SP2K-S

Installation manual

ENABLING BRIGHT OUTCOMES

BARCO

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Changes

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Federal Communications Commission (FCC Statement)

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

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

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1 Safety

About this chapter

Read this chapter attentively. It contains important information to prevent personal injury while installing and using your SP2K-S projector. Furthermore, it includes several cautions to prevent damage to your SP2K-S projector. Ensure that you understand and follow all safety guidelines, safety instructions and warnings mentioned in this chapter before installing and using the SP2K-S 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 “SP2K-S” used in this document

When referring in this document to the term “SP2K-S” means that the content is applicable for following Barco products:

- SP2K-15S, SP2K-11S, SP2K-9S, SP2K-7S

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

This projector embeds extremely high brightness (radiance) lasers; this laser light is processed through the projector's optical path. Native laser light is not accessible by the end user in any use case. The light exiting the projection lens has been diffused within the optical path, representing a larger source and lower radiance value than native laser light. Nevertheless the projected light represents a significant risk for the human eye and skin when exposed directly within the beam. This risk is not specifically related to the characteristics of laser light but solely to the high thermal induced energy of the light source; which is equivalent with lamp based systems.

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.

Restricted access location

This product may only be installed in a restricted access location. The definition of a “restricted access location" is a location for equipment where both of following applies:

- Access can only be gained by SERVICE PERSONNEL or by OPERATORS who have been instructed about the reasons for the restriction applied to the location and about the precautions that shall be taken.
- Access is 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 is a RG3 product. Based on international 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 optional barriers. Within the restricted area operator training is considered sufficient. The applicable separation heights are discussed in “High Brightness precautions: Hazard Distance”, page 18.

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.

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 power requirements, contact your electrician. Do not defeat the purpose of the grounding.
- Installation should be done 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.
- This product is equipped with a 3-terminal barrier strip for the connection of a UPS power cord (2-pole, 3-wire grounding).
- The electronics of the projector (UPS INLET) must be powered from a suitable UPS unit. The building has to be provided with a circuit breaker of max 6A to protect the UPS.
- The building installation has to be provided with a circuit breaker of max 32A to protect the complete unit.
- The circuit breakers are considered as readily accessible disconnect devices that must be incorporated externally to the equipment for removal of the power to the projector mains terminals and UPS inlet terminals.
- The cross-sectional area of the conductors in the power supply cord should be not less than 2.5 mm² (12 AWG) while using a circuit breaker of 32A max. The power cord should have a rating depending on what power system is available:
  - Mono phase configuration: min 300V.
- The cross-sectional area of the UPS inlet cord shall be not less than 0.75 mm² (18 AWG) and has a rating of minimum 300V.
- In case of using a circuit breaker of a current rating less than 32A, the cross-sectional area of the conductors in the power supply cord must comply with the local electrical code regulations where the projector is installed.
- The cable gland of the power supply cord has a clamping range between 8mm and 13 mm (cable diameter of the power supply cord must be in this range :8-13 mm)
- Disconnect the power to the projector mains terminals for removal of all power from the projector.
- 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

- To prevent injury and physical damage, always read this manual and all labels on the system before powering the projector or adjusting the projector.
- Do not underestimate the weight of the projector. The projector weighs ±69.5 kg (±152.119 lbs). To prevent personal injury a hoisting tool should be used to lift the projector.

- To prevent injury, ensure that the lens, cooling 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 projector**: This projector embeds extremely high brightness (radiance) lasers; this laser light is processed through the projectors optical path. Native laser light is not accessible by the end user in any use case. The light exiting the projection lens has been defused within the optical path, representing a larger source and lower radiance value than native laser light. Nevertheless the projected light represents a significant risk for the human eye when exposed directly within the beam. This risk is not specifically related to the characteristics of laser light but solely to the high thermal induced energy of the light source; which is equivalent to lamp based systems.
  Thermal retinal eye injury is possible when exposed within the Hazard Distance. The Hazard Distance (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 “High Brightness precautions: Hazard Distance”, page 18.
- Based on international requirements, no person in allowed to enter the projected beam within the zone between the projection lens and the related Hazard Distance (HD). This shall be made physically impossible by creating sufficient separation height or by placing optional barriers. Within the restricted area operator training is considered sufficient. The applicable separation heights are discussed in “High Brightness precautions: Hazard Distance”, page 18.
- The projector shall be installed in a restricted access room equipped with a key or security lock preventing untrained persons entering the Risk Group 3 use zone.
- Switch off the projector before attempting to remove any of the projector’s covers.
- 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.
- Lenses, shields or 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.
- The associated Safety responsible of the unit must evaluate the setup before the unit may be started.
- Never point or allow light to be directed on people or reflective objects within the HD zone.
- All operators shall have received adequate training and be aware of the potential hazards.
- Strictly minimize the number of people who have access to the unit. The unit may never be operated without permission of the responsible for safety.
- Do not put your hand or any body part in front of the beam.
  Do not clean the port window when the projector is switched on.

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 this projector.
- Do not place any object in the projection light path at close distance to the projection lens output. The concentrated light at the projection lens output may result in damage, fire or burn injuries.
- Ensure that the projector is solidly mounted so that the projection light path cannot be changed by accident.
- Do not cover the projector or the lens with any material while the projector is in operation. . 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, CO_2 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 projector and cooling system to the outside of the building.
- Let the projector cool completely before storing. Remove cord from the projector when storing.

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.

To prevent projector damage

- The air filters of the projector must be cleaned or replaced on a regular basis. Cleaning the booth area 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.
- 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.
- Proper operation of the projector can only be guaranteed in table mounting. It is not permitted 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 collimated laser beams on to the lens from outside the projector body can severely damage the Digital Mirror Devices™ in which case there is a loss of warranty.
- Never place the projector in direct sunlight. Sunlight 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.
- Remove all power from the projectors mains terminals 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. Persistent 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. For lens cleaning follow the instructions precisely as stipulated in the projector manual.
- Rated maximum ambient temperature, t_a= 40°C (104°F).
- Rated humidity = 5% RH to 85% RH non-condensed.
- An external frame must be used to stack projectors.

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.

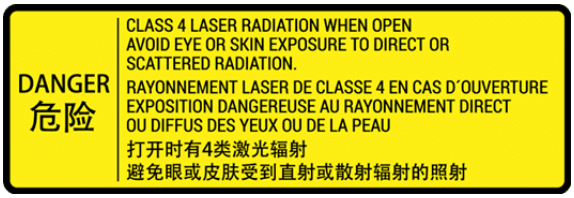
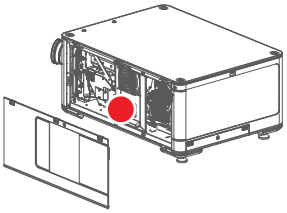
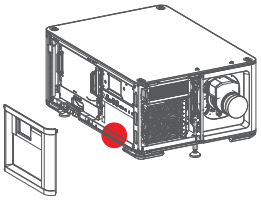
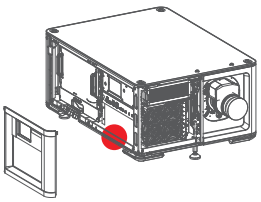
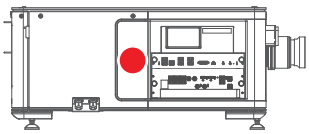
  - If the product does not operate normally when the operating instructions are followed. Adjust only those controls that are covered by the operating instructions since improper adjustment of the other controls may result in damage and will often require extensive work by a qualified technician to restore 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.

Safety Data Sheets for Hazardous Chemicals

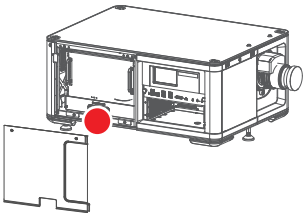
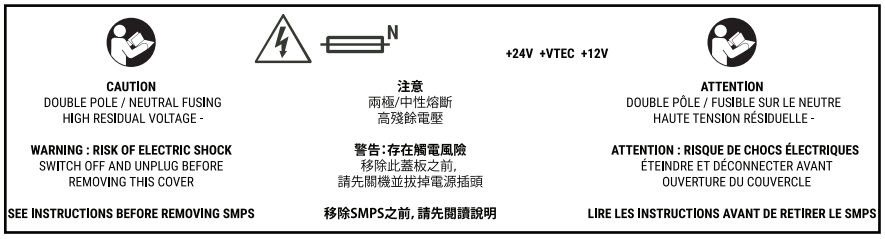
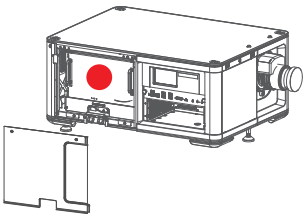
For safe handling information on chemical products, consult the Safety Data Sheet (SDS). SDSs are available upon request via safetydatasheets@barco.com.

1.3 Product safety labels

Light beam related safety labels

Label image	Label description	Label location
	DANGER! CLASS 4 LASER RADIATION WHEN OPEN. AVOID EYE OR SKIN EXPOSURE TO DIRECT OR SCATTERED RADIATION. DANGER! RAYONNEMENT LASER DE CLASSE 4 EN CAS D'OUVERTURE. EXPOSITION DANGEREUSE AU RAYONNEMENT DIRECT OU DIFFUS DES YEUX OU DE LA PEAU. 危险! 打开时有4类激光辐射。 避免眼或皮肤受到直射或散射辐射的照射。	 Located on the light pipe
	WARNING! DO NOT LOOK INTO THE BEAM; NO DIRECT EYE EXPOSURE TO THE BEAM IS PERMITTED. RG3 IEC EN 62471–5:2015. CLASS 1 IEC EN 60825–1:2014. HAZARD DISTANCE: CONSULT SAFETY MANUAL. “Important safety instructions”, page 12 THIS PRODUCT IS IN CONFORMITY WITH PERFORMANCE STANDARDS FOR LASER PRODUCTS UNDER 21 CFR 1040 EXCEPT WITH RESPECT TO THOSE CHARACTERISTICS AUTHORIZED BY VARIANCE NUMBER 2018-V-2875 EFFECTIVE ON JANUARY 24, 2020. ATTENTION! NE PAS REGARDER LE FAISCEAU EVITER TOUTE EXPOSITION DIRECTE DES YEUX AU FAISCEAU. RG3 IEC EN 62471-5:2015. CLASS 1 IEC EN 60825-1:2014. 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 CLASS 1 IEC EN 60825-1:2014 危害距离：请参考安全手册 警告！請勿注視光源。禁止眼睛曝露在光源照射範圍。雷射危險等級 RG3 IEC EN 62471-5:2015 CLASS 1 IEC EN 60825-1:2014 安全危害距離：請參考安全手冊。	 Located on the projector frame
	Hazard RG3: optical radiation warning symbol	 Printed on the security label (see security label above, located on the projector frame)
	Hazard RG3: not for household use symbol	 Printed on the product label (located on the right side cover)

Electric related safety labels

Label image and description	Label location
 Disconnect the power to the unit mains terminals and unplug power cord at UPS inlet before removing this cover. See ID-label for ratings. **WARNING** : HIGH LEAKAGE CURRENT EARTH CONNECTION ESSENTIAL BEFORE CONNECTING SUPPLY. **SEE INSTALLATION INSTRUCTIONS BEFORE CONNECTING TO THE SUPPLY**. Déconnecter l'alimentation des bornes du réseau et déconnecter le câble de la prise UPS avant de retirer ce couvercle. Voir l'étiquette d'identification pour les paramètres. **ATTENTION** : COURANT DE FUITE ÉLEVÉ RACCORDEMENT À LA TERRE INDISPENSABLE AVANT LE RACCORDEMENT AU RÉSEAU **VOIR LA NOTICE D'INSTALLATION AVANT DE RACCORDER AU RÉSEAU** 在取下此外殼前，斷開投影機主電源端的電源並從UPS電源插座上拔下電源線。 額定功率參閱產品標籤。 **警告**：大漏電流，在接通電源之前必須先接地。 **在連接電源前請查看安裝說明書** 在取下此外壳前，断开投影机主电源端的电源并从UPS电源插座上拔下电源线。 额定功率参阅产品标签。 **警告**：大漏电流，在接通电源之前必须先接地。 **在连接电源前请查看安装说明书。**	 Printed on Mains input cover
 **CAUTION!** DOUBLE POLE / NEUTRAL FUSING HIGH RESIDUAL VOLTAGE - **WARNING : RISK OF ELECTRIC SHOCK** SWITCH OFF AND UNPLUG BEFORE REMOVING THIS COVER. SEE INSTRUCTIONS BEFORE REMOVING SMPS. **注意** 兩極/中性熔斷 高殘餘電壓. **警告：存在觸電風險** 移除此蓋板之前， 請先關機並拔掉電源插頭 **移除SMPS之前，請先閱讀說明.** **ATTENTION** DOUBLE PÔLE / FUSIBLE SUR LE NEUTRE HAUTE TENSION RÉSIDUELLE - **ATTENTION : RISQUE DE CHOCS ÉLECTRIQUES**. ÉTEINDRE ET DÉCONNECTER AVANT OUVERTURE DU COUVERCLE. **LIRE LES INSTRUCTIONS AVANT DE RETIRER LE SMPS.**	 Printed on SMPS cover

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 21.

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 a 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.

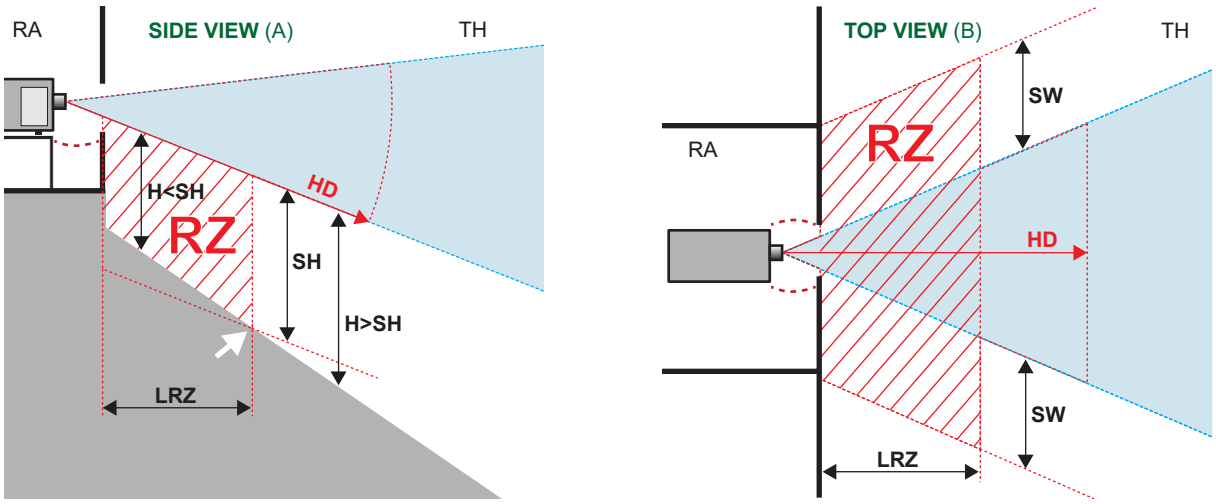


Image 1–1

A Side view
B Top view
RA Restricted Access location (boot area of projector).
TH Theater
RZ Restriction Zone in the theater
HD Hazard Distance
LRZ Length Restriction Zone in the theater
H Height between surface floor and the light beam
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 1–2 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 1–2.

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

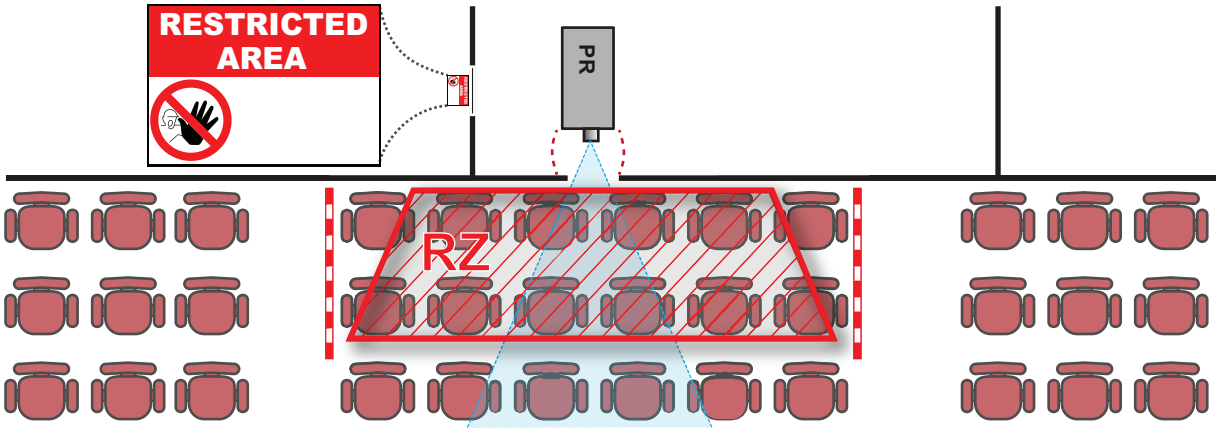


Image 1–2

USA market

For LIPs (Laser Illuminated Projectors) installed in the USA market other restriction zone conditions apply.

LIPs for installation in restrained environment (cinema theaters, business rooms, class rooms, museums ...) shall be installed at height vertically above the floor such that the bottom plane of the hazard distance zone shall be no lower than 2.5 meters above the floor. Horizontal clearance to the hazard distance zone shall be not less than 1 meter. Alternatively, in case the height of the separation barrier for the horizontal clearance is at least 1 meter high then the horizontal clearance (SW) can be reduced to:

- 0 meter if the height of the hazard zone is minimum 2.5 meter.
- 0.1 meter if the height of the hazard zone is minimum 2.4 meter.
- 0.6 meter if the height of the hazard zone is minimum 2.2 meter.

LIPs for installations in unrestrained environment (concerts, ...) shall be installed at a height vertically above the floor such that the bottom plane of the Hazard distance Zone shall be no lower than 3 meters above the floor. Horizontal clearance to the hazard distance zone shall be not less than 2.5 meters. Any human access horizontally to the Hazard Zone, if applicable, shall be restricted by barriers. If human access is possible in an unsupervised environment, the horizontal or vertical clearances shall be increased to prevent exposure to the hazard distance zone.

The LIP shall be installed by Barco or by a trained and Barco-authorized installer or shall only be transferred to laser light show variance holders. This is applicable for dealers and distributors since they may need to install the LIP (demo install) and/or they transfer (sell, rent, lease) the LIP. Dealers and distributors shall preserve sales and installation records for a period of 5 years. Variance holders may currently hold a variance for production of Class IIIB and IV laser light shows and/or for incorporating RG3 LIPs. Laser light show variance for RG3 LIPs can be requested by mailing the application to RadHealthCustomerService@fda.hhs.gov.

The installation checklist for laser illuminated RG3 projectors must be fully completed after the installation. The installation checklist can be downloaded from the Barco website. The installer shall preserve the checklist for a period of 5 years.

Install one or more readily accessible controls to immediately terminate LIP projection light. The power input at the projector side is considered as a reliable disconnect device. When required to switch off the projector, disconnect the power cord at the projector side. In case the power input at the projector side is not accessible (e. g. truss mount), the socket outlet supplying the projector shall be installed nearby the projector and be easily accessible, or a readily accessible general disconnect device shall be incorporated in the fixed wiring.

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 defuse coated projection screen. As displayed in Image 1– 3 two areas should be considered: the restricted enclosed projection area (RA) and the observation area (TH).

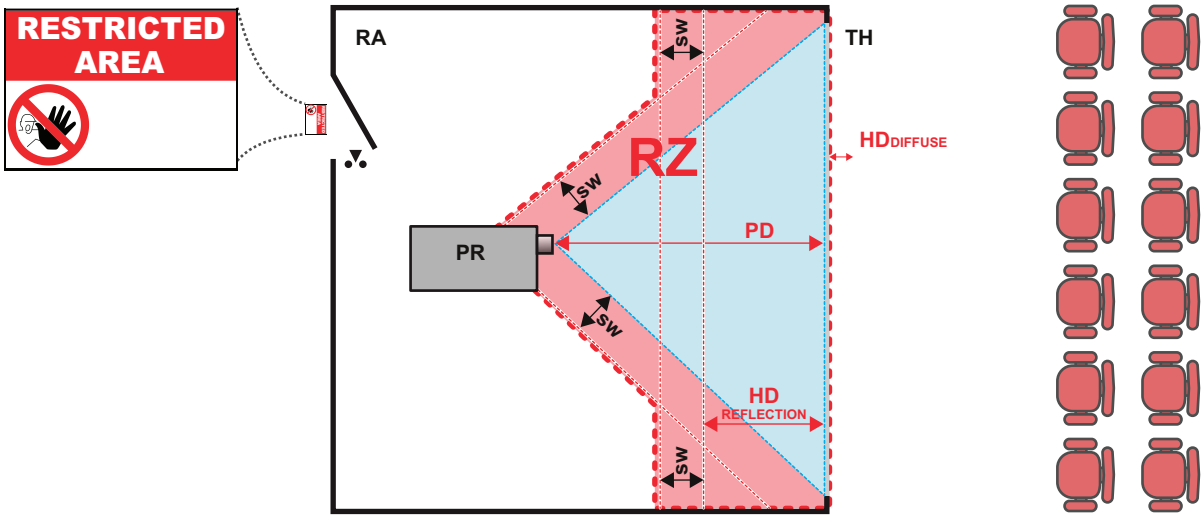


Image 1–3

RA Restricted Access location (enclosed projection area).
PR Projector.
TH Theater (observation area).
RZ Restriction Zone.
PD Projection Distance.
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 18, relevant for intrabeam exposure.
- $HD_{reflection}$: 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 18, 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 ($HD_{reflection}$); also taking into account a 1 meter lateral separation.

The $HD_{reflection}$ 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 21.

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

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

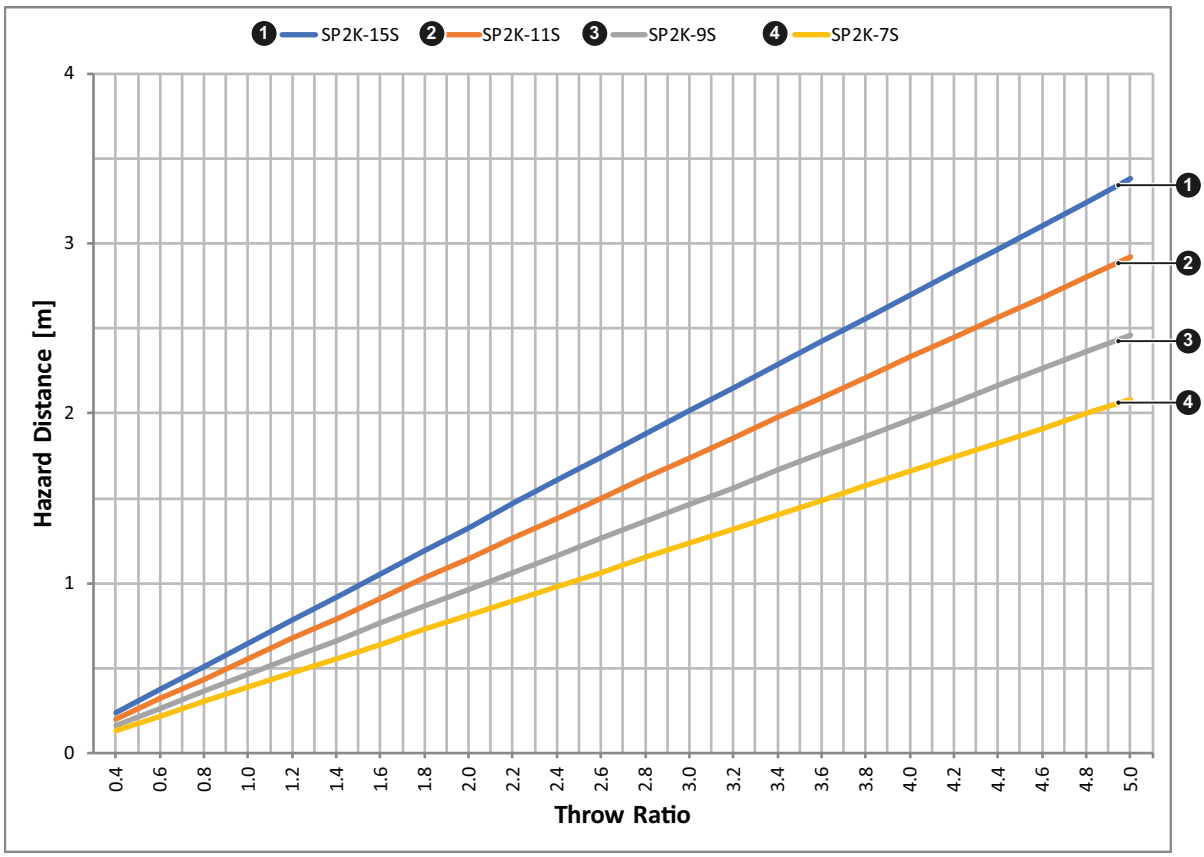


Image 1–4

HD Hazard Distance
TR Throw Ratio

Getting started 2

About this chapter

Read this chapter before installing your SP2K-S projector. It contains important information concerning installation requirements for the SP2K-S 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 SP2K-S projector can be operated or stored.

Environment	Operating	Non-Operating
Ambient Temperature	10°C (50°F) to 40°C (104°F)	-15°C (5°F) to 60°C (140°F)
Air cleanliness	Clean office environment (equivalent with clean room standard ISO 14644-1 ISO Class 9)	n.a.
Humidity	5% RH to 85% RH Non-Condensed	5% to 95% RH Non-Condensed
Altitude	-60 (-197 ft) to 4.000 m (13.125 ft)[1, 2]	-60 (-197 ft) to 10.000 m (32.810 ft)

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

Cooling

The electronics of the projector are fan cooled. For this reason the projector must be installed with sufficient space around the projector to ensure sufficient air flow. Minimum free space must be 20 cm (8 inch) for inlets and 30 cm (12 inch) for the outlets. It should be used in an area where the ambient temperature, as measured at the air inlets, does not exceed 40°C (104°F).

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 the projector to the outside of the building. The minimum flow rate of the air extraction system depends on the ambient temperature and projector type:

Projector	Minimum airflow at 25°C (77°F)	Minimum airflow at 35°C (95°F)
SP2K–15S	250 CFM	400 CFM
SP2K–11S	210 CFM	400 CFM
SP2K–9S	190 CFM	400 CFM
SP2K–7S	170 CFM	400 CFM

When two or more projectors are installed close to each other, ensure that the projectors do not thermally affect each other.

Use in high altitude conditions

Combining high altitude and high ambient temperature creates extra challenging conditions for any electronics system; projectors are no exception to this. The system can be used up to 4.000 m (13.125 ft) altitude[1], but the maximum ambient temperature should be reduced once exceeding 2.500 m (8.202 ft) and the power must be restricted on 15S model[2]. This in accordance with the following table:

Altitude (m)	Altitude (ft)	Maximum Power (%) (15S model only)	Maximum ambient Temp (°C)	Maximum ambient Temp (°F)
0	0	100%	40	104
1 000	3 300	100%	40	104
2 000	6 600	100%	35	95

1. Limited to 2.000 meters (6.562 feet) for Chinese Mainland due to local regulations.
2. For 15S model only, power must be restricted to 90% at 3000m (9900ft) and 80% at 4000m(13200ft) altitude. See table in section “Use in high altitude conditions"

Altitude (m)	Altitude (ft)	Maximum Power (%) (15S model only)	Maximum ambient Temp (°C)	Maximum ambient Temp (°F)
3 000	9 900	90%	35	95
4 000	13 200	80%	35	95

Main Power requirements

SP2K-S projectors operate from a single-phase power net with a protective earth ground (PE).

Power system	Power requirements
single-phase power net	200-240VAC, 10A, 50-60Hz down to 110VAC , 16A, 50-60Hz

When the projector is connected to a 120V power net, a message is displayed to notify the user that the input voltage is lower than expected. This will not affect the projector behavior. Only the SP2K-11S and SP2K-15S will operate at reduced brightness.

The projector must be connected internally between a mono-phase connection. See “Connecting the projector with the power net”, page 44.

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 2.5 mm² (12 AWG).

The power cord must be rated for **minimum 300 V**.

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. 32 A to protect the complete unit.

WARNING: Disconnect the power to the unit mains terminals 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 200-240 V at 50-60 Hz and must be capable of delivering an output current of 5 A. This UPS provides only power for the electronics and not for the light source.

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 1,50 mm² or 14 AWG and minimum 300 V.

The SP2K-S does not have a built in UPS unit.

Projector weight

Do not underestimate the weight of the SP2K-S projector. The projector weight ±69.5 kg (±152.119 lbs) without lens. Ensure that the pedestal on which the projector is installed is capable of supporting the complete load of the system. Minimum 4 people are needed to carry the projector.

CAUTION: An external frame must be used to stack projectors.

2.2 Unpacking the projector

What you need to do?

Upon delivery, the projector is packed in a cardboard box upon a wooden pallet and secured with strapping bands and buckle 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 cardboard box and wooden pallet in a safe manner, without damaging the projector.

After unpacking let the projector acclimatize to a room temperature between 10°C (50°F) and 35°C (95°F). It is suggested to only start using the projector after having it stored for a minimum of 16 hours in its final location. Neglecting this may result in a failure in the start-up of the Light Processor Unit.

Required tools

- Side cutter
- Knife

How to unpack the SP2K-S projector

1. Remove the strapping bands from the packaging. Use a cutting tool (e.g. side cutter, knife, etc.) to carefully cut the straps.
2. Carefully cut open the tape sealing the top flaps of the box and open it.

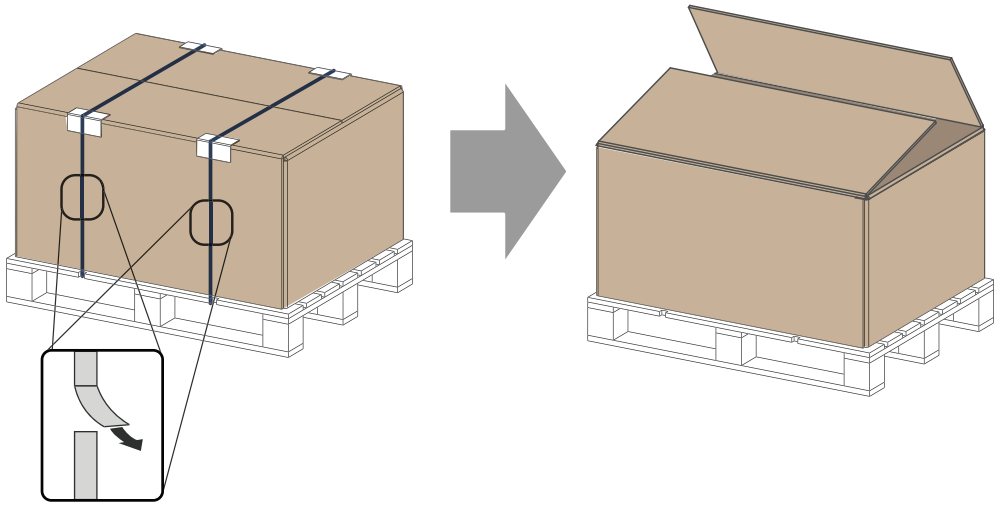


Image 2–1

3. Remove the top plate.
4. Remove the safety manuals.

Note: All product manuals are online available on the Barco website.

Tip: Use the QR code on the package label or product label to download the product manuals.

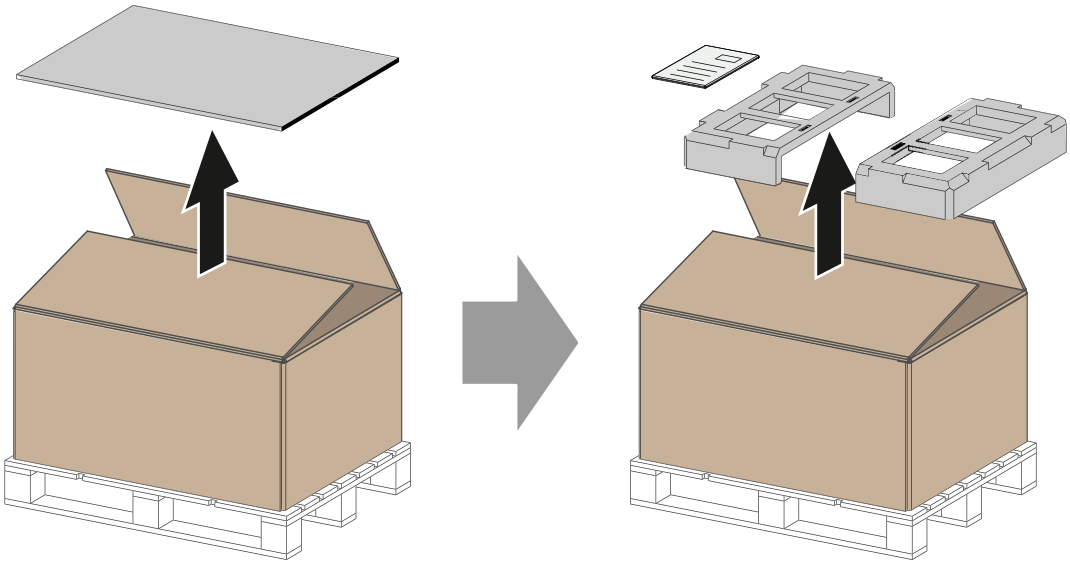


Image 2–2

5. Remove the outer cardboard box and any additional plates.

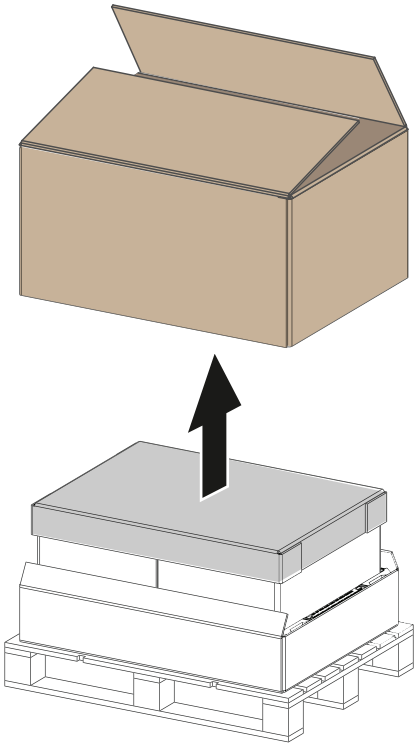


Image 2–3

6. Cut off foam along slots with arrow indication (x8). Remove foam in the 4 corners before lifting the projector.

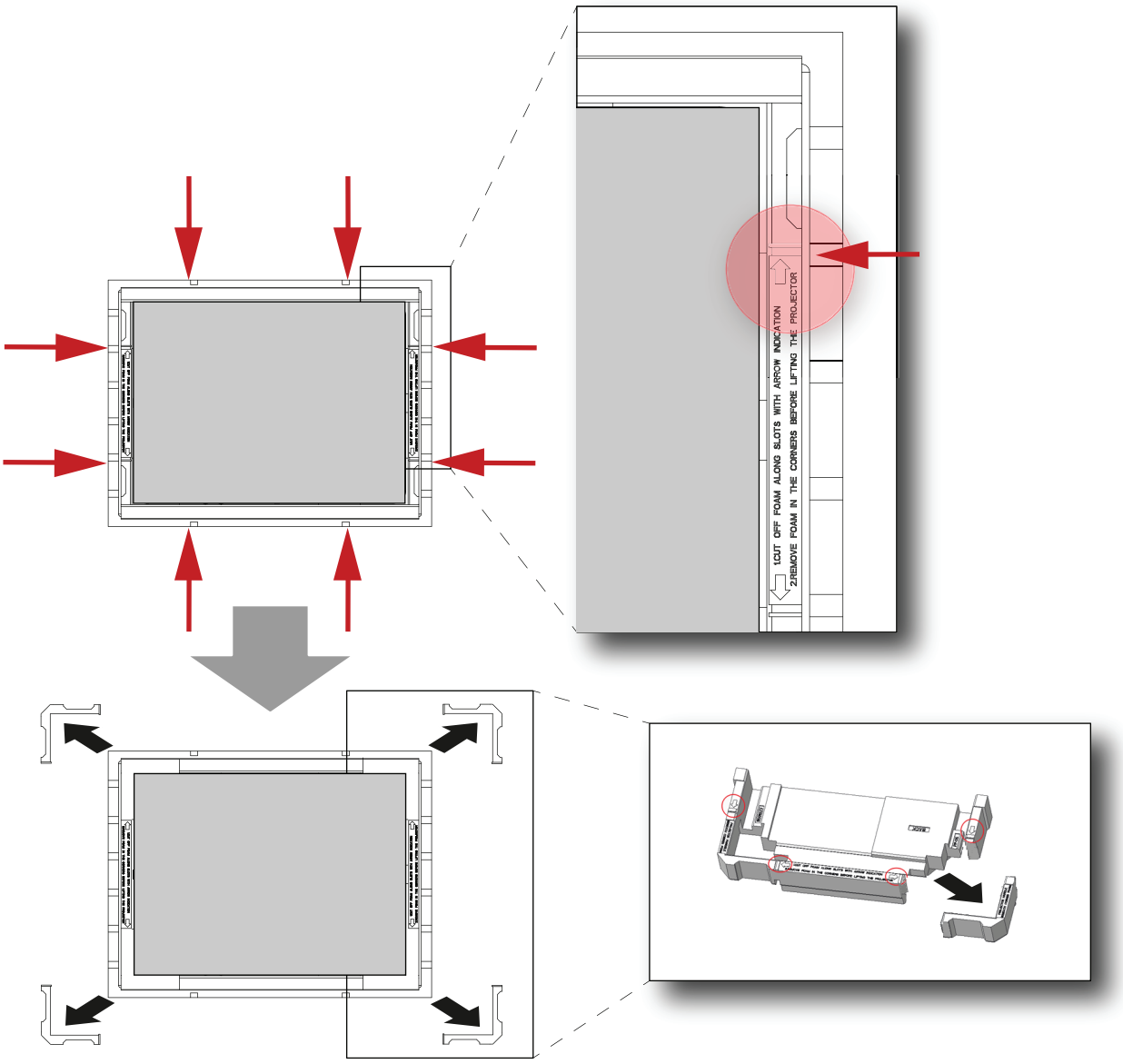


Image 2–4

7. Remove inner top cover and inner box (two U-shaped plates).

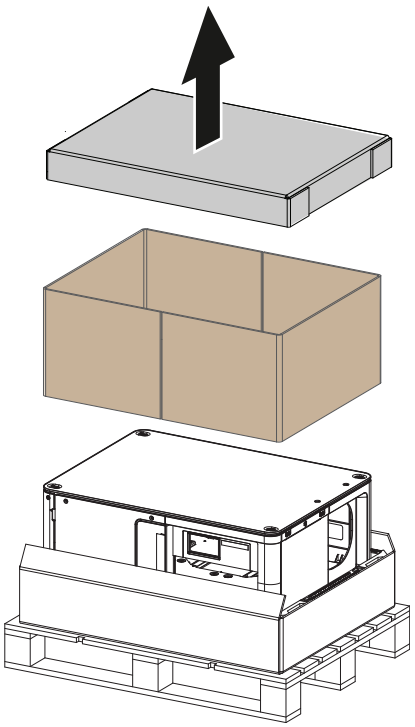


Image 2–5

8. Lift the projector from the wooden pallet by gripping the corner handles of the projector with both hands and place the projector on the pedestal. Use a minimum of 4 people to lift and place the projector on the pedestal.

