F400/FS400

User guide

BARCO

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Guarantee and Compensation

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

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

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

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

Disclaimer on screenshot images used in this manual

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

Disclaimer for network usage

Barco highly recommends to install the projector in a **closed network** environment to minimize the risk of leaking, hacking or corrupting of company confidential information; commercial sensitive information and/or personal data. Furthermore, strengthen your network security to protect the projector against unauthorized access by third parties. To the maximum extent permitted by law, Barco disclaims any liability for the use of the projector in an open network environment.

Table of contents

Safety 1

About this document

Read this document attentively. It contains important information to prevent personal injury while installing and using the F400 product. Furthermore, it includes several cautions to prevent damage to the unit. Ensure that all safety guidelines, safety instructions and warnings mentioned in this chapter are understood and followed before installing the F400 product.

Clarification of the term "F400" used in this document

When referring in this document to the term "F400" means that the content is applicable for following Barco products:

• F400-HR, FS400-HR, F400-4K, FS400-4K, F400-N4K, FS400-N4K

Model certification name

• F400

> 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 optimal performance. Neglecting this can result in loss of warranty.

1.1 General considerations

> **WARNING:** Be aware of suspended loads.

> **WARNING:** When suspending loads, wear a hard hat to reduce the risk of personal injury.

> **WARNING:** Be careful while working with heavy loads.

> **WARNING:** Mind your fingers while working with heavy loads.

> **WARNING:** In case of emergency, disconnect the device from the mains power supply. In case the power input at the projector side is not accessible, a readily accessible general disconnect device shall be incorporated.

General safety instructions

- Before operating this equipment please read this manual thoroughly and retain it for future reference.
- All warnings on the unit and in its documentation manuals must be adhered to.
- Installation and preliminary adjustments must be performed by qualified Barco personnel or by authorized Barco service dealers.
- This product contains no user serviceable parts. Attempts to modify/replace mechanics or electronics inside the housing or compartments will violate any warranties and may be hazardous.
- All instructions for operating and use of this equipment must be followed precisely.
- All local installation codes must 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 a light source incorporating high brightness lasers. The 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 brightness than native laser light. Nevertheless the projected light can represent 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 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 intensity equals the applicable exposure limit as described in the chapter "Hazard Distance".

This projector is classified as a laser product under IEC 60825-1: 2014, EN 60825-1:2014 +A11:2021. The projector, in particular the projection beam, is classified as a Risk Group (RG) under IEC EN 62471-5:2015.

> **WARNING:** This projector has a built-in Class 4 laser module. Never attempt to disassemble or modify the laser module. Service only allowed by qualified service personnel.

> ⚠ **WARNING:** No direct exposure to the projection beam within the hazard distance shall be permitted for RG3 (Risk Group 3) IEC EN 62471-5:2015. Do not stare into the beam for RG2 (Risk Group 2) 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.

Optical radiation safety precautions

- Do not stare into Beam.
- This projector is a Class 1 laser product according to IEC 60825- 1:2014, EN 60825-1:2014+A11:2021.
- This projector is Risk Group 2 (RG2) according to IEC EN 62471-5, and may become RG3 when using a lens of a throw ratio (TR) larger than 3.0.
- Any operation or adjustment not specifically instructed by the user guide creates the risk of hazardous light radiation exposure.
- Do not open or disassemble the projector as this may cause danger to unauthorized personnel.
- Additional RG2 warning against eye exposure for close exposures less than 1m. WARNING: MOUNT ABOVE THE HEADS OF CHILDREN.

Users definition

These projectors are intended "FOR PROFESSIONAL USE ONLY", this means installation can only be carried out by trained and authorized persons.

Throughout this manual, the terms SERVICE PERSONNEL, INSTALLER 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, HIGH TEMPERATURES and HIGH BRIGHTNESS SOURCES) in performing a task, and of measures to minimize the potential risks to themselves or other persons.

The term USER or OPERATOR of RG2 projectors refers to any other person than SERVICE PERSONNEL or INSTALLER. The term USER or OPERATOR of RG3 projectors refers to any person trained and authorized to operate professional RG3 projectors. The USER or OPERATOR may only perform the maintenance tasks set forth in the user manual or the maintenance tasks for which they are trained and authorized. All other maintenance tasks and service tasks must be performed by qualified SERVICE PERSONNEL.

1.2 Important safety instructions

To prevent the risk of electrical shock

- This product should be operated from a mono phase AC power source. Ensure that the mains voltage and capacity match the projectors electrical ratings. If you are unable to install the AC requirements, contact your electrician. Do not defeat the purpose of grounding.
- Use only the power cord supplied with your device. When no power cord for your region/country is provided, contact your dealer. The power cord must be suited for the electrical ratings indicated on the product ID label. Only power cords according to the local electrical code regulations can be used.
- This apparatus must be grounded (earthed) via the power cord.
- Do not allow anything to rest on the power cord. Do not locate this product where persons will walk on the cord. To disconnect the cord, pull it out by the plug. Never pull the cord itself.
- Do not operate the projector with a damaged cord. Replace the cord.
- Do not operate the projector if the projector has been dropped or damaged - until it has been examined and approved for operation by a qualified service technician.
- Position the cord so that it will not be tripped over, pulled, or contact hot surfaces.
- If an extension cord is necessary, a cord with a current rating at least equal to that of the projector should be used. A cord rated for less amperage than the projector may overheat.
- 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 authorized trained service person when service or repair work is required.
- Do not use an accessory attachment which is not recommended by the manufacturer.
- Lightning - For added protection for this video product during a lightning storm, or when it is left unattended and unused for long periods of time, unplug it from the wall outlet. This will prevent damage to the device due to lightning and AC power-line surges.
- Never push objects of any kind into this product through cabinet slots as they may touch dangerous voltage points or short out parts that could result in a risk of fire or electrical shock.
- If you are unable to insert the plug into the outlet, contact your electrician to replace your obsolete outlet. Do not defeat the purpose of the grounding-type plug.
- Ensure that the main power cord complies with the national regulations at the site where the equipment is used.
- Do not use unauthorized replacements.
- Make sure that no objects enter into the vents and openings of the set.
- The projector is designed for indoor use only. Never operate the unit outdoors.

To prevent personal injury

- To prevent injury and physical damage, always read this manual and all labels on the system before connecting to the wall outlet or adjusting the projector.
- To prevent injury, take note of the weight of the projector.
- To prevent injury, ensure that the lens and all covers are correctly installed. See installation procedures.
- High brightness warning: The projector light source must be switched off when no projection lens is installed.
- It is hazardous to operate without lens or shield. Always switch the output light off when replacing a lens.
- Lenses or shields shall be changed if they have become visibly damaged to such extent that their effectiveness is impaired. For example by cracks or deep scratches.
- Warning: high intensity light beam. NEVER look into the lens! High luminance could result in damage to the eye.
- When installing an interchangeable lens with a throw ratio that makes the projector become an RG3 unit, (See chapter "Available lenses" in the installation manual), refer to chapter "High Brightness Precautions", for information regarding precautions.
- FOR PROFESSIONAL USE ONLY means installation can only be carried out by Barco AUTHORIZED PERSONNEL familiar with potential hazards associated with high intensity light beams.
- Warning: High brightness projector: This projector embeds 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 diffused within the optical path, representing a larger source and lower radiance value than native laser light. Nevertheless, when RG3, the projected light represents a significant risk for the human eye when exposed directly within the beam. This risk is not specific related to the characteristics of laser light but solely to the high thermal induced energy of the light source; which is comparable with lamp based systems. When RG3, 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".
- Always switch off the projector and disconnect from the mains power supply before attempting to remove any of the projector covers or access parts inside the projector.
- This product contains no user serviceable parts. Attempts to modify/replace mechanics or electronics inside the housing or compartments will violate any warranties and may be hazardous.
- For correct physical installation, refer to the Installation manual.
- Do not place this equipment on an unstable cart, stand, or table. The product may fall, causing serious damage to it and possible injury to the user.
- Only place the projector on a stable surface, or mount it securely using an approved ceiling-mount.
- **Cooling liquid circuit.** The projector contains a cooling circuit filled with Mono-ethylene glycol (1,2-ehtane diol) and inhibitors in aqueous solution (34% active). In the unlikely event that the cooling circuit has a leak, switch off the device and contact qualified service personnel. The liquid is not for household use. Keep out of range of children. Harmful by oral intake. Avoid exposure to pregnant women. Avoid contact with eyes, skin and clothing. Avoid inhaling the noxious fumes.

To prevent fire hazard

- Barco projection products are designed and manufactured to meet the most stringent safety regulations. This projector radiates heat on its external surfaces and from ventilation ducts during normal operation, which is both normal and safe. Exposing flammable or combustible materials into close proximity of this projector could result in the spontaneous ignition of that material, resulting in a fire. For this reason, it is absolutely necessary to leave an "exclusion zone" around all external surfaces of the projector whereby no flammable or combustible materials are present.
- Do not place flammable or combustible materials near the projector!
- Caution! Hot air is exhausted from the rear vent. Do not place objects that are sensitive to heat nearer than 25 cm (10") to the exhaust vent.
- Slots and openings in this equipment are provided for ventilation. To ensure reliable operation of the projector and to protect it from overheating, these openings must not be blocked or covered.
- The openings should never be blocked by placing the projector too close to walls, or other similar surface. Allow for sufficient distance to walls and ceilings to avoid overheating. Minimum safety distance to the exhaust area of the unit must not be less than 25 cm (10") and to the intake area, not less than 25 cm (10").
- This projector should never be placed near or over a radiator or heat register.
- This projector should not be placed in a built-in installation or enclosure unless proper ventilation is provided.
- Do not cover the projector or the lens with any material while the projector is in operation. Keep flammable and combustible materials away from the projector at all times.
- Mount the projector in a well-ventilated area away from sources of ignition and out of direct sun light. Always allow ample airflow through the projector.
- Never expose the projector to rain or moisture. In the event of fire, use sand, CO_2 or dry powder fire extinguishers.
- Never use water on an electrical fire.
- Always have service performed on this projector by qualified service personnel. Always insist on genuine Barco replacement parts. Never use non-Barco replacement parts as they may degrade the safety of this projector.
- Projection rooms must be well ventilated or cooled in order to avoid heat buildup.
- Let the projector cool down completely before storing. Remove cord from the projector when storing.

To prevent 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

- When Air filters mounted on the projector, they 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.
- If more than one projector is installed in a common projection booth, the exhaust air flow requirements are valid for EACH individual projector system. Note that inadequate air extraction or cooling will result in decreased life expectancy of the projector as well as causing premature failure of the lasers.
- 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. The exception from this is the front cover, that can be removed to give access to multiple anchor points. See User Guide for more detailed info regarding this issue.
- Always remove lens cap before switching on the projector. If the lens cap is not removed, it may melt due to the high energy light emitted through the lens. Melting the lens cap may permanently damage the surface of the projection lens.
- Only connect the projector to signal sources and voltages as described in the technical specification. Connecting to unspecified signal sources or voltages may lead to malfunction and permanent damage of the unit.
- The projector must always be installed in a manner which ensures free flow of air into its air inlets and unimpeded evacuation of the hot air from its cooling system.

- Slots and openings in the cabinet are provided for ventilation. To ensure reliable operation of the product and to protect it from overheating, these openings must not be blocked or covered. The openings should never be blocked by placing the product on a bed, sofa, rug, or other similar surface. This product should never be placed near or over a radiator or heat register. The device should not be placed in a built-in installation or enclosure unless proper ventilation is provided. Ensure that nothing can be spilled on, or dropped inside the projector. If this does happen, switch off and unplug the mains supply immediately. Do not operate the projector again until it has been checked by Barco authorized service personnel.
- Do not block the projector cooling fans or free air movement around the projector. Minimum safety distance to the exhaust area of the unit must not be less than 25 cm (10") and to the intake area, not less than 25 cm (10").
- **Special care for Laser Beams**: Special care should be used when DLP projectors are used in the same room as high-power laser equipment. Direct or indirect hitting of a laser beam on to the lens can severely damage the Digital Mirror Devices™ in which case there is a loss of warranty.
- Do not use this equipment near water.
- Do not operate the projector outside its temperature and humidity specifications as this may result in overheating and malfunction.
- Never place the projector in direct sun light. Sun light on the lens can severely damage the Digital Mirror Devices™ in which case there is a loss of warranty.
- Save the original shipping carton and packing material. They will come in handy if you ever have to ship your equipment. For maximum protection, repack your set as it was originally packed at the factory.
- Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning. Never use strong solvents, such as thinner or benzine, or abrasive cleaners, since these will damage the cabinet. Stubborn stains may be removed with a cloth lightly dampened with mild detergent solution.
- To ensure the highest optical performance and resolution, the projection lenses are specially treated with an anti-reflective coating, therefore, avoid touching the lens. To remove dust on the lens, use a soft dry cloth. Do not use a damp cloth, detergent solution, or thinner. For lens cleaning, follow the instructions given in the user manual.
- Only use FLC series lenses on the projector, or FLD+ / FLDX lenses with adapter. Other lenses may damage the internal optics. See Barco website for suitable FLC and/or FLD lenses.
- Allowed ambient temperature range depends on altitude:
  - between 0 and 1500 meter altitude: ambient temperature range = 10°C (32°F) to 40°C (104°F)
  - between 1500 and 3000 meter altitude: ambient temperature range = 10°C (32°F) to 35°C (86°F)
- Rated operating humidity = 5%RH to 85%RH Non-condensed.
- Rated storage humidity = 10%RH to 90%RH.

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 unit and cancellation of the warranty.
- Replacement parts: When replacement parts are required, be sure the service technician has used original Barco replacement parts or authorized replacement parts which have the same characteristics as the Barco original part. Unauthorized substitutions may result in degraded performance and reliability, fire, electric shock or other hazards. Unauthorized substitutions may void warranty.
- Safety check: Upon completion of any service or repairs to this unit, ask the service technician to perform safety checks to determine that the product is in proper operating condition.

Malfunction unit

Remove all power from the product 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.
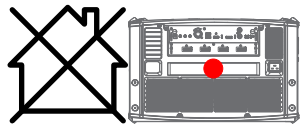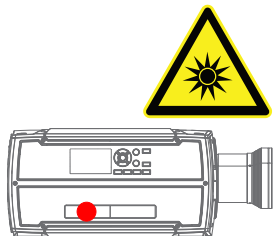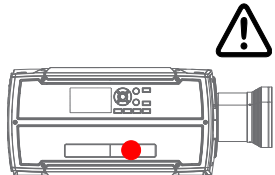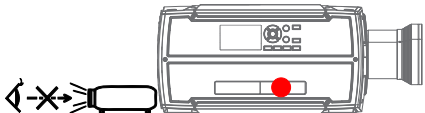• If the product exhibits a distinct change in performance, indicating a need for service.

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

Safety labels explanation and location:

Hazard RG3: Not for household use symbol.	

Hazard RG3: optical radiation warning symbol 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 xxxx.	

WARNING : Mount above the heads of children.[1] AVERTISSMENT Installer au-dessus de la tête des enfants. 警告: 安装在儿童 头部上方 警告: 安裝在兒童頭部上方	

Hazard RG2. Do not look into the lens.	

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1. Additional RG2 warning against eye exposure for close exposures less than 1m.

Ce projecteur peut devenir RG3 si un objectif interchangeable avec un rapport de projection supérieur à 3.0 est installé. Veuillez vous reporter au manuel pour en savoir plus sur la liste des objectifs et la distance de sécurité avant toute utilisation. De telles combinaisons entre projecteur et objectif sont conçues pour des applications professionnelles uniquement et pas pour des applications grand public.

This projector may become RG3 when an interchangeable lens with throw ratio greater than 3.0 is installed. Refer to the manual for the lens list and hazard distance before operation. Such combinations of projector and lens are intended for professional use only, and are not intended for consumer use.

当者安装投射比大于3.0的可互换镜头时，本投影机可能会列为风险组3(RG3)。 操作前，请先参考手册中的镜头清单和危险距离。本投影机和镜头组合仅供专业人员使用，非普通消费者使用
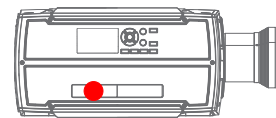
若者安装投射比大於3.0的可交換鏡頭時，可能歸類為風險組3(RG3)。 操作前，請先參考手冊中有關鏡頭清單與危險距離的資訊。上述投影機與鏡頭組合僅供專業用途，不適合一般消費者使用。

CLASS 1 LASER PRODUCT
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 2016-V-0144 EFFECTIVE ON DECEMBER 12, 2019.

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

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

此为A级产品, 在生活环境中, 该产品可能会造成无线电干扰 在这种情况下, 可能需要用户对其干扰 采取可行的措施。

FCC: This device complies with part 15 of the FCC Rules. Operation is subject to the following conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

CAN ICES-003 (A) / NMB-003 (A)

RG2

警告: 安裝在兒童 頭部上方
警告: 安裝在兒童頭部上方

WARNING : Mount above the heads of children
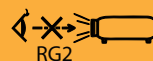AVERTISSMENT : Installer au-dessus de la tête des enfants

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

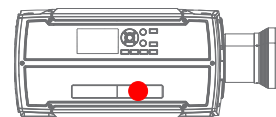警告使用者 此為甲類資訊技術設備，於居住環境中使用時，可能會造成射頻擾動，在此種情況下，使用者會被要求 採取某些適當的對策。

此为A级产品, 在生活环境中, 该产品可能会造成无线电干扰, 在这种情况下, 可能需要用户对其干扰 采取可行的措施。

FCC: This device complies with part 15 of the FCC Rules. Operation is subject to the following conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

CAN ICES-003 (A) / NMB-003 (A)

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 eye 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 20.

