

DPxK-19B/23B/P



User and Installation manual

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

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

EMC notices

EN55032/CISPR32 Class A MME (MultiMedia Equipment)

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

GB/T 9254 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.

BSMI Taiwan Class A statement:

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GNU-GPL code

If you would like a copy of the GPL source code contained in this product shipped to you on CD, please contact Barco. The cost of preparing and mailing a CD will be charged.

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Safety

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About this chapter

Read this chapter attentively. It contains important information to prevent personal injury while installing and using your DPxK B projector. Furthermore, it includes several cautions to prevent damage to your DPxK B projector. Ensure that you understand and follow all safety guidelines, safety instructions and warnings mentioned in this chapter before installing and using the DPxK B projector. After this chapter, additional “warnings” and “cautions” are given depending on the procedure. Read and follow these “warnings” and “cautions” as well.

Clarification of the term “DPxK B” used in this document

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

- DP2K-19B
- DP2K-23B
- DP2K-P
- DP4K-19B
- DP4K-23B
- DP4K-P



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

1.1 General considerations

General safety instructions


- Before operating this equipment please read this manual thoroughly and retain it for future reference.
- Installation and preliminary adjustments should be performed by qualified Barco personnel or by authorized Barco service dealers.
- All warnings on the projector and in the documentation manuals should be adhered to.
- All instructions for operating and use of this equipment must be followed precisely.
- All local installation codes should be adhered to.

Notice on safety


This equipment is built in accordance with the requirements of the applicable international safety standards. These safety standards impose important requirements on the use of safety critical components, materials and insulation, in order to protect the user or operator against risk of electric shock and energy hazard and having access to live parts. Safety standards also impose limits to the internal and external temperature rises, radiation levels, mechanical stability and strength, enclosure construction and protection against the risk of fire. Simulated single fault condition testing ensures the safety of the equipment to the user even when the equipment's normal operation fails.

Notice on optical radiation

Thermal retinal eye injury is possible when exposed within the Hazard Distance (HD). The HD is defined from the projection lens surface towards the position of the projected beam where the irradiance equals the maximum permissible exposure as described in the chapter "Hazard Distance".



WARNING: No direct exposure to the beam within the hazard distance shall be permitted, RG3 (Risk Group 3) IEC EN 62471-5:2015



CAUTION: Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Light beam related safety labels



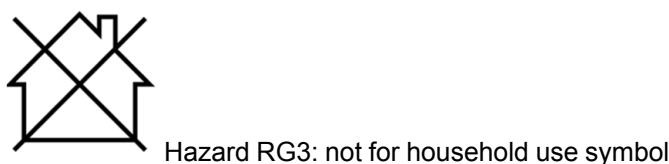
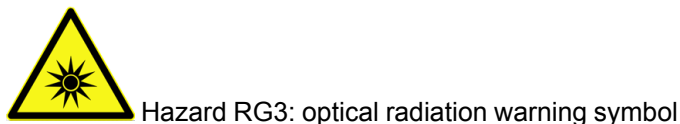
Image 1-1

WARNING! DO NOT LOOK INTO THE BEAM NO DIRECT EYE EXPOSURE TO THE BEAM IS PERMITTED RG3 IEC EN 62471-5:2015 HAZARD DISTANCE: CONSULT SAFETY MANUAL

ATTENTION! NE PAS REGARDER LE FAISCEAU EVITER TOUTE EXPOSITION DIRECTE DES YEUX AU FAISCEAU RG3 IEC EN 62471-5:2015 DISTANCE DE SECURITE: CONSULTER LE MANUEL DE SECURITE

警告！勿观看光束 眼睛勿直接接触可允许暴露的光束 RG3 IEC EN 62471-5:2015 危害距离：请参考安全手册

警告！请勿注视光源。禁止眼睛暴露在光源照射范围 RG3 IEC EN 62471-5:2015 危害距离：请参考安全手册。



Users definition

Throughout this manual, the terms SERVICE PERSONNEL and TRAINED PROJECTIONIST refers to persons having appropriate technical training and experience necessary to be knowledgeable of potential hazards to which they are exposed (including, but not limited to HIGH VOLTAGE ELECTRIC and ELECTRONIC CIRCUITRY and HIGH BRIGHTNESS PROJECTORS) in performing a task, and of measures to minimize the potential risk to themselves or other persons. The term USER and OPERATOR refers to any person other than SERVICE PERSONNEL or TRAINED PROJECTIONISTS, AUTHORIZED to operate professional projection systems.

The TRAINED PROJECTIONISTS may only perform the maintenance task described in the User & Installation manual. All other maintenance tasks and service tasks must be performed by qualified SERVICE PERSONNEL.

The DLP Cinema Systems are intended "FOR PROFESSIONAL USE ONLY" by AUTHORIZED PERSONNEL familiar with potential hazards associated with high voltage, high intensity light beams generated by lasers. Only qualified SERVICE PERSONNEL and TRAINED PROJECTIONISTS, knowledgeable of such risks, are allowed to perform service functions inside the product enclosure.

Restricted access location

To protect untrained persons and children, the projector must be installed in a **restricted access location**. The definition of a **restricted access location** is a location for equipment where both of the following paragraphs apply:

- Access can only be gained by skilled persons (installer or service personnel) or by operators who have been instructed and trained by a skilled person. The persons must have been instructed about the reasons for the restriction applied to the location and about the precautions that shall be taken.
- Access is only possible through the use of the tool or lock and key, or other means of security, and is controlled by the authority responsible for the location.

Why a restricted access location: This product uses an extremely high brightness lamp. No person is allowed to look directly into the lens or lamp. No person is also allowed to touch the exhaust system, due to hot exhaust air.

This shall be physically impossible by creating sufficient separation height or by placing optional barriers. Within the restricted area operator training is considered sufficient.

1.2 Important safety instructions

To prevent the risk of electrical shock

- This projector should be operated from an AC power source. Ensure that the mains voltage and capacity matches the projector electrical ratings. If you are unable to install the AC requirements, contact your electrician. Do not defeat the purpose of the grounding.
- Installation according to the local electrical code and regulations by qualified technical personnel only.
- This product is equipped with a three-terminal barrier strip for the connection of a mono phase power line with a separate earth ground PE. If you are unable to install the AC Requirements, contact your electrician. Do not defeat the purpose of the grounding.
- The cross-sectional area of the conductors in the power supply cord shall be not less than 4 mm² or AWG 10.
The cross-sectional area of the UPS inlet cord and external fan power cord shall be not less than 0.75 mm² or AWG 18.
- The electronics of the projector (UPS INLET) must be powered either from a suitable UPS unit or from the power outlet socket (UPS OUTLET) provided on the projector. An adapted short power cord (2-pole 3-wire grounding) is added to the projector accessories to loop through the power from UPS OUTLET to UPS INLET.
- The provided power output socket (UPS OUTLET) on the projector may only be used to provide power to the projector electronics. Never connect other devices to this power output socket.
- The exhaust fan outlet may only be used to power an external blower, maximum 3A.
- The building installation has to be provided with a circuit breaker of max. 40A to protect the complete unit.
- A readily accessible disconnect device must be incorporated externally to the equipment for removal of the power to the projector mains terminals.

- Disconnect the power to the projector mains terminals and unplug the power cord at UPS INLET for removal of all power from the projector.
- Warning: High leakage current. Earth connection essential before connecting supply.
- Do not allow anything to rest on the power cord. Do not locate this projector where persons will walk on the cord.
- Do not operate the projector with a damaged cord or if the projector has been dropped or damaged - until it has been examined and approved for operation by a qualified service technician.
- Position the cord so that it will not be tripped over, pulled, or contact hot surfaces.
- If an extension cord is necessary, a cord with a current rating at least equal to that of the projector should be used. A cord rated for less amperage than the projector may overheat.
- Never push objects of any kind into this projector through cabinet slots as they may touch dangerous voltage points or short circuit parts that could result in a risk of fire or electrical shock.
- Do not expose this projector to rain or moisture.
- Do not immerse or expose this projector in water or other liquids.
- Do not spill liquid of any kind on this projector.
- Should any liquid or solid object fall into the cabinet, unplug the set and have it checked by qualified service personnel before resuming operations.
- Do not disassemble this projector, always take it to an trained service person when service or repair work is required.
- Do not use an accessory attachment which is not recommended by the manufacturer.
- Lightning - For added protection for this video product during a lightning storm, or when it is left unattended and unused for long periods of time, remove all power from the projector. This will prevent damage to the projector due to lightning and AC power-line surges.

To prevent personal injury

- Isolate electrically before replacing the lamp or lamp house. Caution: Hot lamp (house).
- Caution: High pressure lamp may explode if improperly handled. Refer servicing to qualified service personnel.
- To prevent injury and physical damage, always read this manual and all labels on the system before inserting the lamp casing, powering the projector or adjusting the projector.
- To prevent injury, take note of the weight of the projector. Minimum 4 persons are needed to carry the projector.
- To prevent injury, ensure that the lens, exhausting system and all cover plates are correctly installed. See installation procedures.
- Warning: high intensity light beam. NEVER look into the lens ! High luminance could result in damage to the eye.
- **Warning: extremely high brightness lamps:** This projector uses extremely high brightness lamps. Never attempt to look directly into the lens or at the lamp. If the projection distance is less than 6 meter, any person needs to be at least 4 meters away from the projected image. Avoid close range reflection of the projected image on any reflecting surface (such as glass, metal, ...) . When operating the projector, we strongly recommend wearing suitable safety glasses.
- Before attempting to remove any of the projector's covers, disconnect to the projector mains terminals and unplug the power cord at UPS INLET for removal of all power from the projector.
- When required to remove all power from the projector, to access parts inside, always disconnect to the projector mains terminals and unplug the power cord at UPS INLET
- Do not place this equipment on an unstable cart, stand, or table. The product may fall, causing serious damage to it and possible injury to the user.
- It is hazardous to operate without lens or shield. Lenses, shields or ultra violet screens shall be changed if they have become visibly damaged to such an extent that their effectiveness is impaired. For example by cracks or deep scratches.
- **Warning: Protection from ultraviolet radiation:** Do not look directly in the light beam. The lamp contained in this product is an intense source of light and heat. One component of the light emitted from this lamp is ultraviolet light. Potential eye and skin hazards are present when the lamp is energized due to ultraviolet radiation. Avoid unnecessary exposure. Protect yourself and your employees by making them aware of the hazards and how to protect themselves. Protecting the skin can be accomplished by wearing tightly woven garments and gloves. Protecting the eyes from UV can be accomplished by wearing safety glasses that are designed to provide UV protection. In addition to the UV, the visible light from the lamp is intense and should also be considered when choosing protective eye wear.
- **Exposure to UV radiation:** Some medications are known to make individuals extra sensitive to UV radiation. The American Conference of Governmental Industrial Hygienists (ACGIH) recommends

occupational UV exposure for an-8 hour day to be less than 0,1 micro-watts per square centimeters of effective UV radiation. An evaluation of the workplace is advised to assure employees are not exposed to cumulative radiation levels exceeding these government guidelines.



WARNING: Never look into the exhaust output. High luminance and UV radiation could result in damage to the eye. The installation of an exhaust system is mandatory before operating the projector.

To prevent fire hazard

- Do not place flammable or combustible materials near the projector!
- Barco large screen projection products are designed and manufactured to meet the most stringent safety regulations. This projector radiates heat on its external surfaces and from ventilation ducts during normal operation, which is both normal and safe. Exposing flammable or combustible materials into close proximity of this projector could result in the spontaneous ignition of that material, resulting in a fire. For this reason, it is absolutely necessary to leave an “exclusion zone” around all external surfaces of the projector whereby no flammable or combustible materials are present. The exclusion zone must be not less than 40 cm (16”) for all DLP Cinema projectors. The exclusion zone on the lens side must be at least 5 m. Do not cover the projector or the lens with any material while the projector is in operation. Keep flammable and combustible materials away from the projector at all times. Mount the projector in a well ventilated area away from sources of ignition and out of direct sun light. Never expose the projector to rain or moisture. In the event of fire, use sand, CO₂ or dry powder fire extinguishers. Never use water on an electrical fire. Always have service performed on this projector by authorized Barco service personnel. Always insist on genuine Barco replacement parts. Never use non-Barco replacement parts as they may degrade the safety of this projector.
- Slots and openings in this equipment are provided for ventilation. To ensure reliable operation of the projector and to protect it from overheating, these openings must not be blocked or covered. The openings should never be blocked by placing the projector too close to walls, or other similar surface. This projector should never be placed near or over a radiator or heat register. This projector should not be placed in a built-in installation or enclosure unless proper ventilation is provided.
- Projection rooms must be well ventilated or cooled in order to avoid build up of heat. It is necessary to vent hot exhaust air from console to the outside of the building. The mandatory exhaust system must include a blower that maintain at least 10m³/min (350 CFM) when measured at the projector exhaust opening.
- Let the projector cool completely before storing. Remove cord from the projector when storing.
- Heat sensitive materials should not be placed in the path of the exhaust air or on the lamp house.

To prevent projector damage

- This projector has been designed for use with a specific lamp (house) type. See installation instructions for its correct type.
- The air filters of the projector must be cleaned or replaced on a regular basis (a "clean" booth would be monthly-minimum). Neglecting this could result in disrupting the air flow inside the projector, causing overheating. Overheating may lead to the projector shutting down during operation.
- The projector must always be installed in a manner which ensures free flow of air into its air inlets and the mandatory exhausted system must be capable of removing minimum 10m³/min (350 CFM) measured at the projector's exhaust opening.
- In order to ensure that correct airflow is maintained, and that the projector complies with Electromagnetic Compatibility (EMC) and safety requirements, it should always be operated with all of it's covers in place.
- Slots and openings in the cabinet are provided for ventilation. To ensure reliable operation of the product and to protect it from overheating, these openings must not be blocked or covered. The openings should never be blocked by placing the product on a bed, sofa, rug, or other similar surface. This product should never be placed near or over a radiator or heat register. The device should not be placed in a built-in installation or enclosure unless proper ventilation is provided.
- Ensure that nothing can be spilled on, or dropped inside the projector. If this does happen, switch off and remove all power from the projector. Do not operate the projector again until it has been checked by qualified service personnel.
- Do not block the projector cooling fans or free air movement around the projector. Loose papers or other objects may not be nearer to the projector than 10 cm (4") on any side.
- Do not use this equipment near water.
- Proper operation of the cooling circuit can only be guaranteed in table mounting. It is not allowed to use the projector in another position. See installation procedure for correct installation.

- **Special care for Laser Beams:** Special care should be used when DLP projectors are used in the same room as high power laser equipment. Direct or indirect hitting of a laser beam on to the lens can severely damage the Digital Mirror Devices™ in which case there is a loss of warranty.
- Never place the projector in direct sun light. Sun light on the lens can severely damage the Digital Mirror Devices™ in which case there is a loss of warranty.
- Save the original shipping carton and packing material. They will come in handy if you ever have to ship your equipment. For maximum protection, repack your set as it was originally packed at the factory.
- Disconnect the power to the projectors mains terminals and unplug the power cord at UPS INLET before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning. Never use strong solvents, such as thinner or benzine, or abrasive cleaners, since these will damage the cabinet. Stubborn stains may be removed with a cloth lightly dampened with mild detergent solution.
- To ensure the highest optical performance and resolution, the projection lenses are specially treated with an anti-reflective coating, therefore, avoid touching the lens. To remove dust on the lens, use a soft dry cloth. Do not use a damp cloth, detergent solution, or thinner.
- Rated maximum ambient temperature, $t_a = 35\text{ }^\circ\text{C}$ (95 °F).
- The lamp house shall be replaced if it has become damaged or thermally deformed.

On servicing

- Do not attempt to service this product yourself, as opening or removing covers may expose you to dangerous voltage potentials and risk of electric shock.
- Refer all servicing to qualified service personnel.
- Attempts to alter the factory-set internal controls or to change other control settings not specially discussed in this manual can lead to permanent damage to the projector and cancellation of the warranty.
- Remove all power from the projector and refer servicing to qualified service technicians under the following conditions:
 - When the power cord or plug is damaged or frayed.
 - If liquid has been spilled into the equipment.
 - If the product has been exposed to rain or water.
 - If the product does not operate normally when the operating instructions are followed. Adjust only those controls that are covered by the operating instructions since improper adjustment of the other controls may result in damage and will often require extensive work by a qualified technician to restore the product to normal operation.
 - If the product has been dropped or the cabinet has been damaged.
 - If the product exhibits a distinct change in performance, indicating a need for service.
- Replacement parts: When replacement parts are required, be sure the service technician has used original Barco replacement parts or authorized replacement parts which have the same characteristics as the Barco original part. Unauthorized substitutions may result in degraded performance and reliability, fire, electric shock or other hazards. Unauthorized substitutions may void warranty.
- Safety check: Upon completion of any service or repairs to this projector, ask the service technician to perform safety checks to determine that the product is in proper operating condition.
- Possible explosion hazard: Always keep in mind the caution below:



CAUTION: Xenon compact arc lamps are highly pressurized. When ignited, the normal operating temperature of the bulb increases the pressure to a level at which the bulb may explode if not handled in strict accordance to the manufacturer's instructions. The bulb is stable at room temperature, but may still explode if dropped or otherwise mishandled. Whenever the lamp house, containing a xenon lamp, has to be dismantled or whenever the protective container or cloth has to be removed from the xenon lamp, authorized protective clothing **MUST** be worn!

Authorized protective clothing for xenon lamp handling



WARNING: Always wear face protection (full face shield) when handling xenon lamps.



WARNING: Always wear protective clothing (welder's jacket) when handling xenon lamps.



WARNING: Always wear clean leather gloves with wrist protectors when handling xenon lamps.

To prevent battery explosion

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

1.3 Safety precautions Hazardous Chemicals

Cooling liquid: Pale yellow antifreeze Antifrogen® N



Handling the cooling liquid:

- Not for household use.
- Keep out of reach of children.
- Harmful by oral intake.
- Avoid exposure to pregnant women.
- Avoid contact of the liquid with Eyes, Skin and Clothing.
- Avoid inhaling noxious fumes.
- Conserve the product in the original package and in a well ventilated room.

Personal protection rules:

- Handle the cooling liquid in a well ventilated room.
- Under no circumstances eat, drink and smoke while handling the liquid.
- Wear gloves (Butyl rubber, PVC....) and goggles.
- Wear suitable protection clothing.

Cleansing agent: sodium carbonate crystals (Na₂CO₃)



Handling the cleansing agent:

- Conserve the product in the original container in a cool, well ventilated place.
- Keep away from Incompatible materials: sources of ignition, direct sunlight.
- Keep container closed when not in use.
- After handling: Wash hands and other exposed areas with mild soap and water.

Personal protection rules:

- Handle the cleansing agent in a well ventilated area.
- Do not eat, drink or smoke during use.
- Wear gloves (Butyl rubber, PVC....) and goggles.
- Wear suitable protection clothing.

TIM paste: Loctite TCP 4000 D



Handling the TIM paste:

- Avoid open flame
- After handling: Wash hands and other exposed areas with running water and soap.

Personal protection rules:

- Handle the cleansing agent in a well ventilated area.
- Do not eat, drink or smoke during use.
- Wear chemical-resistant gloves (nitrile-rubber).



WARNING: Before handling Hazardous Chemicals ensure that you have read and understood the safety instructions provided by the supplier of the chemical in the Safety Data Sheet.

Safety Data Sheets for Hazardous Chemicals

For safe handling information on chemical products, consult the Safety Data Sheet (SDS). SDSs are available upon request via safetydatasheets@barco.com.

1.4 High Brightness precautions: Hazard Distance



HD

Hazard Distance (HD) is the distance measured from the projection lens at which the intensity or the energy per surface unit becomes lower than the applicable exposure limit on the cornea or on the skin. The light beam is considered (to be) unsafe for exposure if the distance from a person to the light source is less than the HD.

Restriction Zone (RZ) based on the HD

The HD depends on the amount of lumens produced by the projector and the type of lens installed. See chapter “HD in function of modifying optics”, page 19.

To protect untrained end users (as cinema visitors, spectators) the installation shall comply with the following installation requirements: Operators shall control access to the beam within the hazard distance or install the product at the height that will prevent spectators' eyes from being in the hazard distance. Radiation levels in excess of the limits will not be permitted at any point less than 2.0 meter (SH) above any surface upon which persons other than operators, performers, or employees are permitted to stand or less than 1.0 meter (SW) lateral separation from any place where such persons are permitted to be. In environments where unrestrained behavior is reasonably foreseeable, the minimum separation height should be greater than or equal to 3.0 meter to prevent potential exposure, for example by an individual sitting on another individual's shoulders, within the HD.

These values are minimum values and are based on the guidance provided in IEC 62471-5:2015 section 6.6.3.5.

The installer and user must understand the risk and apply protective measures based upon the hazard distance as indicated on the label and in the user information. Installation method, separation height, barriers, detection system or other applicable control measure shall prevent hazardous eye access to the radiation within the hazard distance.

For example, projectors that have a HD greater than 1 m and emit light into an uncontrolled area where persons may be present should be positioned in accordance with “the fixed projector installation” parameters, resulting in a HD that does not extend into the audience area unless the beam is at least 2.0 meter above the floor level. In environments where unrestrained behavior is reasonably foreseeable, the minimum separation height should be greater than or equal to 3.0 meter to prevent potential exposure, for example by an individual sitting on another individual's shoulders, within the HD. Sufficiently large separation height may be achieved by mounting the image projector on the ceiling or through the use of physical barriers.

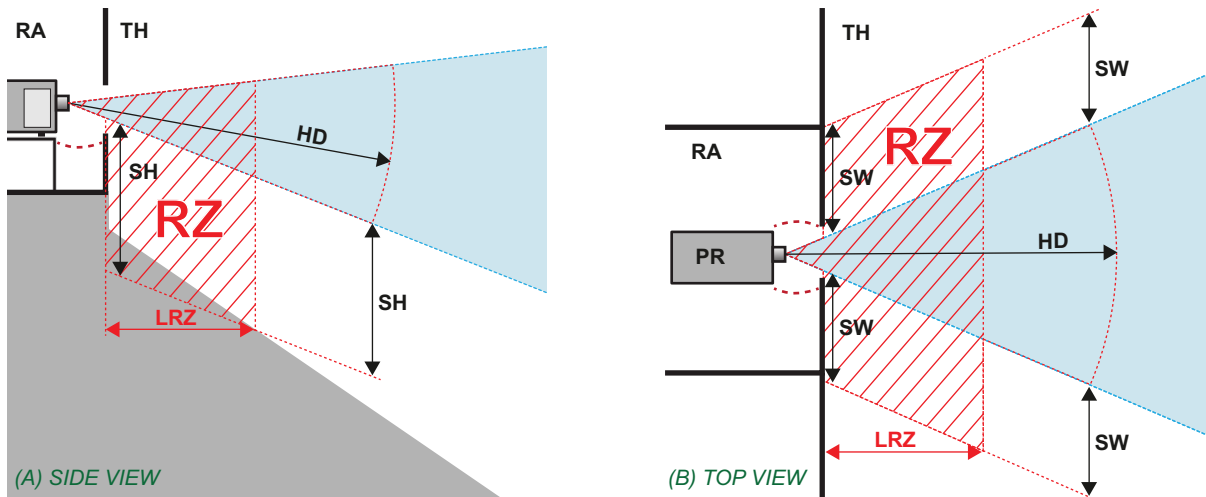


Image 1-2

- A** Side view.
- B** Top view.
- RA** Restricted Access location (boot area of projector).
- PR** Projector.
- TH** Theater.
- RZ** Restriction Zone in the theater.
- SH** Separation Height.
- SW** Separation Width.

Based on national requirements, no person is allowed to enter the projected beam within the zone between the projection lens and the related hazard distance (HD). This shall be physically impossible by creating sufficient separation height or by placing barriers. The minimum separation height takes into account the surface upon which persons other than operator, performers or employees are permitted to stand.

On Image 1-3 a typical setup is displayed. It must be verified if these minimum requirements are met. If required a restricted zone (RZ) in the theater must be established. This can be done by using physical barrier, like a red rope as illustrated in Image 1-3.

The restricted area sticker can be replaced by a sticker with only the symbol.

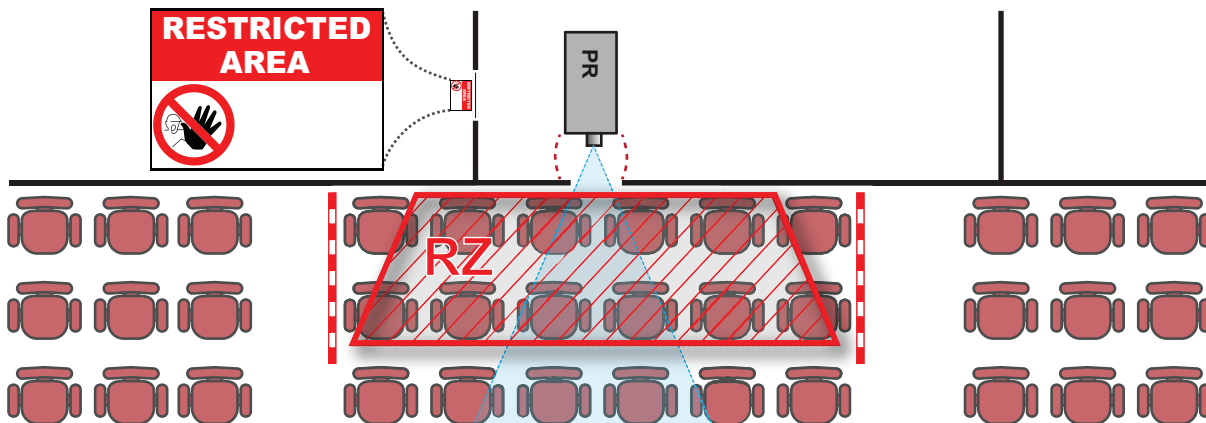


Image 1-3

1.5 HD for fully enclosed projection systems



HD

Hazard Distance (HD) is the distance measured from the projection lens at which the intensity or the energy per surface unit becomes lower than the applicable exposure limit on the cornea or on the skin. The light beam is considered (to be) unsafe for exposure if the distance from a person to the light source is less than the HD.

Restriction Zone (RZ) based on the HD

The projector is also suitable for rear projection applications; projecting a beam onto a diffuse coated projection screen. As displayed in Image 1–4 two areas should be considered: the restricted enclosed projection area (RA) and the observation area (TH).

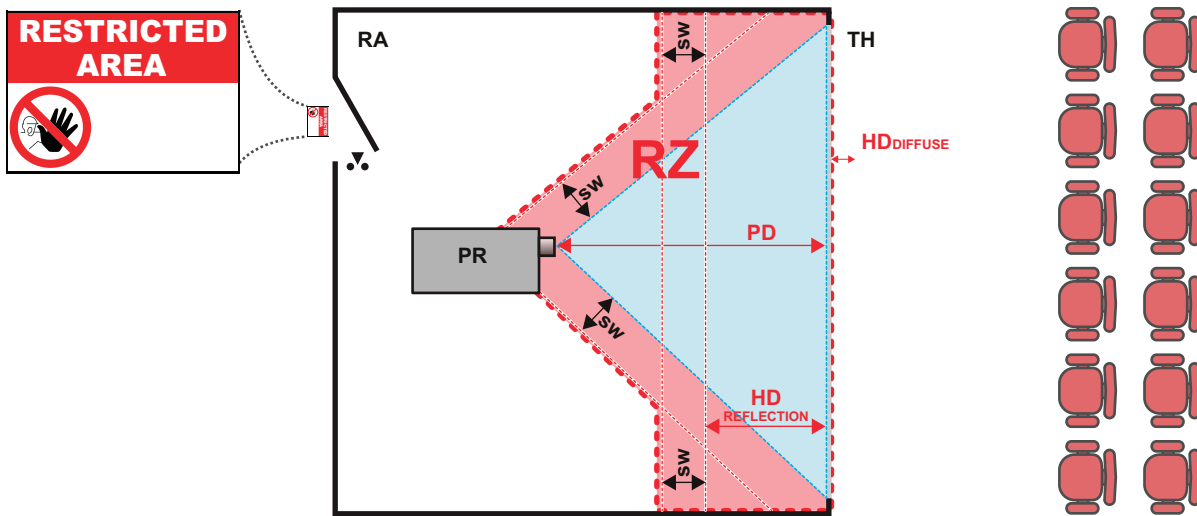


Image 1–4

- | | |
|------------------------------------------------------------------|------------------------------------------------------|
| RA Restricted Access location (enclosed projection area). | RZ Restriction Zone. |
| PR Projector. | PD Projection Distance. |
| TH Theater (observation area). | SW Separation Width. Must be minimum 1 meter. |

For this type of setup 3 different HD shall be considered:

- HD as discussed in “High Brightness precautions: Hazard Distance”, page 16, relevant for intrabeam exposure.
- $HD_{\text{reflection}}$: the distance that has to be kept restrictive related to the reflected light from the rear projection screen.
- HD_{diffuse} : the relevant distance to be considered while observing the diffuse surface of the rear projection screen.

As described in “High Brightness precautions: Hazard Distance”, page 16, it is mandatory to create a restricted zone within the beam areas closer than any HD. In the enclosed projection area the combination of two restricted zones are relevant: The restricted zone of the projected beam toward the screen; taking into account 1 meter Separation Width (SW) from the beam onward. Combined with the restricted zone related to the rear reflection from the screen ($HD_{\text{reflection}}$); also taking into account a 1 meter lateral separation.

The $HD_{\text{reflection}}$ distance equals 25% of the difference between the determined HD distance and the projection distance to the rear projection screen. To determine the HD distance for the used lens and projector model see chapter “HD in function of modifying optics”, page 19.

$$HD_{\text{reflection}} = 25\% (HD - PD)$$

The light emitted from the screen within the observation shall never exceed the RG2 exposure limit, determined at 10 cm. The HD_{diffuse} can be neglected if the measured light at the screen surface is below 5000 cd/m² or 15000 LUX.

1.6 HD in function of modifying optics

Hazard Distance

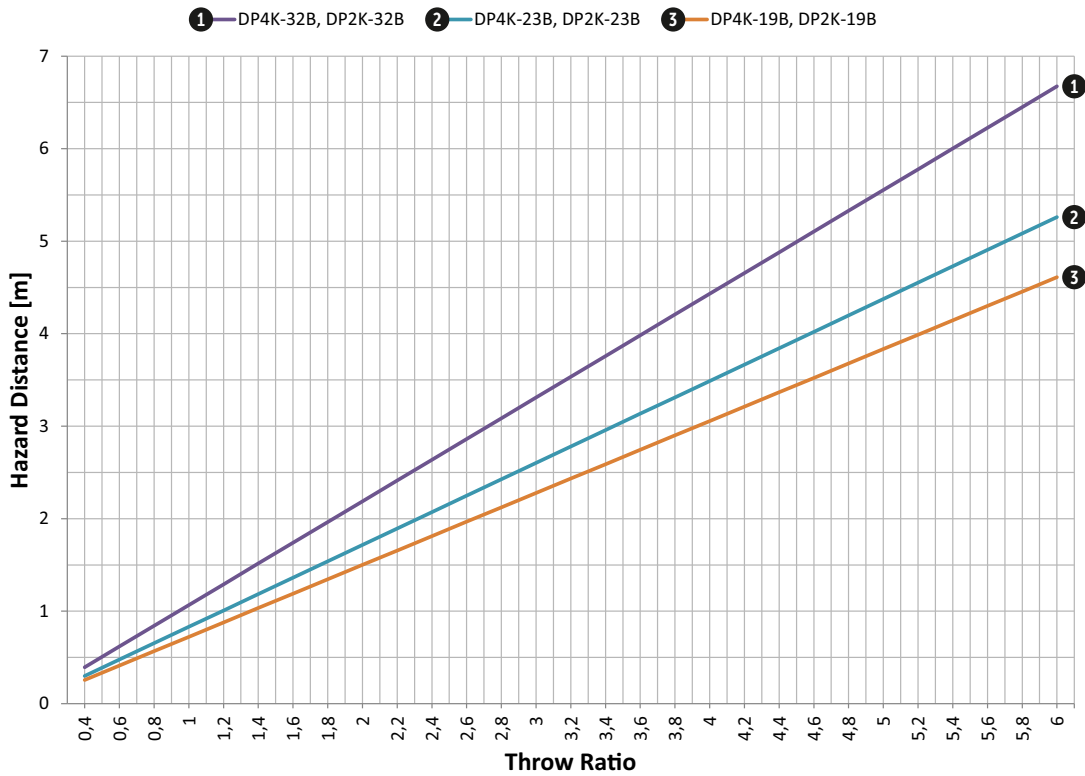



Image 1-5

HD Hazard Distance in meter
TR Throw Ratio

 No hazard distance applicable for DP4K-P and DP2K-P.

General

2

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| 2.2 | Unpacking the projector | 23 |
| 2.3 | Initial inspection..... | 26 |
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About this chapter

Read this chapter before installing your DPxK B projector. It contains important information concerning installation requirements for the DPxK B 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.



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.

2.1 Installation requirements

Environmental conditions

The table below summarizes the physical environment in which the DPxK B 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) ¹ | -60 (-197Ft) to 10000m (32810Ft) |



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

Cooling requirements

The projector is fan cooled and must be installed with sufficient space around the projector head, minimum 20 cm (8 inch) to ensure sufficient air flow. It should be used in an area where the ambient temperature, as measured at the projector air inlet, does not exceed +35°C (+95°F).

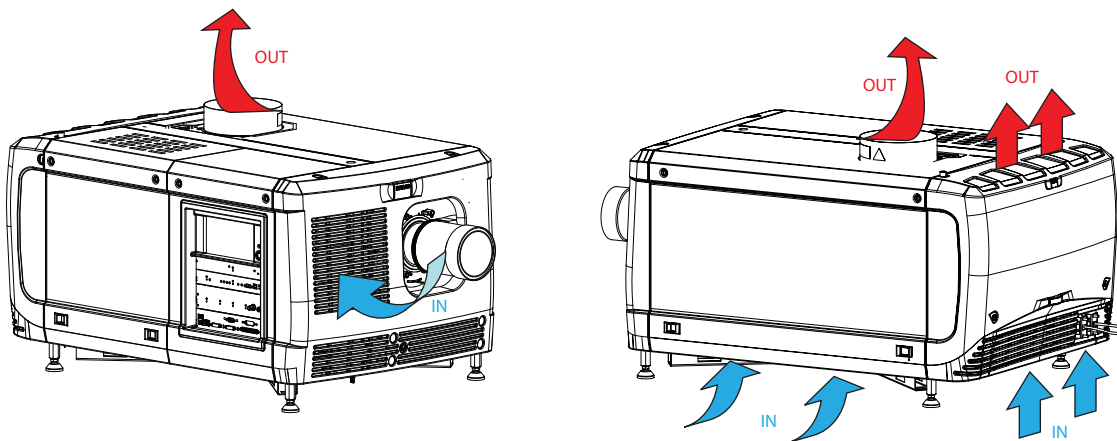


Image 2-1

The installation of an **exhaust system** is **MANDATORY**. The installed exhaust blower must remove an air volume of minimum **10m³/min (350 CFM)** measured at the exhaust output of the projector.

Main Power requirements

The DPxK B operates from a nominal mono phase power net with a separate earth ground PE.

| Projector | Power requirements |
|-----------------|--------------------------------------|
| DP2K-19B | 200-240 VAC, 50-60Hz, 24A at 200 VAC |
| DP2K-23B | 200-240 VAC, 50-60Hz, 30A at 200 VAC |
| DP2K-P | 200-240 VAC, 50-60Hz, 30A at 200 VAC |
| DP4K-19B | 200-240 VAC, 50-60Hz, 24A at 200 VAC |
| DP4K-23B | 200-240 VAC, 50-60Hz, 30A at 200 VAC |

1. For PRC (People's Republic of China) the certified altitude is specified on the product label.

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.

A readily accessible disconnect device shall be incorporated externally to the equipment for removal of the power to the equipment mains terminals.

The building installation must be provided with a circuit breaker of max. 40A to protect the complete unit.



WARNING: Disconnect the power to the unit mains terminals and unplug power cord at UPS inlet for removal of all power from the unit

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. This UPS provides only power for the electronics and not for the lamp.

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 DPxK-19B/23B/P does not have a built in UPS unit.

Exhaust outlet for external fan

The exhaust outlet has an output voltage of 200–240V at 50–60 Hz; switched and maximum 3 amperes is allowed.

The connection between the exhaust outlet and the external blower 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 (exhaust outlet) of the projector may not be used to provide power to any other device than an external exhaust fan. Maximum allowed current : 3A.

Projector weight

Do not underestimate the weight of the DPxK B. The projector weights about ±133 kg (±293 lb.) without lens. Be sure that the pedestal on which the projector has to be installed is capable of handling five (5) times the complete load of the system.



Barco offers a pedestal for the DPxK-19B/23B/P. 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 DPxK-19B/23B/P. Furthermore, the universal pedestal contains a standard 19" rack to build in the projector peripherals such as alternative content switchers.

2.2 Unpacking the projector

What has to be done ?

Upon 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 needs to be removed from the carton box and wooden pallet in a safe manner without damaging the projector.



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

How to unpack

1. Loosen the banding by pulling the free end of the banding loop in the clip.

Take off the box cover.

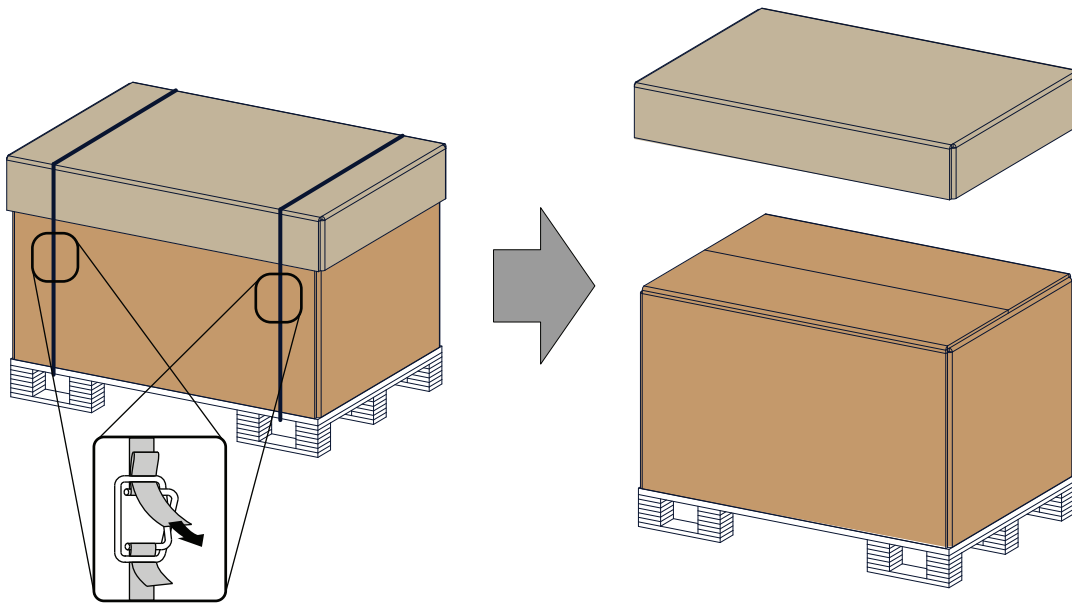


Image 2-2 Open banding

2. Open the box.

Take out the small box between the outer and inner box containing the manuals.

Remove the outer carton box

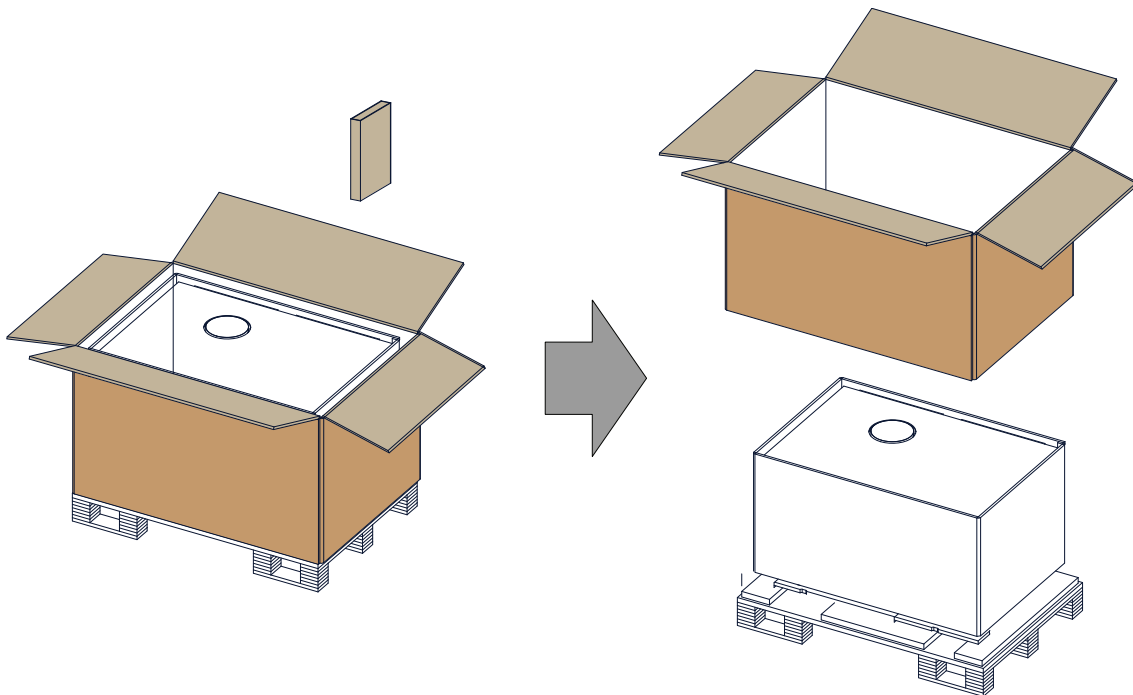


Image 2-3 Remove outer carton

3. Remove the inner carton box.

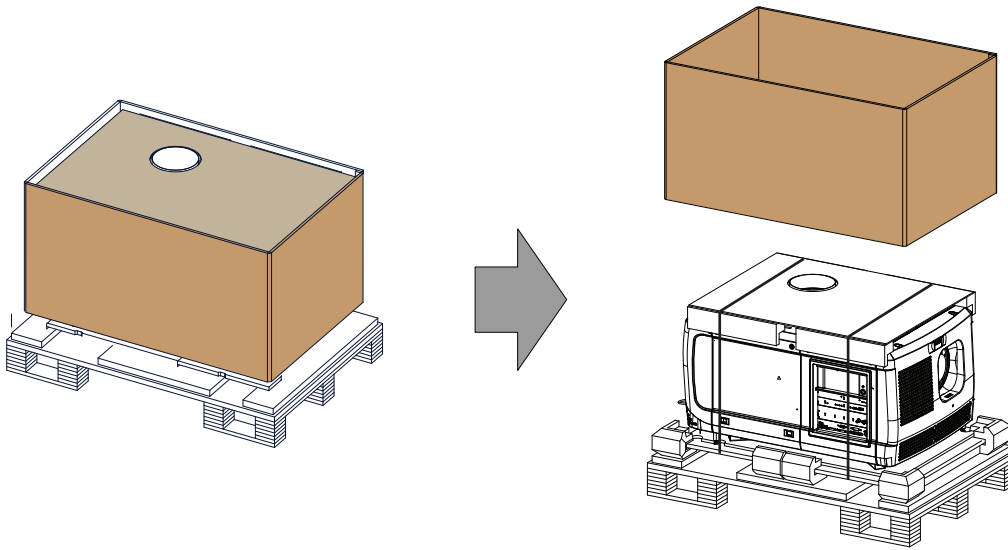


Image 2-4 Remove inner carton

4. Loosen the banding by pulling the free end of the banding loop in the clip.
Take off the upper carton plate (1)
Remove from the wooden pallet (2)

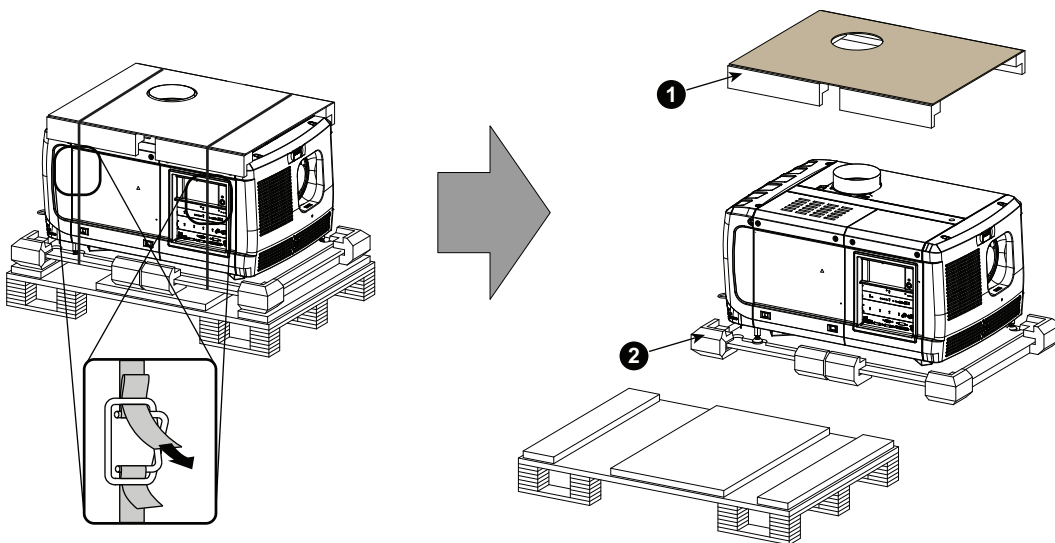


Image 2-5 Remove wooden pallet

5. Take the projector from the wooden board by gripping the bottom of the projector and place the projector on the pedestal.

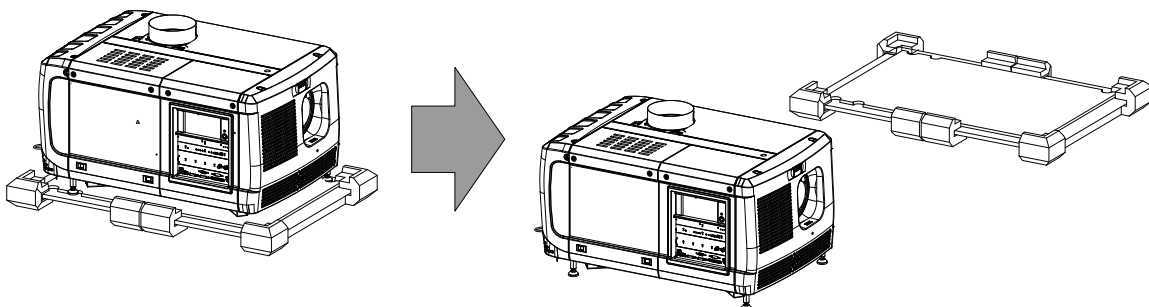


Image 2-6 Remove projector

2.3 Initial inspection

General

Before shipment, the projector was inspected and found to be free of mechanical and electrical defects. As soon as the projector is unpacked, inspect for any damage that may have occurred in transit. Save all packing material until the inspection is completed. If damage is found, file claim with carrier immediately. The Barco Sales and Service office should be notified as soon as possible.



The packaging of the DPxK-19B/23B/P is provided with a **shock-watch** label. If this shock-watch label was triggered (red colored at arrival) during transport, indicates that the package was possibly roughly handled by the transport company. In this case, the instructions mentioned on the label, should be followed, which are: adding a note on the “bill of lading” and informing the transport company and the Barco sales and service office as soon as possible.

Box content

After unpacking the projector it is recommended to check if all following items were included:

- One short power link cable (mono phase) (in case no UPS is used) - Installed on projector.
- This manual (installation manual).
- Safety manual



The projector lens and xenon lamp are not included in the package of the projector.

Mechanical check

This check should confirm that there are no broken knobs or connectors, that the cabinet and panel surfaces are free of dents and scratches, and that the operating panel is not scratched or cracked. The Barco Sales and Service office should be notified as soon as possible if this is not the case.

Tamper labels

During installation please inspect the tamper labels, if they are damaged please contact Barco tech support.

The tamper labels are required by DCI to provide easy visual indication if the equipment was tampered with. The projectors are tested and labeled for shipping to ensure that the system was not compromised before reaching the customer's final destination.

These tamper labels can be found behind the input cover. See “Removal of the input cover”, page 141.

2.4 Installation process overview



Let the projector acclimate to the ambient temperature after unpacking. Neglecting this may result in a startup failure of the light processor unit.


Set up from A to Z

After you have unpacked and checked the projector, you can start with the installation process of your DPxK B. This chapter gives you an overview of all the different stages in the installation process which you have to follow to set your DPxK B up and running. Each stage is briefly described and refers to more detailed step by step procedures in this manual. Use this overview as a checklist to ensure that you have followed all stages in the setup process of your DPxK B.

Set up from A to Z

1. **Check if all installation requirements are fulfilled** such as the environment conditions of the installation area, capacity of the exhaust system, electrical facilities, etc. Note that a solid pedestal is required to support the projector head. For more info see topic “Installation requirements”, page 22.