   Tip: The corner handles are wide enough to fit both your left (L) and right (R) hand. Only use the handles to lift the projector.

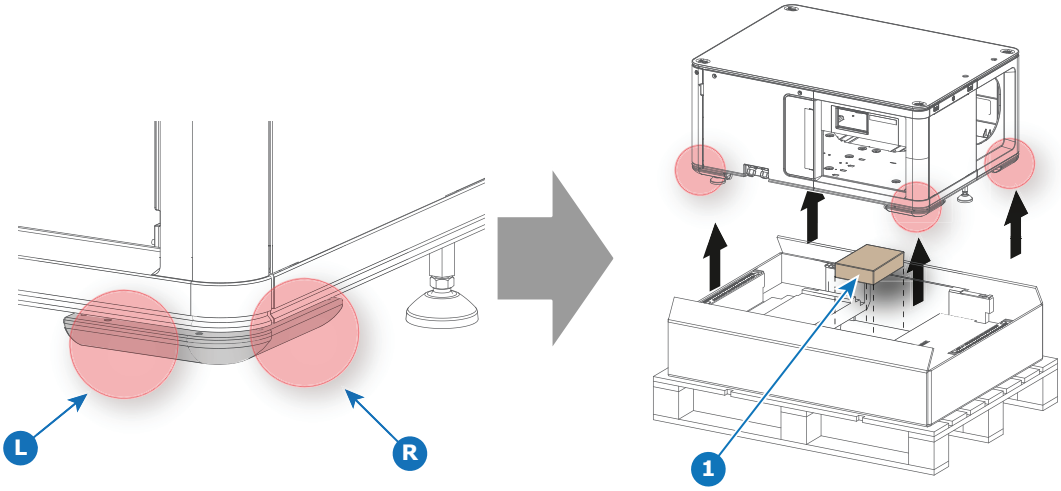


Image 2–6

9. If present (depending on whether the projector comes with an Integrated Cinema Media Processor), remove and put aside the small box containing the HDDs (reference 1).

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

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

The projector is not delivered with a lens by default. If you also ordered a lens, it will be delivered in a separate box. For lens installation, see “Lenses & Lens holder”, page 53.

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.

Projector Box content

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

- A note with QR codes to inform the user that the installation manual (this manual) is available online on the Barco website.
- Worldwide safety manual

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.

2.4 Convention projector orientation

Convention

This manual refers to the light source side of the projector as the side at your left hand when standing behind the projector and looking at the projection screen in front of the projector.

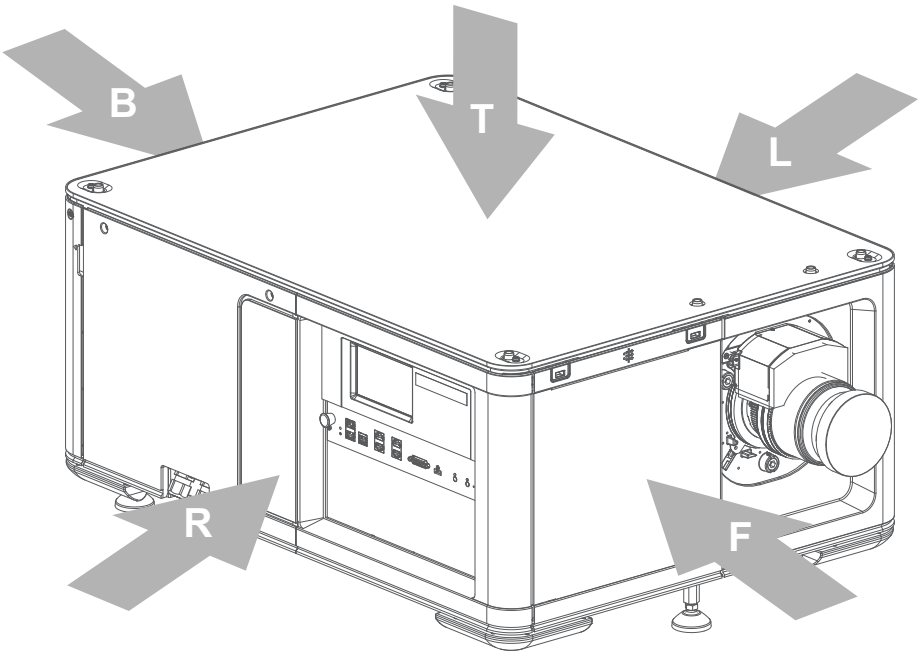


Image 2–7

T Top of the projector.
L Left side of the projector (Light source side).
F Front of the projector.
R Right side of the projector (User input side).
B Back side of the projector.

2.5 Air flow of the projector

Air flow

The SP2K-S projector has three air inlets and one air outlet. The air inlets are located on the front side the left side and bottom side of the projector. The air outlet are located on the back side of the projector.

Take into account the location of the air inlets and outlets when determining a suitable location to install the projector. Make sure that when installed, the hot air coming from the air outlets is not automatically sucked back in via the air inlets.

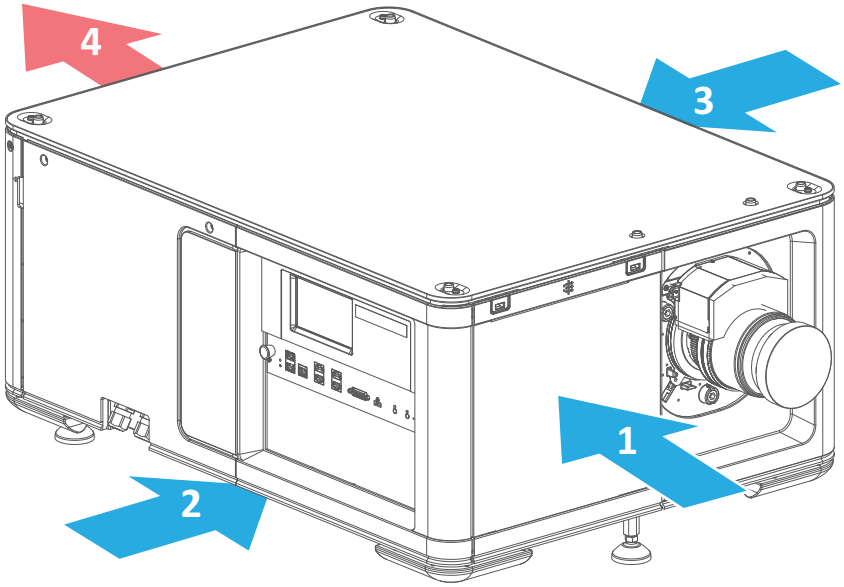


Image 2–8

1 Air inlet front of the projector
2 Air inlet bottom side of the projector
3 Air inlets left side of the projector
4 Air outlet back of the projector

2.6 Web Communicator

Built-in web application

The Web Communicator application is a uniquely powerful and easy to use built-in web application for the Barco projector. This application provides all the necessary tools necessary to setup and control the connected projector. A comprehensive array of easy to access menu pages provide the projectors digital input, output and screen display via a combination of simple buttons and displays.

The Web Communicator user interface is readily available on the projector without any additional software installation. It is accessible via a web browser and is fully supported on iOS and Android devices.

While all web browsers are supported, the recommended browser is Chrome.

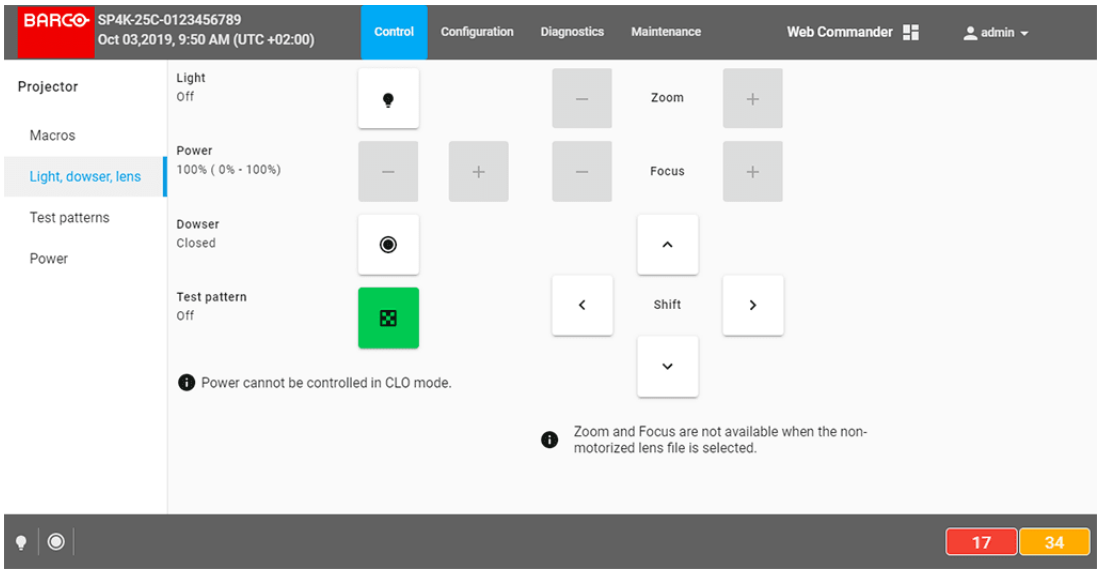


Image 2–9 Example of the Web Communicator tool

Quick and Easy configuration

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

2.7 Web Commander

Web Commander

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

The Barco Alchemy projectors have been carefully designed to greatly increase the level of operational efficiency. Projectionists can enjoy a streamlined and intuitive user interface that seamless blends projector control with a full-fledged screen management system. The ‘Barco Web Commander’ user interface is readily available on the projector without any additional software installation. It is accessible via a web browser and is fully supported on iOS and Android devices.

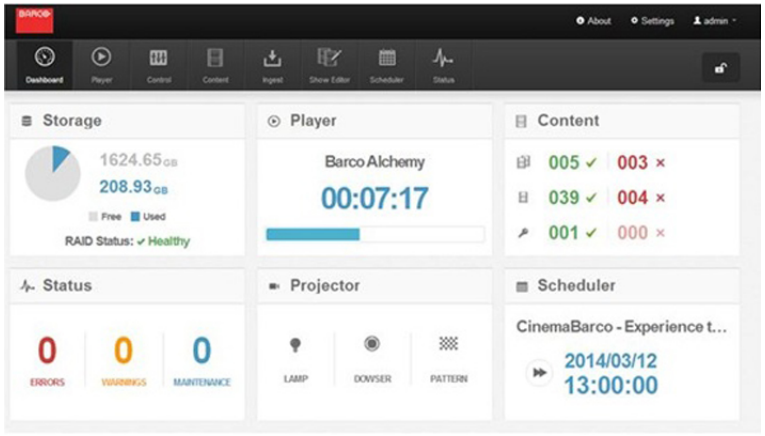


Image 2–10

The Web Commander has its own user guide, of which you can find the latest version on the Barco website.

2.8 Exhaust adapter (Optional)

About the exhaust adapter

An optional exhaust adapter is available, which you can install on top of the top cover of the projector. This exhaust adapter allows the customer to fix an air extraction system to the projector, in order to extract hot air coming from the air outlet of the projector.

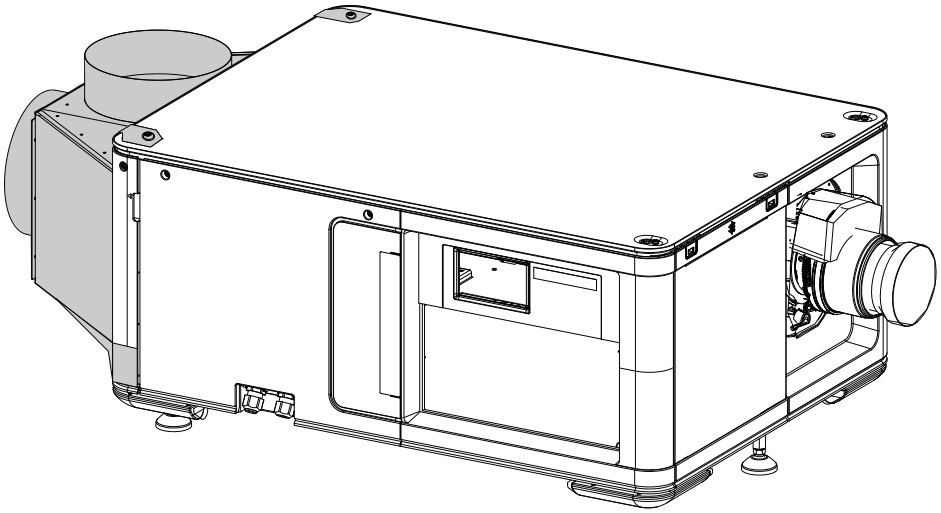


Image 2–11 Projector with exhaust adapter mounted

For all ordering information about options and accessories see Barco website.

Installation process 3

About this chapter

After you have unpacked and checked the projector, you can start with the installation process of your SP2K-S projector. This chapter gives an overview of all the different stages in the installation process which you have to follow to get your SP2K-S projector 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 all stages have been followed in the setup process of the SP2K-S projector.

3.1 Installation process overview

Installation process projector

1. **Check if all installation requirements are fulfilled** such as the environment conditions of the installation area, electrical facilities, etc. Note that a solid pedestal is required to support the projector. For more info see “Installation requirements”, page 24.
2. **Physical installation of the projector** upon its pedestal. For more info of the physical installation, see “Physical installation projector”, page 39.
3. **Optional installation of air exhaust adapter** on the projector. For more info air exhaust adapter installation, see “Installing air exhaust adapter (Optional)”, page 49.
4. **Installation of the lens**. First select a lens with appropriate throw ratio covering the screen size and the projector - screen distance. Then install the lens in the lens holder of the projector. For more information about available lenses, lens selection and lens installation see “Lenses & Lens holder”, page 53.

   Caution: The projector is delivered with a plastic cover inside the Lens Holder. Remove the cover prior to installing the lens.

5. **Installation of the 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 90. 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.

   Note: Only required in case of projector variant with ICMP-X.

6. **Electrical connection with the power net**. See “Connecting the projector with the power net”, page 44.
7. **Plug in the power connector** and let the projector system start up automatically.

   Note: If the projector does not start automatically, press the power button. For more information, see “Projector Power Cycle”, page 93.

8. **Connect your device to the projector for the first time** and log into Web Communicator. See “Connecting to the projector for the first time”, page 102.
9. **Upgrade the projector software** to the latest available version. See “Software update”, page 103.
10. **Select the corresponding lens file for the installed lens and calibrate the lens.** For more details, refer to the user guide.
11. **Alignment of the projected image on the screen**. The image can be aligned with the screen size of the application. Turn on the light source, activate the dowser and use the **ZOOM**, **SHIFT** and **FOCUS** buttons to 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 58.
12. **Adjust the light path**. Normally the lens holder and the convergence of the projector are perfectly adjusted at the factory. Nevertheless, some applications require a readjustment of the lens holder, convergence or both. See procedure “Scheimpflug adjustment”, page 61, and “Convergence”, page 107.
13. **Perform the projector configuration and adjustment** to finish the installation process for the end user. Please refer to the user guide for the configuration and adjustment process and details.
14. **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 71, and projector user guide.

This topic only covers a basic configuration and adjustment process for the projector. For a more in-depth explanation of the Web Communicator and all of its features, please refer to the projector user guide.
If you have a projector with ICMP-X and you want a more in-depth explanation on how to control this media player, please refer to the Web Commander user guide.

Physical installation projector

4

4.1 Positioning the SP2K-S

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

General guide lines

- Use a solid pedestal to put the SP2K-S projector on. Ensure that the pedestal can handle the weight of the projector and that all feet of the projector are captured.
- The pedestal should be placed in front of the port window wall in a manner that the projector lens holder cover is at a minimum distance of 20 centimeters from the port window.

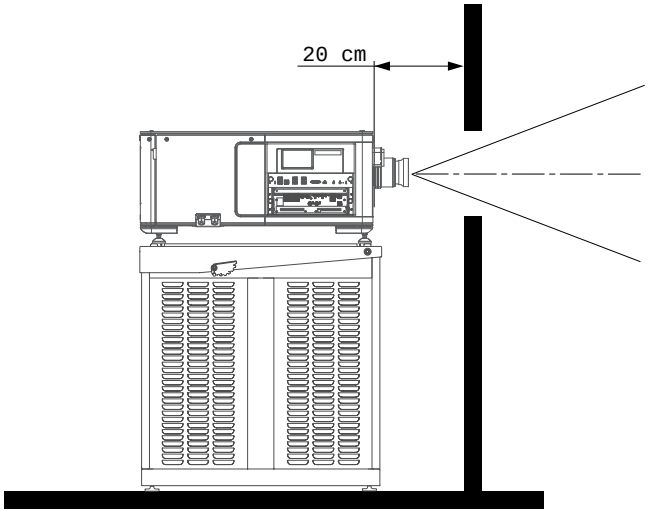


Image 4–1 Positioning at port window

Barco offers a pedestal for the SP2K-S projector. This pedestal allows for a solid and easy setup of the projector. The pedestal support 19” rack systems. (projector peripherals such as alternative content switchers, ShowVault, etc.)

Required tools

- Open-end wrench 14 mm
- Open-end wrench 17 mm

Projector centering

1. If the projector is standalone in front of the port window, center the projector with the theatre screen (reference A Image 4–2).
2. If a film projector is already present (projector will be off-center), try to optimize aim (reference B Image 4–2).

   Note: Unlike film projectors, it is best to keep the projector lens surface as parallel to the screen as possible, even if it is significantly above the screen center.

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

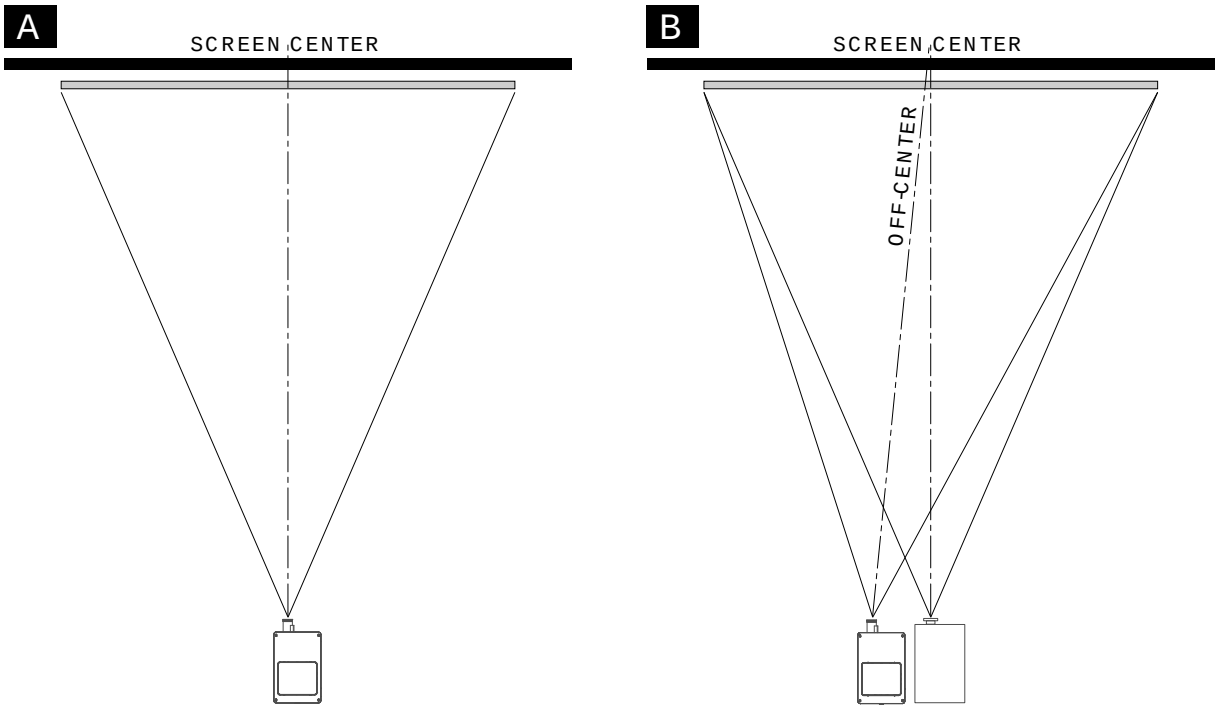


Image 4–2

3. Proceed to level the projector by adjusting the feet of the projector as follows:
   - Loosen the nut (reference 1 Image 4–3) on the threaded rod of the three projector feet. Use a 17 mm open-end wrench.
   - Adjust the height of the 3 legs to level the projector. Use a 14 mm wrench to adjust the height as illustrated (reference 2 Image 4–3).
   - Secure the leg height by tightening the nuts (reference 1 Image 4–3) of each projector foot.

   ⚠ *Caution:* Check if the nuts of the projector feet are sufficiently tightened.

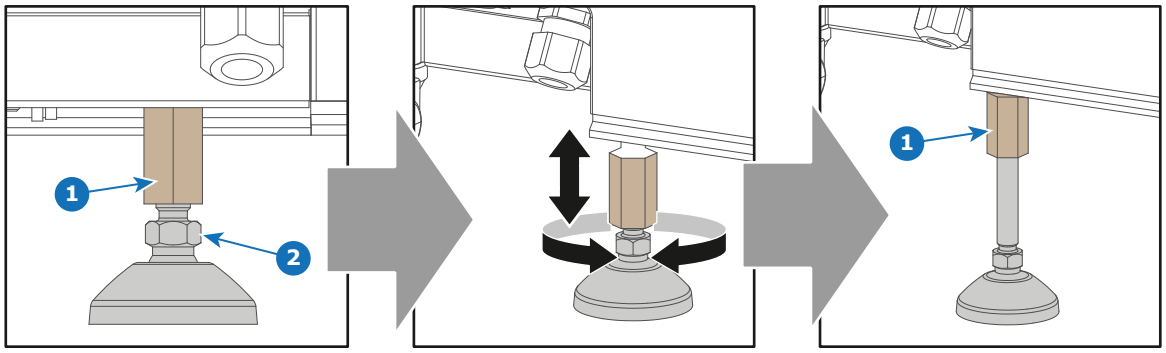


Image 4–3 Adjusting the projector feet

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

Projector tilting

In an ideal installation, the SP2K-S 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 inclination with a protractor at the screen.

3. Tilt the projector to closely match this screen tilt angle as follows:
   - Loosen the nuts (A), using a wrench of 17 mm, on the threaded rod.
   - Adjust the height of the legs until the projected image matches the projection port window and the screen tilt.
   - Secure the leg height by tightening the nuts (A).

   Caution: Check if the nuts of the projector feet are sufficiently tightened.

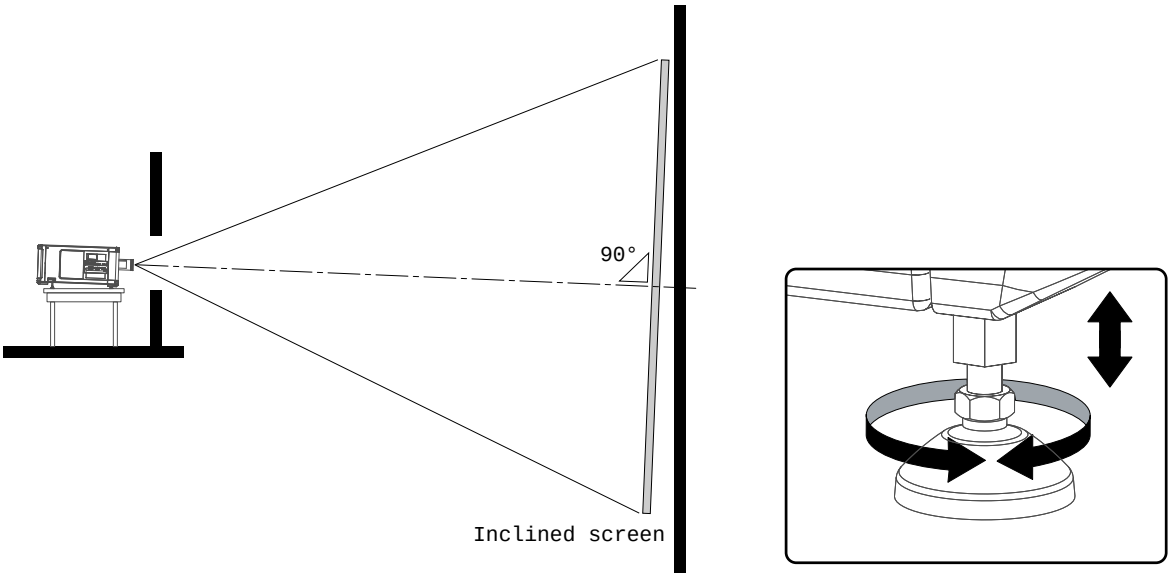


Image 4–4 Projector tilting

CAUTION: The projector may tilt maximum 15° forward and maximum 10° backwards. This includes the tilt created by the projector feet and the tilt created by the pedestal offered by Barco for this projector type (both forward and backward tilt angle of projector are 5°, and forward angle of pedestal is 10° and backward is 5°).

4.2 Accessing the power connections

CAUTION: Whenever you access the mains board and thus remove the net input cover, make sure the projector is disconnected from the power net.

Required tools

Torx screwdriver T20

How to access

1. Remove the right side cover of the projector.
2. Remove the two screws (reference 2) of the net input cover (reference 1). Use a T20 Torx screwdriver.
3. Remove the cover.

   Electrical connections are now accessible.

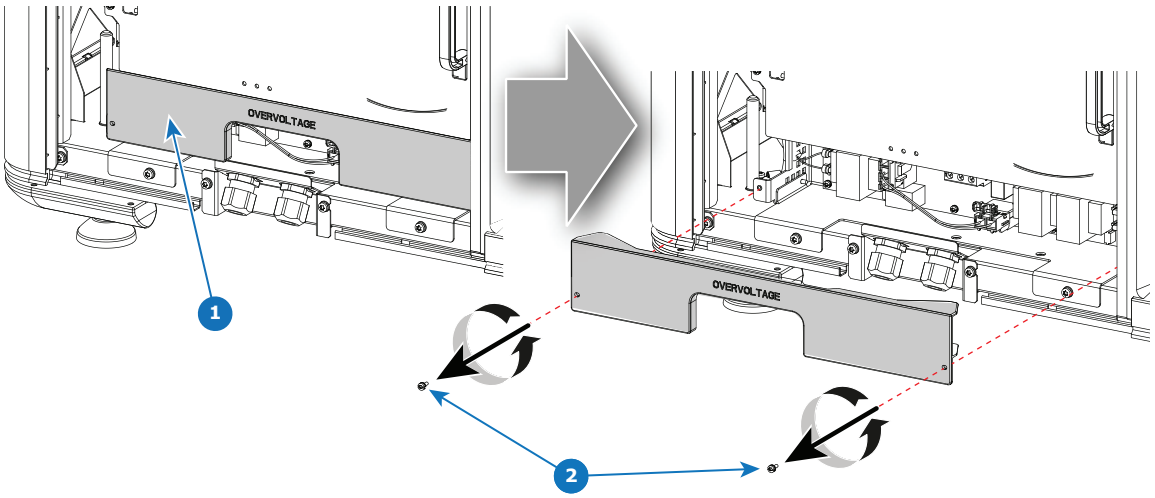


Image 4–5 Removal of the net input cover

4.3 Connecting the projector with the power net

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

CAUTION: ALL POWER CONNECTIONS to the SP2K-S projector are made to the tree-terminal strip located on the mains board behind the operator side cover and mains cover of the projector.

CAUTION: The cross-sectional area of the conductors in the Power Supply Cord shall be not less than 2.5 mm² or AWG 12.

Required tools

- Flat screwdriver
- Open-end wrench 24 mm
- Torx screwdriver T20

Required parts

Certified AC power supply cord 2.5 mm², 12 AWG, min. 300 V.

How to connect the main AC power with the projector

1. Make sure the net input cover has been removed. For more info, see “Accessing the power connections”, page 43.
2. Guide the AC power cord (reference 1) through the cable gland (reference 2).
3. Connect the wires (references 4 and 5) to the 3–terminal strip (reference 3) as illustrated. Use a torque screwdriver to fasten the screws of the 3-terminal strip with a torque of 1.2 Nm.

   Warning: Always connect the PE wire (reference 4) first, then the other wires.

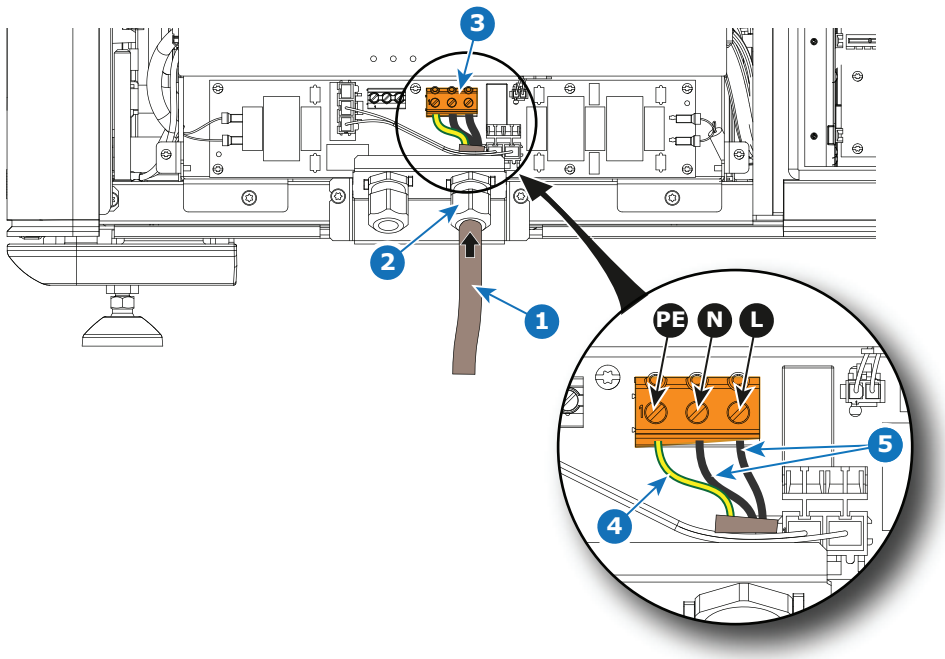


Image 4–6

1	AC Power cord
2	Cable gland
3	3–terminal strip
4	PE wire
5	Phase and neutral wires
PE	Protected Earth connector
N	Neutral connector
L	Phase connector

4. Secure the AC power cord by fastening the cable gland (reference 2). Use a 24 mm open-end wrench.
5. Place the net input cover back and seal it. Tighten the two screws by using a T20 Torx screwdriver.

4.4 Connecting a UPS with the projector electronics

WARNING: Only use UPS units which are suitable for the SP2K-S series projector. See chapter *Installation requirements*, for more information about the requirements of the UPS.

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)

The projector is configured by default for use without UPS.

Required tools

- Torx screwdriver T20
- Flat screwdriver
- Open-end wrench 24 mm

Required parts

Certified AC power supply cord 1.5 mm², 14 AWG, min 300 V

How to connect a UPS unit with the projector electronics?

1. Make sure the net input cover has been removed. For more info, see “Accessing the power connections”, page 43.
2. The link (two wires) between J4 and J3 connectors must be replaced by a link between J4 and J5 in order to configure the projector for use with UPS.

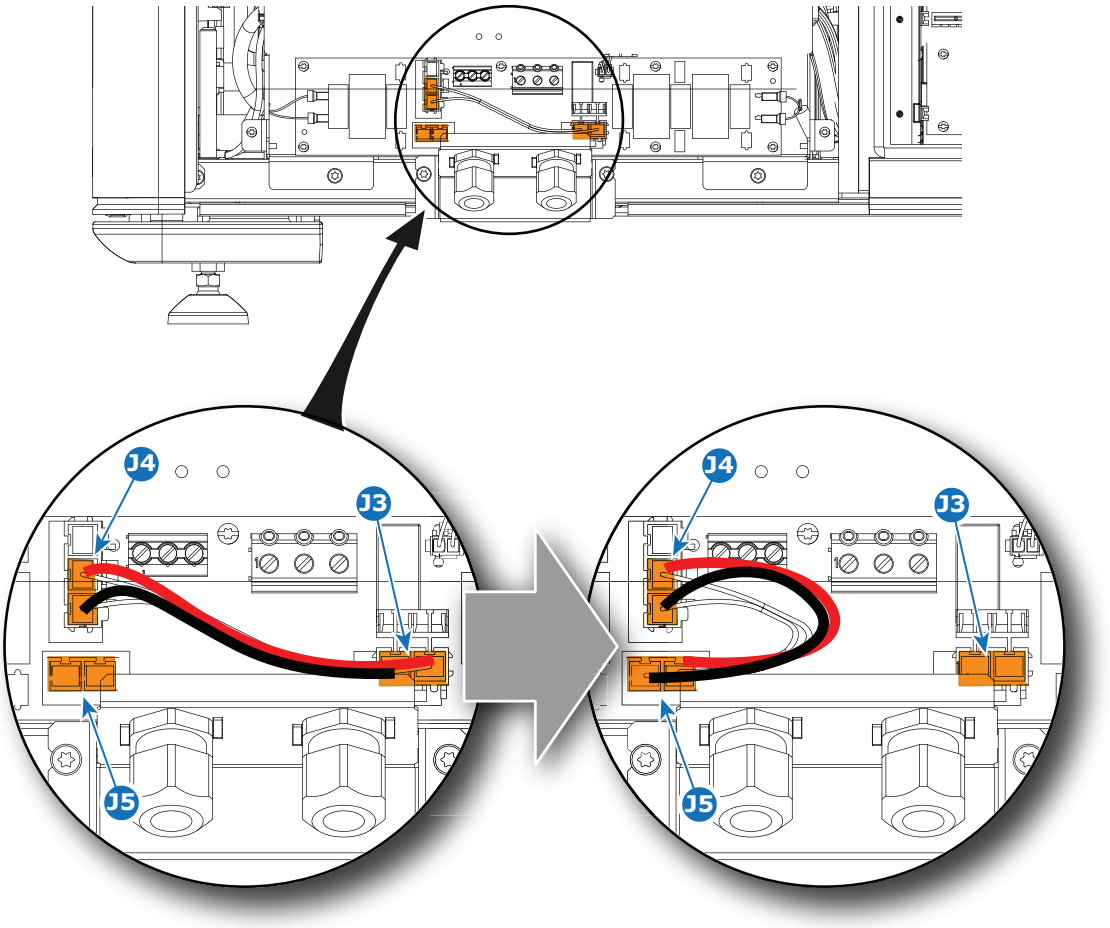


Image 4–7

3. Guide the AC power cord (reference 1) through the cable gland (reference 2). Connect the wires (references 4 and 5) to the 3–terminal strip (reference 3) dedicated to UPS as illustrated. Use a torque screwdriver to fasten the screws of the 3-terminal strip with a torque of 0.5 Nm.