To protect untrained end users (as venue 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.
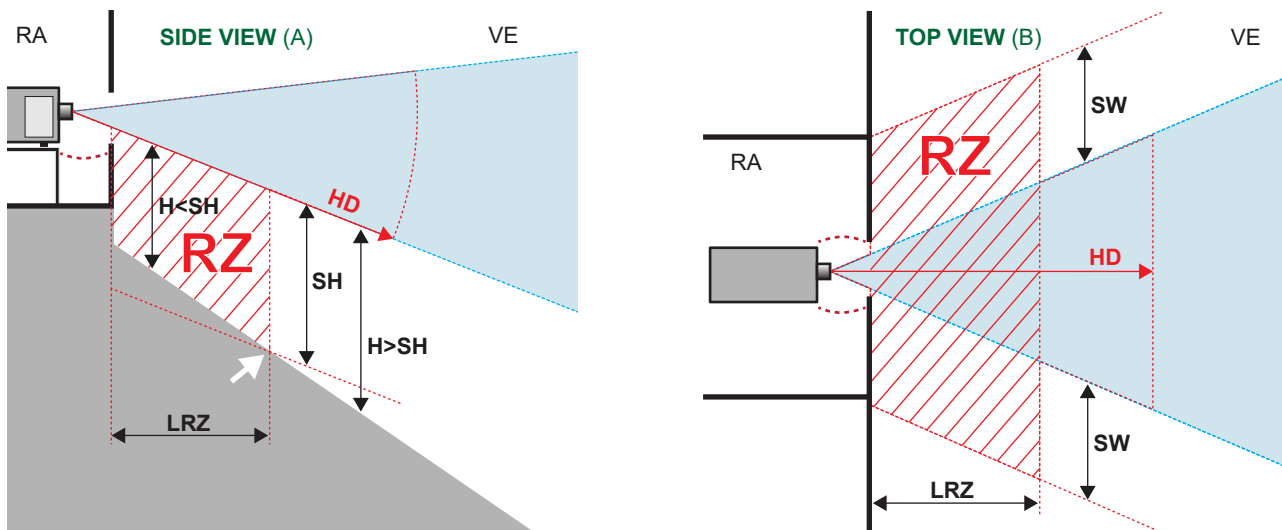

Image 1–1

A	Side view	**HD**	Hazard Distance
B	Top view	**LRZ**	Length Restriction Zone
RA	Restricted Access location (boot area of projector).	**H**	Height between surface floor and the light beam
VE	Venue	**SH**	Separation Height
RZ	Restriction Zone	**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 venue 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.
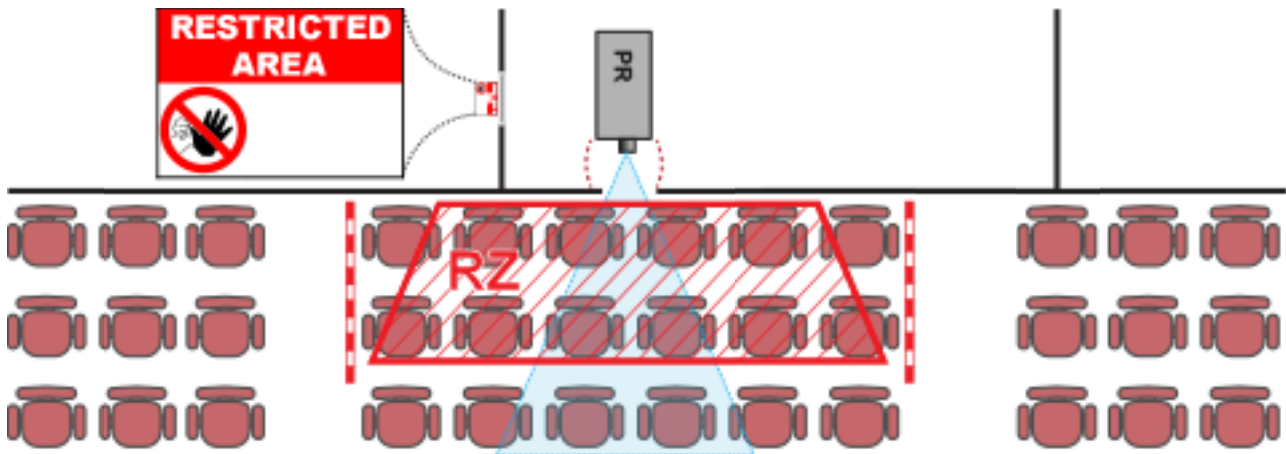
Image 1–2

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. A copy can remain on-site.

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 eye 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 following graphic, two areas should be considered: the restricted enclosed projection area (RA) and the observation area (VE).
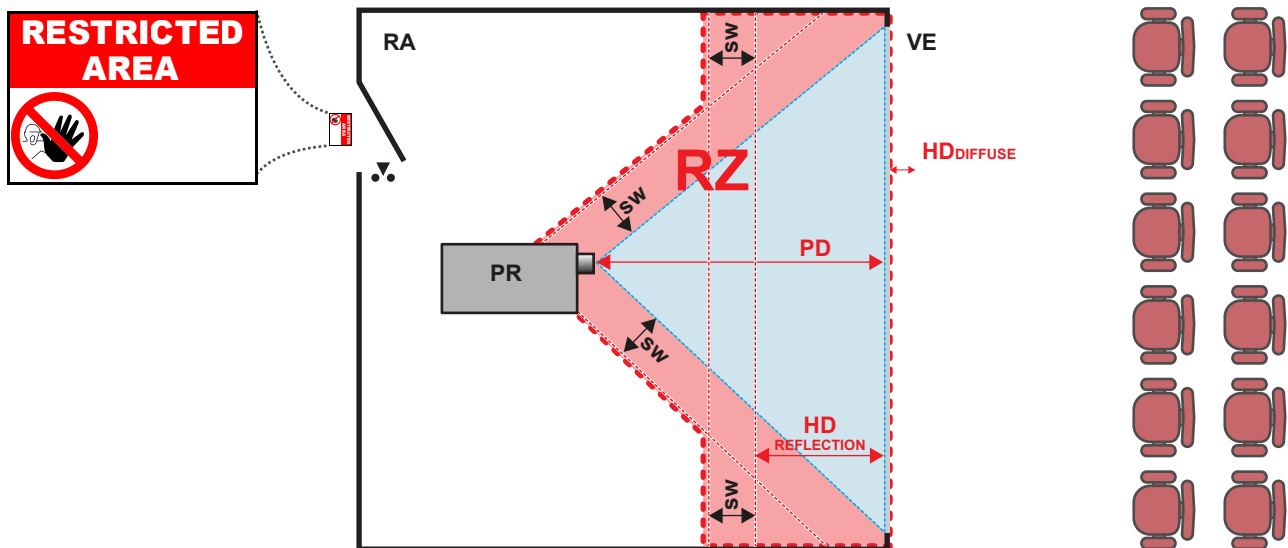

Image 1–3

RA	Restricted Access location (enclosed projection area).	**RZ**	Restriction Zone.
PR	Projector.	**PD**	Projection Distance.
VE	Venue (observation area).	**SW**	Separation Width. Must be minimum 1 meter.

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

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

As described in "High Brightness precautions: Hazard Distance", page 16, it is mandatory to create a restricted zone within the beam areas closer than any HD. In the enclosed projection area the combination of two restricted zones are relevant: The restricted zone of the projected beam toward the screen; taking into account 1 meter Separation Width (SW) from the beam onward. Combined with the restricted zone related to the rear reflection from the screen ($HD_{reflection}$); 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 20.

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

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

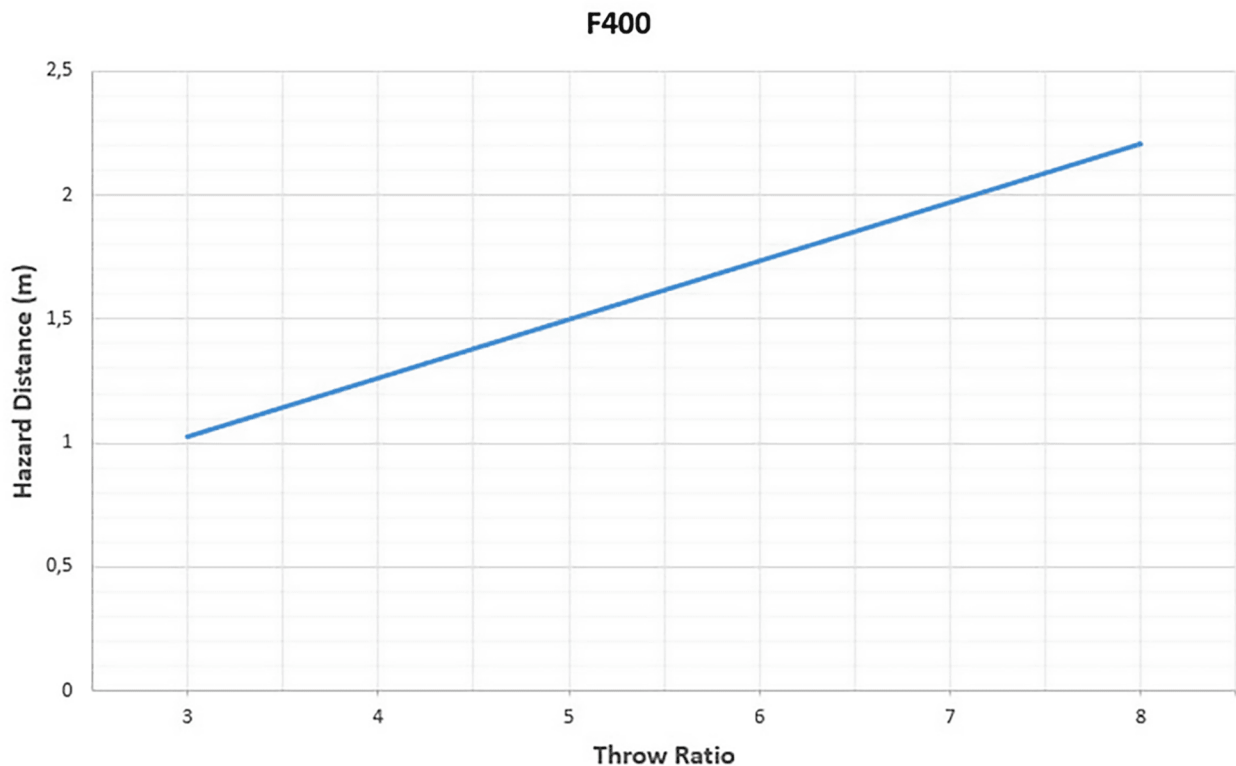Image 1–4

HD Hazard Distance
TR Throw Ratio

1.7 HD calculation of multi-projector stacks

Sometimes two or more projectors are stacked (projecting on the same surface). In this case, because of the overlap of the images, possibly a system Hazard Distance needs to be applied instead of a single projector hazard distance.

Only projectors stacked along one axis (horizontal or vertical) should be considered. Physical stacking of projectors in two dimensions (for example 2x2), can be reduced to separate "N"x1 systems.

The information needed is:

• The Hazard Distance (**HD**) of a single projector with the given lens.
• The distance (**h**) between two adjacent projector lens centers in the stack.

> 📄 For 3 or more projectors, in case the distances between adjacent lenses are not equal, take the shortest distance.

HD calculation:

• For stacking two-projectors:
  - **If the single projector hazard distance HD ≥ 9*h**, then the system hazard distance to implement is 1.15*HD.
  - **If the single projector hazard distance HD < 9*h**, then keep the original HD and risk zone per projector.

- For stacking "N" projectors along the same axis, "N" being 3 or more:
  - **If the single projector hazard distance HD ≥ 12*h**, then the system hazard distance to implement is ("N"/2 + 0.15) * HD.
  - **If the single projector hazard distance 9*h ≤ HD < 12*h**, then the system hazard distance to implement is 1.15*HD.
  - **If the single projector hazard distance HD < 9*h**, then keep the original HD and risk zone per projector.

1.8 Compliance

UK Compliance

This product is fit for use in the UK.

Authorised Representative: Barco UK Ltd

Address: Building 329, Doncastle Road
Bracknell RG12 8PE, Berkshire, United Kingdom

1.9 Download Product Manual

Download product manual

Product manuals and other related documentation are available online at *https://www.barco.com*. Search or browse to the product support page or scan the QR code on the product ID-label or on the box label. To see all service documentation (e. g., spare part list, service manuals, field loadable software ...) you must be registered and logged in.

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

F400 introduction

2

About this chapter

This chapter and by extension this whole document, the **F400 user guide**, is intended for the user who want to get familiar with the projector hardware parts. It describes the input and communication boards, the remote control unit, local keypad, how to power up the projector, the different power states, product specifications and much more. It does not contain installation instructions and does not describe the Pulse graphic user interface. Refer to the **F400 installation manual** for detailed installation instructions and to the **Pulse OSD user guide** for all software features of the projector.

> ☞ The Pulse software has regular new releases due to continuous improvements. Hence, the *Pulse OSD* user guide is subject to updates. Download the latest version of the user guide from the Barco website using following link: *https://www.barco.com/support*.

> ☞ For detailed product specifications, see the user guide of the projector: *https://www.barco.com/support*.

2.1 Projector orientation

Projector orientation

The projector orientation in this manual refers to the left and right side corresponding with the left and right hand when standing behind the projector and look forward in the projection direction.
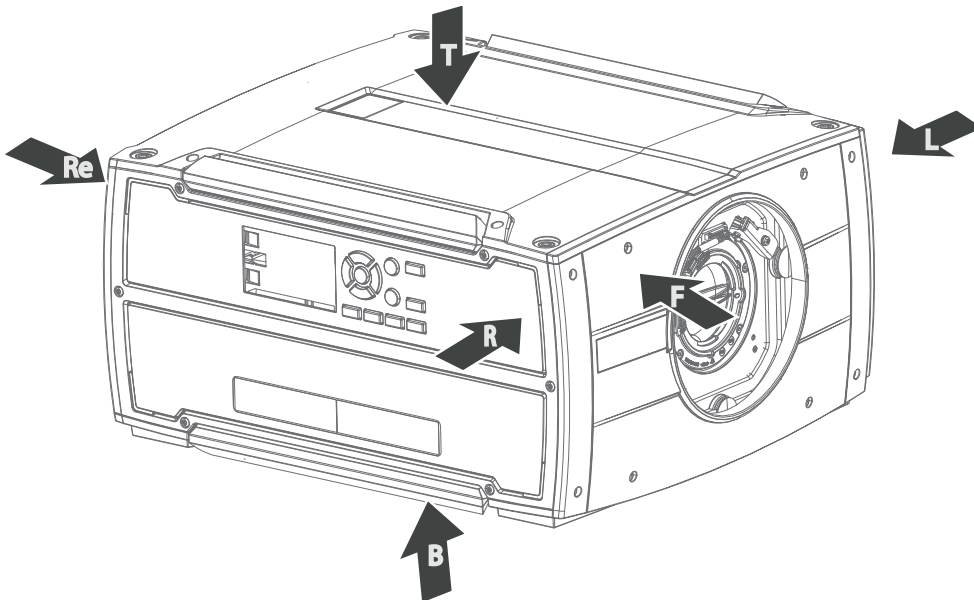

Image 2–1

Re	Rear side		**L**	Left side
R	Right side		**T**	Top
F	Front		**B**	Bottom

2.2 Projector components

Components
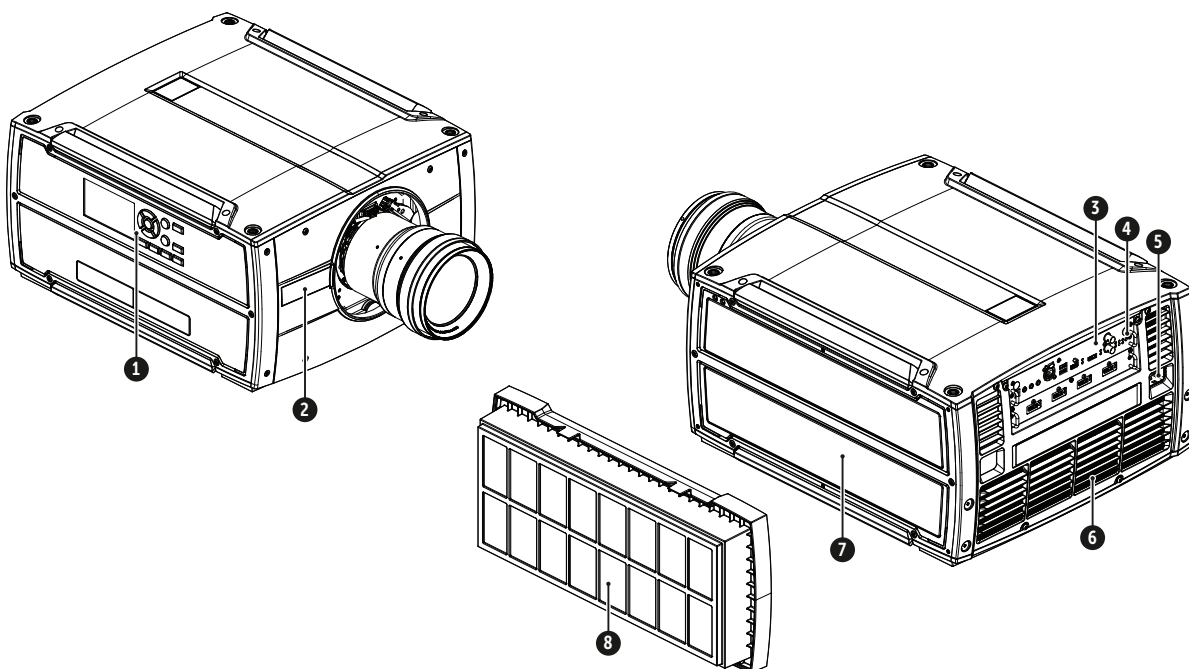
Image 2–2

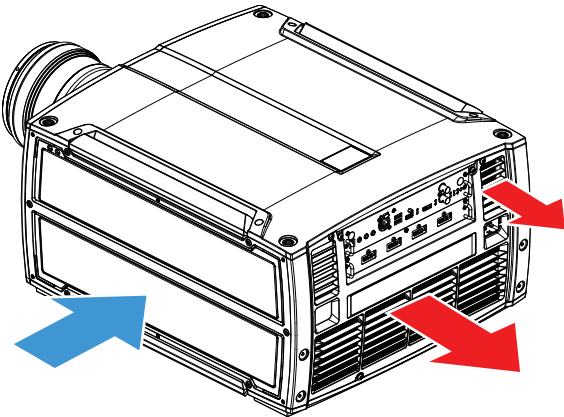|			
1	LCD touch panel with local keypad and side IR receiver	**5**	Mains power input socket
2	Front IR receiver	**6**	Air outlet
3	Input and Communication panels	**7**	Air input
4	Back IR receiver	**8**	Optional pollution filter

2.3 Projector airflow

Air flow

Image 2–3

> ⚠ **CAUTION:** Keep the air inlets and outlet at all times free. Make sure there is a minimum distance of 25cm (10 in) between the air outlet and the nearest solid object.