2. **Physical installation of the projector** upon its pedestal and connecting the air outlet of the projector with the exhaust system. Note that the exhaust system is MANDATORY. See chapters “Positioning the DPxK-19B/23B/P at port window”, page 30, and “Installation of the exhaust system”, page 32.
3. **Electrical connection with the power net.** See chapter “Connecting the DPxK-19B/23B/P with the power net”, page 35.
4. **Installation of a suitable UPS unit or bypass** the power in and outlet for the projector electronics. See chapters “Power loop through to the projector electronics”, page 36 or “Connecting a UPS to the projector electronics”, page 37.
5. **Installation of the xenon lamp** in case the xenon lamp is not installed in the lamp house yet. To install the xenon lamp the lamp house has to be removed from the projector. To install the xenon lamp correctly and in a safe manner, see the detailed step by step procedures in the chapter “Installation of the xenon lamp in manual S/M Lamp House”, page 47.
6. **Installation of the lens.** First select an appropriate lens which throw ratio covers 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 installation”, page 62.
7. **Installation of the Communicator Touch Panel.** See chapter “Communicator Touch Panel”, page 129.
8. **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(-X)”, page 104. Make sure that all HDDs in the ICMP(-X) HDD set have the same storage capacity. See label on top of the HDD to know the storage capacity.
9. **Alignment of the projected image on the screen.** The projector can now be switched on to project its first image (test pattern) on the screen. Then the image can be aligned with the screen size of the application. Follow the next steps to achieve that:
 1. 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.
 2. Press the **STANDBY** button on the local keypad to activate the lamp.
 3. Press the **DOWSER** button on the local keypad to open the dowser of the projector. The dowser is open if the color of the DOWSER button is GREEN.
 4. Press the **TEST PATTERN** button on the local keypad to project one of the internal test patterns of the projector on the screen.
 5. Use the lens **ZOOM**, **SHIFT** and **FOCUS** buttons on the local keypad the match the projected image with the screen. Tilt the projector in case you can not SHIFT the image completely upon the screen. See “Lens shift, zoom & focus”, page 65.
10. **Resetting the lamp parameters.** The “LAMP INFO” parameters which are stored on the controller board of the projector MUST be updated after each installation of an xenon lamp inside the lamp house. Neglecting this update will result in poor performance and short life time of the xenon lamp. See chapter “Resetting the lamp parameters”, page 53.
11. **Realignment of the xenon lamp in its reflector.** For optimal performance of the xenon lamp it is required to realign the lamp after installation in the lamp house. See “Realignment of the lamp in its reflector (manual Lamp House)”, page 56 for more information.
12. **Adjusting the light path.** Normally the lens holder and the convergence of the projector is perfectly adjusted at the factory. Nevertheless, some applications require a readjustment of the lens holder, convergence or both. See procedure “Scheimpflug adjustment”, page 70, to adjust the Scheimpflug and see “Convergence”, page 159 to adjust the convergence of the light path.
13. **SCC calibration.**

 *Note:* A Spatial Color Calibration (SCC) has to be execute in case of a first install or in case a High Brightness lens is swapped with a High Contrast lens or vice versa. See user guide of the Communicator for detail SCC calibration instructions.
14. **Registration of the projector.** The DPxK B is DCI compliant and should be registered by Barco. Therefore, the digital certificate inside the projector will be used to secure encryption key communication between the projector and the rest of the theatre system (server and theatre management system).
15. **Projection of a digital cinema movie.**

In case the projector is equipped with an ICMP(-X), download the ICMP(-X) 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(-X)”, page 97, 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 “Input & communication”, page 77. 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.

Physical installation

3

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| 3.2 | Installation of the exhaust system | 32 |
| 3.3 | Access to the power connection | 34 |
| 3.4 | Connecting the DPxK-19B/23B/P with the power net | 35 |
| 3.5 | Power loop through to the projector electronics | 36 |
| 3.6 | Connecting a UPS to the projector electronics | 37 |

About this chapter

This chapter describes how the mechanical and electrical set up of the projector has to be done.

3.1 Positioning the DPxK-19B/23B/P at port window



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

General guide lines

- Use a solid pedestal to put the DPxK-19B/23B/P 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.

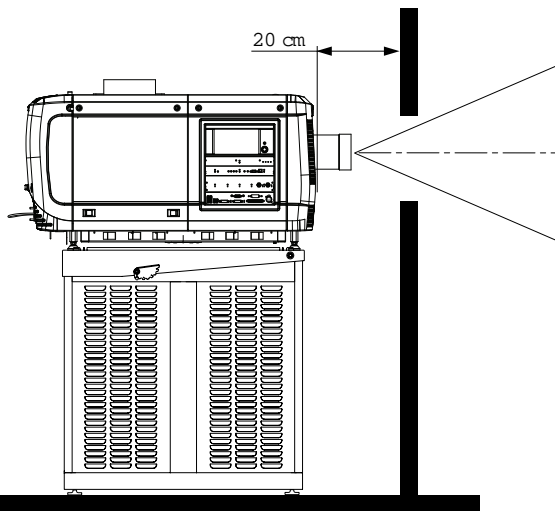


Image 3-1 Positioning at port window



Barco offers a pedestal for the 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 projector. Furthermore, the universal pedestal contains a standard 19" rack to build in the projector peripherals like alternative content switchers.

Required 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 increases side keystone, but will minimize horizontal lens offset required.

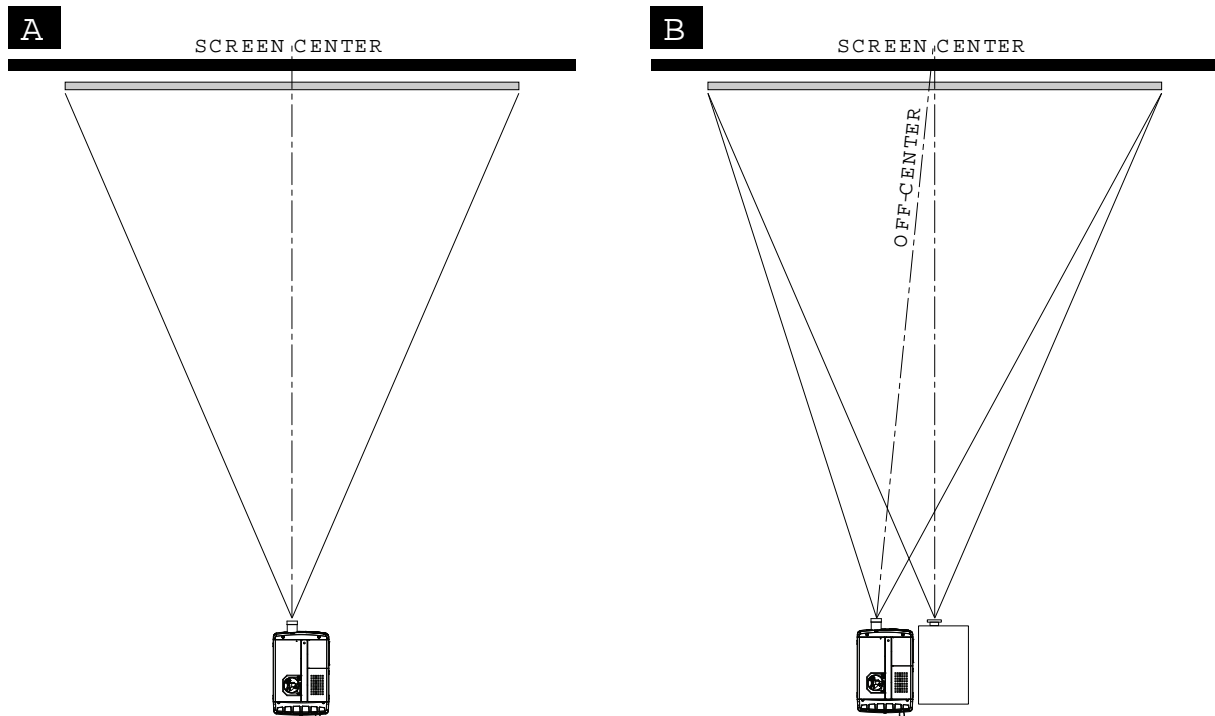



Image 3-2 Projector centering

3. Proceed to level the projector by adjusting the feet of the projector as follows:
 - Loosen the nuts (A), using a wrench of 24 mm, on the threaded rod.
 - Adjust the height of the 4 legs (B) to level the projector, using a 17 mm wrench.
 - Secure the leg height by tightening the nuts (A).

 **Note:** There must be at least 5 cm between the bottom side of the projector and the pedestal.

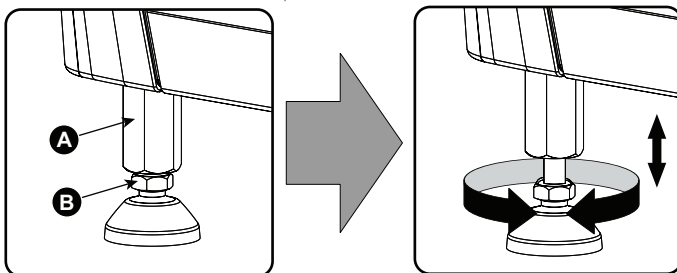


Image 3-3 Projector leveling

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

Projector tilting

In an ideal installation, the DPxK-19B/23B/P 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 24 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).

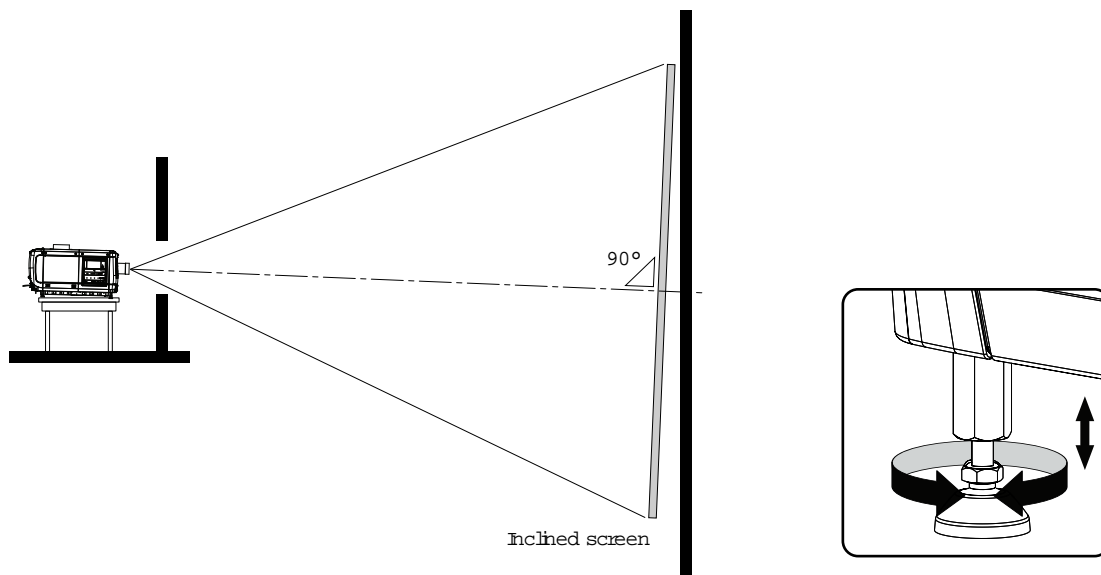


Image 3-4 Projector tilting

CAUTION: The projector may tilt maximum 15° forward and maximum 15° backwards. This includes the tilt created by the projector feet and the tilt created by the pedestal.

Barco offers a pedestal for the projector. This pedestal allows you to easily tilt the projector forward up to 6°.

3.2 Installation of the exhaust system

WARNING: THE USE OF AN EXHAUST SYSTEM IS MANDATORY !

About Exhaust

The exhaust stack of the projector head is designed to fit a 201 mm (7.91 inch) diameter duct. This size must be used throughout the entire system and installed to eliminate any possibility of downdraft or rain dripping into the lamp house.

A built-in vane switch detects if the airflow in the exhaust opening is high enough. When something goes wrong one of the following error codes can be displayed : 6090 or 6091 (insufficient air flow in exhaust of projector check exhaust fan and/or exhaust air outlet system).

Check the functioning of this vane switch regularly. Replace if necessary.

CAUTION: The exhaust system must be capable of removing minimum 10m³/min (350 CFM), measured at the projector's exhaust opening. Although not obligatory, Barco also advises to limit the amount of extraction to a maximum of 11m³/min (390 CFM). Excessive air extraction can dramatically speed-up contamination of the projector air inlet filters, hence requiring more regular filter cleaning interventions.

CAUTION: The connection between the projector duct and the exhaust system should be done with either the chimney or a flexible connection piece. This to prevent that vibrations of the external exhaust system disturbs the projected image.



WARNING: The exhaust system must match the duct of the projector seamless. No gap may exist between the connection of the duct and the exhaust system. This to prevent personal injury due to the UV light that comes out of the duct of the projector.

Never look into the exhaust output on the top of the projector. High luminance and UV radiation could result in damage to the eye. The installation of an exhaust system on top of the projector is mandatory before operating the projector.



CAUTION: If more than one projector is installed in a common projection booth, the above exhaust air flow requirements are valid for EACH individual projector head exhaust stack. Note that inadequate air extraction will result in decreased life expectancy of the projector as a whole as well as causing premature lamp failure.



WARNING: Temperature of exhaust air can approach 100°C.

How to install the Exhaust stack

See illustration below:

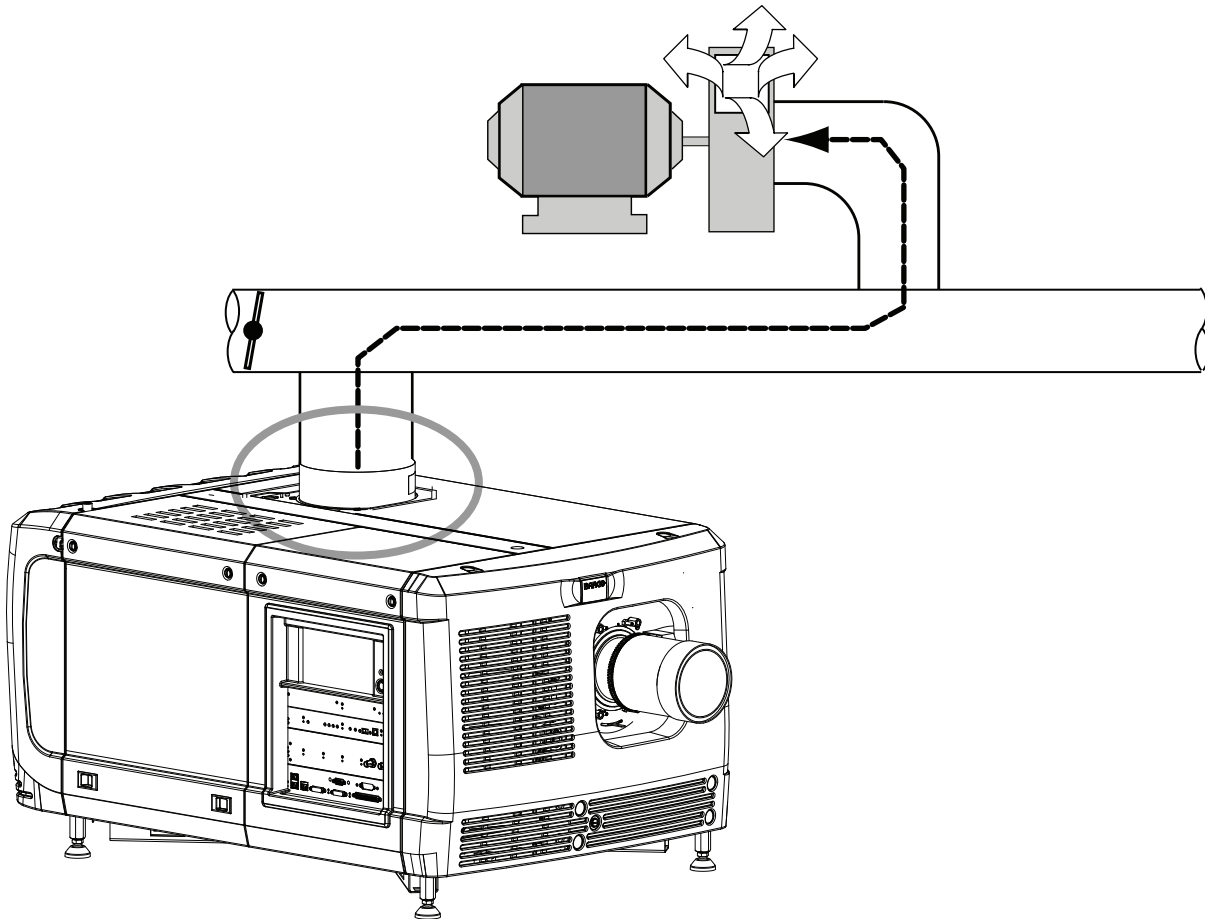


Image 3-5 Exhaust system



Ensure good condition of the lamp house blower. Keep the blower inlet clean for unrestricted air flow.



To ensure maximum lamp life, operate the lamp house blower and the exhaust system for at least ten minutes after extinguishing the lamp.

Optional electrical connection of the fan to the projector

The exhaust fan may electrically be connected with the projector. When that is done, the blower starts working when the lamp is switched on and stops working after the cool period is completed.

The power socket is located next to exhaust output and may only be used to connect the external exhaust fan. No connection with other devices is allowed.

The exhaust outlet delivers maximum 3A, 200-240V at 50-60Hz.

The external fan power cord shall be not less than 0.75 mm² or AWG 18.

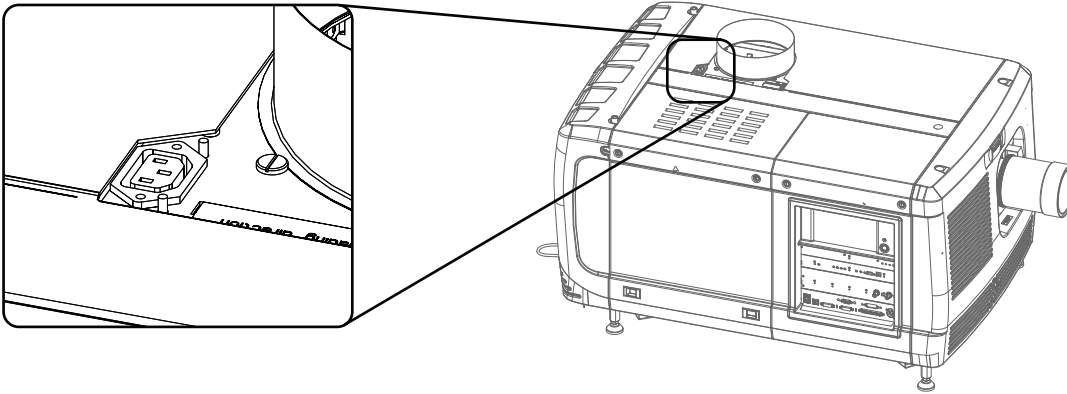


Image 3-6 Fan power connection

3.3 Access to the power connection

Required tools

Flat screw driver 6 mm

How to access

1. Remove the back cover.
2. Loosen both captive screws (1).

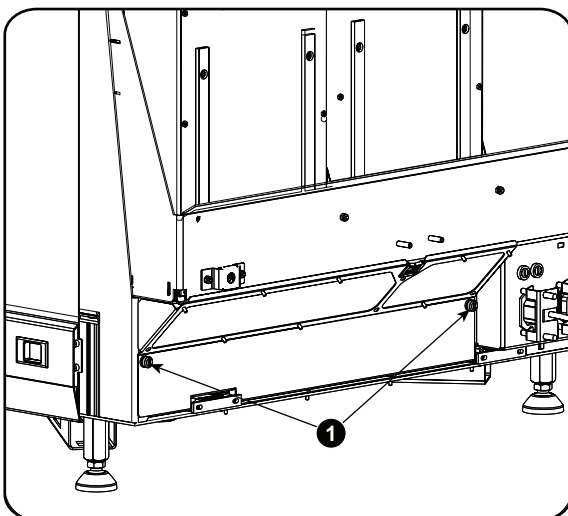


Image 3-7 Power connection cover, captive screws

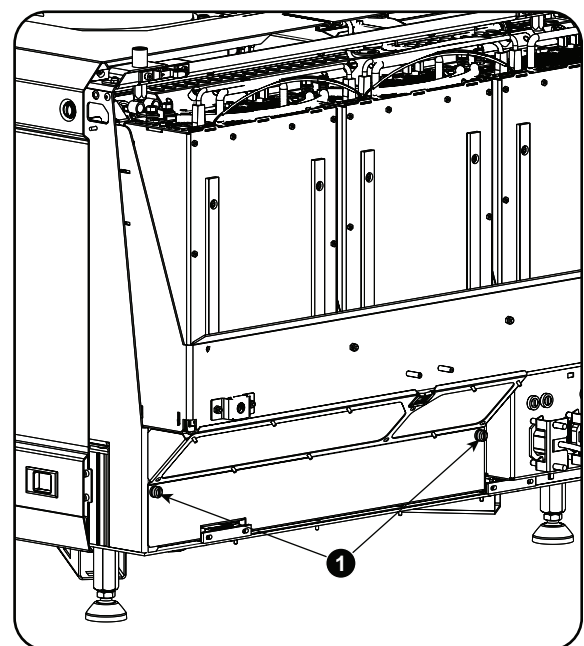


Image 3-8 Power connection cover, captive screws

3. Slide off the power connection cover.

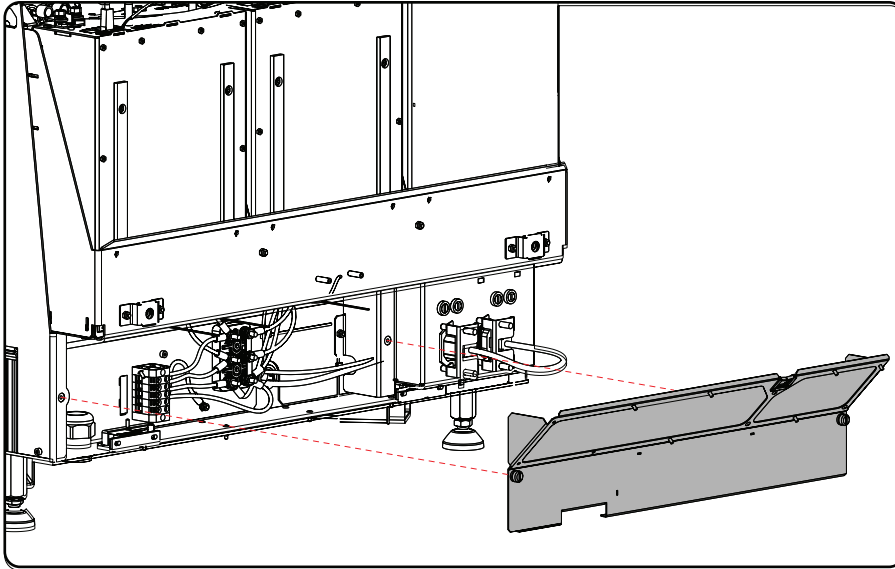


Image 3-9 Terminal strip accessible

The terminal strip and connection plate is accessible.

3.4 Connecting the DPxK-19B/23B/P 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.



WARNING: Make sure that the voltage range of projector matches with the voltage of the local power net.



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

Required tools

- Flat torque screw driver
- Adjustable wrench

Required parts

- Certified power supply cord 4.0 mm², 10AWG, min. 300V, diameter between 11 mm and 21 mm
- Circuit breaker maximum 40A

How to connect

1. Remove the back cover.
2. Remove the power input cover.
3. Loosen the cable gland fixation ring (1).



Note: The cable gland (1) is specified for cables with a diameter between 11mm and 21mm.

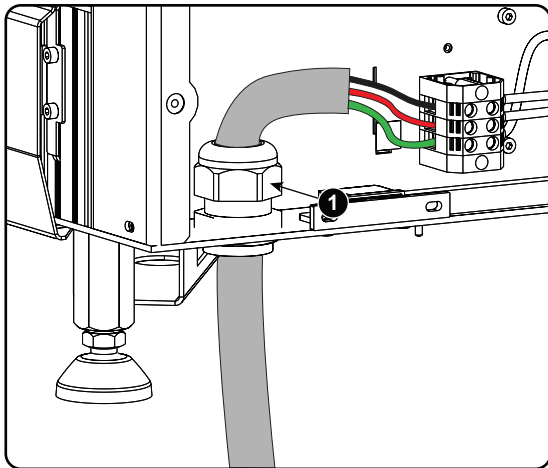



Image 3-10 Power cable connection

4. Push the stripped power supply cable through the cable gland. When using a flexible power cord, make sure that each conductor end is provided with an end sleeve.
Fix the cable in the cable gland by securing ring 1 with an adjustable wrench.
5. Connect the power cord with the terminal barrier strip. Use a flat torque screw driver set to **2 Nm**.
Always connect the ground wire (PE) with the connector indicated with *PE* on the terminal barrier strip.
 **Warning:** Always connect first the PE wire.
6. Reinstall the power connection cover and the back cover.

3.5 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.


Required tools

No tools required.

Required parts

Short power link cable with plug type C13/C14

How to loop through the power

1. Plug in the short power cable (1) which was delivered with the projector.
 **Warning:** Always use the Barco short power cable which is delivered with the projector.

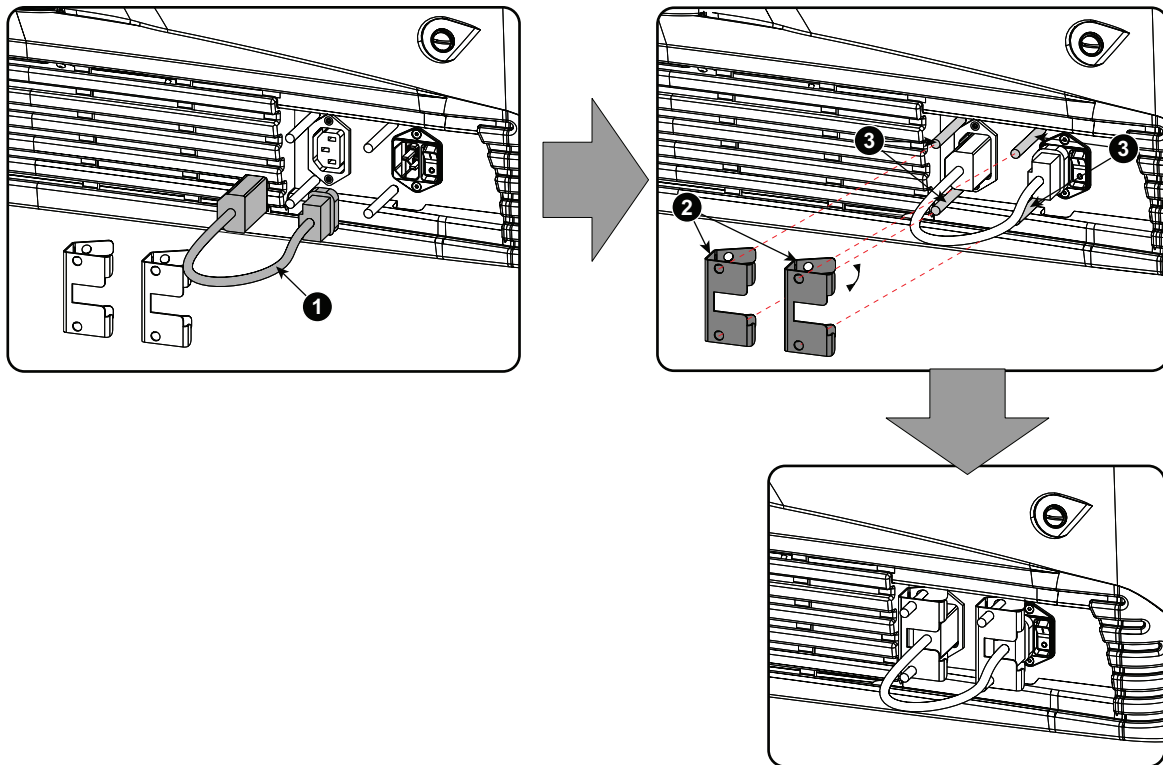


Image 3-11 Power loop through connection

2. Secure both plugs of the short cable with a fixation spring (2). Handle as follow:
 - Squeeze the fixation spring together.
 - Slide the fixation spring on the fixation pins (3) while squeezing together and push it against the power plug.
 - Release the fixation spring.

3.6 Connecting a UPS to the projector electronics



WARNING: Only use UPS units which are suitable for the DPxK-19B/23B/P. See chapter "General", "Installation requirements" for more information about the requirements of the UPS.

How to connect the UPS

1. Install the UPS according to the instructions of the manufacturer and the local regulations.
2. Connect the power output cord from the UPS unit to the UPS inlet socket of the projector (right socket).
Connect directly (A) or drag the cable behind the front cover so that the front cover can be removed without removing the UPS INLET cable (B).

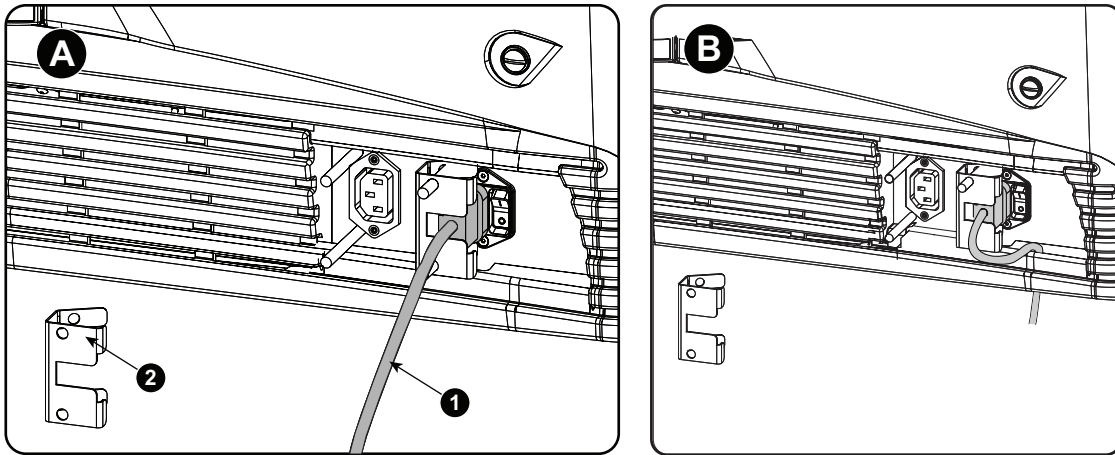


Image 3-12 UPS connection

3. Secure the UPS inlet socket with a fixation spring. Handle as follow:
 - Squeeze the fixation spring together.
 - Slide the fixation spring on the fixation pins while squeezing together and push it against the power plug.
 - Release the fixation spring.
4. Install on the power outlet the second fixation spring to prevent losing it (2).



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!

Lamp & Lamp House

4

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WARNING: DO NOT PERMIT UNAUTHORIZED PERSONNEL TO PERFORM OR ATTEMPT ANY PHASE OF XENON LAMP HANDLING OR SERVICE. ONLY TRAINED AND QUALIFIED TECHNICAL SERVICE PERSONNEL ARE ALLOWED TO HANDLE THE XENON LAMP.



CAUTION: Xenon compact arc lamps are highly pressurized. When ignited, the normal operating temperature of the bulb increases the pressure to a level at which the bulb may explode if not handled in strict accordance to the manufacturer's instructions. The bulb is stable at room temperature, but may still explode if dropped or otherwise mishandled. Whenever the lamp house, containing a xenon lamp, has to be dismantled or whenever the protective container or cloth has to be removed from the xenon lamp, authorized protective clothing **MUST** be worn!



WARNING: Always wear face protection (full face shield) when handling xenon lamps.



WARNING: Always wear protective clothing (welder's jacket) when handling xenon lamps.



WARNING: Always wear clean leather gloves with wrist protectors when handling xenon lamps.

4.1 Introduction

Lamp and Lamp House

The DPxK-19B/23B/P projector is delivered with a manual or motorized **S/M Lamp House** without lamp. The xenon bulb lamp is delivered separately and has to be installed on site by a qualified service technician.

The xenon bulb lamp is packed in a protective container or wrapped in a protective cloth. Never remove this protective container or protective cloth without wearing adequate protective clothing (face shield, clean cotton gloves, welder's jacket).



Image 4-1 Left: Xenon lamp in protective container. Right: Xenon lamp wrapped in protective cloth.



CAUTION: Xenon compact arc lamps are highly pressurized. When ignited, the normal operating temperature of the bulb increases the pressure to a level at which the bulb may explode if not handled in strict accordance to the manufacturer's instructions. The bulb is stable at room temperature, but may still explode if dropped or otherwise mishandled. Whenever the lamp house, containing a xenon lamp, has to be dismantled or whenever the protective container or cloth has to be removed from the xenon lamp, authorized protective clothing **MUST** be worn!

Lamp strike policy and lamp warning/error policy versus the lamp runtime

- The projector issues a lamp run time notification message (end have blue status LEDs) approximately 30 hours before the maximum lamp runtime occurs.
- The projector issues a lamp run time notification message (end have blue status LEDs) when the maximum lamp runtime occurs.
- The projector will always try to strike the lamp, independent of the lamp runtime.

Parts identification xenon lamp

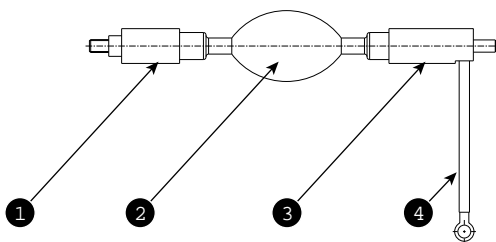


Image 4-2

- 1 Cathode of the xenon lamp.
- 2 Envelope (bulb) of the xenon lamp.
- 3 Anode of the xenon lamp.
- 4 Anode wire of the xenon lamp.

Parts identification manual Lamp House

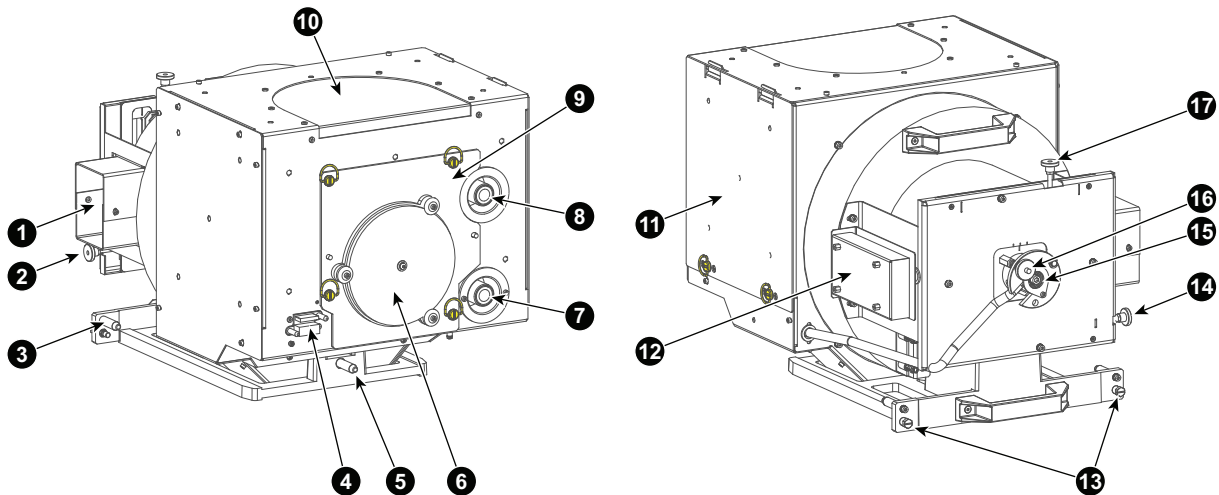


Image 4-3

- | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> 1 Air inlet cathode cooling. 2 Adjustment screw horizontal lamp alignment. 3 Positioning pin. 4 Connection Lamp Info module. 5 Positioning pin. 6 UV blocker. 7 Cathode connection with SPG. 8 Anode connection with SPG. 9 Removable front cover. | <ul style="list-style-type: none"> 10 Air out let. 11 Removable side cover. 12 Lamp Info module. 13 Lamp House fixation screw. 14 Adjustment screw horizontal lamp alignment. 15 Lamp cathode fixation screw. 16 Adjustment screw for lamp Z-alignment. 17 Adjustment screw vertical lamp alignment. |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

4.2 Supported xenon lamps for the S/M Lamp House

Cathode adaptor

A cathode adaptor is required to mount the xenon lamp in the Lamp House. The cathode adaptor has to be mounted on the cathode side of the xenon lamp prior to mounting the lamp in to the Lamp House. The purpose of the cathode adaptor is to position the arc of the xenon lamp in the middle of the reflector inside the Lamp House.

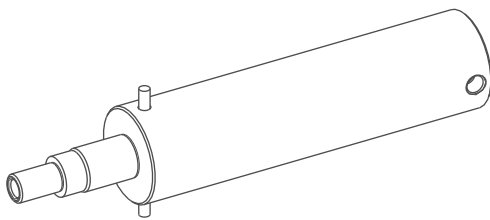


Image 4-4

- 1 Cathode adaptor manual Lamp House (R865555K)



All lamps and adaptors in the table below must be used with the **S/M Lamp House** (either manual or motorized). Note that the maximum lamp power the projector delivers depends on the type of projector and the installed lamp. Prior to install the lamp it's important to check with the Communicator software if the lamp is listed in the list of supported lamps for this projector.

Supported lamp types and their respective anode/cathode adapters for the S/M Lamp House:

| Lamp type Supplier | Cathode adapter S/M Lamp House | Barco Order No. |
|-----------------------|-----------------------------------|-----------------|
| 4kW DHP OSRAM XBO | R865555K | R9855937 |
| 3kW DHP OSRAM XBO | R865555K | R9855938 |
| 2kW DHP OSRAM XBO | R865555K | R9855956 |
| 1200W DHP OSRAM XBO | R865555K | R9855959 |
| DXL40BAF USHIO | R865555K | R9855939 |
| DXL30BAF USHIO | R865555K | R9855940 |
| DXL20BAF USHIO | R865555K | R9855955 |
| DXL12BAF USHIO | R865555K | R9855961 |
| XDC-4000B PHILIPS | R865555K | R9856370 |



WARNING: Always use the correct Cathode adapter for the xenon lamp in the Lamp House. Neglecting this may result in poor performance of the lamp and damage to the xenon lamp and Lamp House. Some adapters look the same, therefore check the engraved item number upon the adapter to ensure you use the right adapter.

4.3 Removal of the Lamp House



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



WARNING: The Lamp House is very hot after operation. To avoid burns, let the projector cool down for at least 15 minutes before proceeding to remove the Lamp House.



CAUTION: Due to its high internal pressure, the lamp may explode in either hot or cold states if improperly handled.

Required tools

10mm nut driver or flat screw driver.

How to remove the Lamp House from the projector?

1. Make sure the projector is switched off and cooled down.
2. Remove the cover of the Lamp House compartment.
3. Release the two retaining screws (reference 1 Image 4–5) at the base of the Lamp House. Use a 10mm nut driver or a flat screw driver.
4. Remove the Lamp House as follows:
 1. Grip the Lamp House by the bottom handle and partially slide it out of the lamp compartment
 2. Grip the Lamp House by both handles and remove it completely from the projector.
 3. Place the Lamp House on a stable support.



Caution: Be aware of the weight of the lamp assembly. Take the necessary precautions to avoid personal injury.

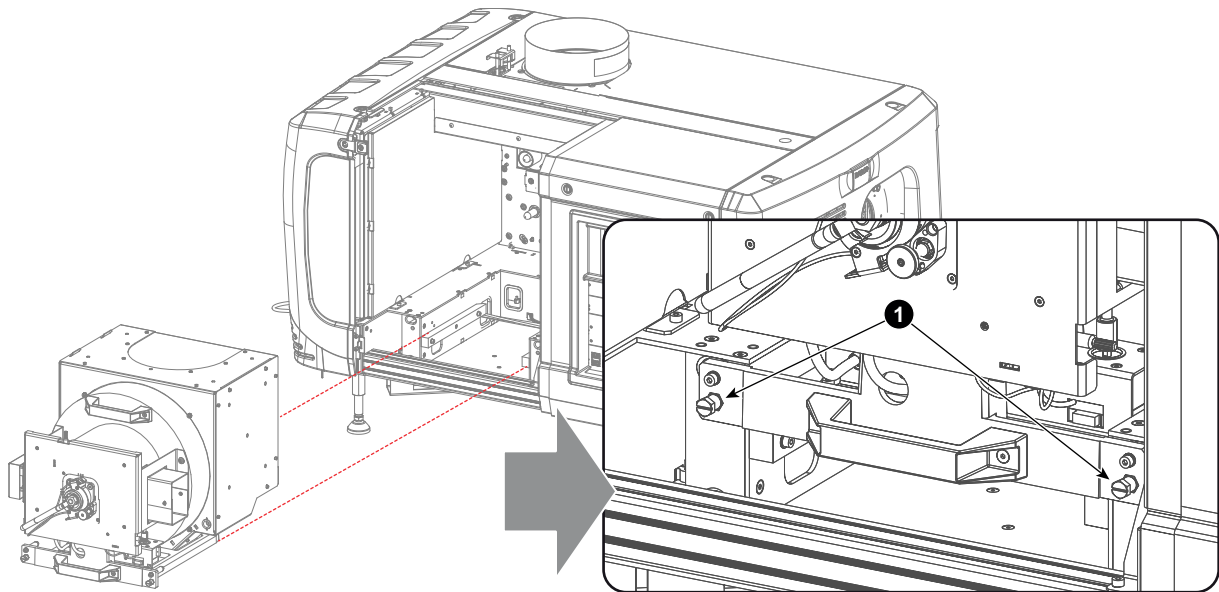


Image 4-5



This procedure is illustrated with a Motorized Lamp House. Nevertheless, the instructions are also applicable for the manual Lamp House.

4.4 Removal of the xenon lamp from manual S/M Lamp House



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



CAUTION: Xenon compact arc lamps are highly pressurized. When ignited, the normal operating temperature of the bulb increases the pressure to a level at which the bulb may explode if not handled in strict accordance to the manufacturer's instructions. The bulb is stable at room temperature, but may still explode if dropped or otherwise mishandled. Whenever the lamp house, containing a xenon lamp, has to be dismantled or whenever the protective container or cloth has to be removed from the xenon lamp, authorized protective clothing **MUST** be worn!



WARNING: Always wear face protection (full face shield) when handling xenon lamps.



WARNING: Always wear protective clothing (welder's jacket) when handling xenon lamps.



WARNING: Always wear clean leather gloves with wrist protectors when handling xenon lamps.


Required tools

- 5mm Allen wrench.
- Lamp protective container or protective cloth with two binders.
- Flat blade screw driver.

- 2.5mm Allen wrench.

How to remove the xenon lamp out of the manual S/M Lamp House?

1. Remove the hexagon socket head cap screw (reference 1 Image 4–6) which fasten the cathode of the xenon lamp. Use a 5 mm Allen wrench. Do not release the cathode wire lug. The screw contains a spring washer and a plain washer (reference 2 & 3 Image 4–6).

 **Note:** The cathode wire remains in its position after the screw and two washers are removed.

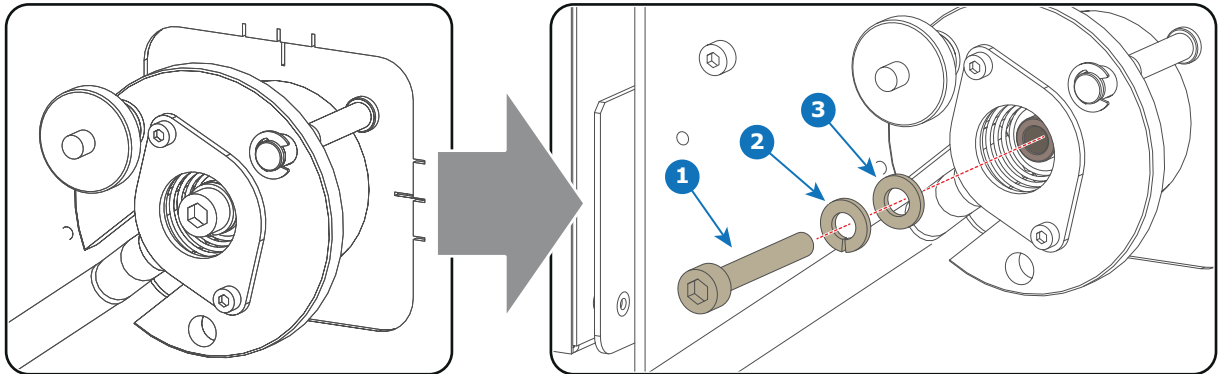



Image 4–6

2. Remove the side cover of the Lamp House by releasing the three quarter turn screws (reference 4 Image 4–7) of the side cover as illustrated.

 **Caution:** Ensure that you wear protective clothing, a full face shield and protective gloves.

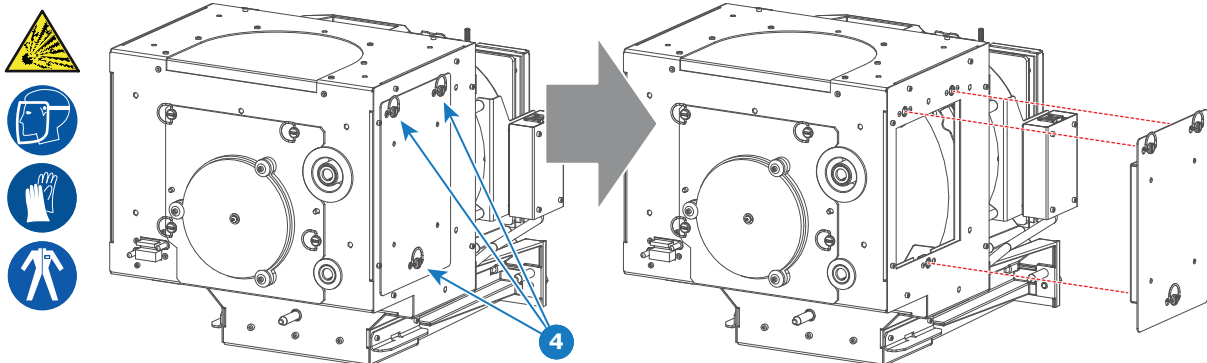


Image 4–7

3. Release the four quarter turn screws (reference 5 Image 4–8) of the UV blocker assembly as illustrated. Make sure that the anode support remains in its position while releasing the screws.

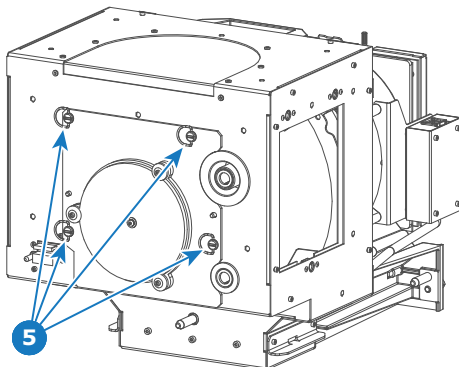


Image 4–8

4. Support the xenon lamp inside the Lamp House with one hand while removing the UV blocker assembly from the lamp house.

- !** *Warning:* Supporting the xenon lamp with one hand prevents the xenon lamp from dropping and colliding with the chassis of the Lamp House.

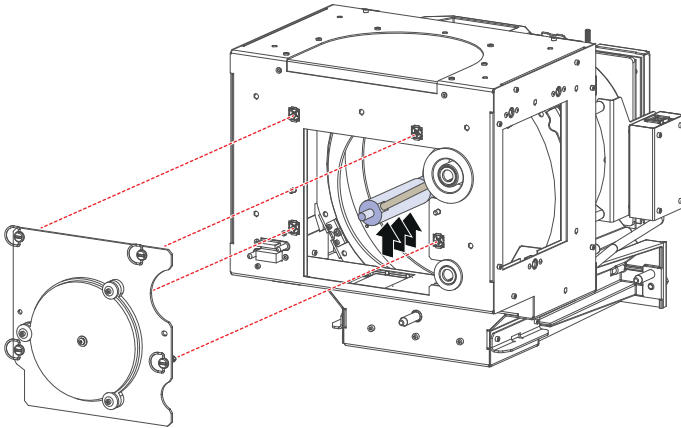


Image 4-9

- 5.** Slide out the anode connector from the Lamp House. The anode connector remains attached with the lamp anode wire.

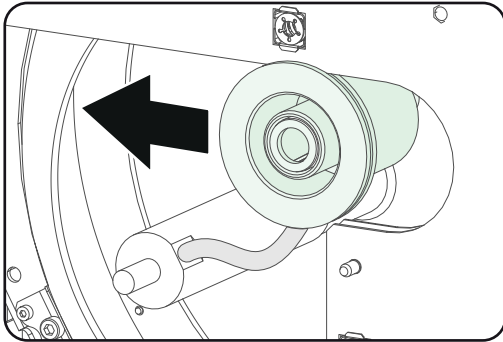


Image 4-10

- 6.** Gently remove the xenon lamp together with the anode socket out of the Lamp House. Do not use excessive force upon the xenon lamp. Normally the xenon lamp will easily slide out the cathode socket of the Lamp House.

- !** *Warning:* Supporting the xenon lamp with one hand while pulling it out with other hand prevents it from bumping against the chassis of the Lamp House.

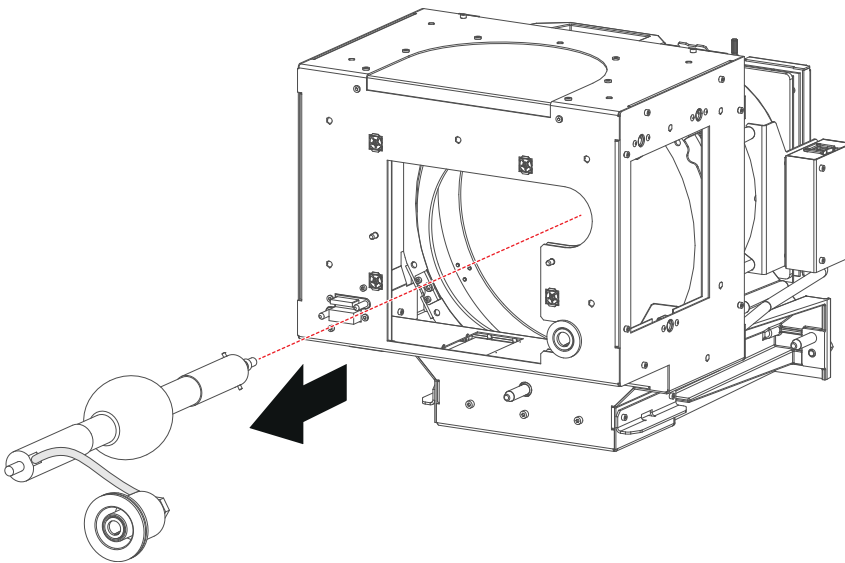


Image 4-11

7. Place the xenon lamp in its protective container or wrap the xenon lamp in a protective cloth and secure with two binders.

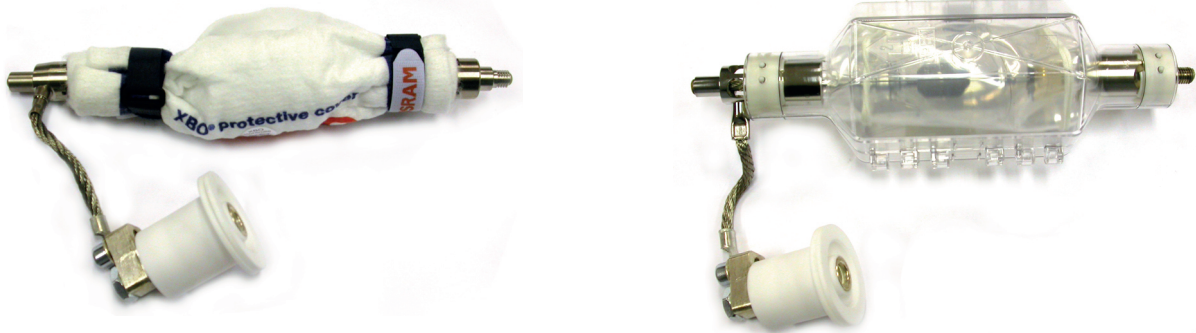


Image 4–12 Left: Xenon lamp wrapped in a protective cloth. Right: Xenon lamp captured in a protective container.