   Warning: Always connect the PE wire (reference 4) first, then the other wires.

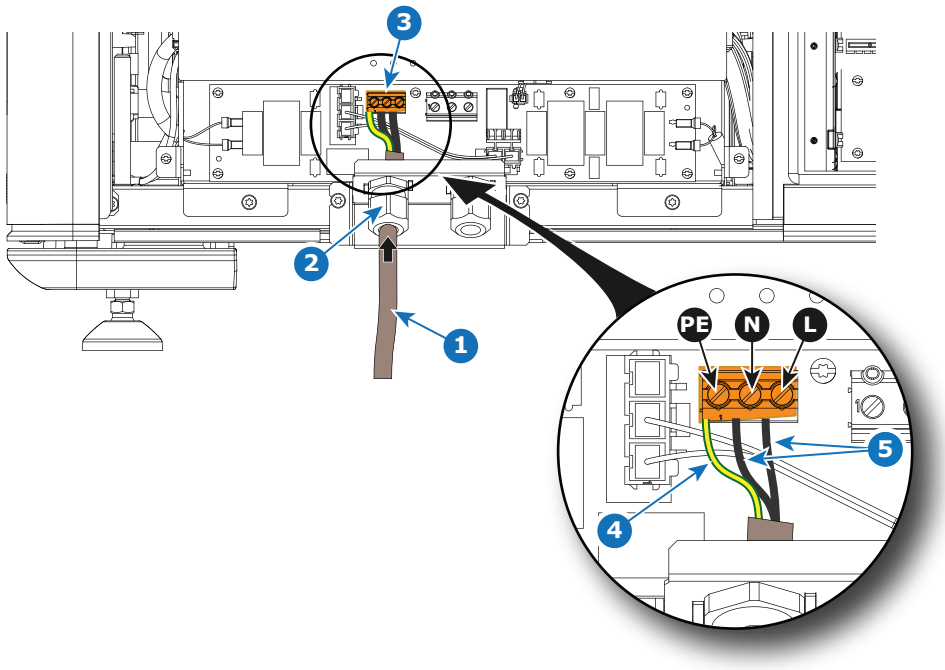


Image 4–8

1 UPS Power cord
2 Cable gland
3 UPS 3–terminal strip
4 PE wire
5 Phase and neutral wires
PE Protected Earth connector
N Neutral connector
L Phase connector

Tip: Check for good fixation by pulling on each wire.

4. Secure the AC power cord by fastening the cable gland (reference 2). Use a 24mm open-end wrench.
5. Place the net input cover back and seal it. Tighten the two screws by using a T20 Torx screwdriver.

4.5 Installing air exhaust adapter (Optional)

About the optional air exhaust adapter

The air exhaust adapter is an optional part that allows the projector to be connected to an air exhaust system in order to increase its cooling. This is an optional part that need to be ordering separately. Depending the installation requirement, the air ring direction where the extraction duct need to be connected can be put upward or backward.

Required tools

- Socket wrench 17 mm
- Socket wrench 7mm
- Torx screwdriver T20

How to install

1. Remove the exhaust adapter from the packaging and examine the metal parts to make sure there is no corrosion or structural damage.

   Note: Put aside the 4 small packages containing the brackets and fixing screws supplied in the box. Take care not to throw them away with the protecting foam and packaging.

2. Mount top holders with exhaust adapter. Fasten the each holder on the exhauster with the two nuts provided in the kit. Use a Socket wrench 7mm.

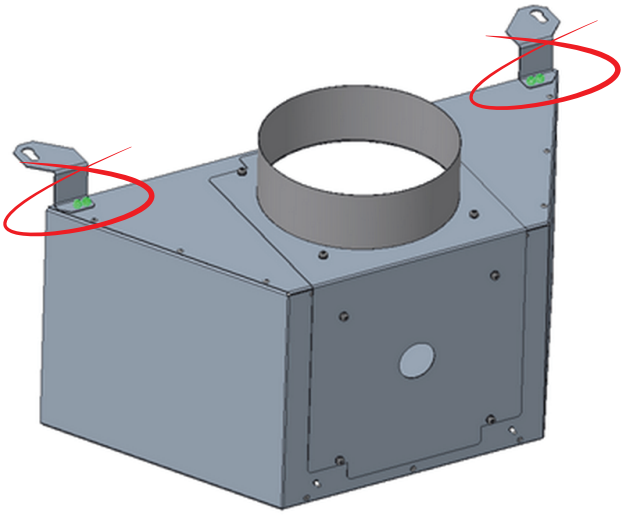


Image 4–9

3. Hang the exhaust adapter onto the projector. Fasten the each holder on the projector with the one M10 Hex head screws provided in the kit. Use Socket wrench 17 mm.

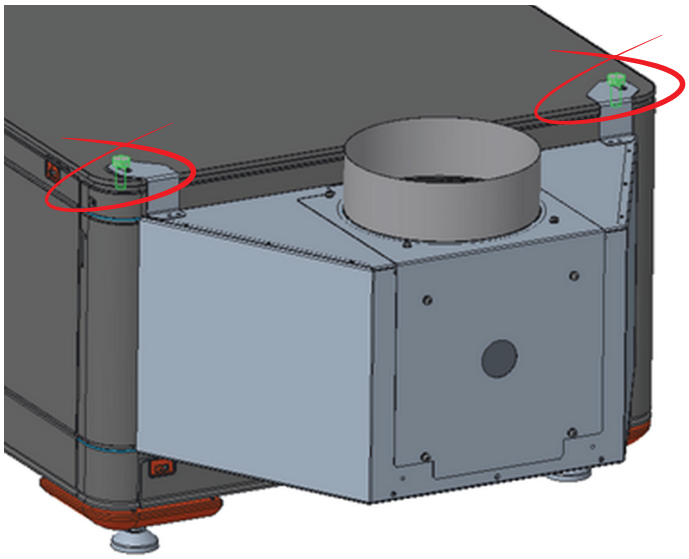


Image 4–10

4. Mount bottom holders. Fasten the each holder on the exhauster with the two nuts provided in the kit. Use a Socket wrench 7mm.

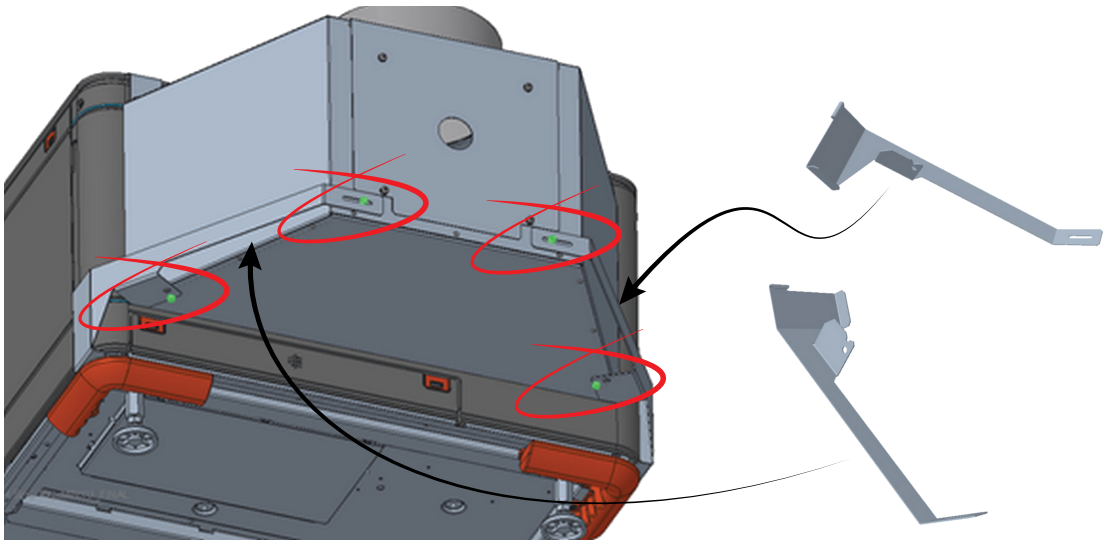


Image 4–11

Little bending feature of bottom holders should be put behind the rear cover.

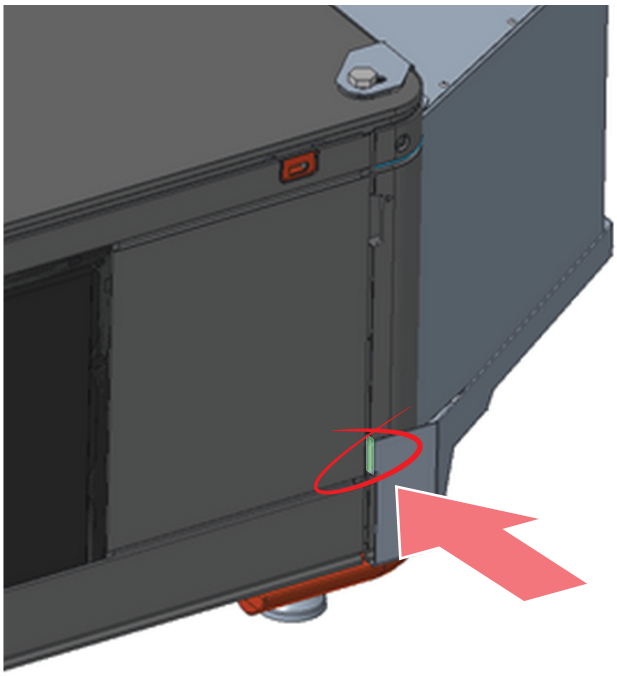


Image 4–12

Bigger bending feature should be put between the top of the projector handle and the projector itself.

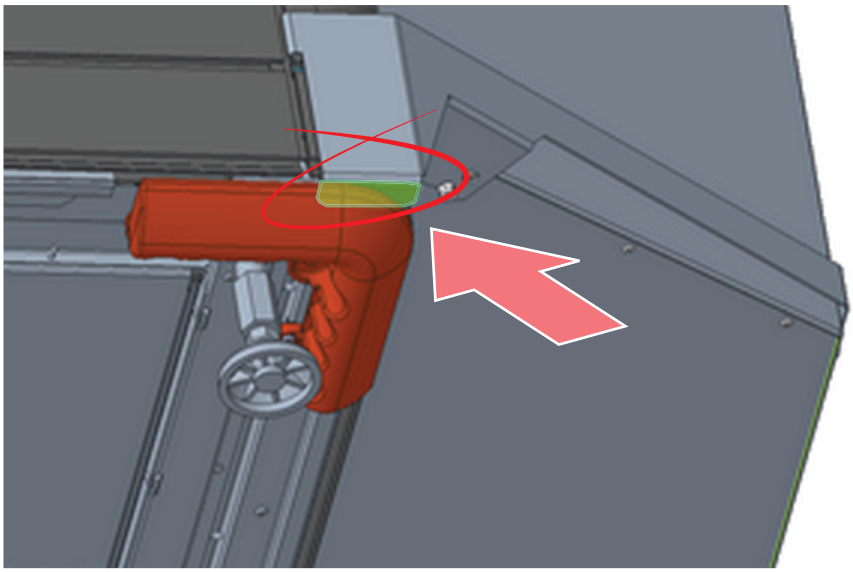


Image 4–13

5. Follow the next steps if you want modify the air ring direction:
   1. Remove the eight TX M4 screws (reference 1) holding the part with the air outlet. Use a Torx screwdriver T20.

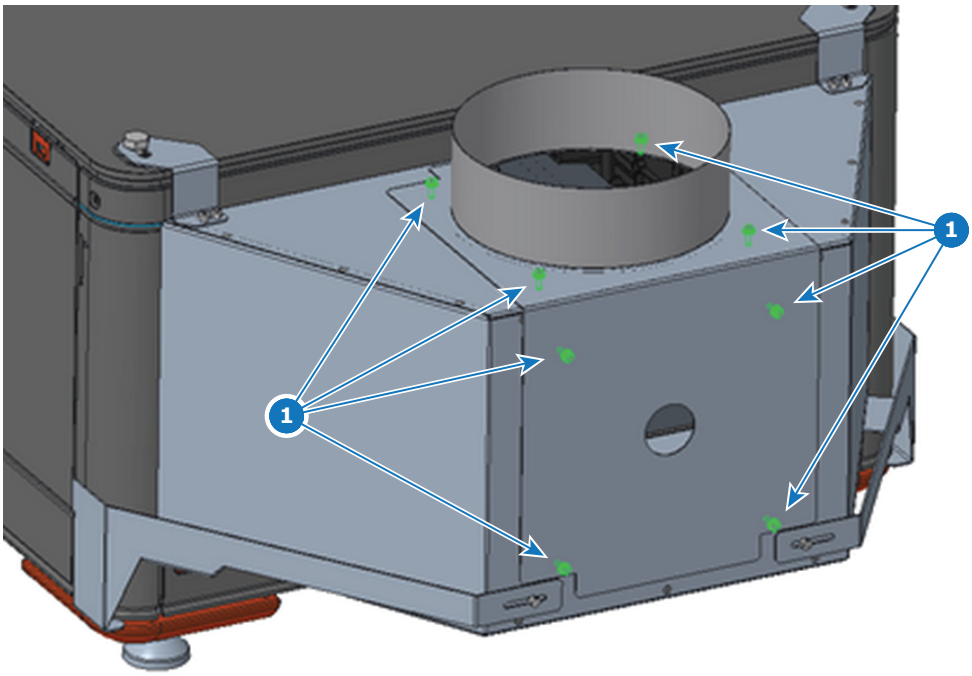


Image 4–14

2. Change the orientation of the air outlet (reference 2).

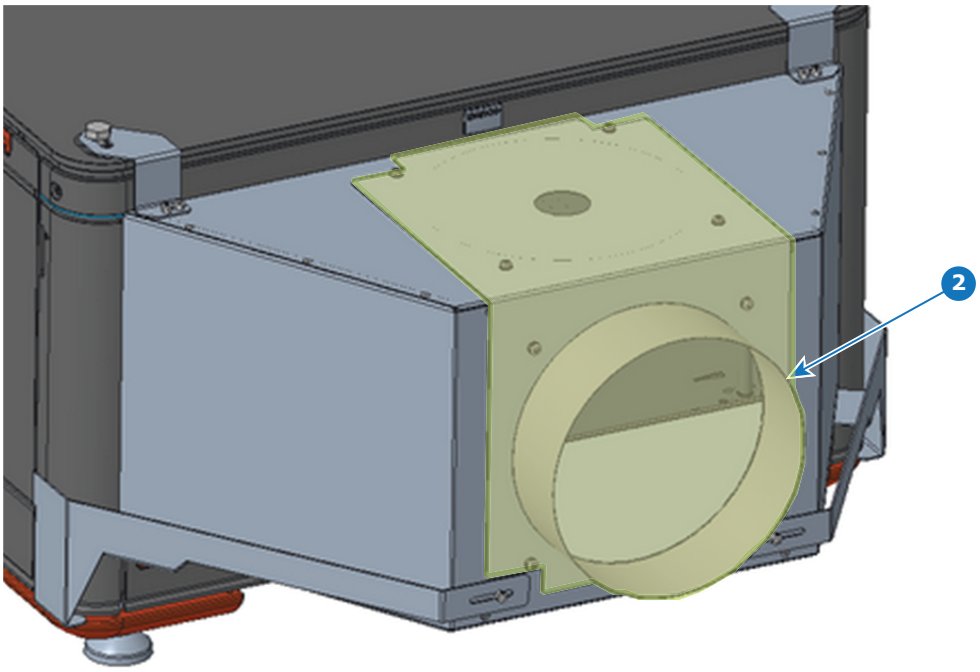


Image 4–15

3. Tighten the eight TX M4 screws (reference 1) to secure the part with the air outlet (reference 2).

Lenses & Lens holder

5

About this chapter

This chapter gives an overview of available lenses for the SP2K-S projector. It also 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.

5.1 Available lenses

Which lenses are available for my projector?

This list only takes into account active lenses at the moment of release of this manual. Lenses that have become end-of life or end-of service are not taken into account. Consult the Barco website for the most up-to-date information on active lenses.
Consult the lens selection list to see which non-active lenses are also supported.

Order No	Name	Resolution	Throw Range	Image
R9856519	S-lens HB 0.8 : 1	DC2K 0.69"	(0.8 : 1)	No image
R9802618	S-lens HB 0.83-1.2	DC2K 0.69"	(0.83 - 1.2 : 1)	No image
R9856520	S-lens HB 1.2-1.7	DC2K 0.69"	(1.2 - 1.7 : 1)	
R98565201	S-lens HB 1.2-1.7	DC2K 0.69"	(1.2 - 1.7 : 1)	
R9856521	S-lens HB 1.34-1.9	DC2K 0.69"	(1.34 - 1.9 : 1)	
R9856522	S-lens HB 1.5-2.15	DC2K 0.69"	(1.5 - 2.15 : 1)	
R9856523	S-lens HB 1.7-2.55	DC2K 0.69"	(1.7 - 2.55 : 1)	
R9856524	S-lens HB 2-3.9	DC2K 0.69"	(2 - 3.9 : 1)	
R98565202	S-lens HC 1.2-1.7	DC2K 0.69"	(1.2 -1.7 : 1)	
R98565212	S-lens HC 1.34-1.9	DC2K 0.69"	(1.34 - 1.9 : 1)	
R98565222	S-lens HC 1.5-2.1	DC2K 0.69"	(1.5 - 2.15 : 1)	
R98565232	S-lens HC 1.7-2.55	DC2K 0.69"	(1.7 - 2.55 : 1)	
R98565242	S-lens HC 2-3.9	DC2K 0.69"	(2 - 3.9 : 1)	

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.

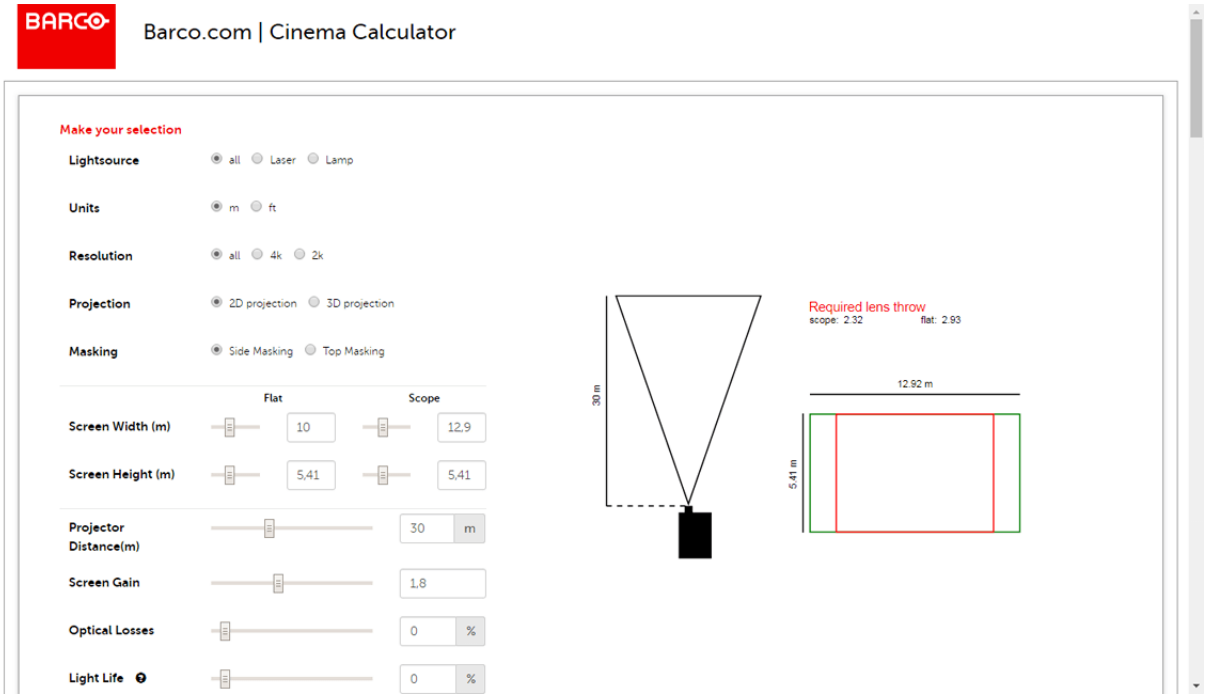


Image 5–1 Example of the Digital Cinema Lens calculator tool

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 Installation of a lens

How to install a lens into the lens holder

1. Place the lens holder in the “unlocked” position. Do this by pulling the lock handle (reference 1) outward the lens holder, then slide it from the Lock symbol (reference 2) toward the unlock symbol (reference 3).

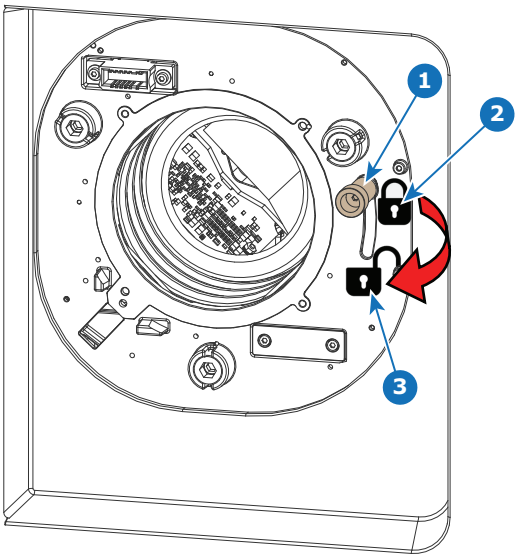


Image 5–2 Lens installation, preparing the lens holder

2. If is still present, remove the dust cover from the lens opening. As noticed on the dust cover, lock handle need to be in unlock position to remove this part.

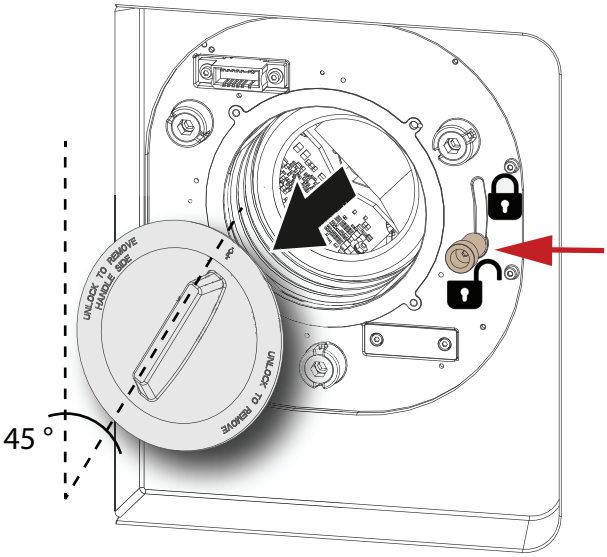


Image 5–3

Note: Handle of dust cover is inclined by the angle 45° from the vertical. This is the correct position to install or remove the cover.

Tip: While not placed in the projector, place the dust cover in a lockable plastic bag to prevent dust from gathering on the cover.

3. Take the lens assembly out of its packing material and remove the lens caps on both sides.
4. Gently insert the lens in such a way that the lens connector matches the socket (reference 4).

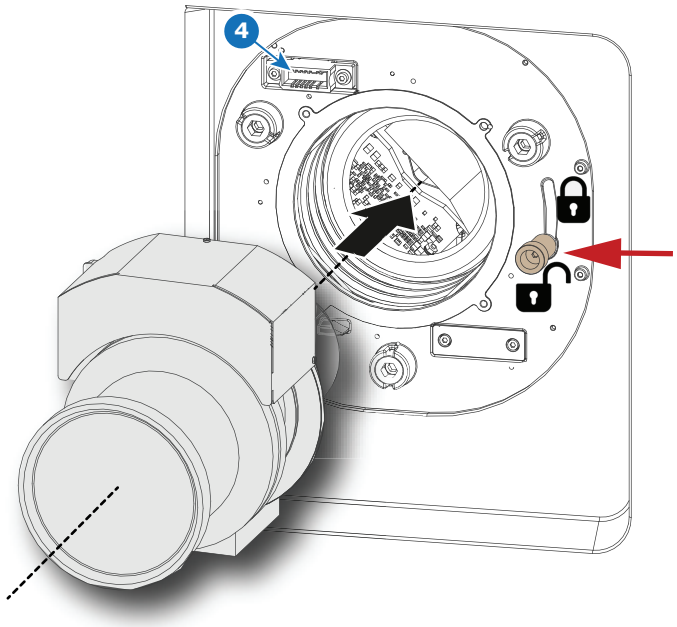


Image 5–4 Lens installation

5. Insert the lens until the connector seats into the socket.

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

6. Secure the lens in the lens holder by sliding the primary lens lock handle (reference 1) into the “locked” position, to the top of the projector (reference 2). Ensure the lens touches the front plate of the lens holder.

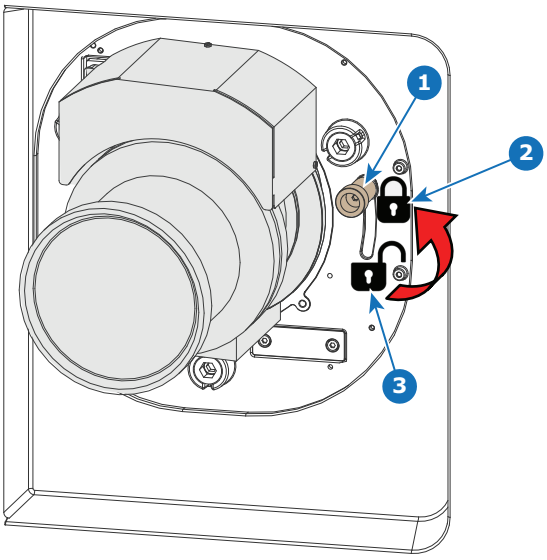


Image 5–5 Locking the lens

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

5.4 Lens shift, zoom & focus

Motorized lens adjustment

The SP2K-S projector is equipped with a motorized lens shift functionality and a motorized zoom & focus functionality.

About the 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 center point of the projected image is shifted by half the screen size. In other words, the center 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 40% up, 70% down, 15% left, and 15% right. This range is valid for all throw ratios. Within these shift ranges the projector and lens perform excellently (color/brightness uniformity is ok). Configuring the projector outside these shift ranges will result in a slight decline of image quality.

It's mechanical possible to shift outside the recommended field of view, but this will result in a decline of image quality depending on the used lens and the zoom position of the used lens. Furthermore, shifting too much in both directions will result in a blurred image corner (and color/ brightness uniformity is out of spec).

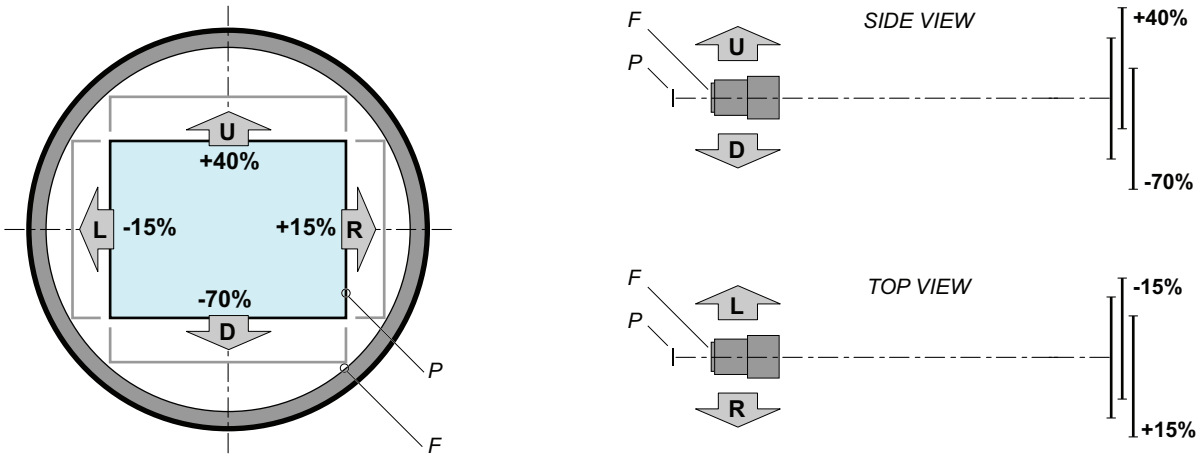


Image 5–6

P DMD
F Field of view

Take into account that when using Scheimpflug to adjust the lens holder, the shift range will become asymmetrical as a direct consequence. An up/down shift range of 30%/70% could (for example) become 25%/75% instead after Scheimpflug adjustment.

For this reason it is advised to perform Scheimpflug adjustment **after** you have reached the sharpest possible image using lens shift, zoom and focus.

How to shift the lens of the SP2K-S projector?

1. In the *Configuration – Lens Selection* menu, Select the correct lens file and the calibrate the selected lens with a **Calibrate & return to mid position** action.
2. Use the **up and down** arrow keys in the *Light, dowser, lens* menu to shift the lens **vertically** and use the **left and right** arrow keys to shift the lens **horizontally**.

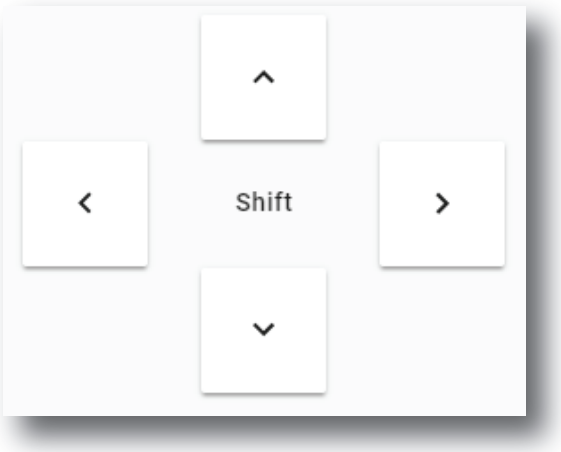


Image 5–7

How to zoom in or out?

1. Is the lens equipped with a motorized zoom & focus?
   ► If yes, Use the **–** and **+ Zoom keys** in the *Light, dowser, lens* menu to zoom the lens in or out.

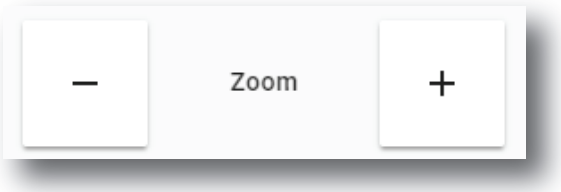


Image 5–8

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

How to focus?

1. Is the lens equipped with a motorized zoom & focus?
   ► If yes, use the **–** and **+ Focus keys** in the *Light, dowser, lens* menu to focus the image on the screen.

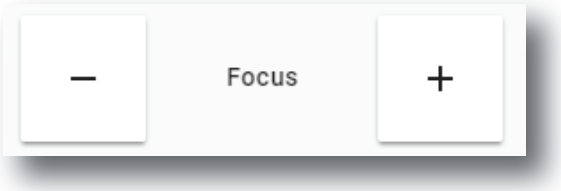


Image 5–9

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

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

If it becomes impossible to focus the image, perform a Scheimpflug adjustment. For more info on this, refer to “Scheimpflug adjustment”, page 61.

5.5 Scheimpflug introduction

What is Scheimpflug?

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 occur 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).

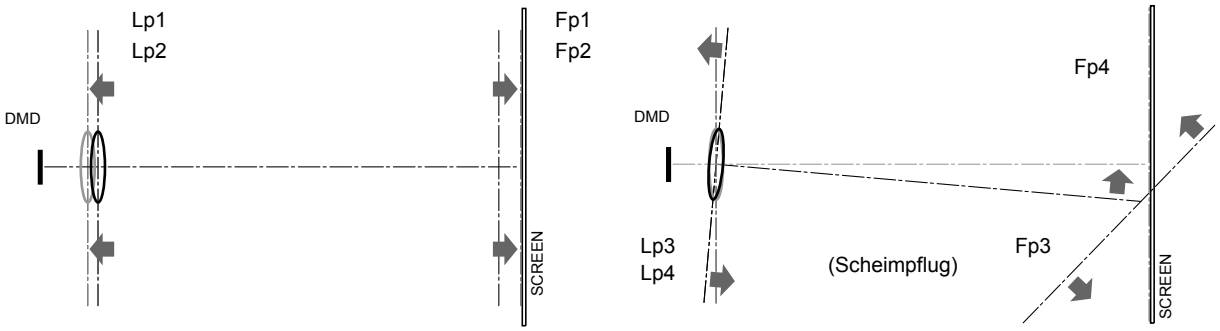


Image 5–10 Scheimpflug principle

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

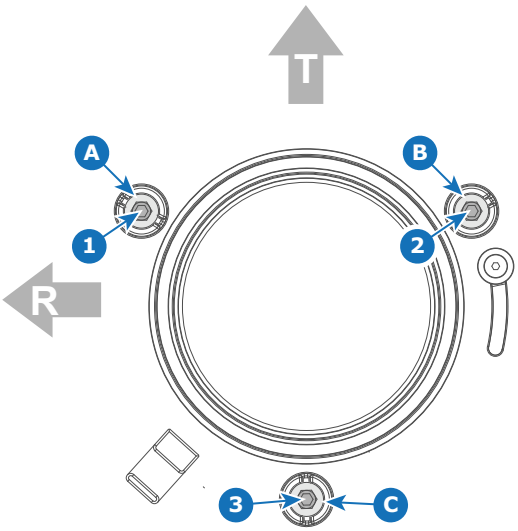


Image 5–11 Scheimpflug adjustments points on Lens holder - Projector front view. (Shape of the lens may vary with the model)

1 Scheimpflug adjustment screw
2 Scheimpflug adjustment screw
3 Scheimpflug adjustment screw
A Lock screw
B Lock screw
C Lock screw
T Projector top side
R Projector Right side

5.6 Scheimpflug adjustment

Required tools

- Allen wrench 5 mm
- Allen wrench 8 mm
- Torque wrench with 8 mm hex socket

This procedure will not go into detail on menu functionality of Web Communicator. For more info on all menu actions, please refer to the projector User Guide.

For the best possible result, place the projector on a flat and level surface and project perpendicular to the screen

Preparation steps

1. Browse to the IP address of the projector and log into Web Communicator.
2. In the *Configuration – Lens Selection* menu, Select the correct lens file and the calibrate the selected lens with a **Calibrate & return to mid position** action.
3. Make sure you have performed a lens shift, zoom and focus action to obtain the sharpest possible picture.

   Tip: Do not perform a Scheimpflug adjustment until you have optimized lens shift, zoom and focus, as well as having calibrated the lens.
4. In the *Control – Light, Dowser, Lens* menu, click a number of times on the *Test pattern* button until you see the **FocusGreen** test pattern.

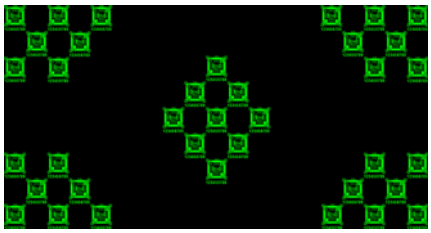


Image 5–12 Example of the Green focus test pattern.

5. Loose half turn of the lock screws (reference A, B and C,) of the Lens Holder . Use a 8 mm Allen wrench for the lock screws.
6. Optimize the focus of the projected image in the center of the screen (F) using the focus buttons in the *“Control – Light, Dowser, Lens menu*”.

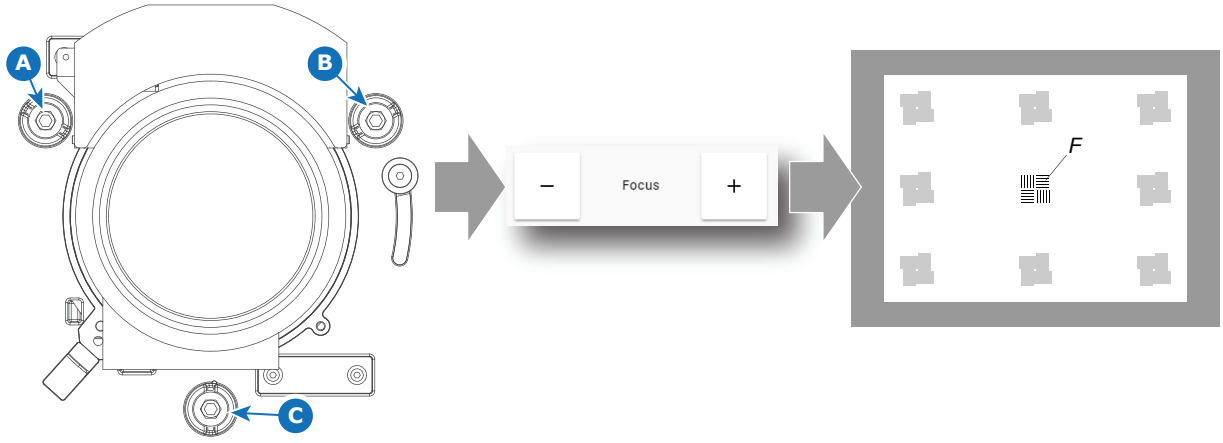


Image 5–13

Scheimpflug adjustment steps

1. Sharpen the image at the bottom right corner of the screen by turning the upper left Scheimpflug adjustment screw either clockwise or counterclockwise (reference 1). Use a 5 mm Allen wrench.