2.4 Projector status

Projector status indicator LEDs

The Control & Communication module contains four status LEDs at the right side of the front panel. These LEDs allows a quick status analyses of the projector. For explanatory see table hereunder.
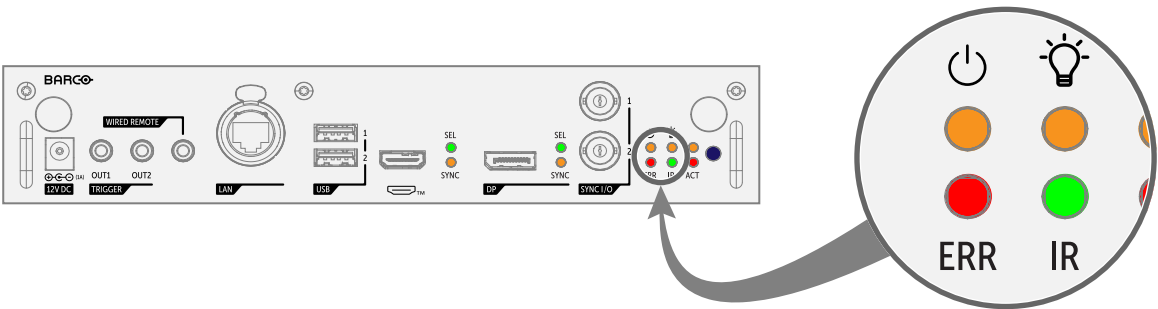

Image 2–4 Location of projector status LEDs.

LED	Color status	Description
⏻ Power	Off	Projector is in ECO STANDBY mode, or is powering up
	RED	Projector is in STANDBY mode
	ORANGE	Projector is in READY mode
	GREEN	Projector is ON
💡 Illumination	Off	Light source is OFF
	RED	No light source detected
	ORANGE	Light source is on in ECO mode
	GREEN	Light source is on in normal mode
	GREEN-ORANGE	Light source is on in CLO mode

LED	Color status	Description
ERR	Off	No error
	RED toggles on/off	Error
	ORANGE toggles on/off	Warning
IR	RED	IR signal received
	GREEN	IR signal acknowledged

LED	Color status	Description

Local keypad

3

3.1 Local keypad functions

Local keypad overview
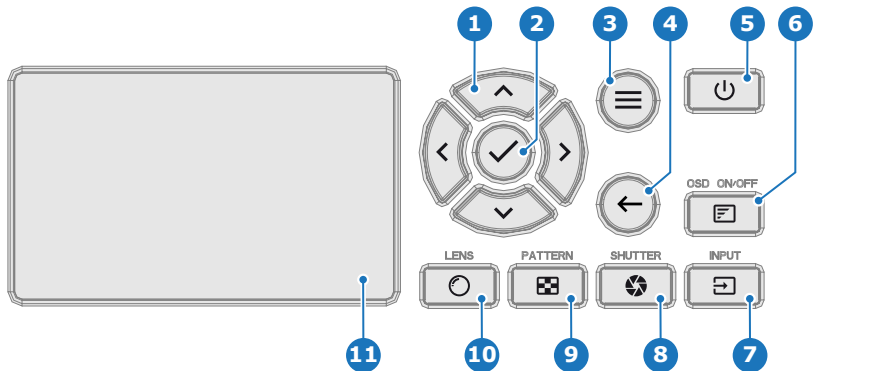
Image 3–1

1 Navigation
2 Confirmation
3 Menu enter/exit
4 Menu back
5 Power On/Off
6 OSD On/Off

7 Input selection
8 Shutter open/close
9 Test patterns
10 Lens menu
11 LCD touch panel

Functionality

The local keypad gives direct access to several functions, in addition, access to the Pulse menu system.

The local keypad has a backlight that can be switched on and off manually. By default the light turns off after 5 minutes.

> 📄 Refer to the *Pulse OSD* user guide for detailed guidance on all software features of the projector.

> 👉 The Pulse software has regular new releases due to continuous improvements. Hence, the *Pulse OSD* user guide is subject to updates. Download the latest version of the user guide from the Barco website using following link: *https://www.barco.com/support*.

3.2 Local keypad backlight

Button backlight status

The **Power** and **Shutter** buttons are equipped with white, blue and red backlit LEDs. The other keys are only equipped with white and blue backlit LEDs. The LEDs are controlled according to the features available.

Button	Color status	Description
Power button	Short WHITE pulse	Projector starts up (booting), or is in ECO STANDBY
	Blinking WHITE	Firmware update, or in transition from ECO STANBY to STANDBY
	Solid WHITE	Projector is in STANDBY or READY mode
	Blinking BLUE	Projector goes to ON mode
	Solid BLUE	Projector is ON
	Blinking RED	Error condition
Shutter button	Off (no color)	Projector is OFF, starts up, or is in STANDBY or READY mode
	Solid WHITE	Projector is ON, shutter is open
	Solid RED	Projector is ON, shutter is closed

3.3 LCD touch panel

Functionality

The LCD touch panel has two main functions:

1. Showing the menus, adjustment information and if enabled a mirror of the OSD (On Screen Display).
2. Information regarding the status of the projector:
   • Projector status
   • Network address
   • Active source
   • Current firmware version
   • Operation Data
   • Active functions (Enabled Functions).

Toggle between the two main function by using the **Menu** button on the local keypad, or on the remote control unit.

The LCD touch panel will fade out 30 seconds after the last key operation.
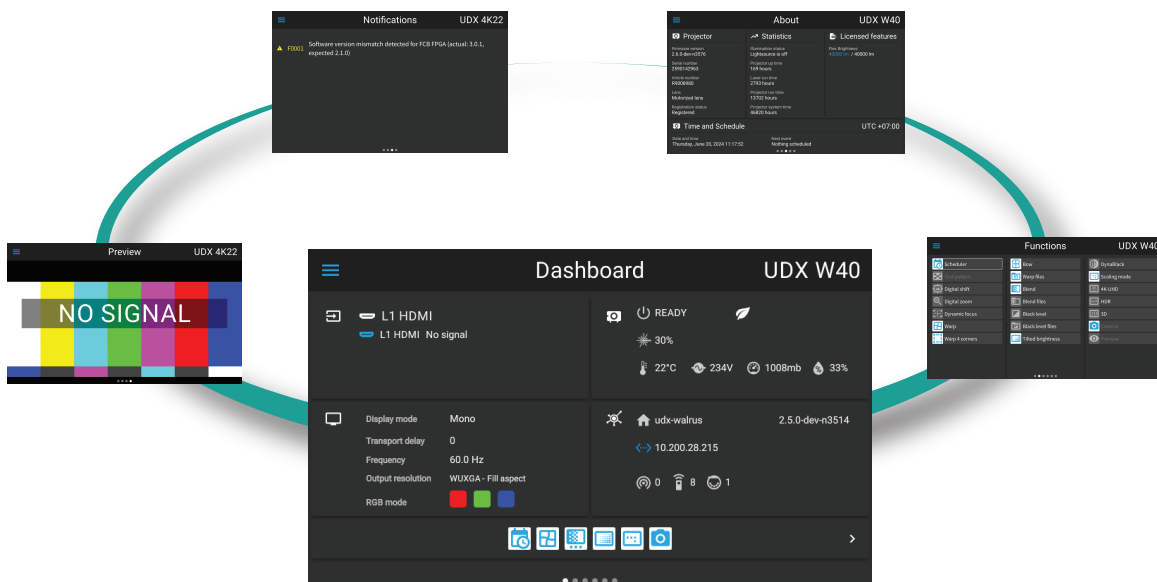

Image 3–2 Example of the Pulse OSD user interface

> 📄 Refer to the *Pulse OSD* user guide for detailed guidance on all software features of the projector.

Navigation

Use the arrow keys on the local keypad or on the remote control unit to navigate through the menus on the LCD touch panel.

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

• Press the icons to select the functions.
• Select switches to toggle.
• Select and drag sliders to adjust slider value.

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

Local keypad

Basic Remote Control Unit

4

About the basic remote

The F400 projector is standard delivered with a basic remote control unit (without batteries). While this remote control unit has a more limited amount of available features compared with the optional Pulse RCU, it will be able to help you out with basic controls.

☞ For more information about the optional Pulse RCU see chapter "Pulse Remote Control Unit", page 35. For ordering information see Barco website.

4.1 Basic remote functions

Functions

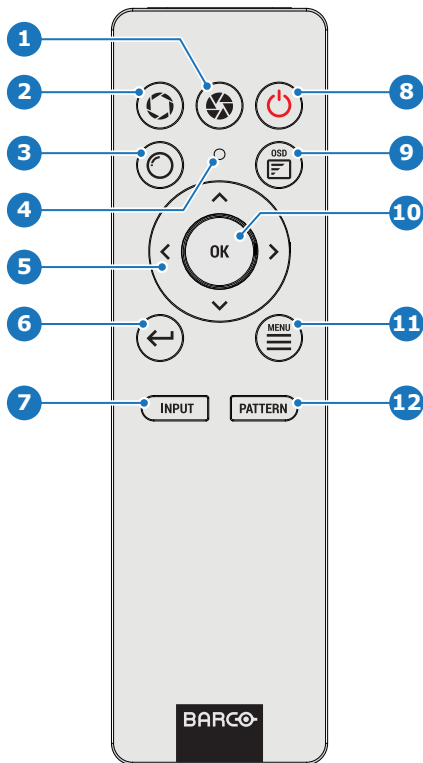Image 4–1

1	Close shutter	**7**	Open *Source* menu
2	Open shutter	**8**	Power on / off
3	Open *Lens* menu	**9**	OSD menu on / off
4	Button pressed indicator	**10**	Menu confirmation
5	Menu navigation keys	**11**	GUI activate / deactivate
6	Move back one level in menu system	**12**	Open *Test pattern* menu

> The Power on / off button only shifts power between Ready and ON mode.

> When pressing the GUI activate / deactivate button while the projector is in stand-by mode, will also power up the projector.

4.2 Basic remote batteries

Battery placement & replacement

The basic remote control is powered by two (2) standard AAA batteries. The needed batteries are not included in the packaging.

The battery compartment is on the back side of the basic remote control. The following image illustrates how to open the battery compartment.
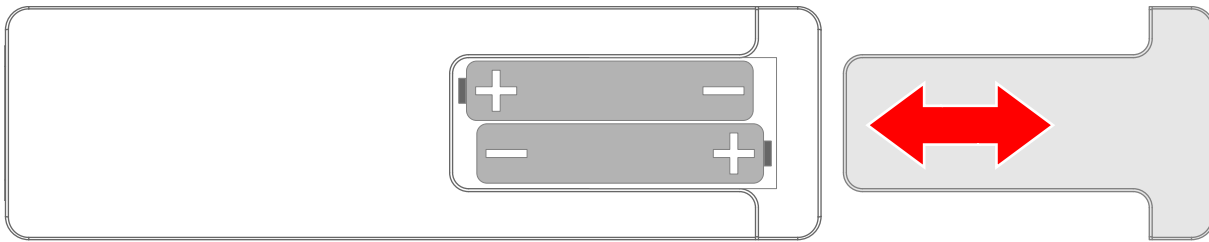
Image 4–2 Position of batteries in basic remote.

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

Pulse Remote Control Unit

5

5.1 Pulse RCU functions

Functions

Image 5–1

1	Button pressed indicator	**14**	Backspace (while entering values)
2	Shutter open	**15**	XLR connector
3	Shutter close	**16**	Decimal mark (while entering values)
4	LCD/Touch panel on / off	**17**	Macro button (Not in use)
5	Projector OSD on / off	**18**	Menu back
6	Lens zoom	**19**	Default value button
7	Lens shift	**20**	Lens focus
8	Menu open / close	**21**	RGB filter
9	Menu selection, OK button	**22**	Test patterns
10	Menu navigation	**23**	Power on
11	Input selection	**24**	Power off
12	Address button	**25**	3.5 mm jack
13	Numeric buttons	**26**	RCU on / off

5.2 Pulse RCU battery installation

About the batteries for the remote control

> 📄 Due to updated shipping regulations, batteries are no longer included in the packaging. It is up to the user to purchase the correct batteries.
> Use two AA size (alkaline) batteries in the remote control.

Install the batteries before using the Pulse RCU.

> ⚠️ **CAUTION:** Replace with the correct battery type. Use two AA size batteries. There is a risk of explosion if the battery is replaced with an incorrect type.

Required parts

AA size alkaline battery (two pieces)

How to install

1. Push the battery cover tab with the fingernail a little backwards (reference 1) and, at the same time, flip the cover outwards (reference 2).
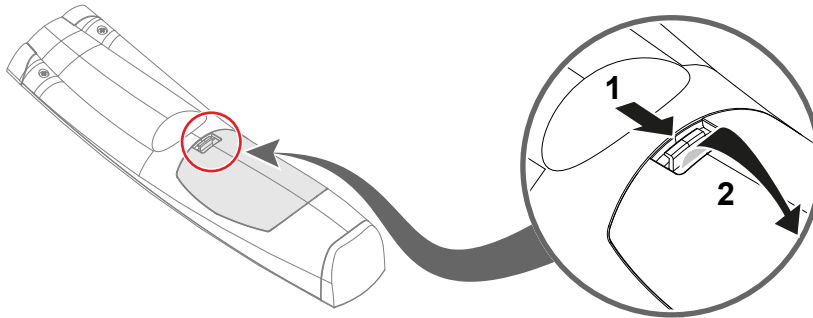
Image 5–2

2. Insert two AA size batteries into the battery compartment.

    making sure to match the polarities of the batteries to the + and - marks inside the battery compartment.

    ⚠️ *Caution:* Place the batteries as explained. There is a risk of explosion if the battery is incorrectly installed.
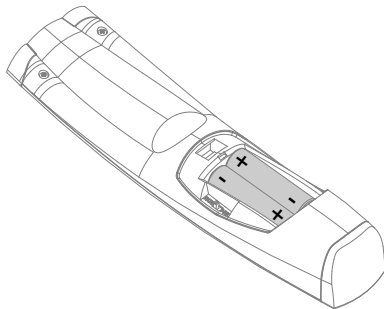
Image 5–3

3. Insert both lower tabs of the battery cover in the gaps at the bottom of the remote control (reference 3).
4. Press the top of the cover until in clicks in place (reference 4).
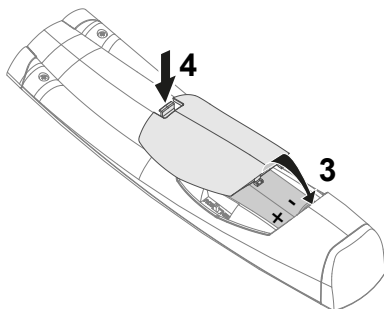
Image 5–4
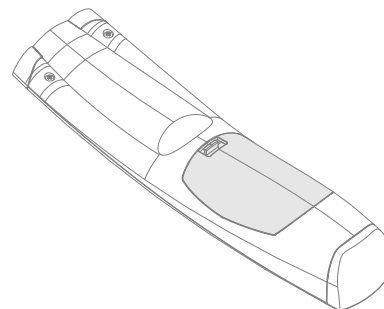
Image 5–5

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

5.3 Pulse RCU on/off button

Function of the remote control on/off button

The Pulse remote control unit has at the front side an on/off button (reference 1 Image 5–6). Switching off the remote control prevents that unwanted commands are send due to an accidental key press. Furthermore, switching the RCU off will extend the battery lifetime of the remote control.

To activate the remote control, press the on/off button until the button pressed indicator will turn off (3-5 seconds).

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

Default after (re)placing batteries, is "ON".
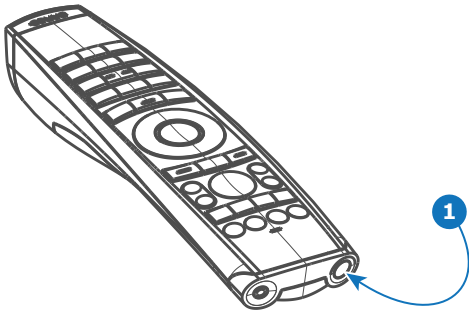
Image 5–6

5.4 Pulse RCU "button pressed indicator"

Functions button pressed indicator

- Rapidly flashes when commands are sent, this is the normal "button pressed" indication.
- 1 Short flash when remote control is switched ON by means of the on/off button.
- Continuously lit (up to 5 seconds) when address digits are expected after pressing the ADDR button.
- Slowly flashes (2 times a second) when the battery level is becoming low; typically when more than 85% of the useful life is past.

5.5 Pulse RCU "RGB filter" button

Filtering the color of the projected image

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

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

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

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

5.6 Pulse RCU "Projector OSD on/off" button

On-Screen Display (OSD) on/off

While the light source is on, you can toggle the projection of the On-screen display on and off by pressing the projector OSD on/off button.

Stealth mode on/off

Stealth mode is a function where the backlight of the LCD, the backlight of the keypad buttons and the indication LEDs on the communication and input panels can be disabled.

If "*Stealth mode*" has been enabled in the Pulse software, pressing the OSD on/off button for five seconds or more will cause Stealth mode to activate or deactivate.

For more info on how to configure stealth mode, see the Pulse OSD software user guide or the Pulse Prospector user guide.

5.7 Using the mini-jack connector of the RCU

> Connecting a cable with the mini-jack connector will reset the broadcast address of the RCU to its default value '0'.

How to use the mini-jack connector

1. Connect a cable with the mini-jack connector (reference 2 Image 5–7) of the RCU.

2. Connect the other end of the cable with the mini-jack input, located on the communication interface of the projector. This location is marked either "RC", or "wired remote", depending on projector type.
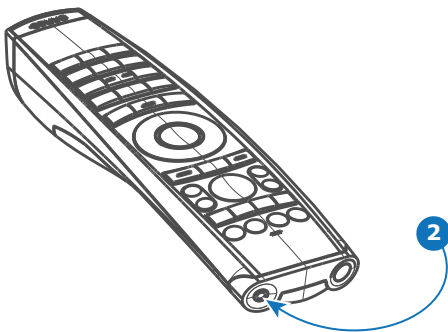
Image 5–7

5.8 Pulse RCU silicone protection sleeve (optional)

Introduction

Barco offers a silicone form fitting protection sleeve for the Pulse RCU. The silicone material keeps it comfortably, non-slip and soft to the touch. All buttons and openings remain accessible. The only thing that needs to be removed is the XLR cover.

