to insert a washer.
3. Mount the front fixation for the cooler assembly.

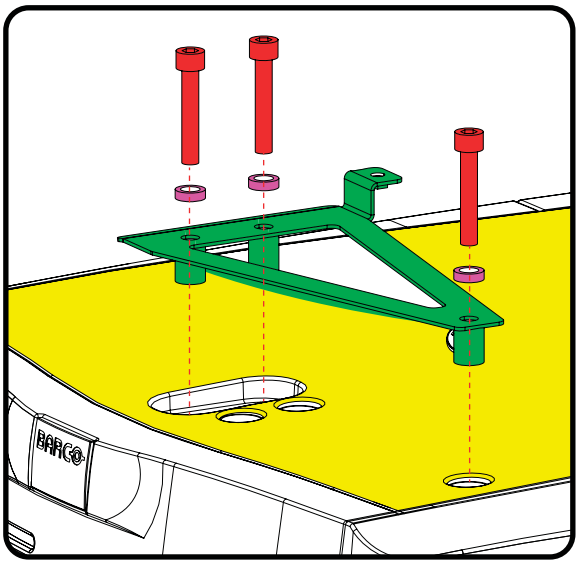


Image 14-12

4. Insert the 3 screws. Put a washer between each screw and front fixation.
5. Turn down the cooler assembly and secure with fixation screw.
6. Reinstall the back cover, connect the hoses and the electrical cables.
7. Reinstall the front cover, and all side covers.
   Mount the lens.

Without top cooler

1. Place the top cover on the projector so that both holes matches the adjustment studs on top of the projector.

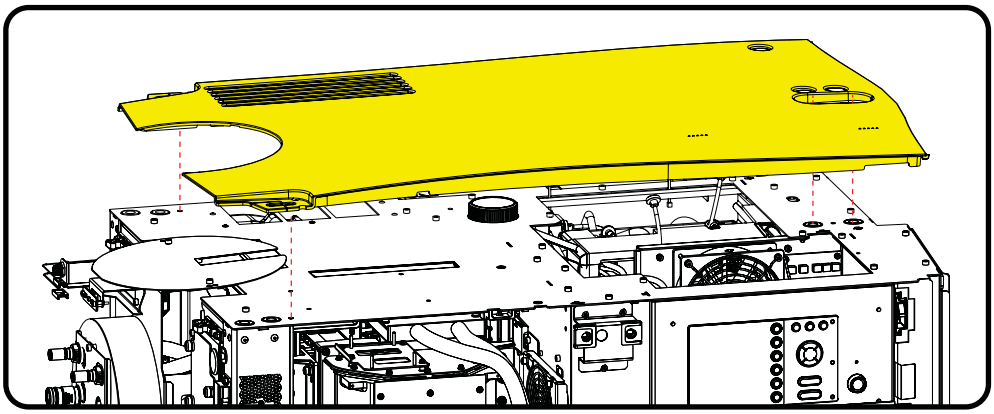


Image 14-13

2. Turn in both fixation screws on the front side. Insert the washer between the screw and the top cover.

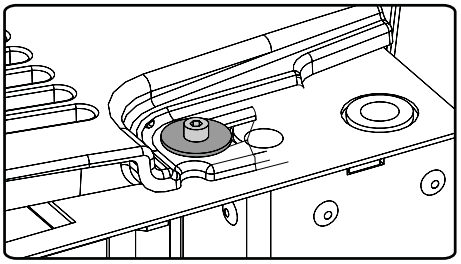


Image 14-14

3. Turn in the fixation screw at the back side.

14.9 Mounting the light unit cover and input cover

Necessary tools

Flat screwdriver

Necessary parts

Previous removed covers

How to install

1. Install the light unit cover of the projector doing the following:
   - Bring the light unit cover towards its final position
   - Then gently push the locking studs on the left side (top and bottom) into their receivers (1-2).

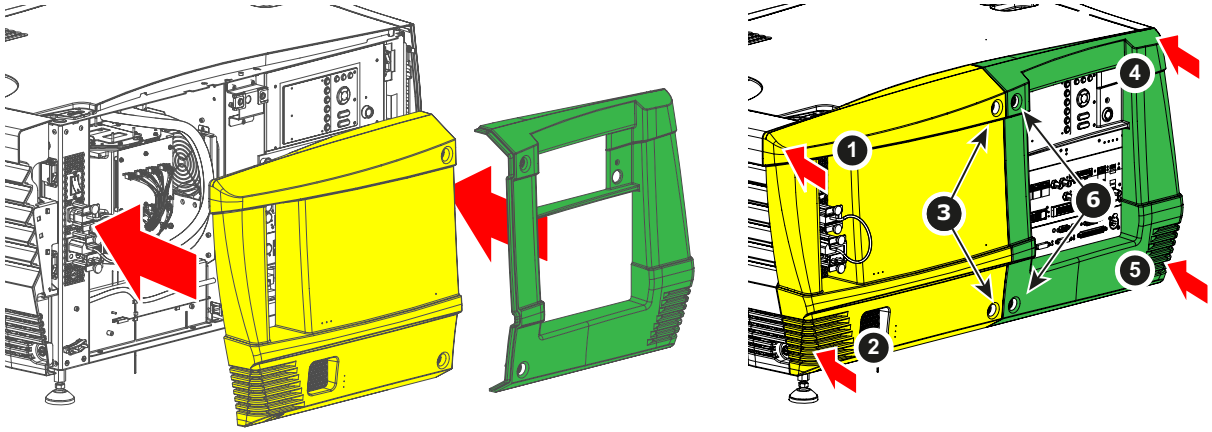


Image 14-15

2. Secure the light unit cover by locking the captive screws on the right side of the cover (3).
3. Install the input cover of the projector doing the following:
   - Bring the input cover towards its final position
   - Then gently push the locking studs on the right side (top and bottom) into their receivers (4-5).
4. Secure the input cover by locking the captive screws on the left side of the cover (6).

14.10 Mounting the side cover

How to mount

1. Install the side cover of the projector doing the following:
   a) Bring the side cover towards its final position,
   b) then gently push the locking studs of the top corners (B) into their receivers,
   c) then gently push the locking studs of the bottom corners (A) into their receivers.

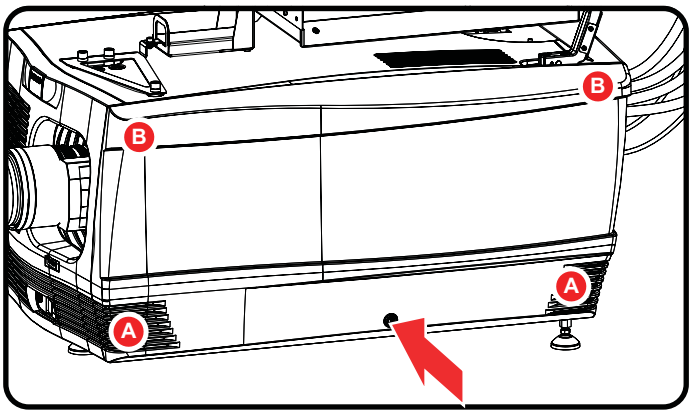


Image 14-16

2. Secure the side cover by locking the captive screw in the middle at the bottom of the side cover.

14.11 Mounting the rear cover

How to mount

1. Install the rear cover of the projector doing the following:
   a) Bring the rear cover towards it final position,
   b) then gently push the locking studs of the top corners into their receivers
2. Secure the rear cover by locking the captive screws at the bottom corners of the rear cover.

14.12 Mounting the front cover

How to mount

1. Ensure that no lens is mounted and that the input cover is not installed.
2. Install the front cover of the projector doing the following:
   a) first hook in the side of the front cover at the front filter,
   b) then gently push the other side of the front cover into position,
   c) ensure that the locking studs in the corners click into their receivers.

