F90 Series.

User Manual

BARCO

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Türkiye Cumhuriyeti: AEEE Yönetmeliğine Uygundur.

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

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

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

Disposal of batteries in the product

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

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

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1. SAFETY

About this chapter

Read this chapter thoroughly before attempting to install or operate the projector.

To prevent personal injury to users or physical damage to the projector while installing and using your projector, ensure that you understand and follow all safety guidelines, instructions and warnings included in this chapter and this manual.

Clarification of the term F70 / F90 series used in this document

Use in this document of the term, F70 / F90 series, means that the content is applicable for the following products:

- F90–W13WUXGA
- F90–4K13 4KUHD/WQXGA
- F70 — 4K6
- F70 — W6

Defining the GP6 platform

The F90 series products in general, are all products within the Barco GP6 Platform.

Defining the GP7 platform

The F70 series products in general, are all products within the Barco GP7 Platform

Overview

- General considerations
- Important safety instructions
- Projector Hazard Distances
- High Brightness Precautions
- Hazard Distance for fully closed projection system
- HD in function of the lens Throw Ratio (TR)
- Safety symbols
- RoHS compliance
- Contact adresses
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1.1 General considerations

Notice on optical radiation F90 Series

- The projector is Class 1 laser product that conforms with IEC EN 60825-1:2014. For Northern America, the projector is class 3R laser product up to throw ratio 2.33. The projector conforms with IEC 60825–1:2007, and with performance standards for laser products under 21 CFR 1040, except with respect to those characteristics authorized by Variance Number 2016–V-0144 effective March 6, 2017
  Do not stare into Beam.
- This projector is Risk Group 2 (RG2) according to IEC EN 62471-5.
  This projector may become Risk Group 3 (RG3) when an interchangeable lens with throw ratio greater than 3.15 is installed. For Northern America, installation requirements according to Risk group 3 (RG3) must be followed when interchangeable lens with throw ratio greater than 2.33 is installed.
  Refer to the manual for the lens list and throw ratio before operation.
  Such combination of projector and lens are intended for **professional use only**, and are not intended for consumer use.
- For RG3, no direct exposure to the beam shall be permitted.
  For RG3, operators shall control access to the beam within the hazard distance or install the product at a height that will prevent eye exposure within the hazard distance.
- This projector has two (2) built-in Class 4 laser clusters. Disassembly or modification is very dangerous and should never be attempted.
- Any operation or adjustment not specifically instructed by the user's guide creates the risk of hazardous laser radiation exposure.
- Do not open or disassemble the projector as this may cause damage by the exposure of laser radiation.

Notice on optical radiation F70 Series

- The projector is Class 1 laser product that conforms with IEC EN 60825-1:2014. For Northern America, the projector is class 3R laser product up to throw ratio 2.5. The projector conforms with IEC 60825–1:2007, and with performance standards for laser products under 21 CFR 1040, except with respect to those characteristics authorized by Variance Number 2016–V-0144 effective March 6, 2017
  Do not stare into Beam.

- This projector is Risk Group 2 (RG2) according to IEC EN 62471-5.
  This projector may become Risk Group 3 (RG3) when an interchangeable lens with throw ratio greater than 4.7 is installed. For Northern America, installation requirements according to Risk group 3 (RG3) must be followed when interchangeable lens with throw ratio greater than 2.5 is installed.
  Refer to the manual for the lens list and throw ratio before operation.
  Such combination of projector and lens are intended for **professional use only**, and are not intended for consumer use.

- For RG3, no direct exposure to the beam shall be permitted.
  For RG3, operators shall control access to the beam within the hazard distance or install the product at a height that will prevent eye exposure within the hazard distance.

- This projector has one (1) built-in Class 4 laser clusters. Disassembly or modification is very dangerous and should never be attempted.

- Any operation or adjustment not specifically instructed by the user's guide creates the risk of hazardous laser radiation exposure.

- Do not open or disassemble the projector as this may cause damage by the exposure of laser radiation.

General safety instructions

- This product contains no user serviceable parts except the Color Wheel. Attempts to modify/replace mechanics or electronics inside the housing or compartments will violate any warranties and may be hazardous.
  Do not remove/replace any other parts than the Color Wheel. Other parts, service personnel only – Warranty void if Removed.
  Follow the instructions in the User Guide to replace the Color Wheel.

- Do not stare into beam when the projector is on. The bright light may result in permanent eye damage.

- Not following the prescribed control, adjustment or operation procedure may cause damage by the exposure of laser radiation.

- Before operating this equipment please read this manual thoroughly and retain it for future reference.

- Installation and preliminary adjustments should be performed by properly trained and qualified personnel.

- All warnings on the projector and in the documentation manuals must be adhered to.

- All instructions for operating and use of this equipment must be followed precisely.

- All local installation codes should be adhered to.