8. Remove the anode wire lug (reference 6 Image 4–13) from the anode socket as illustrated. Use a 8mm Allen wrench.



Tip: Place the flat washer and bolt (reference 7 & 8 Image 4–13) back on its place after the lug is removed.

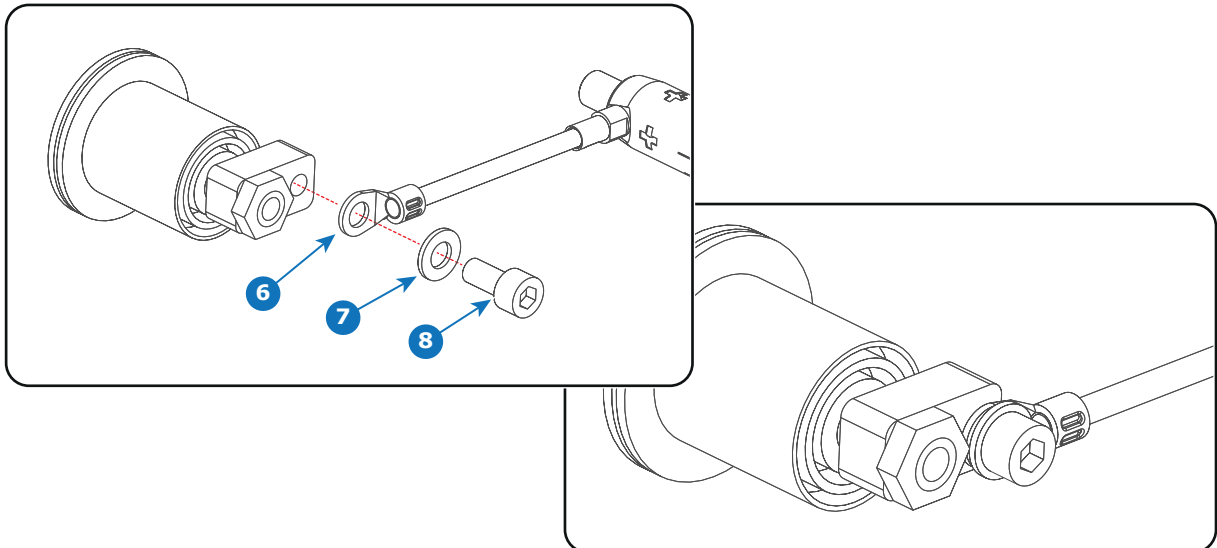


Image 4–13

9. Remove the cathode adapter from the xenon lamp by releasing the hexagon socket head cap screw (reference 9 Image 4–14) of the adapter as illustrated. Use a 5mm Allen wrench.



Note: Some xenon lamps have a cathode pin with screw thread (reference 10 Image 4–14).

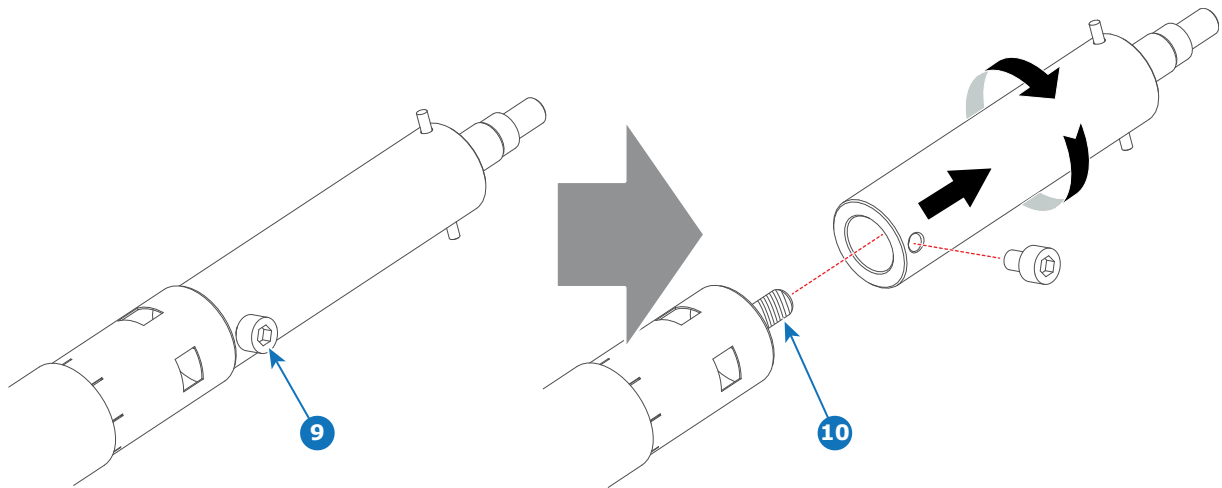


Image 4-14



Reinstall the UV blocker assembly and the side cover in case you do not intend to install another xenon lamp immediately in the Lamp House.



CAUTION: Expired xenon lamps.

Dispose of expired bulbs that are beyond warranty according to the national regulations. See also related user manual of the lamp supplier for more guidance.



CAUTION: Small amounts of radioactive material (< 1000 Bq per lamp) are deliberately added to Xenon lamps for functional reasons. These lamps are manufactured under regulatory control as consumer product according to IAEA basic safety standard BSS 115. Disposal according to national regulations is required e.g. in Europe covered by WEEE regulation. See also related user manual of the lamp supplier for more guidance.



When returning a xenon lamp for warranty adjustment, pack it in its original shipping container. Complete and return all required warranty information.

4.5 Installation of the xenon lamp in manual S/M Lamp House



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



CAUTION: Xenon compact arc lamps are highly pressurized. When ignited, the normal operating temperature of the bulb increases the pressure to a level at which the bulb may explode if not handled in strict accordance to the manufacturer's instructions. The bulb is stable at room temperature, but may still explode if dropped or otherwise mishandled. Whenever the lamp house, containing a xenon lamp, has to be dismantled or whenever the protective container or cloth has to be removed from the xenon lamp, authorized protective clothing **MUST** be worn!



WARNING: Always wear face protection (full face shield) when handling xenon lamps.



WARNING: Always wear protective clothing (welder's jacket) when handling xenon lamps.



WARNING: Always wear clean leather gloves with wrist protectors when handling xenon lamps.



This procedure assumes that the anode support assembly and the side cover are already removed from the Lamp House due to the removal of the xenon lamp.

Required tools

- Torque wrench with a 2,5 mm Allen socket.
- Torque Allen key
- 1,5 mm Allen wrench.
- 22 mm open-end wrench.
- Torque wrench with a 22 mm hexagon socket.
- Torque wrench with a 5 mm Allen socket.

How to install the xenon lamp in the manual S/M Lamp House?

1. Install the lamp cathode adapter on the cathode of the xenon lamp. Note that some xenon lamps have a cathode pin with screw thread (reference 10 Image 4–15). Screw the adaptor on the anode pin as far as possible. Make sure that there is full contact between the adapter flat surface and the lamp base. Fasten the set screw (reference 9 Image 4–15) of the cathode adapter with a torque of **2.5Nm** (1.84 lbf*ft). Use a torque wrench with a 5mm Allen socket.

! *Caution:* Ensure that the adaptor is clean. Periodically clean the adaptor. Remove oxide from silver plated adaptor with standard household metal polish (E.g. Brasso).

! *Warning:* Install the cathode adapter prior to removing the protective container or protective cloth from the xenon lamp.

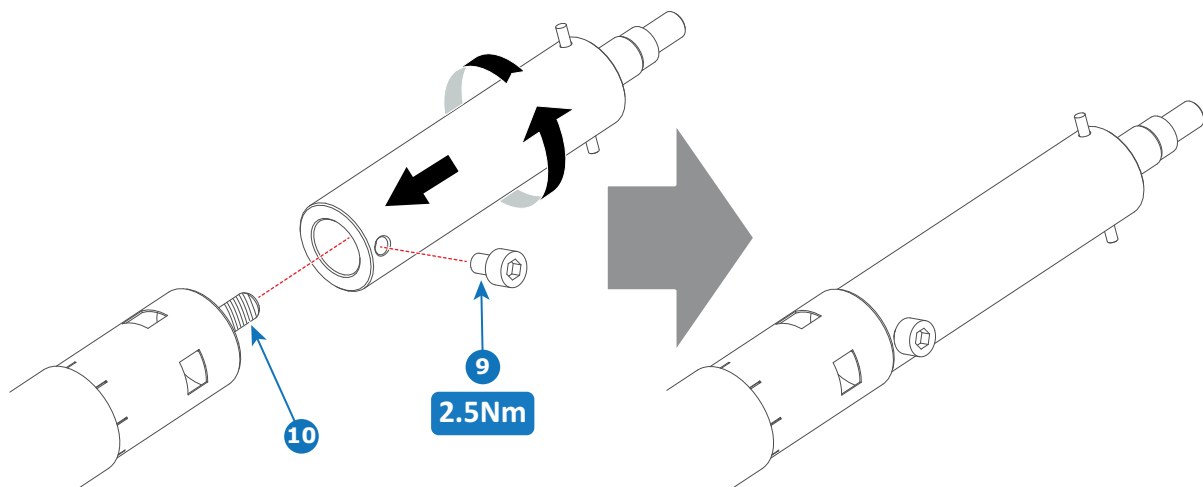


Image 4–15

2. Install the anode wire lug (reference 6 Image 4–16) upon the anode socket as illustrated. Use an 8mm Allen torque key set to **9Nm** (6.64lbf*ft) to secure the bolt (reference 8 Image 4–16). Place a flat washer (reference 7 Image 4–16) between the bolt and the wire lug.

! *Warning:* Make sure that there is no tension on the anode wire of the xenon lamp.

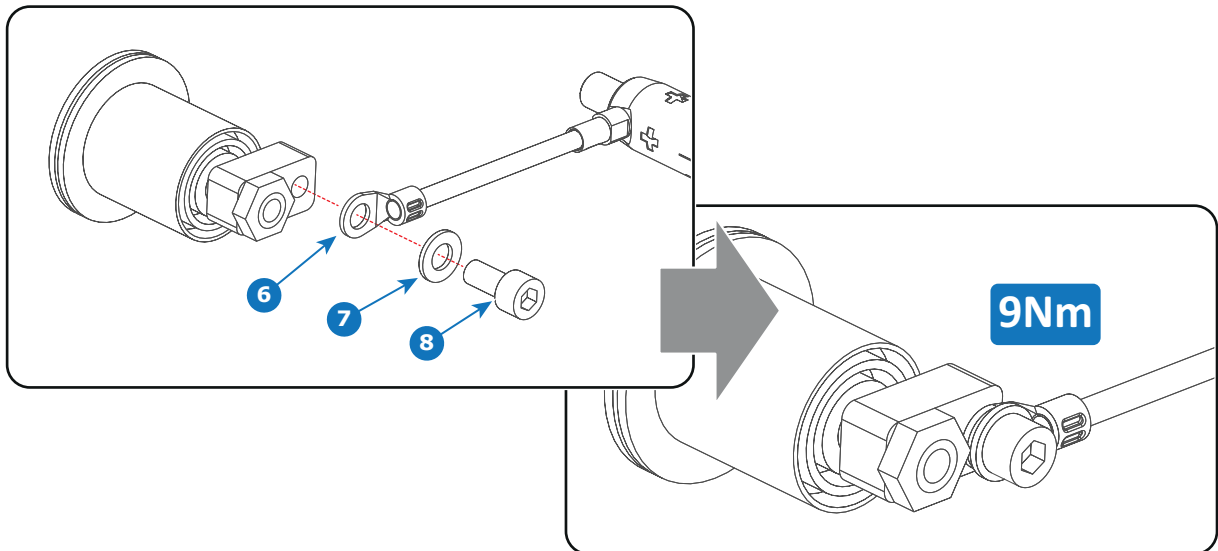


Image 4–16

- 👉 *Tip:* Write down the serial number of the xenon lamp. You will need this while updating the lamp parameters after installation of the xenon lamp. The serial number of the xenon lamp is engraved in the neck of the xenon lamp.

3. Check the cathode connection inside the lamp house. Use an 22 mm open-end wrench to hold the first nut while fastening the second nut on the rod with a torque of **25Nm** (18.4 lbf*ft) using a torque wrench with 22 mm hexagon socket. Ensure that there is a flat washer at both sides of the wire lug. It's safer to do this check before the xenon lamp is installed to avoid accidental bumping against the xenon lamp.

- 👉 *Tip:* The cathode socket can easily pulled out from the Lamp House as a whole to perform this check.

- ⚠️ *Caution:* These cathode connections must be checked with every lamp change!

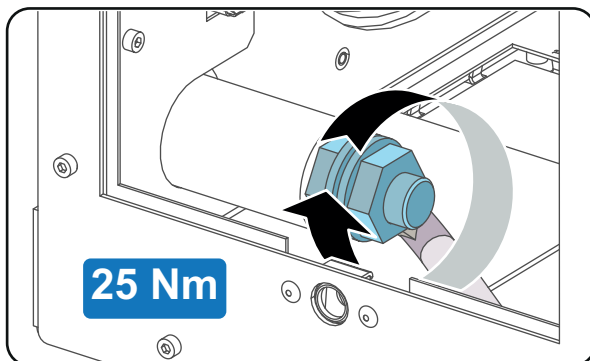


Image 4–17

4. Remove the protective packing from the xenon lamp and gently insert the xenon lamp into the Lamp House as illustrated. Lamp cathode first, Make sure that the wire of the lamp anode is upwards oriented. While inserting the lamp, rotate it slightly, **engaging the pins** (reference 11 Image 4–18) of the cathode adapter in the foreseen slots. This is to ensure the lamp cathode is completely inserted. Keep supporting the anode of the lamp with one hand once the xenon lamp is in position.

- ⚠️ *Caution:* Ensure that you wear protective clothing, a full face shield and protective gloves.

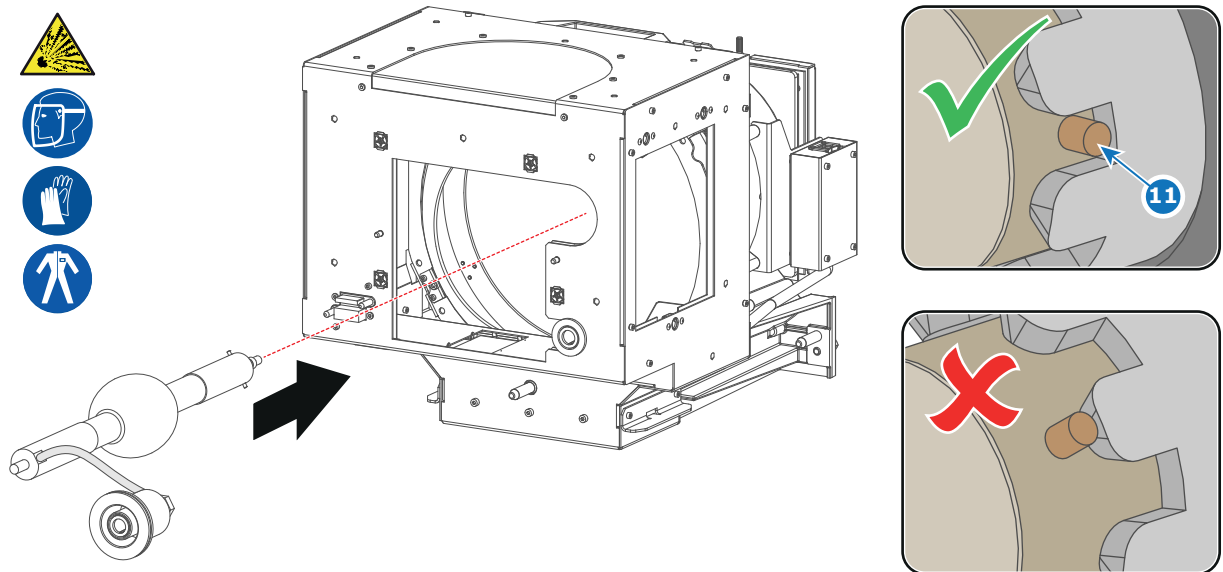


Image 4-18

- Slide the anode connector in its position on the Lamp House as illustrated.

! **Caution:** Avoid any tension on the anode wire, ensuring there is no mechanical stress on the lamp.

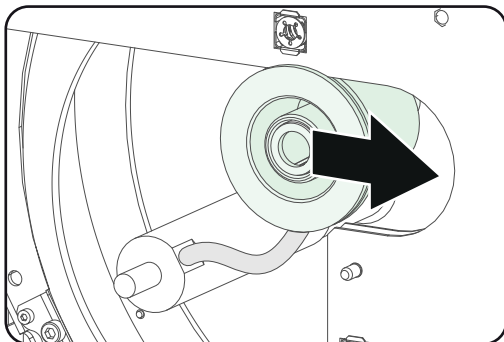


Image 4-19

- Install the UV blocker assembly as illustrated. Use the opening at the side of the Lamp House to guide the anode pin of the xenon lamp into the anode supporting mechanism of the UV blocker.

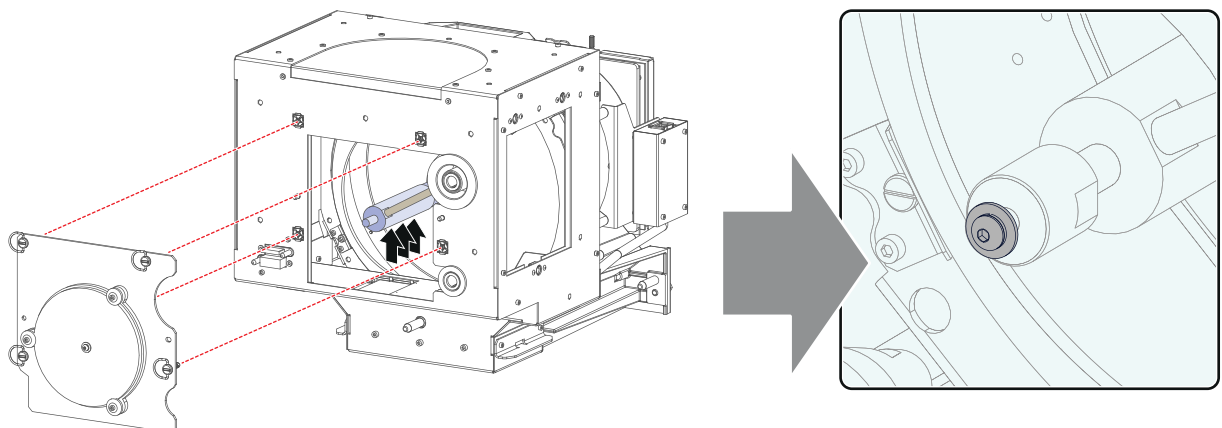


Image 4-20

- Secure the UV blocker by fastening the four quarter turn screws (reference 5 Image 4-21) as illustrated.

📄 Note: Ensure that the quarter turn screws turning wires are flush with the cover or interference will occur while inserting the Lamp House into the projector.

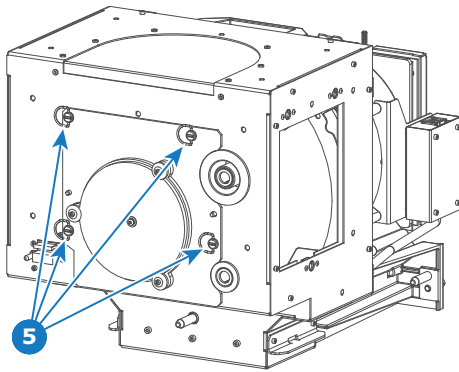



Image 4-21

8. Install the side cover of the Lamp House and fasten the three quarter turn screws (reference 4 Image 4-22) of the cover.

 **Note:** Please ensure that the quarter turn screws turning wires are flush with the cover or interference will occur while inserting the Lamp House into the projector.

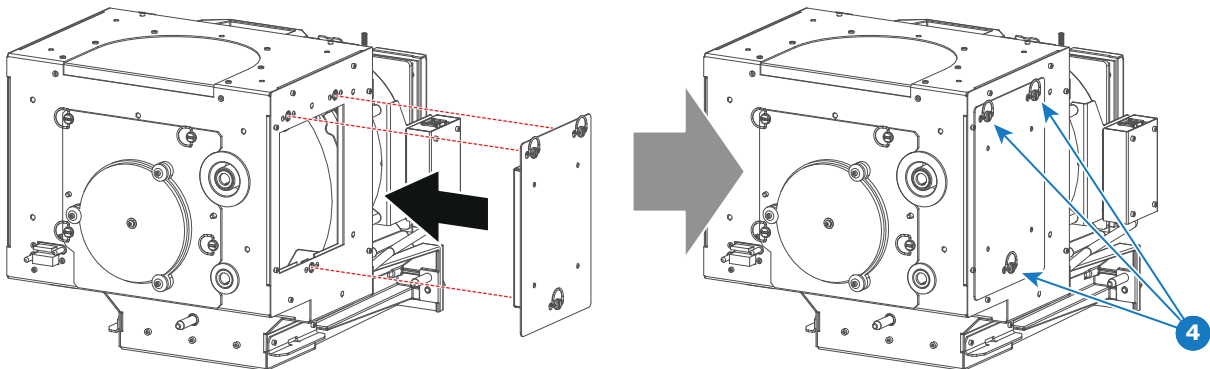



Image 4-22

9. Secure the xenon lamp cathode with the hexagon socket head cap screw (reference 1 Image 4-23), spring washer (reference 2 Image 4-23) and plain washer (reference 3 Image 4-23). Fasten the screw with a torque of **5 Nm** (3,7 lbf*ft). Use a torque wrench with a 5 mm Allen socket.

 **Caution:** Make sure that both pins (reference 11 Image 4-23) of the cathode adapter remain engaged in the foreseen slots.

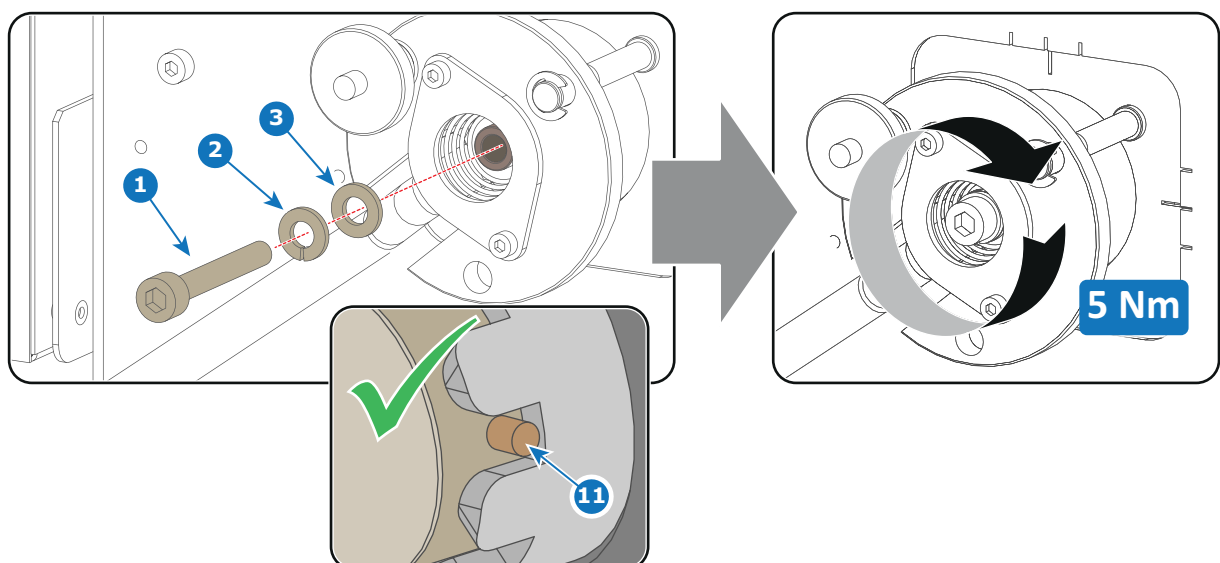


Image 4-23



CAUTION: The “LAMP INFO” parameters which are stored on a chip inside the Lamp House MUST be updated after each installation of an xenon lamp inside the Lamp House. Neglecting this update will result in poor performance and short life time of the xenon lamp.



A realignment of the xenon lamp in its reflector is required after the installation of the xenon lamp in the Lamp House.

4.6 Installation of the Lamp House



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



CAUTION: Due to its high internal pressure, the lamp may explode in either hot or cold states if improperly handled.

Required tools

10mm nut driver or flat screw driver.

How to install the Lamp House in the projector?

1. Check if the six quarter turn screws turning wires (reference 1 Image 4–24) are flush with the cover or interference will occur while inserting the Lamp House into the projector.

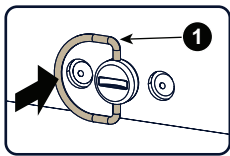
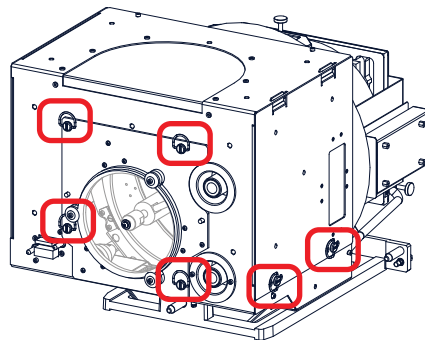


Image 4–24



2. Grip the Lamp House by both handles and place the front of the Lamp House on the base plate inside the lamp compartment of the projector, lining up the foot of the Lamp House with the slots on the base.
3. Push the Lamp House fully into the slots.
4. Secure the Lamp House by fastening the two retaining screws (reference 1 Image 4–25) at the base of the Lamp House.
5. Reinstall the cover of the Lamp House compartment.

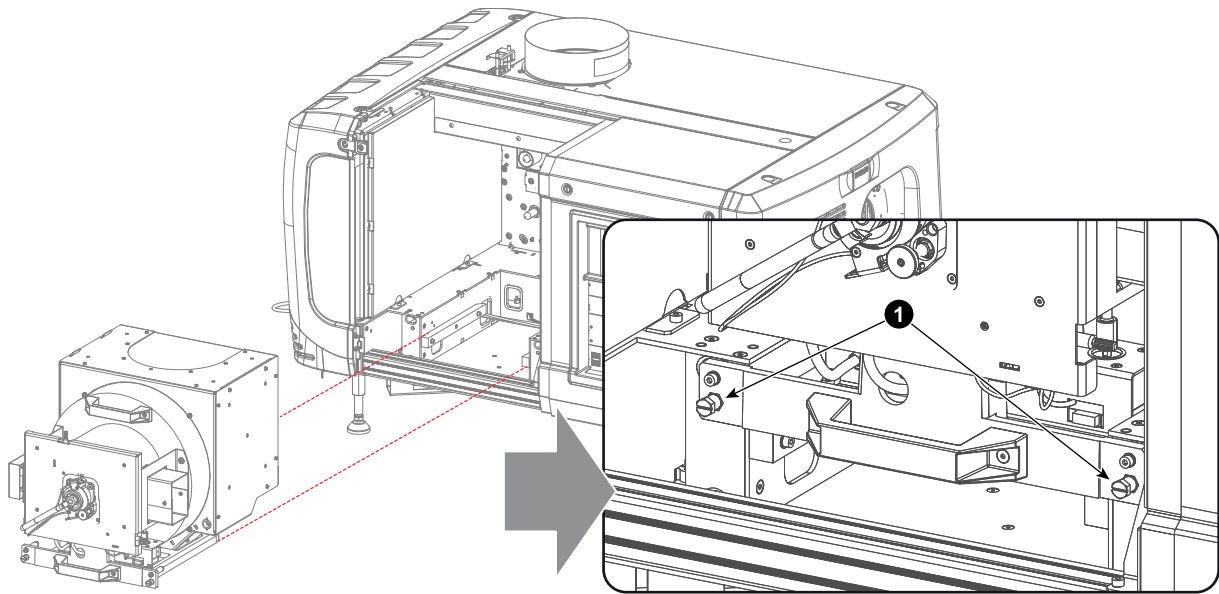


Image 4-25

4.7 Resetting the lamp parameters



CAUTION: The “LAMP INFO” parameters MUST be updated after each installation of a xenon lamp inside the Lamp House. Neglecting this update will result in poor performance and short life time of the xenon lamp.

For a new lamp, how to reset the values

1. While the *Lamp information* window is displayed, click on **Change lamp** (1).

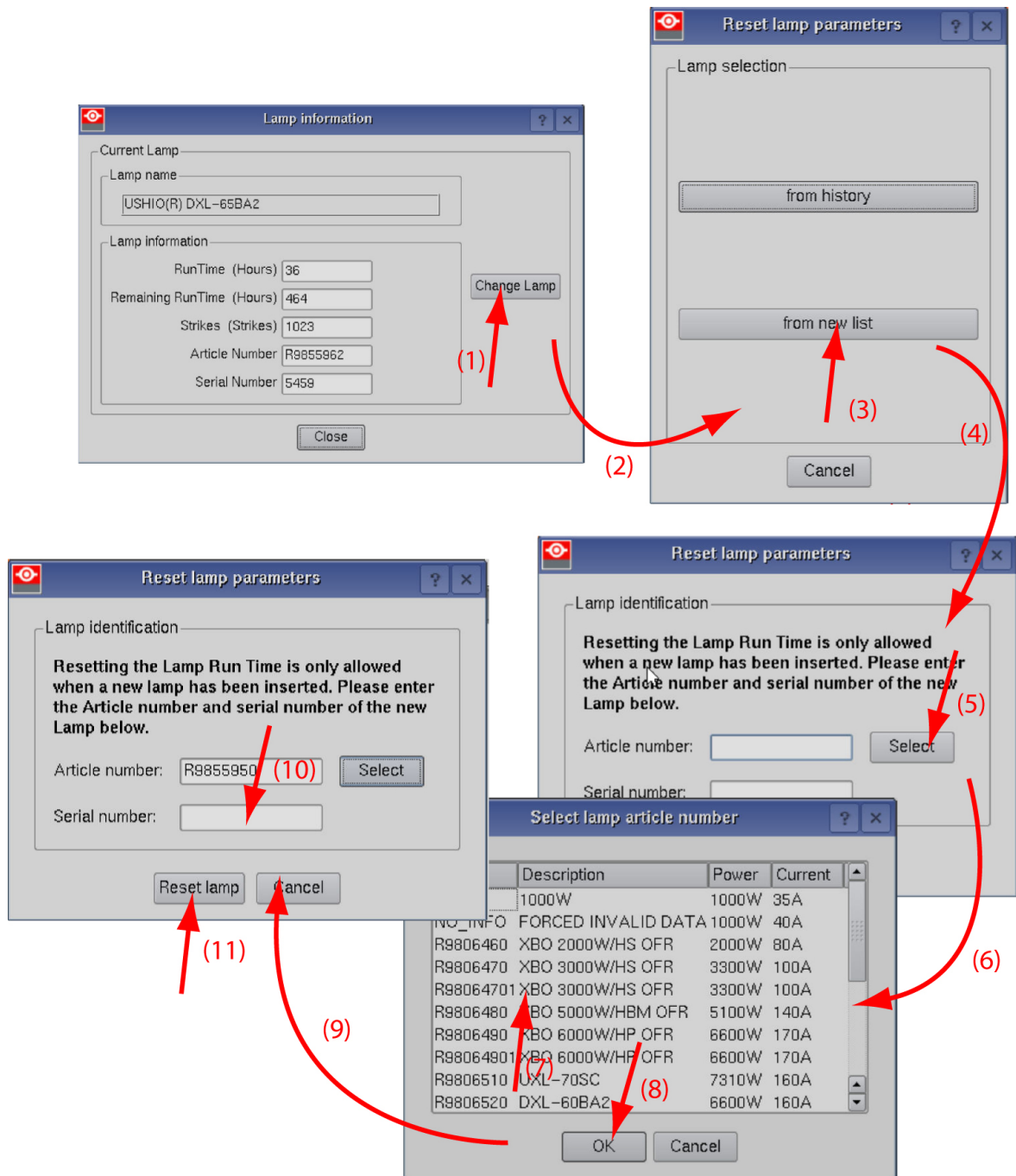


Image 4-26 Reset lamp info, new lamp

A Reset lamp parameters selection window opens (2).

2. To get new lamps, click on **From new list** (3).
The lamp article and serial number opens (4).

3. Fill out the article number of the new lamp (5a)
or

click on **Select** (5b) to display a list of possible article numbers (6). Select a article number (7) and click **OK** (8).

The software will check if the entered article number is a valid number (9).

4. Fill out the serial number of the lamp (10).
5. Click **Reset lamp** (11).

For a used lamp, how to set back the original values

1. While the *Lamp information* window is displayed, click on **Change lamp** (1).

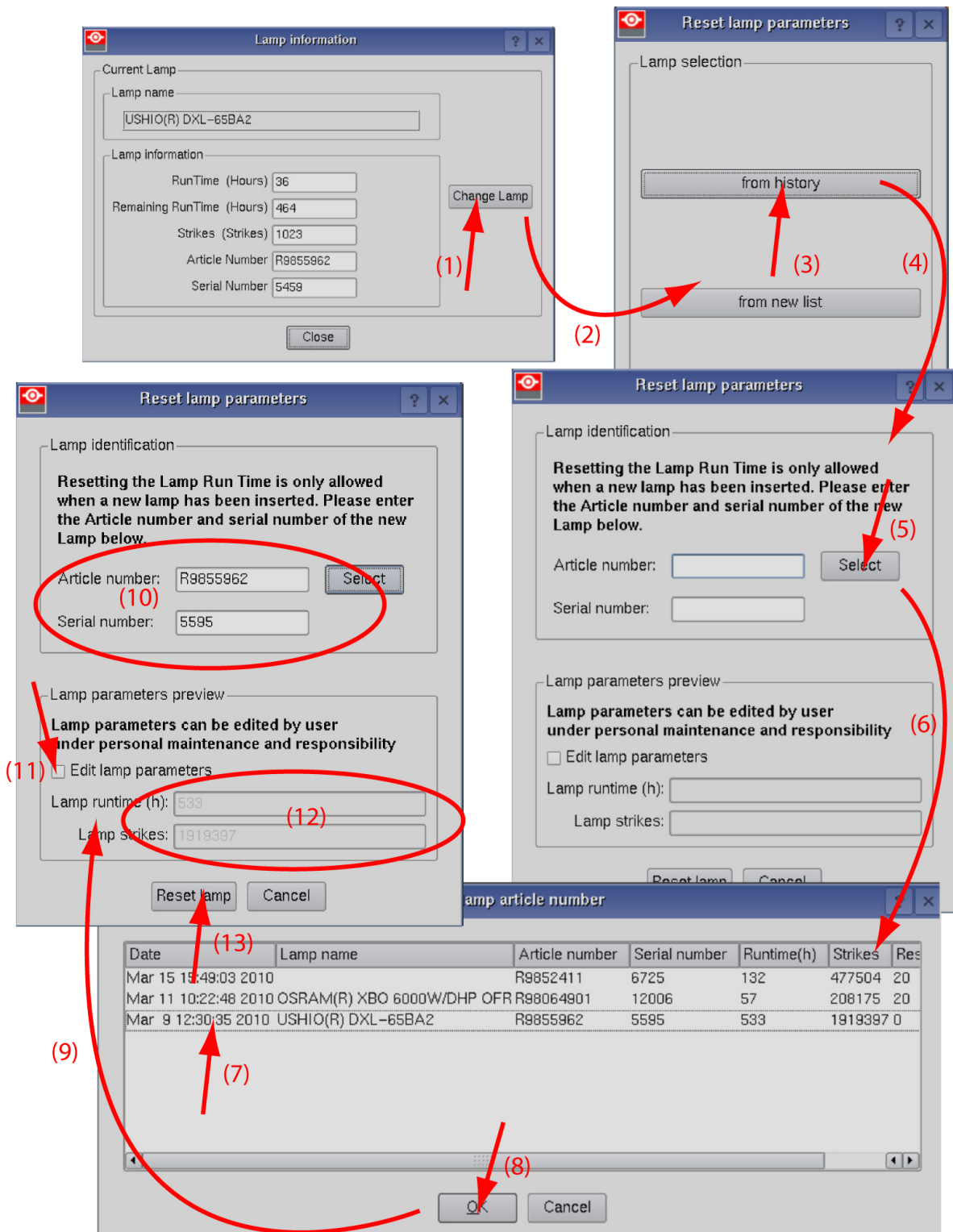


Image 4-27 Reset lamp info, used lamp

A *Reset lamp parameters* window opens (2).

2. To get history of the used lamps, click **from history** (3).
The *Reset lamp history selection* window opens (4).
3. Click on **Select** (5) to display a list of possible lamps (6).

4. Select the desired lamp (7) and click **OK** (8).

The article number and serial number of the selected lamp is added to the *Reset lamp parameters* window (10). The lamp run time and number of strikes of this lamp are added in *Lamp parameter preview* (12).

5. The lamp parameters can be edited by the user under personnel maintenance and responsibility. If you want to change these parameters, check the check box in front of *Edit lamp parameters* (11).

The current parameter fields become active (12).

6. Click in an input field and change to the desired value.
7. Click **Reset lamp** (13).

4.8 Realignment of the lamp in its reflector (manual Lamp House)



Each xenon lamp installation requires a realignment of the lamp in its reflector for optimal performance of the xenon lamp in the DPxK-19B/23B/P. Furthermore, it is recommended to realign the lamp after the first run time of 100 and 200 hours. Especially the Z-axis of the lamp.

How to realign

1. Remove the lamp cover to get access to the X-, Y- and Z-axis adjustment thumbscrews of the lamp.
2. Some lamp houses may have lock nuts on the X and Y adjustment screws which are locked. Before starting the adjustment, fully turn these lock nuts against the thumbscrew.

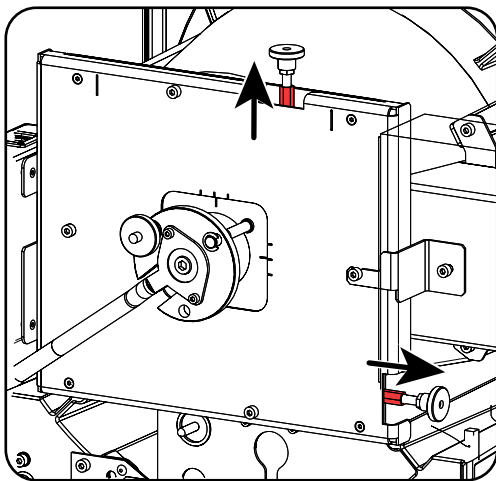


Image 4-28 Lock nuts

3. Switch on the projector and start up the lamp.
4. Go via the Communicator touch panel to the menu "**Installation**" > "**Lamp**" > "**Light output**".
5. Set the "**Light output mode**" in **normal mode** and the "**Lamp Dimming**" on maximum (**255**).



Note: This window on the Communicator touch panel shows in the upper left corner the measured value of the built-in light sensor of the projector.

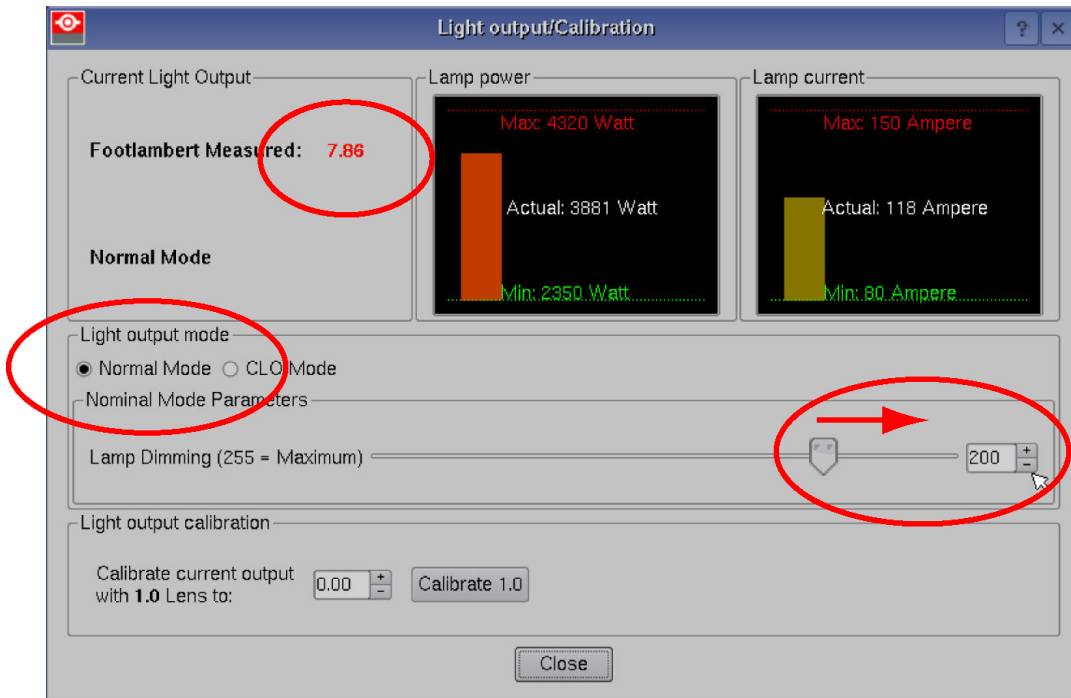


Image 4-29 Light mode selection

6. Adjust the X-axis (ref X Image 4-30), the Y-axis (ref Y Image 4-30) and the Z-axis (ref Z Image 4-30) for maximum current light output (Footlambert Measured). Carefully turn the thumbscrew for maximum light output. Once over the maximum, turn slightly in opposite direction to reach the maximum light output again. Do this for each direction and repeat this adjustment cycle twice.

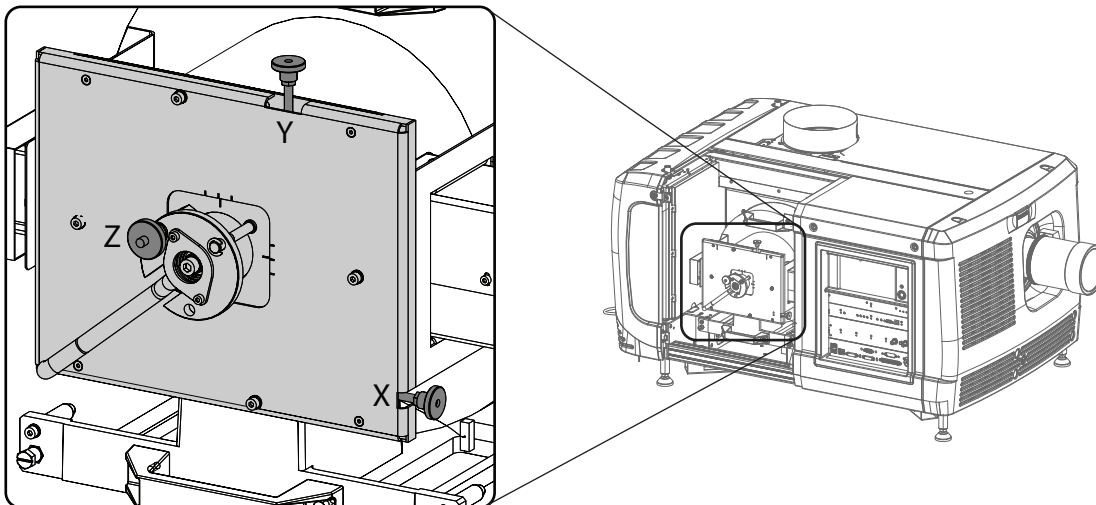


Image 4-30 Realignment points

7. If lock nuts are available, these nuts can be locked again.
8. Switch of the projector.
9. Reinstall the lamp cover.

Lenses & lens holder

5

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About this chapter

This chapter gives an overview of available lenses for the DPxK-19B/23B/P 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.

5.1 Available lenses

Which lenses are available for my projector?



The table below is subject to changes and was last updated on 22/10/2019. Consult Barco's web site for the most recent information about available lenses.

| Order No | Type | Throw Range | | Projector series | | |
|-------------------------------------|------|-------------|-----------|----------------------------------------------------|-----------------------------------------|--------------------------------------------------|
| | | 2K | 4K | DP2K-B DP4K-B DP2K-BLP DP4K-BLP DP4K-L | DP4K-P Prometheus I Prometheus II | DP4K-LHC DP4K-BLPHC Thor Prometheus III |
| R9856504 R9856525 | HB | 1.25-1.90 | 1.13-1.72 | X | | |
| R9856506 | HB | 1.25-1.91 | 1.13-1.72 | X | | |
| R9856294 R9856526 | HB | 1.49-2.05 | 1.35-1.86 | X | | |
| R9856297 R9856527 | HB | 1.61-2.31 | 1.46-2.10 | X | | |
| R9856300 R9856528 | HB | 1.82-2.86 | 1.65-2.60 | X | | |
| R9856303 R9856529 | HB | 2.21-3.70 | 2.00-3.35 | X | | |
| R9855947 | HB | 2.8-5.5 | 2.53-4.98 | X | | |
| R98565042 R98565252 R98565062 | HC | | 1.13-1.72 | X | X | |
| R98562942 R98565262 | HC | | 1.35-1.86 | X | X | |
| R98562972 R98565272 | HC | | 1.46-2.10 | X | X | |
| R98563002 R98565282 | HC | | 1.65-2.60 | X | X | |
| R98563032 R98565292 | HC | | 2.00-3.35 | X | X | |
| R98565043 R98565253 | VHC | | 1.13-1.72 | | | X |
| R98562943 R98565263 | VHC | | 1.35-1.86 | | | X |
| R98562973 R98565273 | VHC | | 1.46-2.10 | | | X |

| Order No | Type | Throw Range | | Projector series | | |
|------------------------|------|-------------|-----------|----------------------------------------------------|-----------------------------------------|--------------------------------------------------|
| | | 2K | 4K | DP2K-B DP4K-B DP2K-BLP DP4K-BLP DP4K-L | DP4K-P Prometheus I Prometheus II | DP4K-LHC DP4K-BLPHC Thor Prometheus III |
| R98563003 R98565283 | VHC | | 1.65-2.60 | | | X |
| R98563033 R98565293 | VHC | | 2.00-3.35 | | | X |

5.2 Lens selection

Which lens do I need?

1. Browse to Barco's website on www.Barco.com.
2. Go to the product page of the desired product.
3. On the product page, go to the *Tools* section and click **Lens calculator**.

The lens calculator 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 5-1 Example of the Digital Cinema Lens calculator tool



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.

5.3 Lens installation

How to install a lens?

1. Remove the plastic lens holder cover.
 1. Put the lock (1) into the unlock position.
 2. Take out the plastic cover.

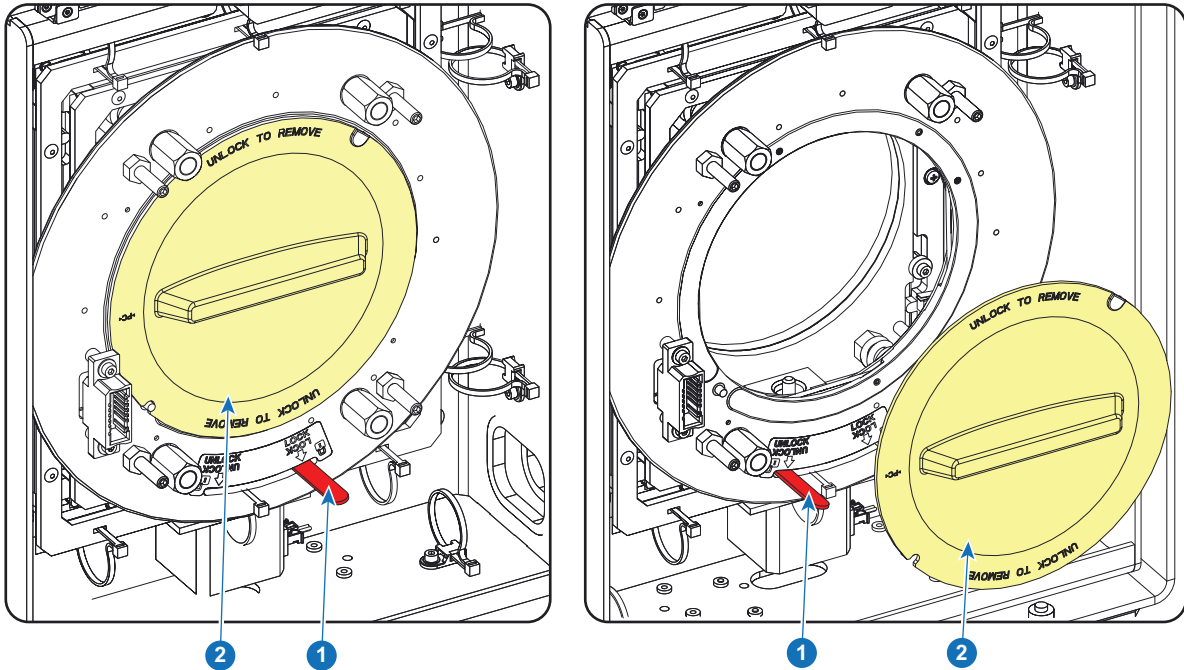


Image 5-2

2. Take the lens assembly out of its packing material and remove the lens caps on both sides.
3. Place the lens holder in the “unlocked” position by moving the lens lock handle (1) towards the lens power supply socket (2).

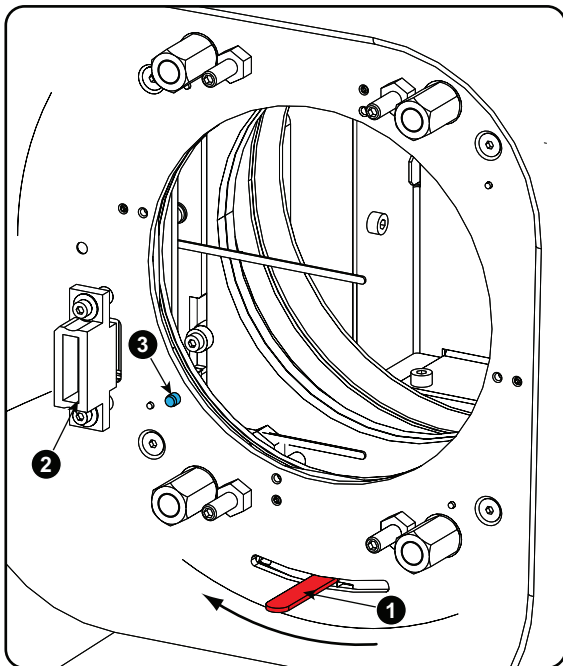



Image 5-3 Unlock lens holder

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.