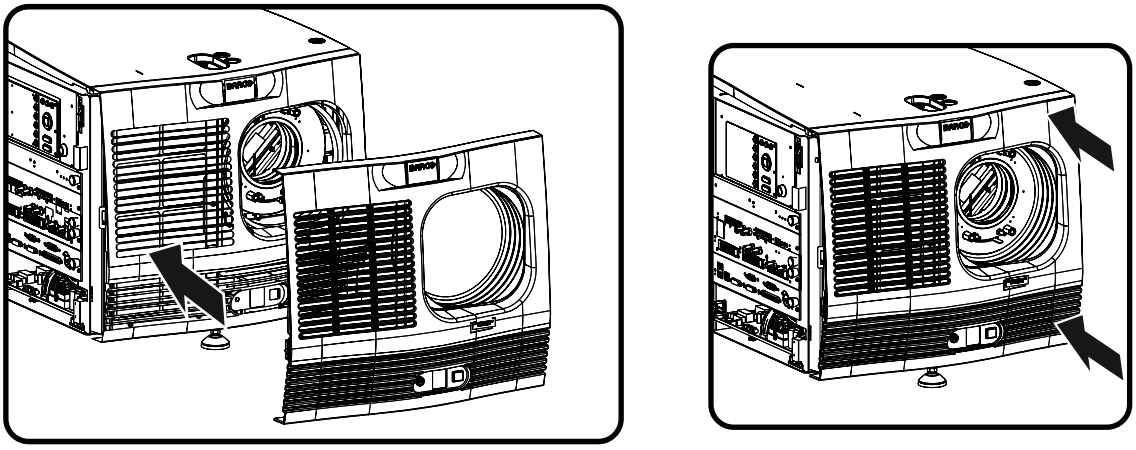


Image 14-17

3. Secure the front cover by locking the captive screw in the middle at the bottom of the front cover.
4. Reinstall the rubber dust ring around the lens holder.

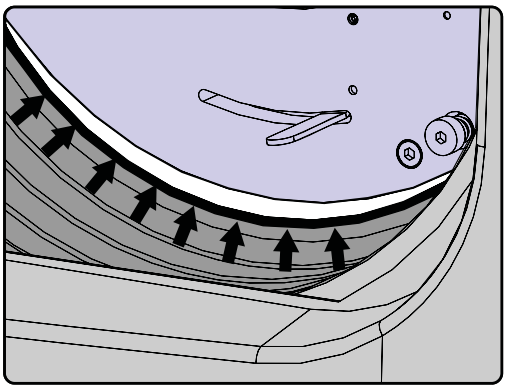


Image 14-18

15. PREVENTATIVE MAINTENANCE ACTIONS

Maintenance program

The maintenance program is subdivided in time frames. The maintenance actions described in this chapter can be done by a trained projectionist. Note that there are also annually and 4 yearly maintenance actions (not included in this manual) which must be done by certified service personnel who are familiar with potential hazards of the product and all product safety checks. Contact your service partner for more information about maintenance services.

Overview

- 1 month maintenance actions
- 3 month maintenance actions

15.1 1 month maintenance actions

MAINTENANCE TYPE A (perform every month)

The 1 month maintenance actions, listed below, may be performed by a trained projectionist who is familiar with potential hazards associated with the product.

No.	Maintenance action	Remarks
1	**Check** both dust **filters** of the projector for **dust** and **grease**. Grease on the filter can build up after several months in an environment contaminated with greasy air. Note that areas where popcorn is consumed are subject to greasy air. • If the filters are contaminated with **dust** than cleaning the filters with a **vacuum cleaner** should be sufficient. • In case the filters feel **greasy** than the filters must be **washed**. Take into account that the time needed to dry the dust filters may be 24 hours or more. For that, it's recommended to have a second set of dust filters which can be used while cleaning the first set.	Replace damaged filters immediately. See procedures "Check the front dust filter", page 129, and "Check the dust filter on the bottom side", page 130. To speed-up drying, allow the filter(s) to dry at 50°C max in a well ventilated room.
2	Check the surface of the lens output side for dust. (it is not needed to remove the lens from the projector). Only clean if necessary.	Clean the lens output side in case dust is clearly visible upon the surface. **Note:** if the lens was removed from the projector, a manual "Lens Home & Return" action must be executed to calibrate the position of the lens in relation to the Lens Holder. This way the references of the existing 'lens files' remain valid. See user guide of the Communicator software.
3	Check the porthole (both sides) for dust.	Clean the porthole in case dust is clearly visible upon the surface. Use an optical cloth.

15.2 3 month maintenance actions

MAINTENANCE TYPE B (perform every three months)

The 3 month maintenance actions, listed below, may be performed by a trained projectionist who is familiar with potential hazards associated with the product.

No.	Maintenance action	Remarks
1	**Check** dust **filters** of cooler for **dust** and **grease**. Grease on the filter can build up after several months in an environment contaminated with greasy air. Note that areas where popcorn is consumed are subject to greasy air. • If the filters are contaminated with **dust** than cleaning the filters with a **vacuum cleaner** should be sufficient. • In case the filters feel **greasy** than the filters must be **washed**. Take into account that the time needed to dry the dust filters may be 24 hours or more. For that, it's recommended to have a second set of dust filters which can be used while cleaning the first set.	Replace damaged filters immediately. See procedures "Check the cooler dust filters", page 131. To speed-up drying, allow the filter(s) to dry at 50°C max in a well ventilated room.
2	Clean the back/side air inlet vents.	Use a vacuum cleaner.
3	Clean the housing of your projector.	Removal overall dust accumulation on projector covers. See cleaning instructions in this manual.
4	Clean the cooler housing	Remove all dust accumulation on the cooler housing and especially cleaning the area in proximity of the air inlets. Remove the dust from the fans below the filter inlets. Pay special attention to cleaning these fans if the cooler is installed above the projector because, due to the heat, this location has a greatest potential for dust accumulation.
5	Verify the internal clock of the ICMP with real time clock. Correct if needed.	ICMP version 1.2.1 is required at least. Communicator version 5.0 or higher is required. See user guide of Communicator for detailed instructions.

16. MAINTENANCE

Overview

- Check the front dust filter
- Check the dust filter on the bottom side
- Check the cooler dust filters
- Vacuum cleaning of the dust filters
- Washing and drying the dust filters
- Hazards
- Cleaning the lens
- Cleaning the exterior of the projector
- Check cooling liquid level of the projector
- Authorization to clear security warning on the projector

The air filters should be cleaned monthly under normal environment conditions. Equipment in very dusty or otherwise contaminated areas may require more frequent maintenance.

If the air filters are not regularly cleaned, the air flow inside the projector could be disrupted and cause overheating. Overheating may lead to the projector shutting down during operation.

All air filters in the projector and/or cooler can be cleaned by washing in a dish wash or by following the procedure "Washing and drying the dust filters", page 133.

16.1 Check the front dust filter

How to check

1. Remove the input cover of the projector, "Removal of the light unit cover and input covers", page 119.
2. Release the captive screw of the front cover.
   Pull the left side of the front cover 5 centimeters forwards. There is no need to remove the cover completely.

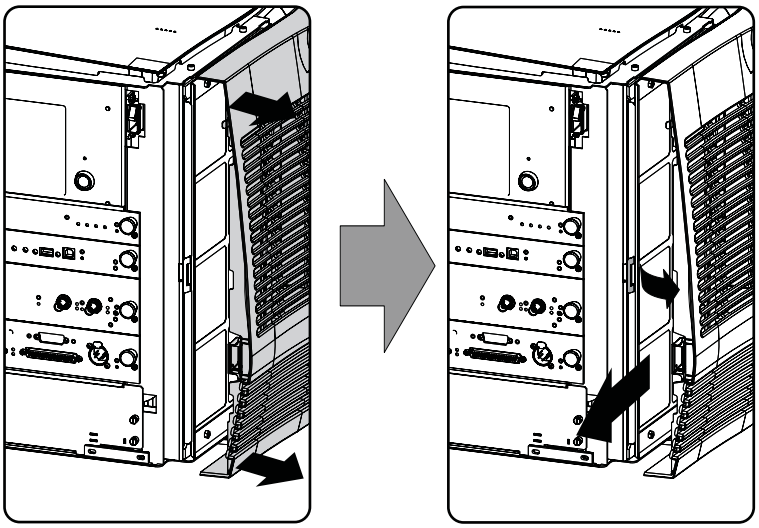


Image 16-1
Dust filter access

3. Pull the small handle a little backwards and then to the front of the projector until the filter frame is released.
4. Slide the filter to the left.