Notice on safety

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

Users definition

Throughout this manual, the term SERVICE PERSONNEL refers to Barco authorized persons having appropriate technical training and experience necessary to be knowledgeable of potential hazards to which they are exposed (including, but not limited to HIGH VOLTAGE ELECTRIC and ELECTRONIC CIRCUITRY and HIGH BRIGHTNESS PROJECTORS) in performing a task, and of measures to minimize the potential risk to themselves or other persons. Only Barco authorized SERVICE PERSONNEL, knowledgeable of such risks, are allowed to perform service functions inside the product enclosure. The term USER and OPERATOR refers to any person other than SERVICE PERSONNEL. When an interchangeable lens with throw ratio 3.15 or more is installed, the F70 / F90 series projector becomes RG3. Refer to the manual for the lens list and hazard distance before operation. Such combination of projector and lens are intended for professional use only, and are not intended for consumer use.

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.

1.2   Important safety instructions

To prevent the risk of electrical shock

- This product should be operated from a mono phase AC power source.
- This apparatus must be grounded (earthed) via the supplied 3 conductor AC power cable. If none of the supplied power cables are the correct one, consult your dealer.
  If you are unable to insert the plug into the outlet, contact your electrician to replace your obsolete outlet. Do not defeat the purpose of the grounding-type plug.
  Never use 2-prong power cords, as this is dangerous and could lead to electrical shock.
- 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.
- Use only the power cord supplied with your device or original replacement cords. While appearing to be similar, other power cords have not been safety tested at the factory and may not be used to power the device. For a replacement power cord, contact your dealer.
- Do not operate the projector with a damaged cord. Replace the cord.
  Do not operate the projector if the projector has been dropped or damaged - until it has been examined and approved for operation by a qualified service technician.
- Position the cord so that it will not be tripped over, pulled, or contact hot surfaces.
- If an extension cord is necessary, a cord with a current rating at least equal to that of the projector should be used. A cord rated for less amperage than the projector may overheat.
- Never push objects of any kind into this product through cabinet slots as they may touch dangerous voltage points or short out parts that could result in a risk of fire or electrical shock.
- Make sure that no objects enter into the vents and openings of the set.
- Do not expose this projector to rain or moisture.
- The projector is designed for indoor use only. Never operate the unit outdoors.
- Do not immerse or expose this projector in water or other liquids.
- Do not spill liquid of any kind on this projector.
- Should any liquid or solid object fall into the cabinet, unplug the set and have it checked by qualified service personnel before resuming operations.
- Do not disassemble this projector, always take it to an authorized trained service person when service or repair work is required.
- Do not use an accessory attachment which is not recommended by the manufacturer.
- Lightning - For added protection for this video product during a lightning storm, or when it is left unattended and unused for long periods of time, unplug it from the wall outlet. This will prevent damage to the device due to lightning and AC power-line surges.

To prevent personal injury

- To prevent injury and physical damage, always read this manual and all labels on the system before connecting to the wall outlet or adjusting the projector.
- To prevent injury, take note of the weight of the projector.
- To prevent injury, ensure that the lens and all covers are correctly installed. See installation procedures.
- Warning: high intensity light beam. NEVER look into the lens! High luminance could result in damage to the eye.
- Warning: extremely high brightness laser: This projector uses extremely high brightness laser. Never attempt to look directly into the lens or at the laser.
- 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 except the Color Wheel. Attempts to modify/replace mechanics or electronics inside the housing or compartments will violate any warranties and may be hazardous.
- Do not remove/replace any other parts than the Color Wheel. Other parts, service personnel only Warranty void if removed
- 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.
- It is hazardous to operate without lens or lens cap. Lenses or shields shall be changed if they have become visibly damaged, for example with cracks or deep scratches, to such an extent that their effectiveness is impaired.

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. The exclusion zone in the exhaust area must be not less than 100 cm (40"). The exclusion zone on the intake area must not be less than 50 cm (20").
- Do not place flammable or combustible materials near the projector!
- For the F90 projector, the exclusion zone on the lens side within the light beam must be at least 1,5m.
- For the F70 projector the exclusion zone on the lens side within the light beam must be at least 1,0m.
- Caution! Hot air is exhausted from the rear vent. Do not place objects that are sensitive to heat nearer than 100 cm (40") 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 100 cm (40") and to the intake area, not less than 50 cm (20").
- 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 authorized Barco service personnel. Always insist on genuine Barco replacement parts. Never use non-Barco replacement parts as they may degrade the safety of this projector.
- Projection rooms must be well ventilated or cooled in order to avoid heat buildup.
- Let the projector cool down completely before storing. Remove cord from the projector when storing.