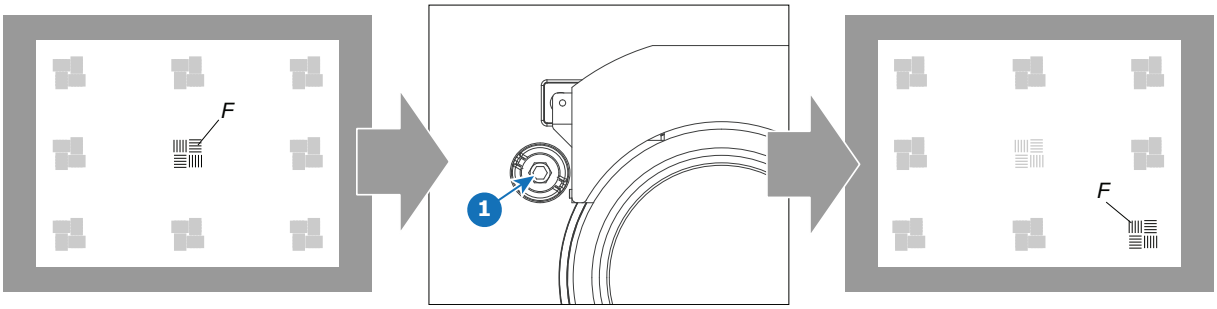


Image 5–14

As a result of this action, the focus in the center will fade a bit. This is expected behavior.

2. Sharpen the image at the lower left corner of the screen by turning the upper right Scheimpflug adjustment screw (reference 2).

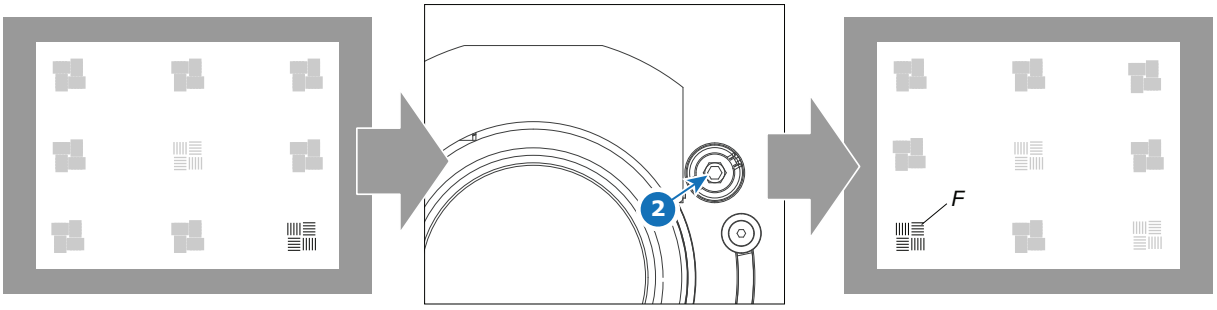


Image 5–15

3. Sharpen the image at the top center of the screen by turning the lower Scheimpflug adjustment screw (reference 3).

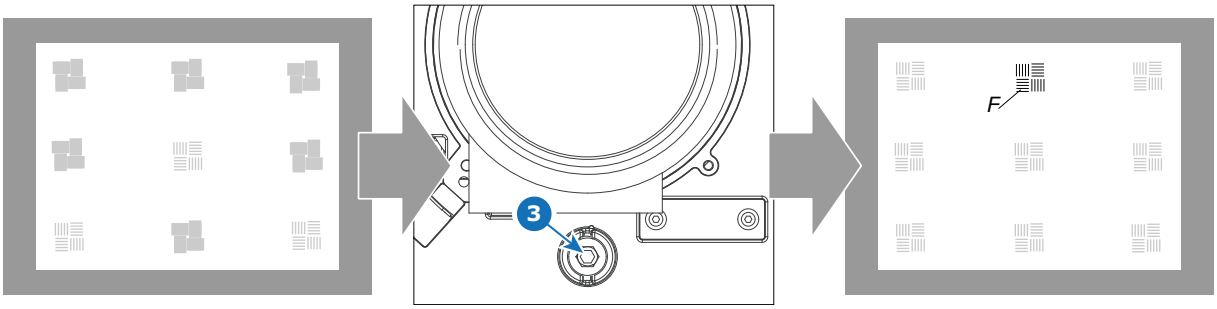


Image 5–16

4. Optimize the focus of the projected image in the center of the screen using the focus buttons in the *“Control – Light, Dowser, Lens menu*”.

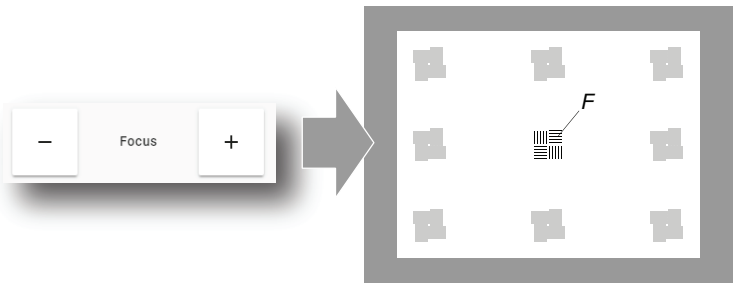


Image 5–17

5. Repeat from step 1 until the projected focus pattern is as sharp as possible in the center, left, right, top and bottom of the screen.

6. Fasten all three lock screws again. Use a torque wrench with a torque of 8.4 Nm.

   Tip: While a stronger torque can be applied, take into account that the maximum allowed torque is 10 Nm.

What to do when no sharp image can be obtained?

If you are unable to obtain a sharp image, even after performing all previously mentioned lens adjustment procedures, you may have messed up the Scheimpflug procedure. This can be fixed by adjusting the adjustment points in such a way the lens holder is returned to its nominal position. In order to do so, consult the service manual.

Input & communication

6

About this chapter

This chapter describes the functionality of the touch display, as well as the different input and communication ports of your projector.

Note that all information about the ICMP-X is gathered into one separate chapter. See “ICMP-X”, page 71.

6.1 Introduction

General

The Input & Communication side of the SP2K-S consists of a touch display and a card cage with three slots. The touch display also functions as the “tail light”, which reflects the status of the projector. Note that all information about the ICMP-X is gathered into one separated chapter called ICMP-X.

The touch display is an optional feature. While the touch display is be handy for local use, all functionality of the touch display can also be accessed via Web Communicator. This to ensure that if you mostly access the projectors from a remote location, you no longer need this touch display.

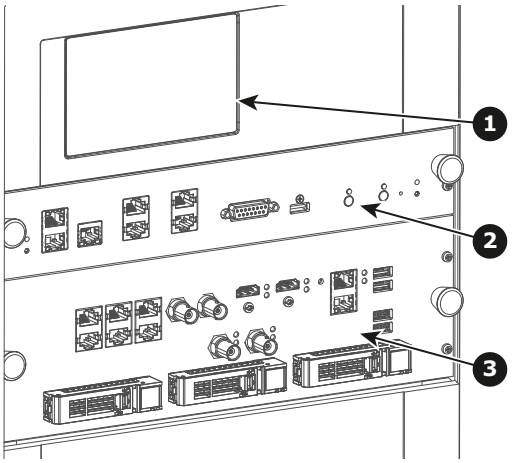


Image 6–1

1 Touch display (optional)
2 Barco Cinema Controller
3 Barco ICMP-X

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 Cinema controller of the projector

Control panel

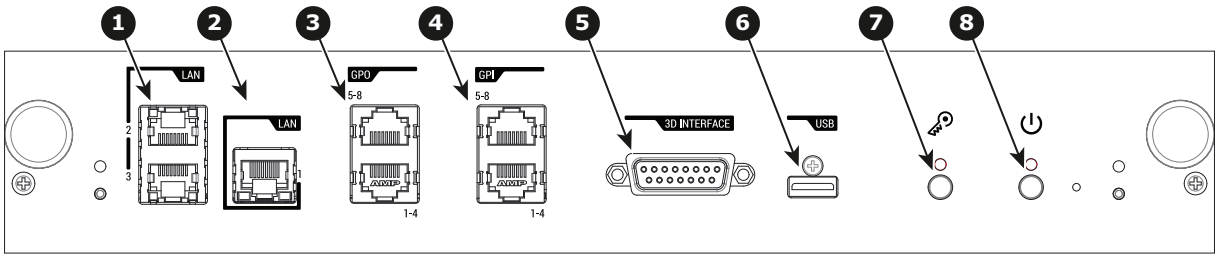


Image 6–2

1 LAN ports
2 Wide Area Network (WAN) port
3 General Purpose Output (GPO) ports
4 General Purpose Input (GPI) ports
5 3D Interface
6 USB port
7 Key button
8 Power button

Local Area Network (LAN: 10/100/1000 base-T) ports

The Cinema Controller has two Local Area Network (LAN: 10/100/1000 base-T) ports with a built-in Ethernet switch (port 1 and port 2). Use for projector control and automation. E.g. Touch display, 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).

Wide Area Network (WAN) port

The Cinema Controller has a Wide Area Network (WAN: 10/100/1000 base-T) port. Use this Ethernet port (reference **2** Image 6–2) to connect the network which contains the DHCP server.

The SP2K-S can be connected to a WAN (Wide area network) (reference **2** Image 6–2). Once connected to the WAN, users can access the projector from any location, inside or outside (if allowed) their company network using the Web 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.

General Purpose Input / Output (GPI & GPO) ports

These ports can be used to send or receive trigger signals from other devices. These input/output ports can be programmed by macros created with the Web Communicator application. For more info, refer to the Web Communicator user guide, section Macro editor.

The GPI ports 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 port numbers the projector can be awakened via GPI.

The GPI ports accept a power input of maximum +18V.

3D Interface port

The 3D interface port 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 ECO mode.

USB port

The Cinema Controller is equipped with a master USB port, type “A” connector. This USB port will simplify the service procedures for firmware updates or for downloading the log files without a network connection.

If the only file on the USB device is the firmware file (a “*.fw” file), the projector will automatically start one of the following processes.

- **samba<version nr>.fw**: The projector will upgrade or downgrade, depending on the version number.

Make sure that any used USB-stick is FAT32 compatible and contains no other files or folders.

6.3 ICP-D (Integrated Cinema Processor – Direct)

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.

Introduction

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 a third-party IMB or IMS can be inserted into the slot below the ICP-D.

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.

License

On Series 4 projectors, a license based on the projector serial number and the brand of the IMB is needed. This means a new license is required in case you change projector or IMB brand.

On Series 2 projectors, no license is needed in order to use ICP-D together with an third party IMB.

Supported IMBs from ICP-D software version 1.2.0.5 (included in the Series 4 software 1.4.0) onwards:

- 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
- GDC SR1000: From software version 17.20 (build 201) onward
- QSC CMS-5000: From software version 1.1.01818+ onward
- Qube Xi: From software version 3.0.1.40 onward
- CMC CineCloud: From software version 1.2.2 onward (Series 2 only)

On series 2 projectors, starting from ICP-D software version 1.2.0.10, HD-SDI + Enigma as well as Quad 3G/SDI + Enigma are now supported. All media server that connect to the HD-SDI + Enigma board and that don't require CineCanvas are now supported.

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

Contact the supplier of your IMB to acquire a valid license.

Grace period

Series 4 projectors equipped with an ICP-D are delivered from the factory with a grace period of 200 hours. This means that the projector can be used (in "On" mode) with a third party IMB for 200hrs. During this period the projector trigger a *Warning* (orange notification) with the time remaining in the description. The projector will go into *Error* status (red notification) if no valid license is installed within the specified timeframe. In this case the media server can no longer be selected.

LEDs and inputs on the ICP-D

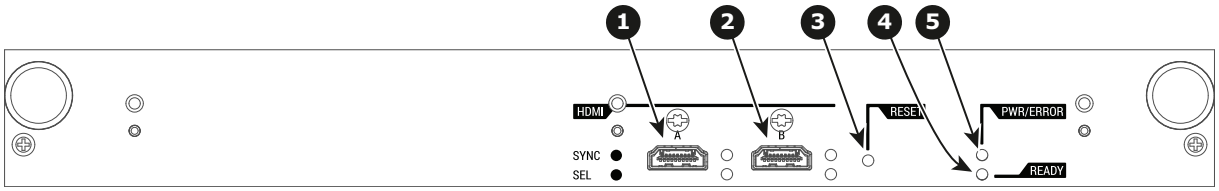


Image 6–3

1 HDMI Input A
2 HDMI Input B
3 Reset button
4 Ready LED
5 Power & Error LED

For the specifications on the HDMI ports, please refer to the appendices of the ICP-D installation manual.

ICP-D LEDs

Status overview PWR/ERROR and READY LEDs:

PWR/ERROR	READY	ICP-D 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
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 board in a SP2K-S 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 !

ICMP-X 7

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.

For the specifications on the “network streaming (Live IP)”, SDI and HDMI ports, please refer to the appendices of the ICMP-X installation manual.

Image 7–1

7.1 ICMP-X introduction

About ICMP-X

The ICMP 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 playable 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 board as well.

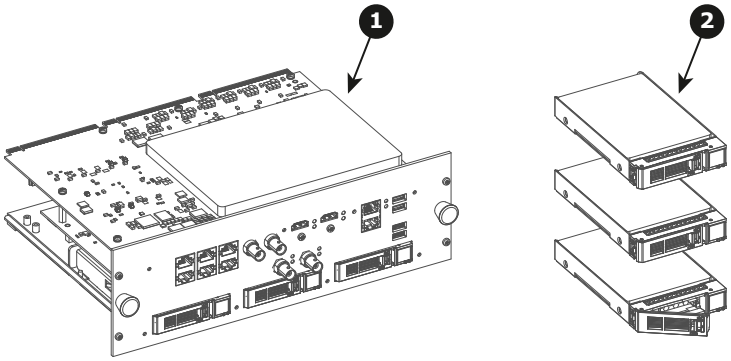


Image 7–2

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 plate of the ICMP-X

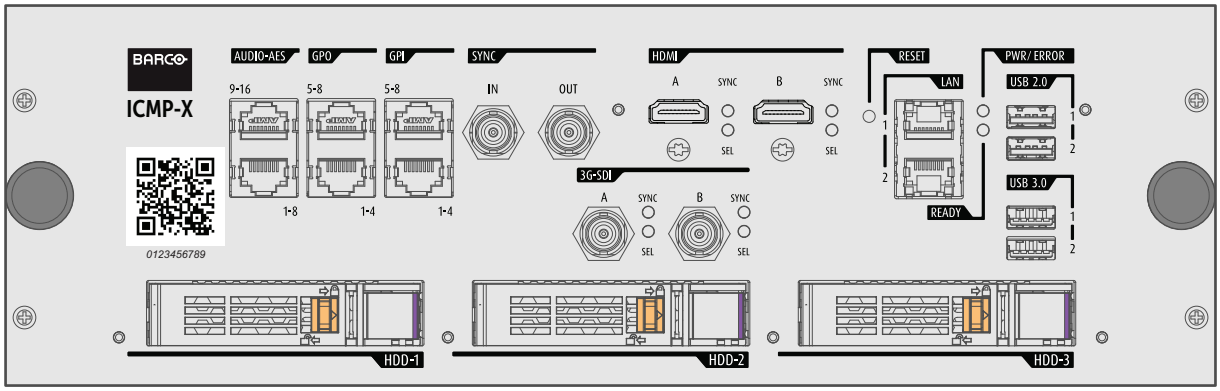


Image 7–3 Front plate ICMP-X

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 77.

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

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. This is the reason why it is very important to ensure that you use correct model.

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

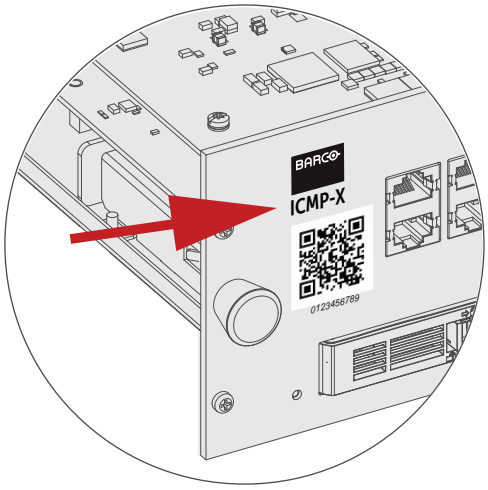


Image 7–4

Location in the Card Cage

The Card Cage can be different depending the projector type but it generally consists of a button module and several removable units, which include the ICMP-X (reference 1) and the Barco Cinema Controller (reference 2).

ICMP-X location in the Card Cage of an SP4K and SP2K series projector.

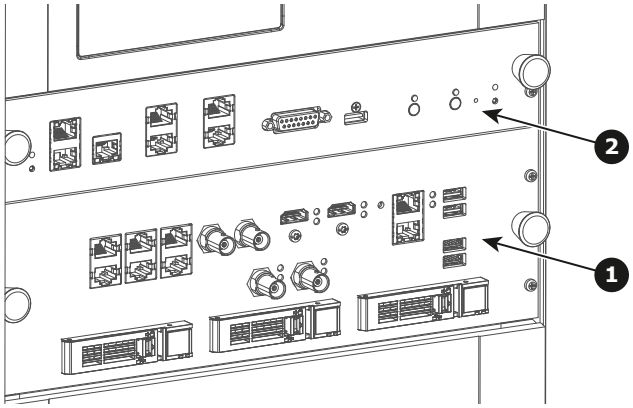


Image 7–5

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.

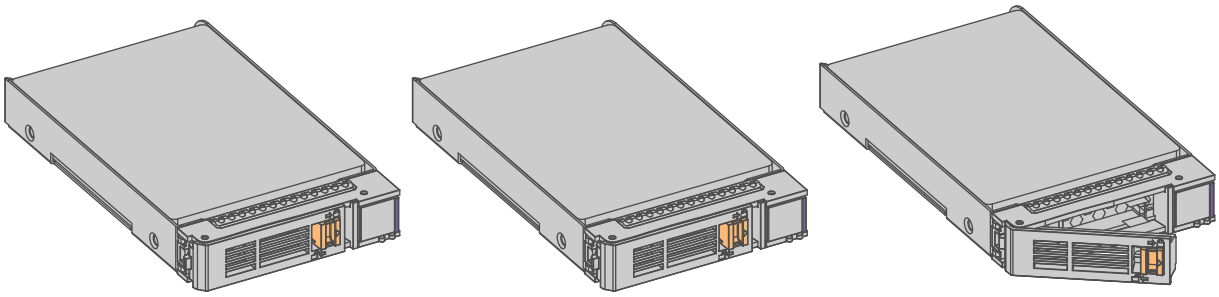


Image 7–6

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

About degraded mode

When a RAID array experiences the failure of one disk, it enters in degraded mode. Content storage and playback remains available on the ICMP-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-Xs 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-Xs 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 [3] 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.
3.84TB: Intel D3-S4610, SSD SATA 2.5 (order code: SSDSC2KG038T801)	Yes	Yes, only if the GEN1 storage controller is replaced by a GEN2 storage controller. Software version 1.4.2 or higher is needed.

3. This list only takes into account supported HDD models validated by Barco at the moment this manual was published. The most update list is available in the installation manual of the ICMP-X

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.	• 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.	• 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).	• All content will be lost. • RAID initialization need to be perform with Communicator. • immediately usable after RAID initialization + restart (content can be ingested).	• 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 **without S4 ready sticker** (Spare part kit provided by Barco with a set of 3 hard disks configured to GEN1 storage controller).	On an ICMP with GEN1 storage Controller: • RAID initialization does not need to be performed. • Content can be ingested immediately. On an ICMP with GEN2 storage Controller: • Only usable after RAID initialization + restart. • Content can be ingested immediately after restart.	• RAID initialization needs to be perform with Web Communicator. • immediately usable after RAID initialization + restart (content can be ingested).
Barco HDD replacement kit **with S4 ready sticker** (New Spare part kit provided by Barco with a set of 3 hard disks configured to GEN2 storage controller).	On an ICMP with GEN1 storage Controller: • Only usable after RAID initialization with Communicator + restart (content can then be ingested immediately). On an ICMP with GEN2 storage Controller: • RAID initialization does not need to be performed. • Content can be ingested immediately after restart.	• RAID initialization does not need to be performed. • Content can be ingested immediately.

Type of HDD swap	On ICMP	On ICMP-X
Set of 3 HDDs with content reused from an ICMP with GEN1 storage controller.	On an ICMP with GEN1 storage controller: • Content is preserved but certificates (KDM) need to be re-ingested. On an ICMP with GEN2 storage controller: • All content will be lost. • Only usable after RAID initialization + restart (content can then be ingested immediately).	• 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.	1. Unit is equipped with an GEN1 storage controller (default configuration): - All content will be lost. - RAID initialization needs to be perform with Communicator. 2. Unit has been upgraded with a GEN2 storage controller (+ ICMP software 1.4.2 or higher is installed): - Content is preserved but certificates (KDM) need to be re-ingested.	• Content is preserved but certificates (KDM) need to be re-ingested.

7.4 ICMP-X communication and input ports

Location of the ports

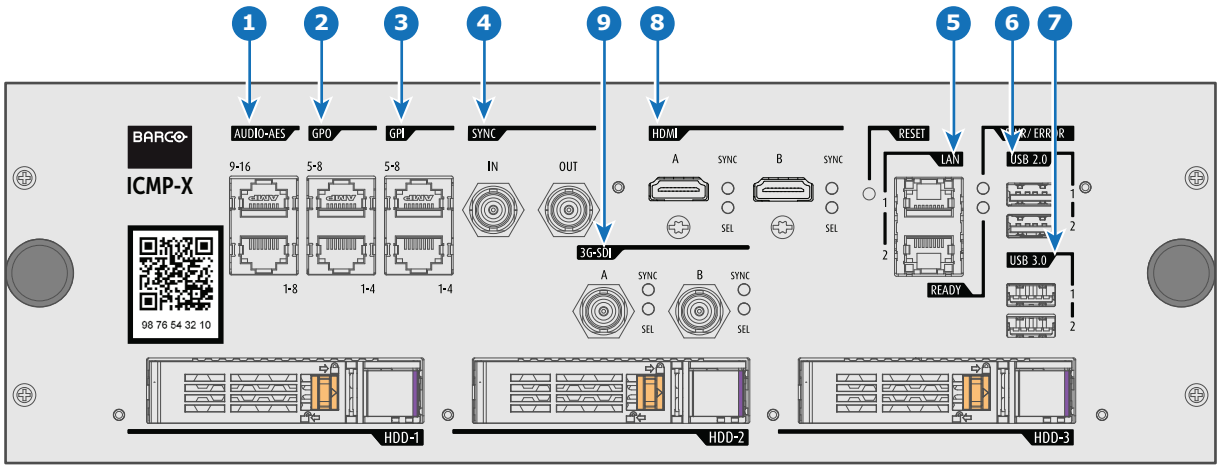


Image 7–7

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 Web Communicator software. Please refer to the Web 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 Web Communicator software. Please refer to the Web 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 cues (GPI) on each input cue is configured via the Web Communicator software. Please refer to the Web Communicator user guide for further information.

4 SYNC IN / OUT

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

5 LAN (2 ports)

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: It is strongly recommended to use a dedicated Data network connected to the ICMP-X LAN to optimize the data transfer. Using the projector LAN (Cinema controller Board - CCB) in order transfer a large amount of data significantly increases the transfer times (x 20). Furthermore, response times between devices connected to this network will be greatly expanded during these data transfers.

6 USB 2.0 (2 ports)

The ICMP-X can be connected to a USB 2.0 media device 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. In addition, USB 3.0 ports supply more power than USB 2.0 ports to an external device when, for example, the content is ingested from devices that do not have their own power supply.

7 USB 3.0 (2 ports)

The ICMP-X can be connected to a USB 3.0 media device to load content. The USB port can be used to load content (DCP), keys (KDM) or software updates.

TIP: USB 3.0 ports are recommended for fast ingest when connected to an appropriate USB 3.0 source. In addition, USB 3.0 ports supply more power than USB 2.0 ports to an external device when, for example, the content is ingested from devices that do not have their own power supply.

8 **HDMI A / B**

HDMI 2.0 connector to connect a video source.

9 **3G-SDI A / B**

SDI connector to connect a video source.

7.5 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.

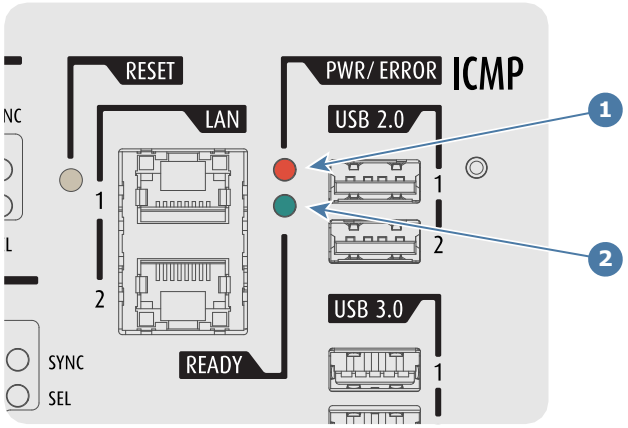


Image 7–8

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

7.6 ICMP-X HDD status LEDs

ICMP-X HDD status LEDs

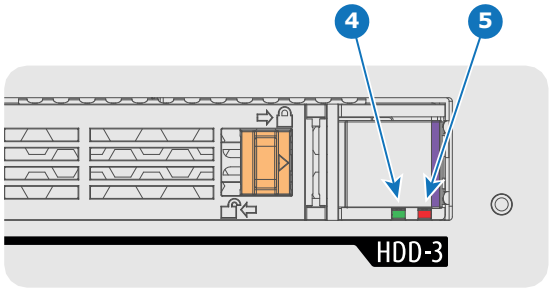


Image 7–9

4 HDD I/O LED
5 RAID LED

Status overview HDD I/Oand RAID LEDs:

HDD I/O	RAID	ICMP-X 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.
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
One disk failed (red LED) + **RAID degraded**. The ongoing event is not interrupted. **Note:** The disk status (RAID degraded) can be retrieved via the (Web) Commander. See user guide of the (Web) Commander.	1. Switch off the power. 2. Replace the defect HDD with approved model of the same storage capacity. See procedure “Removing a HDD from the ICMP-X”, page 89, and “Installing a HDD into the ICMP-X”, page 90. Ensure to insert the HDD firmly. 3. Switch on the power. **Result:** As soon the new HDD is detected by the ICMP-X the rebuild of the RAID is started (Blinking red LED).
One disk failed (red LED) + Error 10580 “**local storage not available**”. **Note:** The disk status (Error code) can be retrieved via the (Web) Commander. See user guide of the (Web) Commander.	1. Switch off the power. 2. Replace the defect HDD with approved model of the same storage capacity. See procedure “Removing a HDD from the ICMP-X”, page 89, and “Installing a HDD into the ICMP-X”, page 90. Ensure to insert the HDD firmly. 3. Switch on the power.

Situation	Solution
	Result: As soon the new HDD is detected by the ICMP-X the rebuild of the RAID is started (Blinking red LED).
Multiple disks failed (multiple red LEDs) + Error 10573 “**The RAID is broken”**. **Note:** The disk status (RAID broken) can be retrieved via the (Web) Commander. See user guide of the (Web) Commander.	1. Switch off the power. 2. Replace all defect HDDs with approved models of the same storage capacity. See procedure “Removing a HDD from the ICMP-X”, page 89, and “Installing a HDD into the ICMP-X”, page 90. Ensure to insert the HDDs firmly. 3. Switch on the power. 4. Start “RAID Initialize”. See user guide of the (Web) Communicator. **Result:** a new empty RAID is created.
All HDD LEDs remain off + Error 10580 “**local storage not available**”. **Note:** The disk status (Error code) can be retrieved via the (Web) Commander. See user guide of the (Web) Commander.	1. Switch off the power. 2. Reseat all HDDs. See procedure “Removing a HDD from the ICMP-X”, page 89, and “Installing a HDD into the ICMP-X”, page 90. 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.

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 device certificate

Purpose of the ICMP-X device certificate

The device certificate (*.pem) of the ICMP-X is a digital certificate signed by Barco which is required when ordering the KDM 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.

Use your control software to retrieve the device certificate directly from the ICMP-X, or retrieve the device certificate from the website by using the QR (Quick Response) code located on the front face. See procedure “Obtaining the ICMP-X certificate”, page 88.

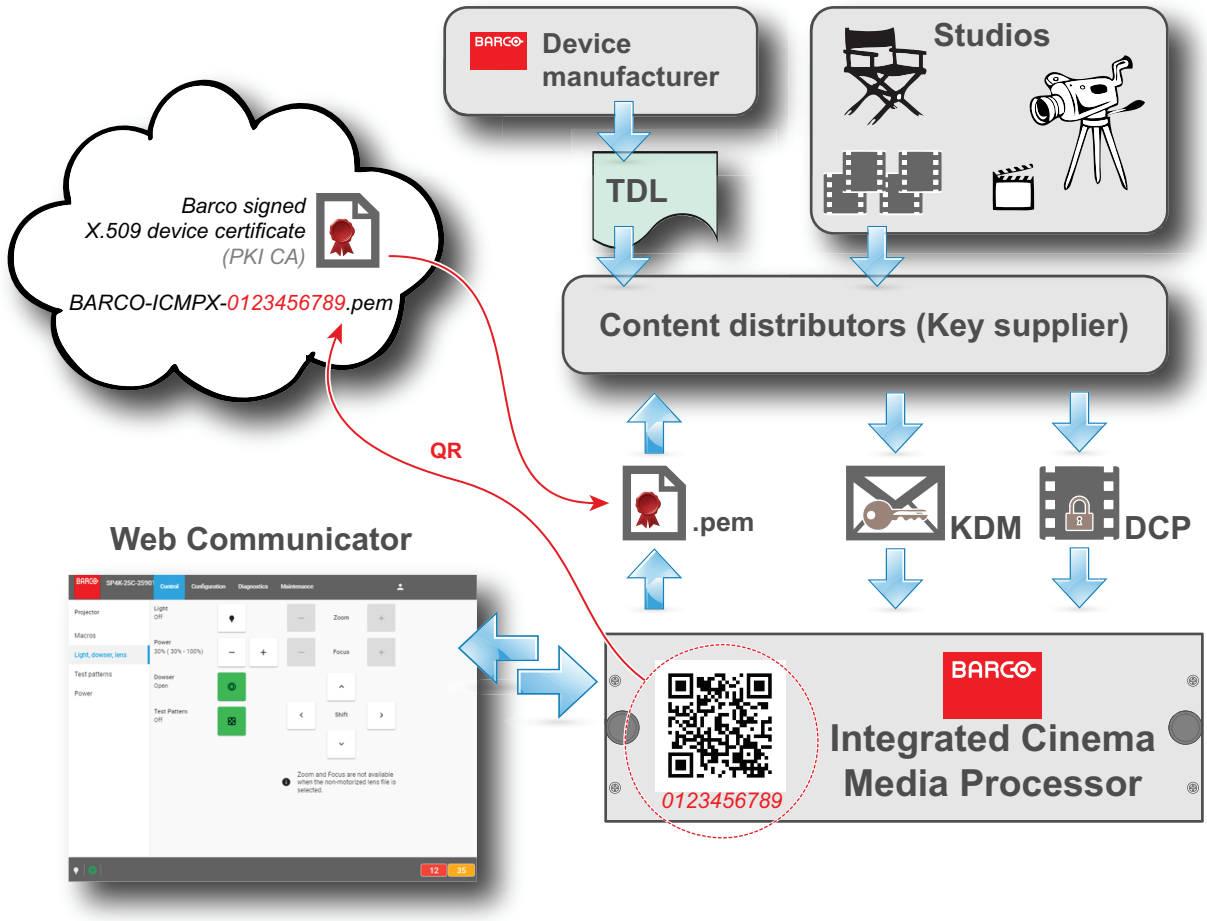


Image 7–10

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*).

7.8 ICMP-X configuration via Web Communicator

About ICMP-X configuration

The 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 Web Communicator, the Barco configuration software. Please refer to the user guide for more information.

Factory settings

Restoring to factory setting is a feature that removes all settings performed on the ICMP-X and replaces them with the default values set at the factory. Please refer to the user guide for more information.

Internal clock settings

The crystal on the ICMP-X board that manages the clock shows a minimal drift. This is expected behavior, all clock crystals have an unavoidable drift. The internal clock can be corrected using the Web Communicator. Checking the *internal clock settings* and correcting if necessary is a maintenance action should be repeated every 3 months. When neglected and the drift becomes too big, the system may lock up.

However, it is also possible to do an automatic correction by enabling **Automatic Synchronization** in Web Communicator. When enabled, you have to enter the IP address for a Network Time Protocol server (NTP server) where the ICMP-X can find a proper sync signal. As long as the projector is connected to an NTP server, the ICMP-X will automatically keep its clock correct. For detailed instructions see user guide.

7.9 ICMP-X reset

ICMP-X reset possibilities

- The **Reboot ICMP-X** button in the *Control – Power* menu of the GUI of the Web Communicator.
- The ICMP-X hardware reset button located on the front panel of the ICMP-X

CAUTION: Using the reset button is not recommended. Only use this as a last resort, when all other reset possibilities are exhausted. If you decide to use this button, make sure the light source is turned off to avoid damage to the DMDs of the light source.

How to reset the ICMP-X?

1. Click on the **Reboot ICMP-X** button in the GUI of the **Web Communicator**

   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.

   The lasers are switched off and the projector remains in ON mode.

   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 light source of the projector.
   2. press the ICMP-X **hardware reset button** a few seconds (reference 3 Image 7–11) .

      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.

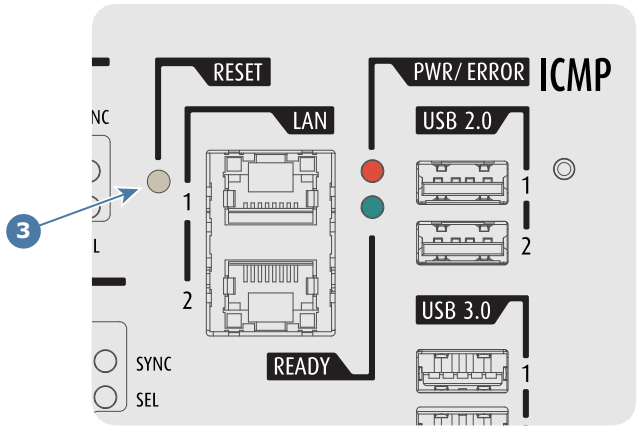


Image 7–11

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!

7.10 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.

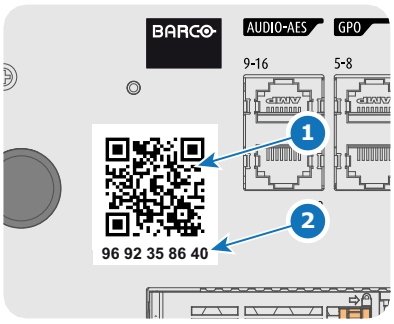


Image 7–12

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.

7.11 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.

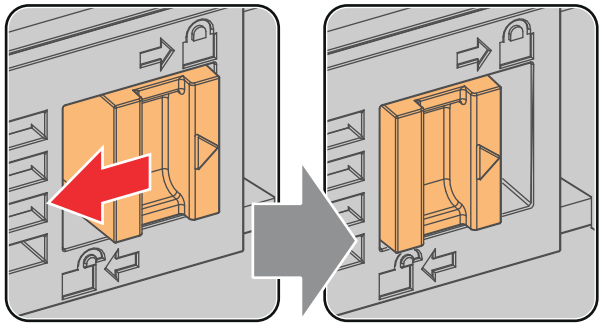


Image 7–13

3. Push the unlock button to open the handle.

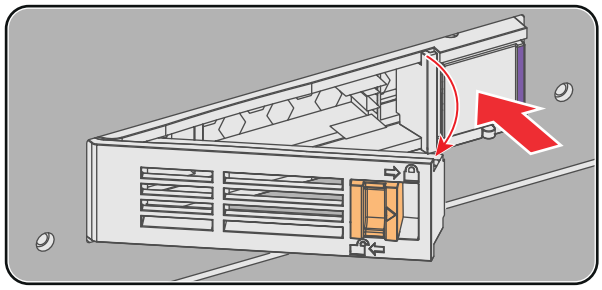


Image 7–14

4. Pull the HDD out of its slot.

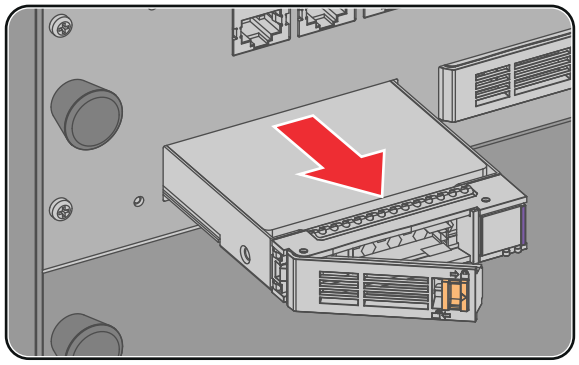


Image 7–15

To install an HDD, see the following procedure: “Installing a HDD into the ICMP-X”, page 90.