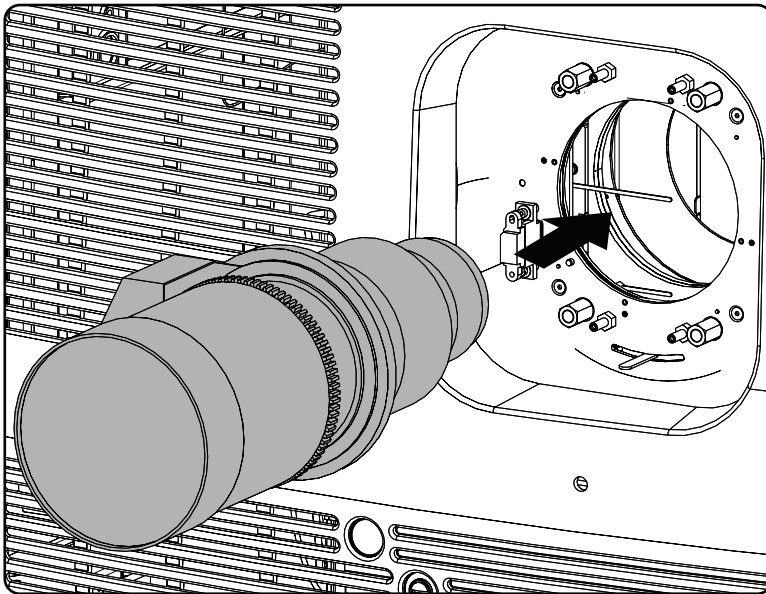



Image 5-4 Mount lens

6. Insert the lens until the connector seats into the socket.
 - the pin (3) on the lens holder matches with the sleeve in the lens.
 - the connector seats into the socket (2)

 **Warning:** Do not release the lens yet, as the lens may fall out of the lens holder.

7. Secure the lens in the lens holder by sliding the lens lock handle into the “locked” position, which is away from the lens power supply socket. Ensure the lens touches the front plate of the lens holder.

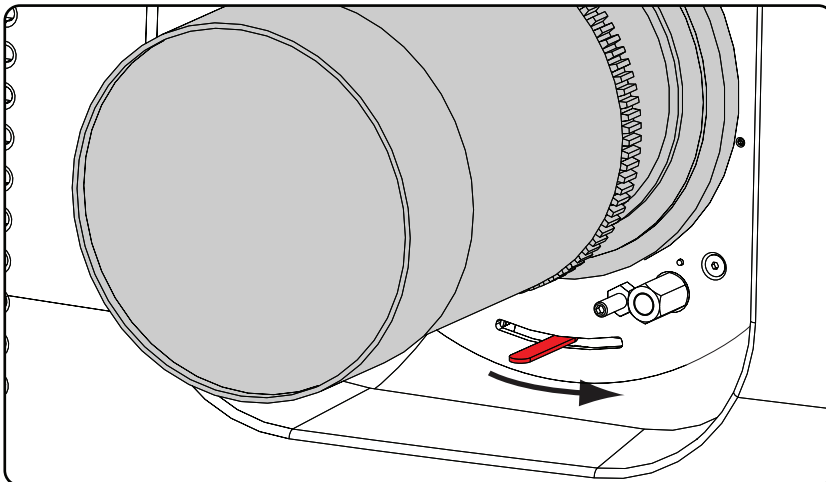



Image 5-5 Fix lens

8. Activate the corresponding lens parameters for the installed lens. (See user guide of the “Communicator” chapter *Installation > Advanced > Lens parameters*)

 **Caution:** Not using the correct lens parameters could result in lens damage.

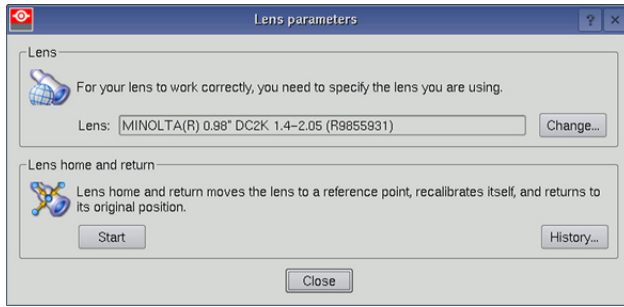



Image 5-6

9. Perform a lens **HOME & RETURN** operation. (See user guide of the “Communicator” chapter *Installation > Advanced > Lens parameters*)

Note: The HOME & RETURN operation enables the projector to determine the reference positions of the motorized ZOOM and FOCUS of the installed lens.

-  For the lenses with a focus adjustment mounted on the lens (4K lenses) , the lens holder goes to a normal (fixed) focus position. For these lenses, do not mechanically adjust the focus position of the lens holder, otherwise the normal position will be lost.



A Spatial Color Calibration (SCC) has to be execute in case of a first install or in case a High Brightness lens is swapped with a High Contrast lens or vice versa. See user guide of the Communicator for detail SCC calibration instructions.



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.

5.4 Lens removal

How to remove a lens?

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

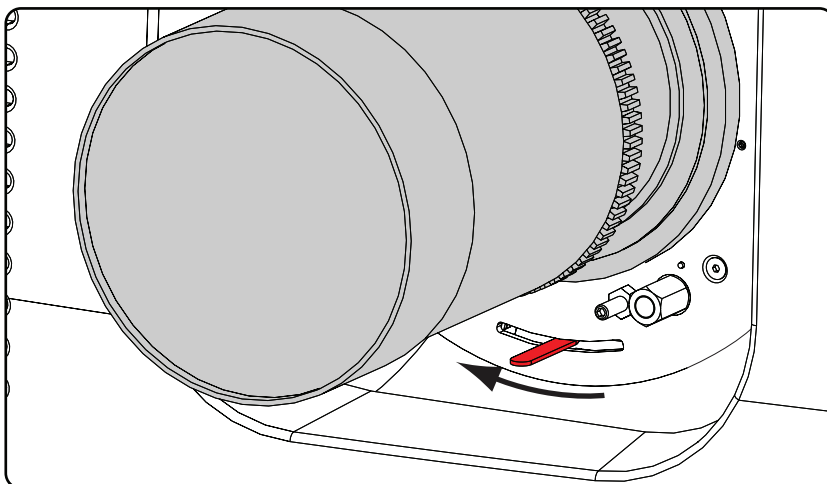


Image 5-7 Unlock lens

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

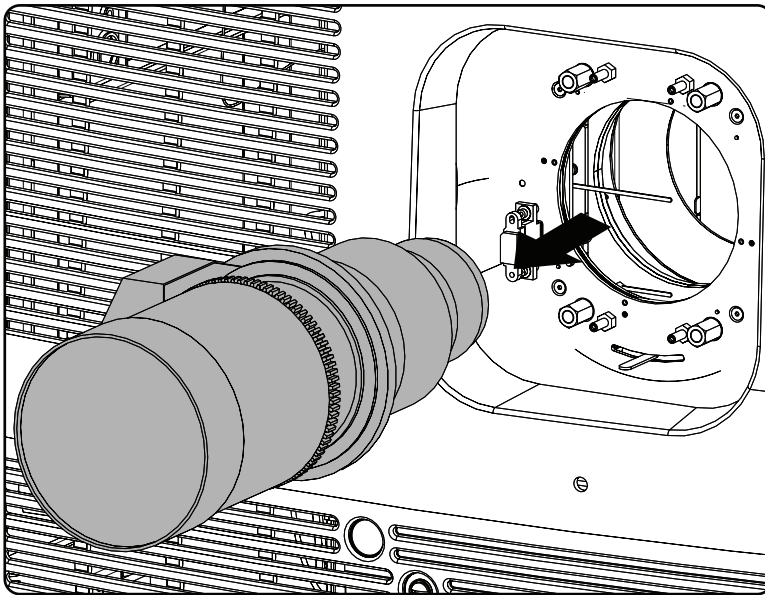


Image 5-8 Remove lens



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 plastic lens holder cover of the original projector packaging, back into the Lens opening to prevent intrusion of dust.

5.5 Lens shift, zoom & focus

Motorized lens adjustment

The DPxK-19B/23B/P 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 internal optics of the projector (DMD) which results 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 and optical limitations the shift range is limited as well.

All lenses have a shift range of 50% up, 50% down, 30% left, and 30% right. This range is valid for all throw ratios. Within these shift ranges the projector and lens perform excellently. Configuring the projector outside these shift ranges will result in a slight decline of image quality.

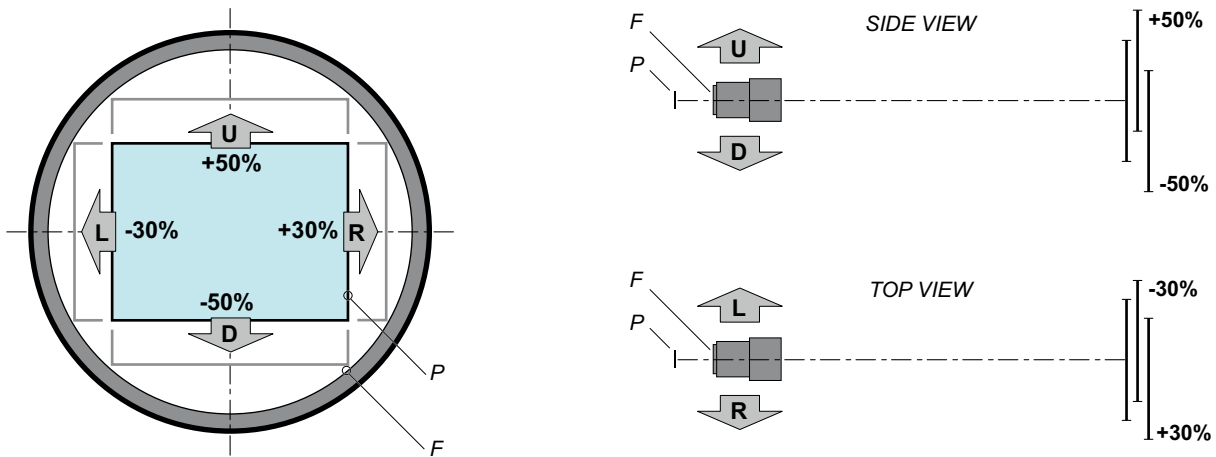


Image 5-9

- P DMD.
- F Field of view.

How to shift the lens of the DPxK-19B/23B/P?

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**.

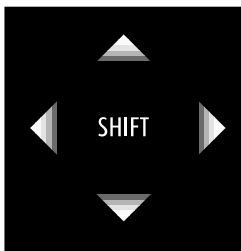


Image 5-10

How to zoom in or out?

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



Image 5-11

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

How to focus?

1. Use the **“+” and “-” focus keys** on the local keypad to focus the image on the screen.



Image 5-12



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.

5.6 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 DPxK B series 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.

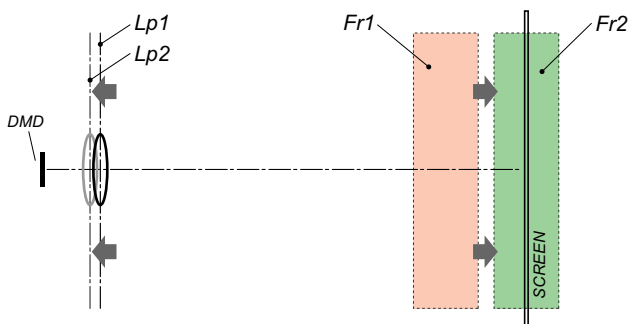


Image 5-13



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).

Required 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”)

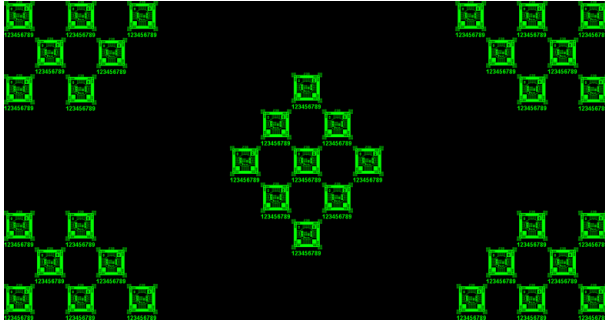


Image 5-14

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 5-15) of the Lens Holder by 1 centimeter. Use a 10mm nut driver for the lock nuts (reference 21 Image 5-15) and use a 3mm Allen wrench for the set screws.

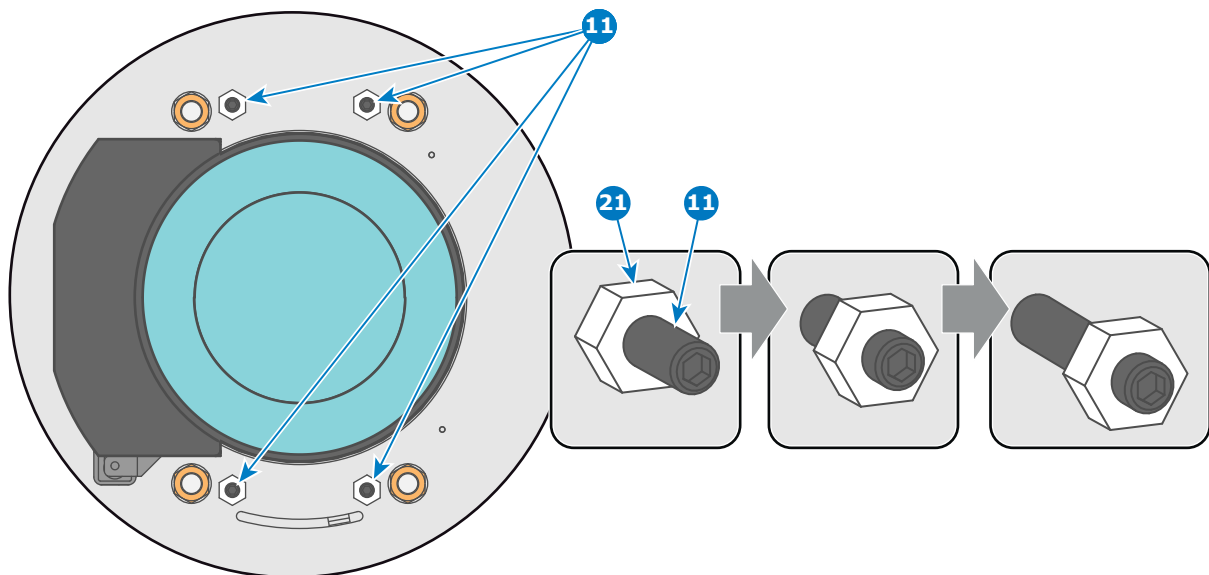


Image 5-15

2. Fully loosen the Scheimpflug nut at the lower left of the Lens Holder (reference 4 Image 5-16). Use a 13mm nut driver.

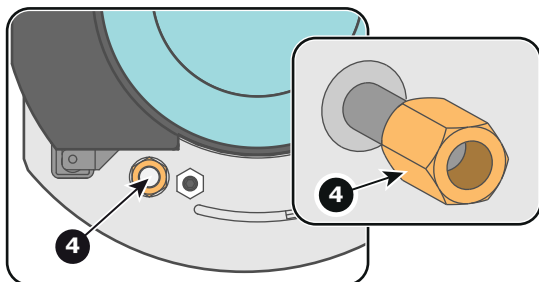




Image 5-16

3. Turn the three Scheimpflug adjustment nuts, reference 1, 2 and 3 Image 5-17, until the front of the nut (reference 5 Image 5-17) is equally aligned with the front of the threaded rod (reference 6 Image 5-17). 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.

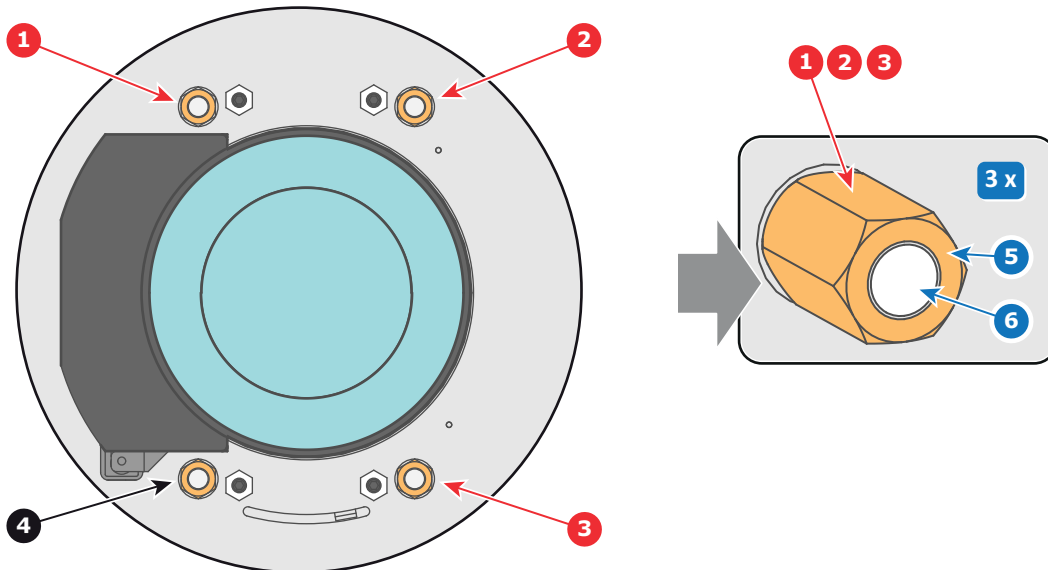


Image 5-17

- 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).

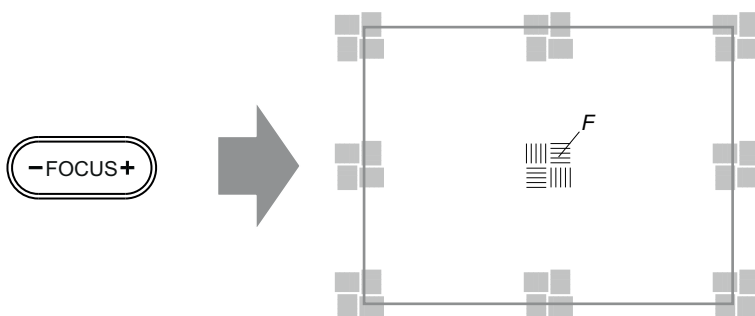


Image 5-18

- 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 5-19, 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.

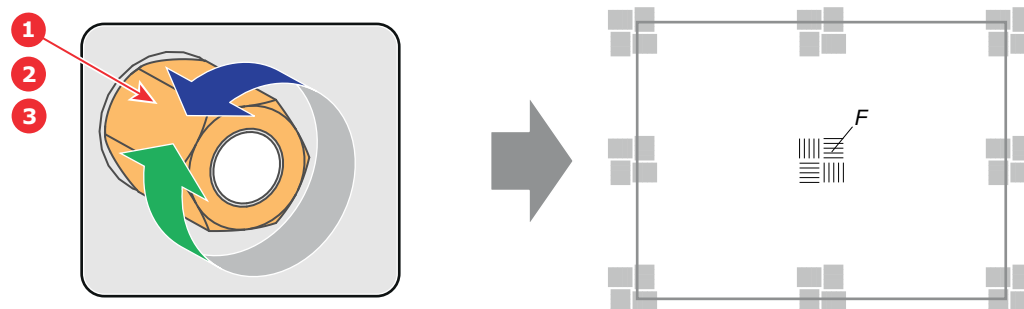


Image 5-19

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).

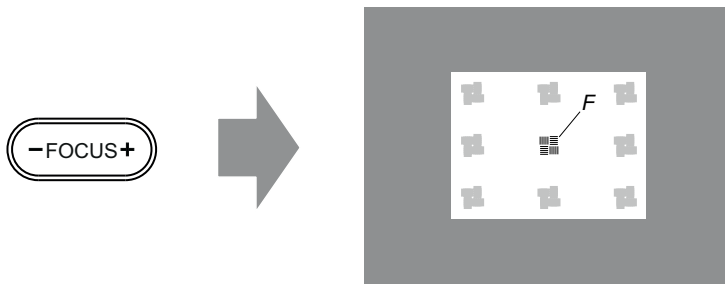


Image 5-20

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 5-21, equally in or out until the center of the projected image is sharp. **Note**: the same turning direction as in step 5 is applicable.

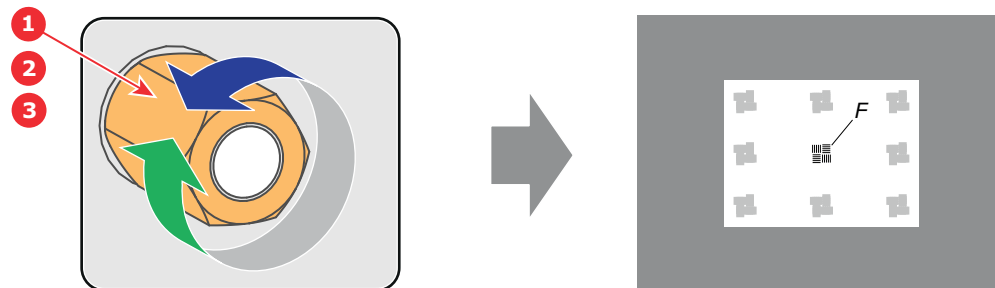


Image 5-21

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 74.
 - ▶ If **no**, Scheimpflug adjustment is required. See procedure “Scheimpflug adjustment”, page 70, 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!

5.7 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 Scheimpflug'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).

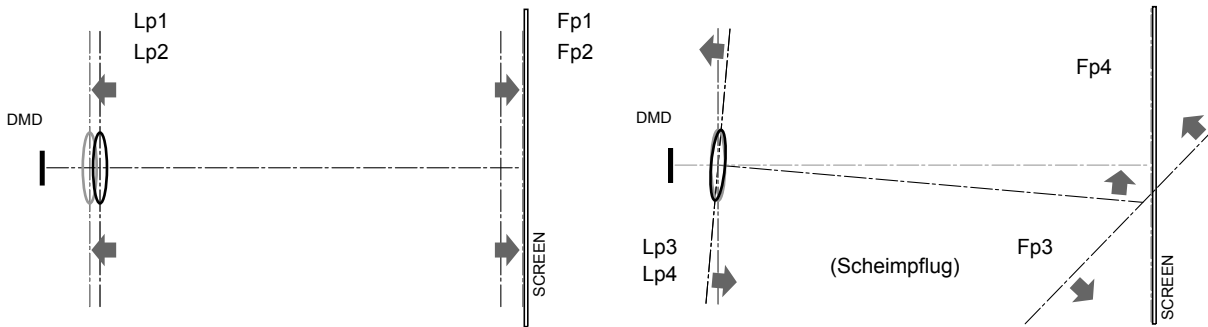


Image 5-22 Scheimpflug principle

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

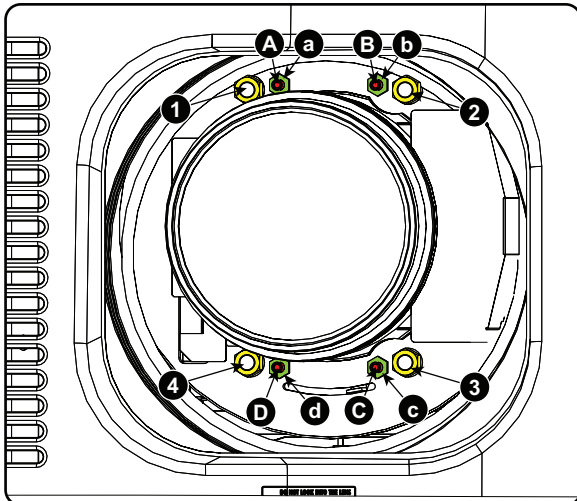


Image 5-23 Scheimpflug adjustments

| Indication on drawing | Function |
|-----------------------|-----------------------------|
| 1, 2 and 3 | Scheimpflug adjustment nuts |
| 4 | Locking nut |
| A, B, C and D | Set screws |
| a, b, c and d | lock nuts |

1, 2 and 3 are adjustment points.

4 is a locking point and NOT used during Scheimpflug adjustment.

Required tools

- Allen key 3 mm
- Nut driver 13 mm
- Nut driver 10 mm

How to adjust

1. Project a green focus pattern. For a 4K projector, use the 4K test pattern. Otherwise, use the 2K test pattern.

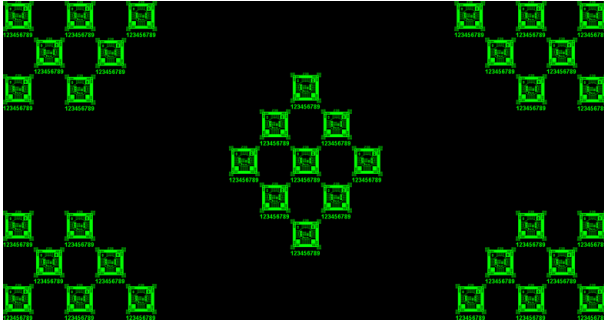


Image 5-24

2. Loosen the lock nuts (a, b, c and d). See Image 5-23.
3. Loosen the 4 set screws (A, B, C and D) by 1 cm. See Image 5-23.
4. Fully loosen lock nut 4. See Image 5-23.
5. Optimize the focus of the projected image as follows:
 1. Turn the Scheimpflug adjustment nuts 1, 2 and 3 until the front of the nut is equally aligned with the front of the threaded rod.
 2. Adjust the focus in the center of the screen (F) using the motorized focus control.

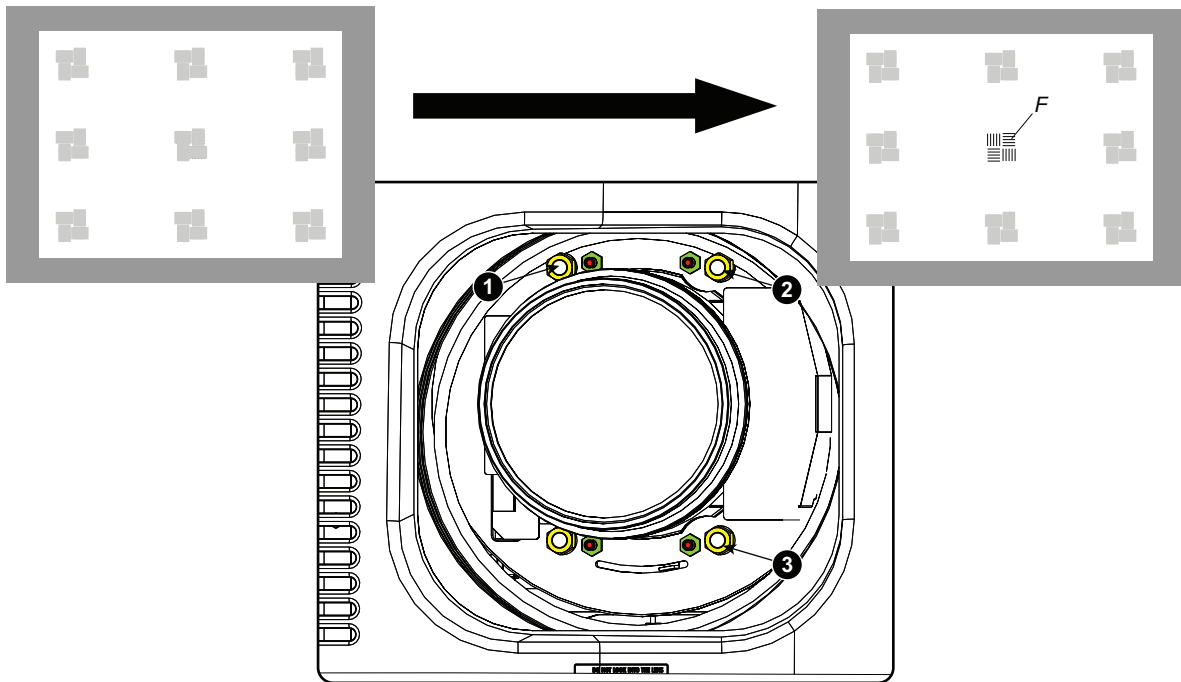


Image 5-25 Center focusing

6. Sharpen bottom left corner of the screen by adjusting nut 1.

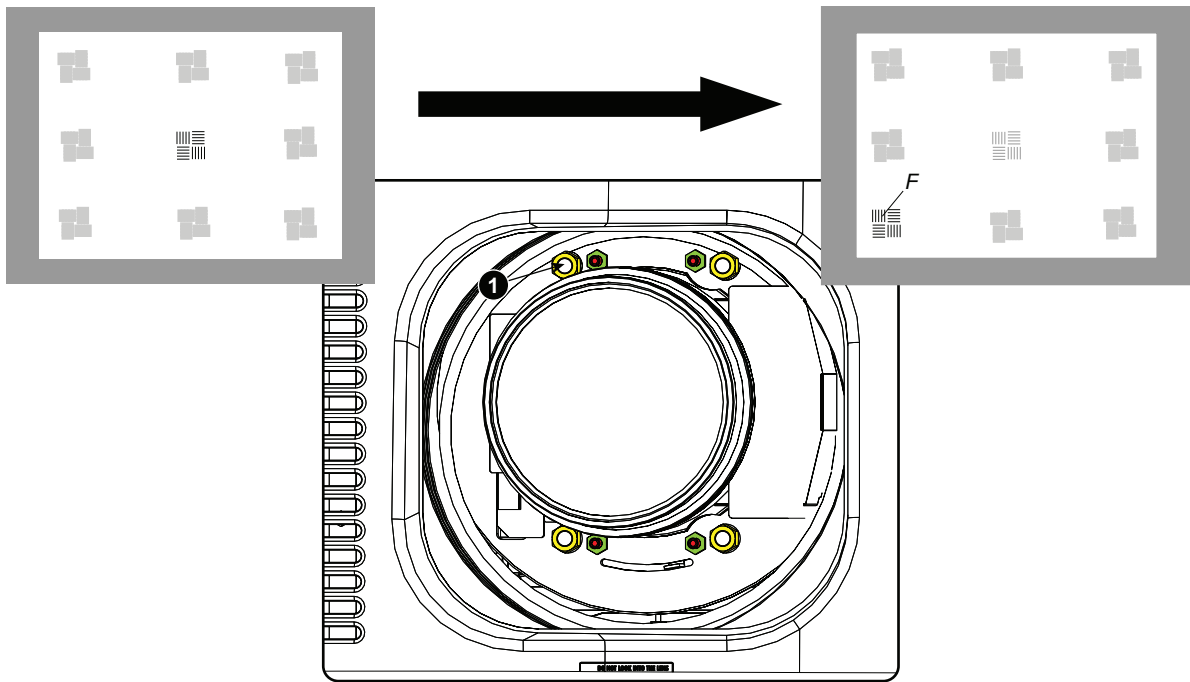


Image 5-26 Left bottom focusing

7. Sharpen bottom right corner of the screen by adjusting nut 2.

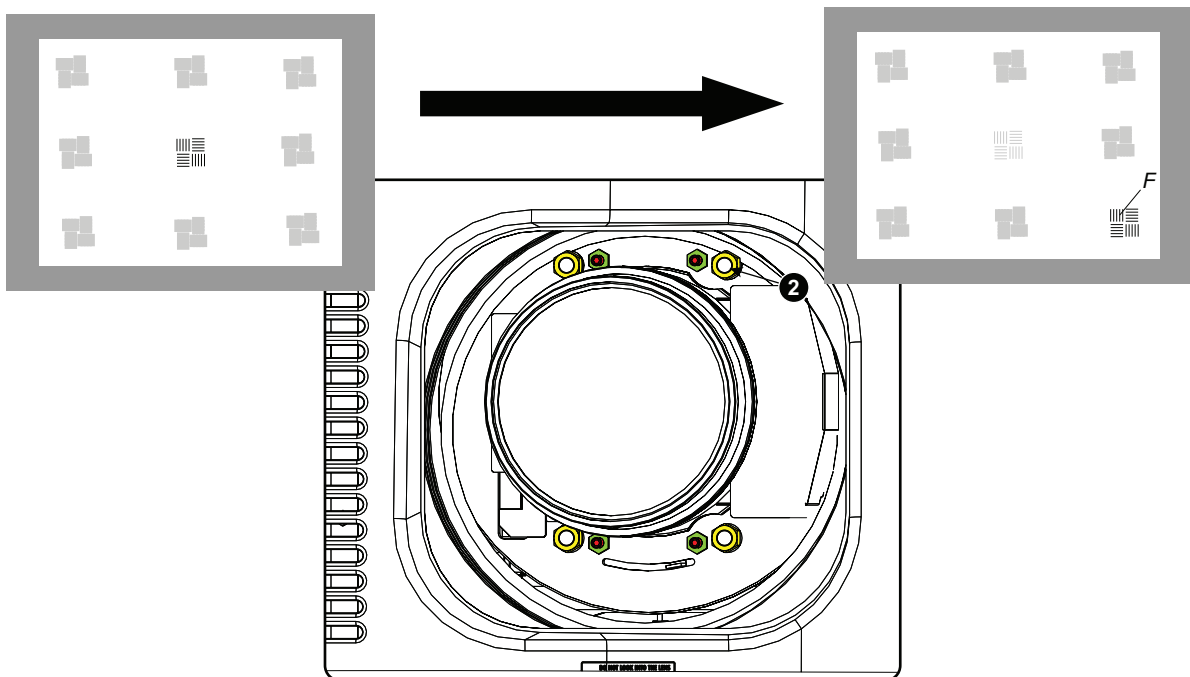


Image 5-27 Right bottom focusing

8. Sharpen top right corner of the screen by adjusting nut 3

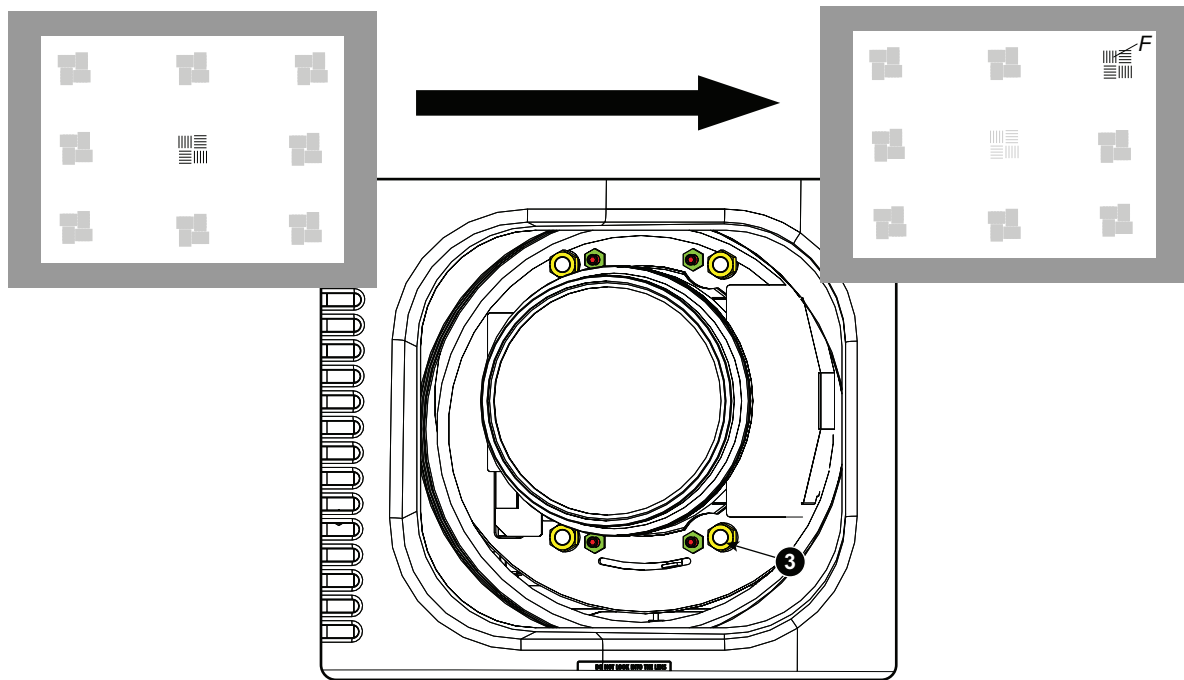


Image 5–28 Corner focusing

9. Repeat from go to step 6 until the projected focus pattern is as sharp as possible in the center, left, right, top and bottom of the screen.
10. Continue with the *Fixation of the lens holder front plate* procedure.

5.8 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.

Required 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.

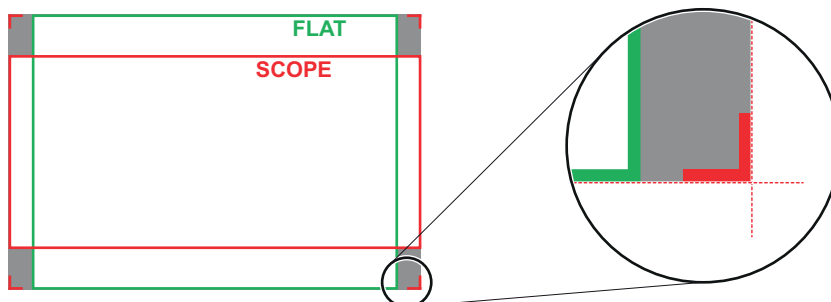



Image 5–29

3. Turn in the three set screws indicated with reference 11 Image 5–30 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 5–30) of the three set screws. Use a 10mm nut driver. Ensure the image doesn't move.

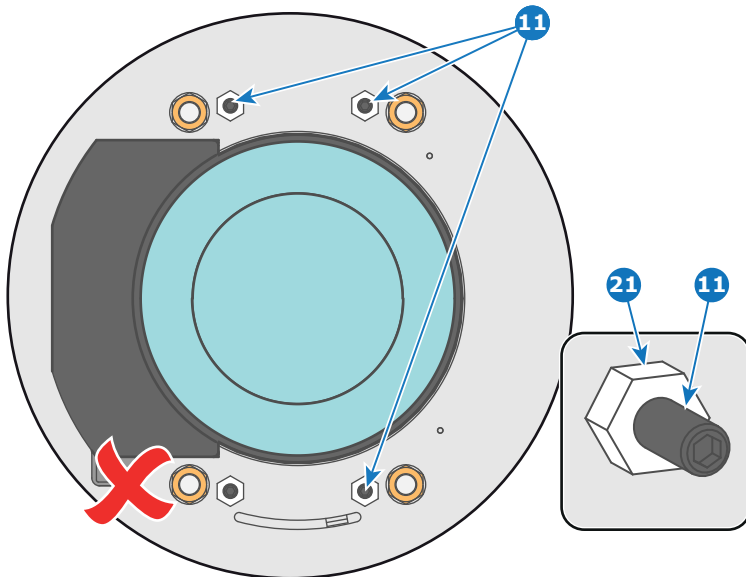




Image 5–30

5. Gently turn (by hand) the Scheimpflug adjustment nut at the lower left of the Lens Holder (reference 4 Image 5–31) 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 5–31) 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.

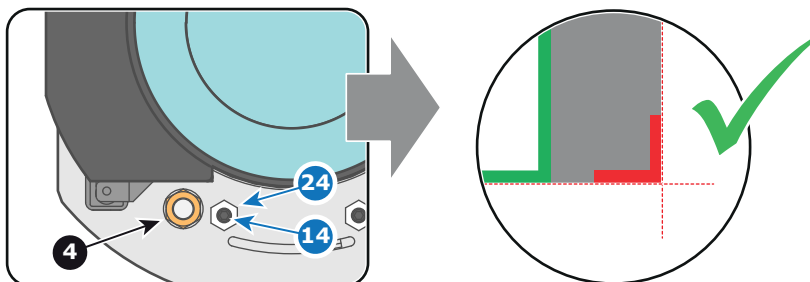


Image 5–31

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

Input & communication

6

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6.1 Introduction

General

The Input & Communication side of the projector 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 (-D) or ICMP (-X). See illustration below. In case an ICP (-D) is installed then an IMB, IMS, or HDSDI input module can be optionally inserted into the slot below the ICP (-D). Note that all information about the ICMP (-X) is gathered into one separated chapter called ICMP.

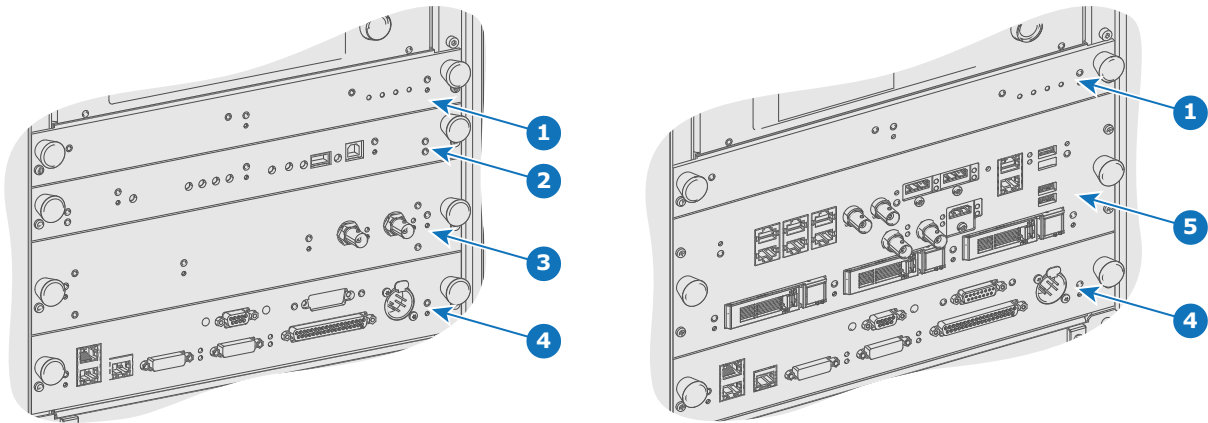


Image 6-1

- | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> 1 Fan Control Board (FCB). 2 Integrated Cinema Processor (ICP) or Integrated Cinema Processor - Direct (ICP-D). 3 Optional slot for either IMB, IMS or HD-SDI input module. | <ul style="list-style-type: none"> 4 Cinema Controller. 5 ICMP(-X) (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.

6.2 Local keypad of the DPxK-19B/23B/P

Identification of the keys

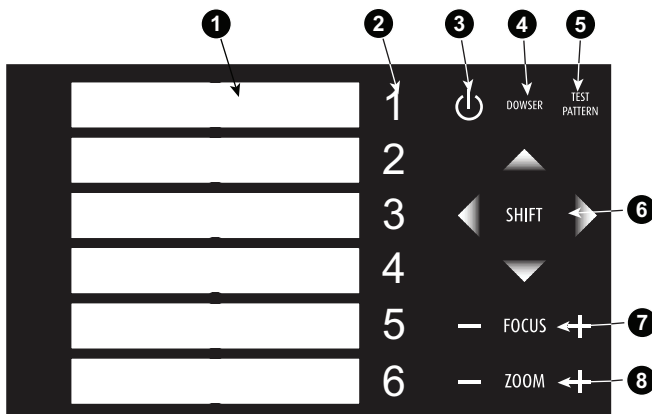


Image 6-2 Local keypad

- 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.

Focus keys

The focus keys (7) allow you to focus the projected image on the screen.

Zoom keys

The zoom keys (8) allow you to zoom in or out the projected image on the screen.

6.3 Integrated Cinema Processor (ICP)



In case the projector is equipped with an ICMP(-X) no ICP board is inserted. All ICP functionality is integrated in the ICMP(-X).

LEDs and ports on the Integrated Cinema Processor

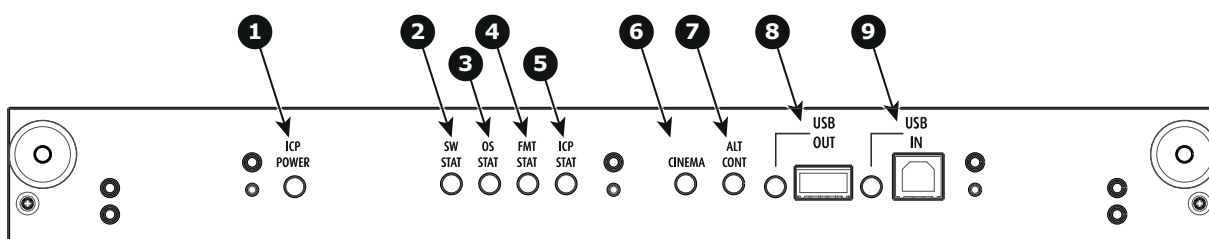


Image 6-3

- | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> 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. | <ul style="list-style-type: none"> 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 projector. When using this board in a projector the software must be re-installed after installation of the board.



When installing a new ICP board in a projector the Spatial Color Calibration file must be reloaded and activated.



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

6.4 Integrated Cinema Processor - Direct (ICP-D)

About ICP-D

The ICP-D (Integrated Cinema Processor - Direct) is a removable electronic assembly situated in the Card Cage of the projector. The ICP-D process and formats DCI cinema content played from a Media Block and delivers it to the projector (DMDs).



In case the projector is equipped with a Barco ICMP(-X) no ICP-D board is inserted. All ICP-D functionality is integrated in the Barco ICMP(-X).



Whatever the projector type, ICP-D is always located above IMB.



A dedicated installation manual for ICP-D is available on the Barco's partner zone.



An ICP-D can always replace an ICP in the field. Consult the dedicated installation manual for ICP-D available on Barco's partner zone.

ICP-D functions

- Stores a part of the projector files (screen files, MCGD files, ...).
- Stores the license files related to HDMI inputs.
Note: the License file related to the use of ICP-D with a third party Integrated Media Block (IMB) is not stored here.
- Stores and generates test patterns.
- Scaling to native resolution, re-sizing, masking, line-insertion de-interlacing, color space conversion, de-gamma, color correction.
- Source Selection between alternative content and cinema content.
- Contains a real time clock, which must be synchronized with the GMT/UTC time stored in Integrated Media Block.
- Handles unpacking of special video formats.

ICP-D limitations

- CineCanvas subtitling support is not available on ICP-D.
- DVI inputs located on cinema controller are no longer functional.

Supported IMBs

Minimum ICP-D software version 1.2.1:

- Dolby ShowVault/IMB: From software version 2.8.25 onward
- Dolby IMS3000: From software version 3.3.26 onward
- Dolby IMS2000: From software version 2.8.25 onward
- GDC SX4000: From software version 10.00 (build 103) onward
- QSC CMS-5000: From software version 1.1.01818+ onward



This list is subject to change. Please contact Barco service to obtain the updated list of supported IMB brands (models, minimum software version, etc).

ICP-D LEDs, communication and input ports

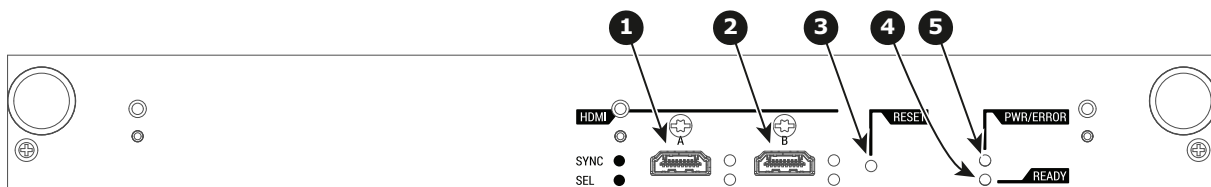


Image 6-4

- 1** HDMI Input A, HDMI 2.0 connector to connect a video source
- 2** HDMI Input B, HDMI 2.0 connector to connect a video source
- 3** Reset button
- 4** Ready LED
- 5** Power & Error LED

ICP-D LEDs

Status overview PWR/ERROR and READY LEDs:

| PWR/ERROR | READY | ICMP(-X) Status |
|----------------|-----------------|------------------------------------------|
| Off | Off | Turned off |
| Red | Off | Board reset or security 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 |
| Green | Blinking Green | Starting Applications |

| PWR/ERROR | READY | ICMP(-X) Status |
|--------------|-----------------|---------------------------------------|
| Green | Green | Applications started in normal mode |
| Green | Orange | Applications started in degraded mode |
| Blinking Red | Off | Security error |
| Green | Blinking Orange | Update ongoing |
| Orange | Orange | Update done |



When installing a new ICP(-D) board in a DPxK-19B/23B/P projector the Spatial Color Calibration file must be reloaded and activated.



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

6.5 ICP-D HDMI 2.0 specifications



Only video data will be processed. Audio component from HDMI standard is not supported by ICP-D.

HDMI 2.0 specifications

For the ICP-D HDMI 2.0 specifications, see “ICMP(-X) HDMI 2.0 specifications”, page 121.

6.6 HD-SDI Input Module (optional)



Not available for purchase at Barco for use in Taiwanese market.



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

Location of the source input ports



Image 6-5

- 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 | | | | | | |
| 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) |
| | | | | | | Single |
| | | | Progressive SF- 1st field dominant | YCbCr | 3G - Level B - Dual stream | Dual (separate left / right eye) |
| | | | Progressive SF - 2nd field dominant | YCbCr | 3G - Level B - Dual stream | Dual (separate left / right eye) |
| | | | Single | | | |
| A+B | HDSDI 3D | 4:2:2 10 bits/color | Progressive | YCbCr | HDSDI - Interleaved | Single |
| | | | | | | Dual (separate left / right eye) |
| | | | | | | Single |
| | | | Progressive SF- 1st field dominant | YCbCr | HDSDI - Interleaved | Dual (separate left / right eye) |
| | | | Progressive SF - 2nd field dominant | YCbCr | HDSDI - Interleaved | Dual (separate left / right eye) |
| | | | Single | | | |
| | 3GSDI 3D | 4:2:2 12 bits/color | Progressive | YCbCr | 3G - Level A - Interleaved | Single |
| | | | | | | Dual (separate left / right eye) |
| | | | | | | Single |
| | | | | | 3G - Level B - Interleaved | Dual (separate left / right eye) |
| | | | | | | Single |
| | | | | | | Dual (separate left / right eye) |
| 4:4:4 10 bits/color | Progressive | RGB | 3G - Level A - Interleaved | Single | | |
| | | | | Dual (separate left / right eye) | | |
| | | | 3G - Level B - Interleaved | Single | | |
| | | | | Dual (separate left / right eye) | | |
| 4:4:4 12 bits/color | Progressive | XYR/ RGB | 3G - Level A - Interleaved | Single | | |
| | | | | Single | | |

| Source: 2K-3D | | | | | | |
|------------------|-----------|------|-----------|-------------------|----------------------------|----------------------------------|
| General settings | | | | Advanced settings | | |
| Port | Port type | Mode | Scan type | Color space | Pixel mapping | Calibration |
| | | | | | | 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 | | | |
| A+B | 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 | |
| A+B | 3GSDI HFR | 4:4:4 12 bits/color | Progressive | XYZ/ RGB | 3G - Level A - Interleaved | Single |
| | | | | | | |

| 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 |

| Source: 3D-HFR | | | | | | |
|------------------|-----------|------|-----------------------------------|-------------------|----------------------------|----------------------------------|
| General settings | | | | Advanced settings | | |
| Port | Port type | Mode | Scan type | Color space | Pixel mapping | Calibration |
| | | | | | | Dual (separate left / right eye) |
| | | | Progressive SF-2nd field dominant | YCbCr | 3G - Level A - Interleaved | Single |
| | | | | | | Dual (separate left / right eye) |

6.7 Quad 3G-SDI Input Module (optional)

Location and source input ports

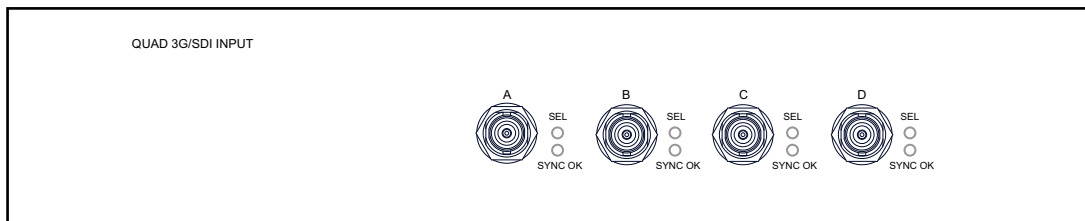


Image 6-6

The following input combinations are possible : A, B, A+B, A+B+C+D

When using all 4 four inputs to create the image connect the quadrants of the image to the inputs as indicated on the drawing.