To prevent projector damage

- To ensure correct airflow is maintained the projector should only be operated when all of its covers in place.
- Always remove lens cap before switching on the projector. If the lens cap is not removed, it may melt due to the high energy light emitted through the lens. Melting the lens cap may permanently damage the surface of the projection lens
- Only connect the projector to signal sources and voltages as described in the technical specification. Connecting to unspecified signal sources or voltages may lead to malfunction and permanent damage of the unit.
- To ensure correct airflow is maintained, it should only be operated when all of its covers are in place.
- The projector must always be installed in a manner which ensures free flow of air into its air inlets and unimpeded evacuation of the hot air from its cooling system.
- Slots and openings in the cabinet are provided for ventilation. To ensure reliable operation of the product and to protect it from overheating, these openings must not be blocked or covered. The openings should never be blocked by placing the product on a bed, sofa, rug, or other similar surface. This product should never be placed near or over a radiator or heat register. The device should not be placed in a built-in installation or enclosure unless proper ventilation is provided. Ensure that nothing can be spilled on, or dropped inside the projector. If this does happen, switch off and unplug the mains supply immediately. Do not operate the projector again until it has been checked by Barco authorized service personnel.
- Do not block the projector cooling fans or free air movement around the projector. Minimum safety distance to the exhaust area of the unit must not be less than 100 cm (40") and to the intake area, not less than 50 cm (20").
- Do not use this equipment near water.
- Do not operate the projector outside its temperature and humidity specifications as this may result in overheating and malfunction.
- Never place the projector in direct sun light. Sun light on the lens can severely damage the Digital Mirror Devices™ in which case there is a loss of warranty.
- Save the original shipping carton and packing material. They will come in handy if you ever have to ship your equipment. For maximum protection, repack your set as it was originally packed at the factory.
- Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning. Never use strong solvents, such as thinner or benzine, or abrasive cleaners, since these will damage the cabinet. Stubborn stains may be removed with a cloth lightly dampened with mild detergent solution.
- To ensure the highest optical performance and resolution, the projection lenses are specially treated with an anti-reflective coating, therefore, avoid touching the lens. To remove dust on the lens, use a soft dry cloth. Do not use a damp cloth, detergent solution, or thinner.

On servicing

- Do not attempt to service this product yourself, as opening or removing covers may expose you to dangerous voltage potentials and risk of electric shock.
- Refer all servicing to Barco authorized repair centers.
- Attempts to alter the factory-set internal controls or to change other control settings not specially discussed in this manual can lead to permanent damage to the projector and cancellation of the warranty.
- Unplug this product from the wall outlet and refer servicing to Barco authorized service personnel or technicians under the following conditions:
  - 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.
  - When the power cord or plug is damaged or frayed.
- Replacement parts: When replacement parts are required, be sure the service technician has used original Barco replacement parts. Unauthorized substitutions may result in degraded performance and reliability, fire, electric shock or other hazards. Unauthorized substitutions may void warranty.
- Safety check: Upon completion of any service or repairs to this projector, ask the service technician to perform safety checks to determine that the product is in proper operating condition.

1.3   Projector Hazard Distances

For F90 series: WARNING. This may be a RG3 laser Product, dependent on which lens used.

This projector may become Risk Group 3 (RG3) when an interchangeable lens with throw ratio greater than 3.15 is installed. For Northern America, installation requirements according to Risk group 3 (RG3) must be followed when interchangeable lens with throw ratio greater than 2.33 is installed

Refer to the product manual for the lens list and throw ratio before operation.

Do not look directly in to the beam from the projector lens.

No direct eye exposure to the beam is permitted.

Operators shall control access to the beam within the hazard distance or install the product at a height that will prevent eye exposure within the hazard distance.

See table below for a definition of hazardous distances versus the throw ratio of the lens.

For F70 Series: WARNING. This may be a RG3 laser Product, dependent on which lens used.

This projector may become Risk Group 3 (RG3) when an interchangeable lens with throw ratio greater than 4.7 is installed. For Northern America, installation requirements according to Risk group 3 (RG3) must be followed when interchangeable lens with throw ratio greater than 2.5 is installed

Refer to the product manual for the lens list and throw ratio before operation.

Do not look directly in to the beam from the projector lens.

No direct eye exposure to the beam is permitted.

Operators shall control access to the beam within the hazard distance or install the product at a height that will prevent eye exposure within the hazard distance.

See table below for a definition of hazardous distances versus the throw ratio of the lens.

1.4   High Brightness Precautions

Restriction Zone (RZ) based on the HD (Hazard Distance).

The HD depends on the amount of lumens produced by the projector and the type of lens installed. See next chapter"HD in function of the lens Throw Ratio (TR)", page 8 .

To protect untrained end users (as cinema visitors) the installation shall comply with the following installation requirements: Operators shall control access to the beam within the hazard distance or install the product at the height that will prevent spectators' eyes from being in the hazard distance. Radiation levels in excess of the limits will not be permitted at any point less than 2.0 meter (SH) above any surface upon which persons other than operators, performers, or employees are permitted to stand or less than 1.0 meter (SH) lateral separation from any place where such persons are permitted to be. In non-cinema 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 6.6.5.