7.12 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 89.

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 77.

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.

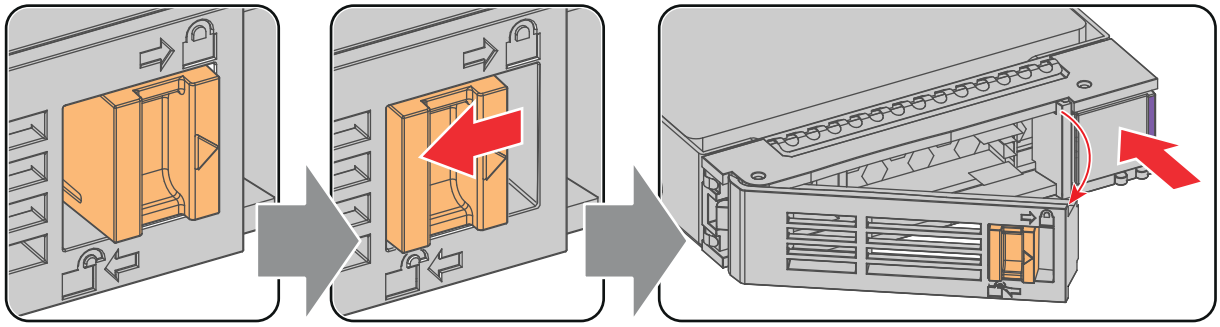


Image 7–16

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.

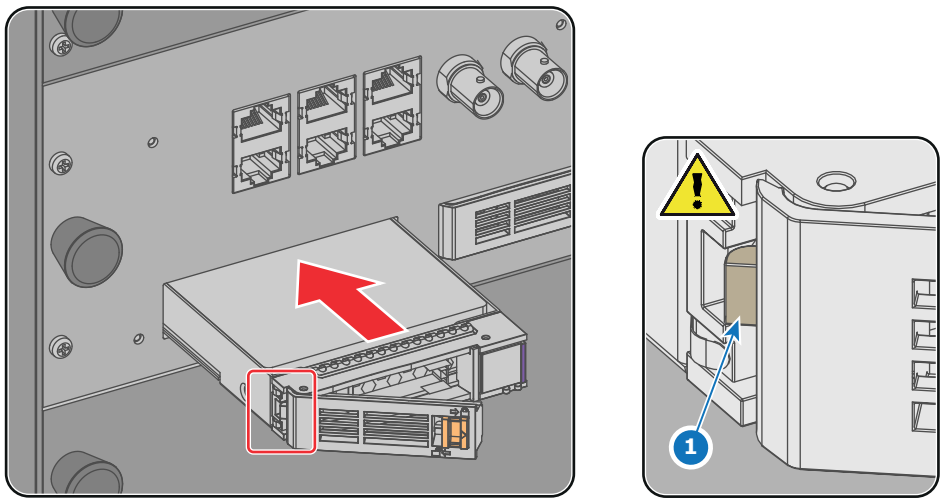


Image 7–17

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

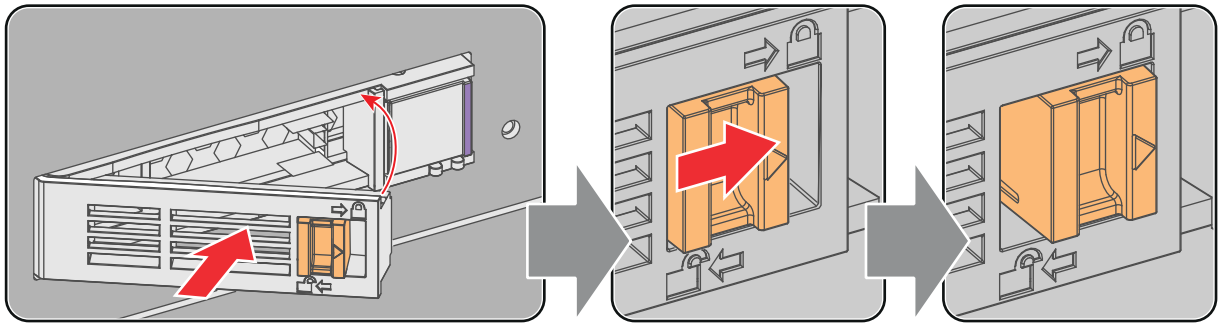


Image 7–18

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.

Projector Power Cycle

8

About the Projector Power Cycle

This chapter contains the Switch ON and Switch OFF procedures for the SP2K-S projector. These procedures highlight all important points to be checked prior to switching the projector ON. This is to ensure a safe startup of the projector.

8.1 Explaining the power states

Power states explained

The projector can have one of several power states, which you can recognize by the state of the power LED.

Projector Power State	Behavior	Power LED
Mains power off	Projector is not powered	Off
OFF mode	The power button and GPI3 are powered (for remote power-on).	Slowly blinking RED
ECO mode	Projector IP connection is active; touch display and image processing are off.	Full RED
READY mode	Projector is fully powered and active; touch display is on (if available), Web Communicator is active and light is OFF.	Full GREEN
ON mode	Projector is fully powered and active; touch display is on (if available), Web Communicator is active and light is ON.	Full GREEN
Going to ECO mode	Turning electronics and light source OFF.	Blinking green

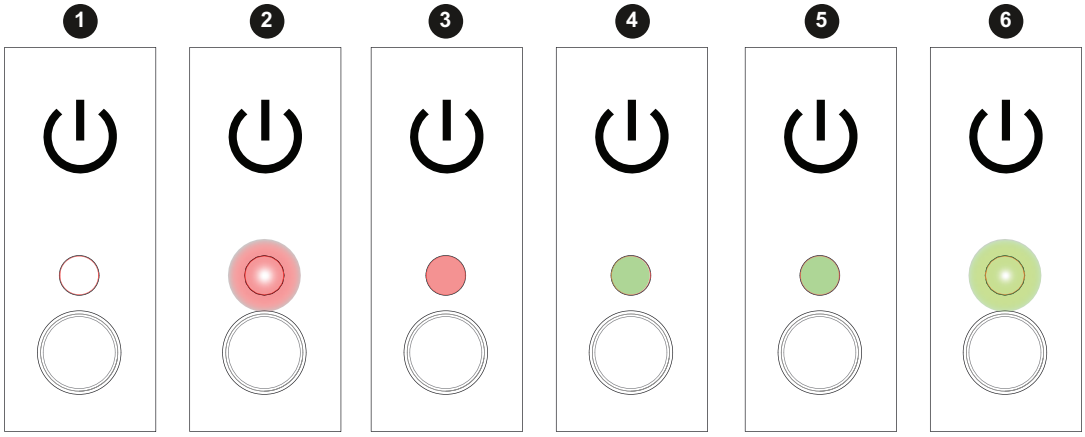


Image 8–1

1 Mains power off
2 OFF mode
3 ECO mode
4 READY mode
5 ON mode
6 Going to ECO mode

Switching between power states

You can change power state by using one of the following options:

- Pressing the Power button on the Cinema Controller (reference 1)
- Sending a wake-up signal to the GPI3 input for more than 0.5 seconds, but less than 2 (reference 2).[4]
- Using the *ECO* menu on the touch display (if available).
- Using the *Power* menu in Web Communicator.

4. GPI3 works the same way as the power button. Thus take into account that sending a signal for more than 6 seconds will turn the projector OFF instead.

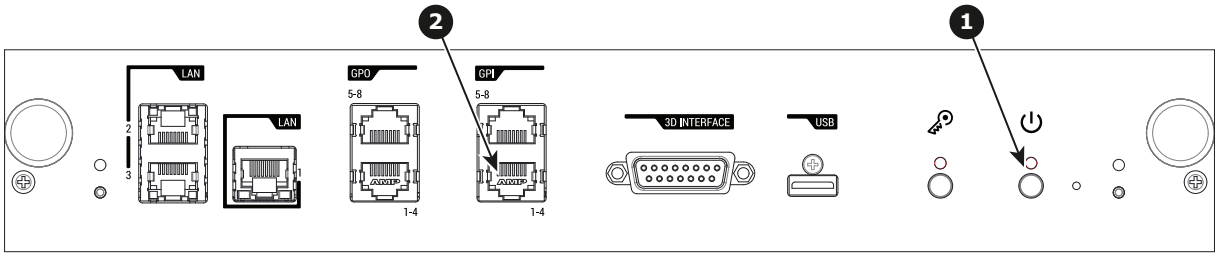


Image 8–2 Location of the Power button and GPI 1-4 input on the Cinema Controller.

Power state diagram

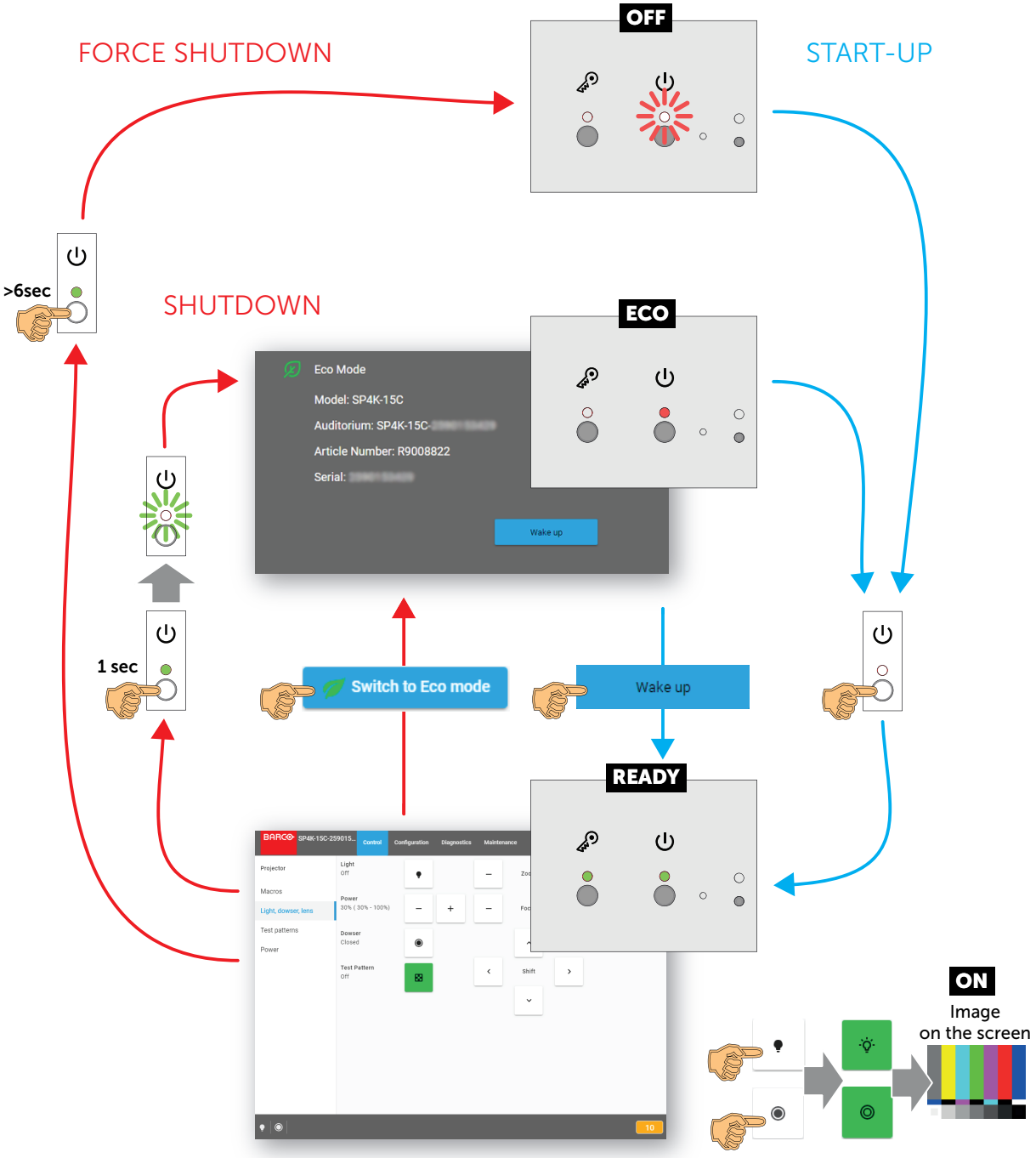


Image 8–3 Power State diagram

8.2 Switching the projector ON

Possible ways to switch on

There are multiple ways to switch on the projector, depending on a few factors:

Current Power Stage	How to power on	Notes
OFF	• Locally, using the power button • Remotely, using GPI3	After the projector is powered, you can further access the projector using either Web Communicator or the optional touch display.
ECO mode	• Locally, using the power button and touch display[5] • Remotely, using Web Communicator • Remotely, using GPI3	Take into account that the Web Communicator method can only be used when the projector is in ECO mode.

How to switch on locally, using the touch display?

1. Ensure that the SP2K-S projector is installed onto a stable platform.
2. Ensure the projector is correctly connected to the mains power.
3. Ensure that the correct lens is installed for your application.
4. Press the power button to switch the projector ON.

   The projector will start up and the touch display will start its initialization procedure.
5. Wait until the *Projector control* menu is fully accessible on the touch display.

   Tip: While the menu may become accessible early on, certain icons (e.g. the Light button) may be greyed out until the projector is ready to play.

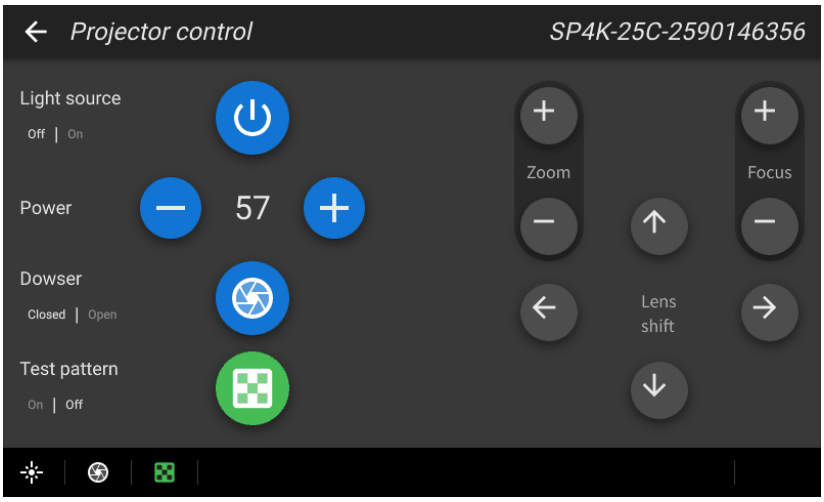


Image 8–4 Example of the Projector control menu on the touch display.

6. Press the **Light** button to activate the light source. Use a press of >1 second.

   The Light source will prepare itself for playing, by doing a laser self-test. This may take a while, depending on your projector variant. While the light source is turning on, the Light button will blink green. Once completed it will be full green.
7. Press the **Dowser** button to open the dowser.

5. Only possible if the Touch Display option has been chosen.

How to switch on remotely, using only Web Communicator?

1. Ensure that the SP2K-S projector is installed onto a stable platform.
2. Ensure the projector is correctly connected to the mains power.
3. Ensure that the correct lens is installed for your application.
4. Browse to the IP address of the projector, using the http protocol.

   With the projector in ECO mode, you will be redirected to the ECO mode page.

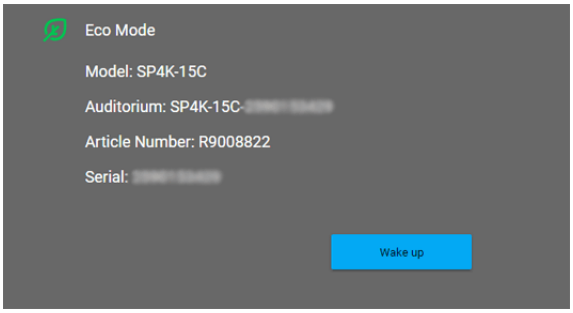


Image 8–5 Example of the Eco Mode page in Web Communicator

5. On the Eco mode page, press **Wake up**.

   The projector will start up. Once it has fully started up, you will be redirected to the login page of Web Communicator.
6. Once the login page becomes available, log in to the projector.

   Once logged in, you will be redirected to the *Light, dowser, lens* menu.
7. In this menu, press the **Light** button to activate the light source. Use a press of >1 second.

   The Light source will start warming up.
8. Press the **Dowser** button to open the dowser.

How to switch on remotely, using only GPI3?

1. Ensure that the SP2K-S projector is installed onto a stable platform.
2. Ensure the projector is correctly connected to the mains power.
3. Ensure that the correct lens is installed for your application.
4. Ensure that the GPI port is connected to a supported automation controller (e.g. a JNIOR device).
5. Send a signal to GPI3 for more than 0.5 seconds (but less than six seconds).

   Tip: GPI3 works in a similar fashion to the power button. So sending a signal for six seconds or more will force the projector OFF instead.

CAUTION: See the User Guide of the projector to operate and control the projector.

8.3 Switching the projector OFF

Putting the projector in ECO mode is thé preferred method of shutting down the projector after a day of playing. Only switch the projector to OFF if technical problems have occurred.
Take into account that you can **not** start the projector remotely when the projector has been switched OFF. You can only power it using the power button.

How to put the projector in ECO mode, using the touch display?

1. In the main menu of the touch display, press on the ECO button.

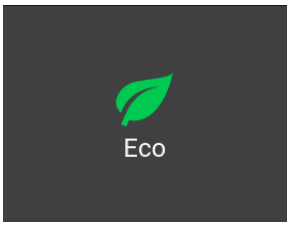


Image 8–6

2. In the Eco menu, press “Switch to ECO mode”. Press for more than one second.

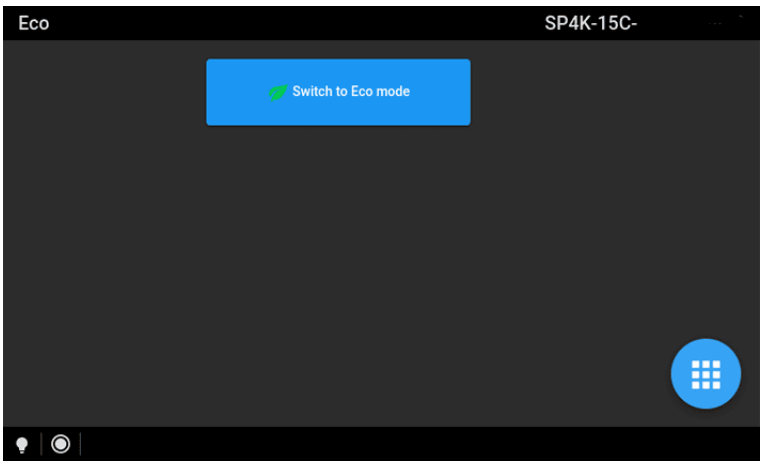


Image 8–7 Example of the ECO menu on the touch display

How to put the projector in ECO mode, using the Web Communicator?

1. In the Communicator, browse to *Control* >> *Power*.
2. In the Power menu, press **Switch to ECO mode** and confirm.

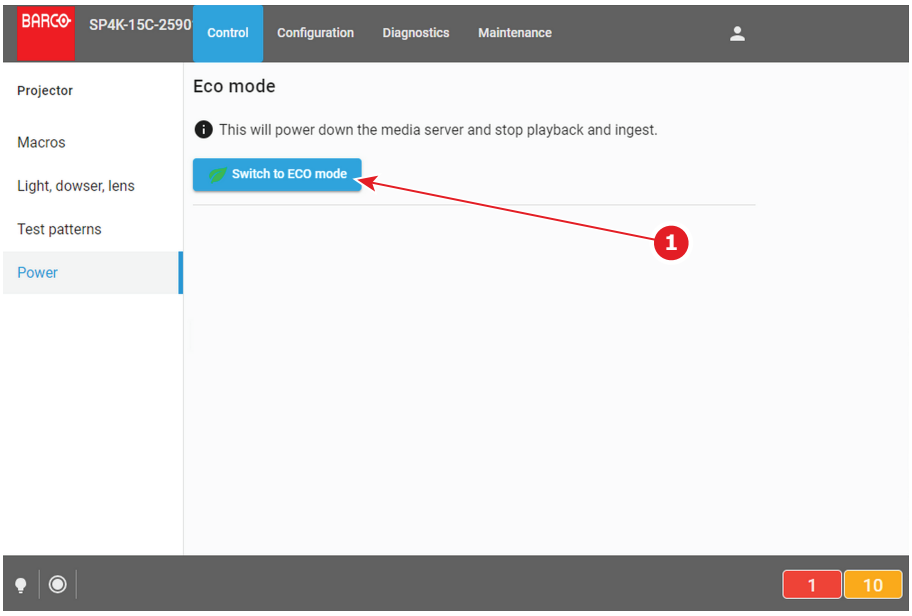


Image 8–8

How to turn the projector OFF?

1. Press the power button for more than six seconds. The projector will go to OFF mode.

   or

   Send a signal via GPI3 for more than six second. The projector will go to OFF mode.

9 Connectivity

9.1 Connecting to the projector for the first time

Default settings

If you want to access Web Communicator, take into account the following default settings of the projector.

By default you will be able to access Web Communicator using the following default settings.

Item	Setting
IP address	192.168.100.2
Subnet mask	255.255.255.0
Default gateway	192.168.100.1
Default hostname	[projector model] - [serial number]

How to connect to an SP2K-S projector with a touch display

1. On the touch display of the projector, press either *About*, or *Settings* to see the IP address assigned to the projector.
2. Use a web browser to browse to the assigned IP address.

   The login page of Web Communicator will be displayed.
3. Log in onto Web Communicator.

How to connect to an SP2K-S projector without a touch display

1. Use a web browser to browse to the default IP address of the projector,

   The login page of Web Communicator will be displayed.

   or

   use a Bonjour program to trace the random IP address assigned to your projector.
2. Log in onto Web Communicator.

Using the Bonjour software to trace an SP2K-S projector on your network

If your network automatically hands out IP addresses and a random IP address has been assigned to your projector without touch display because of this, the only way to obtain this IP address is by using a Bonjour program.

The Bonjour software will display the SP2K-S projector as a combination of product key and the default hostname. In more detail, this is:

- “BARCO PROJ” [projector model] – [serial number]
- For example: “BARCO PROJ SP2K-S-0123456789”

Default passwords Web Communicator

When logging in for the first time, use one of the following default passwords

User group	User name projector	Default password	User name ICMP	Default password
Administrator	admin	Admin1234	admin	Admin1234
Service technician	st	Service1234		
Show manager	show	Show1234	show	Show1234
Projectionist			proj	Proj1234

9.2 Software update

How to update the software

1. Download the latest firmware from the Barco website. Click on *myBarco* and login to get access to secured information. Registration is necessary.

   If you are not yet registered, click on *New to myBarco* and follow the instructions. With the created login and password, it is possible to login where you can download the software.

   Note: Keep in mind to unzip the package. Only *.fw files can be selected for software updates.

2. Make sure the projector is powered on and is in READY mode.
3. Browse to the Web Communicator application and log in as administrator.
4. Click on tab **Maintenance** and select **Software update**.
5. In the Software Update menu, click *Browse for a package to install*.

   An *Open* browse window is prompted.

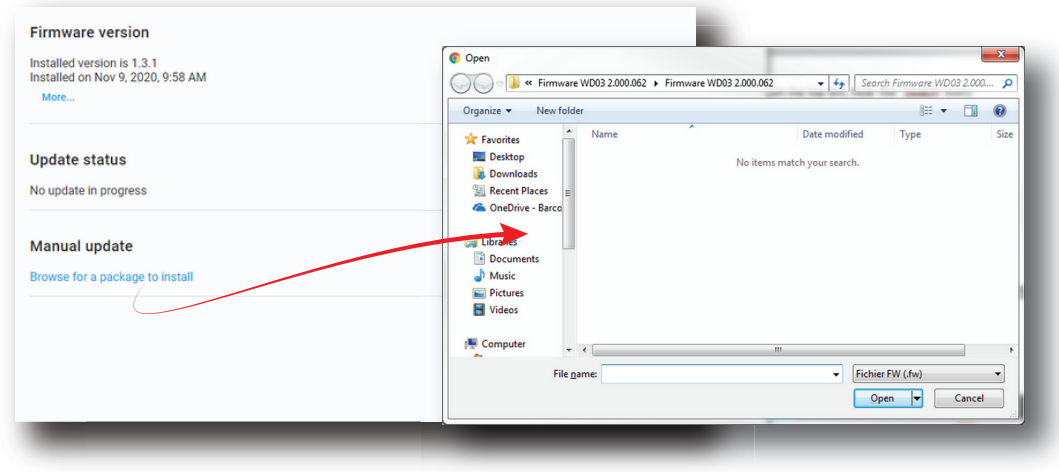


Image 9–1

6. Select the file downloaded from the Barco website.

   The selected file will be mentioned under *Manual update*.

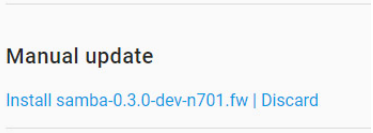


Image 9–2 Example of an update package

7. Click Install and confirm.

   The software update will start.

How to update the software via USB device

1. Download the latest firmware from the Barco website. Click on *myBarco* and login to get access to secured information. Registration is necessary.

   If you are not yet registered, click on *New to myBarco* and follow the instructions. With the created login and password, it is possible to login where you can download the software.

   Note: Keep in mind to unzip the package. Only *.fw files can be selected for software updates.

2. Make sure the projector is powered on and is in READY mode.

3. Browse to the Web Communicator application and log in as administrator.
4. Click on tab **Maintenance** and select **Software update**.
5. Plug a USB device with the downloaded file into the USB port of the Cinema Controller.

   Note: The USB device should be formatted in FAT-32. It may only contain the firmware file in the root level of the device.

   The USB device will be detected and a window will prompt in the Web Communicator.
6. Click Proceed to have the image added in the Manual update section of the page.

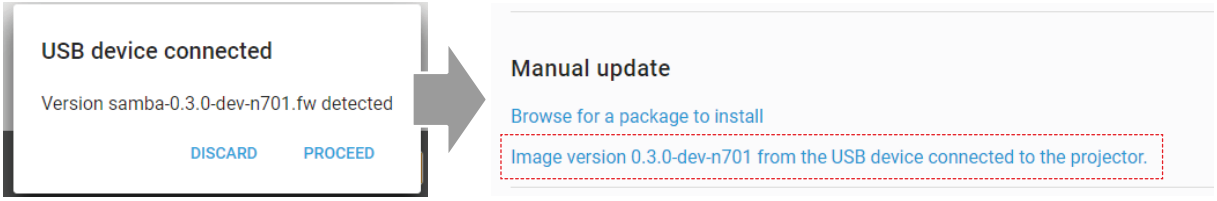


Image 9–3 Example of a software package inserted via USB device

7. Click "*Image [name] from the USB device connected to the projector*" and confirm.

   The software update will start.

Update progress

The update will proceed as follows:

1. The software package will be installed on the projector.

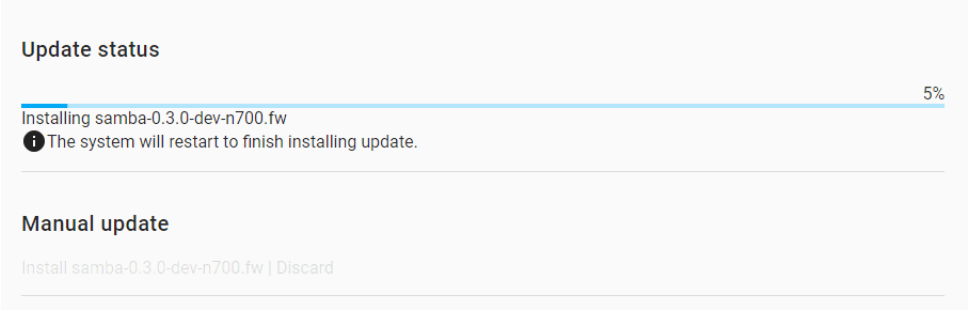


Image 9–4 Example of an update in progress

2. Once the software package has been installed, the following message will be prompted and the projector will reboot.

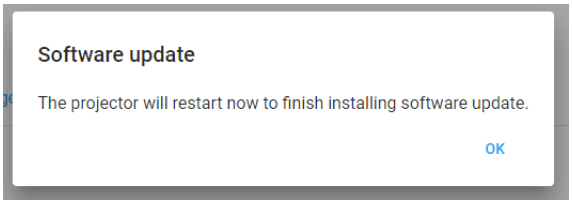


Image 9–5 Example of the prompted reboot message

3. **Take note**: While rebooting, you will lose connection to the projector.
4. Once rebooted, every projector component will be updated to the version included in the software package. Take into account that it might take a while until all components have been updated.

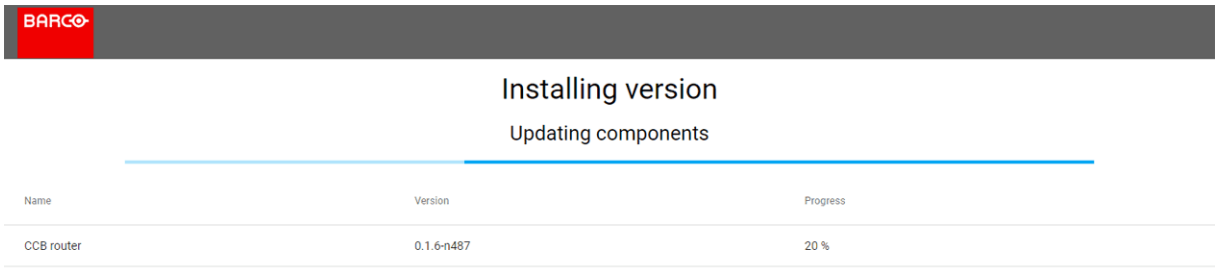


Image 9–6 Example of the components update page.

5. Once every component has been updated, you will be redirected to the Web Communicator login page.

10 Convergence

About this chapter

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

Take into account that opening the sealed compartment to perform convergence will automatically trigger one or more tamper warning messages. Do not forget to clear these messages after convergence has been completed. For more info, refer to “”, .

10.1 Opening the sealed compartment

This procedure assumes that the side and top cover have been removed.

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

Required tools

Torx screwdriver T20

How to open the sealed compartment

1. Remove the two screws (reference 1) holding the side cover. Use a T20 Torx screwdriver.

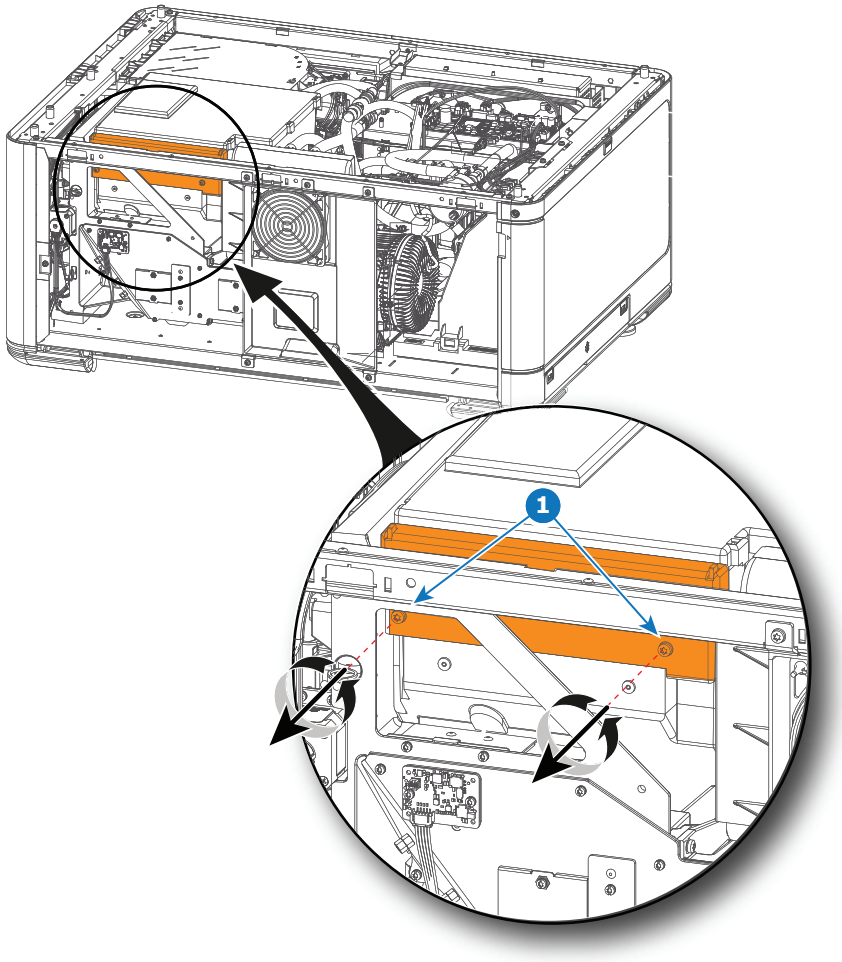


Image 10–1 Sealed cover fixation

2. Lift up the cover and remove it from the projector.

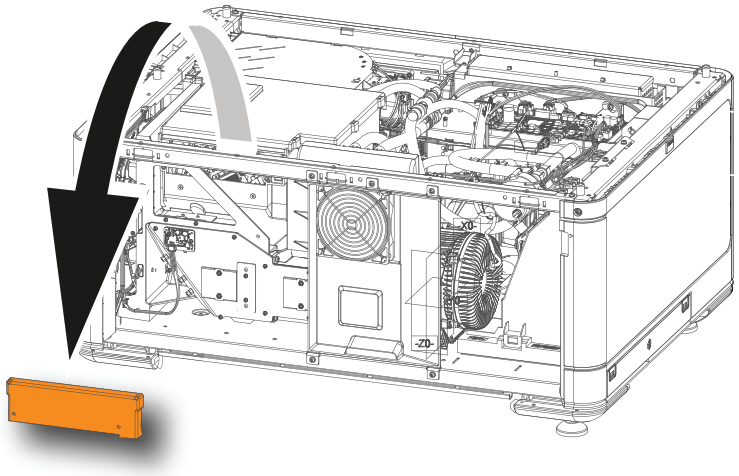


Image 10–2 Sealed compartment side cover, remove

3. Slightly slide the top cover a bit outwards to release the 6 hooks that hold it in place. Then lift it up and remove it from the projector.