Required tools

Scissors or knife cutter

How to install

1. Remove the XLR cover by pulling it backwards.
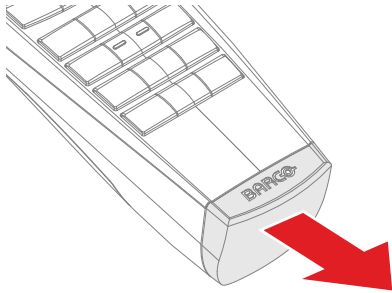
Image 5–8
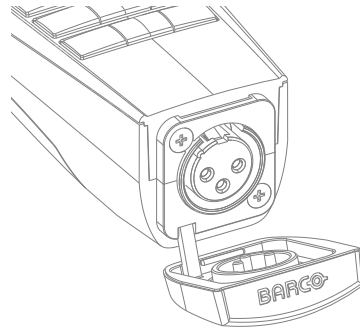
Image 5–9

2. Pull out or cut off the XLR cover. Use scissors or a knife cutter if necessary.

3. Place back side (XLR side) of the RCU into the sleeve and pull the other side of the sleeve over the front side of the RCU.
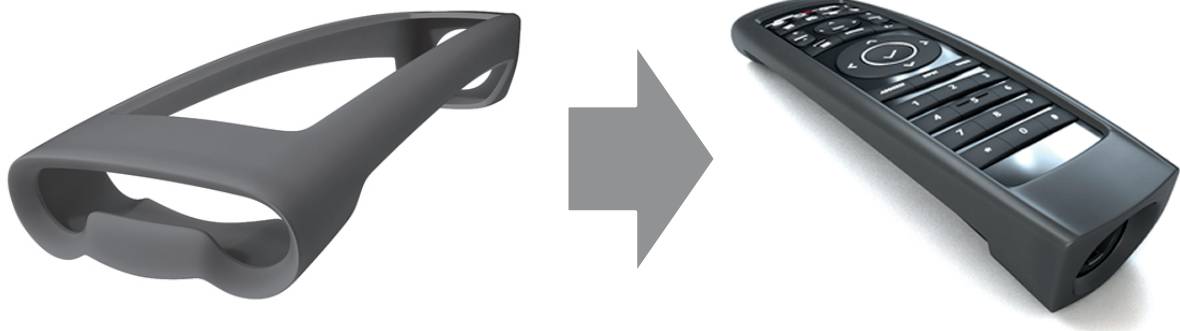
Image 5–10

Powering On/Off

6

6.1 Power modes

Overview

The F400 has 4 different power modes:

Mode	Description
ECO STANDBY	Light source is switched off and projector electronics are powered down.
STANDBY	Light source is switched off and Control & Communication module is active.
READY	Projector is booted up and the light source is switched off.
ON	Projector is booted up and the light source is on.

> Energy consumption is significantly lowers in ECO STANDBY mode: only <0.5W if network is not plugged in and 2W with network (Wake-on-LAN).

> In ECO STANDBY mode, remote power up (Wake-on-LAN) and local power up (button) are supported.

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

> **Wake on DMX activity**
> When the projector is in STANDBY mode, DMX commands using DMX over XLR are not processed. This means that is not possible to wake up the projector using specific "power on" DMX commands. For projectors where this is an issue, the XLR menu now has the command "Wake on DMX activity. When enabled, the projector will wake up if it detects any activity on the DMX input.
> When using DMX over Ethernet (using ArtNet), DMX commands are processed, even when the projector is in STANDBY mode.

6.2 Power On the projector

How to power on the projector

1. Ensure that the mains input of the projector is connected with the power net.

   The projector starts up to **READY** mode as soon as the projector is connected with power net. The **Power on/off** button will blink until **Ready** mode is achieved. Once in **Ready** mode, the **Power on/off** button will be lit **WHITE**. The start up screen is displayed on the touch panel. Once the startup is completed, the status screen will be displayed.

   Image 6–1

2. Press the **Power on/off** button on the projector, or the **Power On** button on the remote control.

   The projector will continue to **ON** mode. The **Power on/off** button will blink until the projector is ready for projection. Once the projector is fully started up, the **Power on/off** button will be lit **BLUE**.

   Image 6–2

6.3 Power Off the projector

How to power off the projector

1. While the projector is in **ON** mode, press and hold the **Standby** button on the local keypad, or the **Power Off** button on the remote control, to shut down the light source of the projector.

   Note: If the **auto lights source off** feature is enabled, the projector will automatically transition to **READY** mode if no sync is detected on the chosen source input (default time-out 15 minutes). For more info, see the Pulse OSD or Pulse Prospector manual.

   The projector will switch from **ON** to **READY** mode first in order to run through a cool down phase.

2. While the projector is in **READY** mode, press and hold the **Standby** button on the local keypad, or the **Power Off** button on the remote control, to bring the projector from the **READY** mode in the **STANDBY** mode.

   Note: If the **auto standby** feature is enabled, the projector will automatically transition to **STANDBY** mode if no activity is happening on the projector (default time-out 15 minutes). For more info, see the Pulse OSD or Pulse Prospector manual.

3. While the projector is in **STANDBY** mode, press and hold the **Standby** button on the local keypad, or the **Power Off** button on the remote control, to bring the projector from the **STANDBY** mode in the **ECO STANDBY** mode.

   Note: If the **auto standby** feature is enabled, the projector will automatically go to **ECO STANDBY** mode after a time-out (default time–out 15 minutes). For more info, see the Pulse OSD or Pulse Prospector manual.

Some actions (like applying a grey test pattern) are done during the two minutes of the cool down phase. This is done in order to minimize the potential effect of burn-in and increase the projector lifetime.

CAUTION: Never switch off the projector by means of unplugging the mains cord or by cutting down the mains power.

Barco advises to keep the projector always powered and use the **ECO STANDBY** mode for low power consumption.

How to unplug the projector

1. Follow the previous power off procedure to switch off the projector.

2. Wait at least two minutes.

   Caution: It is very important to wait few minutes before unplugging the power cord. If the cool down phase is not adhered, projector lifetime could be degraded.

3. Remove the power cord from the AC outlet or unplug it from the projector.

   Note: Some power cords have a clip that must be pressed to release the cord from the projector.

6.4 Power mode transitions

Power transition diagram
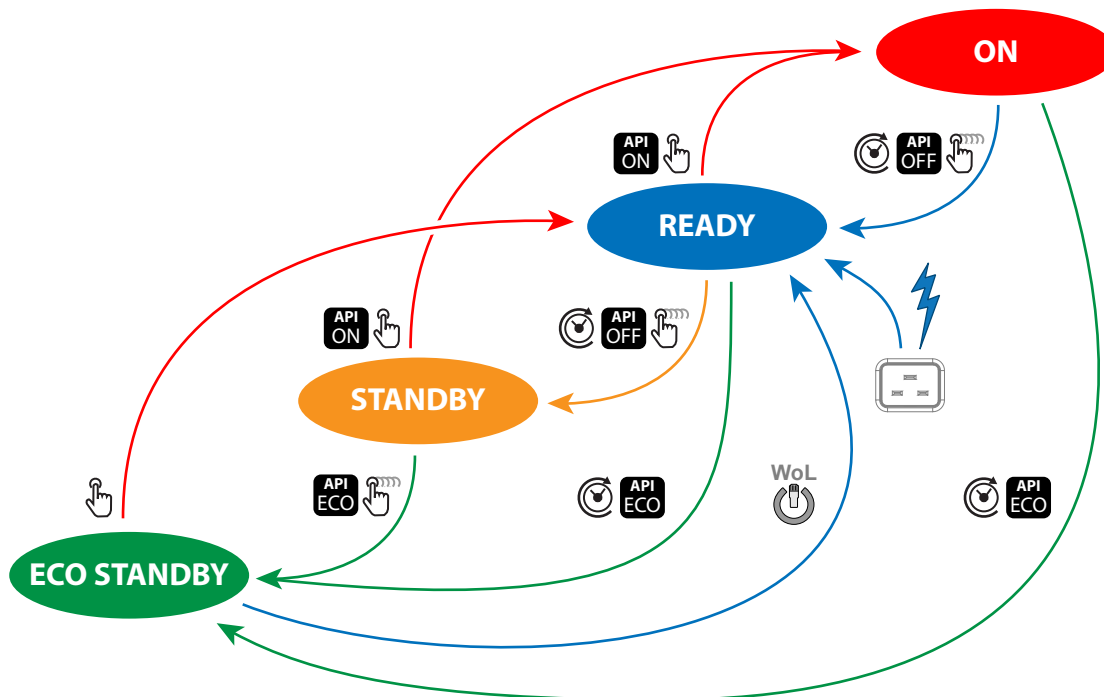
Image 6–3

Symbol	Description
🖐	Short pressing the **Power on/off** button on the local keypad or on the remote control unit.
🖐	Long pressing the **Power on/off** button on the local keypad or on the remote control unit.
⏻	Wake-On-LAN (WOL). Only works if a network was connected with the LAN port of the projector while the projector went to **ECO STANDBY**.
API ON · API OFF · API ECO	API command to change the power state of the projector (Power ON, Power OFF, Go to ECO).See Pulse user guide for more info (E.g. PJLink).
⟳	**Auto light source off** and **auto standby** features. Default disabled (factory settings). For configuration see power saving settings in the Pulse user guide.
⚡	The projector starts default up in **READY** mode when it is powered.

Wake-On-LAN (WOL)

Wake-On-LAN (WOL), the standard ethernet network command, can be used to awakened or to turn on the projector by network message.

Used alone, the WOL command allows to switch in **READY** mode. A JSON command must be performed in addition to make the projector turn in to **ON** mode:

1. Send WOL.
2. Wait for connection to façade/prospector (the unit does provide feedback when it's ready).
3. Wait for ready state.
4. Sleep 5 seconds.
5. Send JSON "power on" command (to switch in **ON** mode).

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

6.5 Increasing the projector lifetime

General

Barco propose the following recommendations to increase the projector life time:

- Dimming out the laser output intensity (70%).
- Use the device in regulated temperature area.
- Apply the recommendations describe in the "Operating in 24/7 Mode" chapter if the projector is destined to be operated continuously 24 hours a day / 7 days a week.

> Typical life time of the projector could be up to double if the laser output is dimmed to 75% and if the projector operate in 25°C temp condition.

6.6 Operation in 24/7 Mode

General

When the projector is destined to be operated continuously 24 hours a day, 7 days a week, the following recommendations should be followed:

- Twice a day, switch off the projector during two minutes by using the power button. The power down action will automatically and invisibly trigger a grey test pattern running within the projector.
- Apply moving video content as much as possible, with on average a level of 50% white (long-term use of extreme black or white content could potentially cause accelerated aging).

Powering On/Off

Controlling the projector

7

7.1 Using the RCU

Pointing to the reflective screen or IR sensors

Switch on the RCU and point the front of the RCU to the reflective screen surface or point directly to one of the projector IR sensors. Make sure you are within the effective operating distance (30 m, 100 ft in a straight line).

The RCU will not function properly if strong light strikes the IR sensor window or if there are obstacles between the RCU and the IR receiver.
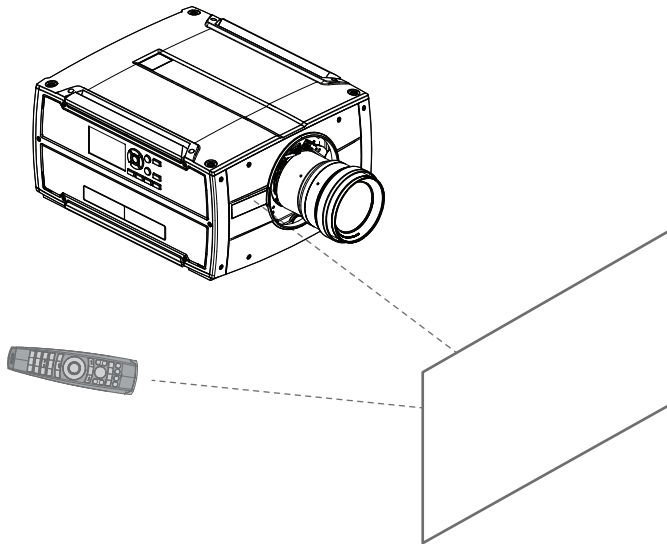
Image 7–1

The RCU can also hard-wired been used. See chapter .

7.2 Projector Address

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

Why a projector address?

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

Set up an individual Projector Address

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

Projector controlling

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

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

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

Broadcast Address

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

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

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

7.3 Quick setup via Direct access

Quick source selection

1. Press the **Input** button on the remote control or local keypad.
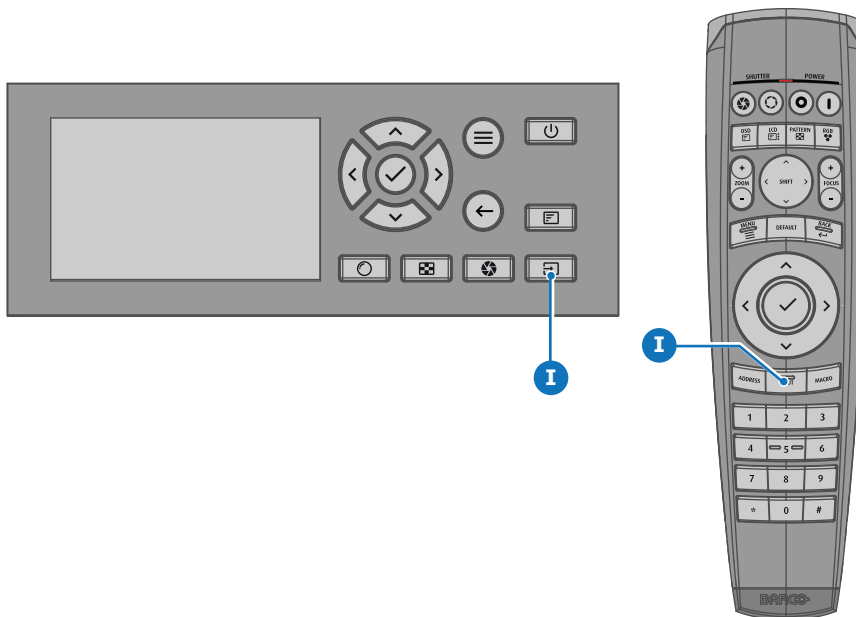
Image 7–2

The *Source selection* menu opens on the LCD display.
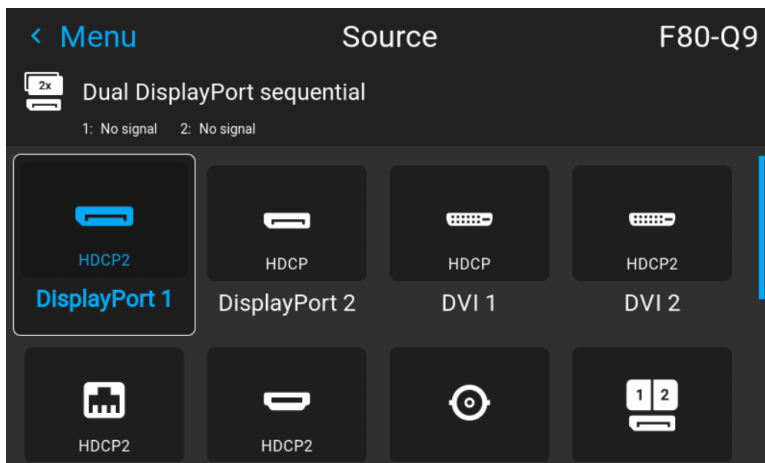
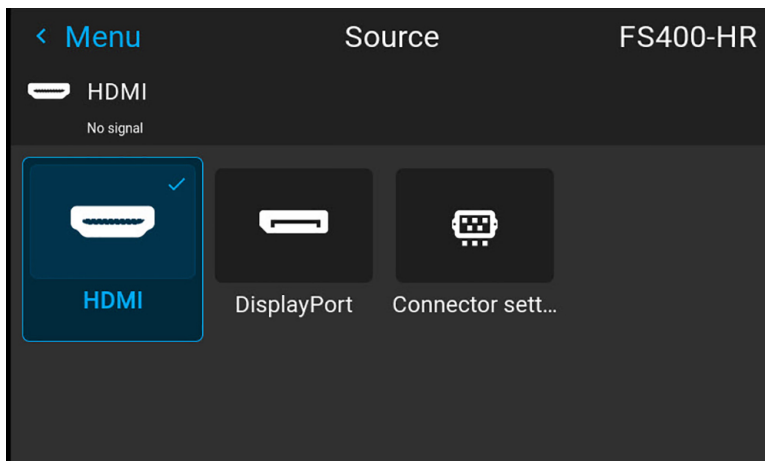

Image 7–3 Example of the input selection menu

Image 7–4

2. Use the arrow keys to select the desired source.

Quick test pattern selection

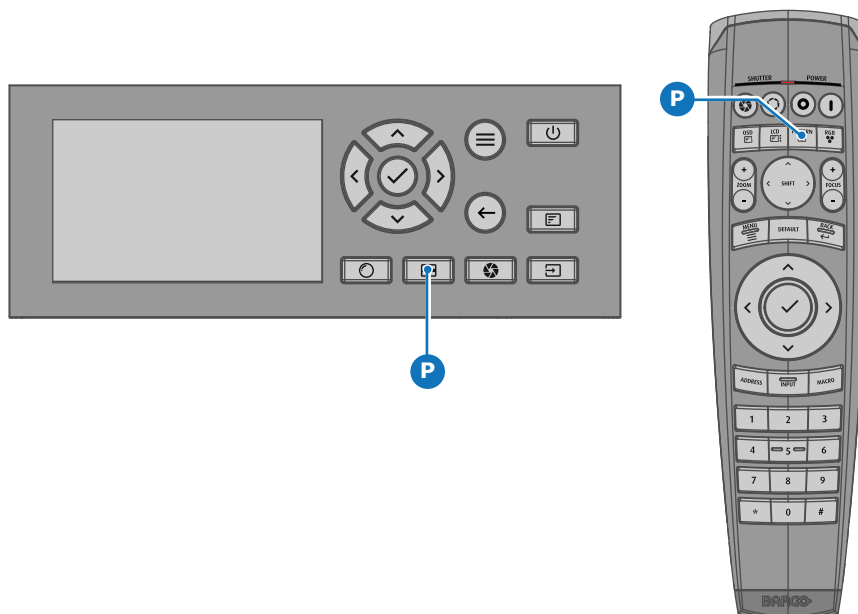**1.** Press the Test pattern button on the remote control or local keypad.

Image 7–5

The *Test pattern* menu opens on the LCD display.