Image 6-7 Quadrant connection

To configure the input, consult the Communicator manual

Source formats

| | | General settings | | | Advanced settings | | |
|-----------------------------------------|---------------------|--------------------|------------------------------------|-------------------------------------|-------------------|------------------------|-------------|
| Source | Port | Port type | Mode | Scan type | Color space | Pixel mapping | Calibration |
| 2K | A or B | HD-SDI Single link | 4:2:2 10 bits/color | Progressive | YCbCr | HD-SDI-Single link | Single |
| | | | | Progressive - field bit normal | | | |
| | | | | Progressive - field bit inverted | | | |
| | | | | Progressive SF - 2nd field dominant | | | |
| | | | | Progressive SF - 1st field dominant | | | |
| | | 3G-SDI 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 | | | |
| | A+B | HD-SDI Duallink AB | 4:4:4 10 bits/color | Progressive | RGB | HD-SDI-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 | | | | |
| HD-SDI Single Link A and B ² | 4:2:2 10 bits/color | Progressive | YCbCr | HD-SDI-Single link | Single | | |
| | | | | | | | |

2. Only for Quad input board (this is a split screen setting, when selected, it turns on split-screen)

| | | General settings | | | Advanced settings | | | |
|------------------------------------|-------------------------------------|----------------------------------|----------------------------|-------------------------------------|-------------------|----------------------------|----------------------------------|----------------------------------|
| Source | Port | Port type | Mode | Scan type | Color space | Pixel mapping | Calibration | |
| | | | | Progressive - field bit normal | | | | |
| | | | | Progressive - field bit inverted | | | | |
| | | | | Progressive SF - 2nd field dominant | | | | |
| | | | | Progressive SF - 1st field dominant | | | | |
| | | 3G-SDI link A and B ³ | 4:2:2 12 bits/color | Progressive | XYZ/RGB | 3G-level A-Single link | | |
| | | | | | | 3G-level B-Dual link | | |
| | | | 4:4:4 10 bits/color | | | 3G-level A-Single link | | |
| | | | | | | 3G-level B-Dual link | | |
| | | | 4:4:4 12 bits/color | | | 3G-level A-Single link | | |
| | | | | | | 3G-level B-Dual link | | |
| 2K-3D | A or B | 3G-SDI 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 | HD-SDI 3D | 4:2:2 10 bits/color | Progressive | YCbCr | HD-SDI - Interleaved | Single | |
| | | | | | | | Dual (separate left / right eye) | |
| Progressive SF- 1st field dominant | | | | YCbCr | | | HD-SDI - Interleaved | Single |
| | | | | | | | | Dual (separate left / right eye) |

3. Only for Quad input board (this is a split screen setting, when selected, it turns on split-screen)

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

| | | General settings | | | Advanced settings | | |
|-------------|---------------|--------------------------|------------------------------------|-------------------------------------|----------------------------|----------------------------------|-------------|
| Source | Port | Port type | Mode | Scan type | Color space | Pixel mapping | Calibration |
| | | 3G-SDI 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 | |
| 2K -3D- HFR | A+B | 3G-SDI 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) | |
| 4K | A+B | 3G-SDI HS- 4K | 4:2:2 10 bits/color | Progressive | YCbCr | 3G - Level A - Single Link | Single |
| | | | | Progressive - field bit normal | | | |
| | | | | Progressive - field bit inverted | | | |
| | | | | Progressive SF - 2nd field dominant | | | |
| | | | | Progressive SF - 1st field dominant | | | |
| | A + B + C + D | 3G-SDI 4K | 4:2:2 10 bits/color | Progressive | XYZ/ RGB | 3G - Level A - Quad Link | Single |
| | | | | | | 3G - Level B - Quad Link | |
| | | | | Progressive SF - 1st field dominant | YCbCr | 3G - Level A - Quad Link | Single |
| | | 3G - Level B - Quad Link | | | | | |

| | | General settings | | | Advanced settings | | |
|--------|------|------------------|---------------------|-------------------------------------|-------------------|------------------------------------------------------|-------------|
| Source | Port | Port type | Mode | Scan type | Color space | Pixel mapping | Calibration |
| | | | | Progressive SF - 2nd field dominant | YCbCr | 3G - Level A - Quad Link 3G - Level B - Quad Link | Single |
| | | | 4:4:4 10 bits/color | Progressive | RGB | 3G - Level A - Quad Link 3G - Level B - Quad Link | Single |
| | | | | Progressive SF - 1st field dominant | RGB | 3G - Level A - Quad Link 3G - Level B - Quad Link | Single |
| | | | | Progressive SF - 1st field dominant | RGB | 3G - Level A - Quad Link 3G - Level B - Quad Link | Single |
| | | | 4:4:4 12 bits/color | Progressive | XYZ/ RGB | 3G - Level A - Quad Link 3G - Level B - Quad Link | Single |
| | | | | Progressive SF - 1st field dominant | XYZ/ RGB | 3G - Level A - Quad Link 3G - Level B - Quad Link | Single |
| | | | | Progressive SF - 2nd field dominant | XYZ/ RGB | 3G - Level A - Quad Link 3G - Level B - Quad Link | Single |
| | | HD-SDI - 4K | 4:2:2 10 bits/color | Progressive | YCbCr | HD-SDI - Quad Link | Single |
| | | | | Progressive SF - 1st field dominant | YCbCr | HD-SDI - Quad Link | Single |
| | | | | Progressive SF - 2nd field dominant | YCbCr | HD-SDI - Quad Link | Single |

6.8 Integrated Media Block/Server (optional)



Not available for purchase at Barco for use in Taiwanese market.



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

Integrated Media Block (IMB)



Image 6–8 Example of IMB powered by Dolby.

Integrated Media Server (IMS)



Image 6–9 Example of IMS powered by Dolby.



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.

6.9 Cinema Controller of the DPxK-19B/23B/P

Location of the communication ports

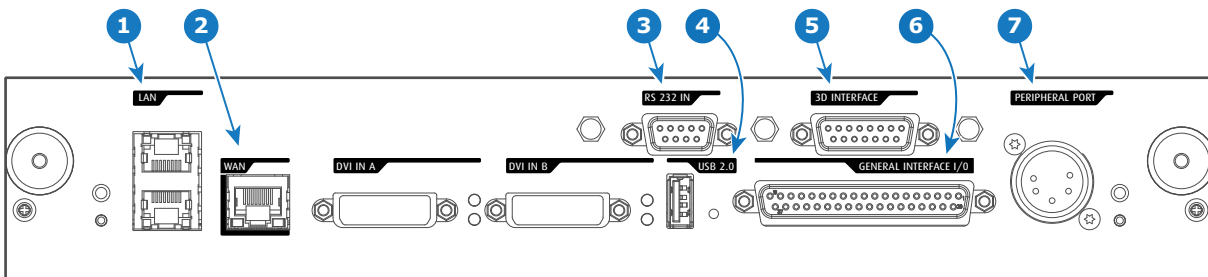


Image 6–10

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 6–10) to connect the network which contains the DHCP server.

The projector can be connected to a WAN (Wide area network) (reference 2 Image 6–10). 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 6–10) 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 6–10). 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 6–10) 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)

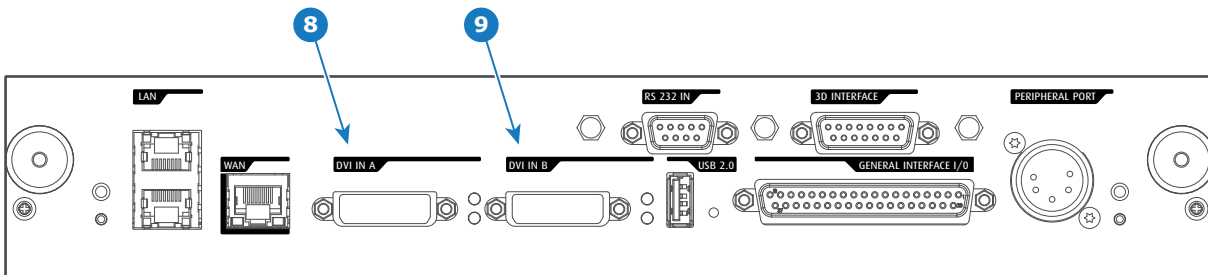


Image 6-11

Legende

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

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 |

| Input | Source standard | Vertical rate | Scan type | Color space | Sampling | Color depth |
|----------|-----------------|---------------|-------------|-------------|----------|-------------|
| 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/eye | Progressive | RGB | 4:4:4 | 2x8 bit |
| DVI-3D | 3D (2048x1080) | 25/eye | Progressive | RGB | 4:4:4 | 2x8 bit |
| DVI-3D | 3D (2048x1080) | 30/eye | Progressive | RGB | 4:4:4 | 2x8 bit |
| DVI-3D | 3D (2048x1080) | 50/eye | Progressive | RGB | 4:4:4 | 2x8 bit |

About DVI-4K:

Two columns of 2048x2160 are needed, where DVI-A is left image and DVI-B is right image. Use Rec 709 for 4K as PFC file.

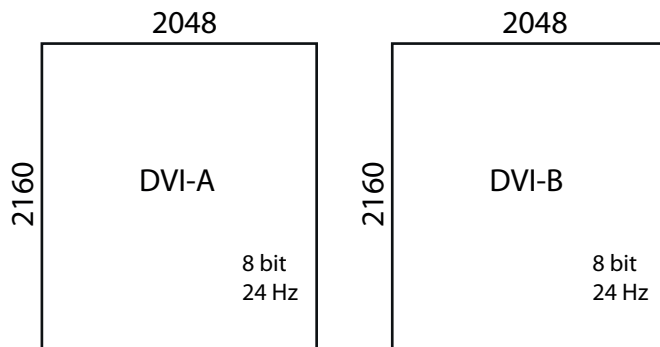


Image 6-12 DVI-4K

ICMP(-X)

7

| | | |
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About this chapter

This chapter describes the ICMP (-X) 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 7-1

7.1 ICMP(-X) introduction

About ICMP(-X)

The ICMP(-X) is a removable electronic assembly situated in the Card Cage of the projector. The ICMP(-X) 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(-X) 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(-X). So, the ICMP(-X) replaces the ICP(-D) board as well.

The ICMP(-X) is located in the Card Cage of the projector.

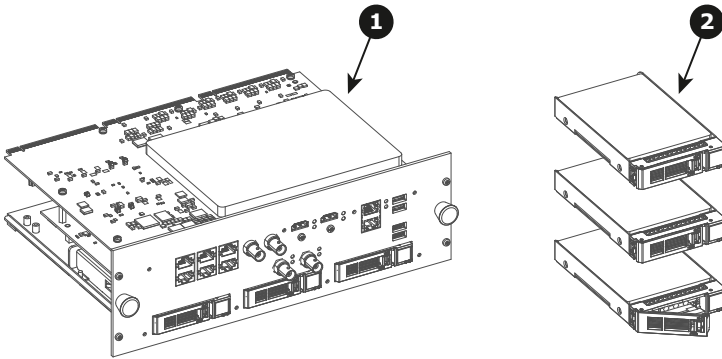


Image 7-2

- 1 ICMP(-X)
- 2 HDDs for ICMP(-X)

As an integrated component of the projector, installation and maintenance of the ICMP(-X) 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-X

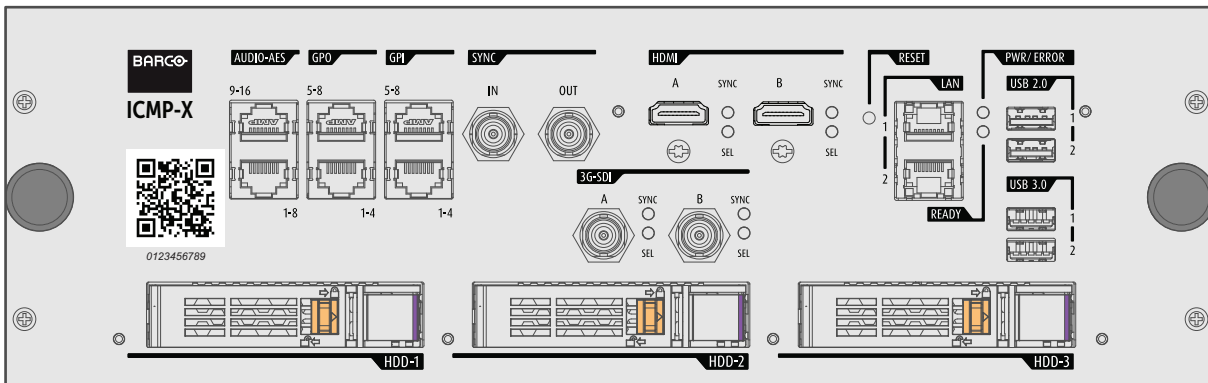


Image 7-3 Front face ICMP-X (standard with storage controller GEN 2)

Front face of the ICMP with HDMI 2.0

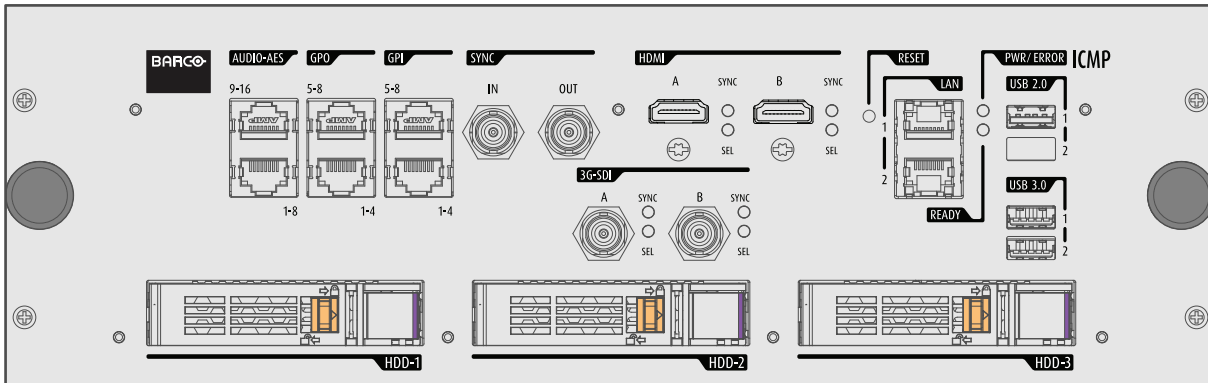


Image 7-4 The model is equipped with two HDMI 2.0 as video source. This ICMP model is no longer available.

Front face of the ICMP with DisplayPort and HDMI 1.4

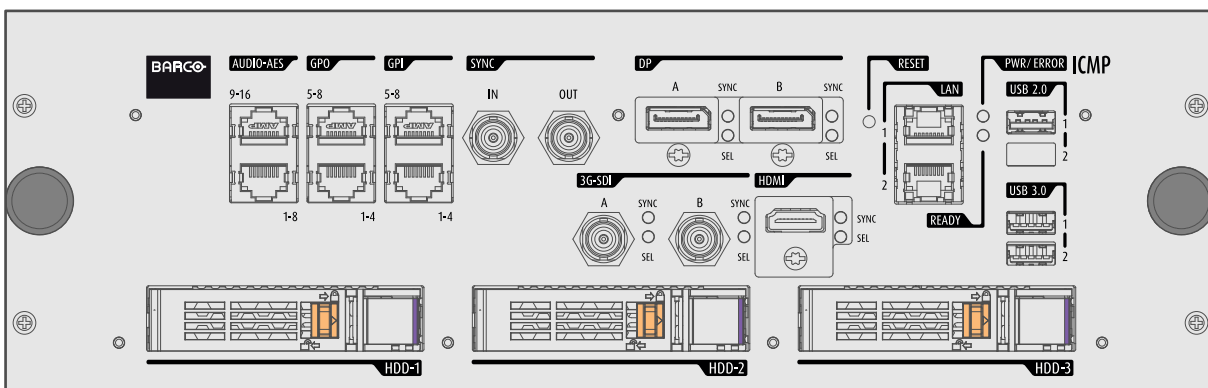


Image 7-5 Some models with DisplayPorts and one HDMI 1.4 (mezzanine) are still present on the field. This ICMP model is no longer available.

GEN1 and GEN2 storage controller

The ICMP-X is equipped with a GEN2 storage controller while the legacy ICMP has an GEN1 storage controller.

The GEN2 storage controller supports SSD and uses another disk initialization type. This implies that HDDs initialized for the legacy ICMP (with GEN1 storage controller) are not interchangeable with the ICMP-X without re-initialization. Note that a re-initialization process result in lost of content. See “What are the possible HDD swaps”, page 103.

It's possible to upgrade an ICMP with a GEN2 storage controller. For more info about the upgrade kit and instructions see Barco website.

How to recognize an ICMP-X or an upgraded ICMP with GEN2 storage controller

At the first glance ICMP-X is very similar to ICMP (the previous generation device) however both devices are not fully compatible and not interchangeable.

Unlike the previous versions the name of ICMP-X appears on the upper left side of the front face (under the Barco logo).

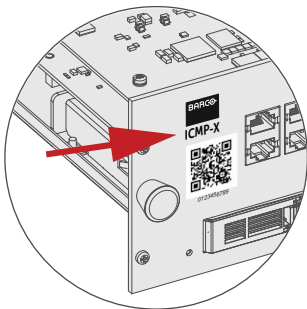


Image 7-6

An upgraded ICMP with GEN 2 storage controller has a label “SSD READY - RAID GEN2” applied under the Barco logo). This sticker comes with the upgrade kit; it will only be there when the “upgrader” applied it.

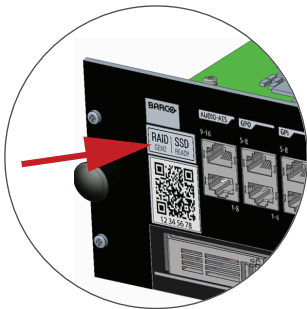


Image 7-7

 It's useful to recognize an ICMP from an ICMP-X or upgraded ICMP to know which HDDs can be used without re-initialization.

7.2 ICMP(-X) HDD

About ICMP(-X) HDD

The three HDDs (local storage) in the ICMP(-X), 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.

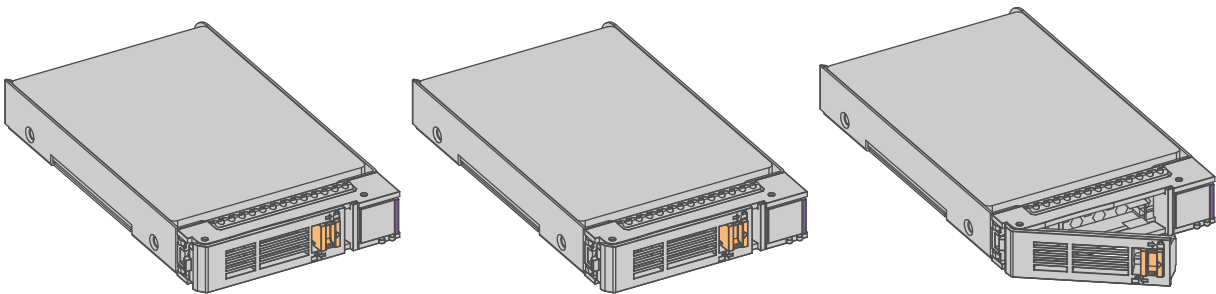



Image 7-8

 **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(-X).



CAUTION: The loss of one disk causes no serious consequences on the ICMP(-X). 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.

How to exchange:

- **Exchange of HDD set between two ICMP(-X)s with the same storage controller:**
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(-X) it is necessary to retrieve from the content distributor the KDMs corresponding to the content and the new ICMP(-X).
- **Exchange of HDD set between two ICMP(-X)s with a different storage controller:**
After inserting the three HDDs it is necessary to perform a manual RAID initialization with (Web) Communicator, the Barco projectors configuration software. The *RAID initialization* command (e.g. in Web Communicator: *Maintenance > Raid Storage*) erases any data present on the HDDs and the old content will be lost. This will only take a short while and after this process, the projector will reboot. You can start immediately after booting with the ingest of your content.



The problem of non-compatibility between the two generations of storage controllers is also encountered when installing a new set of hard drives on an ICMP-X. The HDD spare part kits provided by Barco are configured by default to work with a GEN1 storage controller and it is necessary to perform a manual RAID initialization when they are deployed on a GEN2 storage controller.



Label the HDDs with the initialization type (GEN1 or GEN2) to make it visible for which type of storage controller the disks can be used without requiring a re-initialization and lost of content

HDD storage capacity

Make sure that all HDDs in the ICMP(-X) 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.

HDD models validated by Barco

Only the original HDD spare parts provided by Barco or models validated by Barco (see list below) can be used in the ICMP(-X). All deviations from this rule void warranty.

| HDD model | ICMP-X | ICMP |
|------------------------------------------------------------------------------|--------|--------------------------------------------------------------------------------------------------------------------------------|
| 1TB: HGST – Western Digital (order code: HCC541010A9E630 or HCC541010B9E660) | Yes | Yes |
| 1TB: Western Digital black drives (order code: WD10JQLX-22JFGT0) | Yes | Yes |
| 1TB: Seagate (order code : ST1000NX0313) | Yes | Yes |
| 2TB: Seagate (order code : ST2000NX0253) | Yes | Yes |
| 4TB: Seagate SSD (order code: XA3840ME10063) | Yes | Yes, only if the GEN1 storage controller is replaced by a GEN2 storage controller. Software version 1.4.2 or higher is needed. |

7.3 What are the possible HDD swaps

General

There are several possible scenarios for replacing (exchange) hard drives on the ICMP(-X). The situation is different depending on the device type (ICMP or ICMP-X) and whether to replace one or more disks.

Continuity of data present on the disks is also impacted depending on the type of exchange. Degraded operation or RAID initialization may be required.

List of available actions

The following table exposes all possible swaps available concerning HDDs on ICMP(-X):



Replacing drives should always be done while the power is off.

| Type of HDD swap | On ICMP | On ICMP-X |
|--------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 HDD replaced. | <ul style="list-style-type: none"> Content is preserved. ICMP automatically starts rebuild. Process takes about 3-4 hours for 1TB HDD and could takes about 13-14 hours for 4TB HDD. | <ul style="list-style-type: none"> Content is preserved. ICMP-X automatically starts rebuild. Process takes about 3-4 hours for 1TB HDD and could takes about 13-14 hours for 4TB HDD. |
| 3 HDDs replaced separately (previous kit of one disk used three times). | <ul style="list-style-type: none"> All content will be lost. RAID initialization need to be perform with Communicator. immediately usable after RAID initialization + restart (content can be ingested). | <ul style="list-style-type: none"> All content will be lost. RAID initialization need to be perform with Web Communicator. immediately usable after RAID initialization + restart (content can be ingested). |
| Barco HDD replacement kit (Spare part kit provided by Barco with a set of 3 hard disks configured to GEN1 storage controller). | <ul style="list-style-type: none"> RAID initialization does not need to be performed. Content can be ingested immediately. | <ul style="list-style-type: none"> RAID initialization needs to be perform with Web Communicator. immediately usable after RAID initialization + restart (content can be ingested). |

| Type of HDD swap | On ICMP | On ICMP-X |
|------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Set of 3 HDDs with content reused from an ICMP with GEN1 storage controller. | <p>On an ICMP with GEN1 storage controller:</p> <ul style="list-style-type: none"> Content is preserved but certificates (KDM) need to be re-ingested. <p>On an ICMP with GEN2 storage controller:</p> <ul style="list-style-type: none"> All content will be lost. Only usable after RAID initialization + restart (content can then be ingested immediately). | <ul style="list-style-type: none"> All content will be lost. Only usable after RAID initialization + restart (content can then be ingested immediately). |
| Set of 3 HDDs with content reused from an ICMP-X. | <ol style="list-style-type: none"> Unit is equipped with an GEN1 storage controller (default configuration): <ul style="list-style-type: none"> All content will be lost. RAID initialization needs to be performed with Communicator. Unit has been upgraded with a GEN2 storage controller (+ ICMP software 1.4.2 or higher is installed): <ul style="list-style-type: none"> Content is preserved but certificates (KDM) need to be re-ingested. | <ul style="list-style-type: none"> Content is preserved but certificates (KDM) need to be re-ingested. |

7.4 Installing a HDD into the ICMP(-X)



This procedure assumes that the HDD slot of the ICMP(-X) is empty. If not, see procedure "Removing a HDD from the ICMP(-X)", page 106.



CAUTION: Always use a new empty spare part HDD approved by Barco to replace a malfunction HDD. Do not use a HDD from another ICMP(-X) HDD set.



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

Re-initialization or rebuild of RAID

Installing or exchange one or several HDDs into ICMP(-X) has an impact on data presents on the already inserted drives. RAID integrity depends on the type of HDD swap. Refer to the chapter "What are the possible HDD swaps", page 103.

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.

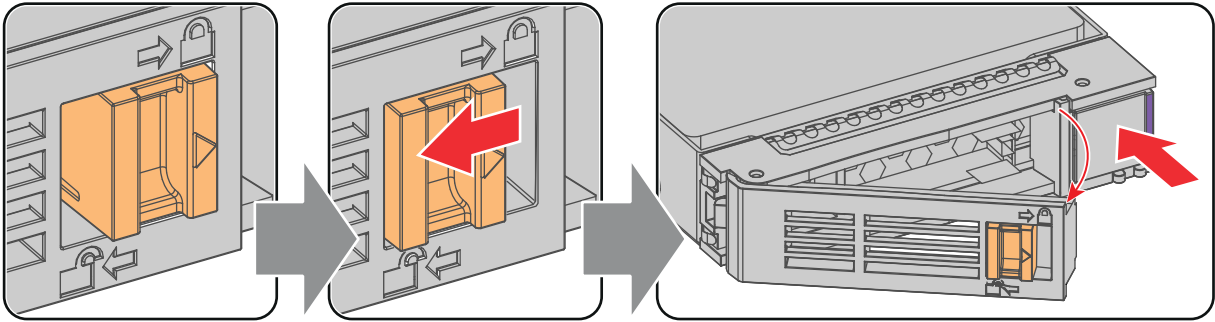


Image 7-9

- 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(-X).

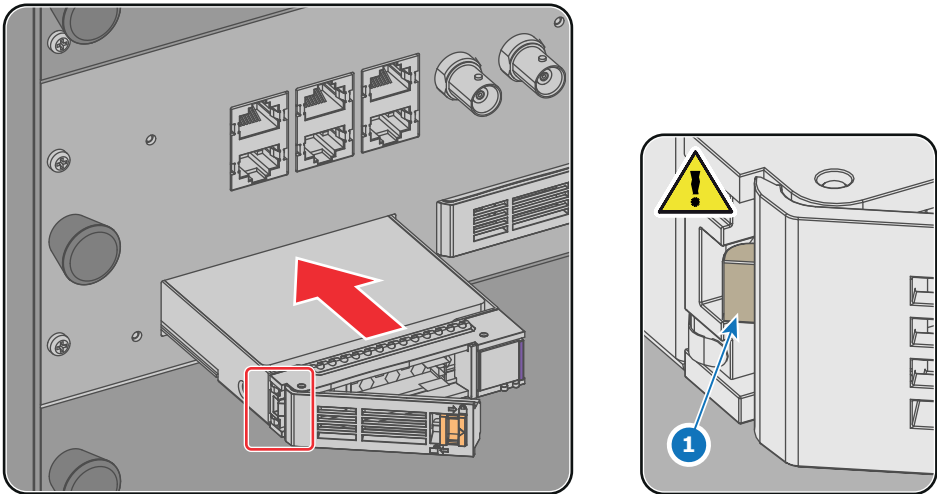


Image 7-10

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

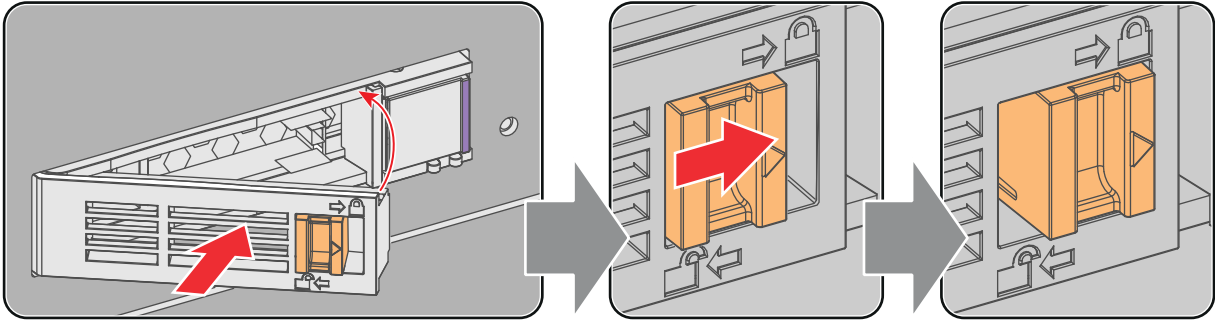




Image 7-11

- 5. Switch on the projector.

 In case you replace one HDD (e.g. degraded mode) the ICMP(-X) 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.

7.5 Removing a HDD from the ICMP(-X)



In case the ICMP(-X) 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.

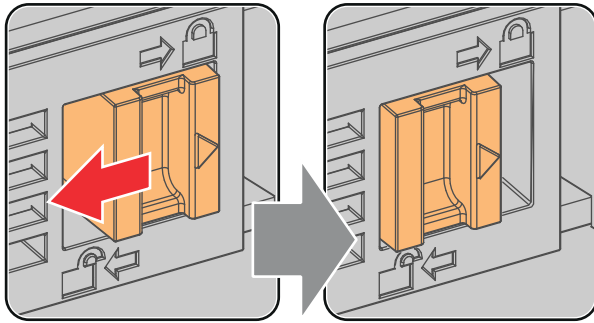


Image 7-12

3. Push the unlock button to open the handle.

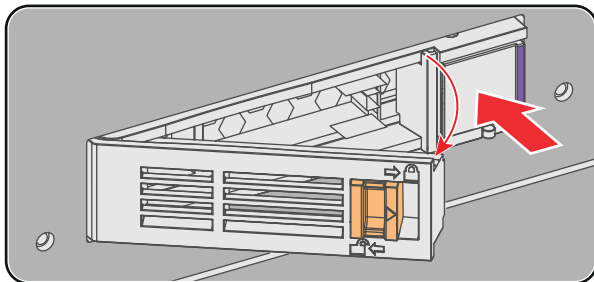


Image 7-13

4. Pull the HDD out of its slot.

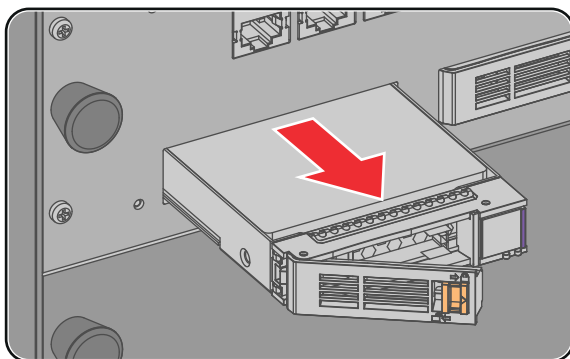


Image 7-14



To install an HDD, see the following procedure: "Installing a HDD into the ICMP(-X)", page 104.

7.6 HDD status LEDs

HDD status LEDs

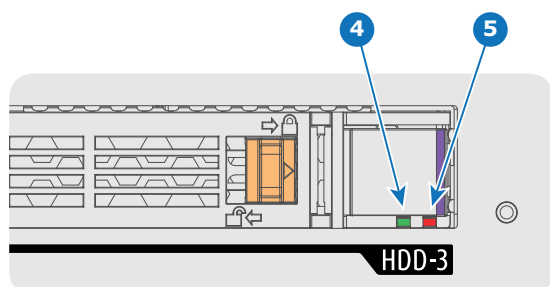


Image 7-15

- 4 HDD I/O LED
- 5 RAID LED

Status LEDs on ICMP(-X)

| HDD I/O | RAID | HDD Status |
|----------------|-------------------|------------------------------------------------------------------------------------------|
| Off | Off | HDD idle / disk in RAID OK. |
| Blinking green | Off | HDD I/O activity / disk in RAID OK. |
| Blinking green | Slow blinking red | HDD disks not (yet) initialized (not supported on ICMP with GEN1 storage controller). |
| Blinking green | Fast blinking red | HDD I/O activity / RAID rebuilding. |
| Off | Red | HDD idle / Disk error. Consult the following troubleshooting table for curative actions. |



When entering a new HDD in an ICMP(-X), the HDD RAID LED will be full red for a short time. This is not an error, the HDD has not yet been “recognized” by the projector and ICMP(-X).

Once the HDD has been accepted by the ICMP(-X), the full red LED will start blinking in accordance with the previous status table.

If the LED remains full red, an error has occurred. In this case, consult the following troubleshooting table for curative actions.

Troubleshooting

| Situation | Solution |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>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.</p> | <ol style="list-style-type: none"> 1. Switch off the power. 2. Replace the defect HDD with approved model of the same storage capacity. See procedure “Removing a HDD from the ICMP(-X)”, page 106, and “Installing a HDD into the ICMP(-X)”, page 104. Ensure to insert the HDD firmly. 3. Switch on the power. <p>Result: As soon the new HDD is detected by the ICMP(-X) the rebuild of the RAID is started (Blinking red LED).</p> |
| <p>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.</p> | <ol style="list-style-type: none"> 1. Switch off the power. 2. Replace the defect HDD with approved model of the same storage capacity. See procedure “Removing a HDD from the ICMP(-X)”, page 106, and “Installing a HDD into the ICMP(-X)”, page 104. Ensure to insert the HDD firmly. |

| Situation | Solution |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Multiple disks failed (multiple red LEDs) + Error 10573 “The RAID is broken”.</p> <p>Note: The disk status (RAID broken) can be retrieved via the (Web) Commander. See user guide of the (Web) Commander.</p> | <p>3. Switch on the power.</p> <p>Result: As soon the new HDD is detected by the ICMP(-X) the rebuild of the RAID is started (Blinking red LED).</p> <hr/> <p>1. Switch off the power. 2. Replace all defect HDDs with approved models of the same storage capacity. See procedure “Removing a HDD from the ICMP(-X)”, page 106, and “Installing a HDD into the ICMP(-X)”, page 104. Ensure to insert the HDDs firmly. 3. Switch on the power. 4. Start “RAID Initialize”. See user guide of the (Web) Communicator.</p> <p>Result: a new empty RAID is created.</p> |
| <p>A set of HDDs initialized for a GEN 2 storage controller is installed on a GEN 1 storage controller (All red LEDs remain off) + Combination of three errors (10580 “local storage not available”, 10585 “storage mount failed”, 10573 “the RAID is broken”)</p> <p>Note: The disk status (Error code) can be retrieved via the (Web) Commander. See user guide of the (Web) Commander.</p> | <p>1. To avoid any misidentification, double check ICMP model and if HDD model is compatible with installed storage controller (see list of HDD models validated by Barco). 2. Start “RAID Initialize”. See user guide of the (Web) Communicator. Note that all content will be lost!</p> <p>Result: a new empty RAID is created.</p> |
| <p>All HDD LEDs remain off + Error 10580 “local storage not available”.</p> <p>Note: The disk status (Error code) can be retrieved via the (Web) Commander. See user guide of the (Web) Commander.</p> | <p>1. Switch off the power. 2. Reseat all HDDs. See procedure “Removing a HDD from the ICMP(-X)”, page 106, and “Installing a HDD into the ICMP(-X)”, page 104. Ensure to insert the HDDs firmly. 3. If problem remains try “RAID Initialize”. See user guide of the (Web) Communicator. Note that all content will be lost! 4. If problem remains contact Service for further instructions.</p> |



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

7.7 ICMP(-X) status LEDs

ICMP(-X) status LEDs and Reset button

LEDs on ICMP(-X) front panel give information on the status of the device.

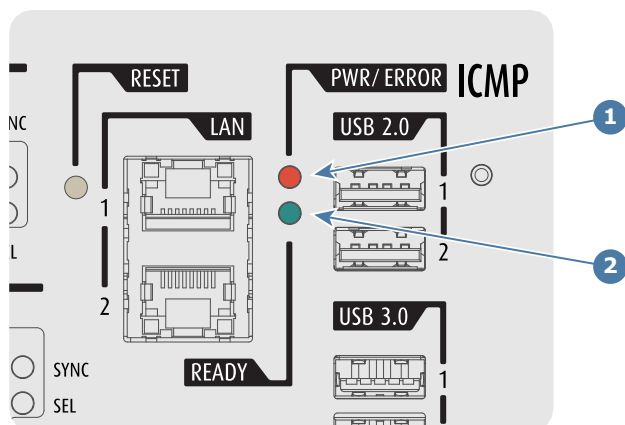


Image 7-16

- 1 Power / Error LED
- 2 Ready LED

Status overview PWR/ERROR and READY LEDs:

| PWR/ERROR | READY | ICMP(-X) 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 |

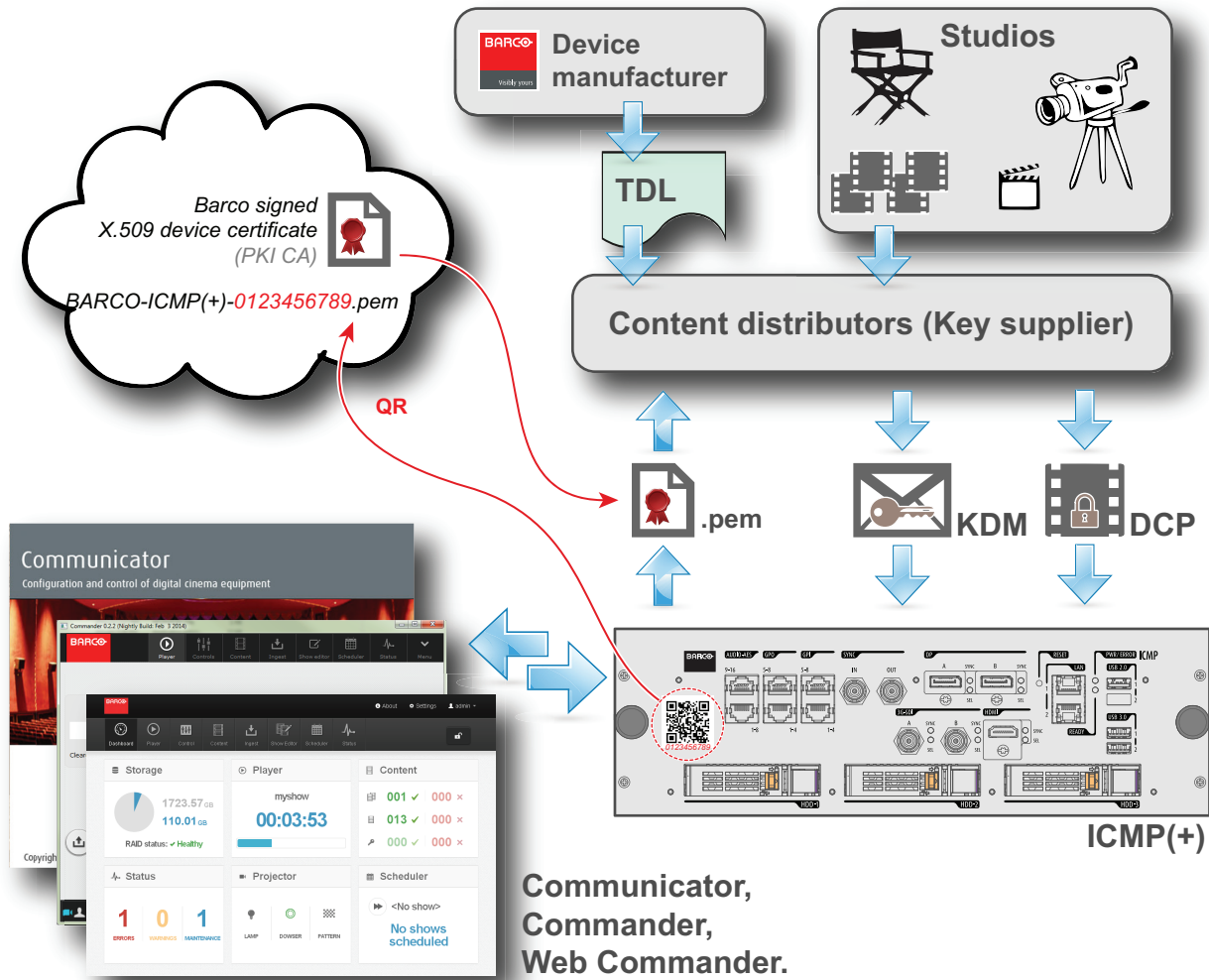
7.8 ICMP(-X) device certificate

Purpose of the Barco ICMP(-X) device certificate

The device certificate (*.pem) of the Barco ICMP(-X) is a digital certificate signed by Barco which is required when ordering the KDM⁴ to play a DCP that is ingested on the ICMP(-X). The device certificate is stored inside the ICMP(-X) and on a web server.

The (WEB) Commander or Communicator can be used to retrieve the device certificate directly from the ICMP(-X). To retrieve the device certificate from the website the QR (Quick Response) code can be used. See procedure "Obtaining the ICMP(-X) certificate", page 111.

4. For China mainland LDM is used next to KDM. LDM specifies also a maximum number of shows.



Communicator,
Commander,
Web Commander.

Image 7-17

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>).

7.9 Obtaining the ICMP(-X) certificate

Required tools

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

Using the CertID label to download the ICMP(-X) certificate

1. Scan the QR code (reference 1) on the front face of the ICMP(-X) with a smartphone. It's recommended to use a smartphone with auto-focus. The QR reader will automatically redirect to the ICMP(-X) certificate download page on the web server.



Note: Instead of downloading the ICMP(-X) 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(-X) certificate directly.

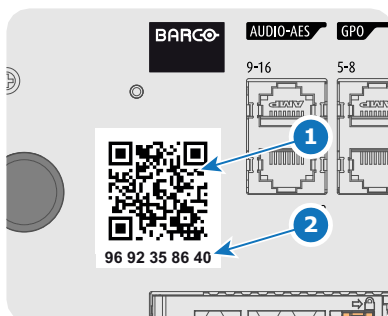


Image 7-18

Using control software to obtain the ICMP(-X) certificate

1. Use your control software to download the ICMP(-X) certificate from the ICMP(-X) main board. For detailed instructions, refer to the user guide of your control software, or the projector User Guide.

7.10 ICMP(-X) configuration via Communicator

About ICMP(-X) configuration

Following parameters are available to configure the ICMP(-X):

- Global settings: allows defining name of the ICMP(-X), 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(-X).
- 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(-X).



All installation and maintenance operations on the ICMP(-X) 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(-X) and replaces them with the default values set at the factory. Please refer to the Communicator user guide for further information.

About the ICMP(-X) internal clock

The crystal on the ICMP(-X) 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 lock up.

From ICMP(-X) 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.

About test patterns

Often, during ICMP(-X) settings, it could be necessary to resize displayed image. In most of the cases, to achieve this, test patterns are displayed on screen. However, some test patterns are provided on the fly by the projector and can not be resized.

List of test patterns that can be resized:

- 2K Barco Enabling Bright Outcomes
- BARCO_rgb_primarylogo_red_2K
- Convergence_pattern
- Convergence_pattern_green_on_blue
- Convergence_pattern_red_on_blue
- Convergence_pattern_xxB
- Convergence_pattern_xxC
- Convergence_pattern_xxS
- DualStack3D_Left
- DualStack3D_Right
- Focus
- FocusGreen
- FocusWhite

- Framing_uncorrected
- RGB-12bit-Color Bars
- RGB-12bit-Convergence Pattern
- RGB-12bit-Log Step Blue
- RGB-12bit-Log Step Cyan
- RGB-12bit-Log Step Green
- RGB-12bit-Log Step Magenta
- RGB-12bit-Log Step Red
- RGB-12bit-Log Step White
- RGB-12bit-Log Step Yellow
- RGB-12bit-MacBeth ColorChecker
- RGB-12bit-Shallow Horizontal Ramp
- RGB-12bit-Split Ramp
- RGB-12bit-Vertical Bars Plus Crosshairs
- SCC_13PNTS
- SCC_27PNTS

7.11 ICMP(-X) communication ports

Location of the communication ports

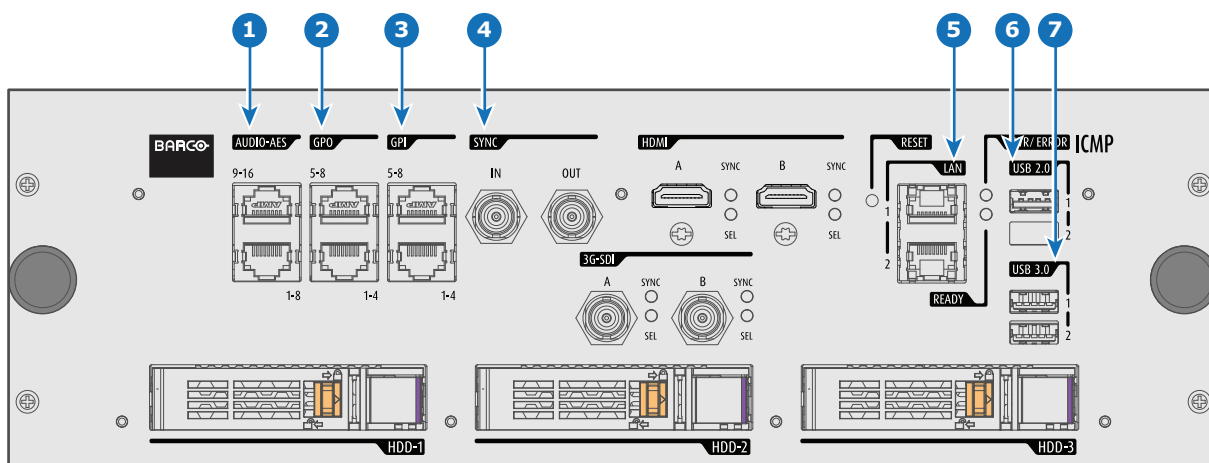


Image 7-19 ICMP(-X) (with HDMI 2.0).

Functionality

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

ICMP(-X) 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(-X)) is performed by configuring the ICMP(-X) 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(-X) 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(-X) is done via the same IP address as the projector.

6 USB 2.0

The ICMP(-X) 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(-X) 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.

7.12 ICMP(-X) source input ports

Location of the source input ports

ICMP and ICMP-X equipped with two HDMI 2.0 (Reference 8, Image 7–20) as video source.

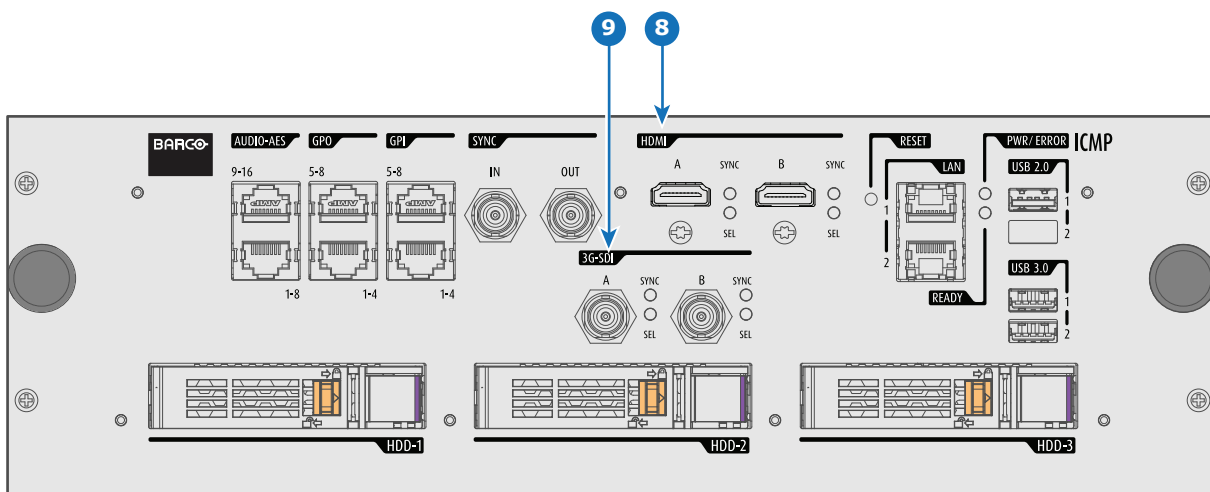


Image 7–20 ICMP(-X) (with HDMI 2.0).

ICMP with DisplayPorts (Reference 11, Image 7–21) and HDMI 1.4 (Reference 10, Image 7–21) are still present on the field.