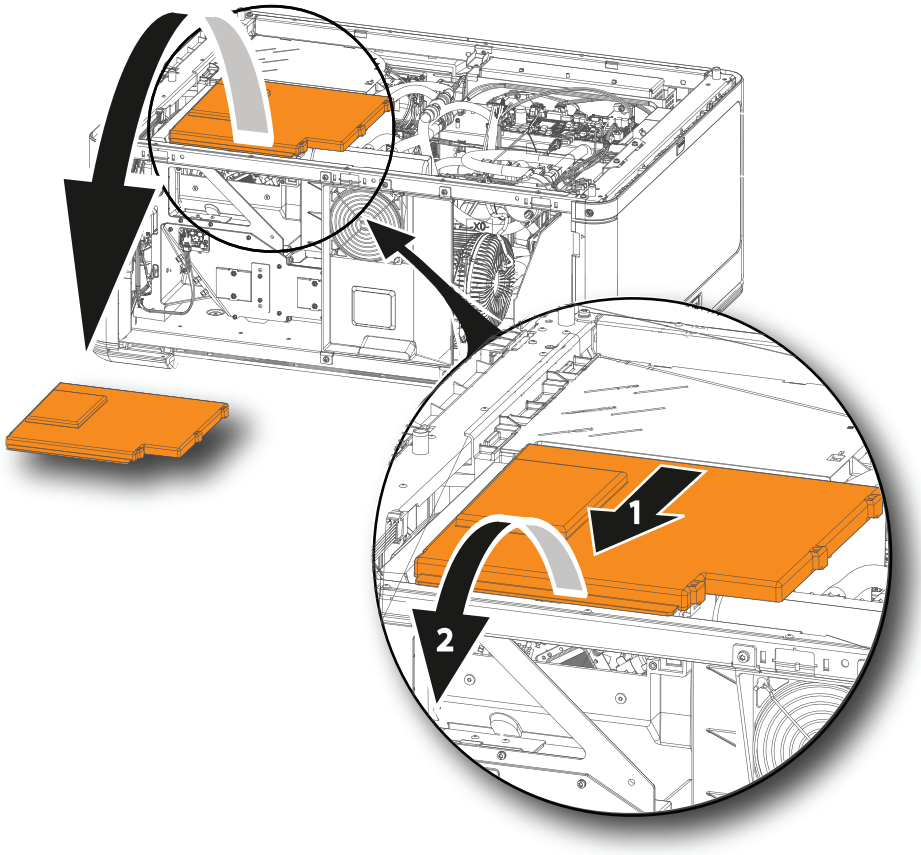


Image 10–3 Sealed top cover, remove

10.2 Closing the sealed compartment

Required tools

Torx screwdriver T20

How to close the sealed compartment

1. Place the top cover on the light processor compartment as illustrated.

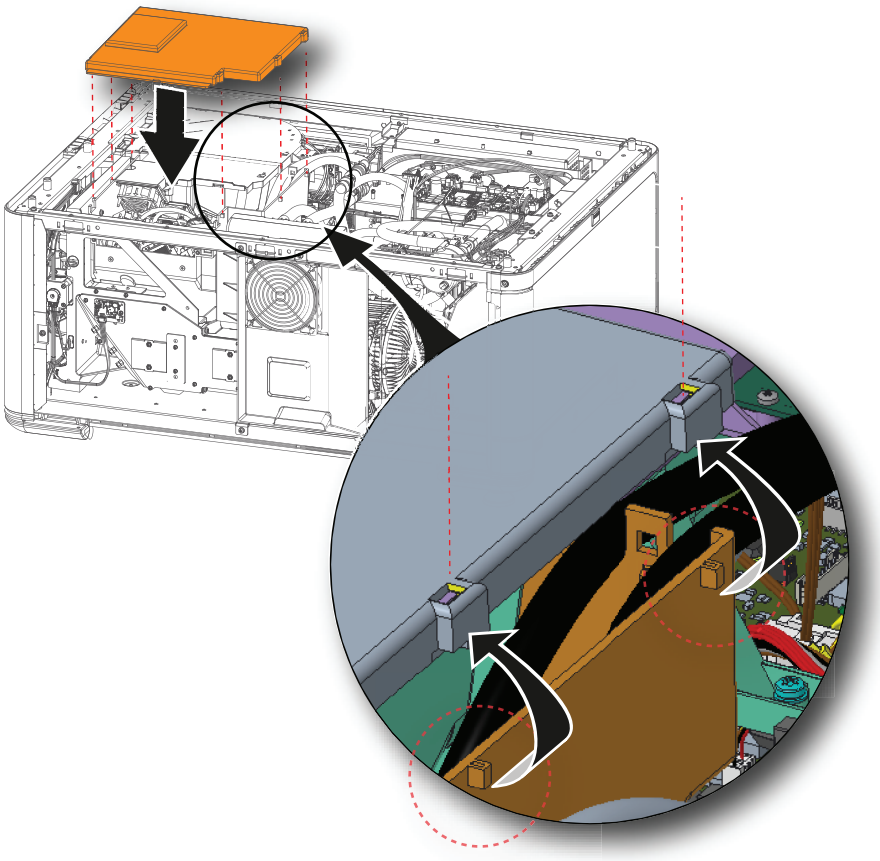


Image 10–4

2. Slide the top cover wards on the lips until it is in its correct position.

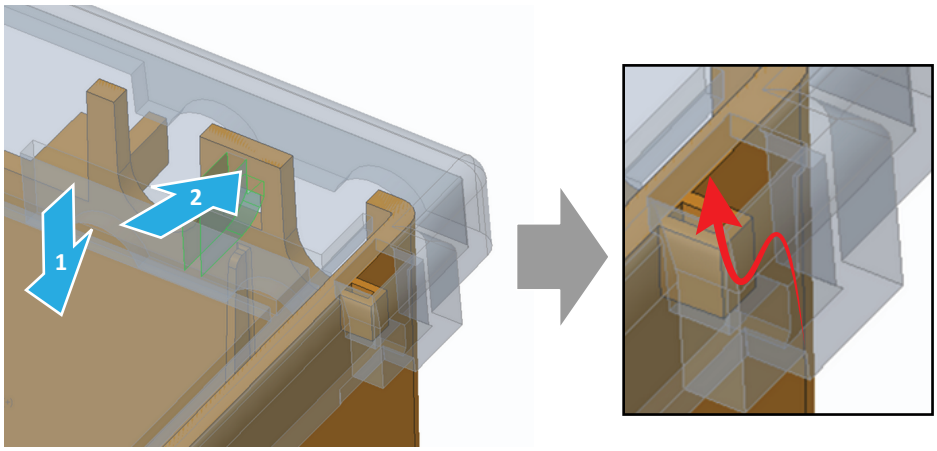


Image 10–5

3. Place the side cover. You need slide the cover downwards on both lips until it is in its correct position (take care to hook the cover onto the studs).

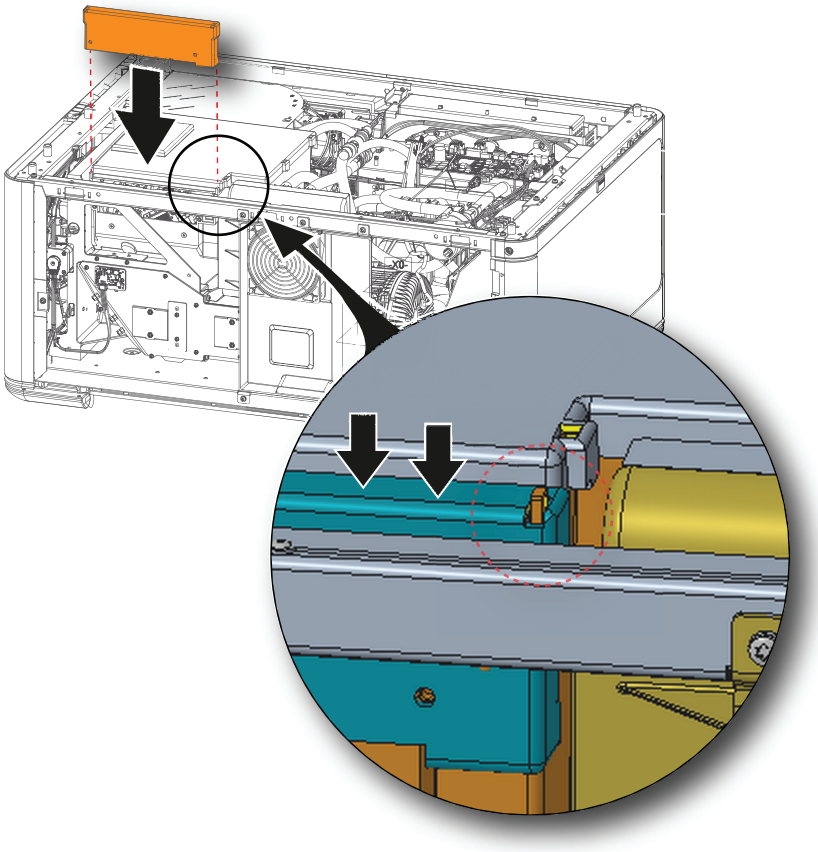


Image 10–6 Sealed compartment side cover, mount

4. Tighten the two screws (reference 1) to secure the side cover. Use a T20 Torx screwdriver.

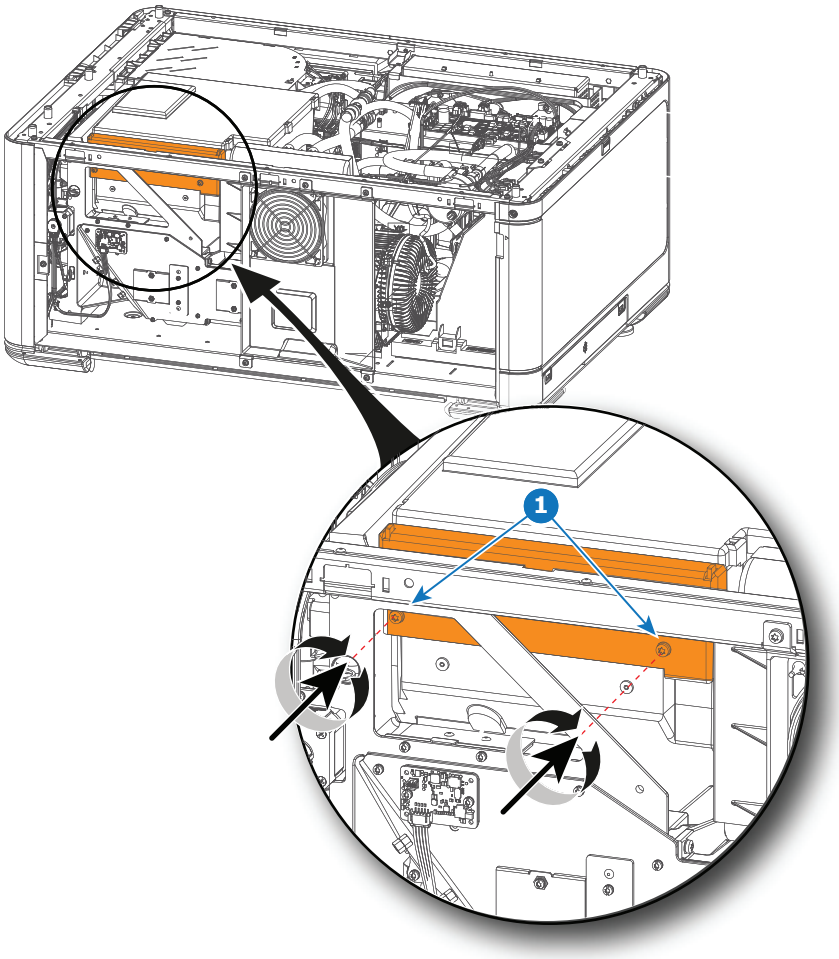


Image 10–7 Sealed cover fixation

10.3 Convergence controls

Control knobs

As the DMD of the Red channel is not accessible in the projector, it remains fixed. Therefore the image of this DMD will be taken as reference. Blue and Green will be aligned onto Red when a small convergence drift is recognized. The Blue and Green channels have pivot plates equipped with three control knobs for convergence adjustment, some of which are extended for accessibility. The adjustment knobs are numbered from 1 to 6 and have the same color as the channel which they affect.

To access the control knobs, the top cover and left side covers of the projector must be removed, as well as the top cover plate and side cover plate of the sealed Light Processor compartment.

A service kit with 3 pivot flex extenders is available to facilitate convergence setting.

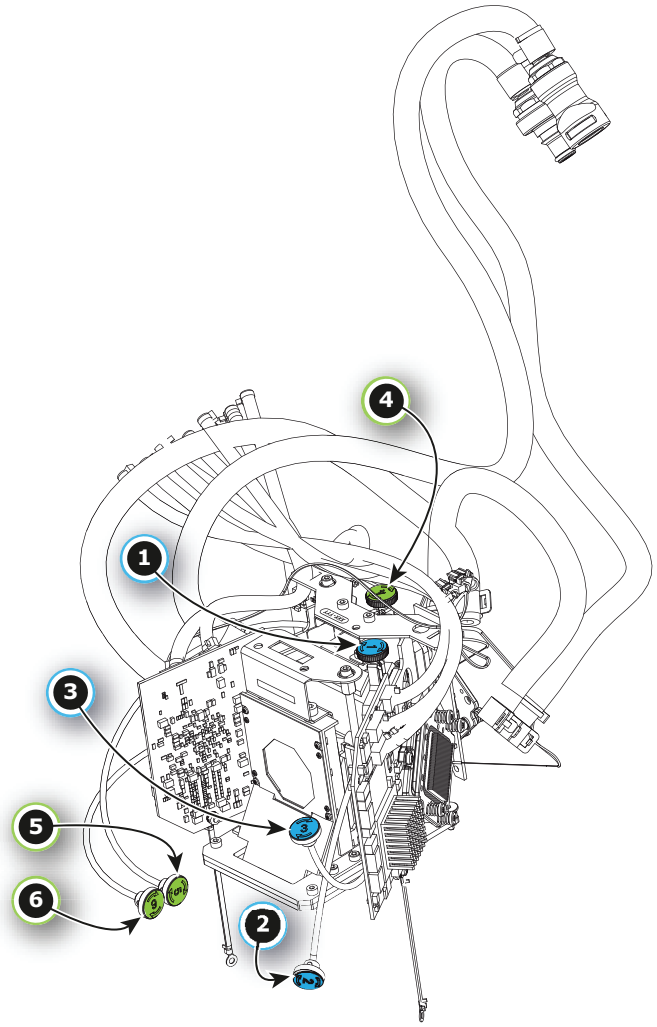


Image 10–8

1 Blue channel, knob number 1[6]
2 Blue channel, knob number 2[6]
3 Blue channel, knob number 3[6]
4 Green channel, knob number 4[6]
5 Green channel, knob number 5[6]
6 Green channel, knob number 6[6]

6. Exact position of the knobs can differ slightly

Convergence test pattern

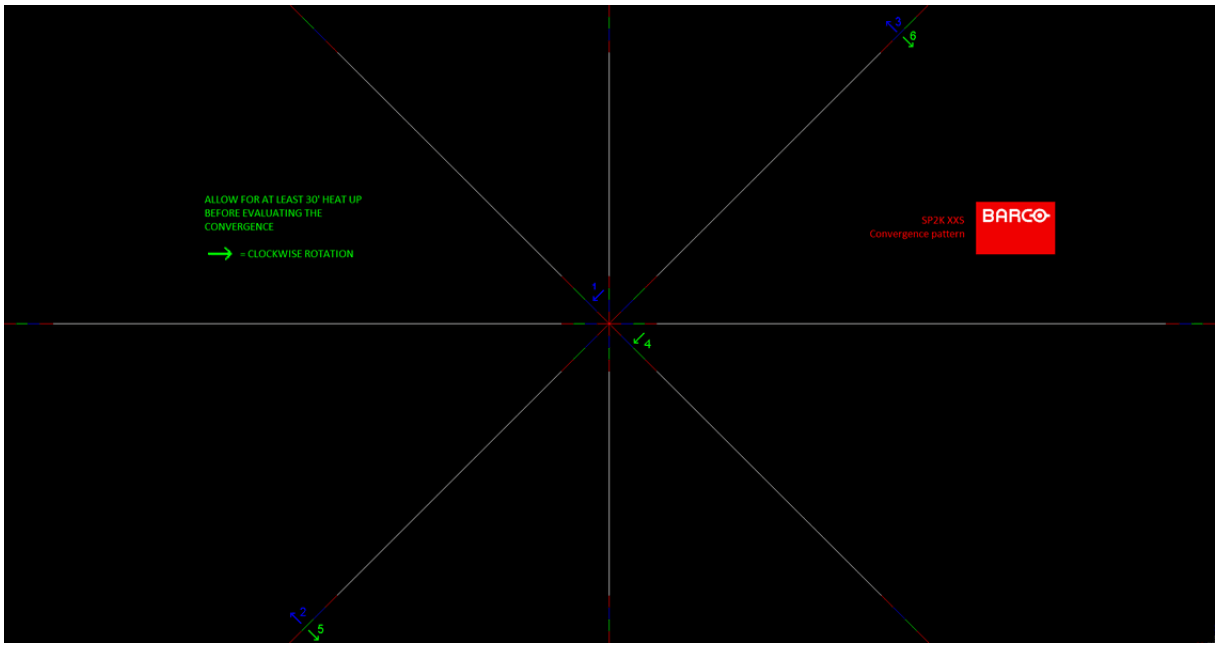


Image 10–9

The test pattern illustrated above is specifically designed for convergence purposes. The test pattern has three blue arrows numbered from 1 to 3 and three green arrows numbered from 4 to 6. These numbers and colors correspond to those of the control knobs. Turning the control knob clockwise corresponds to the direction indicated on the screen.

Basic instructions

Keep into account the following:

- BLUE and GREEN DMD's are to be adjusted with reference to the RED DMD.
- Each adjustment allows for 20 pixels maximum displacement to either side of the nominal RED position.
- Rotation is limited to approximately +/- 10 pixels on the left screen flank and +/- 10 pixels on the right screen flank.
- One turn of a control knob relates to an approximately 10 pixels displacement on the screen.
- Before starting to adjust the convergence, let the projector warm up for at least 30 min, while projecting the convergence test pattern and while using the correct brightness level.

Adjustment Range

Avoid slipping of the torque limiter clutch by limiting the amount/number of adjustment(s) made. Typically the convergence adjustments serve to correct a convergence fault of a few pixels at the most. Any convergence fault beyond this is considered grossly abnormal and likely indicates abuse or rough handling..

CAUTION: The system does have an end of travel in either direction, but using excessive force may cause damage. Please handle gently.

Troubleshooting 'dead zone' of control knob

In rare cases it can happen that a control knob is loose in the perfect convergence position. This means 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. 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 (approximately 30 pixels). 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.

10.4 Converging the blue pattern onto the red pattern

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

Required tools

No tools required.

How to converge the blue pattern onto the red pattern?

Start with aligning the BLUE pattern in the vertical direction (control knob 1 and 2) and then proceed with the horizontal direction (control knob 3)

1. To translate the BLUE pattern **vertically**, slightly turn the blue control knobs number 1 and 2. Turn both control knobs in equal increments.

   Note: Note that a turn of a few degrees corresponds with one full pixel. Turning the control knob clockwise corresponds to the direction of the arrow of the test pattern.

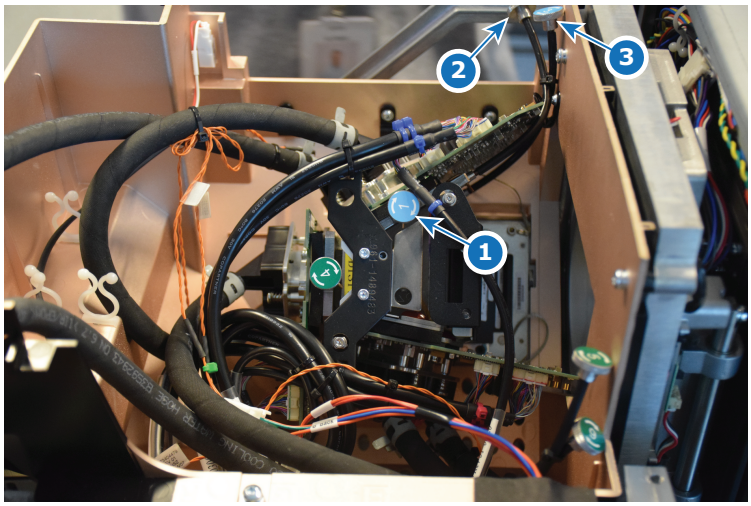


Image 10–10 Location of the blue control knobs

1 Blue control knob 1
2 Blue control knob 2
3 Blue control knob 3

2. To translate the BLUE pattern **horizontally**, slightly turn the blue control knob number 3.
3. To **rotate** the BLUE pattern, sightly turn the blue control knob number 1. If much rotation is required, slightly turn the blue control knob number 2 in the opposite direction.

   Note: Slight corrections of the BLUE pattern in vertical direction may be required after rotation.

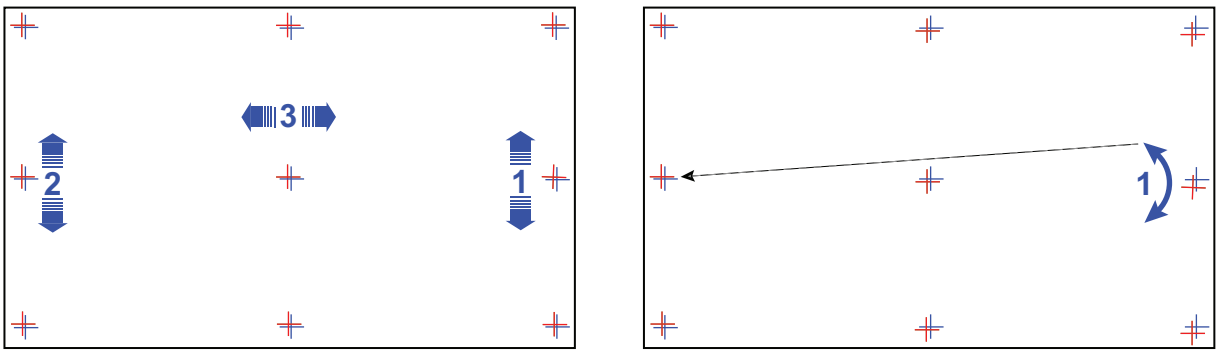


Image 10–11

4. Repeat from step 1 until **full coincidence** is obtained of the BLUE pattern in the **center**, **left** and **right** of the projected image.
5. Continue with the procedure: “Converging the blue pattern onto the red pattern”, page 115.

10.5 Converging the green pattern onto the red pattern

This adjustment procedure assumes that the projector is prepared for convergence adjustment.

Required tools

No tools required.

How to converge the green pattern onto the red pattern?

1. To translate the GREEN pattern **vertically**, slightly turn the green control knobs number 4 and 5. Turn both control knobs in equal increments.

   Note: Note that a turn of a few degrees corresponds with one full pixel. Turning the control knob clockwise corresponds to the direction of the arrow of the test pattern.

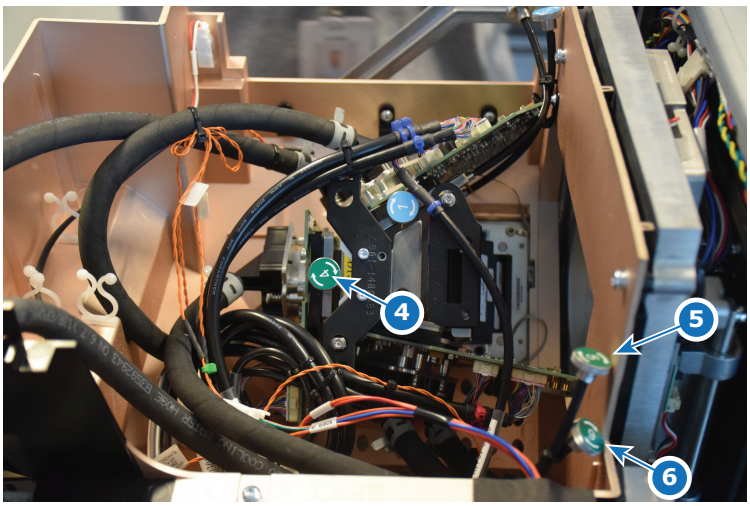


Image 10–12 Location of the green control knobs

4 Green control knob 4
5 Green control knob 5
6 Green control knob 6

2. To translate the GREEN pattern **horizontally**, slightly turn the green control knob number 6.
3. To **rotate** the GREEN pattern, sightly turn the green control knob number 4. If much rotation is required, slightly turn the green control knob number 5 in the opposite direction.

   Note: Slight corrections of the GREEN pattern in vertical direction may be required after rotation.

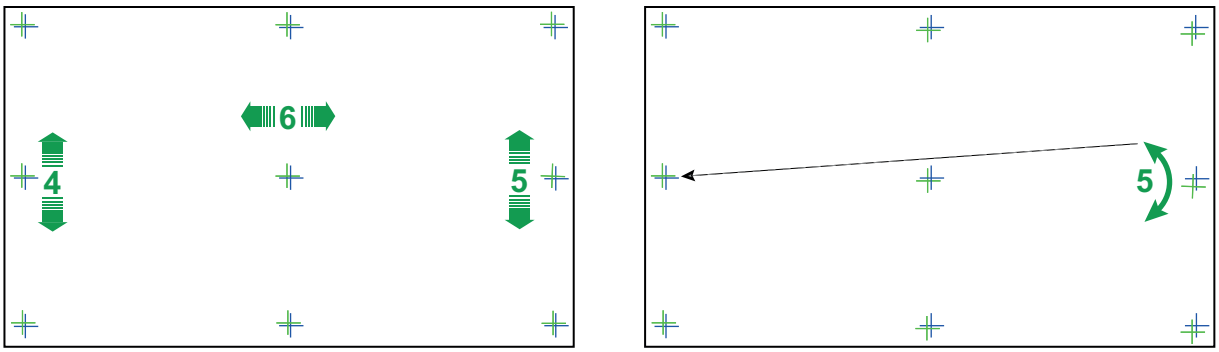


Image 10–13

4. Repeat from step 1 until **full coincidence** is obtained of the GREEN pattern in the **center**, **left** and **right** of the projected image.

5. If necessary repeat the blue convergence adjustment. For more info, see “Converging the blue pattern onto the red pattern”, page 115.
6. If all adjustments are finished, switch off the projector.
7. Close the sealed compartment and reinstall all covers of the projector.

10.6 Extenders for control knobs

When to use knob extenders

Install and use control knob extenders in boothless installations with limited space to perform convergence adjustment. service kit provides 3 pivot flex extenders. Extenders need to be installed onto green adjust knobs (DMD green channel setting only) before projector installation.

Required tools

Hex key 1.5mm

How to install extenders

1. Make sure the sealed compartment covers have been removed for easy access the Green adjustment Knobs (references 4, 5 and 6). For more info, see “Opening the sealed compartment”, page 108.

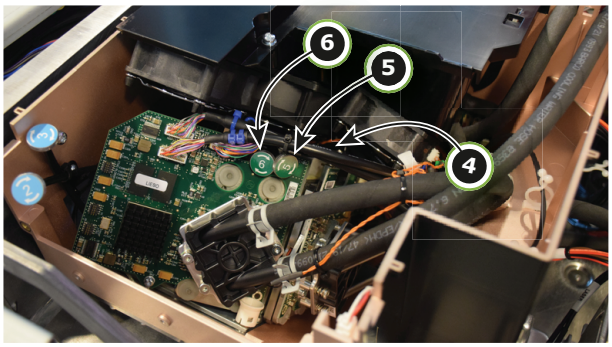


Image 10–14

2. Install the 3 extenders onto the green adjust knobs.

   Clamp the knob (reference 3) with the two parts of the extender (reference 1 and 2) as illustrated, then secure the assembly with the screws (reference 4).

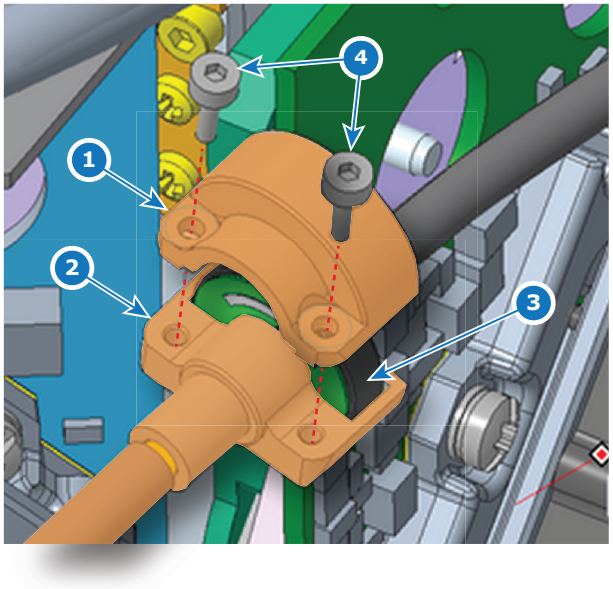


Image 10–15

3. Guide the others side of the 3 extensions to DCI box side opening.
4. Close the sealed compartment and reinstall all covers of the projector.

11 Color calibration

About this chapter

This chapter briefly describes the luminance and color calibration process for the SP2K-S. Several references are made to **the projector user guide**, where more detailed instructions and menu navigations are available. If you want more detailed explanations of how every menu related to the color calibration works, please consult this user guide.

The first chapter describes the complete calibration process in chronological order.

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

11.1 Calibration process

Overview

1. Create **Lens position files for FLAT and SCOPE** . For more info on creating lens files, see the projector user guide.
2. If applicable for your projector: **create the necessary amount of 3D files**. For more info on creating 3D files, see the projector user guide.
3. Calibrate the light source, using **white point calibration**. For more info, see also “White point calibration”, page 123.
4. For the light sensor calibration, select the desired aspect ratio by activating the correct lens file.
   - **SCOPE** format
   - **FLAT** format
5. **Perform Light sensor calibration** and **create LSC files for Flat, Scope and 3D** (if applicable for your projector). For more info, see the projector user guide.
6. Prepare for color calibration in 2D. Set up the correct LSC file and the desired white point target. For more info on setting the white point target, see the projector user guide.
7. **Color gamut calibration** (electronic P7 correction). Measured values are saved in the **Measured Color Gamut Data (MCGD) file**. This calibration needs to be repeated for each used format (FLAT/SCOPE) and for each used projection mode (2D/3D).

   For more info about MCGD files and color gamut calibration, see “Color gamut calibration”, page 125.
8. **Verify the corrected colors by comparing to select target colors**. The target colors are stored in **Target Color Gamut Data (TCGD) files**. Several TCGD files are already available in the file system of the projector.

   For more info about TCGD files and verifying colors, see projector user guide.
9. **Arrange calibration files in a macro**. To apply correct color calibration it is important that the MCGD file (s) and matching TCGD file(s) are activated after that the INPUT file and PCF file are activated. For that it is recommended to create a macro where the files are loaded one by one in the right order:
   1. First activate the **INPUT** file.
   2. then activate the **PCF** file (PCF already contains plane 1 information),
   3. then activate the **MCGD** and **TCGD** files.

   For more details on creating and using macros, see the projector user guide.

11.2 White point calibration

What has to be done?

By default the native white point of a projector will always vary slightly from the DCI standard. In order to meet the DCI standard, this uncorrected native white point (W_n) has to be shifted towards the DCI white point (W_t). The coordinates of the DCI white point (x_w=0.314 ; y_w=0.351) are embedded in the projector software and cannot been changed. The coordinates of the projector uncorrected white point has to be measured and entered.

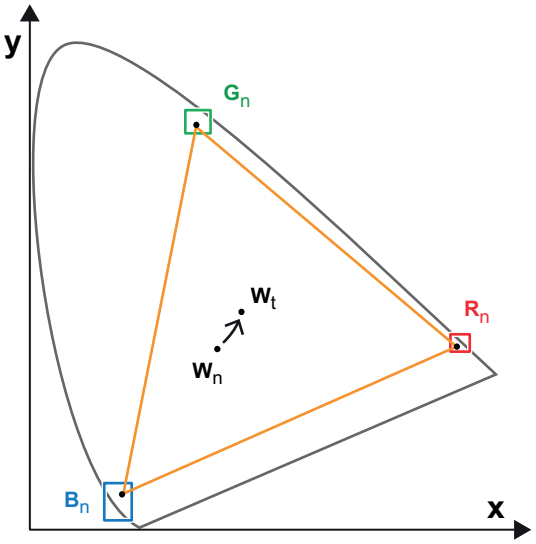


Image 11–1 Shifting projector 'white point' towards desired white point (laser power calibration)

The projector uncorrected white point can be defined by measuring the xy coordinates of the uncorrected primary colors (red, green, blue) and uncorrected full white separately.

The initial set of xy values stored in the projector for the uncorrected white point are the same as for DCI white point. After white point calibration, the initial values are overwritten with the measured values.

Laser correction

Based on the measured values the projector can balance the power of the lasers to move the projector uncorrected white point towards the desired white point. This adjustment is called 'Laser correction' or 'Laser power calibration'.

2D and 3D projector mode

The projector uncorrected white point is different for 2D projection and 3D projection. Therefore, the projector uncorrected white point has to be measured and entered for each projection mode separately. Per projection mode one set of measured values are stored. Depending on the projection mode, the corresponding set is used for white point correction.

In case of 3D projection, the xy coordinates of uncorrected white has to be measured twice. Once through the left eye glass of the 3D goggles and once through the right eye glass.

Required tools

- Spectroradiometer
- Web Communicator software

Preparations

1. Place a spectroradiometer in the auditorium. Position it in such a way it meets the following requirements.
   - Perpendicular to the screen.
   - In the auditorium sweet spot.
   - In such a way it can measure the reflected light from the center of the screen.

2. Set up the ambient light conditions as it should be during the play-out of the movie (e.g. only the stairs and emergency exit lighting are switched on).

   Note: In an optimal setup less than 1% of light from any other source than the light from the projector should illuminate the screen.

3. Start your browser and browse to the Web Communicator of the projector.
4. Project a full white test pattern with the desired aspect ratio (flat or scope).
5. In Web Communicator, navigate to *"Configuration"* > *Color calibration* > *Light source*.

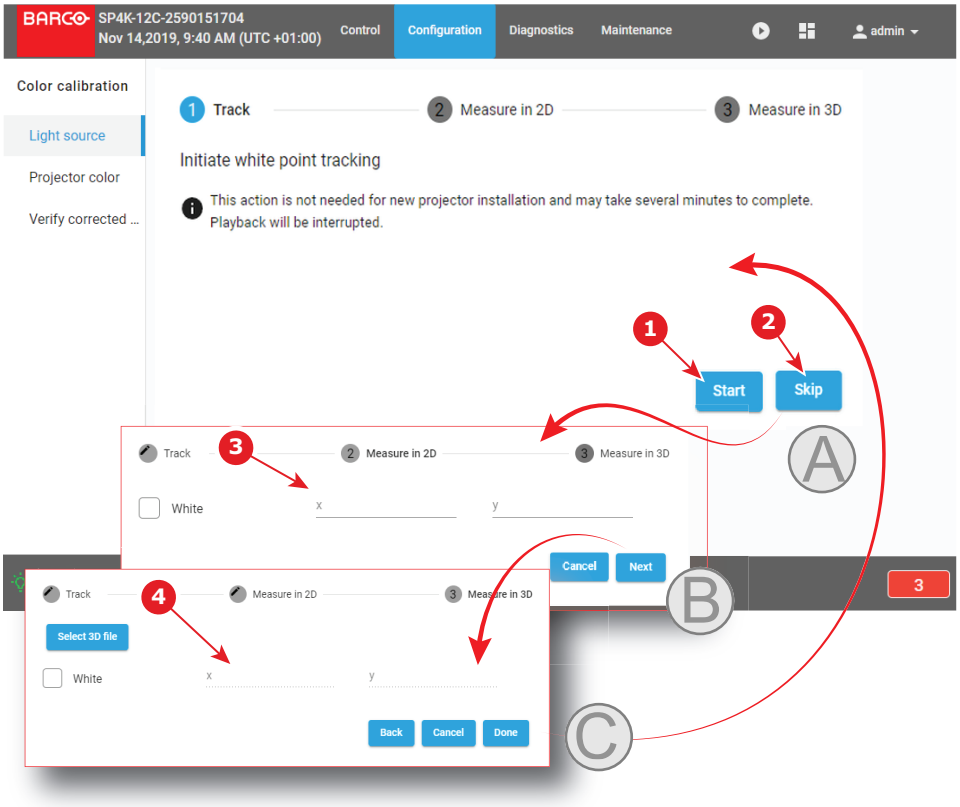


Image 11–2 Example of the white point calibration menu

1 Status of the last white point tracking
2 White point tracking button
3 2D measurement
4 3D measurement

6. Start the white point calibration wizard by performing a **White point tracking**.

   Tip: If this is a new projector, you can skip this step. This because white point tracking is done at the factory. This is indicated by the status of the last tracking when you start the wizard.

   Note: This may take several minutes to complete. Any playback may be interrupted while doing this.

7. In the next screen, enter the x & y coordinates for the **2D measurement**. Use the spectroradiometer to measure these values.
8. Optionally, you can also click next to enter the x & y coordinates for **3D measurement**, while **using a 3D file**.

After white point calibration proceed immediately with color gamut calibration.

11.3 Color gamut calibration

Color Gamut

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

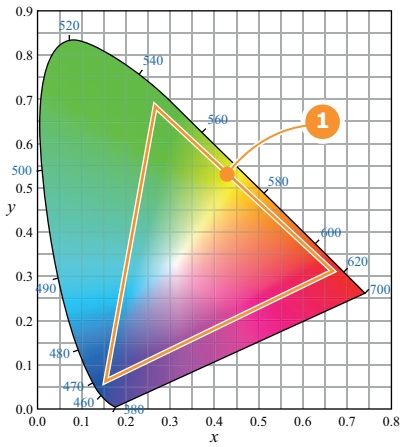


Image 11–3 Sample Chromaticity Diagram with Color Gamut of target device (1).

Why apply color correction?

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

What has to be done?

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

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

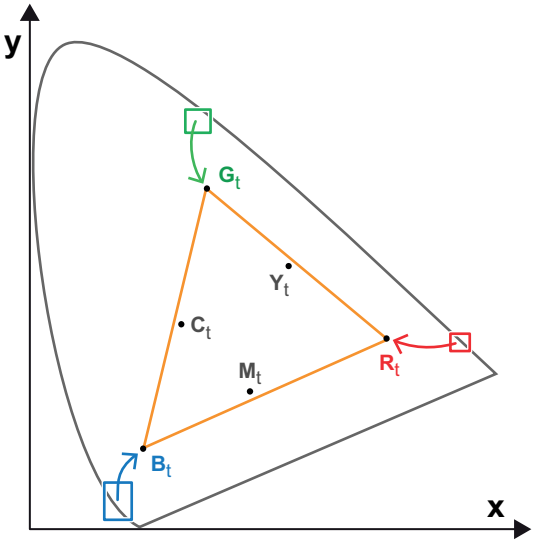


Image 11–4 Correction of native color gamut towards desired color gamut (electronic correction)

Electronic correction

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

Influence of aspect ratio

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

CAUTION: Prior to start with color gamut calibration ensure that the white point calibration is finalized successfully. See "White point calibration", page 123.