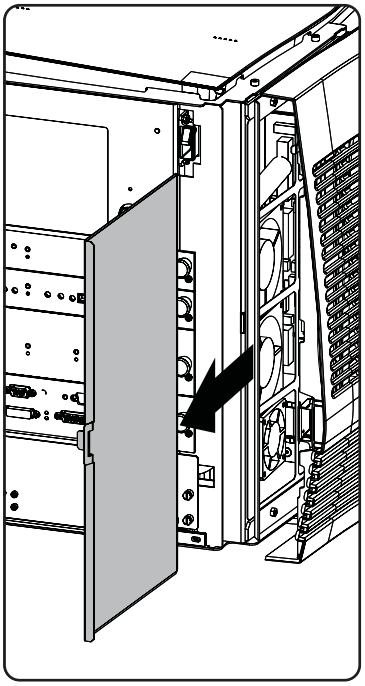


Image 16-2
Dust filter removal

5. **Check** the “air in” side of the dust filter for **dust** and/or **grease**.
   In case the filter is contaminated with grease wash and dry the dust filter. See cleaning procedure "Washing and drying the dust filters", page 133.
   In case the filter contains dust but doesn’t feel greasy then vacuum clean the dust filter. See procedure "Vacuum cleaning of the dust filters", page 132.
   Note: *Grease on the filter can build up after several months in an environment contaminated with greasy air. Note that areas where popcorn is consumed are subject to greasy air.*

   Tip: *Take into account that the time needed to dry the dust filters may 24 hours or more. For that, it’s recommended to have a second set of dust filters which can be used while cleaning the first set.*
6. Insert a clean dust filter with the handle to the projector side.
   Caution: *UNDER NO CIRCUMSTANCES SHOULD WET FILTERS BE INSTALLED BACK INTO THE PROJECTOR. THIS CAN HAVE SERIOUS SAFETY CONSEQUENCES AS WELL AS JEOPARDIZE THE INTERNAL OPTICS OF THE SYSTEM.*
7. Pull the handle a little backward, push the filter completely in. Release the handle so that it jumps in its lock.

16.2 Check the dust filter on the bottom side

How to check

1. Remove the side cover, see "Removal of the side cover", page 118.
2. Release the dust filter by pushing the handle a little bit downwards.

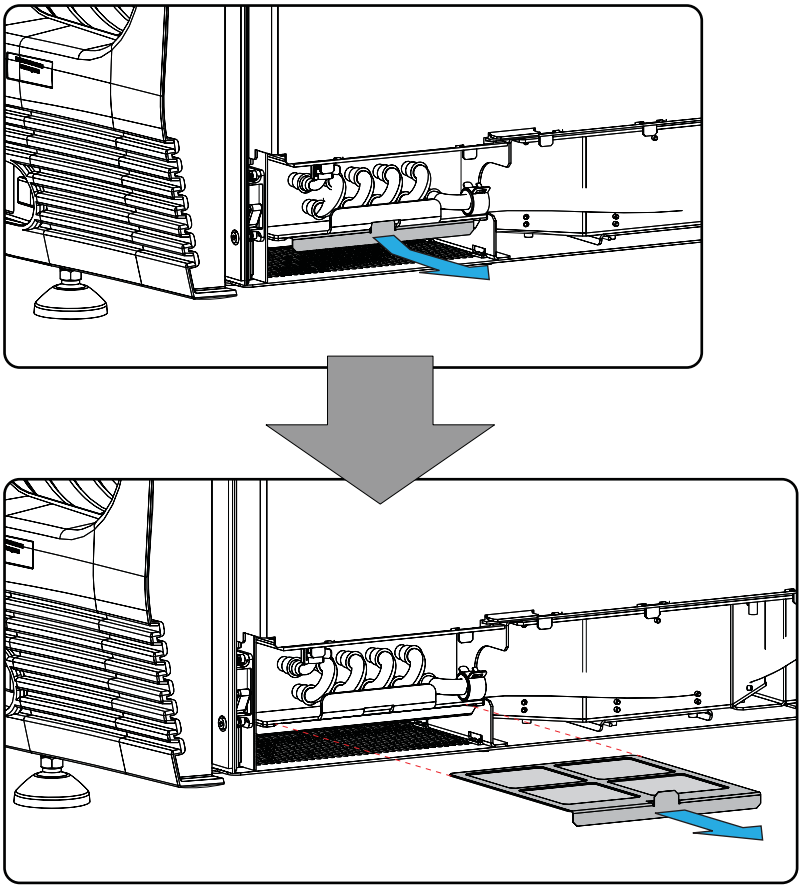


Image 16-3
Bottom dust filter

3. Pull out the dust filter.
4. **Check** the “air in” side of the dust filter for **dust** and/or **grease**.
   In case the filter is contaminated with grease wash and dry the dust filter. See cleaning procedure "Washing and drying the dust filters", page 133.
   In case the filter contains dust but doesn’t feel greasy then vacuum clean the dust filter. See procedure "Vacuum cleaning of the dust filters", page 132.
   Note: *Grease on the filter can build up after several months in an environment contaminated with greasy air. Note that areas where popcorn is consumed are subject to greasy air.*

   Tip: *Take into account that the time needed to dry the dust filters may be 24 hours or more. For that, it’s recommended to have a second set of dust filters which can be used while cleaning the first set.*
5. Insert a clean dust filter with the locking lip facing up.
   Caution: *UNDER NO CIRCUMSTANCES SHOULD WET FILTERS BE INSTALLED BACK INTO THE PROJECTOR. THIS CAN HAVE SERIOUS SAFETY CONSEQUENCES AS WELL AS JEOPARDIZE THE INTERNAL OPTICS OF THE SYSTEM.*
6. Push the handle a little downwards and insert the filter completely. Release the handle so that it jumps in to its lock.

16.3 Check the cooler dust filters

How to check

1. Remove both fixation screws (captive screws) and take off the cover plate.

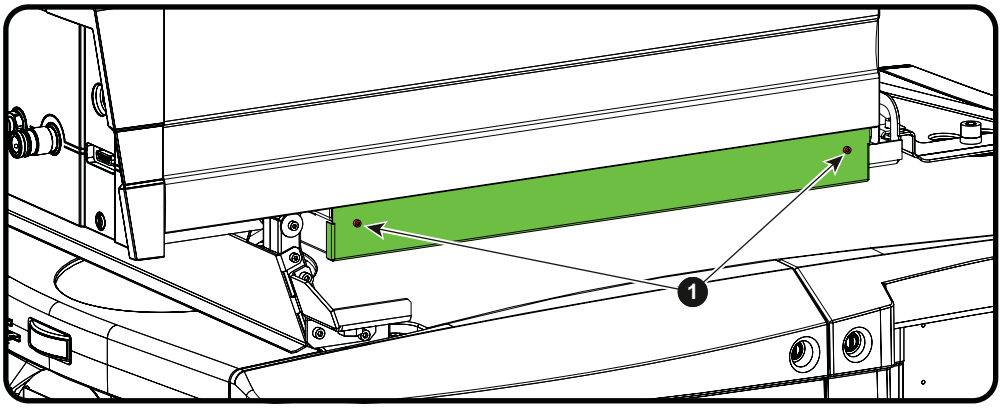


Image 16-4

2. Slide out the filter.

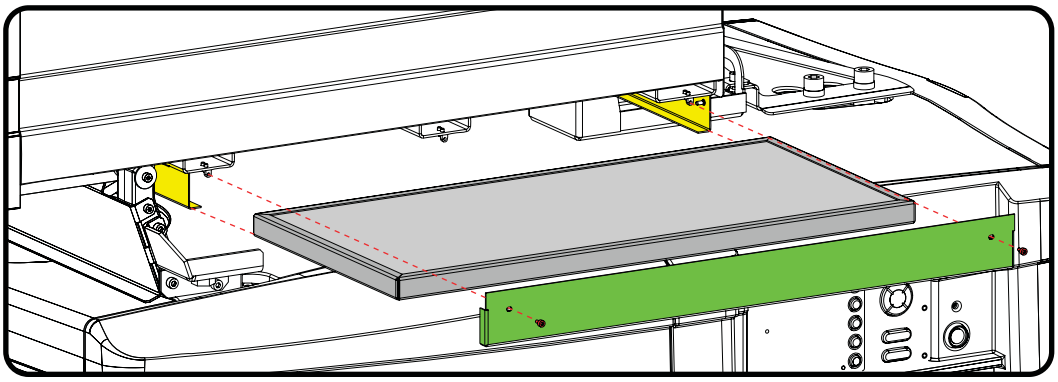


Image 16-5

3. **Check** the “air in” side of the dust filter for **dust** and/or **grease**.
   In case the filter is contaminated with grease wash and dry the dust filter. See cleaning procedure "Washing and drying the dust filters", page 133.
   In case the filter contains dust but doesn’t feel greasy then clean these filters with compressed air. These filters are not fragile and this method is more easier.
   If an air compressor is not available, use vacuum to clean the dust filter. See procedure "Vacuum cleaning of the dust filters", page 132.
   Note: *Grease on the filter can build up after several months in an environment contaminated with greasy air. Note that areas where popcorn is consumed are subject to greasy air.*

   Tip: *Take into account that the time needed to dry the dust filters may be 24 hours or more. For that, it’s recommended to have a second set of dust filters which can be used while cleaning the first set.*

4. While the filters are removed, pivot the cooling unit to check the fans for dust. Remove that dust if necessary.
   Note: *Do not neglect this step. Removing dust from the fans must be checked/cleaned regularly. Pay special attention to cleaning these fans if the cooler is installed above the projector because, due to the heat, this location has a greatest potential for dust accumulation.*

5. Insert a clean dust filter and mount cover plate.

16.4 Vacuum cleaning of the dust filters

When vacuum the dust filters?