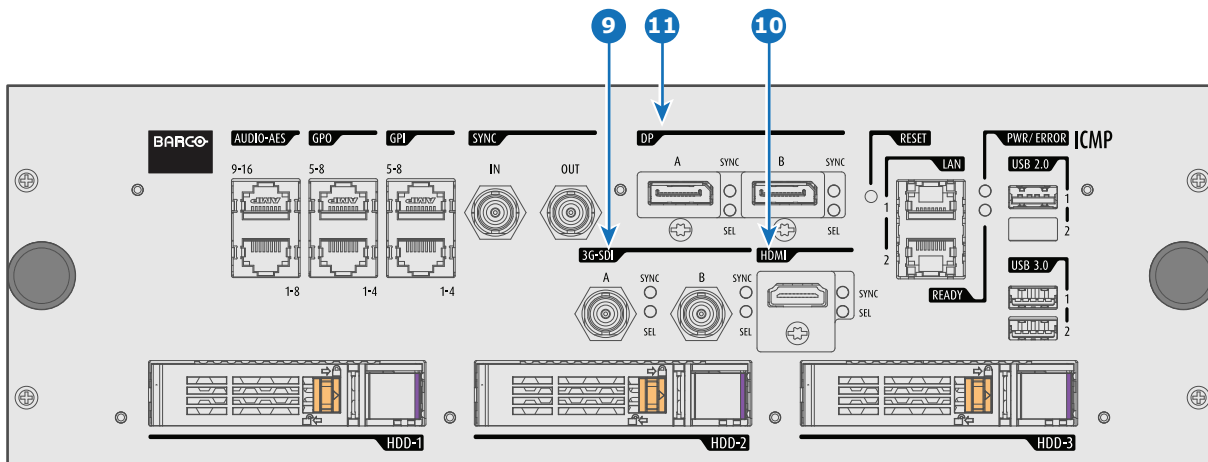


Image 7–21 ICMP (with DisplayPort and HDMI 1.4).

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.

7.13 ICMP(-X) network streaming (Live IP) specifications

About network streaming

When equipped with a mezzanine, the ICMP (-X) can receive and play streaming content (multicast live streaming or http live streaming). Streaming content (audio/video/text files) is delivered in real time via one of LAN (local area network) connected to one of Ethernet ports of the ICMP (LAN1/LAN2) or Cinema Controller.

For more details concerning playout of Live IP streaming content please refer to the Web Commander user guide: in the chapter dedicated to the show editor a section explains how to manage alternative input clips (the clips dedicated to the alternative media inputs or Live IP streaming content).

Minimum requirements

To use Live IP function of ICMP(-X), the followings are needed:

- ICMP(-X) must be equipped with a video mezzanine board.
- a license need to be installed with (Web) Communicator to enable the functionality.
- a macro named *LIVE_IP* (used to set Live IP as the input of the video mezzanine board) need to be present on the projector. To do this both the following methods are available:
 - a new clone package that contain *Icmp_Live_IP.INPUT* file (and *LIVE_IP* macro) could be apply with (Web) Communicator.

ICMP(-X)

- new macro named *LIVE_IP* based on the file *lcmp_Live_IP.INPUT* could be created with (Web) Communicator. For more details concerning creation of *LIVE_IP* macro, please refer to the (Web) Communicator user guide.

It is not necessary to upgrade ICMP(-X) (or video mezzanine board) with new software version to use Live IP function.

Network Streaming

- UDP (multicast)
- HLS (http live streaming)
- from RJ45 network port of Cinema Controller or ICMP(-X) (LAN1/LAN2)

Stream containers

- Mpeg Transport Stream ISO13818-1 with 1 program
- HLS (http live streaming) with segmented MpegTS stream
- MP4 from file
- Webm from file

Video formats

- MPEG2/H.264 4:2:0 up to 1920x1080 (smaller resolutions are upscaled to full screen)
- Standard frame rates: 24/25/30/50/60p and 50/60i
- Fractional frame rates: 24/30/60 x (1000/1001) according to HDMI spec CEA-861-F
- High quality temporal de-interlacing with edge detection

Audio formats

- MP2, MP3, AAC, AC3
- Multichannel output (up to 5.1)

Subtitle formats

- MpegTS timed text support according to DVB spec ETSI EN 300 743

7.14 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

7.15 ICMP(-X) SDI specifications

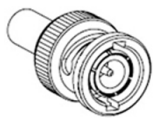
3G-SDI



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

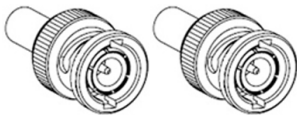


HD 4:2:2

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



1.5Gb/s

1.5Gb/s



1080p 50/60⁵

or

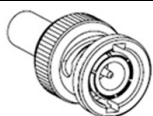
1080p 4:4:4

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



3Gb/s



1080p 50/60 (Level A)

or

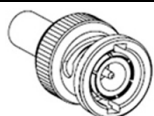
1080p 4:4:4 (Level B)

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.

5. Not supported in Alchemy

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



3Gb/s



HD 4:2:2 Signal #1
and
HD 4:2:2 Signal #2

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 24 25 29.970 30 50 59.940 60 | 23.976 24 25 29.970 30 50 59.940 60 | Progressive Y Cb Cr 4:2:2 10-Bit |
| SMPTE 274M SMPTE 428-8 | 1920 x 1080 2048 x 1080 | 23.976 24 25 29.97 30 | 23.976 24 25 29.97 30 | Progressive Y Cb Cr 4:2:2 10-Bit |
| SMPTE 274M SMPTE 428-9 (SMPTE RP211) | 1920 x 1080 2048 x 1080 | 23.976 24 25 29.97 30 | 23.976 24 25 29.97 30 | Segmented frame Y Cb Cr 4:2:2 10-Bit |
| SMPTE 274M | 1920 x 1080 | 25 29.970 30 | 50 59.940 60 | Interlaced Y Cb Cr 4:2:2 10-Bit |

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

| SMPTE Standard | Source Resolution | Frame Rate | Display Rate | Scan Type |
|--------------------------------------------|----------------------------|------------------------------------|------------------------------------|------------------------------------------------------------------------------------------------------------|
| SMPTE 274M SMPTE 428-8 | 1920 x 1080 2048 x 1080 | 23.976 24 25 29.970 30 | 23.976 24 25 29.970 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 SMPTE 428-9 (SMPTE RP211) | 1920 x 1080 2048 x 1080 | 23.976 24 25 29.970 30 | 23.976 24 25 29.970 30 | Segmented frame 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 | 25 29.970 30 | 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 |

Standard HD-SDI (2 × SMPTE 292M) formats⁶

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

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.

6. 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 | 23.976 | Progressive Y Cb Cr 4:4:4 10-Bit RGB (XYZ) 4:4:4 10-Bit |
| | | 24 | 24 | |
| | | 25 | 25 | |
| | | 29.970 | 29.970 | |
| | | 30 | 30 | |
| | | 50 | 50 | |
| | | 59.940 | 59.940 | |
| SMPTE 274M ⁷ | 1920 x 1080 | 50 | 50 | Progressive Y Cb Cr 4:2:2 10-Bit |
| | | 59.940 | 59.940 | |
| | | 60 | 60 | |
| SMPTE 274M | 1920 x 1080 | 23.976 | 23.976 | 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 |
| | | 24 | 24 | |
| | | 25 | 25 | |
| | | 29.97 | 29.97 | |
| SMPTE 274M | 1920 x 1080 | 50 | 50 | 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 |
| | | 59.940 | 59.940 | |
| | | 60 | 60 | |
| SMPTE 428-9 | 2048 x 1080 | 23.976 | 23.976 | Progressive Y Cb Cr 4:4:4 12-Bit RGB (XYZ) 4:4:4 12-Bit |
| | | 24 | 24 | |

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 | 47.952 | Progressive Y Cb Cr 4:2:2 10-Bit |
| | | 24 | 48 | |
| | | 25 | 50 | |
| | | 29.970 | 59.940 | |
| | | 30 | 60 | |

7.16 ICMP(-X) HDMI 2.0 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 2.0 specifications

HDMI

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

Both HDMI 2.0 inputs are fully compliant with the HDMI 1.4, 1.4a, 1.4b, 2.0 and 2.0a revisions of the HDMI specification.

Full Range and Limited Range Quantization are supported for all specified formats.

BT.709 and DCI-P3 are supported for all formats. For HDR content (UHD and 4K only) the BT.2020 color coding is supported.

All video streams should have a progressive scan order, with the exception of 1920x1080i 60 fps (interlaced scan).

HDCP

Both HDMI 2.0 inputs are HDCP 1.4 & HDCP 2.2 compliant.

HDR (SMPTE ST 2084)

HDR (High Dynamic Range) is supported on all UHD and 4K formats.


This includes SMPTE ST 2084 (static metadata) and BT.2020 color coding. Requires a license!

HDMI 2.0 Cable requirements

All HDMI cables should work with HDMI 2.0 receivers. There is no such thing as a “4K HDMI cable” even though this is sometimes sold this way. But of course there are quality differences. The “high-speed” cables would be preferred over the “standard-speed” cables. They usually work at higher cable lengths than the standard-speed ones.



The “Premium Certified HDMI” cables are tested to work with high bandwidth as is the case with 4K HDR content. These can be more expensive though. When using active and/or optical cables you should verify if the integrated receiver and sender are HDMI certified to guarantee to work compliant with the HDMI protocol. You can request the HDMI certificate to the manufacturer of the cable.

 The ICMP is not supporting Ethernet-over-HDMI and such specific cables are thus not required.

HDMI 2.0 Supported 2D Formats

| Format | Frame Rate | Color coding | Bit depth |
|------------------------|------------|--------------|-----------|
| 1280x720 | 23.976 | RGB | 8 |
| | 24 | YCbCr 4:4:4 | 10 |
| | 25 | YCbCr 4:2:2 | 12 |
| | 29.97 | | |
| | 30 | | |
| | 50 | | |
| | 59.94 | | |
| 1280x720 | 100 | RGB | 8 |
| | 119.88 | YCbCr 4:4:4 | |
| | 120 | YCbCr 4:2:2 | |
| 1920x1080 2048x1080 | 23.976 | RGB | 8 |
| | 24 | YCbCr 4:4:4 | 10 |
| | 25 | YCbCr 4:2:2 | 12 |
| | 29.97 | | |

| Format | Frame Rate | Color coding | Bit depth |
|------------------------|--------------------------------|-----------------------------------|---------------|
| | 30 50 59.94 60 | | |
| 1920x1080 2048x1080 | 100 119.88 120 | RGB YCbCr 4:4:4 YCbCr 4:2:2 | 8 |
| 3840x2160 4096x2160 | 23.976 24 25 29.97 30 | RGB YCbCr 4:4:4 YCbCr 4:2:2 | 8 10 12 |
| 3840x2160 4096x2160 | 50 59.94 60 | RGB YCbCr 4:4:4 YCbCr 4:2:2 | 8 |

HDMI 2.0 Supported 3D (Frame Packing) Formats

| Format | Frame Rate | Color coding | Bit depth |
|------------------------|-----------------------------------|-----------------------------------|---------------|
| 1920x1080 2048x1080 | 23.976 24 25 29.97 30 | RGB YCbCr 4:4:4 YCbCr 4:2:2 | 8 10 12 |
| 1920x1080 2048x1080 | 50 59.94 60 | RGB YCbCr 4:4:4 YCbCr 4:2:2 | 8 |
| 3840x2160 4096x2160 | 23.976 24 25 29.97, 30 | RGB YCbCr 4:4:4 YCbCr 4:2:2 | 8 10 12 |
| 3840x2160 4096x2160 | 50 59.94 60 | RGB YCbCr 4:4:4 YCbCr 4:2:2 | 8 |

HDMI 2.0 Supported Audio Formats

| Format | Sample Rate | Sample coding | Bit depth |
|--------|-------------|---------------|-----------|
| 2.0 | 32 | L-PCM | 16 |
| 2.1 | 44.1 | | 20 |
| 5.1 | 48 | | 24 |
| 7.1 | 88.2 96 | | |

HDMI 2.0 Supported Dual (Twin) Link Formats (2D formats only)

| Format | Frame Rate | Color coding | Bit depth |
|------------------------|--------------------------------------------------------|-----------------------------------|-----------|
| 1920x1080 2048x1080 | 23.976 24 25 29.97 30 50 59.94 60 | RGB YCbCr 4:4:4 YCbCr 4:2:2 | 8 |
| 3840x2160 4096x2160 | 23.976 24 25 29.97 30 50 59.94 60 | RGB YCbCr 4:4:4 YCbCr 4:2:2 | 8 |



Both HDMI2 inputs (port A & port B) should have to same Format, Frame Rate and Color coding.



Port A should contain the 8 most significant bits of the pixel data, where port B should contain the 8 least significant bits of the pixel data. The pixel data will be reconstructed using the all 8 bits of port A and using the 4 most significant bits of port B.

HDMI 2.0 Supported Passive 3D Formats (3D formats only)

| Format | Frame Rate | Color coding | Bit depth |
|------------------------|------------|-----------------------------------|---------------|
| 1920x1080 2048x1080 | 24 30 | RGB YCbCr 4:4:4 YCbCr 4:2:2 | 8 10 12 |
| 1920x1080 2048x1080 | 60 | RGB YCbCr 4:4:4 YCbCr 4:2:2 | 8 |
| 3840x2160 4096x2160 | 24 30 | RGB YCbCr 4:4:4 YCbCr 4:2:2 | 8 |



In Passive 3D HDMI2 input port A should contain the pixel data of Left Eye and HDMI2 input port B should contain the pixel data for Right Eye.

7.17 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

HDMI 1.4 Supported 2D Formats (progressive)

| Format | Frame Rate | Color coding | Bit depth |
|------------------------|-------------------|---------------------|------------------|
| 720x480 | 60 | RGB | (8) |
| | | YCbCr 4:4:4 | 10 |
| | | YCbCr 4:2:2 | 12 |
| 720x576 | 50 | RGB | (8) |
| | | YCbCr 4:4:4 | 10 |
| | | YCbCr 4:2:2 | 12 |
| 1280x720 | 23.976 | RGB | 8 |
| | 24 | YCbCr 4:4:4 | 10 |
| | 25 | YCbCr 4:2:2 | 12 |
| | 29.97 | | |
| | 30 | | |
| | 50 | | |
| | 59.94 | | |
| | 60 | | |
| | 100 | | |
| | 119.88 | | |
| 120 | | | |
| 1680x720 | 23.976 | RGB | 8 |
| | 24 | YCbCr 4:4:4 | 10 |
| | 25 | YCbCr 4:2:2 | 12 |
| | 29.97 | | |
| | 30 | | |
| | 50 | | |
| | 59.94 | | |
| | 60 | | |
| | 100 | | |
| | 119.88 | | |
| 120 | | | |
| 1920x1080 2048x1080 | 23.976 | RGB | 8 |
| | 24 | YCbCr 4:4:4 | 10 |
| | 25 | YCbCr 4:2:2 | 12 |
| | 29.97 | | |
| | 30 | | |
| | 50 | | |
| 1920x1080 2048x1080 | 59.94 | | |
| | 60 | | |
| | 100 | | |
| 1920x1080 2048x1080 | 119.88 | | |
| | 120 | | |
| | 120 | | |
| 1920x1080 2048x1080 | 100 | RGB | 8 |
| | 119.88 | YCbCr 4:4:4 | |
| | 120 | YCbCr 4:2:2 | |

| Format | Frame Rate | Color coding | Bit depth |
|------------------------|-------------------|---------------------|------------------|
| 2560x1080 | 23.976 | RGB | 8 |
| | 24 | YCbCr 4:4:4 | 10 |
| | 25 | YCbCr 4:2:2 | 12 |
| | 29.97 | | |
| | 30 | | |
| | 50 | | |
| | 59.94 | | |
| 3840x2160 4096x2160 | 23.976 | RGB | 8 |
| | 24 | YCbCr 4:4:4 | 10 |
| | 25 | YCbCr 4:2:2 | 12 |
| | 29.97 | | |
| | 30 | | |

HDMI 1.4 Supported 2D (Interlaced) Formats

| Format | Frame Rate | Color coding | Bit depth |
|---------------|-------------------|---------------------|------------------|
| 720x576 | 25 | | |
| | 50 | | |
| | 100 | | |
| 1920x1080 | 25 | | |
| | 29.97 | | |
| | 30 | | |
| | 50 | | |
| | 59.94 | | |
| 60 | | | |

HDMI 1.4 Supported 3D (Frame Packing) Formats

| Format | Frame Rate | Color coding | Bit depth |
|---------------|-------------------|---------------------|------------------|
| 1280x720 | 50 | | |
| | 59.94 | | |
| | 60 | | |
| 1920x1080 | 23.98 | | |
| | 24 | | |

HDMI 1.4 Supported 3D (Top Bottom) Formats

| Format | Frame Rate | Color coding | Bit depth |
|---------------|-------------------|---------------------|------------------|
| 1280x720 | 50 | | |
| | 59.94 | | |
| | 60 | | |
| 1920x1080 | 23.98 | | |
| | 24 | | |

HDMI 1.4 Supported Audio Formats

| Format | Sample Rate | Sample coding | Bit depth |
|--------------|-------------|---------------|-----------|
| 2 channels | 32 | L-PCM | 16 |
| | 44 | | |
| | 48 | | |
| | 88 | | |
| | 96 | | |
| 5.1 channels | 24 | L-PCM | 48 |
| 7.1 channels | 20 | L-PCM | 48 |

7.18 ICMP(-X) reset



This procedure requires that ICMP(-X) version 1.2.4 or later is installed.

ICMP(-X) reset possibilities

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

How to reset the ICMP(-X)?

1. Click on the *Control/ICMP/Reboot media server* in the GUI of the Web Commander

or

Click on *Control/ICMP/Reboot media server* in the GUI of the Commander



Note: The behavior could be different depending the projector type. Please, refer to the projector manual to obtain more details.

or

click on *Maintenance/Reboot action/media server* in the GUI of the Communicator (recommended)

or

click on *Contol/projector/power/Reboot ICMP* 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(-X) 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(-X) the lasers are switched on again.

Once the READY LED lit continuous green the ICMP(-X) is up and running.

2. Did the reset of the ICMP(-X) fail?

► **If yes**, perform a hardware reset as follows:

1. switch off the lasers of the projector or switch of the projector lamp.
2. press the ICMP(-X) **hardware reset button** a few seconds (reference 3 Image 7–22) .

Warning: Resetting the ICMP(-X) 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.

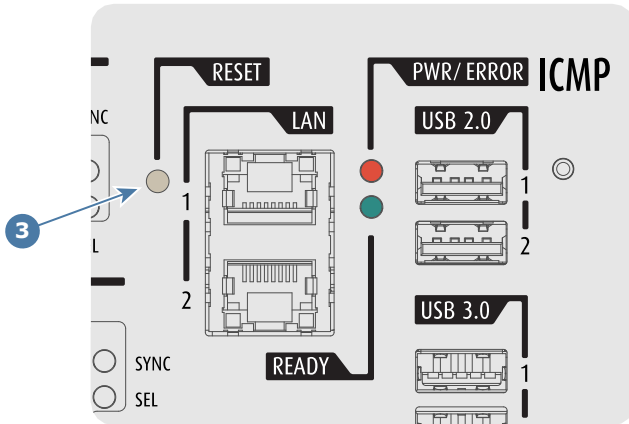


Image 7-22

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

Communicator Touch Panel

8

| | | |
|-----|-------------------------------------------------|-----|
| 8.1 | Introduction | 130 |
| 8.2 | Installation of the touch panel interface | 131 |

8.1 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.

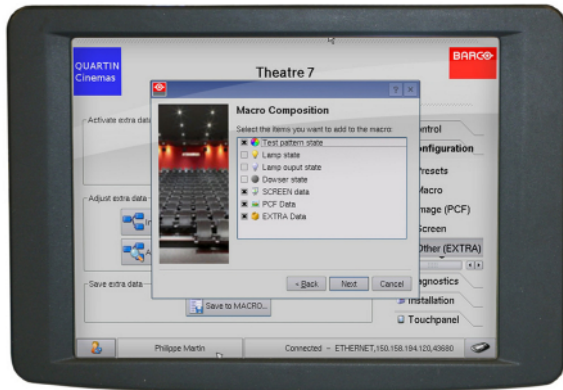


Image 8-1

Flexible touch panel interface

The touch panel interface can be mounted upon a swivel arm which easily fits on top of the DPxK-19B/23B/P. 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 DPxK-19B/23B/P. 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 DPxK-19B/23B/P and the Communicator Touch Panel.

The touch panel interface can also be connected with a Local Area Network (LAN) just like the DPxK-19B/23B/P. 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

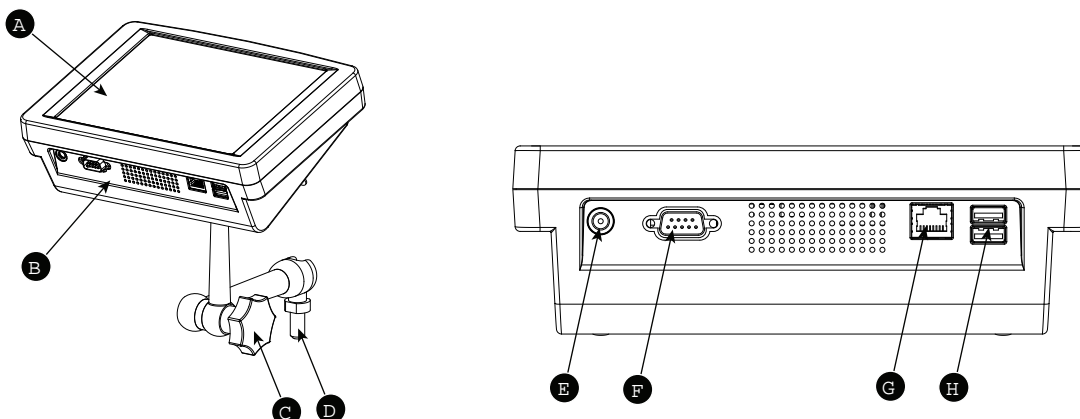


Image 8-2 Communicator touch panel

- 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.

8.2 Installation of the touch panel interface

Required tools

- 17 mm wrench
- 10 mm wrench

How to install the touch panel interface

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.

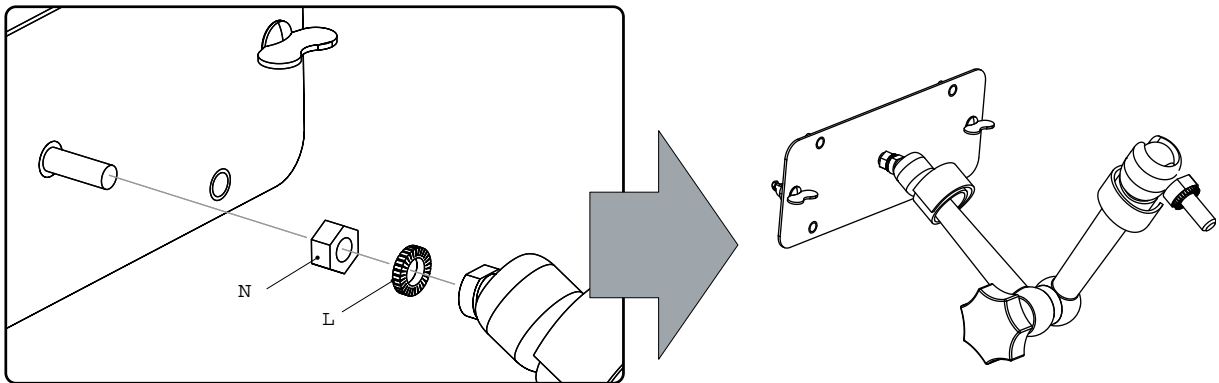


Image 8-3 Assemble swivel arm

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 DPxK-19B/23B/P as illustrated.

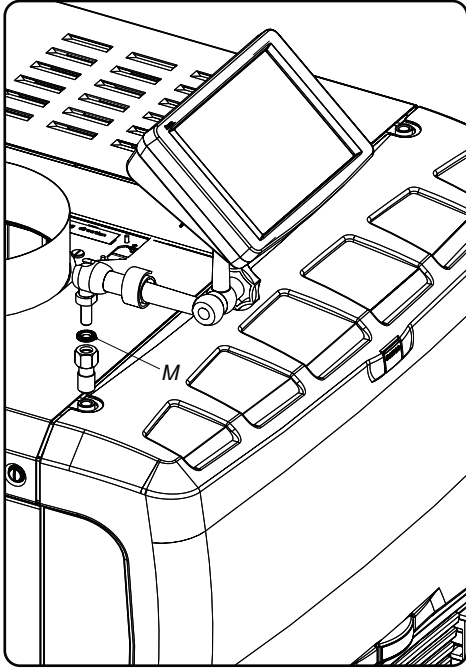


Image 8-4 Mount touch panel

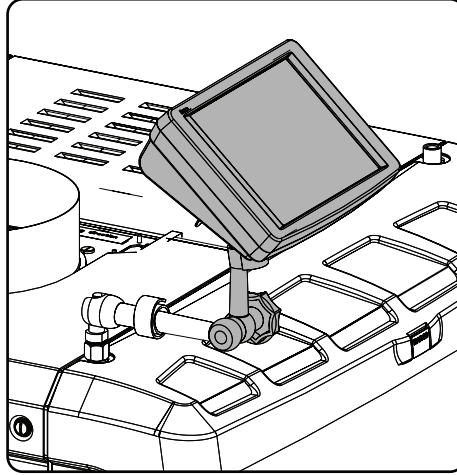


Image 8-5 Touch panel mounted

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

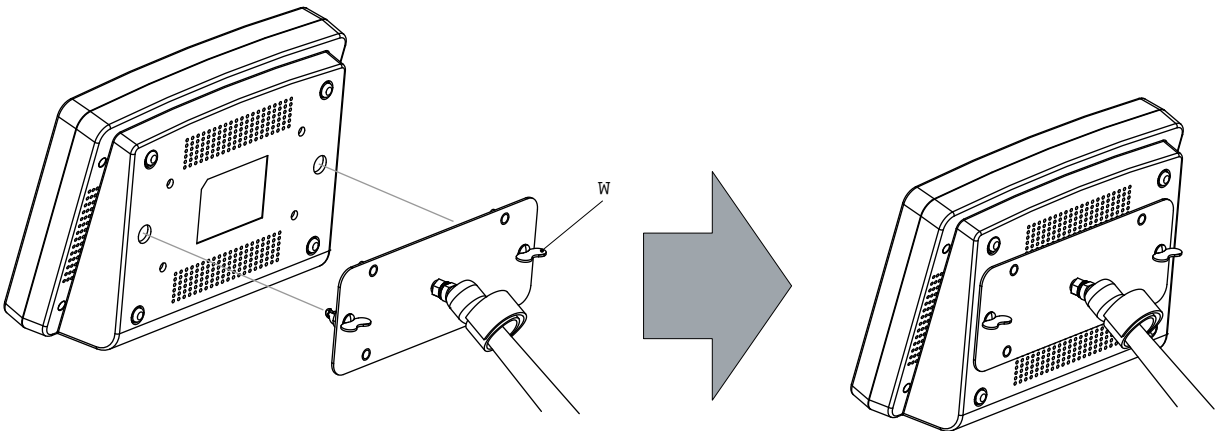


Image 8-6 Mount touch panel

4. Connect the circular plug of the multi cable with the circular socket at the rear side of the DPxK-19B/23B/P.

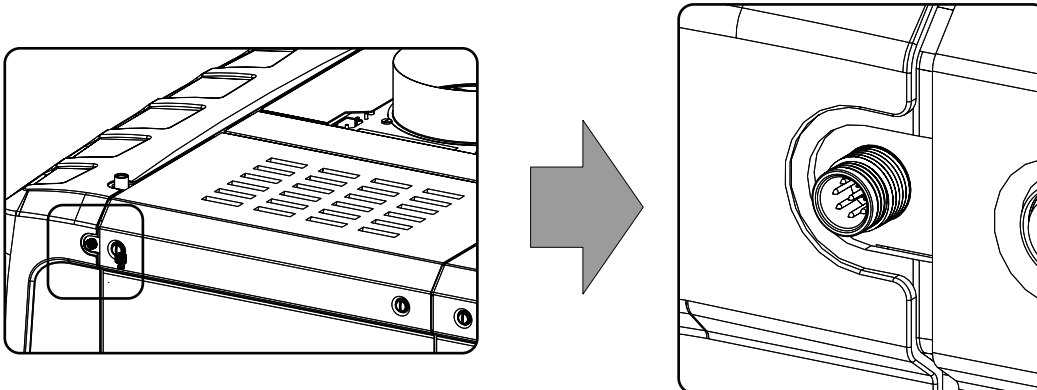


Image 8-7

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.

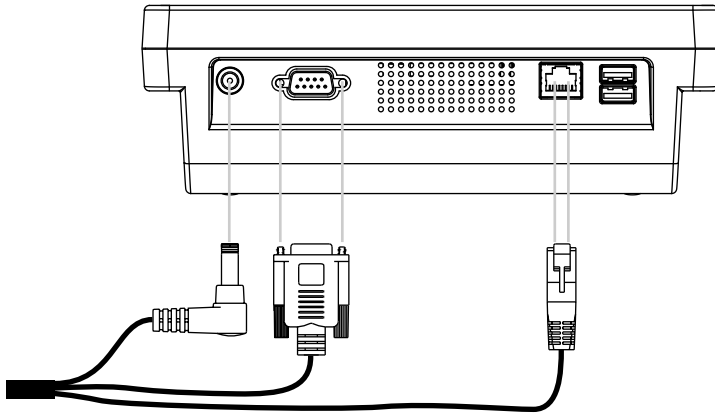


Image 8-8 Connections

Starting up

9

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| 9.1 | Switching ON the DPxK-19B/23B/P | 136 |
| 9.2 | Switching OFF the DPxK-19B/23B/P | 136 |

About this chapter

This chapter contains the switch ON and switch OFF procedures of the DPxK-19B/23B/P. 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.

9.1 Switching ON the DPxK-19B/23B/P

How to switch on

1. Make sure that the DPxK-19B/23B/P is installed upon a stable pedestal. See chapter “Positioning the DPxK-19B/23B/P at port window”, page 30.
2. Make sure that the exhaust system is properly installed. See chapter “Installation of the exhaust system”, page 32.
3. Make sure that the right lens is installed for your application. See chapter “Lens selection”, page 61.
4. Make sure that the lamp and lamp house are correctly installed. See chapter “Lamp & Lamp House”, page 39.
5. Make sure the projector is correctly connected to the power net. See chapter “Connecting the DPxK-19B/23B/P with the power net”, page 35.
6. Check if a video source is connected with the projector. See chapter “Input & communication”, page 77.
7. Check if the communicator touch panel is installed. See chapter “Communicator Touch Panel”, page 129.
8. Press the power switch to switch ON the projector. As a result the projector starts up in standby. So, the lamp is OFF and the dower 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.
9. Press the **STANDBY** button on the local keypad or use the Communicator Touch Panel to activate the lamp.
10. Press the **DOWSER** button on the local keypad or use the Communicator Touch Panel to open the dower. As a result the applied source will be displayed.



CAUTION: See user's guide of the Communicator Touch Panel to operate and control the DPxK-19B/23B/P.



When for any reason a restart of the projector is required, the content server should be restarted also.

9.2 Switching OFF the DPxK-19B/23B/P

How to switch OFF the DPxK-19B/23B/P?

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 lamp turns off but the fans remain turning 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.

Removal and installation of the projector covers

10

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| 10.1 | Removal of the lamp cover | 139 |
| 10.2 | Removal of the rear cover | 140 |
| 10.3 | Removal of the input cover | 141 |
| 10.4 | Removal of the front cover | 142 |
| 10.5 | Removal of the side cover | 144 |
| 10.6 | Installation of the front cover | 145 |
| 10.7 | Installation of the input cover | 146 |
| 10.8 | Installation of the lamp cover | 147 |
| 10.9 | Installation of the rear cover | 149 |
| 10.10 | Installation of the side cover | 149 |



WARNING: All procedures in this chapter may only be performed by “qualified service technicians”.



WARNING: Disconnect the power to the circuit mains terminals and unplug the power cord at UPS INLET, unless otherwise specified in the procedure.

Location of the covers

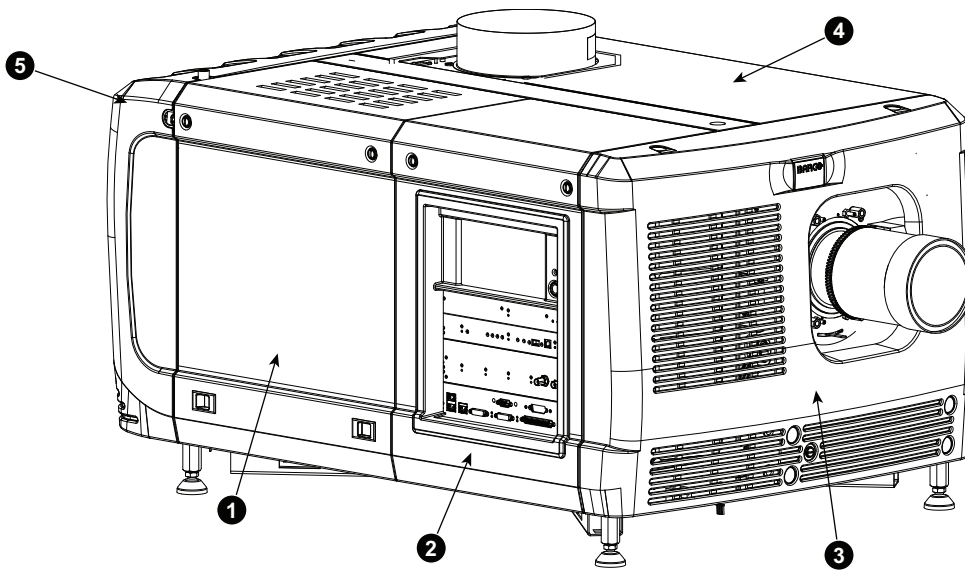


Image 10-1 Location of the covers

- 1 Lamp cover
- 2 Input cover
- 3 Front cover
- 4 Side cover
- 5 Rear cover

All cover can be individually removed.

10.1 Removal of the lamp cover

Required tools

Flat screwdriver

How to remove

1. Release both captive screws on top of the lamp cover.

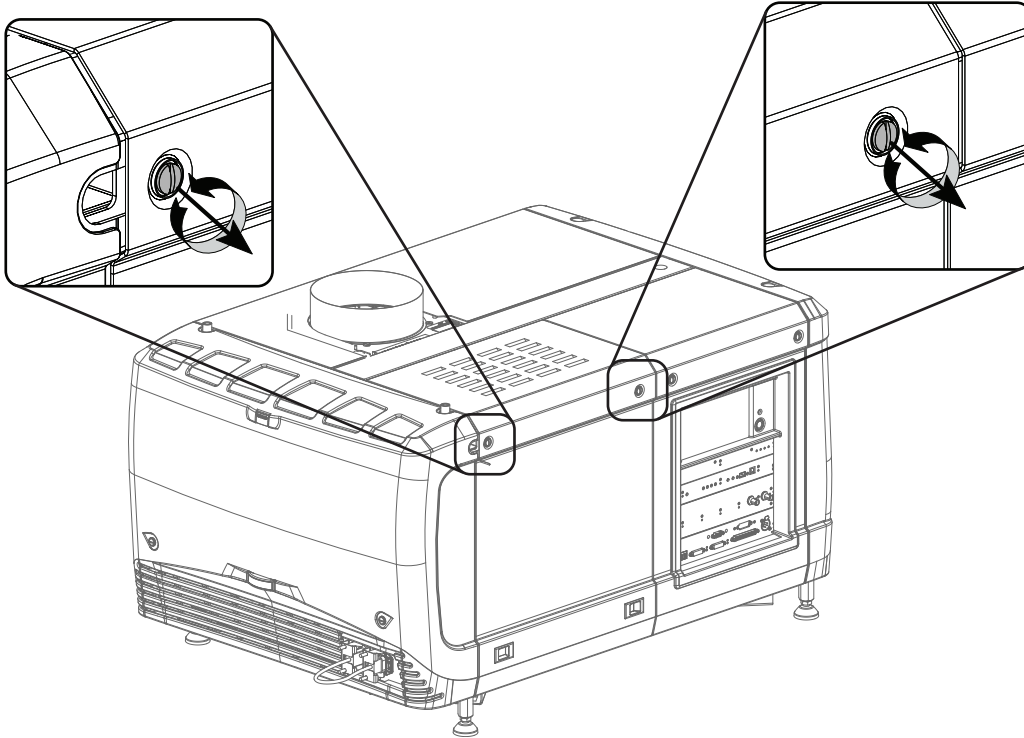


Image 10-2 Lamp cover, fastening screws

2. Push both lock to each other to release the locks and pull at the same time the bottom side of the cover away from the projector.

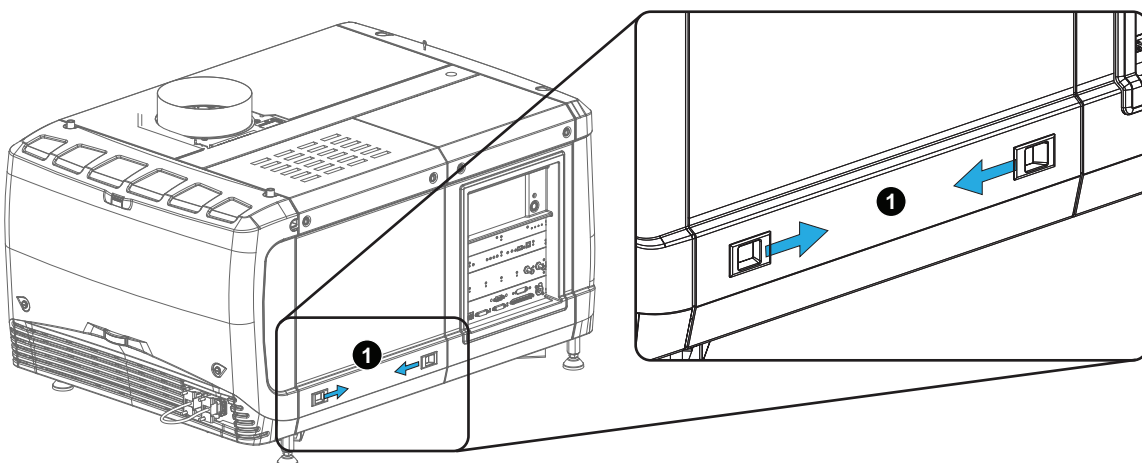


Image 10-3 Lamp cover, locks

3. Take off the cover.

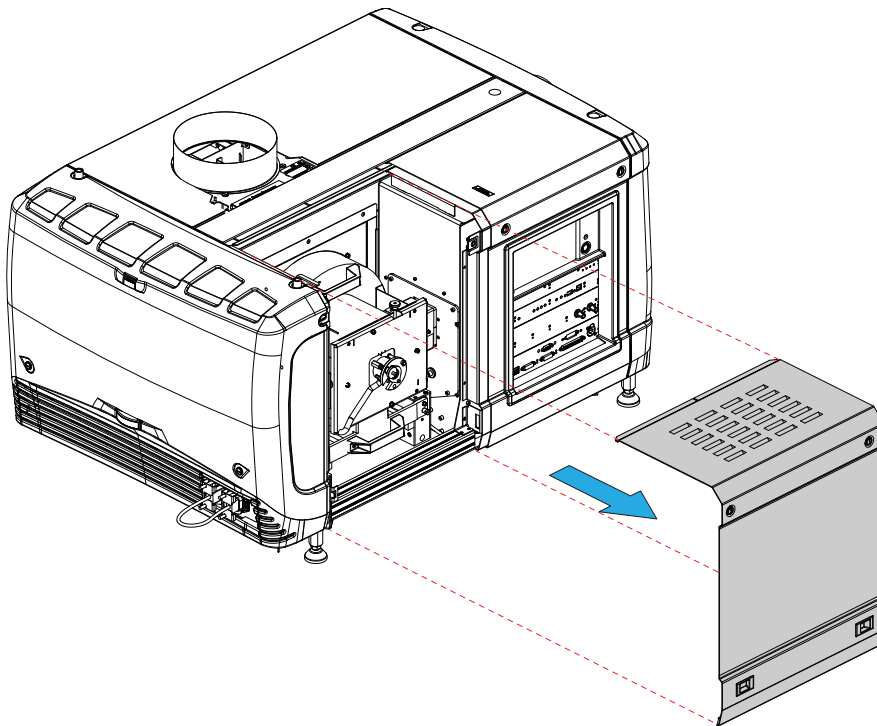


Image 10-4 Lamp cover, removal

10.2 Removal of the rear cover

Required tools

Flat screwdriver

How to remove

1. Release both captive screws almost at the bottom of the rear cover using a flat screw driver (1).

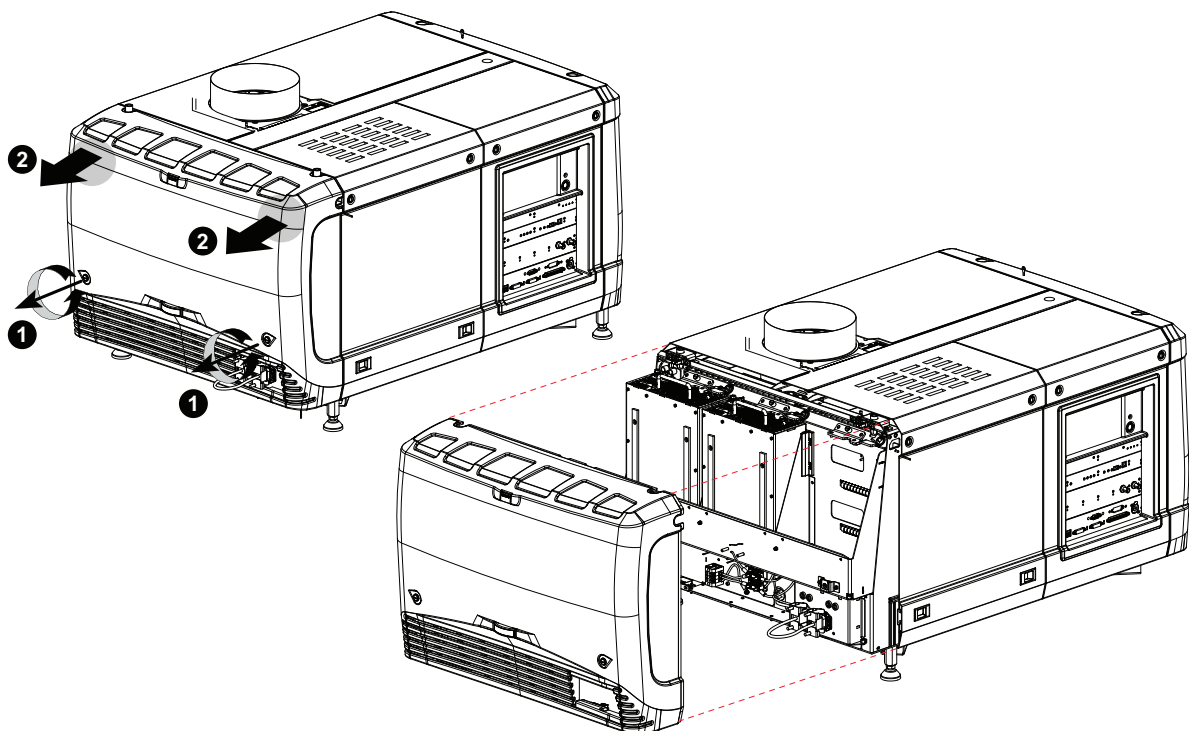


Image 10-5 Rear housing removal

2. Remove the rear cover of the projector doing the following:
 1. gently pull out the top covers of the rear cover (2).
 2. then move the rear cover away from the projector.

10.3 Removal of the input cover

Required tools

Flat screwdriver

How to remove

1. Release both captive screws at the top of the input cover using a flat screw driver.

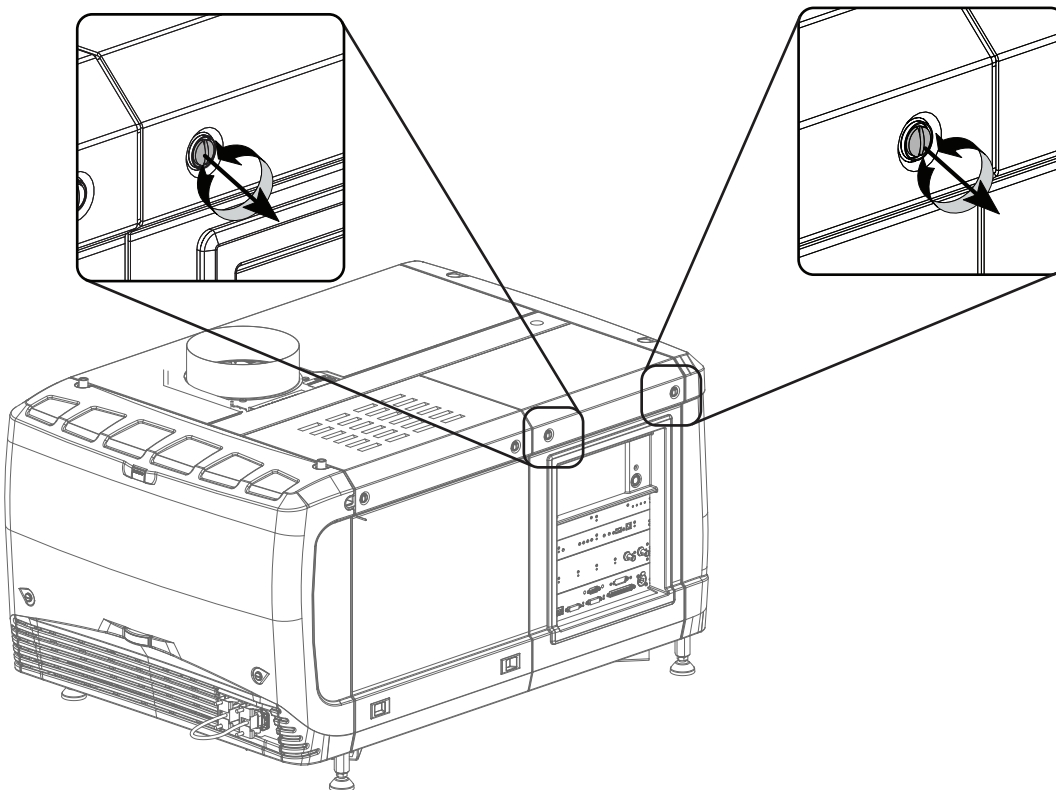


Image 10-6 Input cover, fixation

2. Remove the input cover as follow:
 1. Pull the bottom side of the cover to you until the cover is unlocked.
 2. Slide the full cover away from the projector.

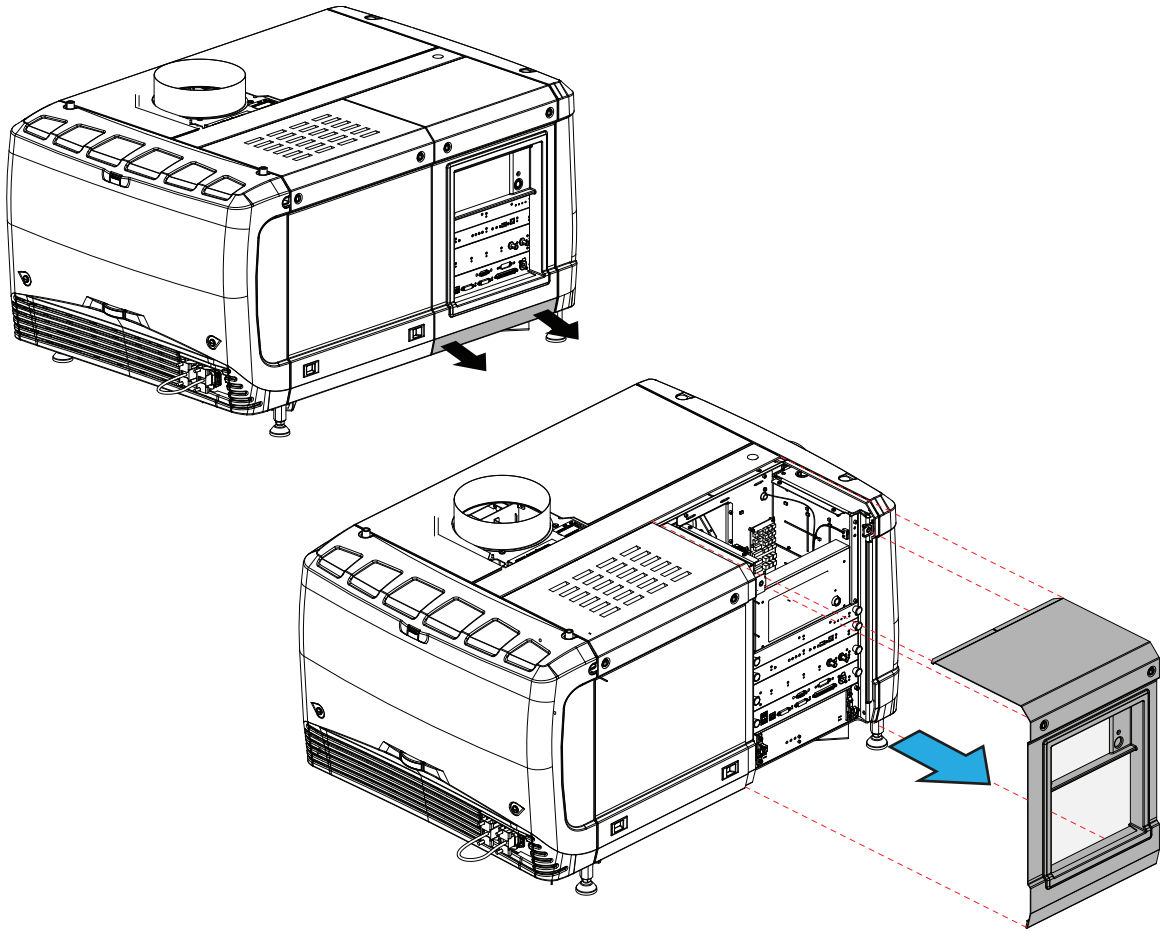


Image 10-7 Input cover removal

10.4 Removal of the front cover

Required tools

Flat screwdriver

How to remove

1. Check if the lens is removed.
2. Remove the rubber dust ring from the lens holder.

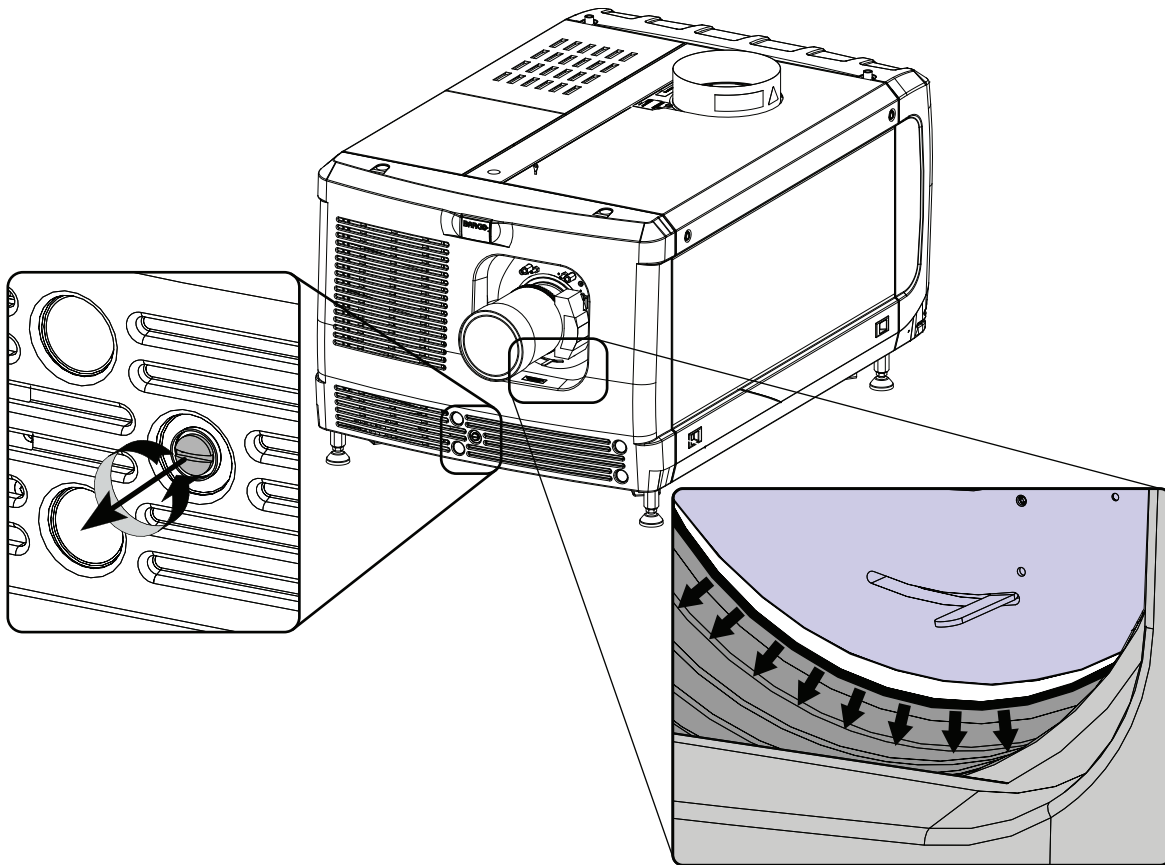


Image 10–8 Release cover removal

3. Release the captive screw at the middle bottom of the front cover.
4. Remove the front cover as follow:
 1. standing in front of the projector, pull the top side of the cover to you until it is unlocked.
 2. slide the cover away from the projector.