Color gamut calibration procedure

1. Check if the white point calibration is done. If not, see "White point calibration", page 123.
2. **Setup the ambient light conditions** as it should be during the play out of the movie. (e.g. only the stairs and emergency exit lighting is switched on).

   Note: In an optimal setup less than 1% of light from any other source than the light from the projector should illuminate the screen.
3. Select the appropriate lens file (2D or 3D). See projector user guide for more info on lens files.
4. **Sequentially measure and enter the xy coordinates** of the three primary colors (red, green, blue) and full white. To do so, use Web Communicator and browse to: *Installation* > *Color calibration* > *Projector color*. For detailed instructions see projector user guide.

   Caution: In case of 3D, measure the xy coordinates once through the left eye glass of the 3D goggles and once through the right eye glass.
5. Once all xy coordinates are measured and entered proceed by saving all measured values into a MCGD file.

   Tip: Put in the MCGD file name the type of projection mode (2D or External 3D) and the aspect ratio (FLAT, SCOPE).
6. In addition you can check if the corrected colors comply. To do so, browse to the Web Communicator and navigate to *Configuration* > *Color calibration* > *Verify corrected colors*. See the projector user guide for detailed instructions.

12 Projector covers

About this chapter

Most installation, maintenance and service procedures demand removing one or more of the projector covers to gain access to the parts to maintain or to service. To avoid redundancy, all procedures about cover removing or installing are grouped together in this chapter. The maintenance and servicing procedures also refer to this chapter if required. The procedures in this chapter describe, with detailed step by step actions and illustrations, how to remove or install the projector covers. Note that the covers may only be removed by qualified service personnel.

WARNING: All procedures described in this chapter may only be performed by TRAINED PROJECTIONISTS or qualified SERVICE PERSONNEL.

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

12.1 Removal of the left side cover

How to remove

1. Unlock the cover from the frame by pushing plastic hooks in handles.

   Tip: A tool such as a flat screwdriver can be used to more easily unlock the locked handles.

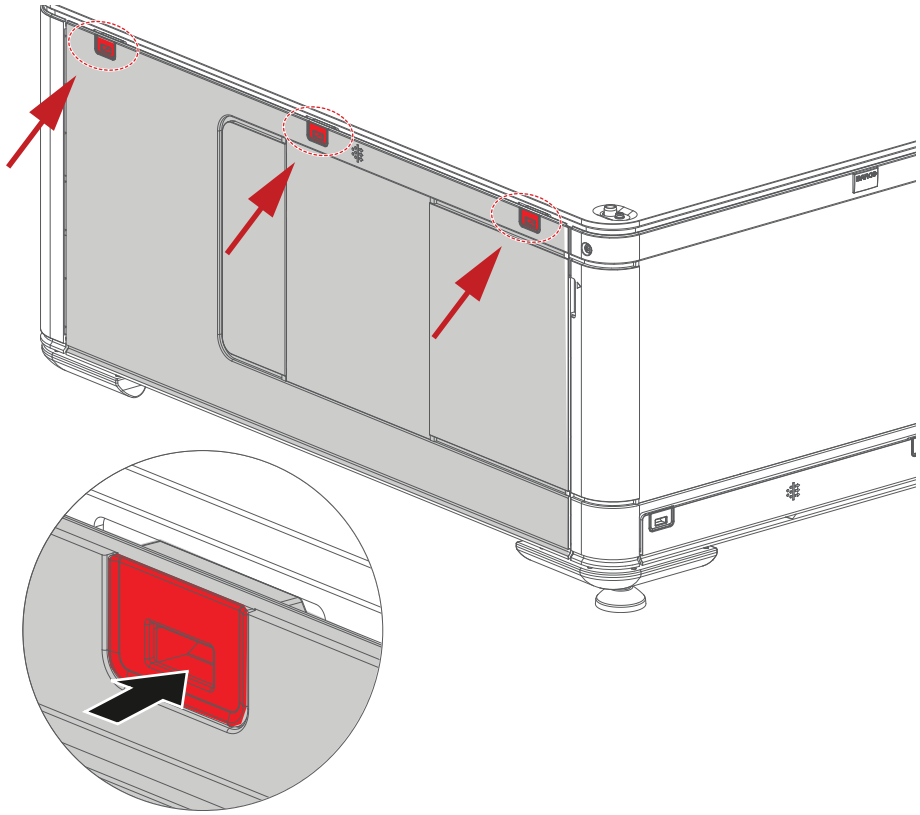


Image 12–1 Left side cover unlocking

2. Tilt the upper side of the cover outwards (reference 1).

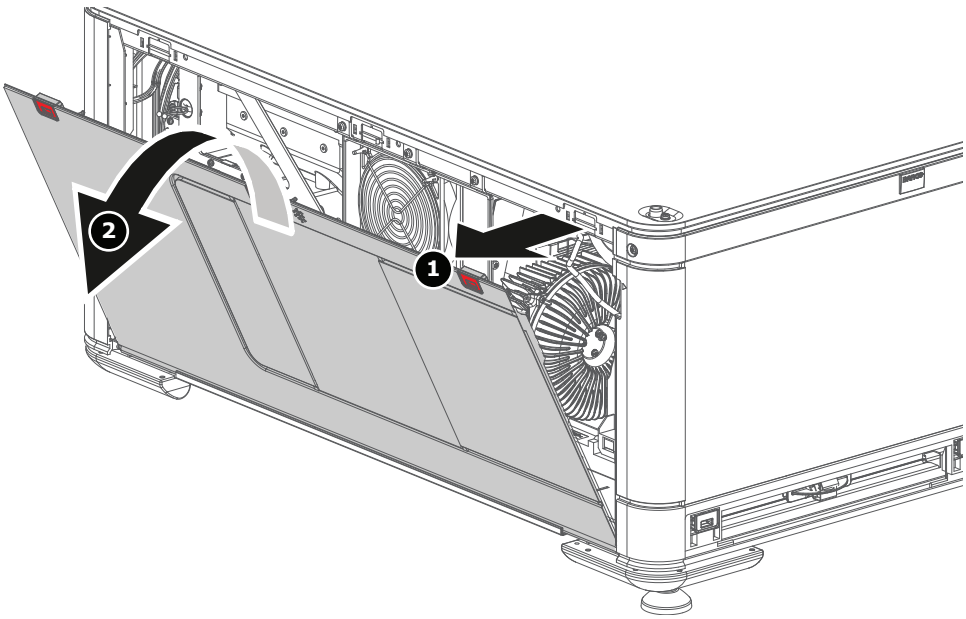


Image 12–2 Left side cover removing from the projector

3. Lift up the cover and remove it (reference 2).

12.2 Removal of the front cover

If the front cover is the only cover you need to remove (e.g. when checking / replacing the filter), there is no need to turn off the projector.

Required tools

No tools required.

How to remove

1. Unlock the cover from the frame by pushing plastic hooks in handles.

   Tip: A tool such as a flat screwdriver can be used to more easily unlock the locked handles.

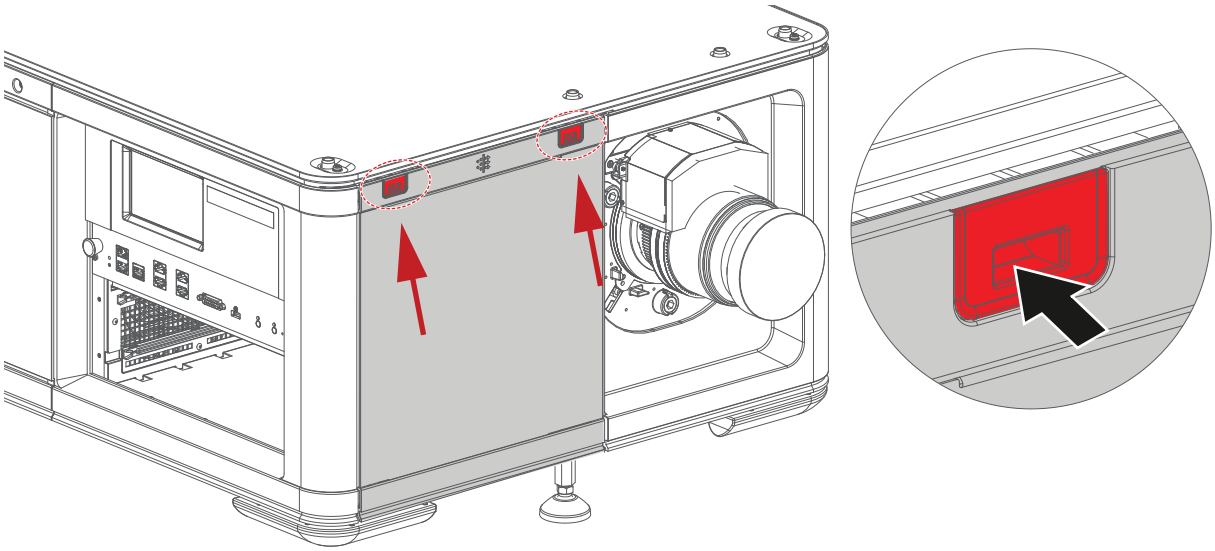


Image 12–3 Front cover unlocking

2. Tilt the upper side of the cover outwards (reference 1).

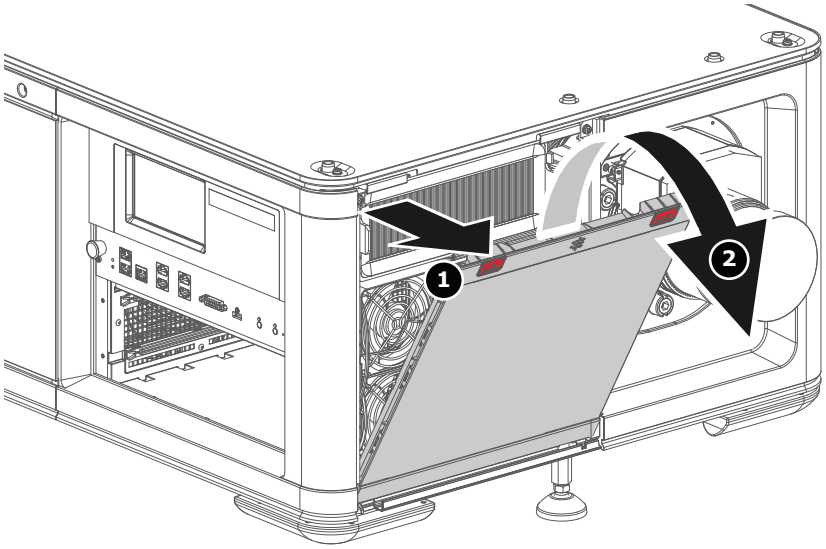


Image 12–4 Front cover removing from the projector

3. Lift up the cover and remove it (reference 2).

12.3 Removal of the rear filter cover

If the rear cover is the only cover you need to remove (e.g. when checking / replacing the filter), there is no need to turn off the projector.

Required tools

No tools required.

How to remove

1. Unlock the cover from the frame by pushing plastic hooks in handles.

   Tip: A tool such as a flat screwdriver can be used to more easily unlock the locked handles.

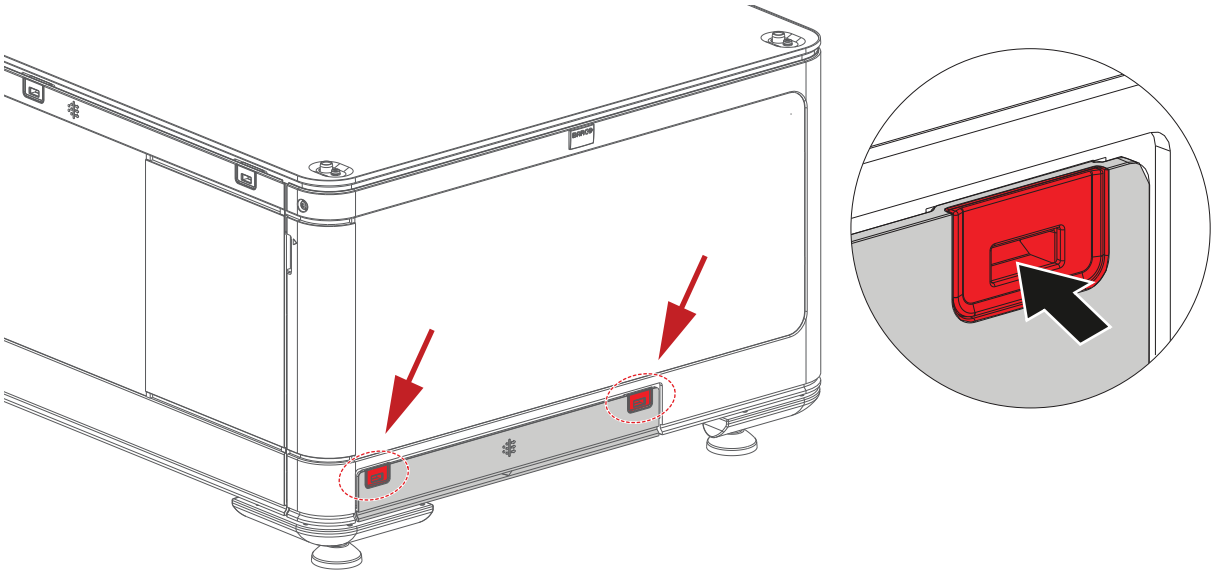


Image 12–5 Rear filter cover unlocking

2. Tilt the upper side of the cover outwards, then lift up the cover and remove it.

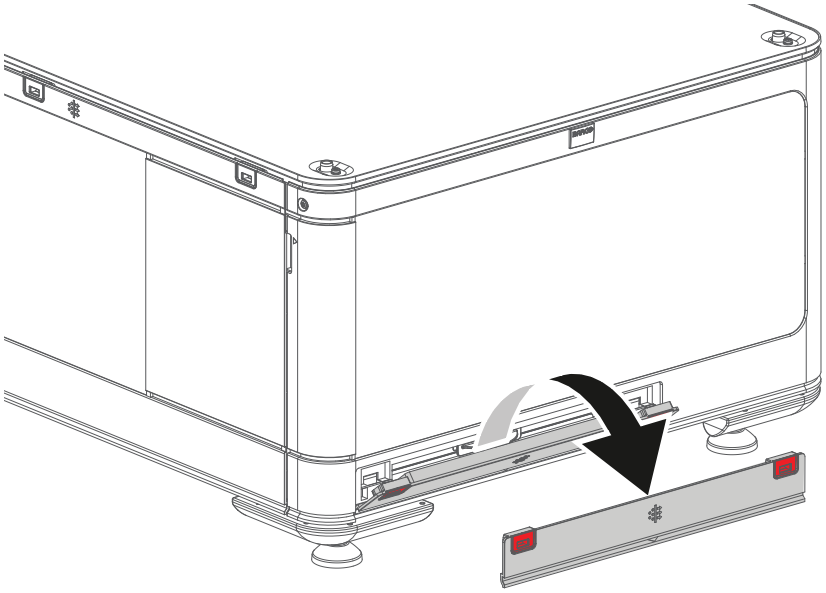


Image 12–6 Rear filter cover removing from the projector

12.4 Removal of the entire rear cover

Required tools

Torx screwdriver T20

How to remove

1. Remove the two screws at the top of the cover. Use a T20 Torx screwdriver.

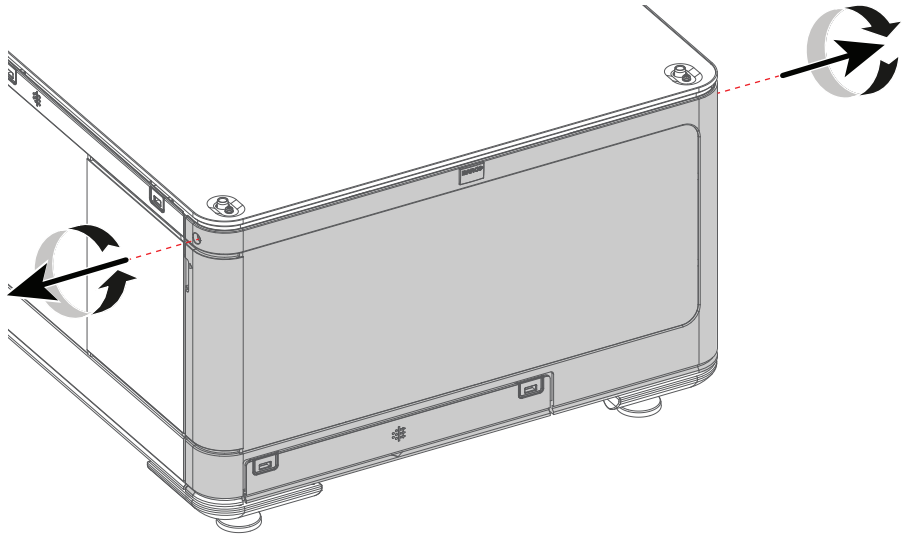


Image 12–7 Removing the screws of the rear cover

2. Tilt the upper side of the cover outwards (reference 1).

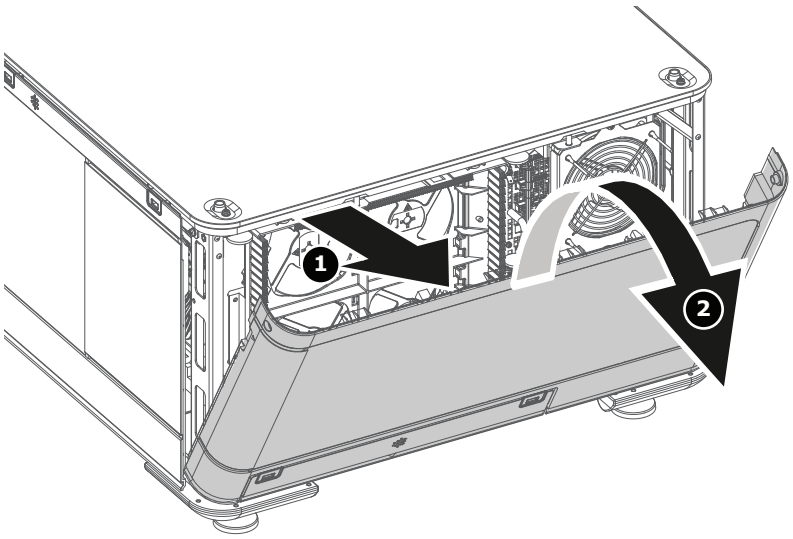


Image 12–8 Rear cover removing from the projector

3. Lift up the cover and remove it (reference 2).

12.5 Removal of the right side cover

Required tools

Torx screwdriver T20

How to remove

1. Remove the two screws at the top of the cover. Use a T20 Torx screwdriver.

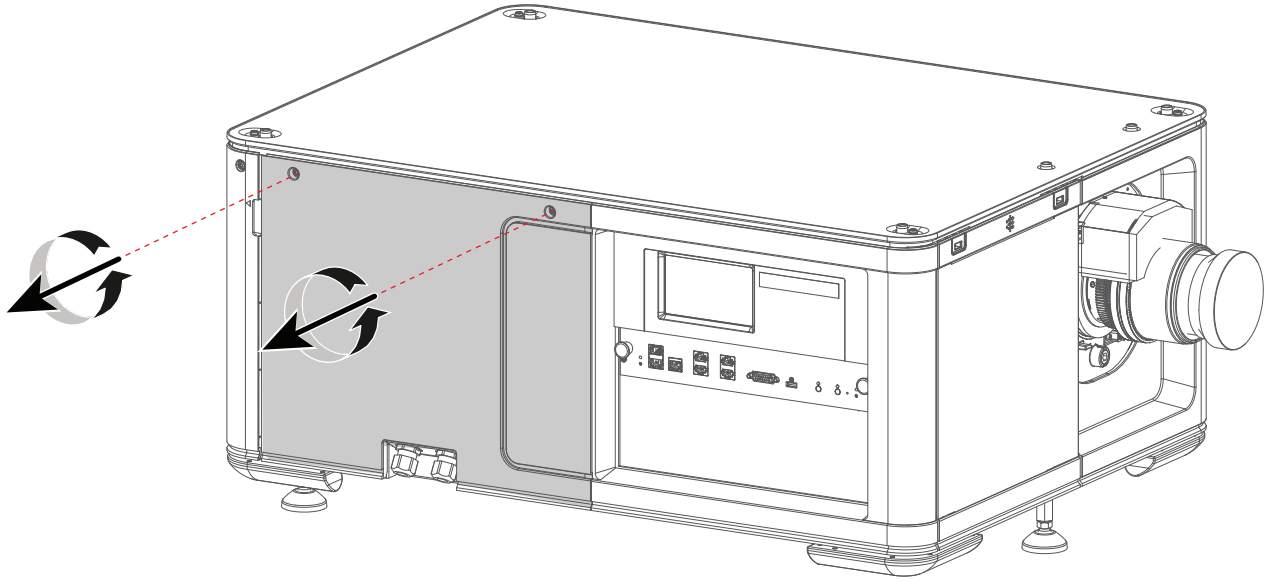


Image 12–9 Removing the screws of the right side cover

2. Tilt the upper side of the cover outwards (reference 1).

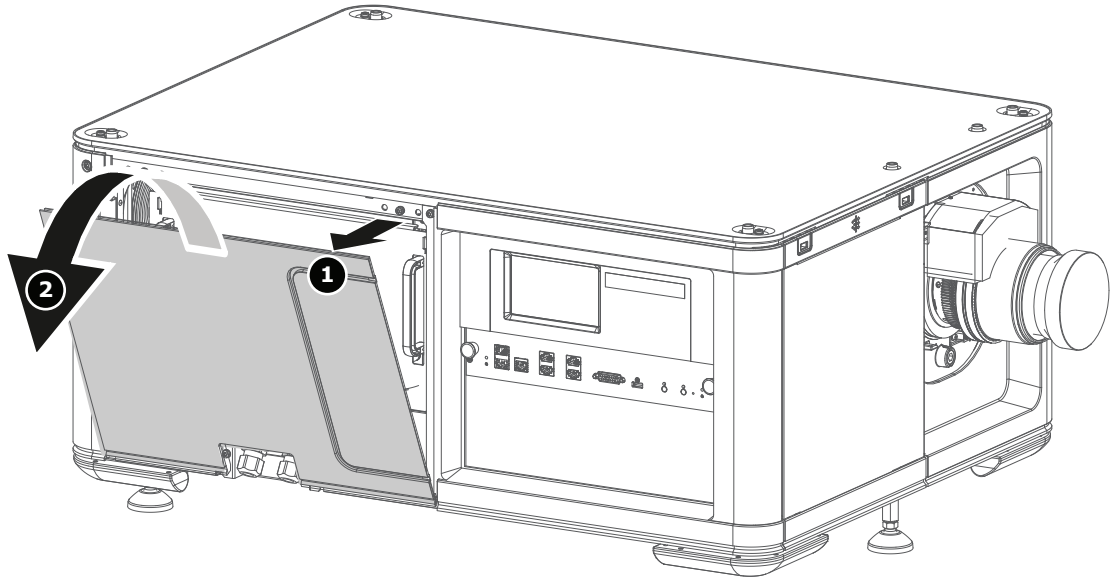


Image 12–10 Right side cover removing from the projector

3. Lift up the cover and remove it (reference 2).

12.6 Removal of the operator side cover

Required tools

Torx screwdriver T20

How to remove

1. Remove the front and right side covers of the projector.
2. Remove the two screws at the top of the cover. Use a T20 Torx screwdriver.

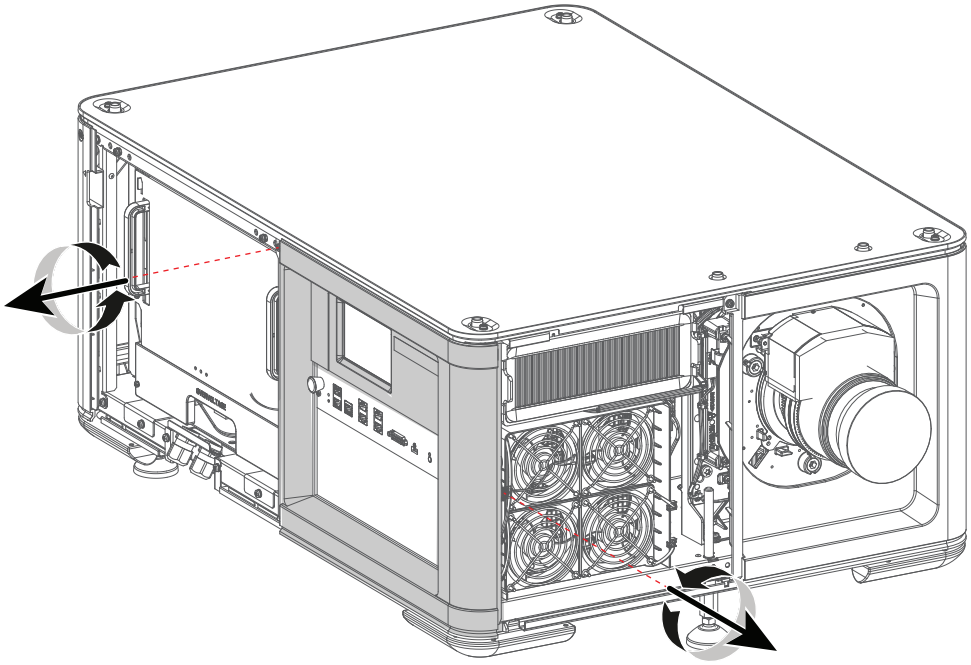


Image 12–11 Removing the screws of the operator side cover

3. Tilt the upper side of the cover outwards (reference 1).

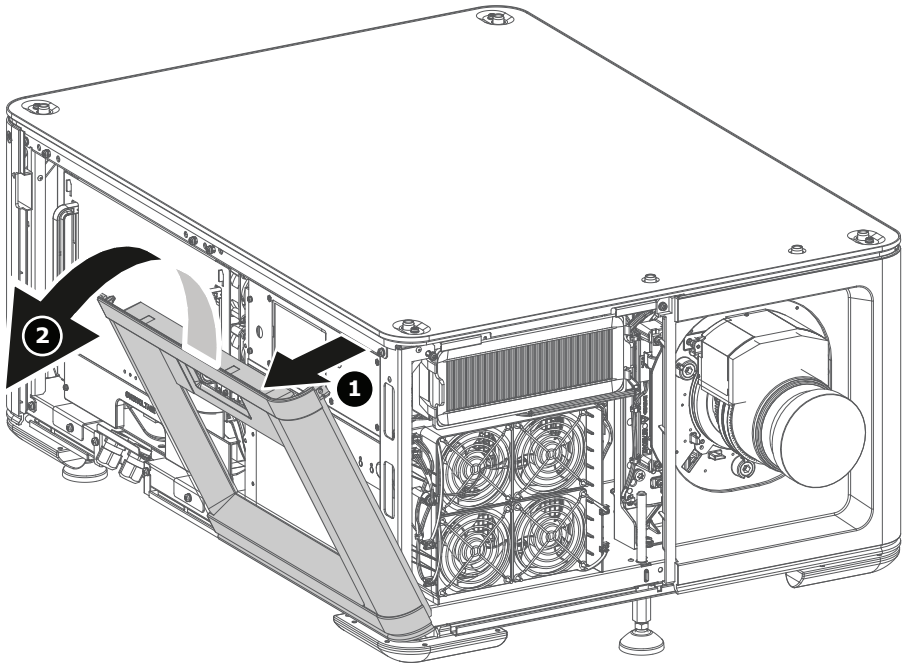


Image 12–12 Right operator cover removing from the projector

4. Lift up the cover and remove it (reference 2).

12.7 Removal of the top cover

Required tools

Torx screwdriver T20

How to remove

1. Remove the four screws of the top cover. Use a T20 Torx screwdriver.
2. Lift the top cover up and remove it.

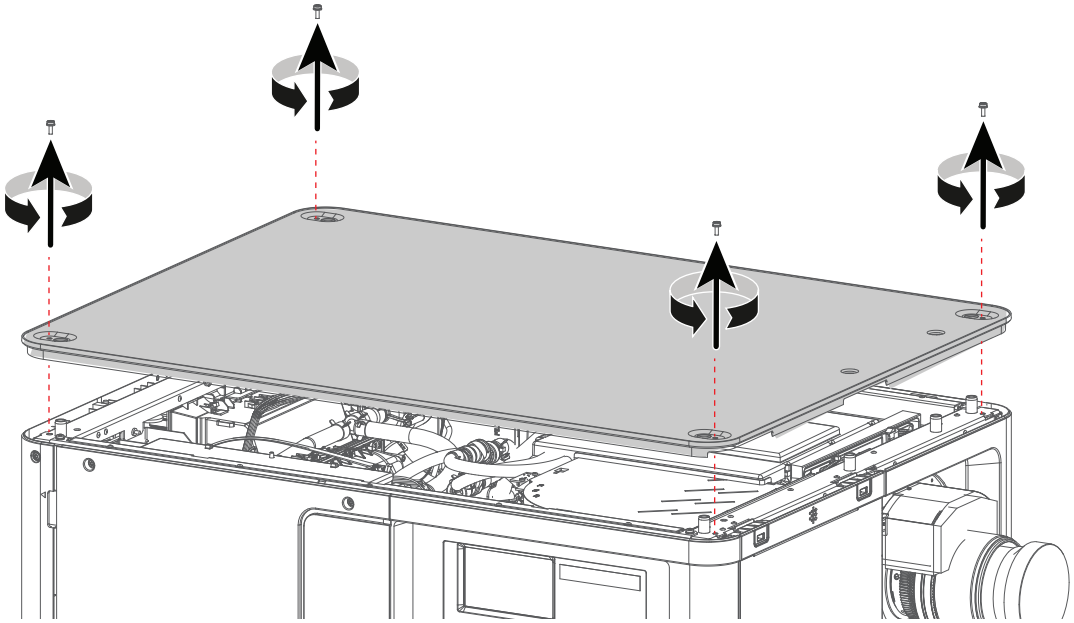


Image 12–13 Removing the top cover

12.8 Mounting the top cover

Required tools

Torx screwdriver T20

How to mount

1. Place the top cover (reference 1) on top of the projector. Use guides (reference 2) to orient correctly the cover.

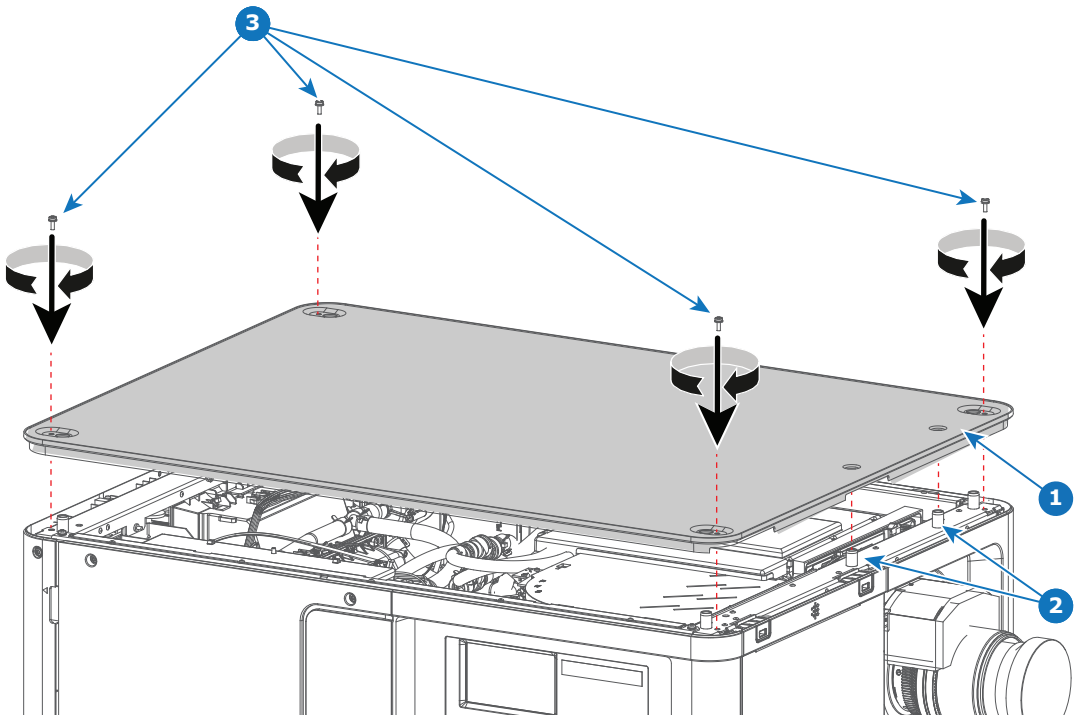


Image 12–14 Mounting the top cover

Tip: The top cover has been designed it can be mounted in only one way.

2. Fasten the top cover with the four screws (reference 3). Use a T20 Torx screwdriver.

12.9 Mounting the operator side cover

How to mount

1. Place the cover onto the hook located on the bottom of the projector frame (reference 1).

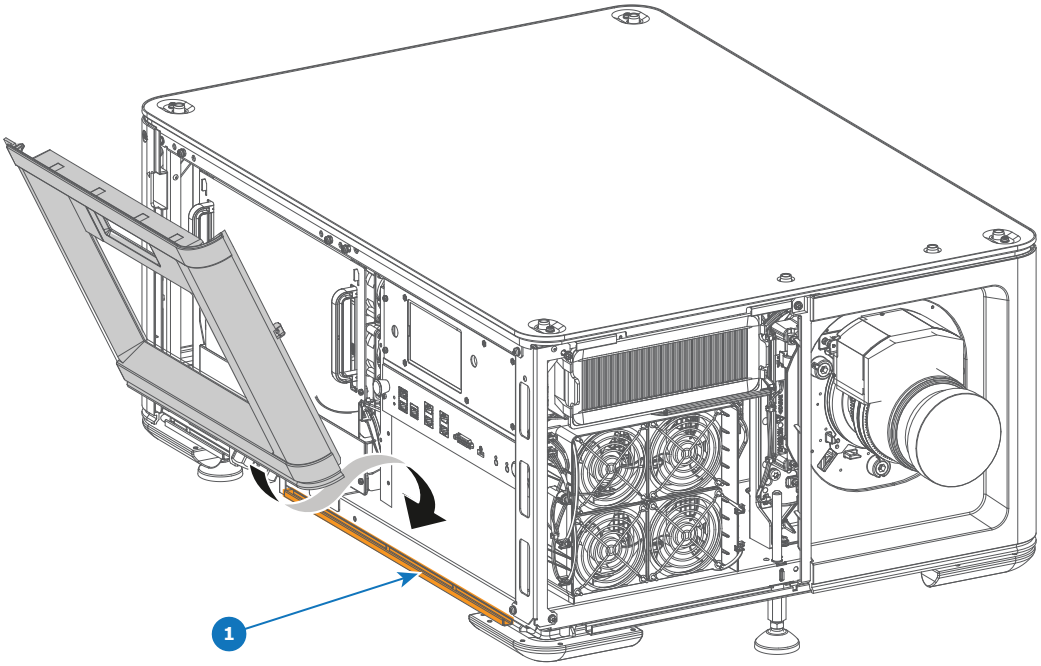


Image 12–15

Tip: Place the cover in a slightly tilted angle so you can clearly see the hooks while mounting the cover.