2. Use the arrow keys to select the desired test pattern.

Input & Communication

8

8.1 Control & Communication module

Front panel Control & Communication module
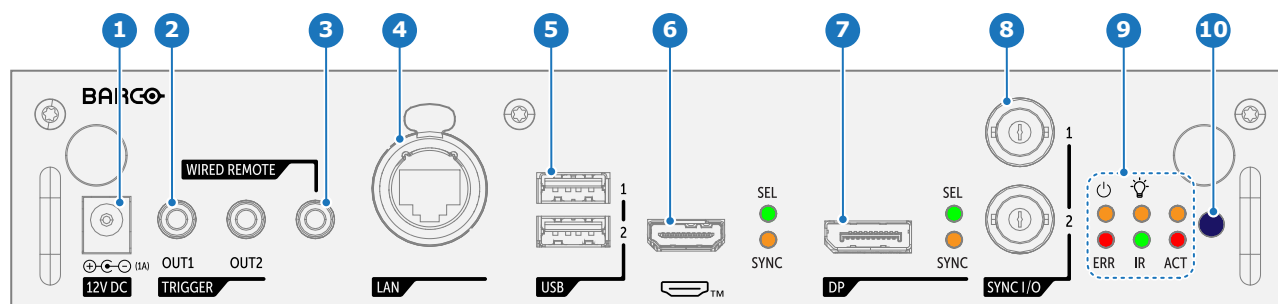
Image 8–1

1	12V DC	**6**	HDMI™
2	TRIGGER	**7**	DP
3	WIRED REMOTE	**8**	SYNC I/O
4	LAN	**9**	Projector status LEDs
5	USB	**10**	IR receiver

Functionality

Nr	Name	Description
1	**12V DC**	12 V DC output, maximum 1A available when projector is not in standby.
2	**TRIGGER**	Two 3.5 mm mini jack connectors (OUT1 & OUT2) for controlling peripherals like motorized screens, curtains etc. Give 12V DC, 0.5A (6W) output when projector is switched on.
		Note: If the TRIGGER outputs are loaded too heavy, there is a risk that the projector will go in reset mode, and restart. This causes no damage to the projector, but is an undesirable response. This will also happen if the startup current for the external equipment is too high, even though the nominal power consumption is less than 0,5A
3	**WIRED REMOTE**	Connect the RCU via a 3.5 mm mini jack with the wired remote input to control the projector without interference.
4	**LAN**	Standard RJ45 connector for external projector control over IP and Art-Net.
		Note: Ethernet should only be connected to either the 10/100 base-T port of the Control & Communication module, or the HDBaseT input of the HDBaseT input module, or the HDBaseT input of the Quad Combo Input Mk II. Using HDBaseT inputs of different modules simultaneously will lead to undefined behavior.
5	**USB**	2 x USB 2.0 type A. These USB ports 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:
		• **cornet<version nr>.fw**: The projector will upgrade or downgrade, depending on the version number.
		• **LogExtractor.fw**: The log files will be downloaded.
		Note: Make sure that any used USB-stick is FAT32 compatible and contains no other files or folders.
6	**HDMI™**	Standard HDMI 2.1 input port for source connection to the projector.
7	**DP**	Standard DisplayPort™ (1.4), for source connection to the projector.
8	**SYNC I/O**	BNC sync port in/out for projector control. This is mainly used in multiple projector installations with requirement of synchronization between the units.
9	Status LEDs	Projector status LEDs (see chapter "Projector status", page 25).
10	IR	Infra Red receiver.

LED behavior

- The SEL LED lights up GREEN: input is selected.
- The SEL LED blinks GREEN: input/output is selected and configured as output.
- The SYNC LED lights up ORANGE: valid input sync is detected.
- The SYNC LED blinks ORANGE: Sync/signal is present, but not conform with input port standard.

> Non-conformity issues can be caused by older or low quality cables unable to handle the requested resolution, or connected signal converters manipulating the signal out of the supported video standards.

8.2 Pulse Quad DP 1.2 input

Front panel Quad DP 1.2 input
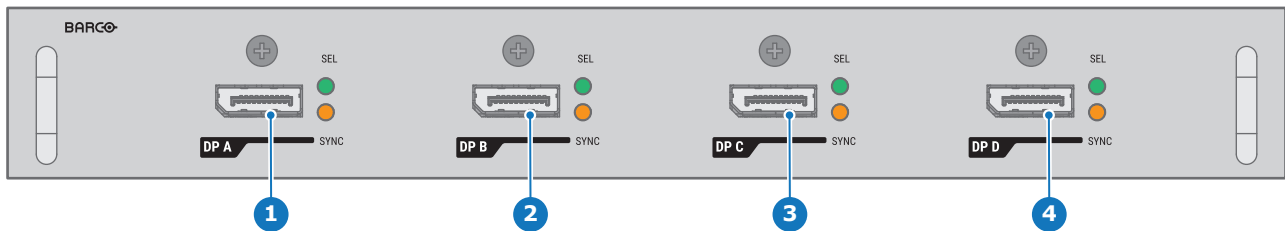
Image 8–2

1 Quad DisplayPort channel A input
2 Quad DisplayPort channel B input
3 Quad DisplayPort channel C input
4 Quad DisplayPort channel D input

LED behavior

- The SYNC LED lights up ORANGE when valid input sync is detected.
- The SEL LED lights up GREEN when the input is selected.
- Blinking YELLOW: Sync/signal is present, but not conform with input port standard.

> Non-conformity issues can be caused by older or low quality cables unable to handle the requested resolution, or connected signal converters manipulating the signal out of the supported video standards.

> For specifications about the supported inputs for DisplayPort 1.2 see chapter "Specifications", page 81.

Filters

9

9.1 Introduction

About

The dust filter (reference 1) and pollution filter (reference 2) can only be mounted on the left cover of the projector, which has a switch to detect if the dust filter is installed. The dust filter serves as a mounting frame for the pollution filter, so to install the pollution filter, the dust filter must be installed first.
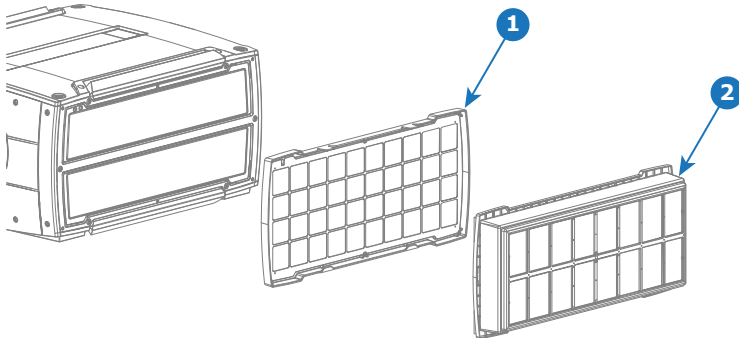
Image 9–1

1 Dust filter
2 Pollution filter

When to use the dust filter

The dust filter is recommended for use in environments where dust and small particles are prevalent. This helps maintain air quality and prevents dust buildup inside the projector.

When to use the pollution filter

The pollution filter is recommended for use in environments where gases or smoke are produced. It is designed to capture smoke and gases, ensuring the projector operates efficiently and remains protected.

9.2 Replacing the pollution filter

How to replace

1. Carefully unsnap the top part of the pollution filter from the top dust filter frame and gently pull it away from the dust filter frame.
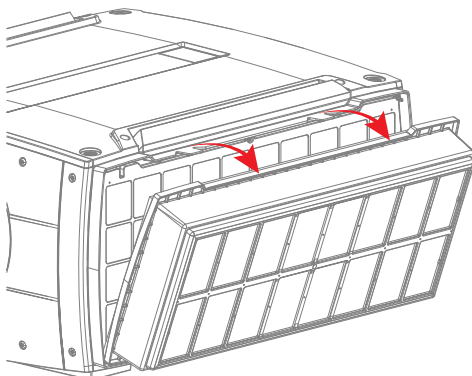
Image 9–2

2. Lift the bottom part of the pollution filter out of the dust filter frame.
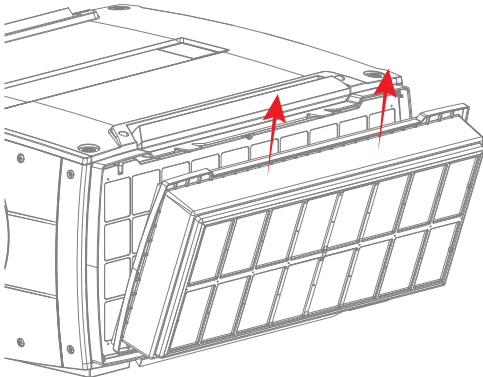
Image 9–3

3. Align the bottom part of the new or cleaned pollution filter with the bottom of the dust filter frame and carefully insert it, ensuring it fits securely at the bottom.

> ⚠ *Caution:* Do not install a wet filter back into the projector under any circumstance. A wet filter can have serious safety consequences as well as jeopardize the internal optics of the system.

Image 9–4

4. Gently snap the top part of the pollution filter into the dust filter frame, ensuring the locking tabs snap into position.

Image 9–5

> ⚠ **CAUTION:** Do not install/use a damaged filter. Replace a damaged filter immediately with a new filter of the same type. See *https://my.barco.com* for the correct replacement part.

> ☞ For cleaning instructions see "Vacuum cleaning of a filter", page 59, or "Washing and drying a filter", page 60.

9.3 Replacing the dust filter

Prerequisites

This procedure assumes that the pollution filter is removed. See procedure:

• "Replacing the pollution filter ", page 56.

Required tools

Torx screwdriver T8

How to replace

1. Loosen the 6 screws (reference 1) using Torx screwdriver T8.
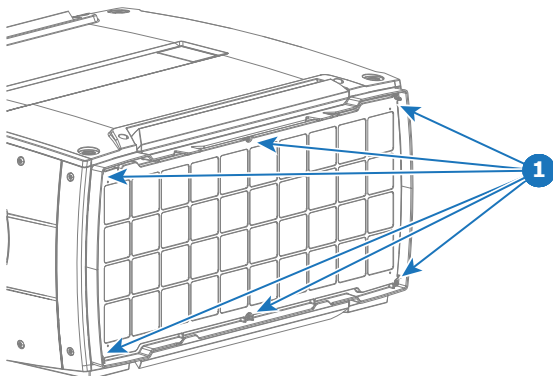
Image 9–6

2. Carefully detach the dirty dust filter from the left cover of the projector.

3. Place the new or cleaned dust filter on the left cover of the projector and ensure that the stud on the dust filter frame (reference 2) enters the opening for the dust filter detection switch (reference 3).

⚠ *Caution:* Do not install a wet filter back into the projector under any circumstance. A wet filter can have serious safety consequences as well as jeopardize the internal optics of the system.

Image 9–7

4. Fasten the dust filter with 6 screws (reference 4) using Torx screwdriver T8.
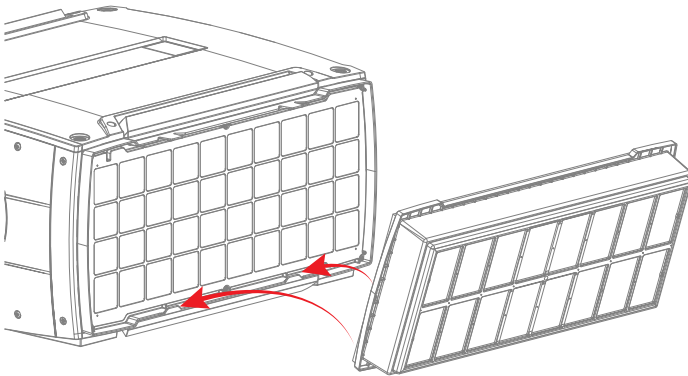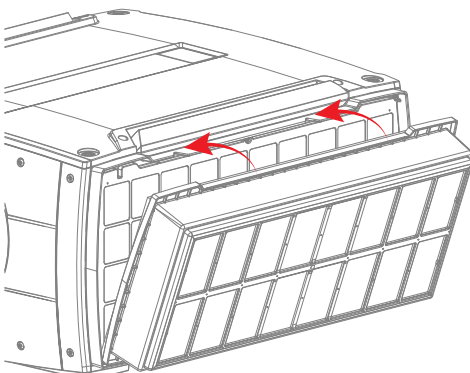
Image 9–8

> ⚠️ **CAUTION:** Do not install/use a damaged filter. Replace a damaged filter immediately with a new filter of the same type. See *https://my.barco.com* for the correct replacement part.

> ☞ For cleaning instructions see "Vacuum cleaning of a filter", page 59, or "Washing and drying a filter", page 60.

9.4 Vacuum cleaning of a filter

When vacuum a filter

If the filter is contaminated with dust then cleaning the filter with a vacuum cleaner should be sufficient. In case the filter feels greasy then it must be washed. See cleaning procedure: "Washing and drying a filter", page 60.

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

Prerequisites

This procedure assumes that the filter to be cleaned is removed. See procedure:

- "Replacing the pollution filter ", page 56.
- "Replacing the dust filter", page 58.

Required tools

Vacuum cleaner with soft brush suction nuzzle.

How to vacuum-clean a filter

1. Carefully vacuum the air inlet side of the filter. Use a vacuum cleaner with a soft brush suction nuzzle.

   > ☞ *Tip:* Lightly tap the filter on its dusty side to expel heavy dust contamination.

   > ☞ *Tip:* Compressed air is also permitted to clean the filter but take care not to damage the filter.

   > ⚠️ *Caution:* Replace a damaged filter immediately.

9.5 Washing and drying a filter

About filter washing and drying

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

Cleansing agent

To clean sticky, greasy filter we suggest usage of **Sodium carbonate** crystals (Na_2CO_3). Sodium carbonate (Often called **washing soda**, **soda crystals**, or **sal soda** in the detergent section of stores) is widely used to effectively remove oil, grease, alcohol stains … The product itself is relatively safe, sodium carbonate is used in toothpastes and as a food additive (E500). Potential Hazards are described in the section "Safety", page 9.
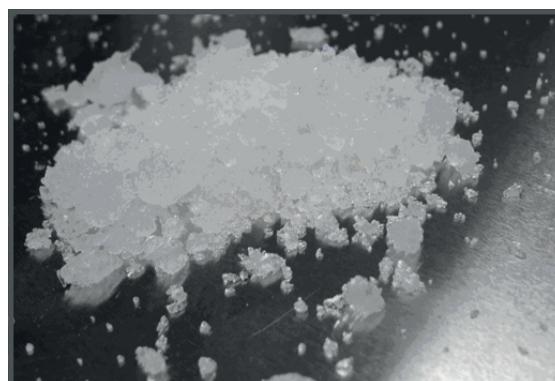
Image 9–9 Sodium carbonate crystals.

> 📄 This cleaning procedure assumes that the filter is already removed.

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

Prerequisites

This procedure assumes that the filter to be cleaned is removed. See procedure:

- "Replacing the pollution filter ", page 56.
- "Replacing the dust filter", page 58.

Required tools

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

How to wash and dry a filter

1. Make a solution with a ratio of 30 gram (a handful) sodium carbonate to 1 liter **hot water**.

2. Soak the filter in the solution for **30 to 60 minutes**. The grease should be dissolved after 1 hour.

3. If the filter is still clogged repeat this procedure from step 1.

4. Rinse the filter with clean water to flush all grease residue away.

5. Shake out all excess liquid by repeatedly swinging the filter to-and-fro in a centrifugal action.

6. Then allow the filter to **dry thoroughly**.

   > 📄 *Note:* Drying time of the filter can be up to 24h or more. Drying time can be shorter when being done in a well-ventilated area.

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

⚠ **CAUTION:** Do not install a wet filter back into the projector under any circumstance. A wet filter can have serious safety consequences as well as jeopardize the internal optics of the system.
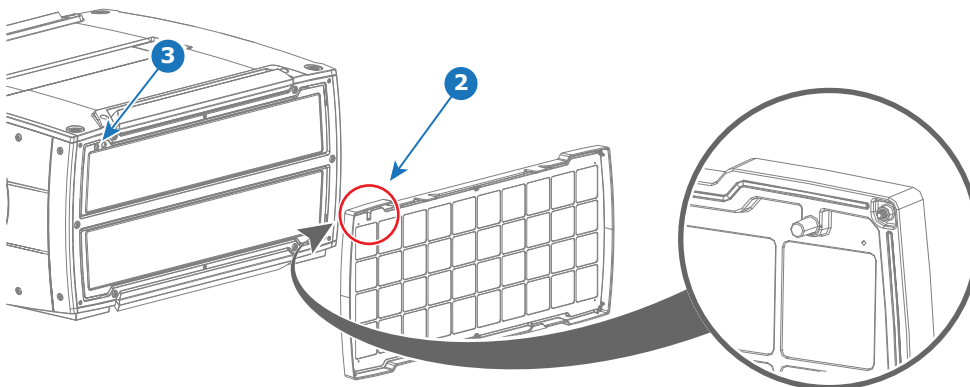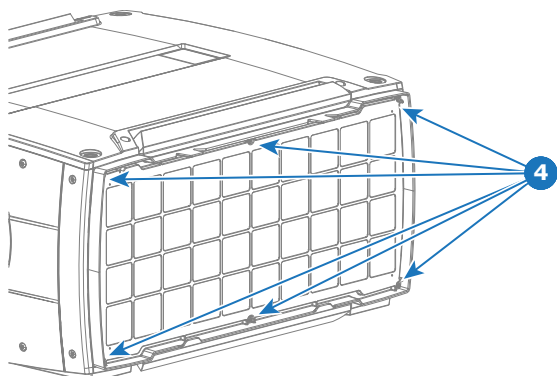
⚠ **CAUTION:** Do not install/use a damaged filter. Replace a damaged filter immediately with a new filter of the same type. See *https://my.barco.com* for the correct replacement part.

Filters

Maintenance 10

About this chapter

This chapter contains general maintenance procedures.

10.1 Cleaning the lens

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

Required tools

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

How to clean the lens?

1. Blow off dust with clean compressed air (or pressurized air cans[2]) .

2. Clean with lens cleaner together with a clean lens cleaning cloth to remove the dust and contamination. Use big wipes in one single direction.

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

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

4. If there are still fingerprints on the surface, wipe them off with lens cleaner together with a clean lens cleaning cloth. Polish again with a dry one.

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

10.2 Cleaning the exterior of the projector

How to clean the exterior of the projector ?

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

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

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

Image settings and adjustments for optimal latency

A

A.1 Introduction

Introduction

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

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

A.2 Latency

Latency

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

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

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

A.3 DMD display device

DMD display device

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

Because of dividing the image into bitplanes, all pixels of an image must be loaded to the DMD before it can start to display any of the pixels.