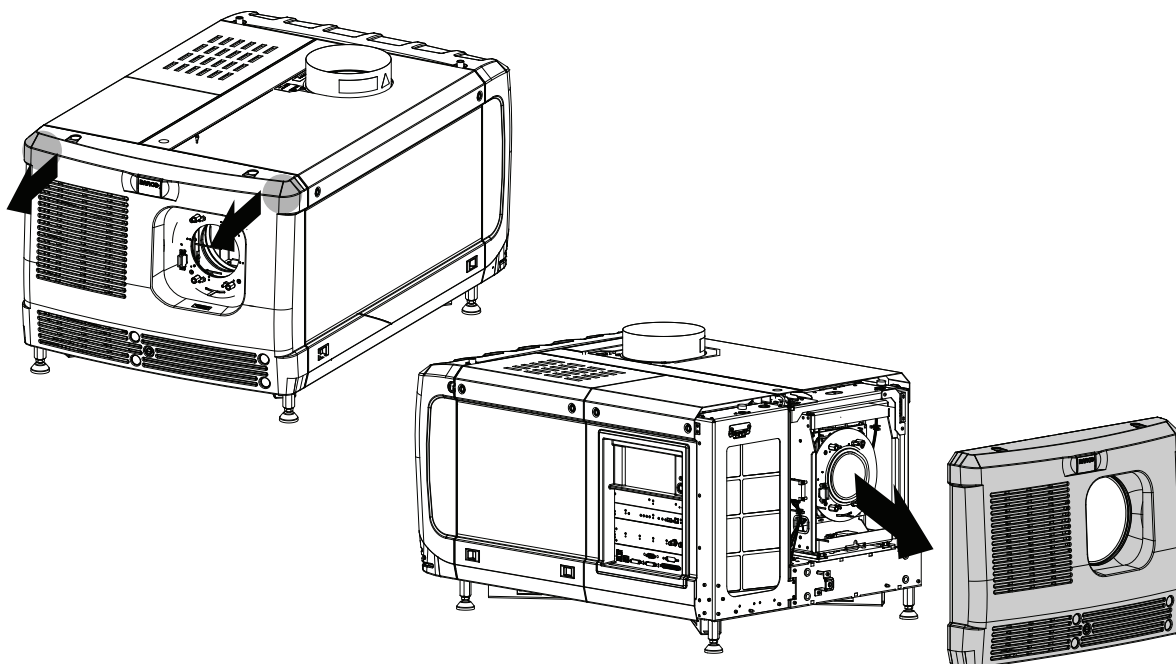


Image 10–9 Remove front cover

10.5 Removal of the side cover

Required tools

Flat screwdriver

How to remove

1. Release both captive screws on top of the side cover.

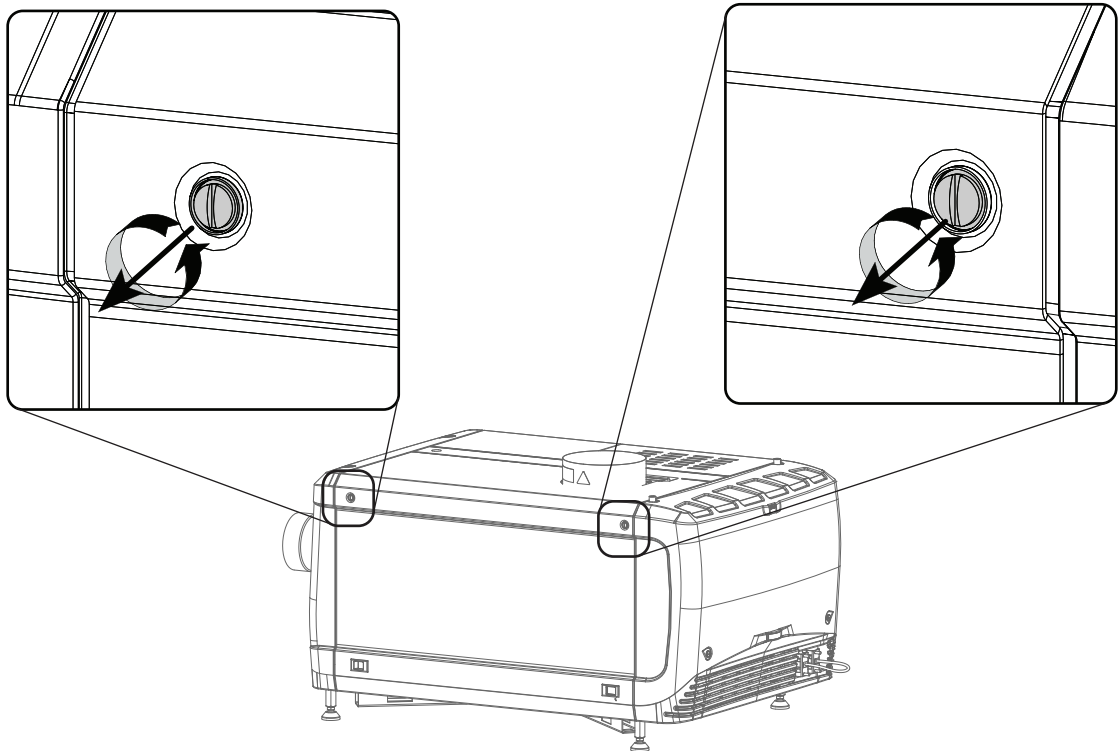


Image 10-10 Captive screws

2. Push both lock to each other to release the locks and pull at the same time the bottom side of the cover away from the projector.

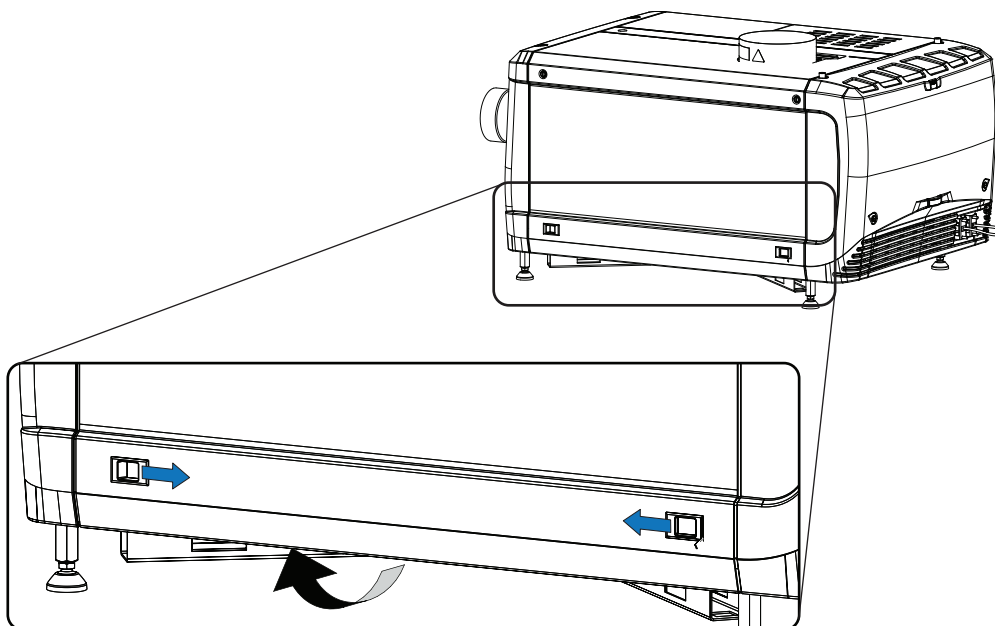


Image 10-11 Unlock side cover

3. Take off the cover.

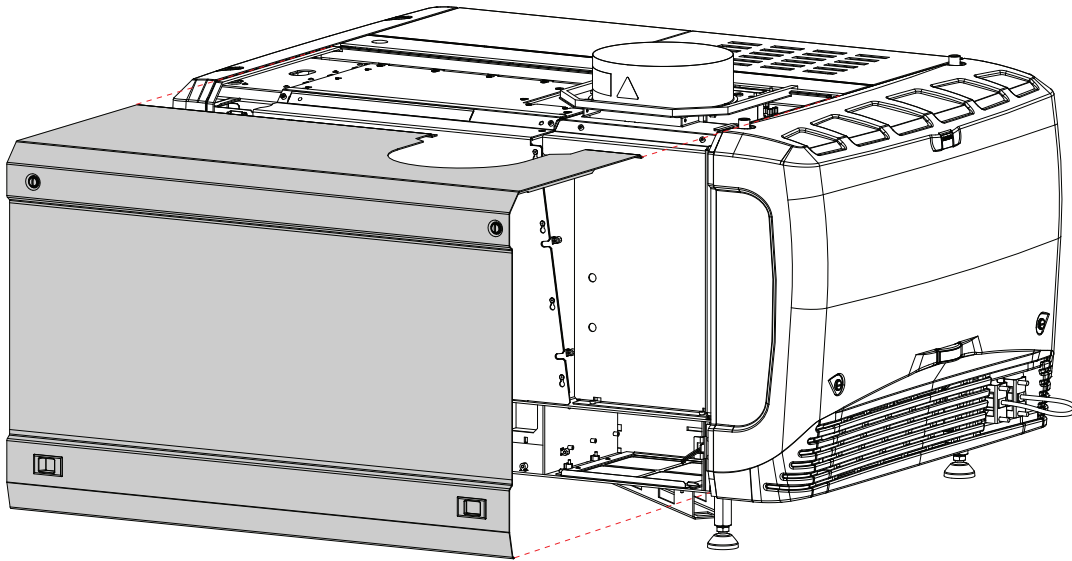


Image 10-12 Side cover

10.6 Installation of the front cover

Required tools

Flat screwdriver

How to install

1. Ensure that no lens is mounted.
2. Execute the next steps to install the front cover:
 1. Hook the bottom side of the cover to the projector.
 2. Gently push the top side of the cover into position.
 3. Ensure that the locking studs click into their receivers.

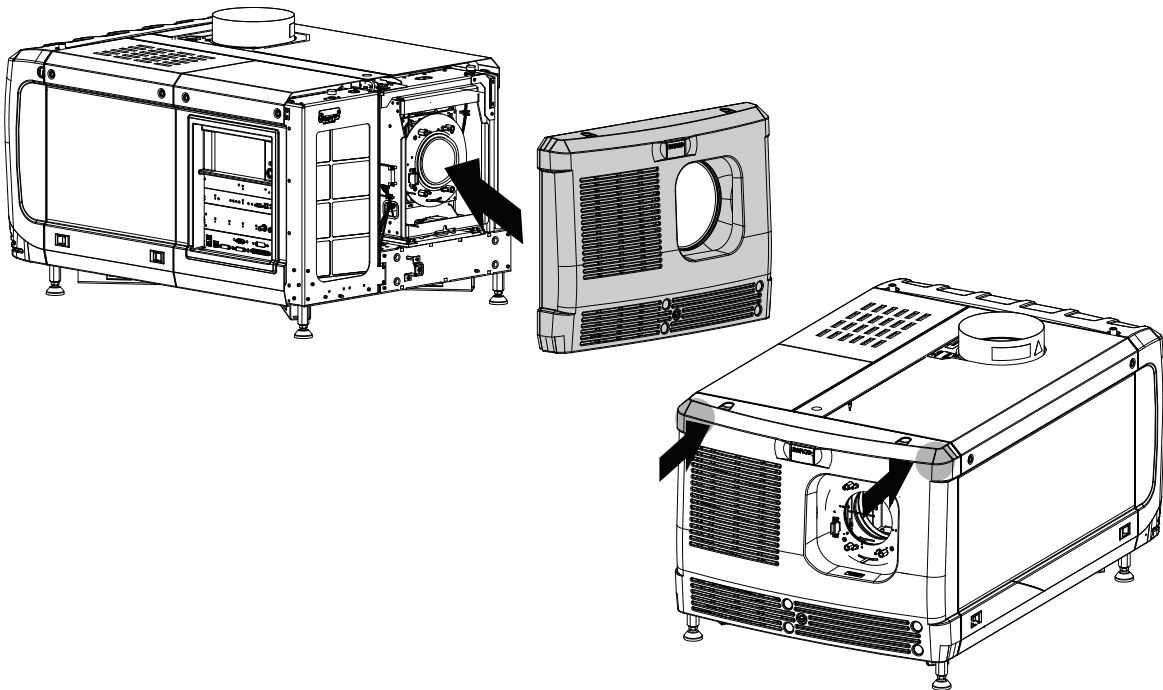


Image 10-13 Mount front cover

3. Secure the front cover by locking the captive screw in the middle at the bottom of the front cover.

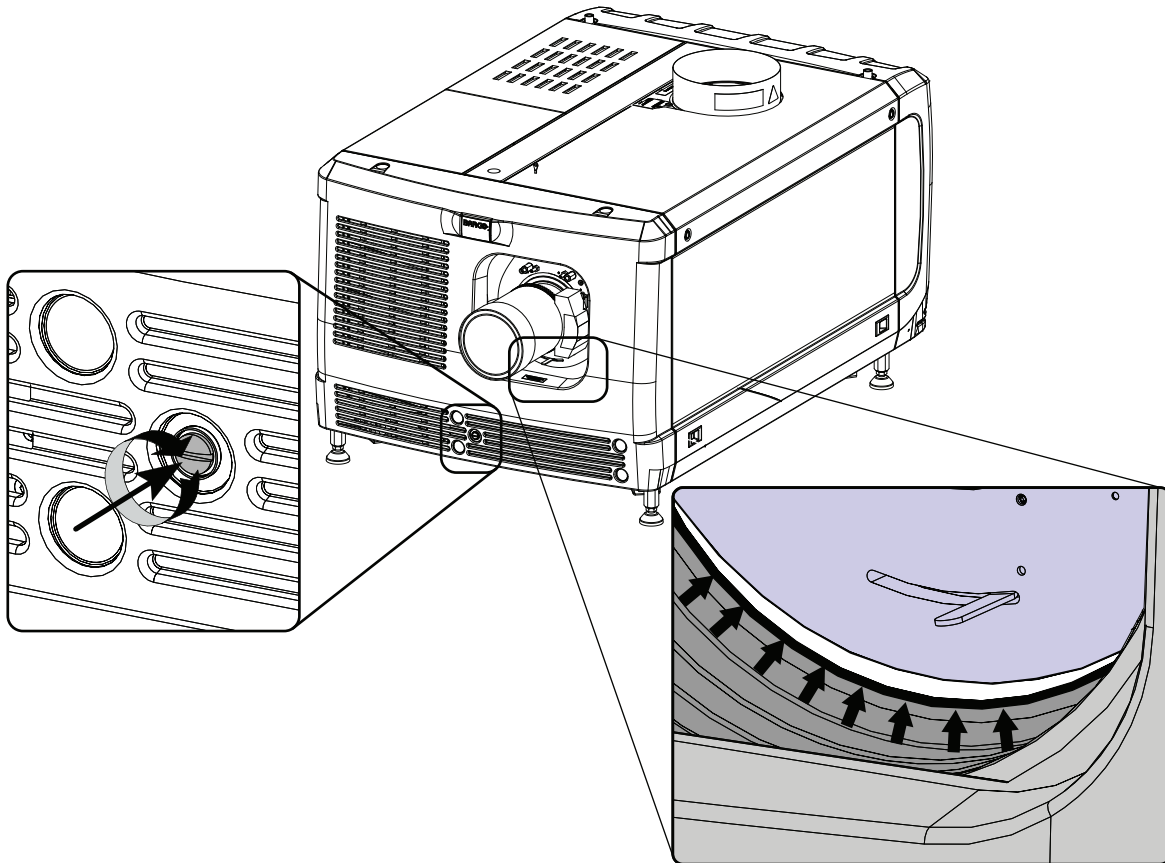


Image 10-14 Secure front cover

4. Reinstall the rubber dust ring around the lens holder.

10.7 Installation of the input cover

Required tools

Flat screwdriver

How to install

1. Place the top side of the cover on its place.

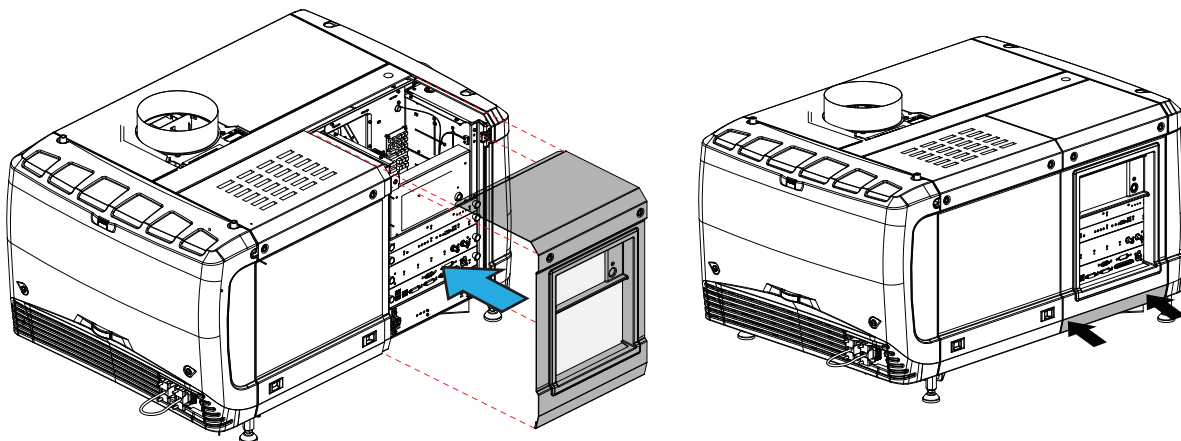


Image 10-15 Mount input cover

2. Gently move the bottom side of the cover towards the projector and push the bottom side until the locking studs click in the receivers.

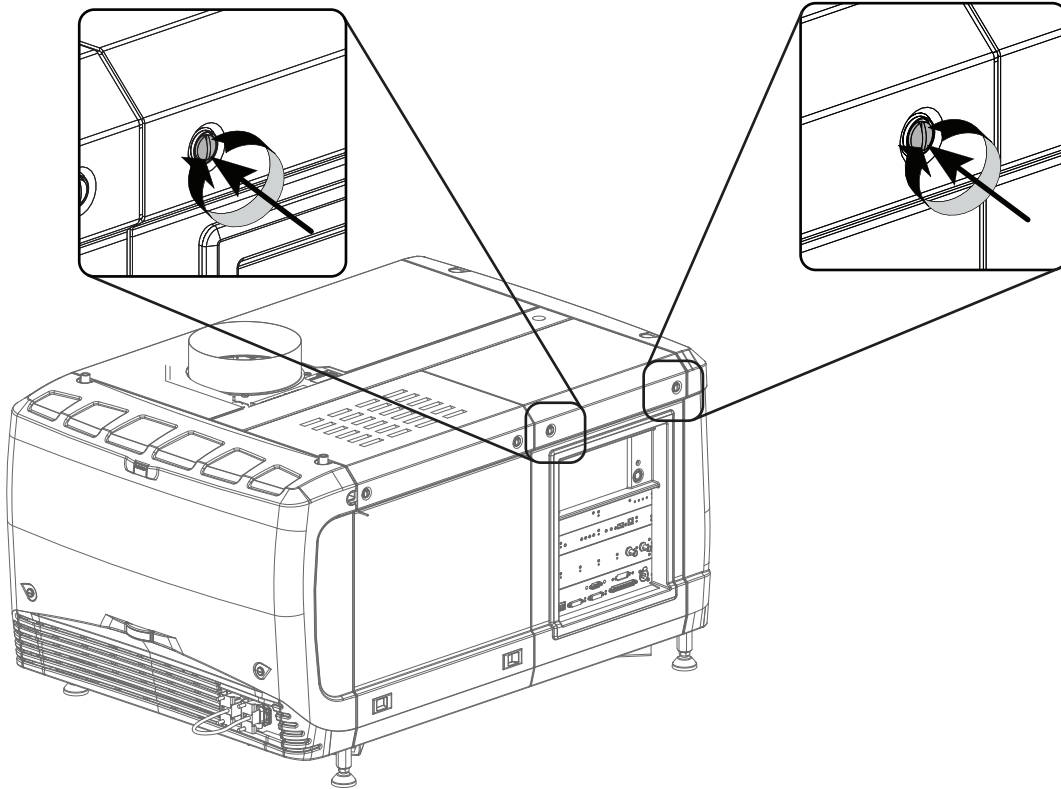


Image 10-16 Secure input cover

3. Secure the cover by fastening the captive screw.

10.8 Installation of the lamp cover

Required tools

Flat screwdriver

How to install

1. Place the top side of the cover on its place.

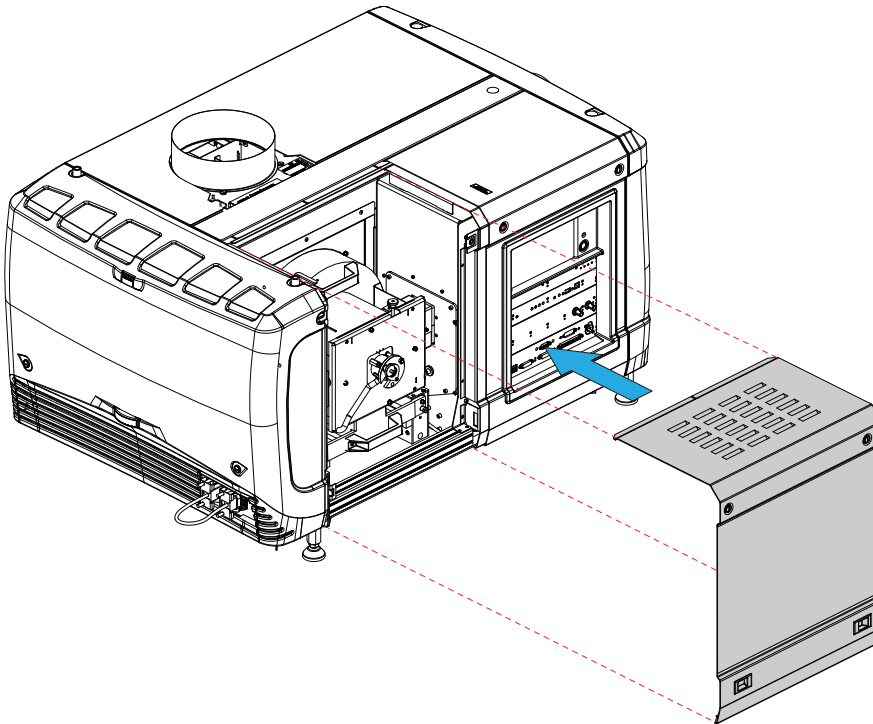


Image 10-17 Mount lamp cover

- 2.** Close the cover as follow:
 1. Gently move the bottom side of the cover towards the projector
 2. Push both lock to each other and push at the same time the cover against the projector frame.
 3. Release both locks so that they lock in their receivers.
- 3.** Secure the cover by fastening both captive screws.

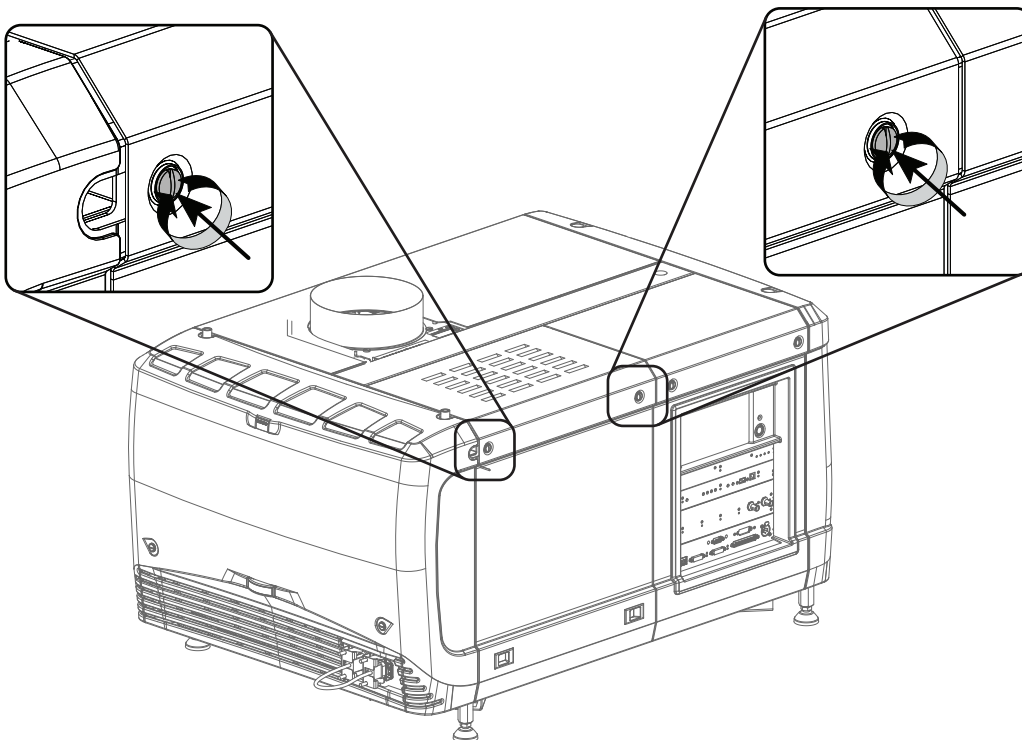


Image 10-18 Secure lamp cover

10.9 Installation of the rear cover

Required tools

Flat screwdriver

How to install

1. Install the rear cover of the projector doing the following:
 1. Bring the rear cover towards its final position.
 2. Gently push the locking studs into the receivers (1).

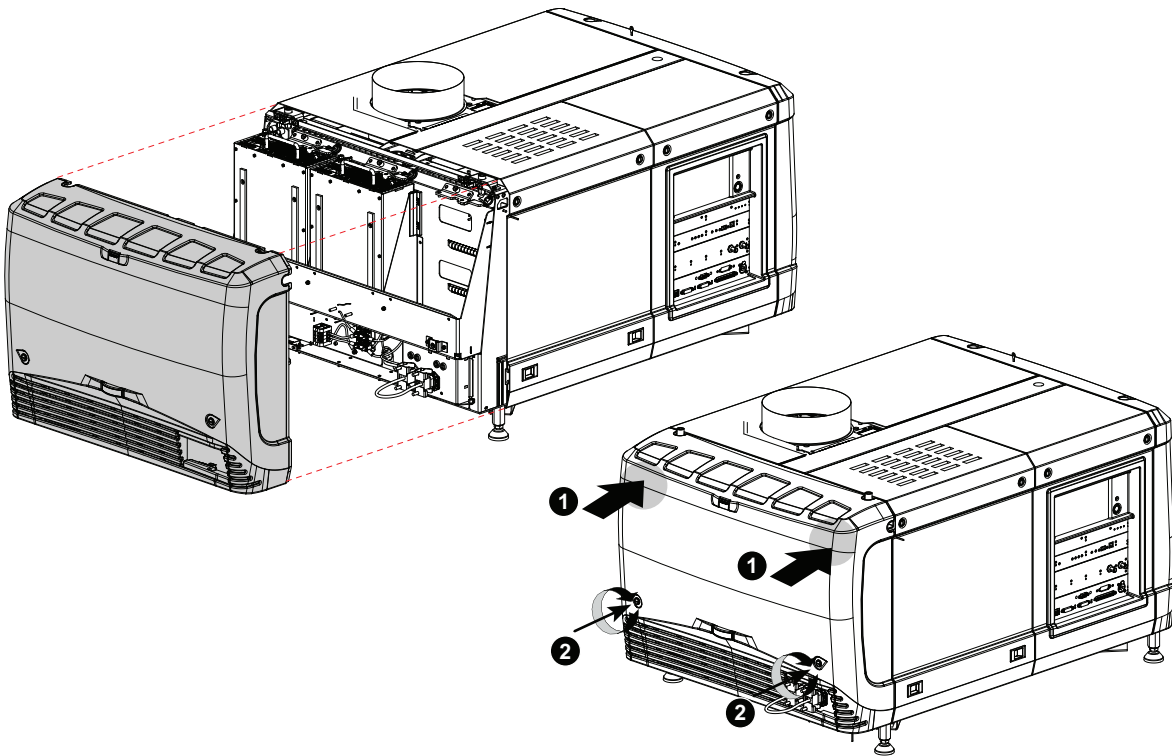


Image 10-19 Mount rear cover

2. Secure the cover by fastening the captive screw at the bottom of the rear cover (2).

10.10 Installation of the side cover

How to install

1. Place the top of the side cover on its place.
2. Close the cover as follow:
 1. Gently move the bottom side of the cover towards the projector
 2. Push both lock to each other and push at the same time the cover against the projector frame.
 3. Release both locks so that they lock in their receivers.

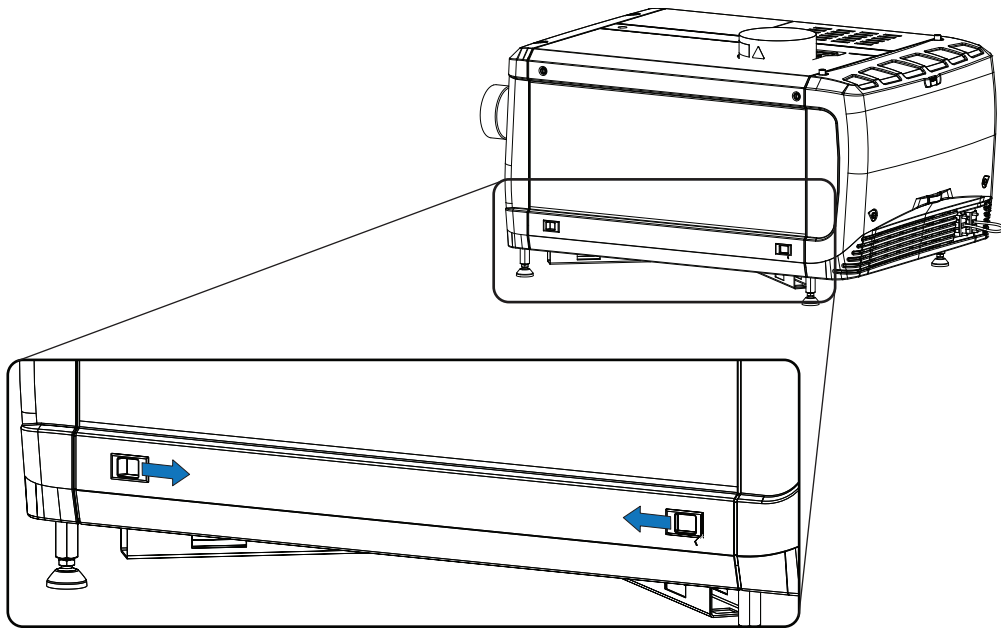


Image 10-20

3. Secure the cover by fastening both captive screws.

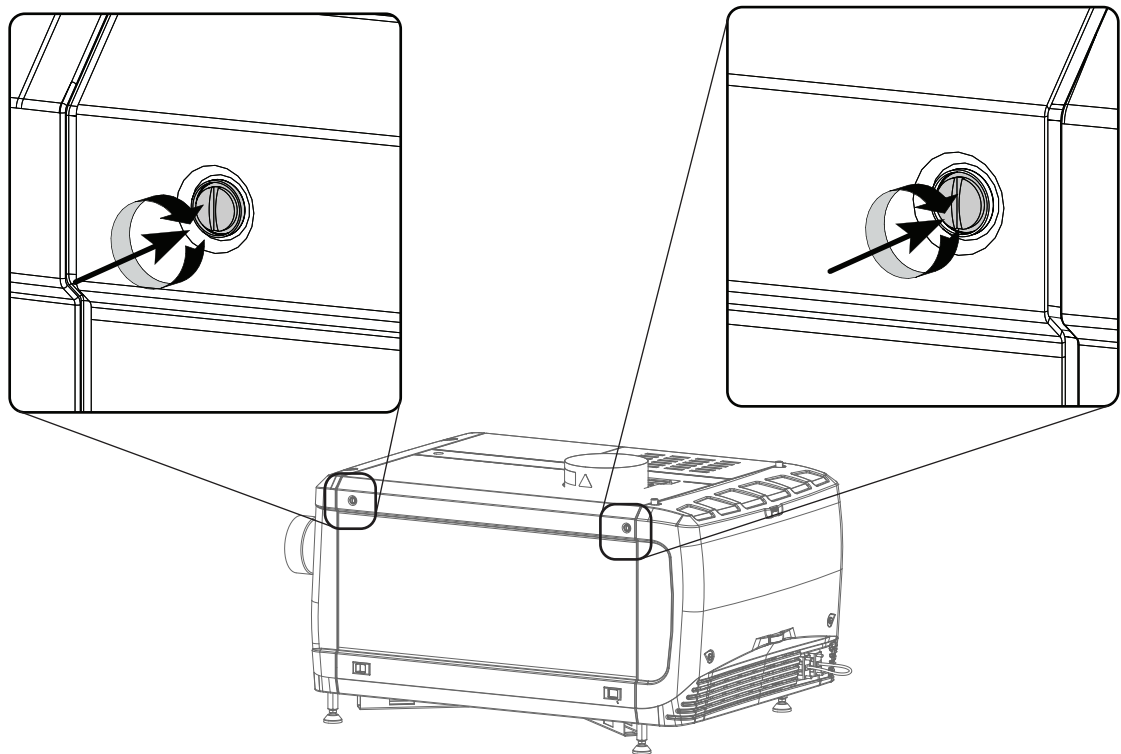


Image 10-21 Lock side cover

Maintenance

11

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| 11.1 | Remove and clean the front dust filter | 152 |
| 11.2 | Remove and clean both bottom dust filters | 153 |
| 11.3 | Cleaning the lens | 154 |
| 11.4 | Cleaning the exterior of the projector | 154 |
| 11.5 | Check cooling liquid level | 155 |
| 11.6 | Cooling liquid refill | 155 |
| 11.7 | Authorization to clear security warning on the projector..... | 156 |

About this chapter

This chapter describes how to remove the dust filters



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.

11.1 Remove and clean the front dust filter



WARNING: Take care: the metal filters of the projector are fragile. Clean with care!

How to remove

1. Remove the input cover.
2. Slide out the filter frame.

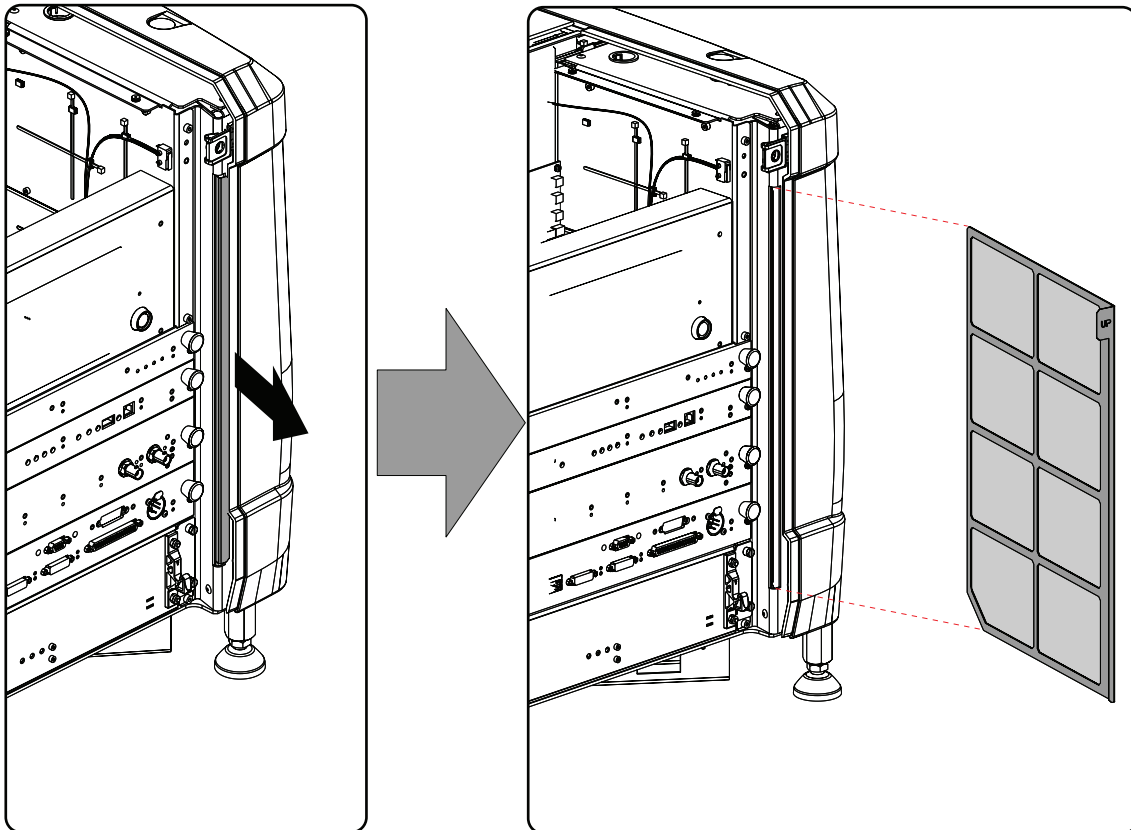


Image 11-1 Front dust filter

Clean the dust filter

1. Remove most contamination gently with a vacuum cleaner in an other room or outside.
2. Blow remaining dust away with clean (without oil/lubricant) compressed air in an other room or outside. Do not hold compressor nozzle too close to the projector filters, as this may also cause damage.



These dust filters are fragile. Clean them gently!

Mount the dust filter

1. Insert the dust filter with the “up” indication to the top of the projector.

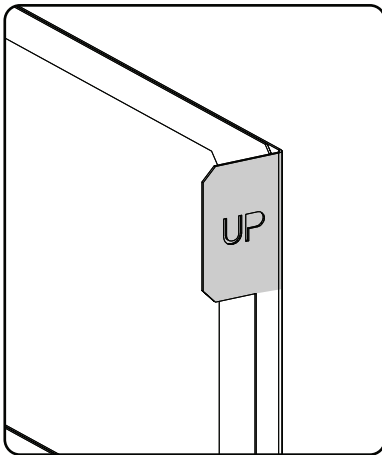


Image 11-2 Up indication

2. Push the filter completely in.
3. Reinstall the input cover.

11.2 Remove and clean both bottom dust filters

How to remove

1. Remove the side cover.
2. Slide out the bottom front dust filter.

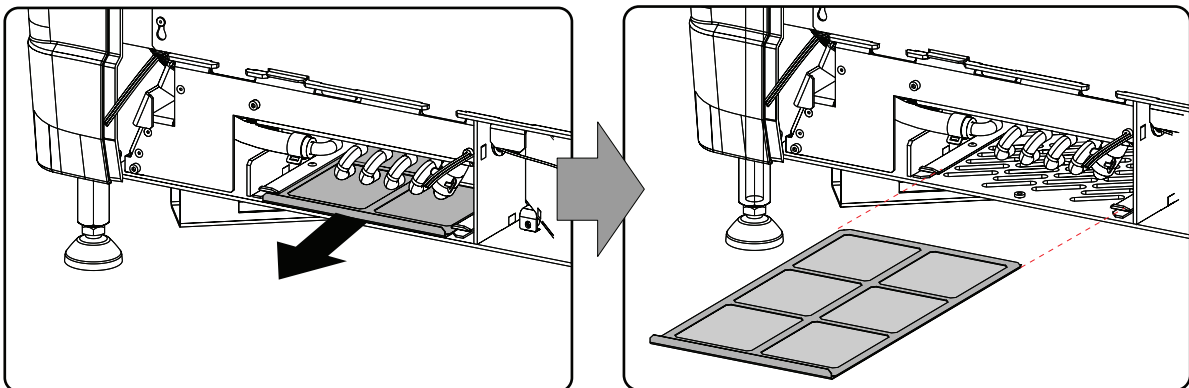


Image 11-3 Bottom front dust filter

3. Slide out the bottom back dust filter.

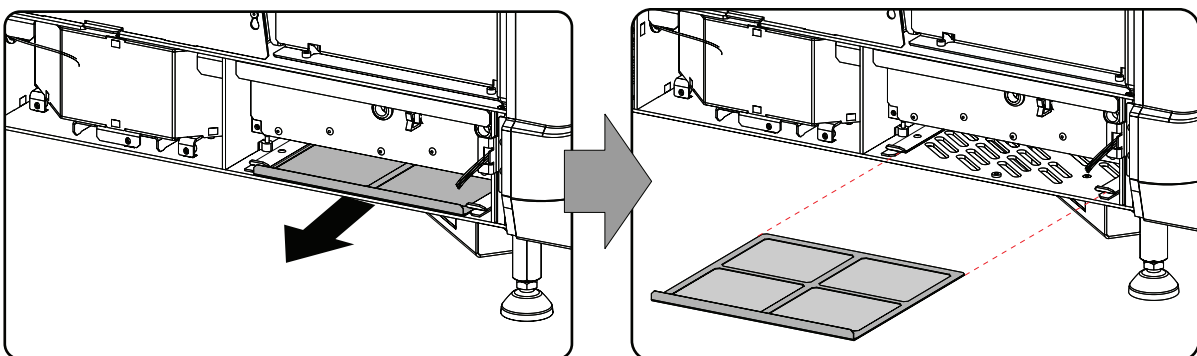


Image 11-4 Bottom back dust filter

Clean the dust filter

1. Remove most contamination with a vacuum cleaner in an other room or outside.

2. Blow remaining dust away with compressed air in an other room or outside.



These dust filters are fragile. Clean them gently!

Mount the dust filters

1. Insert the dust filter with the handle upwards. Small filter at the back, big filter at the front.
2. Push the filters completely in until they click into position.
3. Reinstall the side cover.

11.3 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.

Required tools

- Compressed air
- Clean micro fiber lens cleaning cloth (e.g. Toraysee® cloth(s))
- Clean cotton cloth
- Lens cleaner (e.g. ZEISS lens cleaner, Purosol™ or other water based lens cleaner products)

How to clean the lens?

1. Blow off dust with clean compressed air (or pressurized air cans⁸).
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.



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

11.4 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.

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

11.5 Check cooling liquid level

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 left side cover (Light Processor side). see “*Removal of the side cover*”, page 144.
2. Check the liquid cooling level in the reservoir.

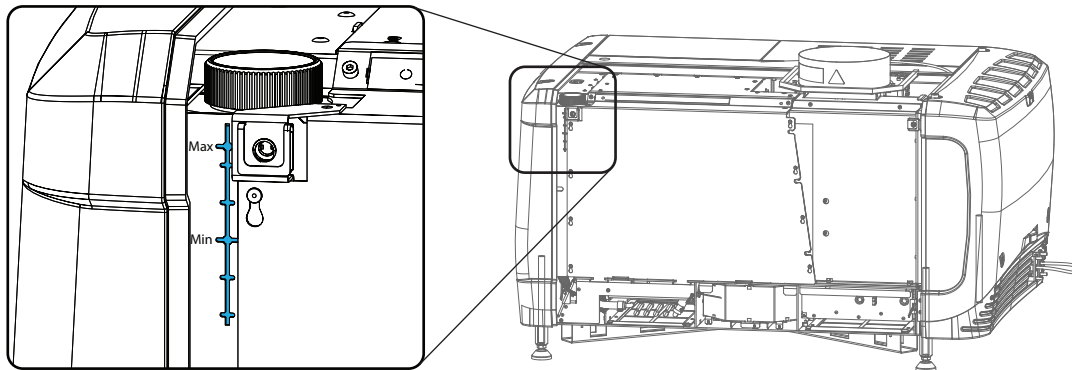


Image 11-5 Cooling liquid check

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 approaching the **Min** level point, than check for leakage in the cooling system prior starting the refill procedure.



If you cannot see the level, open the filler cap and shine a torch into the reservoir

11.6 Cooling liquid refill



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

Order info cooling liquid

B1909086K : bottle of 1 liter cooling liquid.

Required parts

Cooling liquid

How to refill

1. Remove the side cover, see “*Removal of the side cover*”, page 144.
2. Open the filler cap by turning it anti clockwise.

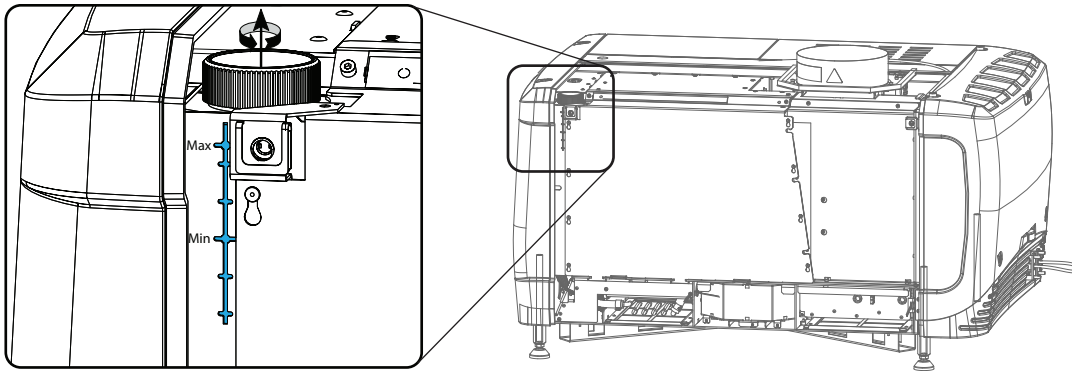


Image 11-6 Cooling liquid refill

3. Fill the reservoir with cooling liquid until the level is equal with the **Max** indication on the reservoir.
4. Close the reservoir again. Turn the filler cap clockwise to close the reservoir.
5. Reinstall the side cover.



CAUTION: Never fill above **Max** level mark !

11.7 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.

Required 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..

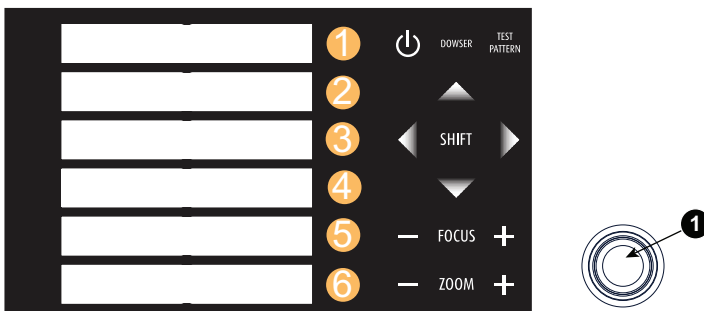


Image 11-7 Keypad

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.

Convergence

12

| | | |
|------|------------------------------------|-----|
| 12.1 | Open the sealed compartment..... | 160 |
| 12.2 | Close the sealed compartment | 161 |
| 12.3 | Convergence controls | 162 |
| 12.4 | Red on blue convergence..... | 163 |
| 12.5 | Green on blue convergence | 164 |

About this chapter

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

12.1 Open the sealed compartment



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



CAUTION: This procedure may only be done by a qualified and trained service technician.

Required tools

3 mm Allen wrench

How to open the sealed compartment

1. Remove both hexagon head cap screws (1).

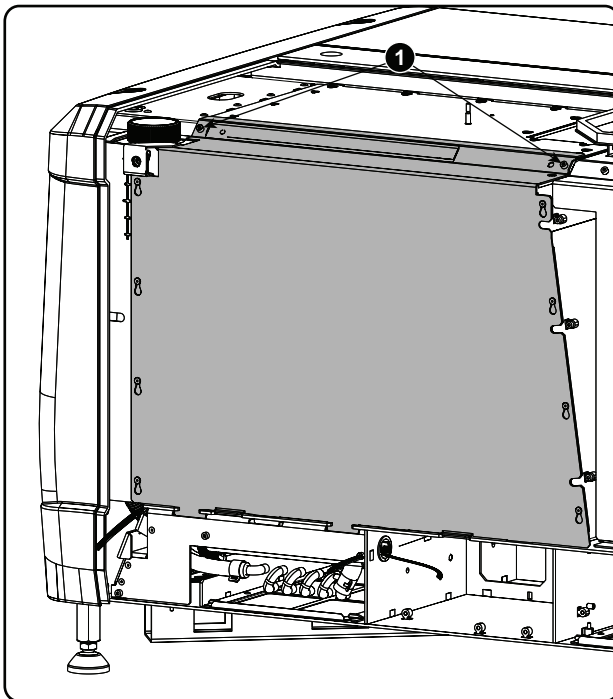


Image 12-1 Sealed cover fixation

2. Lift up the cover plate slightly using both lower lips (2) and then remove the cover by taking it away from the projector.