The end 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, 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 non-cinema 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. For example, a sufficiently large separation height may be achieved by mounting the image projector on the ceiling or through the use of physical barriers.

For applications installed in the USA market the above limits for cinema like environments do not apply. The relevant minimum separation height is 2.5m (8,2 ft) by the FDA CDRH. Non cinema like environments require 2.5 meter (8.2 ft) separation height and 1.0 meter (3.3 ft) separation width for areas where restrained behavior is to be expected. All other areas require 3.0 (9.9 ft) separation height.
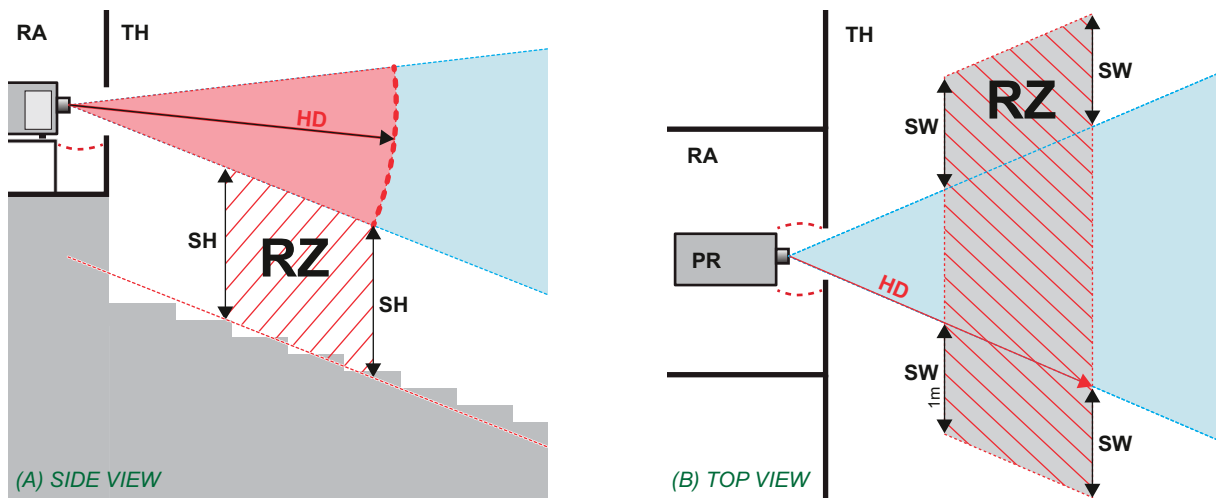
Image 1-1
A   Side View
B   Top View
RA   Restricted Area
PR   Projector
TH   Theater
RZ   Restriction Zone in the theater
SH   Separation Height
SW   Separation Width

> **Regarding the SH Distance: For Cinema applications, the distance must be >2m. For Concert applications, the distance must be >3m.**

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

On image 1-2 a typical setup is displayed. It must be verified if these minimum requirements are met. If required a restricted zone (RZ) in the theater must be established. This can be done by using physical barrier, like a red rope as illustrated in image 1-2.

The restricted area sticker can be replaced by a sticker with only the symbol.
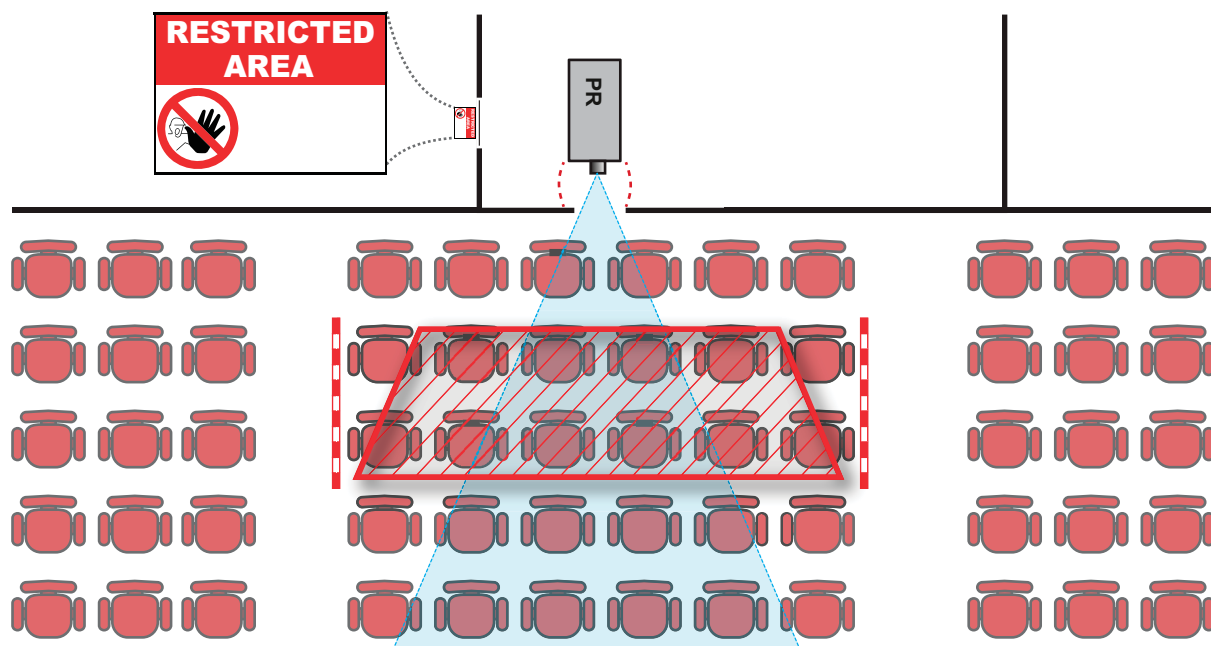
Image 1-2