The dust filters should be checked every month. If the filters are contaminated with dust then cleaning the filters with a vacuum cleaner should be sufficient. In case the filters feel greasy these must be washed. See cleaning procedure "Washing and drying the dust filters", page 133.

Grease on the filter can build up after several months in an environment contaminated with greasy air. Note that areas where popcorn is consumed are subject to greasy air.

This procedure assumes that the dust filters are removed from their slots.

Necessary tools

Vacuum cleaner with soft brush suction nuzzle.

How to vacuum-clean the dust filter?

1. Carefully vacuum the air inlet side of the dust filter. Use a vacuum cleaner with a soft brush suction nuzzle. The air inlet side of the dust filter is the side which is surrounded with a glue edge.
   Tip: *Lightly tap the filter on its dusty side to expel heavy dust contamination.*

   Tip: *Compressed air is also permitted to clean the filters but take care not to damage them.*

   Caution: *Do not damage the dust filter. Replace damaged dust filters immediately.*

16.5 Washing and drying the dust filters

About filter washing and drying

For environments where popcorn grease and such can contaminate the filters, Barco advises the client to purchase one extra set of filters to cover drying time, as well as taking following extra precautions and instructions pertaining to filter cleaning and drying.

Cleansing agent

To clean sticky, greasy dust filters we suggest usage of **Sodium carbonate** crystals (Na_2CO_3). Sodium carbonate (Often called **washing soda**, **soda crystals**, or **sal soda** in the detergent section of stores) is widely used to effectively remove oil, grease, alcohol stains … The product itself is relatively safe, sodium carbonate is used in toothpastes and as a food additive (E500). Potential Hazards are described in the section "Hazards", page 134.

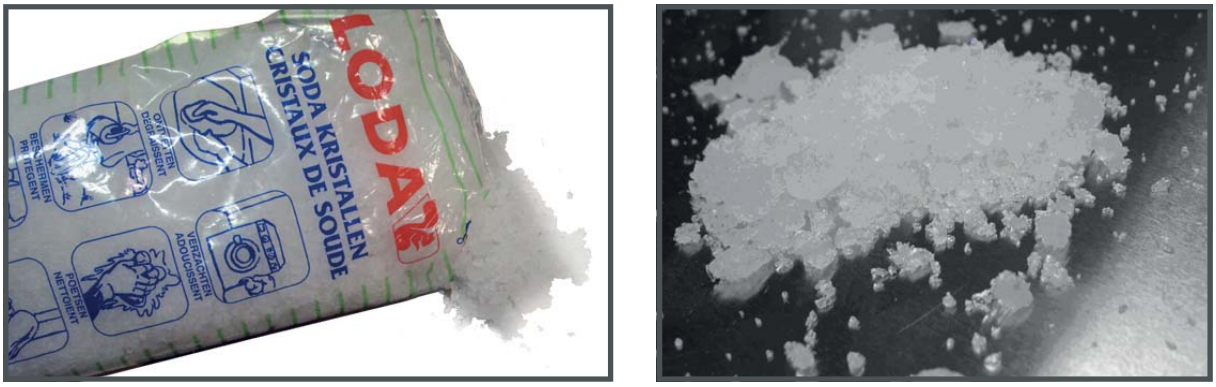


Image 16-6
Sodium carbonate crystals.

This cleaning procedure assumes that the filters are already removed from their slots.

Take into account that the time needed to dry the dust filters may be 24 hours or more. For that, it's recommended to have a second set of dust filters which can be used while cleaning the first set.

Necessary tools

- Bucket with hot water.
- Sodium carbonate, 30 gram (handful) per liter hot water.

How to wash and dry the dust filters?

1. Make a solution with a ratio of 30 gram (a handful) sodium carbonate to 1 liter **hot water**.
2. Soak the dust filters in the solution for **30 to 60 minutes**. The grease should be dissolved after 1 hour.

3. If the dust filter is still clogged repeat this procedure from step 1.
4. Rinse the dust filters with clean water to flush all grease residue away.
5. Shake out all excess liquid by repeatedly swinging the filter to-and-fro in a centrifugal action.
6. Then allow the filters to **dry thoroughly**. Typically this can take up to 24h and more, depending on the drying conditions.
   Note: *Drying time of the dust filters can be up to 24h or more. Drying time can be shorter when being done in a well-ventilated area.*

   Tip: *To speed-up drying, allow the filter(s) to dry at 50°C max in a well ventilated room.*

CAUTION: UNDER NO CIRCUMSTANCES SHOULD WET FILTERS BE INSTALLED BACK INTO THE PROJECTOR. THIS CAN HAVE SERIOUS SAFETY CONSEQUENCES AS WELL AS JEOPARDIZE THE INTERNAL OPTICS OF THE SYSTEM.

CAUTION: Do not install/use damaged dust filters. Replace damaged dust filters immediately with new dust filters of the same type. See https://my.barco.com for replacement part

16.6 Hazards

Safety notice Sodium Carbonate (Na_2CO_3)

According to the Material Safety Data Sheet (MSDS), Sodium Carbonate could cause the following hazards:

- Potential Acute Health Effects: Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation (lung irritant).
- Potential Chronic Health Effects: Slightly hazardous in case of skin contact (sensitizer). The substance may be toxic to upper respiratory tract, skin, eyes. Repeated or prolonged exposure to the substance can produce target organ damage.

More info about the product can be found on website of “unep” or the link below:

http://www.chem.unep.ch/irptc/sids/oecdsids/Naco.pdf

16.7 Cleaning the lens

To minimize the possibility of damage to optical coatings, or scratches to lens surfaces follow the cleaning procedure as described here precisely.

Necessary tools

- Compressed air.
- Clean Toraysee® cloth or any micro fiber lens cleaning cloth.
- Clean cotton cloth.

Necessary parts

Lens cleaner (e.g. Carl Zeiss lens cleaner or Purasol® or any water-based lens cleaner)

How to clean the lens?

1. Blow off dust with clean compressed air (or pressurized air cans[4]) .
2. Clean with lens cleaner together with a clean lens cleaning cloth to remove the dust and contamination. Use big wipes in one single direction.
   Warning: *Do not wipe back and forwards across the lens surface as this tends to grind dirt into the coating.*
3. Use a dry lens cleaning cloth to remove left liquid or stripes. Polish with small circles.
4. If there are still fingerprints on the surface, wipe them off with lens cleaner together with a clean lens cleaning cloth. Polish again with a dry one.

4. Pressurized air cans are not efficient if there is too much dust on the surface, the pressure is too low

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

16.8 Cleaning the exterior of the projector

How to clean the exterior of the projector ?

1. Switch off the projector and unplug the projector from the mains power net.
2. 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.

16.9 Check cooling liquid level of the projector

What should be done

The projector is liquid cooled. It is important that the liquid level is checked at regular intervals. We advise to check every 3 months. The liquid level must be between min. and max. Significant drop in liquid level indicates a major leakage and requires immediate attention.

How to check

1. Remove the side cover on the light processor side, see "Removal of the side cover", page 118.
2. Look through the small window in the security cover of the light processor and check the liquid cooling level in the reservoir.

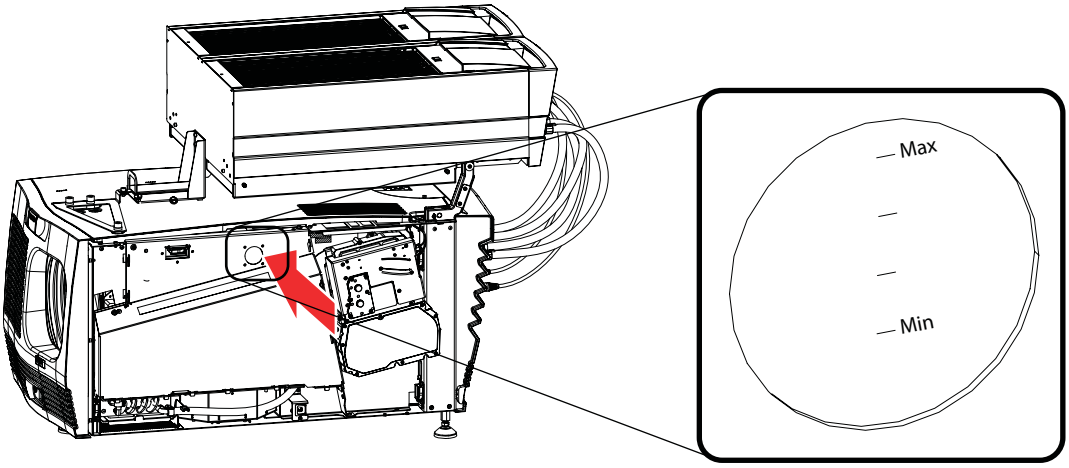


Image 16-7

If the current liquid cooling level is somewhere between **Min** and **Max**, then no action should be taken.