A.4 Image display

Native image

Consider the following setup, where the incoming image has the same resolution as the DMD device.
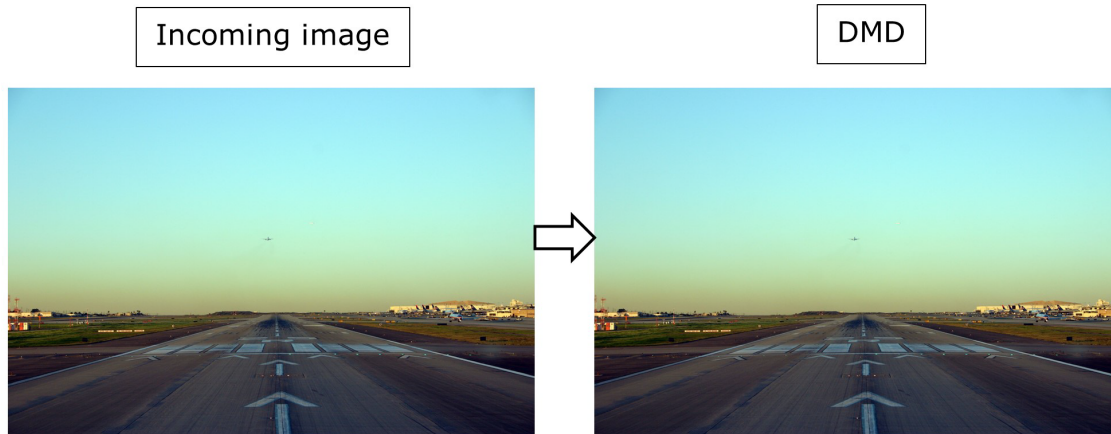
Image A–1

The image is sent to the projector, pixel by pixel, line by line from top left to bottom right. For 60Hz, it takes 16.6667ms for all the pixels to arrive at the projector (disregarding blanking pixels).

Theoretically, as soon as the first pixel arrives, it can be transmitted directly to the DMD. Since incoming and output pixels follow a one-to-one relation, when the last pixel arrives it is sent to the DMD and at that time the DMD can immediately start to divide the image into bitplanes and display the image. This means that the latency never can go below 16.6667ms.

There is more processing being done to the pixels (color analysis, memory handling etc.), so in real life, latency will never be this low.

Non-native image
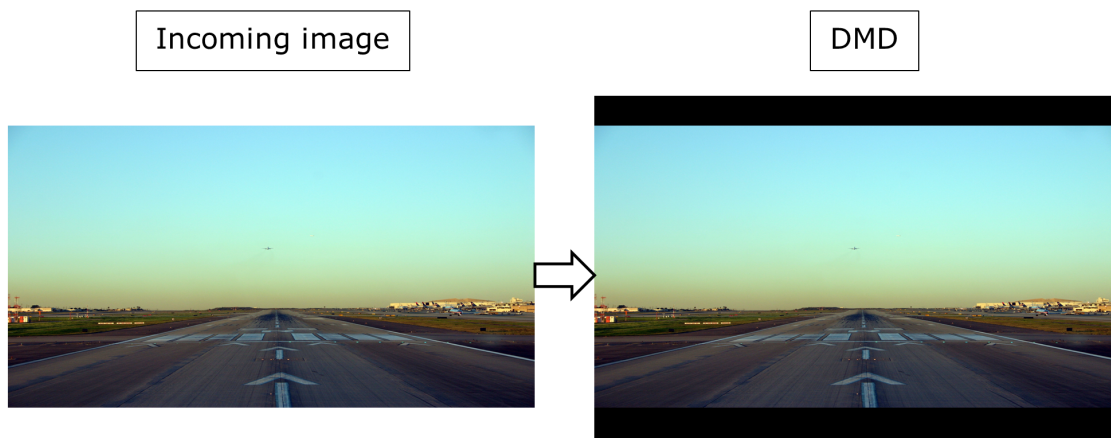
Image A–2

Consider this setup where the incoming image is smaller vertically than the DMD resolution. To maintain correct aspect, the image will be displayed by filling in black pixels above and below on the DMD. The DMD device needs to receive all the pixels it shall display, including the black ones.

In this case, the Pulse image processing will start to prefill the DMD with black pixels before the actual pixels arrive on the input. Then it follows a one-to-one pixel copy until the last incoming pixel has arrived. After that, the additional black pixels are transmitted until the DMD has received all the pixels for a full frame. It is not until then that the image can be displayed.

Therefore, the black pixels at the bottom of the image directly adds to latency since the image cannot be display until all the extra black pixels have been transmitted to the DMD.

A.5 Image positioning

Image positioning

From the discussion above, it follows that the incoming image should follow the DMD resolution as much as possible to reduce latency. If this is not possible, the image should be adjusted and positioned as close to the bottom edge (in desktop-front projection mode) of the DMD as possible to have minimum latency.

To position the image on the DMD, it's recommended that the digital image shift is used. This function shifts the image content and is done after the image has been warped. Shifting the image does not degrade pixel quality and no scaling is used for this functionality.

Another option is to use the warp settings itself, either the 4-corner coordinates of the warp mask or the warp grid calculated externally. Always adjust the warp grid to position it as close to the bottom of the image as possible.

A curious effect of this is when applying keystone warp to an image smaller than DMD resolution and the output is adjusted down as discussed above. In the following example some keystone (4-corner adjustment) is applied.
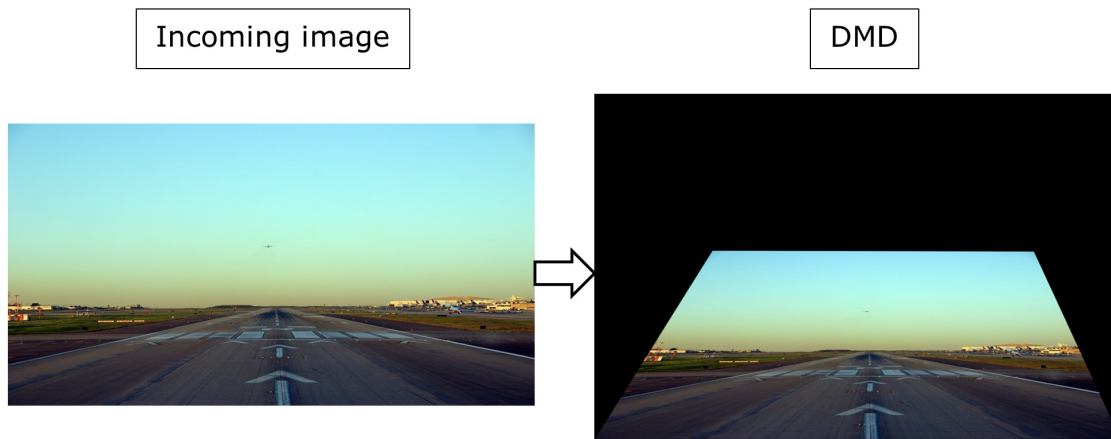
Image A–3

In this setup, the projector latency will in fact be lower than the uncorrected image. This is because the output image has fewer active lines than the incoming image. All the incoming lines are used in the warp calculations, but the resulting image consists of fewer active lines than the original. The projector can take advantage of this by preloading the DMD with black lines before the actual content. Note that for a 60Hz system, latency will never go below 16.66667ms because the DMD is displaying the image synchronously with the refresh of the incoming image.

Color component mapping

B

B.1 Introduction

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

Introduction

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

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

B.2 How infrared is displayed

How infrared is displayed

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

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

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

B.3 Default setup

Default setup

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

Display port 1 (VL)   Color mapping   DMD
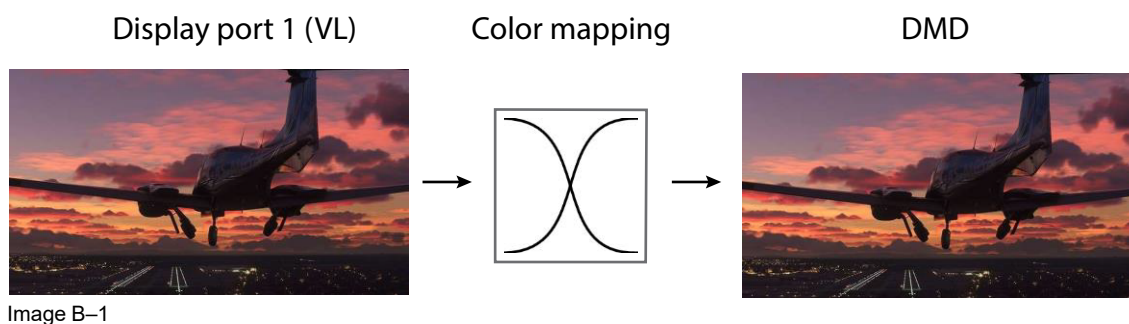
Image B–1
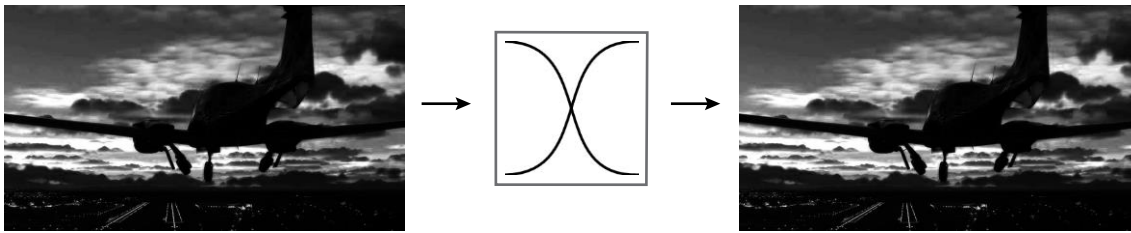
Displayport 2 (IR)

Image B–2

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

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

B.4 Cloned image with full RGB input

Cloned image with full RGB input

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

Display port 1 (VL)   Color mapping   DMD
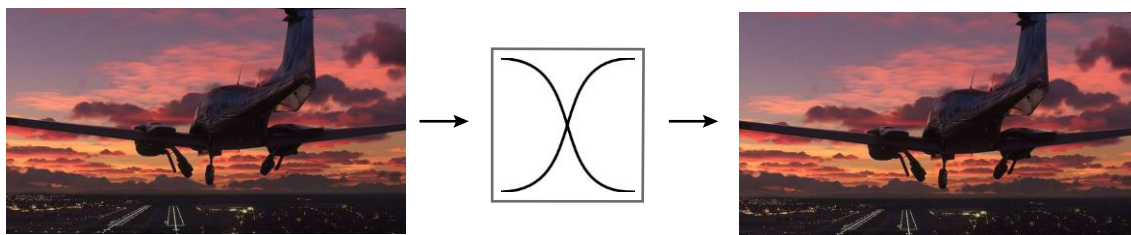
Image B–3

Displayport 2 (IR)
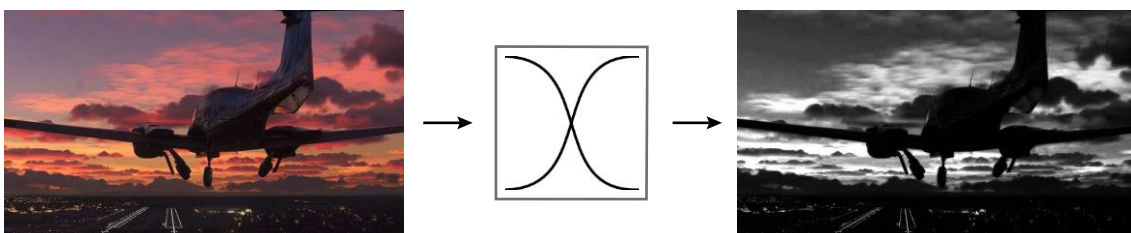
Image B–4

To achieve this result, use the following settings:

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

B.5 Cloned inputs with only green content for IR

Cloned inputs with only green content for IR

In this setup, the input is a fully saturated green and white image, well suited for the IR channel. In this setup, a portion of the green image is extracted and applied to the red channel for visible light also. Note that the power of the visible light source must be dimmed to achieve the desired effect.
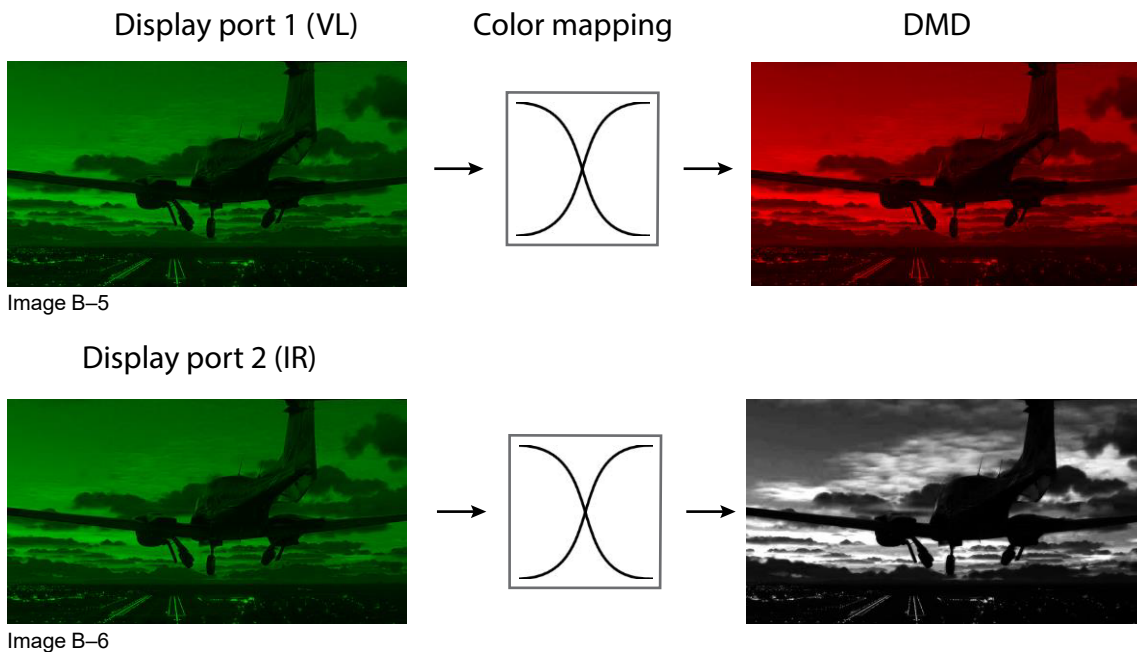
Display port 1 (VL)   Color mapping   DMD

Image B–5

Display port 2 (IR)

Image B–6

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

Advanced blend

C

Advanced blend

C.1 Advanced blend, file creation

About

The file format is JSON based and consists of a top-level object that has a **surfaces** member, containing an array of surfaces objects. Files containing this format are marked with the extension .babl (for Barco Advanced BLend).

File parameters

Invert	Renders the file with inverted colors when **true**

Surfaces		
Type	A string describing the type of surface	
	Coons	12 control points. A Coons Patch is described via 4 bezier curves, sharing the 4 corner points. These will be described as C1 to C4 , in this order: top-left, top-right, bottom-left, bottom-right. Each corner also has two handles, which describe the way each curve exits the corner point, these will be described as C1H1 to C4H2 where H1 is the horizontal handle, and H2 is the vertical handle. The order of the points in the points array is then as follows: C1, C1H1, C2H1, C2, C1H2, C2H2, C3H2, C4H2, C3, C3H1, C4H1, C4.
	Cubic	16 control points Bicubic Bezier surface
Points	An array of normalized 2D points (float,float).	
Colors	An array of exactly four normalized RGB values (float, float, float). These describe the color values used for each corner point, and are arranged in the same order as the corner points	

Type	Must contain the text value "babl" in order to declare this a drawing of the advanced blend type

Version	Must be set to the text value "1.0"

"presentation":
 {
 "stroke":1,
 "points":true,
 "bubbles":true
 }
	Used by the UI tool when files are created and/or edited in this tool, and will be present in a file downloaded from the projector
	 These parameters are not needed when creating a file

74   R5915525 /03 F400/FS400

C.2 Example files

1 shape, coons

```
{
"invert": false,
"surfaces": [
{
"type":" coons",
"points": [
[0.25, 0.2], [0.4, 0.2], [0.6, 0.2], [0.8, 0.2],
[0.30, 0.4], [0.8, 0.3],
[0.30, 0.6], [0.8, 0.6],
[0.20, 0.8], [0.4, 0.8], [0.6, 0.8], [0.8, 0.8]
],
"colors": [
[1.0, 1.0, 1.0], [0.50, 0.50, 0.50],
[0.0, 0.0, 0.0], [0.98, 0.98, 0.98]
]
}
],
"type":"babl",
"version":"1.0"
}
```

2 shapes, coon

```
{
"invert": false,
"surfaces": [
{
"type": "coons",
"points": [
[0.50, 0.20], [0.28, 0.28], [0.23, 0.28], [0.03, 0.21],
[0.48 ,0.41], [0.07, 0.39],
[0.49 ,0.51], [0.07, 0.50],
[0.49, 0.71], [0.28, 0.66], [0.23, 0.67], [0.03, 0.72]
],
"colors": [
[1.0 ,1.0 ,1.0], [0.0 ,0.0 ,0.0],
[0.0, 0.0, 0.0], [1.0, 1.0 ,1.0]
]
},
{
"type": "coons",
"points": [
[0.98, 0.21], [0.78, 0.27], [0.73, 0.28], [0.53, 0.21],
[0.94, 0.37], [0.53, 0.38],
[0.94, 0.55], [0.53, 0.54],
[0.99, 0.71], [0.79, 0.67], [0.73, 0.67], [0.53, 0.71]
],
"colors": [
[0.0, 0.0 ,0.0], [0.95, 0.95, 0.95],
[1.0, 1.0, 1.0], [0.05, 0.05, 0.05]
]
} ],
"type":"babl",
"version":"1.0"
}
```

1 shape, cubic

```
{
"invert": false,
"surfaces": [
{
"type": "cubic",
"points": [
[0.08, 0.14], [0.29, 0.14], [0.70, 0.13], [0.90, 0.13],
[0.12, 0.37], [0.29, 0.14], [0.70, 0.13], [0.86, 0.33],
[0.12, 0.59], [0.28, 0.82], [0.71, 0.82], [0.86, 0.62],
[0.08, 0.82], [0.28, 0.82], [0.71, 0.82], [0.91, 0.82]
],
"colors": [
[1.0, 1.0, 1.0],[0.0, 0.0, 0.0],
[0.0, 0.0 ,0.0],[1.0 ,1.0 ,1.0]
]
}
],
"type":"babl",
"version":"1.0"
}
```

C.3 User interface

About

In Prospector there is a built-in UI for creating advanced blend files, located under Warp and blend -> Advanced blend.