1.5 Hazard Distance for fully closed projection system

HD

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

Restriction Zone RZ Based on the HD

The projector is also suitable for rear projection applications; projecting a beam onto a defuse coated projection screen. As displayed in image 1-3 two areas should be considered: the restricted enclosed projection area (RA) and the observation area (TH).
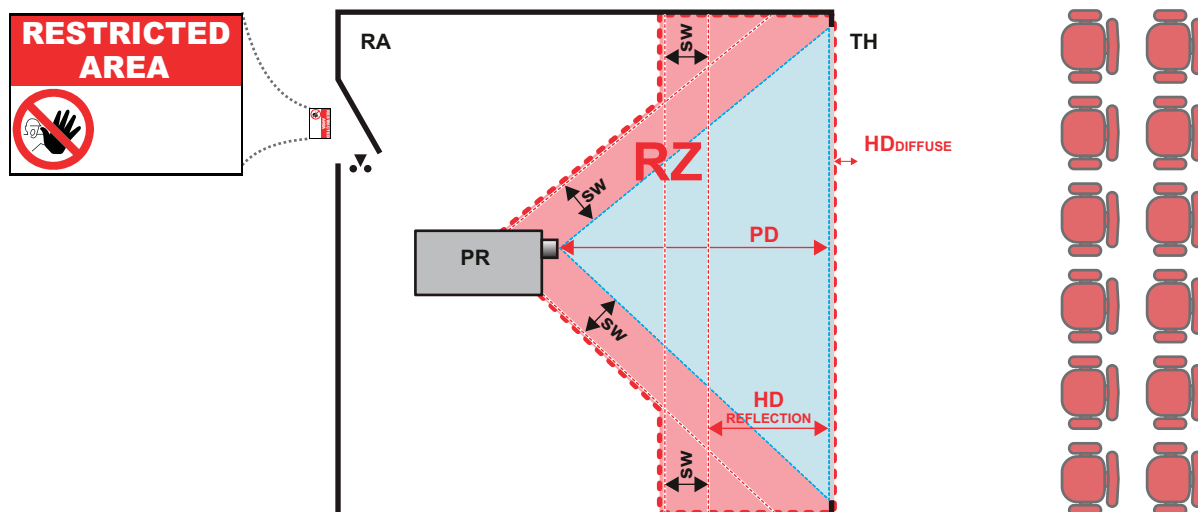
Image 1-3
RA   Restricted Access location (Enclosed projection area)
PR   Projector.
TH   Theater (observation area).
RZ   Restriction Zone
PD   Projection Distan
SW   Separation Width. Must be minimum 1 meter.

Restriction zone (RZ) based on the HD continued.

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

- HD as discussed in "High Brightness precautions: Hazard Distance (HD)", page 6 , relevant for intrabeam exposure.
- HDreflection : the distance that has to be kept restrictive related to the reflected light from the rear projection screen.
- HDdiffuse : the relevant distance to be considered while observing the defuse surface of the rear projection screen.

As described in "High Brightness precautions: Hazard Distance (HD)", page 6 , it is mandatory to create a restricted zone within the beam areas closer than any NOHD. 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 (HDreflection); also taking into account a 1 meter lateral separation.

The HDreflection 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 graphs in chapter "HD in function of the lens Throw Ratio (TR)", page 8 .

HDreflection = 25% (HD – PD)

The light emitted from the screen within the observation shall never exceed the RG2 exposure limit, determined at 10 cm. The HDdiffuse 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 the lens Throw Ratio (TR)

> **TR (Throw Ratio)**
>
> The ratio of the distance to the screen (throw) to the screen width.