If the current liquid cooling level is lower than **Min**, than check for leakage in the cooling system.

16.10 Authorization to clear security warning on the projector

When is an authorization required to clear the security warning?

If a module has been removed or if the sealed compartment has been opened, an authorization will be required to clear the security warning.

Necessary tools

- Security key (Dallas iButton®).
- Authorization pin code.

Authorization procedure to clear security warning

1. Ensure that all modules are properly installed.

2. Start up the projector (standby mode).
3. Initiate authorization by holding the security key in the security socket D..

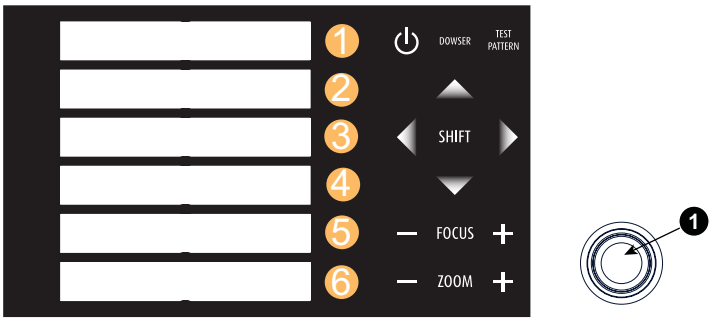


Image 16-8
Keypad

The color of the backlight of the numeric keys 1 to 6 of the local keypad changes from blue to yellow.

4. Enter pin code within 5 seconds.
   - In case no keys are pressed, the color of the backlight of the numeric keys 1 to 6 changes back to blue.
   - In case of an **incorrect code** entry, the color of the backlight of the numeric keys changes to **red** for 1 second and then back to blue.
   - In case of a **correct code** entry, the color of the backlight of the numeric keys 1 to 10 changes to **green** for 1 second and then back to blue.

Each attempt to clear the security warning and its result (successfully or unsuccessfully) is logged inside the projector.

17. SPECIFICATIONS

17.1 Specifications

Overview DP2K-20CLP

Resolution	2,048 x 1,080
Brightness	20,000 lumens (typical)
Native contrast ratio	Up to 2,400:1
Prime lenses	1.2-1.8; 1.4-2.05; 1.6-2.5; 1.95-3.2; 2.4-3.9
Long-term brightness stability	50% decrease during a runtime of 30,000 hrs @ 25°C at average use conditions
Dimensions (WxLxH)	Projector: 694 x 1,034 x 558 mm / 27.3 x 40.7 x 22 inches Cooler: 561.5 x 738.5 x 348 mm / 22.11 x 29.07 x 13.7 inches
Weight	Projector: 110kg (243 lb) Cooler: 32kg (70.6 lb)
Cooling liquid hose length	0.5m (1.6ft) and 5m (16.4ft)
Vertical separation between cooler and projector	Maximum 3m (10ft) (higher or lower)
Power requirements	Projector: single phase 200-240V 16A Cooler: obtains power from the projector
Ambient temperature	35°C (95°F) Max. (projector and cooler)
Ambient humidity	85% Max. (projector and cooler)
Power consumption	Projector (incl. cooler) @ full laser power: 2.85 kW Projector (incl. cooler) @ half laser power: 1.7 kW
Noise Level	dB(A) @ 1 m: 67.6 dB(A) 62 dB(A) (half fan speed)
Media server	Barco Alchemy ICMP and other IMB brands supported.
3D systems	Active glasses systems and polarization systems on silver sceens are supported. Color separation systems (Dolby3D and 6P) are not supported.
Safety requirements	Show safety: the customer shall take precaution for the laser safety (respect the hazard distance and separation height) according to local laser show safety regulations. Workplace safety: the customer shall take precaution for: • workplace safety as prescribed by the local authorities • basic laser safety training for operators • laser safety program implementation in the company; • access limitation only to trained personnel: area labelling, etc.

Overview DP2K-15CLP

Resolution	2,048 x 1,080
Brightness	15,000 lumens (typical)
Native contrast ratio	Up to 2,400:1
Prime lenses	1.2-1.8; 1.4-2.05; 1.6-2.5; 1.95-3.2; 2.4-3.9
Long-term brightness stability	50% decrease during a runtime of 30,000 hrs @ 25°C at average use conditions
Dimensions (WxLxH)	Projector: 694 x 1,034 x 558 mm / 27.3 x 40.7 x 22 inches Cooler: 561.5 x 738.5 x 348 mm / 22.11 x 29.07 x 13.7 inches
Weight	Projector: 110kg (243 lb) Cooler: 32kg (70.6 lb)

Cooling liquid hose length	0.5m (1.6ft) and 5m (16.4ft)
Vertical separation between cooler and projector	Maximum 3m (10ft) (higher or lower)
Power requirements	Projector: single phase 200-240V 14A Cooler: obtains power from the projector
Ambient temperature	35°C (95°F) Max. (projector and cooler)
Ambient humidity	85% Max. (projector and cooler)
Power consumption	Projector (incl. cooler) @ full laser power: 2.3 kW Projector (incl. cooler) @ half laser power: 1.35 kW
Media server	Barco Alchemy ICMP and other IMB brands supported.
Noise Level	dB(A) @ 1 m: 67.6 dB(A) 62 dB(A) (half fan speed)
3D systems	Active glasses systems and polarization systems on silver sceens are supported. Color separation systems (Dolby3D and 6P) are not supported.
Safety requirements	Show safety: the customer shall take precaution for the laser safety (respect the hazard distance and separation height) according to local laser show safety regulations. Workplace safety: the customer shall take precaution for: • workplace safety as prescribed by the local authorities • basic laser safety training for operators • laser safety program implementation in the company; • access limitation only to trained personnel: area labelling, etc.