The UI can be used to create new Advanced blend files and also to edit uploaded babl-files. Note that only coons shapes are supported in the UI-tool.

Advanced blend, UI guide
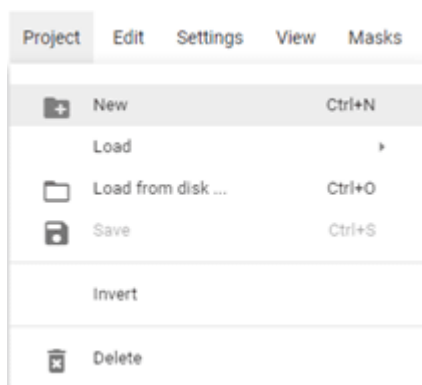
Image C–1

- **New**: Creates a new project
- **Load**: Switch between active projects.
    - Note: Make sure to save changes before switching to a new project
- **Load from disk**: Load saved project
- **Invert**: Inverts the current project
- **Save**: Saves current project

- **Delete**: Deletes the current project

Edit
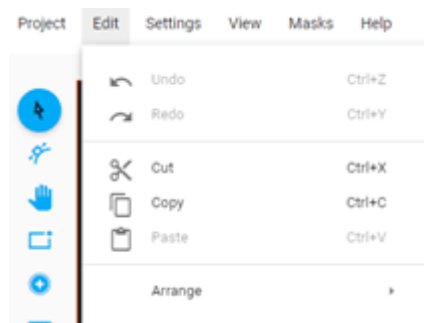
Image C–2

- **Undo:** Undo last action
- **Redo:** Redo the last action
- **Cut:** Cut out the selected surface
- **Copy:**Copy the selected surface
- **Paste:** Paste cut or copied surface
- **Arrange:** Select shapes to be in the foreground or background

Settings
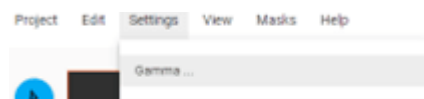
Image C–3

- **Gamma:** Change the global gamma value

View
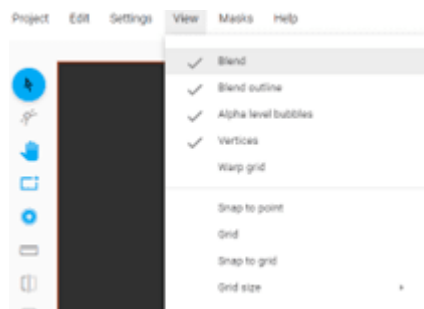
Image C–4

- **Blend:** Enable Blend file. To view changes on screen
- **Blend outline:** Enable the outline of the blend. View the outline of the blend surface(s)
- **Alpha level bubbles:** Enable alpha level bubbles. Indicates if a point goes towards white or black
- **Vertices:** Enable vertices. To see the vertex of lines in the blend
- **Warp grid:** Enable the warp grid on screen
- **Snap to point:** Snap to a point on another surface
- **Grid:** Enable the grid in the Advanced blend tool
- **Snap to grid:** Snap a point to the intersections of the grid in the Advanced blend tool
- **Grid size:** Choose the grid size

Masks
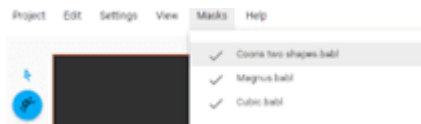
Image C–5

• Enable or disable active files

Help

Image C–6

Tools
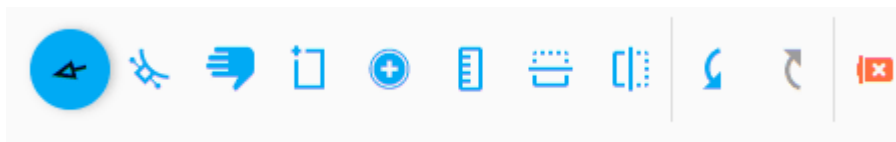
Image C–7

• **Move and select tool:** Select and move surfaces by clicking and dragging them
• **Edit curves:** Select a point and drag it to change the angle of the line
• **Create new surface:** Click in the design area to create a new rectangular surface
• **Create new circle:** Click in the design area to create a new circle
• **Straighten line:** First use the Move and select tool to select a point, click the straighten line tool and select a control point handle connected to the point to straighten the line
• **Mirror horizontal:** First use the Move and select tool to select a surface, then click Mirror horizontal to mirror the shape horizontally
• **Mirror vertial:** First use the Move and select tool to select a surface, then click Mirror vertical to mirror the shape vertically
• **Undo and Redo:** Undo or redo the last action
• **Delete selected surface:** Select the surface with the Move and select tool and click Delete selected surface

Image C–8

• **Shape outline color:**Change the color of the shape
• **Zoom:**Zoom the grid in and out
• **X,Y:** Position of the selected corner point
• **A:** Change the grey level of the selected point

Advanced blend

Specifications

D

D.1 Specifications of F400-4K

Overview

Brightness	5,400 typical ANSI lumens 5,750 typical center lumens
Contrast ratio	1,800 – 6,000:1 sequential
IR for NVG	No
Brightness uniformity	90%
Aspect ratio	16:10
Projector type	1DLP RGB-LaPh
Resolution	2,560 x 1,600 (WQXGA native) 3,840 x 2,400 (4K UHD)
Lens type	FLD+ / FLDX
Optical lens shift	Vertical up to 144% depending on iris Horizontal up to 71% depending on lens Motorized zoom & Focus + Lens memory (FLDX) Motorized lens shift (all lenses)
Color correction	P7 RealColor™
Color space	REC709
CLO (constant light output)	Yes
Light source	RGB LaPh (static laser phosphor)
Light source lifetime	Minimum 25,000 hours @ full power Up to 50,000 hours, depending on mode of operation
Sealed DLP™ core	Yes
Orientation	360° rotation no restrictions
3D	Active stereoscopic 3D
Image processing	Embedded warp & blend
Keystone correction	Yes
Inputs	1 x DP 1.4 (HDCP 2.2) 1 x HDMI™ 2.1 (HDCP 2.2) 4 x DP 1.2
Input resolutions	Including and up to: 3840 x 2400 @ 60HZ 3840 x 2160 @ 60Hz 4096 x 2160 @ 60Hz 2560 x 1600 @ 120Hz
Input color depth	Up to 12-bit, depending on configuration
Software tools	Pulse Toolset + Android app + iOS app + IMS
Control	IR, RJ45, Cabled Remote Control
Network connection	10/100/1000 Mbit

Power requirements	100-240V / 50-60Hz
Power consumption	815W typical 1200W maximum rated
BTU per hour	2781 BTU/h typical 4095 BTU/h maximum
Noise level (typical at 25°C/ 77°F)	34 db(A)
Operating temperature	10°- 40°C (sea level)
Standby power	< 0.5W
Storage temperature	-20 to 60 °C
24/7 operation	Yes
Operating humidity	20 - 80% RH (no condense)
Storage humidity	10 - 90% RH (no condense)
Dimensions (WxLxH)	472 x 562(542) x 293 mm / 18,6 x 22,1(21,3) x 11,5 in (front cover removed)
Weight	31Kg / 68Lbs (no lens)
Standard accessories	Power cord. wireless remote control
Certifications	CE, FCC Class A and cSGSus, KCC, CCC
Warranty	Limited 5 years on parts and labor Extentable

D.2 Specifications of FS400-4K

Overview

Notes	PRELIMINARY SPECIFICATION
Brightness	5,400 typical ANSI lumens 5,750 typical center lumens
Contrast ratio	1,800 – 6,000:1 sequential
IR for NVG	Yes
Brightness uniformity	90%
Aspect ratio	16:10
Projector type	1DLP RGB-LaPh
Resolution	2,560x1,600 (WQXGA native) 3,840x2,400 (4K UHD)
Lens type	FLD+ / FLDX
Optical lens shift	Vertical up to 144% depending on iris Horizontal up to 71% depending on lens Motorized zoom & Focus + Lens memory (FLDX) Motorized lens shift (all lenses)
Color correction	P7 RealColor™

Color space	REC709
CLO (constant light output)	Yes
Light source	RGB LaPh (static laser phosphor)
Light source lifetime	Minimum 25,000 hours @ full power Up to 50,000 hours, depending on mode of operation
Sealed DLP™ core	Yes
Orientation	360° rotation no restrictions
3D	Active stereoscopic 3D
Image processing	Embedded warp & blend
Keystone correction	Yes
Inputs	1 x DP 1.4 (HDCP 2.2) 1 x HDMI™ 2.1 (HDCP 2.2) 4 x DP 1.2
Input resolutions	Including and up to: 3840 x 2400 @ 60HZ 3840 x 2160 @ 60Hz 4096 x 2160 @ 60Hz 2560 x 1600 @ 120Hz
Input color depth	Up to 12Bits depending on set-up`s
Software tools	Projector Toolset + Android app + iOS app
Control	IR RJ45
Network connection	10/100/1000 Mbit
Power requirements	100-240V / 50-60Hz
Power consumption	815W typical 1200W maximum rated
BTU per hour	2781 BTU/h typical 4095 BTU/h maximum
Noise level (typical at 25°C/ 77°F)	34 db(A)
Operating temperature	10°- 40°C (sea level)
Standby power	< 0.5W
Storage temperature	-20 to 60 °C
24/7 operation	Yes
Operating humidity	20 - 80% RH (no condense)
Storage humidity	10 - 90% RH (no condense)
Dimensions (WxLxH)	562 x 472 x 286 mm / 22 x 18,5 x 11,2 In
Weight	31Kg / 68Lbs (no lens)
Standard accessories	Power cord. wireless remote control
Certifications	CE, FCC Class A and cSGSus, KCC, CCC
Warranty	Limited 5 years on parts and labor Extentable

D.3 Specifications of F400-N4K

Brightness	5,000 typical ANSI lumens 5,300 typical center lumens
Contrast ratio	2,000 – 10,000:1 sequential
IR for NVG	no
Brightness uniformity	90%
Aspect ratio	1.88:1
Projector type	4K 1-chip DLP LaPh RGB projector
Resolution	4,096 x 2,176 (4K native) 6,144 x 3,264 (6K)
Lens type	FLD+ / FLDX / FLC
Optical lens shift	Vertical up to 134% depending on iris Horizontal up to 50% depending on lens Motorized zoom & Focus + Lens memory (FLDX) Motorized lens shift (all lenses)
Color correction	P7 RealColor™
Color space	REC709
CLO (constant light output)	Yes
Light source	RGB LaPh (static laser phosphor)
Light source lifetime	Minimum 25,000 hours @ full power Up to 50,000 hours, depending on mode of operation
Sealed DLP™ core	Yes
Orientation	360° rotation, no restrictions
3D	Active stereoscopic 3D
Image processing	Embedded warp & blend engine
Keystone correction	Yes
Inputs	1 x DP 1.4 (HDCP 2.2) 1 x HDMI™ 2.1 (HDCP 2.2) 4 x DP 1.2
Input resolutions	Including and up to: 4,096 x 2,176 @ 60Hz 4,096 x 2,176 @ 120Hz 4,096 x 2,176 @ 240Hz* 6,144 x 3,264 @ 60Hz
Input color depth	Up to 12-bit, depending on configuration
Software tools	Pulse Toolset + Android app + iOS app + IMS
Control	IR, RJ45, Cabled Remote Control
Network connection	10/100/1000 Mbit
Power requirements	100-240V / 50-60Hz

Power consumption	815W typical 1200W maximum rated
BTU per hour	2781 BTU/h typical 4095 BTU/h maximum
Noise level (typical at 25°C/ 77°F)	34 db(A)
Operating temperature	10 - 40 °C (sea level)
Standby power	< 0.5W
Storage temperature	-20 to 60 °C
24/7 operation	Yes
Operating humidity	20 - 80% RH
Storage humidity	10 - 90% RH
Dimensions (WxLxH)	472 x 562(542) x 293 mm / 18,6 x 22,1(21,3) x 11,5 in (front cover removed)
Weight	31,0 kg / 68 lbs
Standard accessories	Power cord, wireless remote control
Certifications	CE, FCC Class A and cSGSus, KCC, CCC
Warranty	Limited 5 years parts and labor, extendable.
*	* Future software release

D.4 Specifications of FS400-N4K

Notes	PRELIMINARY
Brightness	5,000 typical ANSI lumens 5,300 typical center lumens
Contrast ratio	2,000 – 10,000:1 sequential
IR for NVG	Yes (740nm)
Brightness uniformity	90%
Aspect ratio	1.88:1
Projector type	4K 1-chip DLP LaPh RGB projector
Resolution	4,096 x 2,176 (native) 6,144 x 3,264 (6K)
Lens type	FLD+ / FLDX / FLC
Optical lens shift	Vertical up to 134% depending on iris Horizontal up to 50% depending on lens Motorized zoom & Focus + Lens memory (FLDX) Motorized lens shift (all lenses)
Color correction	P7 RealColorTM
Color space	REC709
CLO (constant light output)	Yes

Light source	RGB LaPh (static laser phosphor)
Light source lifetime	Minimum 25,000 hours @ full power Up to 50,000 hours, depending on mode of operation
Sealed DLP™ core	Yes
Orientation	360° rotation, no restrictions
3D	Active stereoscopic 3D
Image processing	Embedded warp & blend engine
Keystone correction	Yes
Inputs	1 x DP 1.4 (HDCP 2.2) 1 x HDMI™ 2.1 (HDCP 2.2) 4 x DP 1.2
Input resolutions	Including and up to: 4,096 x 2,176 @ 60Hz 4,096 x 2,176 @ 120Hz 4,096 x 2,176 @ 240Hz* 6,144 x 3,264 @ 60Hz
Input color depth	Up to 12Bits depending on set-up
Software tools	Prospector, PToolSet
Control	IR, RJ45, Cabled Remote Control
Network connection	10/100/1000 Mbit
Power requirements	100-240V / 50-60Hz
Power consumption	815W typical 1200W maximum rated
BTU per hour	2781 BTU/h typical 4095 BTU/h maximum
Noise level (typical at 25°C/ 77°F)	34 db(A)
Operating temperature	10 - 40 °C (sea level)
Standby power	< 0.5W
Storage temperature	-20 to 60 °C
24/7 operation	Yes
Operating humidity	20 - 80% RH
Storage humidity	10 - 90% RH
Dimensions (WxLxH)	472 x 562(542) x 286 mm / 18,6 x 22,1(21,3) x 11,3 in (front cover removed)
Weight	31,0 kg / 68 lbs
Standard accessories	Power cord, wireless remote control
Certifications	CE, FCC Class A and cSGSus, KCC, CCC

Warranty	Limited 5 years parts and labor, extendable
*	* Future software release

D.5 Dimensions of a F400

Overview

UNDER CONSTRUCTION

D.6 Specifications HDMI 2.1 inputs

Availability

The HDMI inputs are available on the following location(s):

• Control & Communication module

HDMI specifications

The HDMI inputs support the following HDMI 2.1 features:

Specification	Value
Pixel rate	25 – 1188 MHz pixel clock
HDCP support	• HDCP 1.4 • HDCP 2.x
Color space	• YCbCr 4:2:0 • YCbCr 4:2:2 • YCbCr 4:4:4 • RGB 4:4:4
Color depth	• 24 bpp • 30 bpp • 36 bpp
3D support	• Field sequential 3D (Active 3D) - Frame-packed - Top Bottom progressive - Side-by-side progressive • Passive 3D **not** supported.
Audio	Not supported
Video timings progressive	• 640 x 480 @60 Hz • 720 x 480 @60 Hz • 720 x 576 @50 Hz • 1280 x 720 @50 Hz and @60 Hz • 1920 x 1080 up to and including @60 Hz • 3840 x 2160 up to and including @120 Hz • 4096 x 2160 up to and including @120 Hz
Video timings interlaced	• 1920 x 1080 @50 Hz • 1920 x 1080 @60 Hz

D.7 Specifications DisplayPort 1.4 inputs

Availability

The Displayport 1.4 inputs are available on the following location(s):

• Control & Communication module

DisplayPort 1.4 specifications

Pixel rate	Up to 1080 MHz pixel clock
Color format support	• RGB • YCbCr 4:2:2 • YCbCr 4:4:4
Color depth support	• 18 bpp • 24 bpp • 30 bpp • 36 bpp
Data rate support	• 1.62 Gbps: Reduced Bit Rate (RBR) • 2.7 Gbps: High Bit Rate (HBR) • 5.4 Gbps: High Bit Rate 2 (HBR2) • 8.1 Gbps: High Bit Rate 3 (HBR3)
HDCP support	• HDCP 1.3 • HDCP 2.x
Audio	not supported
3D support	• Field sequential 3D (Active 3D) • Passive stereoscopic 3D (Passive stereo) converted to active 3D
Video timings	• 1920 x 1080 @60 Hz and @120 Hz • 1920 x 1200 @60 Hz and @120 Hz • 1920 x 2160 @60 Hz and @120 Hz • 2560 x 1600 @24 Hz, @60 Hz and @120 Hz • 3840 x 2160 @24 Hz, @50 Hz and @60 Hz • 3840 x 2400 @24 Hz, @50 Hz and @60 Hz • 4096 x 2176 @60 Hz • 960 x 2160 @60 Hz and @120 Hz

⚠️ **CAUTION:** In order to display high resolution images (e.g.: 3840 x 2160 @60 Hz or higher) via the DisplayPort input, the quality of the cable must be adequate, in addition the length of the cable can also influence the performance (recommended maximum ~1 meter for DP 1.4 and ~1.2 meter for DP 1.2);. In case there is an issue with one of these criteria the automatic link-training initiated by the DP-standard may decide to switch to a lower resolution.