HD versus Throw Ratio
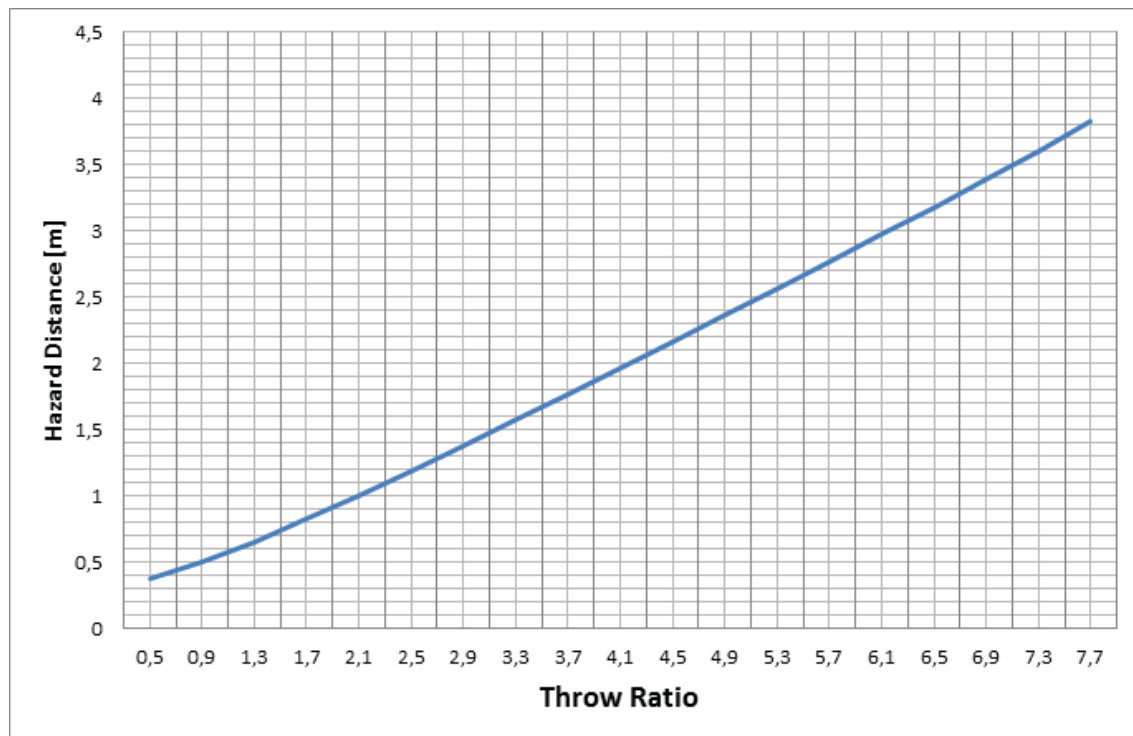
Image 1-4
Hazard Distance in meters versus Throw ratio of the lens for the F90 projectors
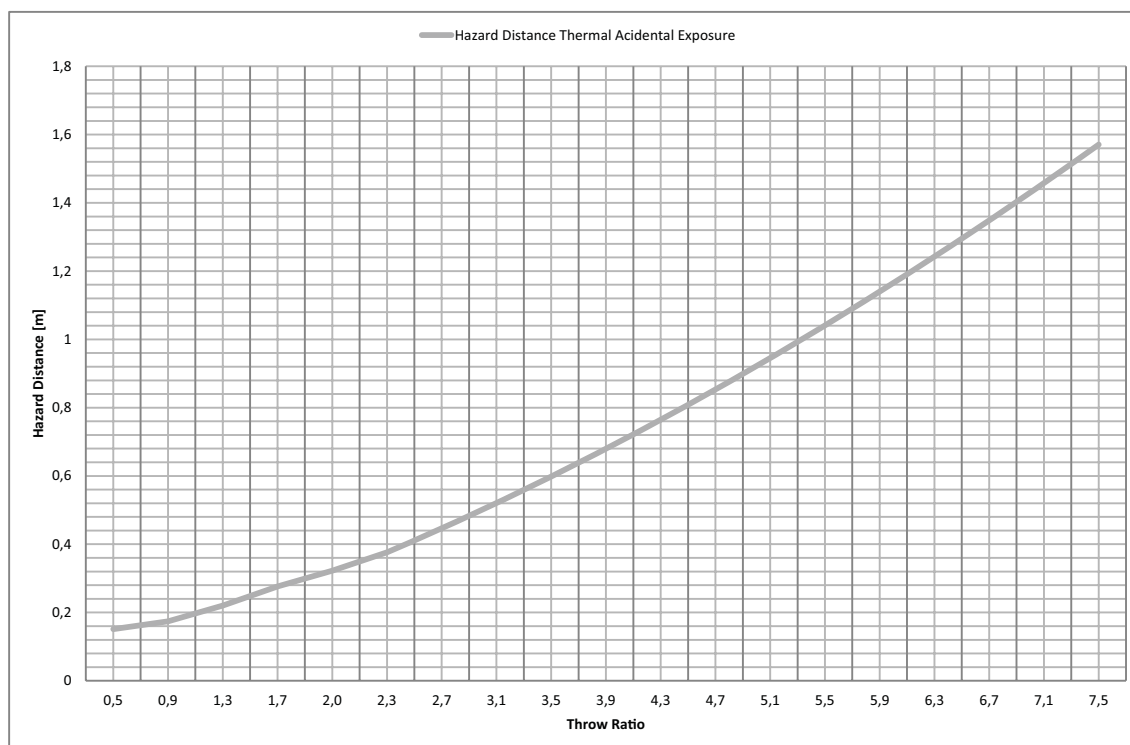
Image 1-5
Hazard Distance in meters versus Throw ratio of the lens for the F70 projectors
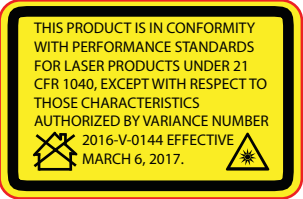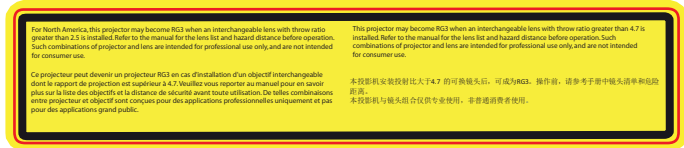
Graphs shows Hazard Distance in meters versus Throw ratio of the lens