17.2 Dimensions of the DP2K CLP series projector

Dimensions

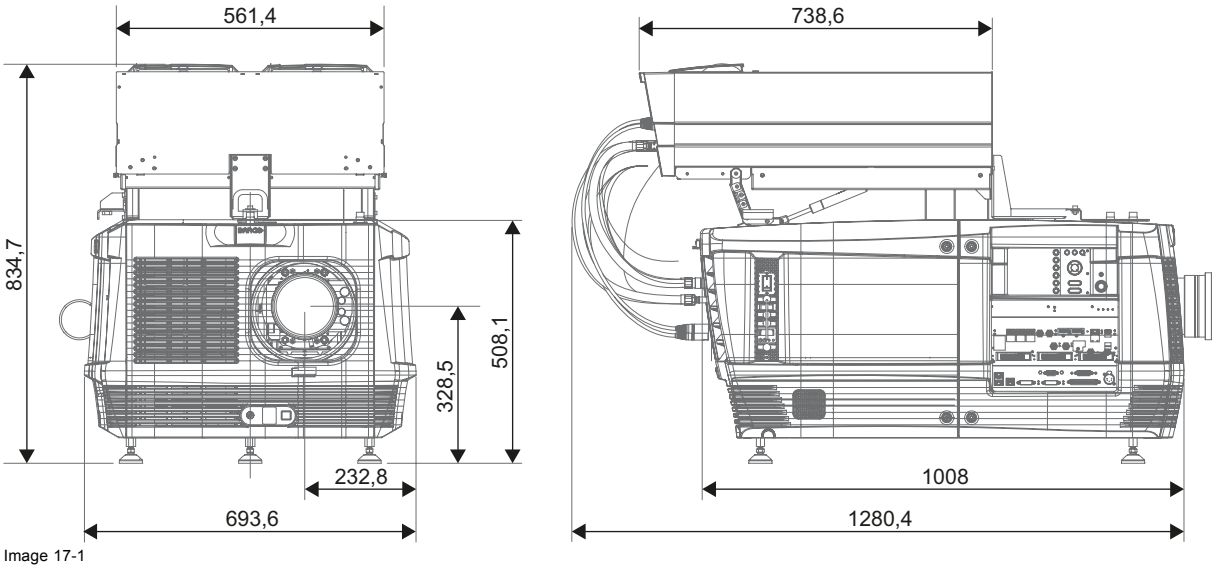


Image 17-1

17.3 Dimensions of the universal pedestal

Dimensions

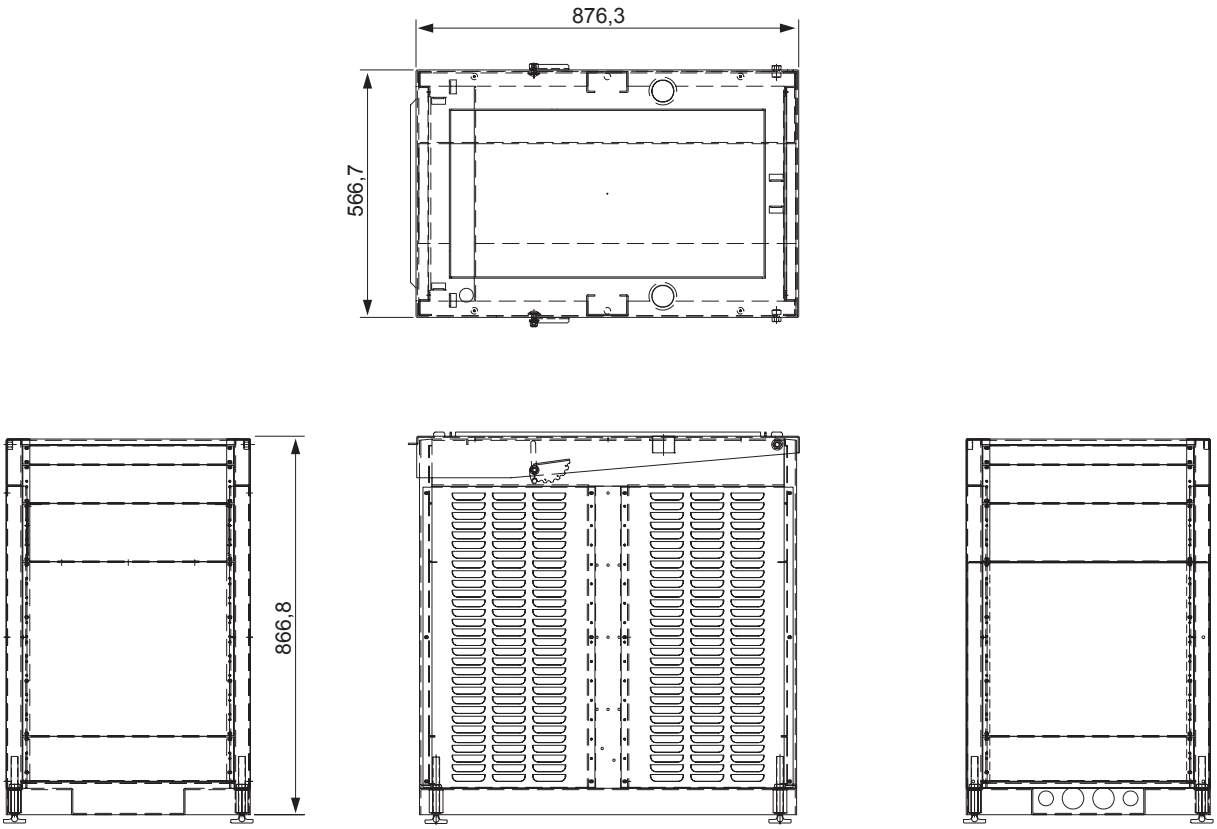


Image 17-2
Dimensions given in millimeters.

17.4 Projector air inlets and outlets

Air inlets and outlets

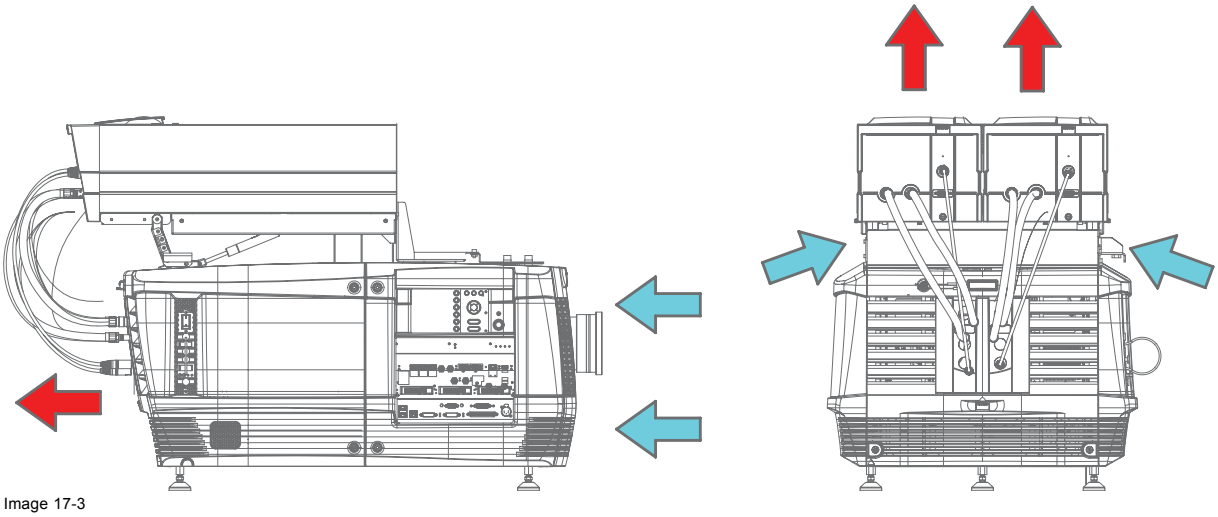


Image 17-3

17.5 Technical Regulations

Certificates

Image 17-4
EAC mark

Image 17-5
Rohs

Image 17-6
Rohs OK

Image 17-7
CE mark

Image 17-8
ETL mark

Image 17-9
CCC mark

Image 17-10
FCC label

18. PIN CONFIGURATIONS

Overview

- About General Purpose Inputs & Outputs (GPIO)
- Pin configurations of the communication ports
- Pin configurations of the ICMP communication ports
- Pin configurations of the inputs

18.1 About General Purpose Inputs & Outputs (GPIO)

The Barco Cinema Controller and the Barco ICMP are equipped with GPIO ports. The electrical specifications described in this chapter are the same for both GPIO ports.

General Purpose inputs

The Barco Cinema Controller and the Barco ICMP have each eight (8) opto-isolated general purpose inputs available. These inputs are used to trigger the execution of macro files. For more explanation about the association of a macro to a GPI, consult the user guide of the Communicator.

Input voltage

The inputs can be directly driven from a TTL or CMOS output.

- The shape of the pulse must be rectangular.
- The duration of the pulse must be at least 50 milliseconds (shorter pulses are considered as a switch bounce)
- Minimum voltage : V_{min} = +5V
- Maximum voltage : V_{max} = +18V

External power supply

When interfacing with contact closure outputs, an external power supply needs to be provided. Depending upon the configuration a suitable pull-up resistor needs to be added as well.

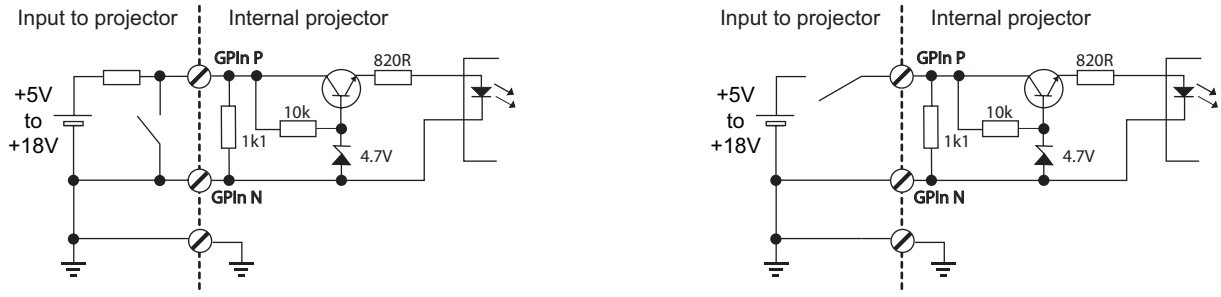


Image 18-1

Cables

When long cable connections are required the use of shielded cables with twisted pairs is recommended. One twisted pair is to be assigned to each GP Input pair.

How to make the connection

When the power supply used to provide the DC voltage is isolated from ground (for example in the case of an AC adapter) it is recommended that the minus pole of that power supply is connected to ground (or to the projector chassis). This will avoid high common mode voltages at the projector GP Inputs. If that same power supply is used for other parts of the system, take care not to create ground loops. In any case when shielded cables are used that shield should be connected to the projector chassis.

General Purpose outputs

The Barco Cinema Controller and the Barco ICMP have each eight (8) opto-isolated outputs available. Four (4) of the outputs on the Cinema Controller are dedicated for TI. The other general purpose outputs can be controlled via software.

About an output

The output can generate a falling edge, rising edge, toggle or continuous toggle.