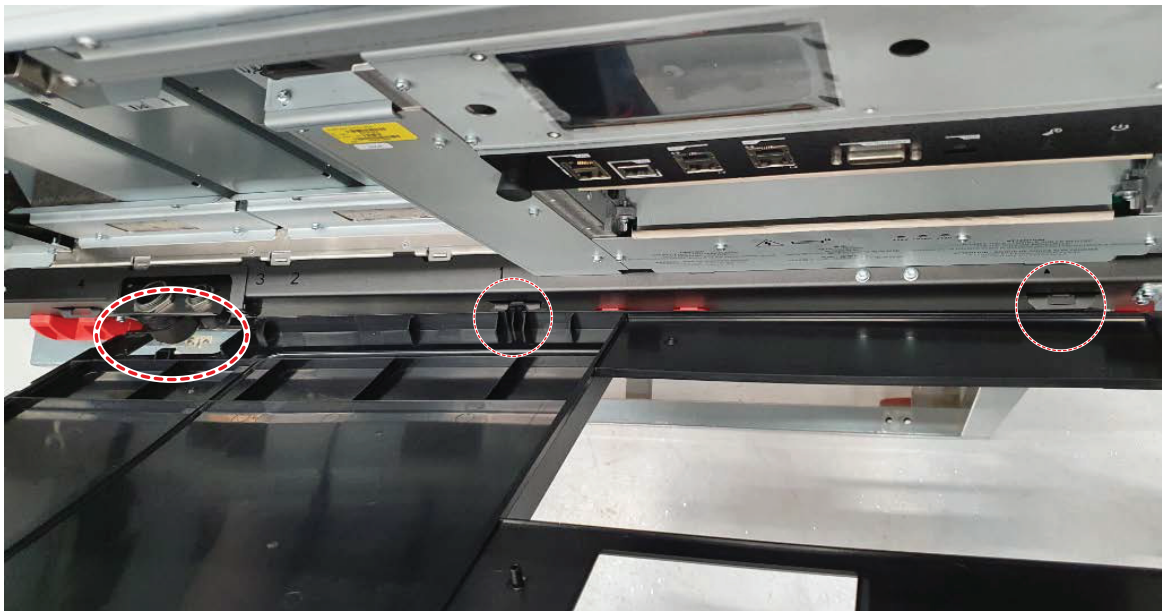


Image 12–16

2. Push the upper side of the cover towards the projector to close it.

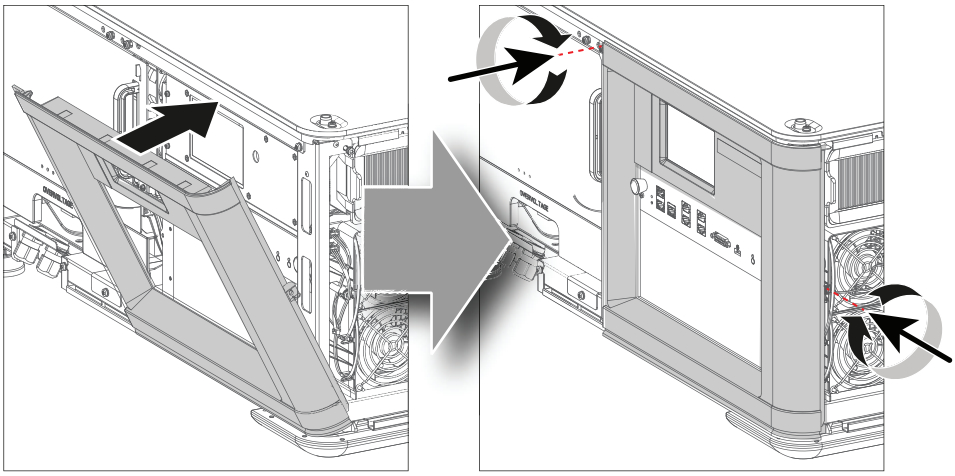


Image 12–17 Tightening the screws of the operator cover

3. Fasten the cover with the two top screws. Use a T20 Torx screwdriver.

12.10 Mounting the right side cover

How to mount

1. Place the cover onto the hooks located on the bottom of the projector frame (reference 1). To clearly see the hooks (reference 1) when mounting the cover, place the cover in a slightly tilted angle as shown in the drawing.

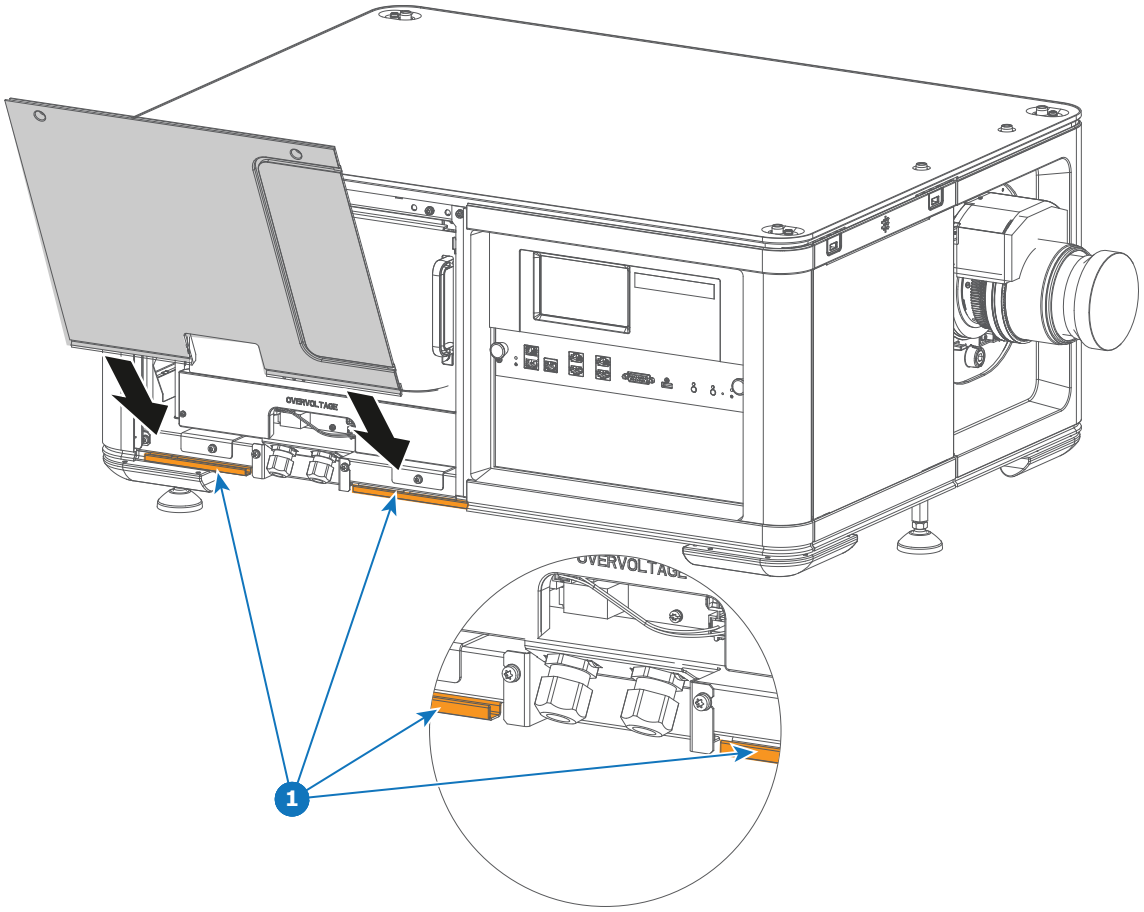


Image 12–18 Positioning the operator cover

2. Push the upper side of the cover towards the projector to close it.

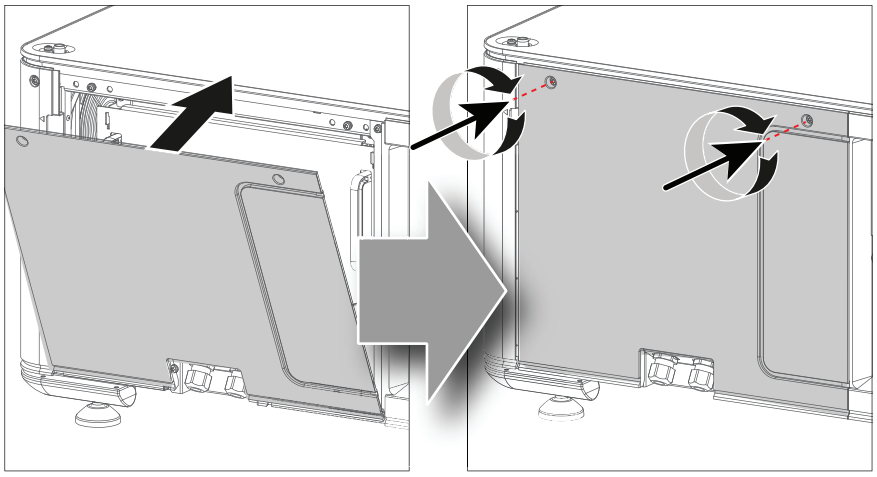


Image 12–19 Tightening the screws of the cover

3. Fasten the cover with the two top screws. Use a T20 Torx screwdriver.

12.11 Mounting the rear cover

How to mount

1. Place the cover onto the hooks located on the bottom of the projector frame (reference 1). To clearly see the hooks (reference 1) when mounting the cover, place the cover in a slightly tilted angle as shown in the drawing.

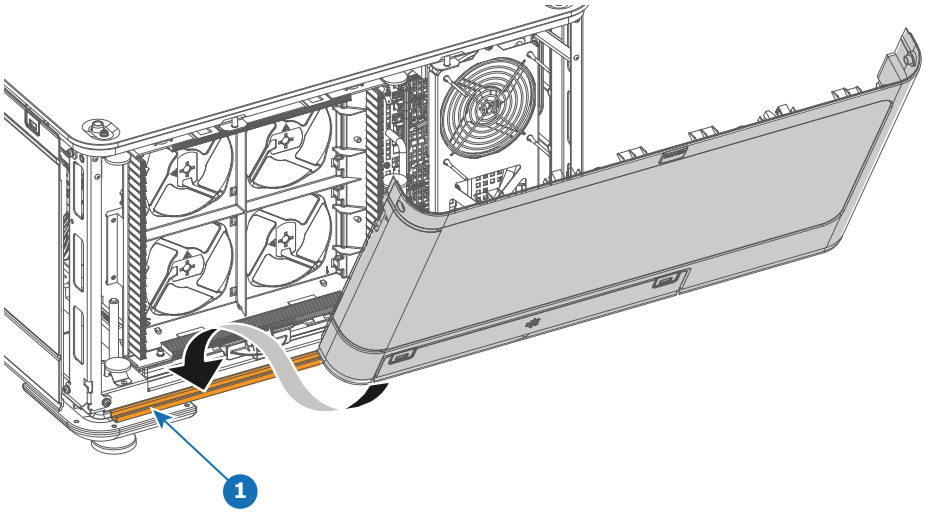


Image 12–20 Positioning the rear cover

2. Push the upper side of the cover towards the projector to close it.

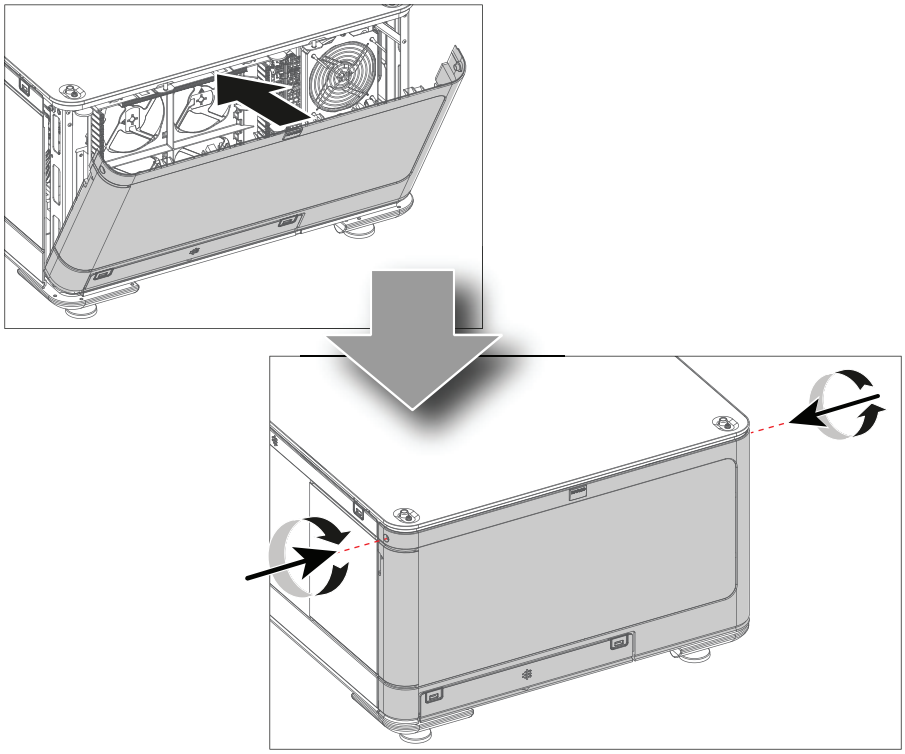


Image 12–21 Tightening the screws of the cover

3. Fasten the cover with the two top screws. Use a T20 Torx screwdriver.

12.12 Mounting the rear filter cover

How to mount

1. Place the cover over the cover hook on the bottom of the projector frame (reference 1).

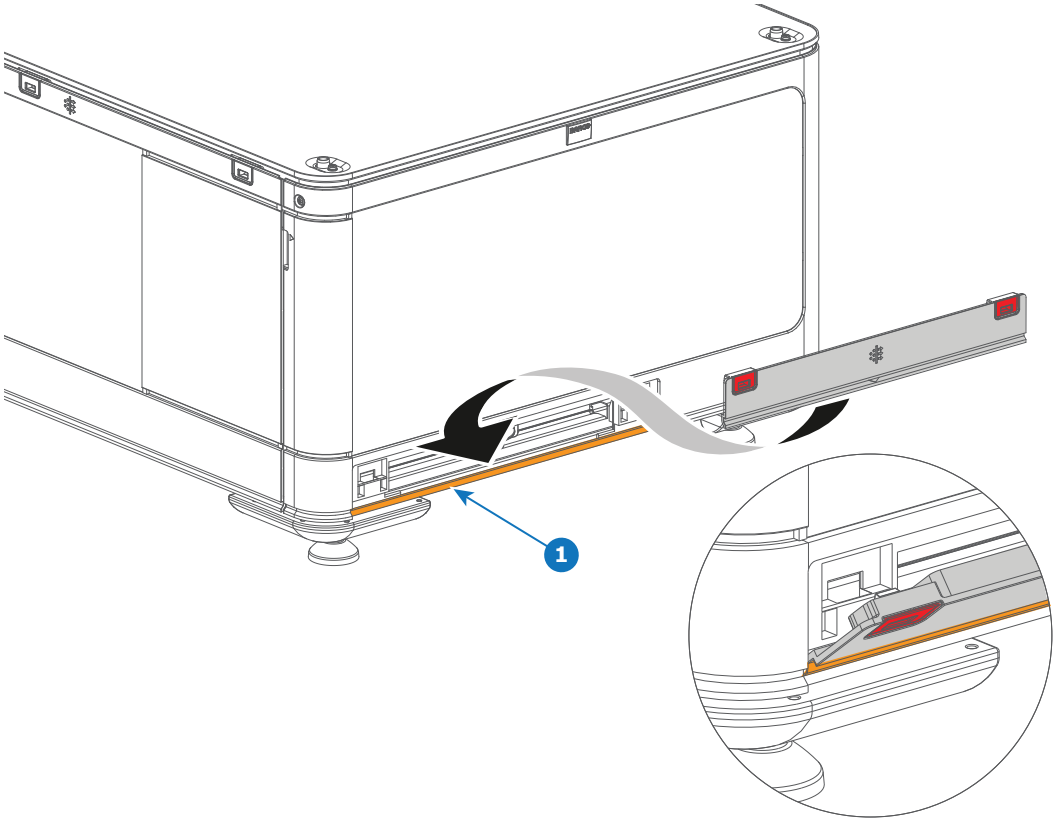


Image 12–22 Rear filter cover positioning

2. Tip forward the cover over the hooks (reference 2) located each side of the filter, then push lightly to lock the handles (reference 3) on the hooks.

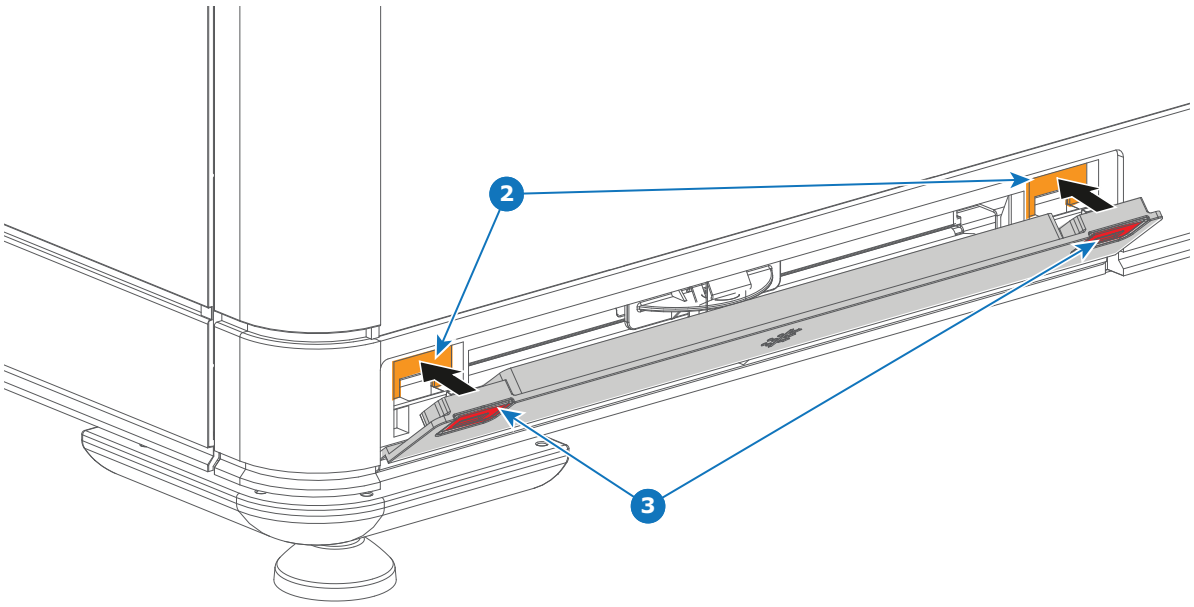


Image 12–23 Rear filter cover locking

12.13 Mounting the front cover

Required tools

No tools required.

How to mount

1. Place the cover over the cover hook on the bottom of the projector frame (reference 1).

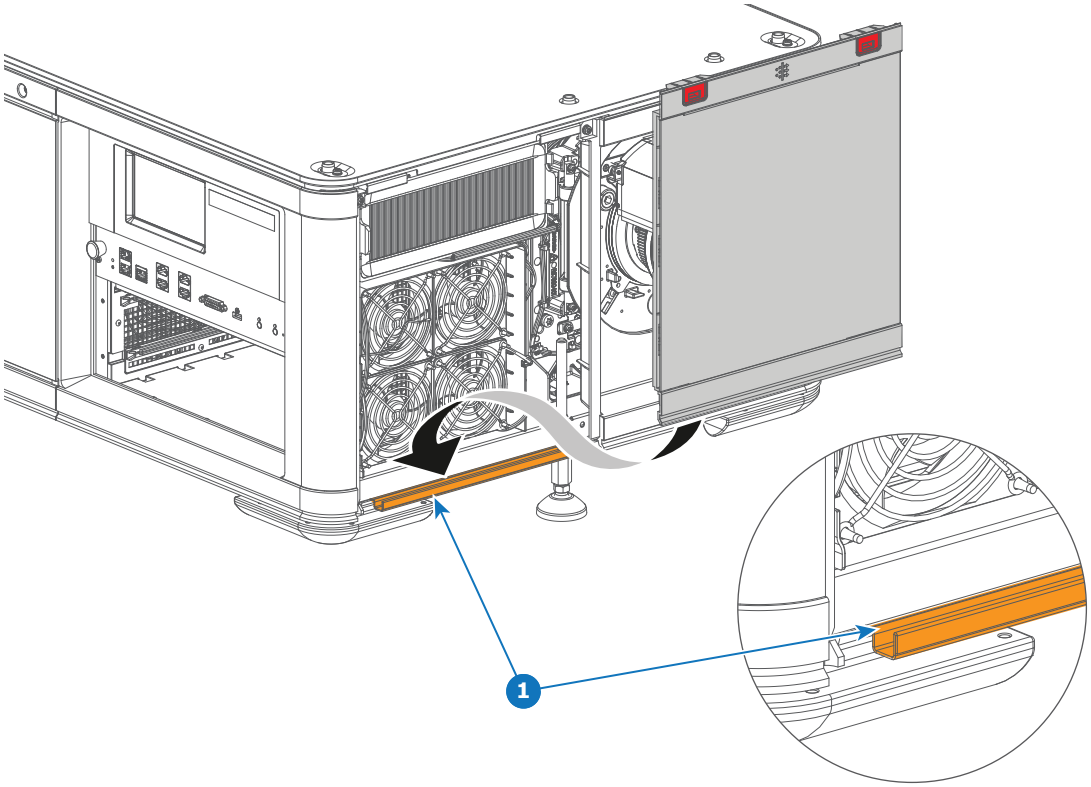


Image 12–24 Front cover positioning

2. Tip forward the cover over the hooks (reference 2) in the top of the frame, then push lightly to lock the handles (reference 3) on the hooks.

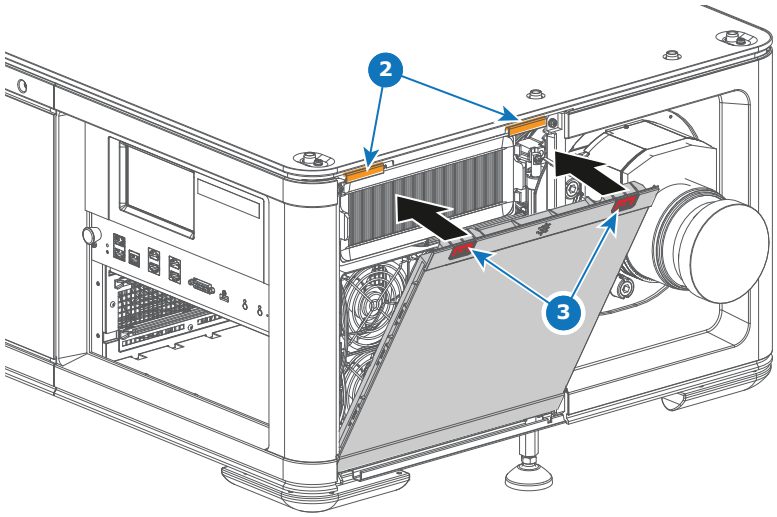


Image 12–25 Front cover locking

12.14 Mounting the left side cover

How to mount

1. Place the cover over the cover hook on the bottom of the projector frame (reference 1).

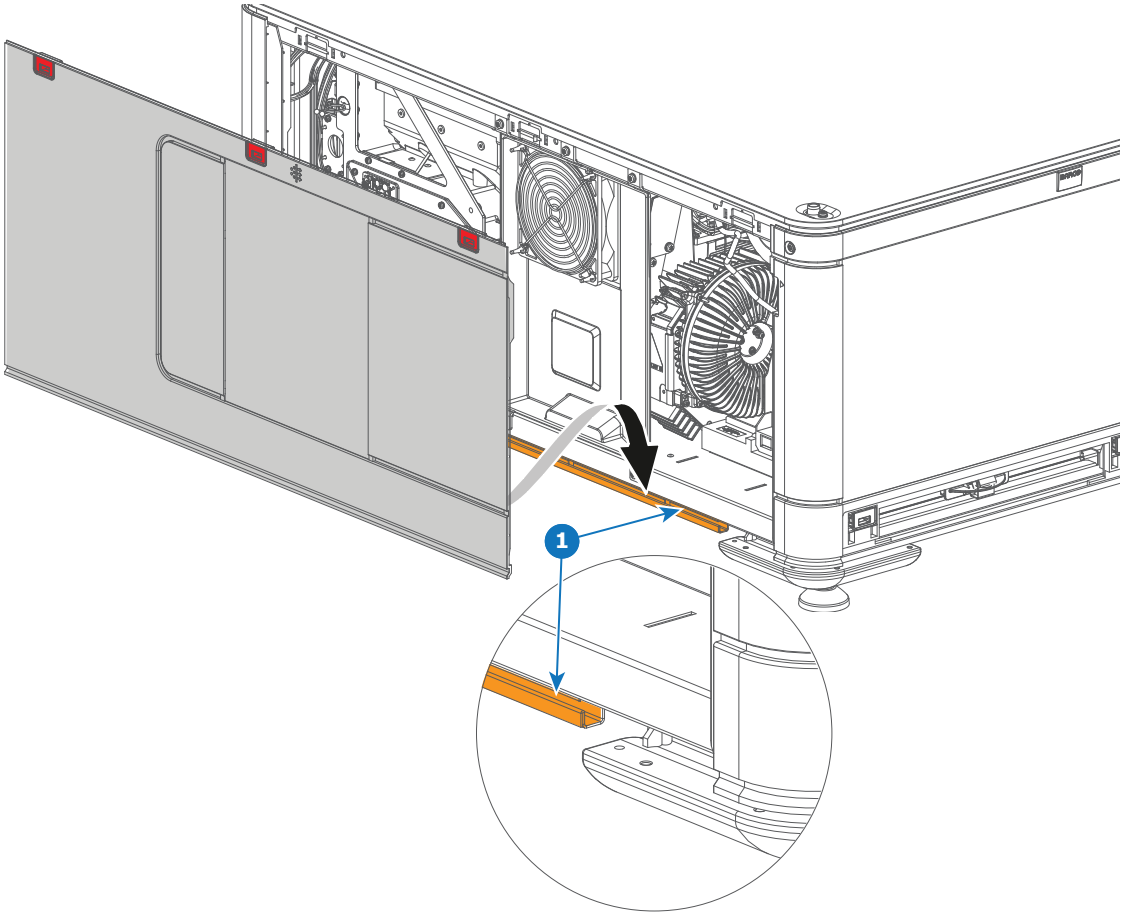


Image 12–26 Left side cover positioning

2. Tip forward the cover over the hooks (reference 2) in the top of the frame, then push lightly to lock the handles (reference 3) on the hooks.

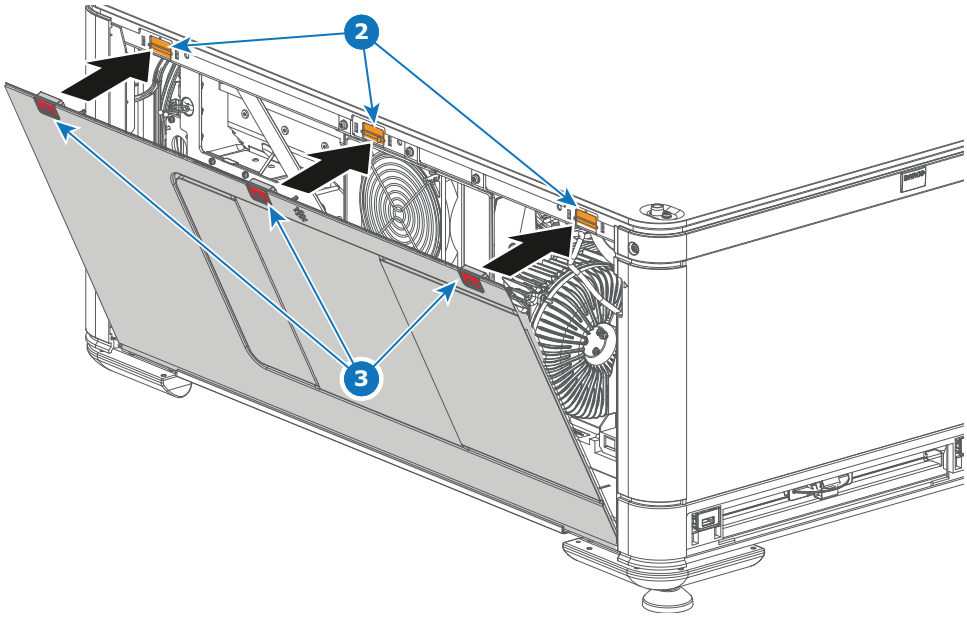


Image 12–27 Left side cover locking

Dimensions

A

A.1 Dimensions of the projector

Dimensions of the projector

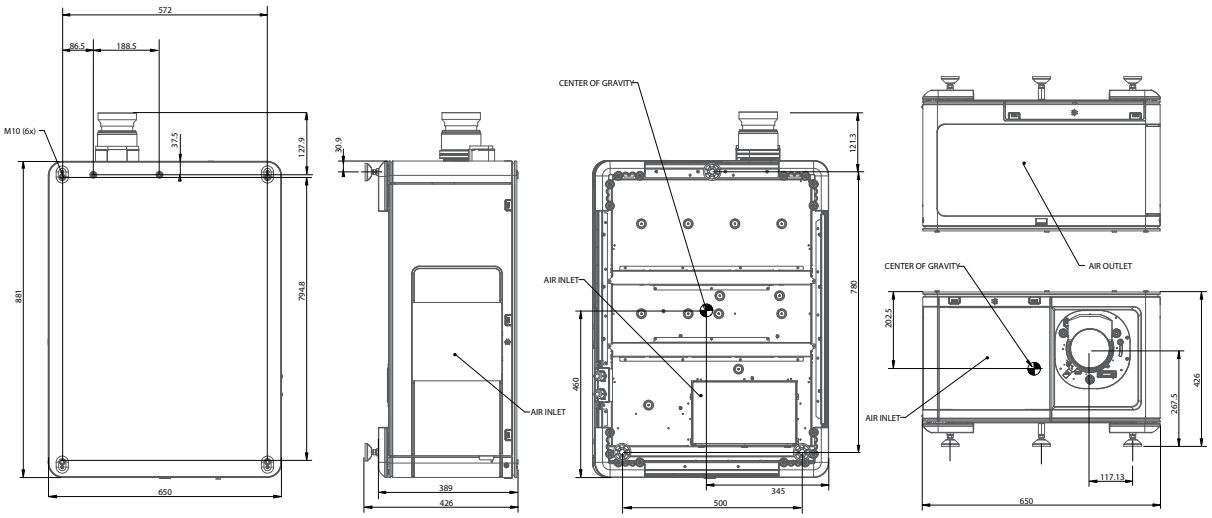


Image A–1 Dimensions given in mm

Dimensions of the projector with the exhaust adapter

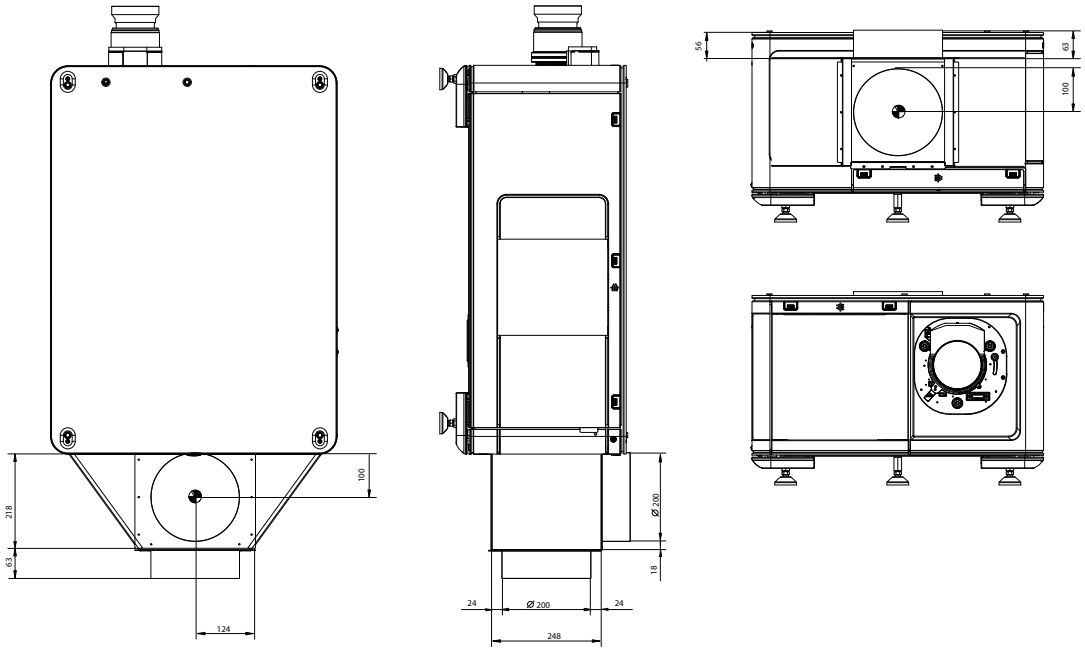


Image A–2

A.2 Dimensions of the universal pedestal

Dimensions

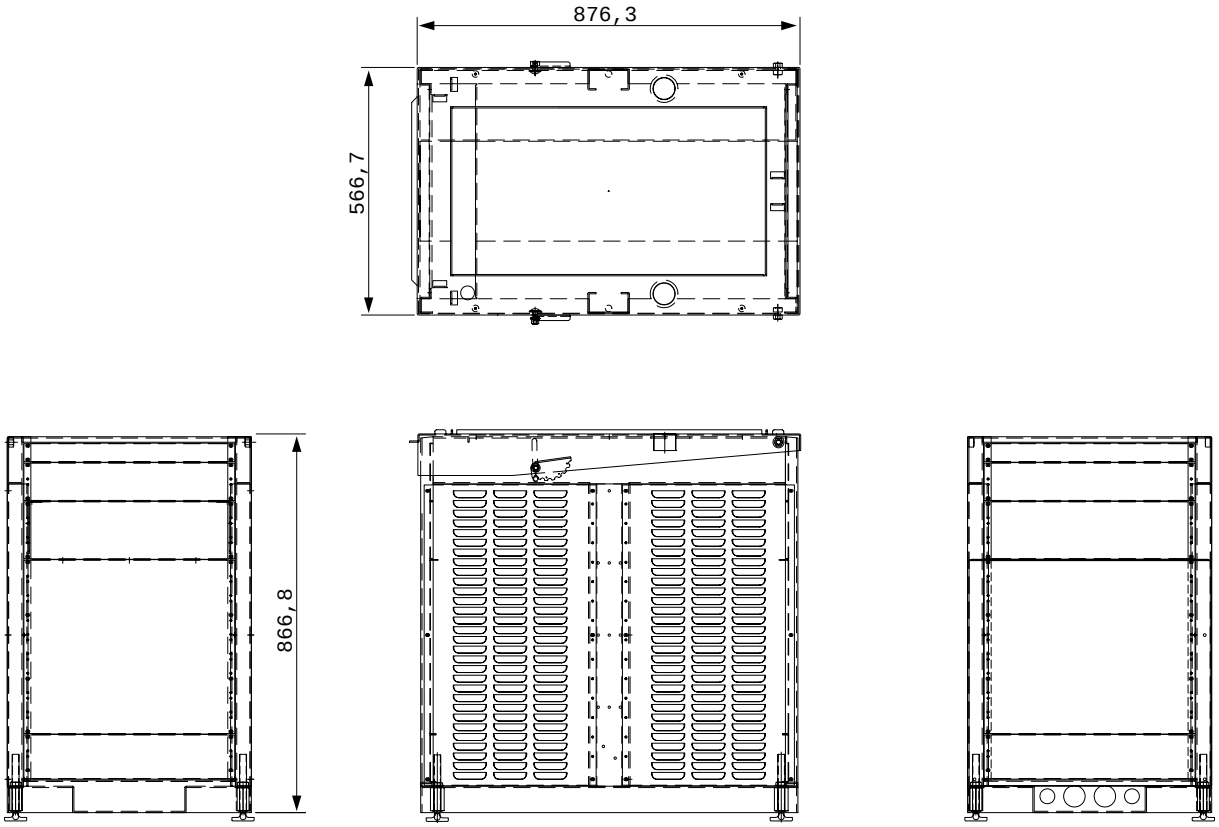


Image A–3 Dimensions given in millimeters.

A.3 Dimensions of the flat-packed pedestal

Dimensions

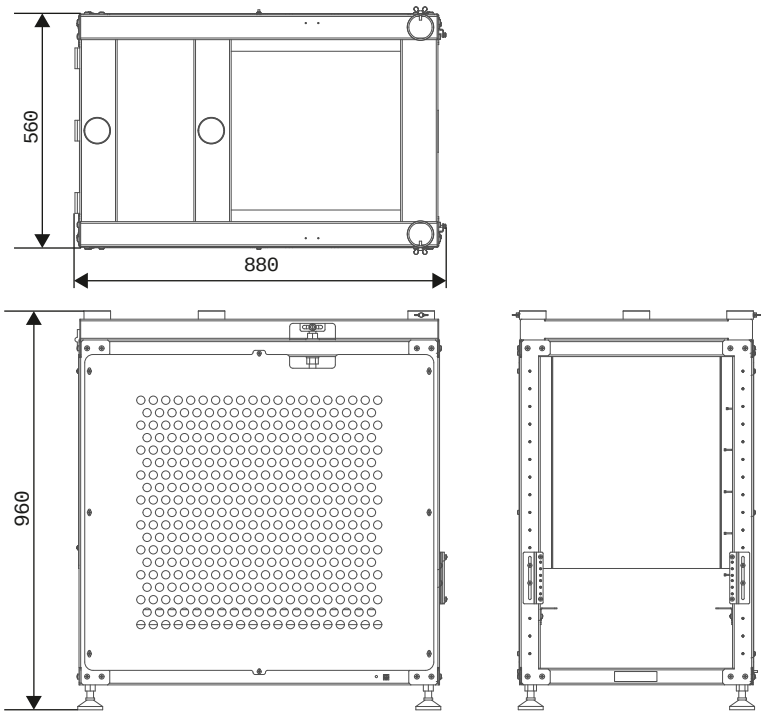


Image A–4 Dimensions given in millimeters

Glossary

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.

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.

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.

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.

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.

List of tools

Allen wrench 5 mm
Allen wrench 8 mm
Flat screwdriver
Hex key 1.5mm
Knife
Open-end wrench 14 mm
Open-end wrench 17 mm
Open-end wrench 24 mm
Side cutter
Smartphone (with auto-focus) or control software (e.g. Communicator, Web Communicator, Commander or Web Commander)
Socket wrench 17 mm
Socket wrench 7mm
Spectroradiometer
Torque wrench with 8 mm hex socket
Torx screwdriver T20
Web Communicator software

Index

Numbers/Symbols

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