1.7 Safety symbols

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

Image	Description
⚠ 📖	Refer to user manual for further information!
(beam symbol)	Caution! Do not stare into beam, RG2 product.
(no telephone symbol)	No telephone! Do not connect to telephone lines.
For F90 series: Warning Label (yellow warning label)	Caution! For North America: With interchangeable lens with throw ratio greater than 2.33, consider hazard distance and installation requirements for RG3 product. Refer User Manual. Caution! With Interchangeable lens with throw ratio greater then 3.15, consider hazard distance and installation requirements for RG3 product. Refer User manual.

Image	Description
For F90 series: FDA Label 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 MARCH 6, 2017.	
For F70 Series: Warning label For North America, this projector may become RG3 when an interchangeable lens with throw ratio greater than 2.5 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. Ce projecteur peut devenir un projecteur RG3 en cas d'installation d'un objectif interchangeable dont le rapport de projection est supérieur à 4.7. 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 4.7 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. 本投影机安装投射比大于4.7 的可换镜头后，可成为RG3。操作前，请参考手册中镜头清单和危险距离。 本投影机与镜头组合仅供专业使用，非普通消费者使用。	Caution! For North America: With interchangeable lens with throw ratio greater than 2.5, consider hazard distance and installation requirements for RG3 product. Refer User Manual Caution! With Interchangeable lens with throw ratio greater then 4.7, consider hazard distance and installation requirements for RG3 product. Refer User manual.
For F70 Series: FDA Label 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 MARCH 6, 2017.	

Location of Safety Label
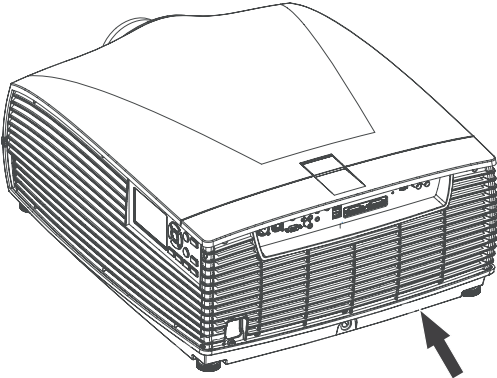
Image 1-6
F90 Projector
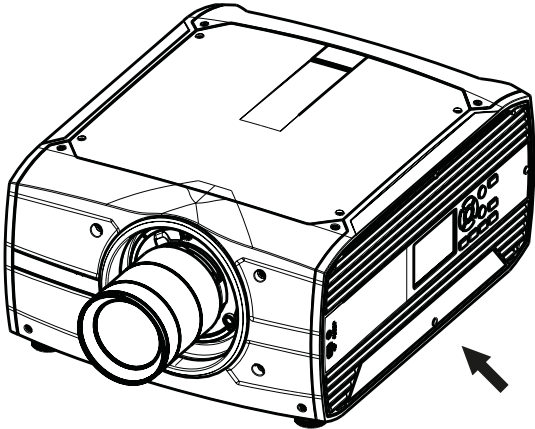
Image 1-7
F70 Projector

Disposal Information

Waste Electrical and Electronic Equipment

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

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

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

WEEE Information

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

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

WARNING: **This product contains chemicals, including lead, known to the State of California to cause birth defects or other reproductive harm. Recycle properly, do not dispose of in ordinary waste!**

Turkey RoHS compliance

Türkiye Cumhuriyeti: AEEE Yönetmeliğine Uygundur.