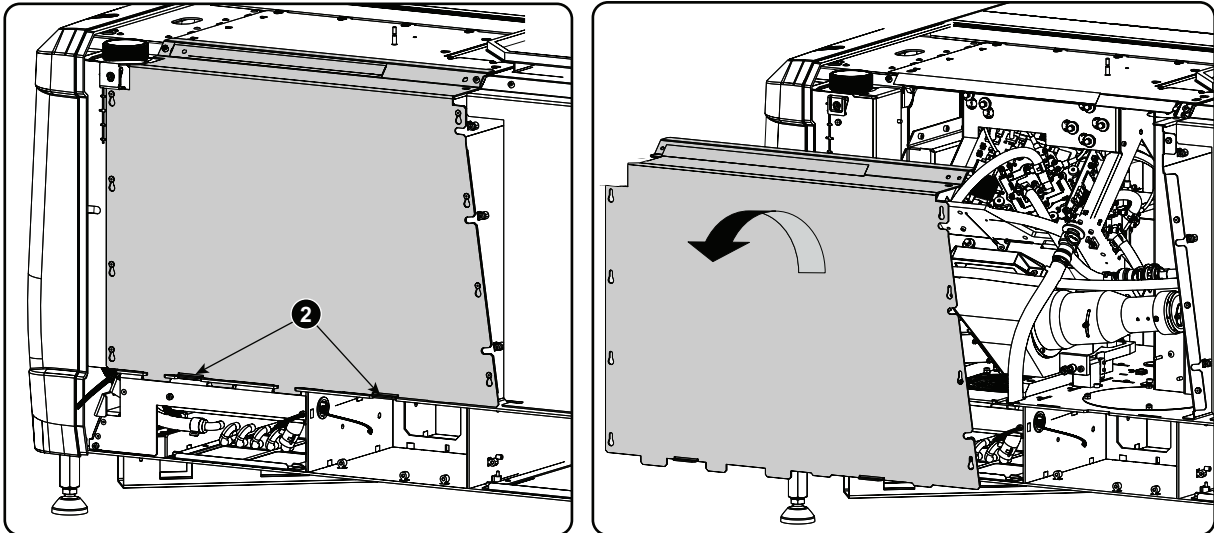


Image 12-2 Sealed cover, remove



A security warning will be displayed on the projector. Execute the procedure “Authorization to clear security warning on the projector”.

12.2 Close the sealed compartment

Required tools

3 mm Allen wrench

How to close the sealed compartment

1. Hook the cover plate on the studs.

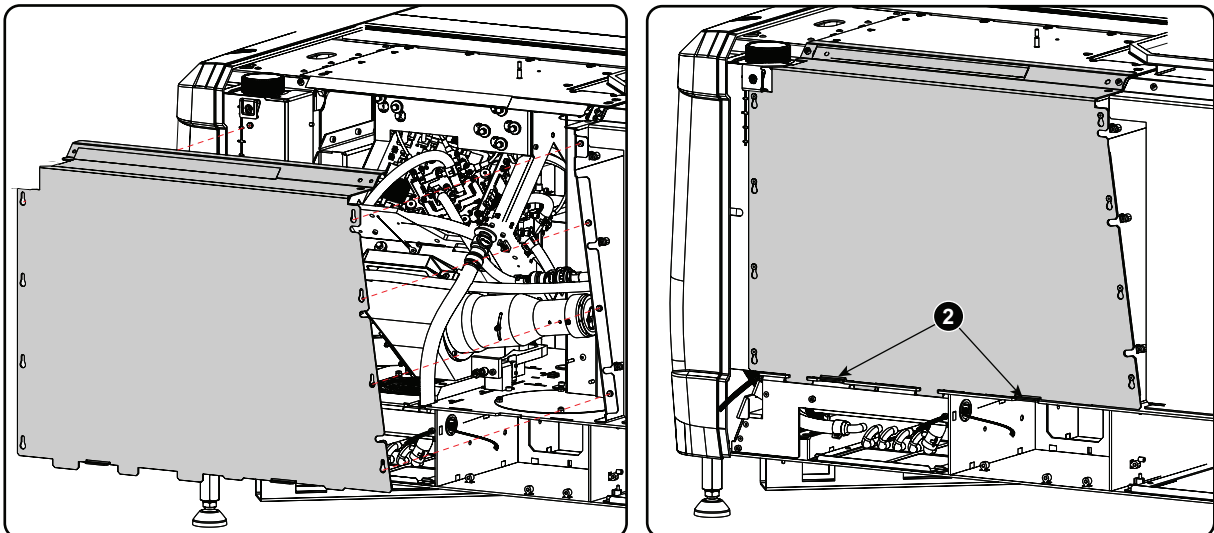


Image 12-3 Sealed cover, mount

2. Slide the cover downwards by pushing on both lips until it is in its correct position.
3. Drive in both fixation screws (1).

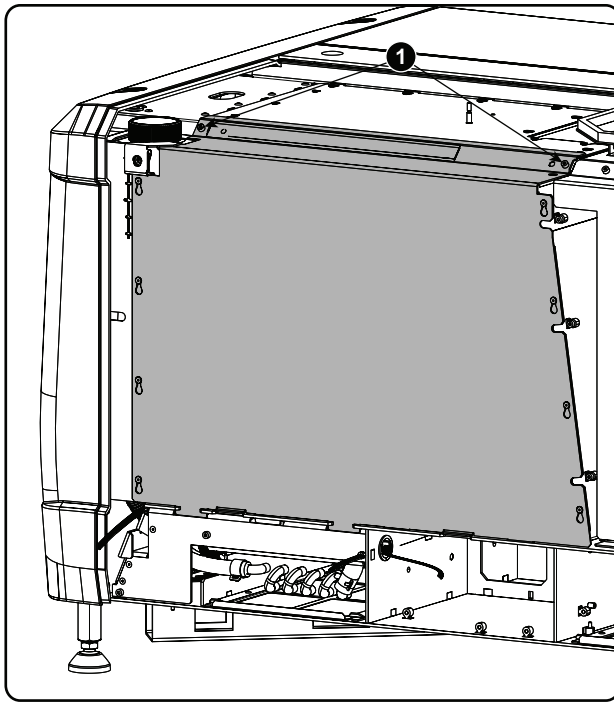


Image 12-4 Sealed cover, fixation

12.3 Convergence controls

Definitions-Abbreviations

- **X**: Horizontal direction on the screen, with origin in the centre of the screen and + to the right
- **Y**: Vertical direction on the screen, with origin in the centre of the screen and + to the top
- **Z** rotation: Tilting of the X and Y axes in their plane: + is clockwise rotation
- **[1] ; [2] ; [3] ; [4] ; [5] ; [6]** : these are the 6 adjustments available as they appear on the standard convergence adjustment screen.

Convergence controls, location

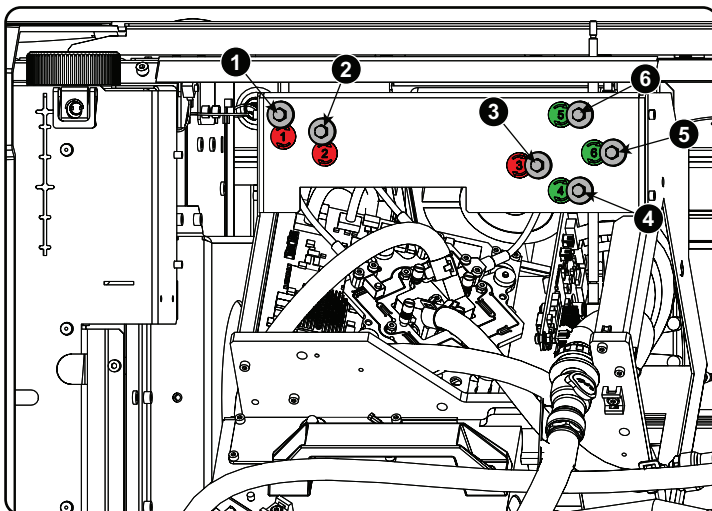


Image 12-5 Convergence knobs

- | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| <p>1 Red channel, knob number 1 (position of knob can slightly differ)</p> <p>2 Red channel, knob number 2</p> <p>3 Red channel, knob number 3</p> | <p>4 Green channel, knob number 4</p> <p>5 Green channel, knob number 5</p> <p>6 Green channel, knob number 6</p> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|

Convergence Test pattern

For the manual correction of the DMD convergence, a typical convergence test pattern is generated. For a 4K projector, use the 4K test pattern.

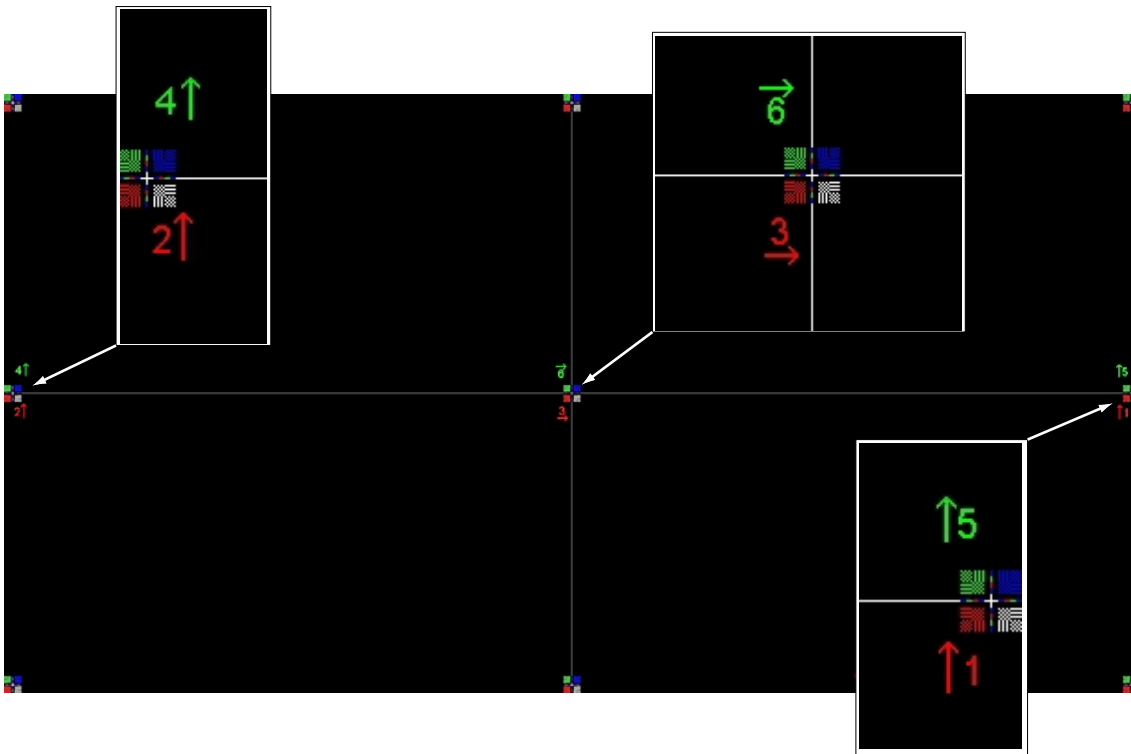


Image 12-6 Convergence test pattern

Work Instructions:

- GREEN and RED DMD's are to be adjusted with reference to the BLUE dmd.
- Each adjustment allows for approximately 10 pixels (for 2K projectors) or 20 pixels (for 4K projectors) maximum displacement to either side of the nominal BLUE position
- Rotation is limited to approximately +/- 5pixels on the left screen flank and +/- 5 pixels on the right screen flank
- One turn of an adjustment screw relates to an approx. 5-pixel displacement on the screen.
- Let the projector warming up for 30 minutes, while projecting the convergence test pattern, before starting to adjust the convergence.

Take Care:

- In rare cases it can happen that the nominal dmd position falls within a **dead zone**, where the mechanism changes from a pushing to a pulling function. This dead zone is due to inherent tolerances within the mechanism. Approximately 2 turns are required to get out of the dead zone. If it so happens that the nominal position of an adjustment falls within this dead zone, it is preferable to continue screwing through the dead zone for another 2 turns. Then return to the required nominal position. The dead zone should now be displaced away from the required end position. The DMD is now securely held in the nominal position.
- Each adjustment is limited to approximately 10 pixels (for 2K projectors) or 20 pixels (for 4K projectors) displacement. DO NOT try to force the adjustment beyond this point. The system has an end of travel in both directions, but with excessive force one could cause damage.

12.4 Red on blue convergence

Required tools

No tools required.

Converging the RED pattern onto the BLUE pattern

Start with aligning the RED DMD in the vertical directions [1] and [2] and then proceed with the horizontal direction [3]

1. To translate RED vertically in the Y + direction, turn both [1] and [2] clockwise. Turn screws in equal increments.
2. To translate RED vertically in the Y - direction, turn both [1] and [2] anti-clockwise. Turn screws in equal increments.
3. To translate RED horizontally in the X + direction, turn [3] clockwise.
4. To translate RED horizontally in the X - direction, turn [3] anti-clockwise.
5. For clockwise rotations of RED, turning [1] anti-clockwise would generally suffice. If much rotation is required, [2] may also be turned in the opposite direction. Slight corrections to Y may be required after rotation.
6. For anti-clockwise rotations of RED, turning [1] clockwise would generally suffice. If much rotation is required, [2] may also be turned in the opposite direction. Slight corrections to Y may be required after rotation.

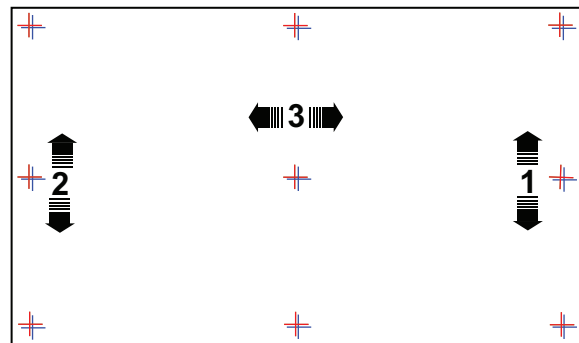
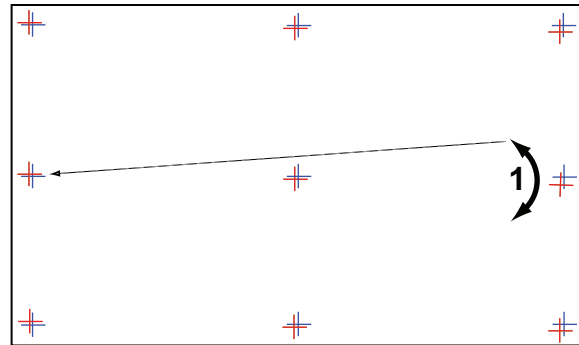
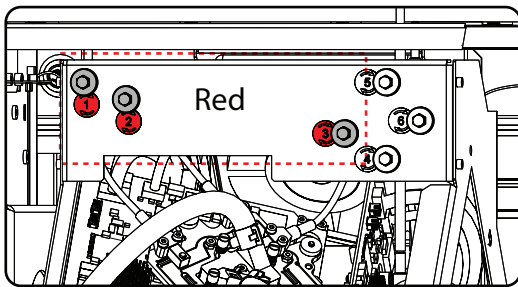


Image 12-7 Red on blue convergence

12.5 Green on blue convergence

Required tools

No tools required.

Converging the GREEN pattern onto the BLUE pattern

Next, align the GREEN DMD in the vertical directions [4] and [5] and then proceed with the horizontal direction [6].

1. To translate GREEN vertically in the Y + direction, turn both [4] and [5] clockwise. Turn screws in equal increments.

2. To translate GREEN vertically in the Y - direction, turn both [4] and [5] anti-clockwise. Turn screws in equal increments.
3. For clockwise rotations of GREEN, turning [5] anti-clockwise would generally suffice. If much rotation is required, [4] may also be turned in the opposite direction. Slight corrections to Y may be required after rotation.
4. For anti-clockwise rotations of GREEN, turning [5] clockwise would generally suffice. If much rotation is required, [4] may also be turned in the opposite direction. Slight corrections to Y may be required after rotation.
5. To translate GREEN horizontally in the X + direction, turn [6] clockwise.
6. To translate GREEN horizontally in the X - direction, turn [6] anti-clockwise.

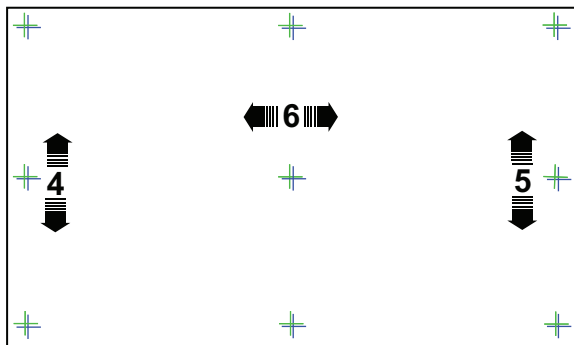
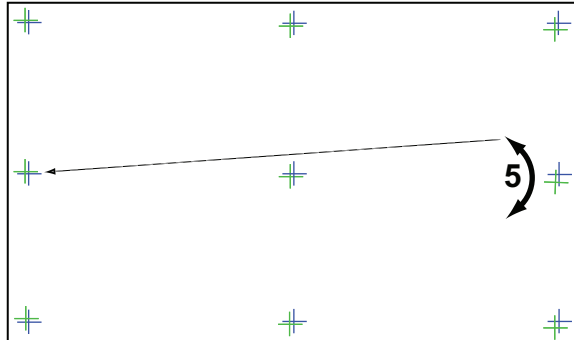
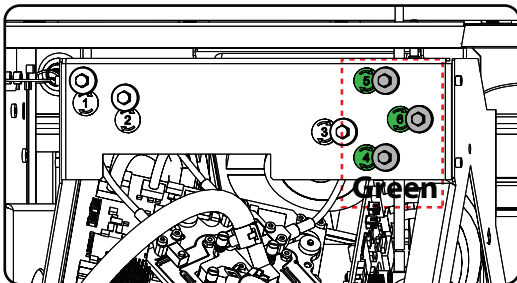


Image 12-8 Green on blue convergence

Specifications

A

| | | |
|------|--------------------------------------------|-----|
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| A.2 | Specifications of the DP4K-19B | 169 |
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About this chapter

This chapter gives an overview of the specification of the projector as well as the dimensions, the center of gravity and the dimensions of the optional pedestal.

A.1 Specifications of the DP2K-19B

Overview

| | |
|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Digital MicroMirror Device™ | 3 x 1.2" DC2K dark metal devices |
| Native resolution | 2,048 x 1,080 pixels |
| Housing | Hermetically sealed DMDs and optical assembly |
| Lamp | 1.2kW - 3kW (Xenon lamp) |
| Light output | 19,000 lumens |
| Screen size | Up to 19m / 62ft wide |
| Contrast ratio | 2,000:1 |
| Prime lenses | 1.25 - 1.45 1.4 - 2.05 1.6 - 2.35 1.8 - 2.8 2.15 - 3.6 2.8 - 5.5 |
| Control I/O | 3x Ethernet 8x GPIO (DB 25) 3D interface USB RS-232 interface (DB9) |
| Integrated Cinema Media Processor | DCI 4K 2D up to 60fps DCI 4K 3D (24 or 30 fps per eye) DCI High Frame Rates 2K 3D up to 120fps (60fps per eye) JPEG 2000 bit-rates up to 625Mbps Dual-channel color-correction MPEG-2 (4:2:0 and 4:2:2 up to 60fps) 2x HDMI2.0a (up to 4K 2D 60fps) 2x 3G-SDI inputs 16x AES/EBU audio channels (2x RJ45) 8x GPI, 8x GPO (4x RJ45) 2x Gbe for content connectivity & ingest 2x front-accessible USB 3.0 for fast ingest 2x front-accessible USB 2.0 Video watermarking: Civolution NexGuard Audio watermarking: Civolution Closed captioning devices: Support for SMPTE 430-10 |
| Integrated storage | 1.9TB effective storage (RAID-5) / 3x 1TB Hot-swappable 2.5" hard-drives 3.9TB effective storage (RAID-5) / 3x 2TB Hot-swappable 2.5" hard-drives |
| Barco Web Commander | Projector Dashboard Projector Control Board Show Player/Editor/Scheduler Automation, 3D, Ingest Dynamic DCP playlists & intermission TMS integration Smart Projector Status |

| | |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | Via HTML5 web-browsers including iOS & Android tablets Dual projector 3D: passive and active Auro 11.1 decoding |
| Barco Communicator | Projector installation & configuration Projector update & maintenance |
| Projector diagnostics | via Integrated Media Server via Communicator control software via SNMP agent |
| Power requirements | 200-240V, 50-60Hz, 24A 19,000 BTU/hr (with 4kW lamp) |
| Dimensions | 604(H) x 754(W) x 1129(D) mm 23.78(H) x 29.69(W) x 44.45(D) inch NB.: min. 5 cm of air inlet spacing required at the bottom of projector |
| Weight | 133 kg (293 lbs) |
| Ambient temperature | 35°C / 95°F Max. |
| Exhaust airflow | 350 – 390 CFM (10 – 11 m ³ /min) |
| Options | Barco CineMate App (iOS & Android) - free 3D add-ons Touch screen monitor, inc. Barco Commander & Communicator Pedestal CineCare Web Auro 11.1 license Barco Escape license Live 3D*** *** Software roadmap |

A.2 Specifications of the DP4K-19B

Overview

| | |
|------------------------------------|----------------------------------------------------------------------------------------|
| Digital MicroMirror Device™ | 3 x 1.38" DC4K dark metal devices |
| Native resolution | 4,096 x 2,160 pixels |
| Housing | Hermetically sealed DMDs and optical assembly |
| Lamp | 1.2kW - 3kW (Xenon lamp) |
| Light output | 19,000 lumens (3 kW lamp) |
| Screen size | Up to 19m / 62 ft wide |
| Contrast ratio | 1,850:1 |
| Prime lenses | 1.13 - 1.66 1.35 - 1.86 1.46 - 2.10 1.65 - 2.60 1.95 - 3.26 2.53 - 4.98 |

| | |
|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | equivalent throw ratios for 4K 1.38" DMD |
| Control I/O | 3x Ethernet (RJ 45) 8x GPIO (DB 25) 3D interface USB RS-232 interface |
| Integrated Cinema Media Processor | DCI 4K 2D up to 60fps DCI 4K 3D (24 or 30 fps per eye) DCI High Frame Rates 2K 3D up to 120fps (60fps per eye) JPEG 2000 bit-rates up to 625Mbps Dual-channel color-correction MPEG-2 (4:2:0 and 4:2:2 up to 60fps) 2x HDMI2.0a (up to 4K 2D 60fps) 2x 3G-SDI inputs 16x AES/EBU audio channels (2x RJ45) 8x GPI, 8x GPO (4x RJ45) 2x Gbe for content connectivity & ingest 2x front-accessible USB 3.0 for fast ingest 2x front-accessible USB 2.0 Video watermarking: Civolution NexGuard Audio watermarking: Civolution Closed captioning devices: Support for SMPTE 430-10 ** On B&C series projectors, the DisplayPort inputs replace the DVI inputs of the Cinema Controller. |
| Integrated storage | 1.9TB effective storage (RAID-5) / 3x 1TB Hot-swappable 2.5" hard-drives 3.9TB effective storage (RAID-5) / 3x 2TB Hot-swappable 2.5" hard-drives |
| Barco Web Commander | Projector Dashboard Projector Control Board Show Player/Editor/Scheduler Automation, 3D, Ingest Dynamic DCP playlists & intermission TMS integration Smart Projector Status Via HTML5 web-browsers including iOS & Android tablets Dual projector 3D: passive and active Auro 11.1 decoding |
| Power requirements | 200-240V, 50-60Hz, 24A 19,000 BTU/hr (with 4kW lamp) |
| Dimensions | 604(H) x 754(W) x 1129(D) mm / 23.78(H) x 29.69(W) x 44.45(D) inch NB.: min. 5 cm of air inlet spacing required at the bottom of projector |
| Weight | 134 kg (295 lbs) |
| Ambient temperature | 35°C / 95°F Max. |
| Exhaust airflow | 350 – 390 cfm (10 – 11 m ³ /min) |

| | |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Standard Features | CLO (Constant Light Output) Powerful SNMP agent Motorized/memorized lens (focus, zoom & shift) Advanced patented DMD cooling |
| Options | Barco CineMate App (iOS & Android) - free 3D add-ons Touch screen monitor, inc. Barco Commander & Communicator Pedestal CineCare Web Auro 11.1 license Barco Escape license Live 3D*** *** Software roadmap |

A.3 Specifications of the DP2K-23B

Overview

| | |
|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Digital MicroMirror Device™ | 3 x 1.2" DC2K dark metal devices |
| Native resolution | 2048 x 1080 pixels |
| Housing | Hermetically sealed DMDs and optical assembly |
| Lamp | 1.2kW - 4kW (Xenon lamp) |
| Light output | 24,500 lumens |
| Screen size | Up to 23 m / 75ft wide |
| Contrast ratio | 2,000:1 |
| Prime lenses | 1.25 - 1.45 1.4 - 2.05 1.6 - 2.35 1.8 - 2.8 2.15 - 3.6 2.8 - 5.5 |
| Control I/O | 3x Ethernet 8x GPIO (DB 25) 3D interface USB RS-232 interface (DB9) |
| Integrated Cinema Media Processor | DCI 4K 2D up to 60fps DCI 4K 3D (24 or 30 fps per eye) DCI High Frame Rates 2K 3D up to 120fps (60fps per eye) JPEG 2000 bit-rates up to 625Mbps Dual-channel color-correction MPEG-2 (4:2:0 and 4:2:2 up to 60fps) 2x HDMI2.0a (up to 4K 2D 60fps) 3G-SDI inputs 16x AES/EBU audio channels (2x RJ45) 8x GPI, 8x GPO (4x RJ45) 2x Gbe for content connectivity & ingest |

| | |
|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | 2x front-accessible USB 3.0 for fast ingest 2x front-accessible USB 2.0 Video watermarking: Civolution NexGuard Audio watermarking: Civolution Closed captioning devices: Support for SMPTE 430-10 |
| Integrated storage | 1.9TB effective storage (RAID-5) / 3x 1TB Hot-swappable 2.5" hard-drives 3.9TB effective storage (RAID-5) / 3x 2TB Hot-swappable 2.5" hard-drives |
| Barco Web Commander | Projector Dashboard Projector Control Board Show Player/Editor/Scheduler Automation, 3D, Ingest Dynamic DCP playlists & intermission TMS integration Smart Projector Status Via HTML5 web-browsers including iOS & Android tablets Dual projector 3D: passive and active Auro 11.1 decoding |
| Barco Communicator | Projector installation & configuration Projector update & maintenance |
| Projector diagnostics | via Integrated Media Server via Communicator control software via SNMP agent |
| Power requirements | 200-240V, 50-60Hz, 30A |
| Dimensions | 604(H) x 754(W) x 1129(D) mm 23.78(H) x 29.69(W) x 44.45(D) inch NB.: min. 5 cm of air inlet spacing required at the bottom of projector |
| Weight | 133 kg (293 lbs) |
| Ambient temperature | 35°C / 95°F Max. |
| Exhaust airflow | 350 – 390 cfm (10 – 11 m ³ /min) |
| Options | Barco CineMate App (iOS & Android) - free 3D add-ons Touch screen monitor, inc. Barco Commander & Communicator Pedestal CineCare Web Auro 11.1 license Barco Escape license Live 3D*** *** Software roadmap |

A.4 Specifications of the DP4K-23B

Overview

| | |
|------------------------------------|-----------------------------------|
| Digital MicroMirror Device™ | 3 x 1.38" DC4K dark metal devices |
| Native resolution | 4,096 x 2,160 pixels |

| | |
|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Housing | Hermetically sealed DMDs and optical assembly |
| Lamp | 1.2kW - 4kW (Xenon lamp) |
| Light output | 24,500 lumens (4 kW lamp) |
| Screen size | Up to 23m / 75 ft wide |
| Contrast ratio | 1,850:1 |
| Prime lenses | 1.13 - 1.66 1.27 - 1.86 1.45 - 2.13 1.63 - 2.53 1.95 - 3.26 2.53 - 4.98 equivalent throw ratios for 4K 1.38" DMD |
| Control I/O | 3x Ethernet (RJ 45) 8x GPIO (DB 25) 3D interface USB RS-232 interface |
| Integrated Cinema Media Processor | DCI 4K 2D up to 60fps DCI 4K 3D (24 or 30 fps per eye) DCI High Frame Rates 2K 3D up to 120fps (60fps per eye) JPEG 2000 bit-rates up to 625Mbps Dual-channel color-correction MPEG-2 (4:2:0 and 4:2:2 up to 60fps) 2x Displayport 2x 3G-SDI inputs 1x HDMI 1.4a (up to 4K 2D 24fps, support for BluRay 3D) 16x AES/EBU audio channels (2x RJ45) 8x GPI, 8x GPO (4x RJ45) 2x Gbe for content connectivity & ingest 2x front-accessible USB 3.0 for fast ingest 2x front-accessible USB 2.0 Video watermarking: Civolution NexGuard Audio watermarking: Civolution Closed captioning devices: Support for SMPTE 430-10 |
| Integrated storage | 1.9TB effective storage (RAID-5) / 3x 1TB Hot-swappable 2.5" hard-drives 3.9TB effective storage (RAID-5) / 3x 2TB Hot-swappable 2.5" hard-drives |
| Barco Web Commander | Projector Dashboard Projector Control Board Show Player/Editor/Scheduler Automation, 3D, Ingest Dynamic DCP playlists & intermission TMS integration Smart Projector Status Via HTML5 web-browsers including iOS & Android tablets Dual projector 3D: passive and active Auro 11.1 decoding |
| Power requirements | 200-240V, 50-60Hz, 30A 19,000 BTU/hr (with 4kW lamp) |

| | |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Dimensions | 604(H) x 754(W) x 1129(D) mm / 23.78(H) x 29.69(W) x 44.45(D) inch NB.: min. 5 cm of air inlet spacing required at the bottom of projector |
| Weight | 134 kg (295 lbs) |
| Ambient temperature | 35°C / 95°F Max. |
| Exhaust airflow | 350 – 390 cfm (10 – 11 m ³ /min) |
| Standard Features | CLO (Constant Light Output) Powerful SNMP agent Motorized/memorized lens (focus, zoom & shift) Advanced patented DMD cooling |
| Options | Barco CineMate App (iOS & Android) - free 3D add-ons Touch screen monitor, inc. Barco Commander & Communicator Pedestal CineCare Web Auro 11.1 license Barco Escape license Live 3D*** *** Software roadmap |

A.5 Specifications of the DP2K-P

Overview

| | |
|------------------------------------|--------------------------------------------------------------------------------------------------------|
| Digital MicroMirror Device™ | 3 x 1.2" DC2K dark metal devices Advanced DLP Cinema™ signal processing with built-in 3D look-up table |
| Native resolution | 2,048 x 1,080 pixels |
| Housing | Hermetically sealed DMD and optical assembly |
| Lamp | 1.2kW - 4.0kW (Xenon lamp) Compatible with models from all major brands |
| Light output | 5,400 lumens (standard 2kW lamp, 10% deviation possible) |
| Screen size | Up to 7.5 m (24.6 ft) (@ 16 ftl (unity gain)) |
| Uniformity | Meets the DCI review room specifications (10% deviation possible) |
| Contrast ratio | 2,500:1 |
| Digital Video Inputs | 2 x SMPTE 292M inputs 2 x DVI input both selectable as single and dual link |
| Control I/O | Ethernet 8x GPIO Serial RS232 |
| Prime lenses | 1.25 - 1.45 1.4 - 2.05 1.6 - 2.35 1.8 - 2.8 2.15 - 3.6 |

| | |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| | 2.8 - 5.5 |
| Color gamut | native red: x = 0.7; y = 0.3 native green: x = 0.2; y = 0.76 native blue: x = 0.145; y = 0.04 |
| Power requirements | 220V |
| Dimensions | 604(H) x 754(W) x 1129(D) mm 23.78(H) x 29.69(W) x 44.45(D) inch NB: min. 5 cm of air inlet spacing required at the bottom of projector |
| Weight | 133 kg (293 lbs) |
| Ambient temperature | 35°C / 95°F |
| Options | ACS-2048 3D add-ons Touch panel Pedestal |

A.6 Specifications of the DP4K-P

Overview

| | |
|------------------------------------|------------------------------------------------------------------------------------------------------------------|
| Digital MicroMirror Device™ | 3 x 1.38" DC4K dark metal devices |
| Native resolution | 4,096 x 2,160 pixels |
| Housing | Hermetically sealed DMD and optical assembly |
| Lamp | 2kW included (Xenon) Up to 4kW possible Compatible with models from all major brands |
| Light output | 2,700 lumens (10% deviation possible) |
| Screen size | Up to 5.5 m (18 ft) |
| Brightness uniformity | 80% at sides, 75% at corners |
| Color uniformity | Meets the DCI/SMPTE 431-1 specs |
| Native contrast ratio | Target: 2,500:1 Min: 2,250:1 |
| Color gamut | native red: x = 0.7; y = 0.3 native green: x = 0.2; y = 0.76 native blue: x = 0.145; y = 0.04 |
| Digital Video Inputs | 4 x 3Gb/s HD-SDI inputs (max. two single-link HD-SDI, one dual-link HD-SDI or one quad link 4K) 2 x DVI input |
| Control I/O | Ethernet 8x GPIO Serial RS232 |
| Projector diagnostics | Via Communicator postproduction software (included) Via PC touch panel (optional) |

| | |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| | Via SNMP agent |
| Prime lenses | 1.13 - 1.31 1.31 - 1.86 1.45 - 2.13 1.63 - 2.53 1.95 - 3.26 (equivalent throw ratios for 4K 1.38" DMD) |
| Power requirements | 200-240 V 30 A 50-60 Hz |
| Dimensions | 604(H) x 754(W) x 1129(D) mm 23.78(H) x 29.69(W) x 44.45(D) inch NB: min. 5 cm of air inlet spacing required at the bottom of projector |
| Weight | 134 kg (295 lbs) |
| Ambient temperature | 35°C / 95°F |
| Exhaust airflow | 350 CFM |
| Options | ACS-2048 3D add-ons Touch panel Pedestal |

A.7 Specifications of the ICMP

Specifications

| | |
|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Integrated Cinema Media Processor | DCI 4K 2D up to 60fps DCI 4K 3D (24 or 30 fps per eye) DCI High Frame Rates 2K 3D up to 120fps (60fps per eye) JPEG 2000 bit-rates up to 625Mbps Dual-channel color-correction MPEG-2 (4:2:0 and 4:2:2 up to 60fps) 2x HDMI2.0a (up to 4K 2D 60fps) 2x 3G-SDI inputs 16x AES/EBU audio channels (2x RJ45) 8x GPI, 8x GPO (4x RJ45) 2x Gbe for content connectivity & ingest 2x front-accessible USB 3.0 for fast ingest 2x front-accessible USB 2.0 Video and audio watermarking: Civolution NexGuard Closed captioning devices: Support for SMPTE 430-10 Streaming of Live IP content |
| Barco Web Commander | Projector dashboard Projector control board Show player/editor/scheduler Automation, 3D, Ingest Smart projector status |

| | |
|-----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | Via HTML5 web browsers including iOS & Android tablets Compatible with free Barco CineMate iOS & Android app |
| Barco Commander (for touch panel controller) | Projector control board Show Player/Editor/Scheduler Automation, 3D, ingest Dynamic DCP playlists & intermission Smart projector status |
| Barco Communicator | Projector installation & configuration Projector update & maintenance Barco CineMate App (iOS & Android) - free |
| Integrated storage | 2TB effective storage (RAID-5) / 3x 1TB Hot-swappable 2.5" hard-drives 4TB effective storage (RAID-5) / 3x 2TB Hot-swappable 2.5" hard-drives |
| Options | ICMP License for HDMI2.0 HDR ICMP License for Live IP |
| Compatibility | Barco Alchemy is supported by the following Theater Management System (TMS) brands: AAM Screenwriter, Ymagis Melody, CFG-Barco, Unique RosettaBridge, ADDE, CinéDigital Manager, GDC, Proyecson, Real Image, Sony, Hollywoodsoftware/Comscore TCC, Kinoton Barco Alchemy is supported by 4DX Experience |

A.8 Specifications of the ICMP-X

Specifications

| | |
|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Integrated Cinema Media Processor | DCI 4K 2D up to 60fps DCI 4K 3D (24 or 30 fps per eye) DCI High Frame Rates 2K 3D up to 120fps (60fps per eye) JPEG 2000 bit-rates up to 625Mbps Dual-channel color-correction MPEG-2 (4:2:0 and 4:2:2 up to 60fps) 2x HDMI2.0a (up to 4K 2D 60fps) 2x 3G-SDI inputs 16x AES/EBU audio channels (2x RJ45) 8x GPI, 8x GPO (4x RJ45) 2x Gbe for content connectivity & ingest 2x front-accessible USB 3.0 for fast ingest 2x front-accessible USB 2.0 Video and audio watermarking: Civolution NexGuard Closed captioning devices: Support for SMPTE 430-10 Streaming of Live IP content |
| Barco Web Commander | Projector dashboard Projector control board Show player/editor/scheduler Automation, 3D, Ingest Smart projector status Via HTML5 web browsers including iOS & Android tablets Compatible with free Barco CineMate iOS & Android app |

| | |
|-----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Barco Commander (for touch panel controller) | Projector control board Show Player/Editor/Scheduler Automation, 3D, ingest Dynamic DCP playlists & intermission Smart projector status |
| Barco (Web) Communicator | Projector installation & configuration Projector update & maintenance Barco CineMate App (iOS & Android) - free |
| Integrated storage | 2TB effective storage (RAID-5) / 3x 1TB Hot-swappable 2.5" hard-drives 4TB effective storage (RAID-5) / 3x 2TB Hot-swappable 2.5" hard-drives 8TB effective storage (RAID-5) / 3x 4TB Hot-swappable 2.5" solid state drives |
| Options | ICMP License for HDMI2.0 HDR ICMP License for Live IP |
| Compatibility | Barco Alchemy is supported by the following Theater Management System (TMS) brands: AAM Screenwriter, Ymagis Melody, CFG-Barco, Unique RosettaBridge, ADDE, CinéDigital Manager, GDC, Proyecson, Real Image, Sony, Hollywoodsoftware/Comscore TCC, Kinoton Barco Alchemy is supported by 4DX Experience |

A.9 Dimensions of the DPxK-19B/23B/P

Overview

Dimensions are given mm.

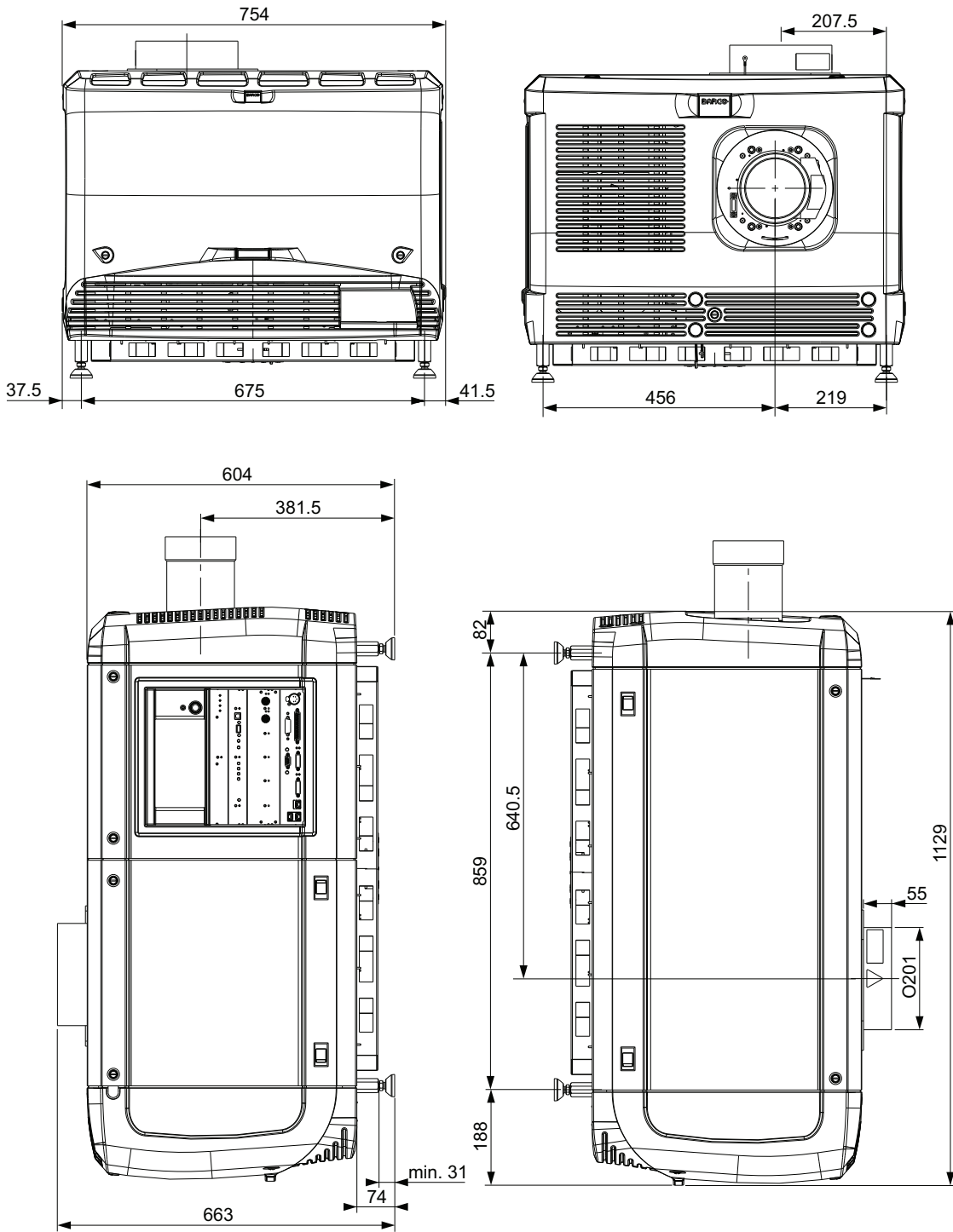


Image A-1 Dimensions in mm

A.10 Dimensions of the universal pedestal

Dimensions

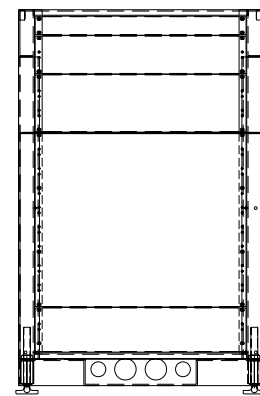
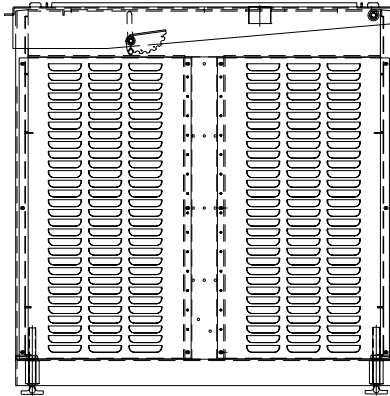
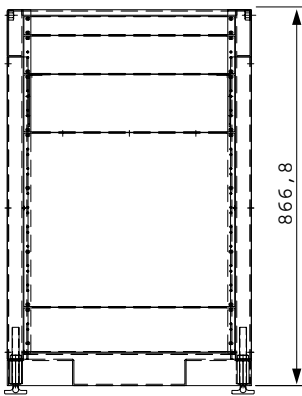
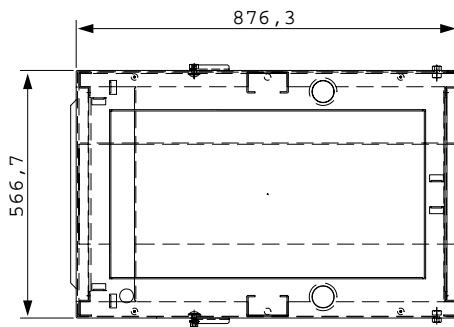


Image A-2 Dimensions given in millimeters.

A.11 Technical Regulations

Certificates



Image A-3 EAC mark



Image A-4 CE mark



Image A-5 CCC mark



Image A-6 CEBEC mark

Pin configurations

B

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B.1 About General Purpose Inputs & Outputs (GPIO)



The Barco Cinema Controller and the Barco ICMP(-X) 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 (-X) 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.

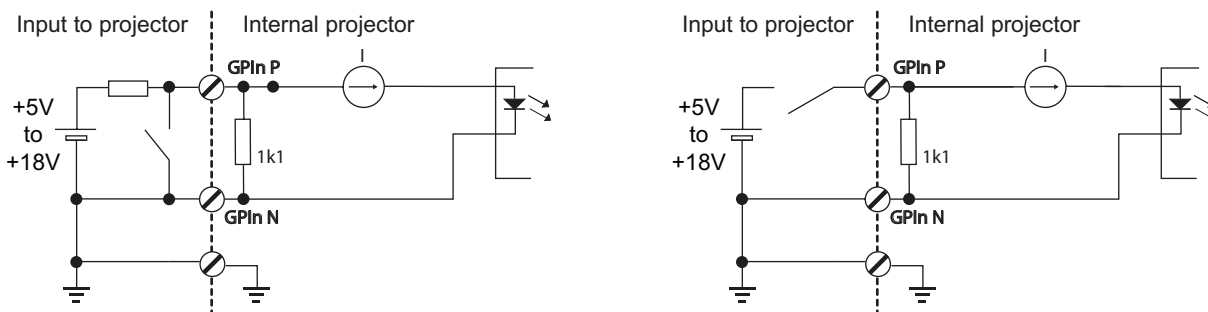


Image B-1

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(-X) 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 : $V_{max} = 18\text{ V}$
- Maximum current : $I_{max} = 30\text{ mA}$
- Maximum power dissipation : 120 mW

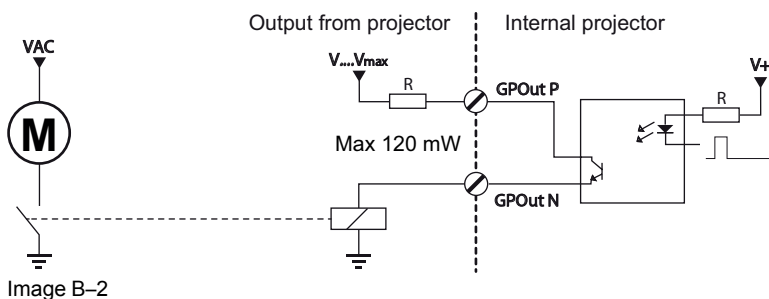


Image B-2



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(-X).

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.

B.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 | - |

| RS232 IN | | | |
|-----------------|---------------------|---|---|
| 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 |
| 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 - |
| 7 | CONN_SYNC + | 15 | - |
| 8 | 3D Input Reference + | | |

B.3 Pin configurations of the ICMP(-X) communication ports

RJ-45 pin configuration

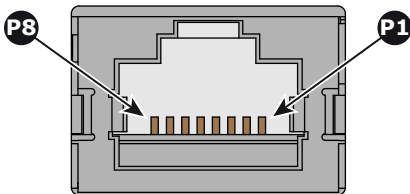


Image B-3

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 |
| 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 |
| 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 |

| RJ-45 Pin Number (Left >Right copper side) | 568A | | 568B | | AES -1-8 |
|--------------------------------------------------|-------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------|-------------------|
| 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.

B.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- |

Environmental information

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C.1 Disposal information

Disposal Information

Waste Electrical and Electronic Equipment



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

For more information about recycling of this product, please contact your local city office or your municipal waste disposal service.

For details, please visit the Barco website at: <http://www.barco.com/AboutBarco/weee>

Disposal of batteries in the product



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

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

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

Disposal of lamp

Dispose of expired bulbs that are beyond warranty according the national regulations. See also related user manual of the lamp supplier for more guidance.

Small amounts of radioactive material (< 1000 Bq per lamp) are deliberately added to Xenon lamps for functional reasons. These lamps are manufactured under regulatory control as consumer product according to IAEA basic safety standard BSS 115. Disposal according to national regulations is required e.g. in Europe covered by WEEE regulation. See also related user manual of the lamp supplier for more guidance.



CAUTION: To avoid breaking the lamps, repack carefully when storing and transporting them.



CAUTION: Lamps may not be disposed as normal household trash. Contact your local waste disposal facility for information on the recycling program for HID (High Intensity Discharge) lamps in your area.

C.2 Turkey RoHS compliance

Turkey RoHS compliance



■ Türkiye Cumhuriyeti: AEEE Yönetmeliğine Uygundur.

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

C.3 Contact information

Barco contact information

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

Contact address: Beneluxpark 21, 8500 Kortrijk, Belgium

Importers contact information

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

C.4 Production address

Factories

Barco NV (BELGIUM)

President Kennedypark 35, B-8500 Kortrijk

CFG Barco (Beijing) Electronics Co. Ltd.

中影巴可 (北京) 电子有限公司

3rd Floor, Barco Factory, No.16 Changsheng Road, Changping District, 102200, Beijing, P.R.C.

北京市昌平区中关村科技园区昌平园昌盛路16号巴可工厂第3层 邮政编码：102200

Barco Visual (Beijing) Electronics Co. Ltd.

巴可伟视 (北京) 电子有限公司

No.16 Changsheng Road, Changping District, 102200, Beijing, P.R.C.

北京市昌平区中关村科技园区昌平园昌盛路16号 邮政编码：102200

Made in information

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

Production date

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

C.5 Download Product Manual

Download Product Manual

Product manuals and documentation are available online at www.barco.com/td.

Registration may be required; follow the instructions given on the website.

IMPORTANT! Read Installation Instructions before connecting equipment to the mains power supply.

Glossary

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.

HD

Hazard Distance (HD) is the distance measured from the projection lens at which the intensity or the energy per surface unit becomes lower than the applicable exposure limit on the cornea or on the skin. The light beam is considered (to be) unsafe for exposure if the distance from a person to the light source is less than the HD.

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.

***.pem**

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

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.

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