- **Generate Falling Edge** – generate a falling edge on the external GPO port if the present state of the output is high. If the present state of the external GPO is low, no edge will be generated.
- **Generate Rising Edge** – generate a rising edge on the external GPO port if the present state of the output is low. If the present state of the external GPO is high, no edge will be generated.
- **Generate Toggle** – generate a toggle on the external GPO port. If the present state of the output is low, a rising edge will be generated, followed by a falling edge. If the present state of the output is high, a falling edge will be generated, followed by a rising edge. Pulse width = 20 milliseconds.
- **Generate Continuous Toggle** - This command will generate a continuous toggle of the external GPO port. This toggle will continue until a *Generate Falling Edge*, *Generate Rising Edge*, or *Generate Toggle* command is received. The rate of toggle is 24Hz. .

Output transistor

- Maximum output driving voltage : V_{max} = 18 V
- Maximum current : I_{max} = 30 mA
- Maximum power dissipation : 120 mW

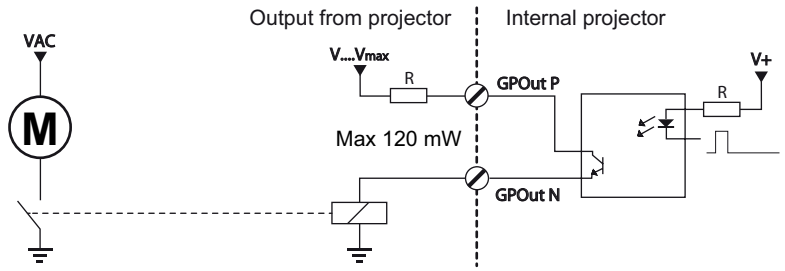


Image 18-2

When the GPO driver inside the projector becomes powerless the GPO state changes to the default state. The default GPO state depends on the external system connected with the GPO port (pull-up or pull-down circuitry).

GPIO and projector Sleep mode

In case the projector is equipped with a “Sleep” mode (e.g. DP2K S series): Enter or leave Sleep mode can be done with GPIO of the Cinema Controller via two predefined Macros (not editable). Not with the GPIO of the ICMP.

The GPO signals of the ICMP will return to their default output level when the projector is switched to Sleep mode. This could generate unexpected "Falling Edge" triggers at the output pins. Also when awakening the projector (from Sleep mode to Standby mode) the GPO signals of the ICMP may generate unexpected "Rising Edge" events.

GPO and projector switching On or Off

The GPO signals of the Cinema Controller and ICMP will return to their default output level when the projector is switched to power-off. This could generate unexpected "Falling Edge" triggers at the output pins. Also during power-on the GPO signals may generate unexpected "Rising Edge" events.

18.2 Pin configurations of the communication ports

RS232IN

RS232 IN			
1	-	6	-
2 RXE-	Receive Data (RD or RX or RXD)	7	-
3 TXE-	Transmitted Data (TD or TX or TXD)	8	-
4	-	9	-
5 GND	Signal Ground (GND)	-	-

General Purpose IN/OUT

General Purpose In/Out			
1	3D Input Reference P	20	3D Input Reference N
2	3D Display Reference P	21	3D Display Reference N

General Purpose In/Out			
3	GPIN 3 P (reserved)	22	GPIN 3 N (reserved)
4	GPIN 4 P (reserved)	23	GPIN 4 N (reserved)
5	GPIN 5 P	24	GPIN 5 N
6	GPIN 6 P	25	GPIN 6 N
7	GPIN 7 P	26	GPIN 7 N
8	GPIN 8 P	27	GPIN 8 N
9	3D Output Reference P	28	3D Output Reference N
10	GPOUT 2 P (reserved)	29	GPOUT 2 N (reserved)
11	GPOUT 3 P (reserved)	30	GPOUT 3 N (reserved)
12	GPOUT 4 P	31	GPOUT 4 N
13	GPOUT 5 P	32	GPOUT 5 N
14	GPOUT 6 P	33	GPOUT 6 N
15	GPOUT 7 P	34	GPOUT 7 N
16	GPOUT 8 P	35	GPOUT 8 N
17	reserved	36	reserved
18	reserved	37	reserved
19	reserved		

Ethernet port

			10/100 Base-T — RJ45 port	1000 Base-T — RJ45 port
Pin	**Pair**	**Color**	**Description**	**Description**
1	3	white/green	TXD+	TX0+
2	3	green	TXD-	TX0-
3	2	white/orange	RXD+	RX0+
4	1	blue	—	TX1+
5	1	white/blue	—	TX1-
6	2	orange	RXD-	RX0-
7	4	white/brown	—	Rx1+
8	4	brown	—	RX1-

Peripheral Port

Pin	Name
1	+5V
2	SCL
3	SDA
4	+24V
5	GND

3D connector

Pin	Name	Pin	Name
1	+12V	9	+12V
2	Grnd	10	3D Input Reference -
3	Grnd	11	3D Display Reference +
4	RS232 RX	12	3D Display Reference -
5	RS232 TX	13	CONN_3D MODE -
6	CONN_3D_MODE +	14	CONN_SYNC -

Pin	Name	Pin	Name
7	CONN_SYNC +	15	-
8	3D Input Reference +		

18.3 Pin configurations of the ICMP communication ports

RJ-45 pin configuration

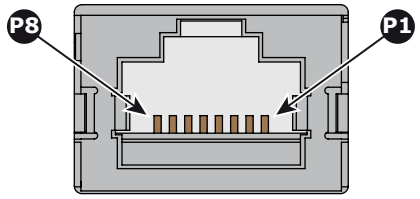


Image 18-3

Audio Channels:

AUDIO-AES 1-8		
Audio channel	**AES pair**	**RJ-45 pin**
1, 2	1 +	1
	1 -	2
3, 4	2 +	3
	2 -	6
5, 6	3 +	4
	3 -	5
7, 8	4 +	7
	4 -	8

AUDIO-AES 9-16		
Audio channel	**AES pair**	**RJ-45 pin**
9, 10	5 +	1
	5 -	2
11, 12	6 +	3
	6 -	6
13, 14	7 +	4
	7 -	5
15, 16	8 +	7
	8 -	8

General Purpose Output:

GPO 1-4	
Definition	**RJ-45 pin**
EXT_GPOUT_1_P	1
EXT_GPOUT_1_N	2
EXT_GPOUT_2_P	3
EXT_GPOUT_2_N	4
EXT_GPOUT_3_P	5
EXT_GPOUT_3_N	6

GPO 1-4	
Definition	**RJ-45 pin**
EXT_GPOUT_4_P	7
EXT_GPOUT_4_N	8

GPO 5-8	
Definition	**RJ-45 pin**
EXT_GPOUT_5_P	1
EXT_GPOUT_5_N	2
EXT_GPOUT_6_P	3
EXT_GPOUT_6_N	4
EXT_GPOUT_7_P	5
EXT_GPOUT_7_N	6
EXT_GPOUT_8_P	7
EXT_GPOUT_8_N	8

General Purpose Input:

GPI 1-4	
Definition	**RJ-45 pin**
EXT_GPIN_1_P	1
EXT_GPIN_1_N	2
EXT_GPIN_2_P	3
EXT_GPIN_2_N	4
EXT_GPIN_3_P	5
EXT_GPIN_3_N	6
EXT_GPIN_4_P	7
EXT_GPIN_4_N	8

GPI 5-8	
Definition	**RJ-45 pin**
EXT_GPIN_5_P	1
EXT_GPIN_5_N	2
EXT_GPIN_6_P	3
EXT_GPIN_6_N	4
EXT_GPIN_7_P	5
EXT_GPIN_7_N	6
EXT_GPIN_8_P	7
EXT_GPIN_8_N	8

About 568A and 568B on an Ethernet connector RJ-45

TIA/EIA-568A and -568B are two standards for connecting Category 3 and Category 5 wire to connectors. Both are appropriate for high speed data, though 568B is somewhat more common for installed wiring and 568A is more common in jumpers. There is no performance advantage either way. The only real difference between the two is the order in which the pairs are used (orange and green).

Hold a cable as if to plug it into a wall jack, the locking tab down (contacts facing you). The contacts are numbered 1-8 from left to right. Here's what you will see:

RJ-45 Pin Number (Left >Right copper side)	**568A**		**568B**		**AES -1-8**
1	White/Green			White/Orange	AES 1&2 +plus

RJ-45 Pin Number (Left >Right copper side)	568A		568B		AES -1-8
2	Green			Orange	AES 1&2 +minus
3	White/Orange			White/Green	AES 3&4 +plus
4	Blue			Blue	AES 5&6 +minus
5	White/Blue			White/Blue	AES 5&6 +plus
6	Orange			Green	AES 3&4 +minus
7	White/Brown			White/Brown	AES 7&8 +plus
8	Brown			Brown	AES 7&8 +minus

568A and 568B may be used interchangeably in a system SO LONG AS both ends of a given cable are terminated the same way.