D.8 Specifications DisplayPort 1.2 inputs

Availability

The DisplaPort 1.2 inputs are available on the following location(s):

• Pulse Quad DP 1.2 input

DisplayPort 1.2 specifications

Pixel rate	Up to 600 MHz pixel clock
Color space	• YCbCr 4:2:2

	• YCbCr 4:4:4 • RGB 4:4:4		
Color depth	• 24 bpp • 30 bpp • 36 bpp		
Data rate support	• 1.62 Gbps: Reduced Bit Rate (RBR) • 2.7 Gbps: High Bit Rate (HBR) • 5.4 Gbps: High Bit Rate 2 (HBR2)		
For future release	• Interlaced support • HDCP 1.4		
Audio	Not supported		
3D support	• Field sequential 3D (Active 3D) • Passive stereoscopic 3D (Passive stereo) converted to active 3D		
Video timings progressive	**2D / 3D**	**Layout Mode[3]**	**Supported formats**
	2D	Standard layout (1x1 layout)	• 1920 x 1080 @60 Hz and @120 Hz • 1920 x 1200 @60 Hz and @120 Hz • 1920 x 2160 @60 Hz and @120 Hz • 2560 x 1600 @24 Hz, @60 Hz and @120 Hz • 3840 x 2160 @24 Hz, @50 Hz and @60 Hz • 3840 x 2400 @24 Hz, @50 Hz and @60 Hz • 960 x 2160 @60 Hz and @120 Hz
	2D	2 column mode (2x1 layout)	• 1920 x 2160 @60 Hz and @120 Hz • 1920 x 2400 @60 Hz • 2048 x 2160 @60 Hz and @120 Hz
	2D	4 quadrant mode (2x2 layout)	• 960 x 1080 @120 Hz • 960 x 1200 @120 Hz • 1280 x 1080 @60 Hz and @120 Hz • 1280 x 1600 @60 Hz and @120 Hz • 1920 x 1080 @120 Hz • 1920 x 1200 @120 Hz • 2048 x 1080 @120 Hz
	2D	4 column mode (4x1 layout)	• 960 x 2160 @120 Hz • 960 x 2400 @120 Hz • 1024 x 2160 @60 Hz
	Active 3D	Standard layout (1x1 layout)	• 1600 x 1200 @120 Hz • 2560 x 1080 @120 Hz • 2560 x 1600 @120 Hz
	Active 3D	2 column mode (2x1 layout)	1920 x 2160 @120 Hz
	Active 3D	4 quadrant mode (2x2 layout)	• 1920 x 1080 @120 Hz • 1920 x 1200 @120 Hz • 2048 x 1080 @120 Hz
	Active 3D	4 column mode (4x1 layout)	• 960 x 2160 @120 Hz • 960 x 2400 @120 Hz • 1024 x 2160 @120 Hz

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3. Only 1x1 layout is supported on the Quad Combo input boards. The Quad DP1.2 input supports all layout configurations.

	Passive stereo	Standard layout (1x1 layout)	3840 x 2160 @60 Hz
	Passive stereo	2 column mode (2x1 layout)	1920 x 2160 @60 Hz

> ⚠ **CAUTION:** In order to display high resolution images (e.g.: 3840 x 2160 @60 Hz) via the DP1.2 input, the quality of the cable must be adequate, in addition the length of the cable can also influence the performance. In case there is an issue with one of these criteria the automatic link-training initiated by the DP-standard may decide to switch to a lower resolution.

Regulatory information

E

E.1 Contact information

Contact address

Barco NV
Beneluxpark 21, 8500 Kortrijk, Belgium
www.barco.com

Barco Ltd., Taiwan
33F, No. 16, Xinzhan Rd., Banqiao Dist., New Taipei City 220, Taiwan
公司名稱：巴可股份有限公司
地址：新北市板橋區新站路16號33樓

Barco Fredrikstad AS
Mosseveien 63, 1610 Fredrikstad, Norway

Importers contact information

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

Registered offices

Manufacturer: Barco Fredrikstad AS
Mosseveien 63, 1610 Fredrikstad, Norway

Manufacturer: Barco Visual (Beijing) Electronics Co., Ltd.
No. 16 Changsheng Road, Zhong Guan Cun Science Park, Chang Ping District, 102200 Beijing

E.2 Production address

Made in information

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

Production date

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

Factories

Factory: Barco NV
President Kennedypark 35, 8500 Kortrijk, Belgium

Factory: Barco (Wuxi) Technology Co., Ltd.
No. 38, Chunhui Middle Road, XiShan District, 214101 Wuxi CHINA
工厂：巴可（无锡）技有限公司
中国无锡市锡山区春晖中路38号，邮编214101

E.3 Product compliance EU

Disposal Information

Waste Electrical and Electronic Equipment (WEEE)

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

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

Disposal of batteries in the product

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

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

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

EMC notices Europe

EN55032/CISPR32 Class A MME (MultiMedia Equipment)

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

E.4 Product compliance UK

UK Compliance

This product is fit for use in the UK.

Authorised Representative: Barco UK Ltd

Address: Building 329, Doncastle Road

                    Bracknell RG12 8PE, Berkshire, United Kingdom

E.5 Product compliance US

Federal Communications Commission (FCC Statement)

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

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

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

E.6 Product compliance Turkey

Turkey RoHS compliance

Türkiye Cumhuriyeti: AEEE Yönetmeliğine Uygundur.
[Republic of Turkey: In conformity with the WEEE Regulation]

E.7 Product compliance EAC

EurAsian Conformity (EAC)

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

E.8 Product compliance China

EMC notices China

GB/T 9254.1 A级ITE(信息技术设备)

警告： 在居住环境中，运行此设备可能会造成无线电干扰。

中国大陆 RoHS (Information for China ROHS compliance)

根据中华人民共和国《电器电子产品有害物质限制使用管理办法》规定，以下部分列出了Barco产品中可能包含的有毒和/或有害物质的名称和含量。

According to the "Management Methods for the Restriction of the Use of Hazardous Substances in Electrical and Electronic Products" (Also called RoHS of Chinese Mainland), the table below lists the names and contents of toxic and/or hazardous substances that Barco's product may contain.

零件项目(名称) Component name	有毒有害物质或元素 Hazardous substances and elements					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr6+)	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
印制电路配件 Printed Circuit Assemblies	X	O	X	O	O	O
外接电(线)缆 External Cables	X	O	O	O	O	O
内部线路 Internal wiring	X	O	O	O	O	O
镜头支架 Lensholder	X	O	O	O	O	O

零件项目(名称) Component name	有毒有害物质或元素 Hazardous substances and elements					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr6+)	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
螺帽,螺钉(栓),螺旋(钉),垫圈, 紧固件 Nuts, bolts, screws, washers, Fasteners	X	O	O	O	O	O
激光发生器 Laser	X	O	O	O	O	O
电源供应器 Power Supply Unit	X	O	O	O	O	O
风扇 Fan	X	O	O	O	O	O
附電池遙控器 Remote control	X	O	O	O	O	O
本表格依据SJ/T 11364的规定编制 This table is prepared in accordance with the provisions of SJ/T 11364. O: 表示该有害物质在该部件所有均质材料中的含量均不超出电器电子产品有害物质限制使用国家标准要求。 O: Indicates that the content of the hazardous substance in all homogeneous materials of the component does not exceed the national standard requirements for the restriction of the use of hazardous substances in electrical and electronic products. X: 表示该有害物质至少在该部件的某一均质材料中含量超出电器电子产品有害物质限制使用国家标准要求。 X: Indicates that the content of the hazardous substance in at least one homogeneous material of the component exceeds the national standard requirements for the restriction of the use of hazardous substances in electrical and electronic products.						

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

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

E.9 Product compliance Taiwan

Product info

BARCO

product name 產品名稱:

projector 投影機

model 型號: GPC

EMC notices Taiwan

BSMI Taiwan Class A statement

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

BSMI Reporting Obligor Information / 報驗義務人資訊

製造商（報驗廠商）：巴可股份有限公司/新北市板橋區新站路16號33樓。

一、 商品在國內產製時，為商品之產製者或輸出者。
　　 但商品委託他人產製，並以在國內有住所或營業所之委託者名義，於國內銷售或輸出時，為委託者。
二、 商品在國外產製時，為商品之輸入者。
　　 但商品委託他人輸入，並以在國內有住所或營業所之委託者名義，於國內銷售時，為委託者。
三、 商品之產製者、輸出入者、委託產製或委託輸出入者不明或無法追查時，為銷售者。
　　 前項所稱產製者，包括具有下列情形之一者：
　　 一、組裝者：商品由個別零組件以組裝銷售。
　　 二、修改者：符合檢驗規定之商品於進入市場前，為銷售目的而修改。

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

單元 Unit	限用物質及其化學符號 Restricted substances and its chemical symbols					
	鉛 Lead (Pb)	汞 Mercury (Hg)	鎘 Cadmium (Cd)	六價鉻 Hexavalent chromium (Cr6+)	多溴聯苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated diphenyl ethers (PBDE)
印製電路板配件 Printed Circuit Assemblies	—	O	—	O	O	O
外接電（線）纜 External Cables	—	O	O	O	O	O
內部線路 Internal wiring	—	O	O	O	O	O
鏡頭支架 Lensholder	—	O	O	O	O	O
螺絲組件 Nuts, bolts, screws, washers, Fasteners	—	O	O	O	O	O
雷射 Laser	—	O	O	O	O	O
電源供應器 Power Supply Unit	—	O	O	O	O	O
風扇 Fan	—	O	O	O	O	O

單元 Unit	限用物質及其化學符號 Restricted substances and its chemical symbols					
	鉛 Lead (Pb)	汞 Mercury (Hg)	鎘 Cadmium (Cd)	六價鉻 Hexavalent chromium (Cr6+)	多溴聯苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated diphenyl ethers (PBDE)
遙控器 Remote control	—	O	O	O	O	O
備考1.〝超出0.1 wt %〞及〝超出0.01 wt %〞係指限用物質之百分比含量超出百分比含量基準值。 Note 1："Exceeding 0.1 wt %" and "exceeding 0.01 wt %" indicate that the percentage content of the restricted substance exceeds the reference percentage value of presence condition. 備考2.〝○〞係指該項限用物質之百分比含量未超出百分比含量基準值。 Note 2："○" indicates that the percentage content of the restricted substance does not exceed the percentage of reference value of presence. 備考3.〝—〞係指該項限用物質為排除項目。 Note 3：The "—" indicates that the restricted substance corresponds to the exemption.						

備註: 此RoHS表格適用於以下產品型號: F400

Hint: This RoHS table is suitable for following models: F400

E.10 Trademark notice

HDMI™

The terms HDMI, HDMI High-Definition Multimedia Interface, HDMI trade dress and the HDMI Logos are trademarks or registered trademarks of HDMI Licensing Administrator, Inc.

DisplayPort™

DisplayPort™, the DisplayPort™ logo and DisplayPortHDR™ logo are trademarks owned by the Video Electronics Standards Association (VESA®) in the United States and other countries.

USB Type-C™

USB Type-C and USB-C are a registered trademarks of USB Implementers Forum

HDBaseT™

HDBaseT™ and the HDBaseT Alliance logo are trademarks of the HDBaseT Alliance.

PJLink™

The PJLink™ is a registered trademark of Japan Business Machine and Information System Industries Association.

DLP™

DLP® and the DLP logo are registered trademarks of Texas Instruments.

> All other trademarks and registered trademarks are trademarks or registered trademarks of their respective holders. In this manual, ™ and ® marks are not specified.

E.11 Product privacy statement

About

Learn more about Barco's Product Privacy Statement:

https://www.barco.com/en/about/trust-center/product-privacy-statement.

Which data is captured and why

Following data[4] is captured for general secure operation of the product.

- IP addresses
- User ID information
- Date and time information
- Mobile network information
- Network configuration information
- Device identification information
- Device operational conditions
- Device environmental conditions
- Device performance metric
- Device configuration information
    - Resolution
    - Brightness
- Device input configuration
    - Active inputs
    - Input resolution

Data retention mechanism

An administrator should modify or delete a user (upon user request, or when the user does not work for the company anymore), either via the Users feature, or via a factory reset executed as administrator.

Logs may contain user names and IP addresses and are subject to the retention policy, but cannot be deleted by the user. The user can send a request to dataprotection@barco.com.

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4. Only if applicable for the product type and model.

Video timing tables

F

REVISION OF THE TABLES IS NECESSARY.

F.1 Overview video timings

List of compatible signals

The following table specifies the video signals that the projector can project. Barco Events projectors supports the signal with "X" in the Compatible signals column.

Note: Support for refresh rates 24.00, 30.00, 60.00 Hz automatically includes support of 1/1.001 x those refresh rates.

Resolution	Vertical refresh rate (Hz)	Compatible signal		
		HDMI 2.0 Input	DisplayPort 1.4 Input	DisplayPort 1.2 Inputs
640 x 480	60	X	X	X
720 x 480	60	X	—	—
720 x 576	50	X	—	—
800 x 600	60	X	X	X
1024 x 768	60	X	X	X
1280 x 720	24	—	—	—
1280 x 720	25	—	—	—
1280 x 720	30	—	—	—
1280 x 720	50	X	X	X
1280 x 720	60	X	X	X
1280 x 800	60	X	X	X
1280 x 960	60	X	X	X
1280 x 1024	60	X	X	X
1400 x 1050	60	X	X	X
1600 x 1200	60	X	X	X
1600 x 1200	120	—	X	X
1920 x 1080	24	X	X	X
1920 x 1080	25	X	—	—
1920 x 1080	30	X	—	—
1920 x 1080	50	X	X	X
1920 x 1080	60	X	X	X
1920 x 1080	120	—	X	X
1920 x 1200	50	X	X	X
1920 x 1200	60	X	X	X
1920 x 1200	120	—	X	X
2048 x 1080	24	X	X	X
2048 x 1080	25	X	X	X
2048 x 1080	30	X	X	X
2048 x 1080	48	X	X	X
2048 x 1080	50	X	X	X

Resolution	Vertical refresh rate (Hz)	Compatible signal		
		HDMI 2.0 Input	DisplayPort 1.4 Input	DisplayPort 1.2 Inputs
2048 x 1080	60	X	X	X
2048 x 1080	120	—	X	X
2560 x 1600	50	X	X	X
2560 x 1600	60	X	X	X
2560 x 1600	120	—	X	X
3840 x 2160	24	X	X	X
3840 x 2160	25	X	X	X
3840 x 2160	30	X	X	X
3840 x 2160	50	X	X	X
3840 x 2160	60	X	X	X
3840 x 2400	50	X	X	X
3840 x 2400	60	X	X	X
4096 x 2160	24	X	X	X
4096 x 2160	25	X	X	X
4096 x 2160	30	X	X	X
4096 x 2160	50	X	X	X
4096 x 2160	60	X	X	X
4096 x 2176	60			
4096 x 2176	120			
4096 x 2176	240			

F.2 Overview video timings HDMI 2.0 inputs

Overview

The following standard video formats are available for the projector.

Note: support for refresh rates 24.00, 30.00, 60.00 Hz automatically includes support of 1/1.001 x those refresh rates

Video timing (active pixels x active lines)	Vertical refresh rate (Hz)	3D support?
640 x 480	60	
720 x 480	60	
720 x576	50	
800 x 600	60	
1024x 768	60	
1280 x720	50	Frame packing Top – bottom

Video timing (active pixels x active lines)	Vertical refresh rate (Hz)	3D support?
1280 x 720	60	Frame packing Top – bottom
1280 x 800	60	
1280 x 960	60	
1280 x1024	60	
1400 x 1050	60	
1600 x 1200	60	
1920 x 1080	24	Frame packing Top – bottom
1920 x 1080	25	
1920 x 1080	30	
1920 x 1080	50	Side by Side (SbS) progressive
1920 x 1080	60	Side by Side (SbS) progressive
1920 x 1200	50	
1920 x 1200	60	
2048 x 1080	24	
2048 x 1080	25	
2048 x 1080	30	
2048 x 1080	48	
2048 x 1080	50	
2048 x 1080	60	
2560 x 1600	50	
2560 x 1600	60	
3840 x 2160	24	
3840 x 2160	25	
3840 x 2160	30	
3840 x 2160	50	
3840 x 2160	60	
3840 x 2400	50	
3840 x 2400	60	
4096 x 2160	24	
4096 x 2160	25	
4096 x 2160	30	
4096 x 2160	50	
4096 x 2160	60	
4096 x 2176	60	

Video timing (active pixels x active lines)	Vertical refresh rate (Hz)	3D support?
4096 x 2176	120	
4096 x 2176	240	

F.3 Overview video timings DisplayPort 1.4 input

Overview

The following standard video formats are available for the projector.

Note: support for refresh rates 24.00, 30.00, 60.00 Hz automatically includes support of 1/1.001 x those refresh rates

Do we have to insert a separate table for DP1.4 as we have one for DP1.2 (which should be adapted)

F.4 Overview video timings DisplayPort 1.2 inputs

Overview

The following standard video formats are available for the projector.

Note: support for refresh rates 24.00, 30.00, 60.00 Hz automatically includes support of 1/1.001 x those refresh rates

Video timing (active pixels x active lines)	Vertical refresh rate (Hz)	Available layout modes, other than standard layout (1 x 1 layout)	Support for 3D?
640 x 480	60		
800 x 600	60		
1024x 768	60		
1280 x720	50		
1280 x 720	60		
1280 x 800	60		
1280 x 960	60		
1280 x1024	60		
1280 x 1600	60	2 Column mode (2 x 1 layout)	
1280 x 1600	120	2 Column mode (2 x 1 layout)	Active 3D
1400 x 1050	60		
1600 x 1200	60		
1600 x 1200	120		Active 3D
1920 x 1080	50		
1920 x 1080	60		

Video timing (active pixels x active lines)	Vertical refresh rate (Hz)	Available layout modes, other than standard layout (1 x 1 layout)	Support for 3D?
1920 x 1080	120		Active 3D
1920 x 1200	50		
1920 x 1200	60		
1920 x 1200	120		Active 3D
1920 x 2160	60	2 Column mode (2 x 1 layout)	
1920 x 2160	120	2 Column mode (2 x 1 layout)	Active 3D
1920 x 2400	60	2 Column mode (2 x 1 layout)	
1920 x 2400	120		Active 3D
2048 x 1080	24		
2048 x 1080	25		
2048 x 1080	30		
2048 x 1080	48		
2048 x 1080	50		
2048 x 1080	60		
2048 x 2160	60	2 Column mode (2 x 1 layout)	
2048 x 2160	120	2 Column mode (2 x 1 layout)	Active 3D
2560 x 1080	120		Active 3D
2560 x 1440	120		Active 3D
2560 x 1600	50		Active 3D
2560 x 1600	60		
2560 x 1600	120		
3840 x 2160	24		
3840 x 2160	25		
3840 x 2160	30		
3840 x 2160	50		
3840 x 2160	60		
3840 x 2400	50		
3840 x 2400	60		
4096 x 2160	24		
4096 x 2160	25		
4096 x 2160	30		

Video timing (active pixels x active lines)	Vertical refresh rate (Hz)	Available layout modes, other than standard layout (1 x 1 layout)	Support for 3D?
4096 x 2160	50		
4096 x 2160	60		

Video timing tables

Glossary

Broadcast address

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

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 eye 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.

Projector address

Address installed in the projector to be individually controlled.

Glossary

110 R5915525 /03 F400/FS400

Index