568A + 568B wiring is a crossover cable.

568A + 568A wiring is a straight cable.

568B + 568B wiring is a straight cable.

The mapping of the channels is done according to the Ethernet wiring scheme and gives us 100 Ohm per pair.

18.4 Pin configurations of the inputs

DVI-D

DVI IN A & B							
1	RX2-	7	DDC Data	13	nc	19	RX0 Shield
2	RX2+	8	nc	14	+5V	20	nc
3	RX2 Shield	9	RX1-	15	GND	21	nc
4	nc	10	RX1+	16	Hot Plug Detect	22	TMDS Clock Shield
5	nc	11	RX1 Shield	17	RX0-	23	TMDS RXC+
6	DDC Clock	12	nc	18	RX0+	24	TMDS RXC-

GLOSSARY

***.pem**

Privacy-enhanced Electronic Mail. File format used to distribute digital signed certificates. Base64 encoded DER certificate, enclosed between "-----BEGIN CERTIFICATE-----" and "-----END CERTIFICATE-----"

3G-SDI

Serial Digital Interface (SDI) is a serial link standardized by ITU-R BT.656 and the Society of Motion Picture and Television Engineers (SMPTE). SDI transmits uncompressed digital video over 75-ohm coaxial cable within studios, and is seen on most professional video infrastructure equipment. The first revision of the standard, SMPTE 259M, was defined to carry digital representation of analog video such as NTSC and PAL over a serial interface and is more popularly known as standard-definition (SD) SDI. The data rate required to transmit SD SDI is 270 Mbps. With the advent of high-definition (HD) video standards such as 1080i and 720p, the interface was scaled to handle higher data rates of 1.485 Gbps. The 1.485-Gbps serial interface is commonly called the HD SDI interface and is defined by SMPTE 292M, using the same 75-ohm coaxial cable. Studios and other video production facilities have invested heavily on the hardware infrastructure for coaxial cable and have a vested interest in extending the life of their infrastructure. Fortunately, SMPTE recently ratified a new standard called SMPTE 424M that doubles the SDI data rates to 2.97 Gbps using the same 75-ohm coaxial cable. This new standard, also called 3-Gbps (3G)-SDI, enables higher resolution of picture quality required for 1080p and digital cinema.

Digital Cinema Initiatives (DCI)

DCI is a joint venture of Disney, Fox, Paramount, Sony Pictures Entertainment, Universal and Warner Bros. Studios. DCI's primary purpose is to establish and document voluntary specifications for an open architecture for digital cinema that ensures a uniform and high level of technical performance, reliability and quality control. Note that the DCI specification is not a standard. Standards for digital cinema are the domain of the Society of Motion Picture and Television Engineers (SMPTE). "DCI compliant" is a term used to describe products that conform to the DCI specification. Products that have been tested per the DCI Compliance Test Plan (CTP) are posted at the DCI compliance web site. Notably, DCI compliance does not require compliance to the full set of SMPTE DCP standards. A copy of the most recent DCI specification can be downloaded from the DCI website (http://dcimovies.com).

Digital Cinema Package (DCP)

A Digital Cinema Package (DCP) is a collection of digital files used to store and convey Digital Cinema (DC) audio, image, and data streams. The term has been defined by Digital Cinema Initiatives (DCI). General practice adopts a file structure that is organized into a number of usually multi-gigabyte size Material eXchange Format (MXF) files, which are separately used to store audio and video streams, and auxiliary index files in XML format. The MXF files contain streams that are compressed, encoded, and encrypted, in order to reduce the huge amount of required storage and to protect from unauthorized use. The image part is JPEG 2000 compressed, whereas the audio part is linear PCM. The adopted (optional) encryption standard is AES 128 bit in CBC mode. The newer SMPTE standards are used to conform the recommendations among different tool vendors and producers. Interop, the legacy DCP standard, is still required to be supported by DCP players.

DisplayPort

Digital display interface developed by the Video Electronics Standards Association (VESA). This royalty-free interface is primarily used to connect a video source to a display device such as a computer monitor, though it can also be used to transmit audio, USB, and other forms of data. VESA designed it to replace VGA, DVI, and FPD-Link. Backward compatibility to VGA and DVI by using active adapter dongles enables users to use DisplayPort fitted video sources without replacing existing display devices.

DVI

Digital Visual Interface is a display interface developed in response to the proliferation of digital flat panel displays.

The digital video connectivity standard that was developed by DDWG (Digital Display Work Group). This connection standard offers two different connectors: one with 24 pins that handles digital video signals only, and one with 29 pins that handles both digital and analog video. This standard uses TMDS (Transition Minimized Differential Signal) from Silicon Image and DDC (Display Data Channel) from VESA (Video Electronics Standards Association).

DVI can be single or dual link.

HDCP

High-bandwidth Digital Content Protection is a form of digital copy protection developed by Intel Corporation to prevent copying of digital audio and video content as it travels across DisplayPort, Digital Visual Interface (DVI), High-Definition Multimedia Interface (HDMI), Gigabit Video Interface (GVIF), or Unified Display Interface (UDI) connections, even if such copying would be permitted by fair use laws. The specification is proprietary, and implementing HDCP requires a license.

HDMI

HDMI (High-Definition Multimedia Interface) is a compact audio/video interface for transferring uncompressed video data and compressed/uncompressed digital audio data from a HDMI-compliant device ("the source device") to a compatible computer monitor, video projector, digital television, or digital audio device. HDMI is a digital replacement for existing analog video standards.

Key Delivery Message (KDM)

The security key for each movie is delivered in a unique KDM for each digital cinema server. The security key is encrypted within the KDM, which means that the delivery of a KDM to the wrong server or wrong location will not work, and thus such errors cannot compromise the security of the movie. The KDM is a small file, and is typically emailed to the exhibitor. To create the correct set of KDMs for a site requires knowledge of the digital certificate in the projection system´s media block.

Public Key Infrastructure (PKI)

PKI is a framework for creating a secure method for exchanging information based on public key cryptography. The foundation of a PKI is the certificate authority (**CA**), which issues digital certificates that authenticate the identity of organizations and individuals over a public system such as the Internet. The certificates are also used to sign messages, which ensures that messages have not been tampered with.

RS232

An Electronic Industries Association (EIA) serial digital interface standard specifying the characteristics of the communication path between two devices using either D-SUB 9 pins or D-SUB 25 pins connectors. This standard is used for relatively short-range communications and does not specify balanced control lines. RS-232 is a serial control standard with a set number of conductors, data rate, word length and type of connector to be used. The standard specifies component connection standards with regard to computer interface. It is also called RS-232-C, which is the third version of the RS-232 standard, and is functionally identical to the CCITT V.24 standard. Logical ’0’ is > + 3V, Logical ’1’ is < - 3V. The range between -3V and +3V is the transition zone.

Scheimpflug principle

The "plane of sharp focus" can be changed so that any plane can be brought into sharp focus. When the DMD plane and lens plane are parallel, the plane of sharp focus will also be parallel to these two planes. If, however, the lens plane is tilted with respect to the DMD plane, the plane of sharp focus will also be tilted according to geometrical and optical properties. The DMD plane, the principal lens plane and the sharp focus plane will intersect in a line below the projector for downward lens tilt.

SMPTE

Society of Motion Picture and Television Engineers - A global organization, based in the United States, that sets standards for baseband visual communications. This includes film as well as video standards.

Trusted Device List (TDL)

The Goal of the TDL is to maintain timely and accurate information on participating auditoriums so that participating subscribers can obtain information needed to issue KDMs. The TDL has several data sources: Device manufacturers, Exhibitors, Deployment Entities, Integrators, Service Providers (interacting with Exhibitors), regional authorities and Support.

USB

Universal Serial Bus (USB) is an industry standard developed in the mid-1990s that defines the cables, connectors and communications protocols used in a bus for connection, communication, and power supply between computers and electronic devices. **USB 2.0** (also called "Hi-Speed"), adding higher maximum signaling rate of 480 Mbit/s (effective throughput up to 35 MB/s or 280 Mbit/s), in addition to the "USB 1.x Full Speed" signaling rate of 12 Mbit/s.[16] USB 2.0 connectors are usually colored black. **USB 3.0** defines a new SuperSpeed mode with a signaling speed of 5 Gbit/s and a usable data rate of up to 4 Gbit/s (500 MB/s). A USB 3.0 port is usually colored blue, and is backwards compatible with USB 2.0.

INDEX

Numerics/Symbols

A

B

C

D

E

F

S

T

U

V

W

Z