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

1.8 RoHS compliance

中国大陆 RoHS (Chinese Mainland RoHS)

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

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

零件項目（名稱） Component Name	有毒有害物質或元素 Hazardous Substances or Elements					
	鉛 (Pb)	汞 (Hg)	鎘 (Cd)	六價鉻 (Cr6+)	多溴聯苯 (PBB)	多溴二苯醚 (PBDE)
印製電路配件 Printed Circuit Assemblies	X	O	X	O	O	O
外接電（線）纜 External Cables	X	O	O	O	O	O
內部線路 Internal wiring	X	O	O	O	O	O
鏡頭支架 Lensholder	X	O	O	O	O	O
激光發生器 Laser	X	O	O	O	O	O
底架 Chassis	O	O	O	O	O	O
外殼 Enclosure	O	O	O	O	O	O
螺帽，螺釘（栓），螺旋（釘），墊圈緊固件 Nuts, bolts, screws, washers. Fasteners	X	O	O	O	O	O
電源供應商 Power Supply Unit	X	O	O	O	O	O
散熱片（器） Heatsinks	O	O	O	O	O	O
風扇 Fan	X	O	O	O	O	O
塑膠外殼 Plastic Enclosure	O	O	O	O	O	O
外殼 Enclosure	O	O	O	O	O	O
電池（組） Batteries	O	O	O	O	O	O
文件說明書 Paper Manuals	O	O	O	O	O	O
裝置配件 Installation kit	O	O	O	O	O	O
附電池遙控器 Remote control	X	O	O	O	O	O
本表格依據 SJ/T 11364 的規定編制。 This table is prepared in accordance with the provisions of SJ/T 11364. O: 表示該有毒有害物質在該部件所有均質材料中的含量均在 GB/T 26572 標準規定的限量要求以下。 O: Indicates that this toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in GB/T 26572 X: 表示該有毒有害物質至少在該部件的某一均質材料中的含量超出 GB/T 26572 標準規定的限量要求。 X: Indicates that this toxic or hazardous substance contained in at least one of the homogeneous materials used forth is part is above the limit requirement in GB/T 26572.						

Image 1-8

零件项目(名称)	有毒有害物质或元素					
Component Name	Hazardous Substances or Elements					
	铅	汞	镉	六价铬	多溴联苯	多溴二苯醚
	(Pb)	(Hg)	(Cd)	(Cr6+)	(PBB)	(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
內部线路 Internal wiring	X	O	O	O	O	O
镜头支架 Lensholder	X	O	O	O	O	O
激光发生器 Laser	X	O	O	O	O	O
底架 Chassis	O	O	O	O	O	O
外壳 Enclosure	O	O	O	O	O	O
螺帽,螺钉(栓),螺旋(钉),垫圈, 紧固件 Nuts, bolts, screws, washers, Fasteners	X	O	O	O	O	O
电源供应器 Power Supply Unit	X	O	O	O	O	O
散热片(器) Heatsinks	O	O	O	O	O	O
风扇 Fan	X	O	O	O	O	O
塑胶外壳 Plastic Enclosure	O	O	O	O	O	O
外壳 Enclosure	O	O	O	O	O	O
电池(组) Batteries	O	O	O	O	O	O
文件说明书 Paper Manuals	O	O	O	O	O	O
装置配件 Installation kit	O	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: 表示该有毒有害物质在该部件所有均质材料中的含量均在 GB/T 26572 标准规定的限量要求以下. O: Indicates that this toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in GB/T 26572. X: 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 标准规定的限量要求. X: Indicates that this toxic or hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in GB/T 26572.						

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

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

1.9   Contact adresses

For Taiwan:

AWIND Inc., 33F., No. 16. Xinzhan Rd., Banqiao Dist.,, New Taipei City 220, Taiwan

Tel: +886-2-7715-0099, Fax: +886-2-7715-0097

E-mail: sales@awindinc.com

1.10   Product Info

Product info

Image 1-9

product name 產品名稱:

projector 投影機

model 型號: GP6 / GP7

1.11   Statement

EN55032/CISPR32 Class A MME (MultiMedia Equipment)

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

Class A ITE (Information Technology Equipment)

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

2. GETTING TO KNOW THE PROJECTOR

Overview

- Main components
- Service and maintenance
- LED status light
- Power on / Standby button backlight indications
- LCD panel
- Local keypad
- Remote control, Battery installation
- Remote control, protocol setup
- Functionality overview
- Projector Address
- Connector panel
- Color Wheels
- Optional accessories

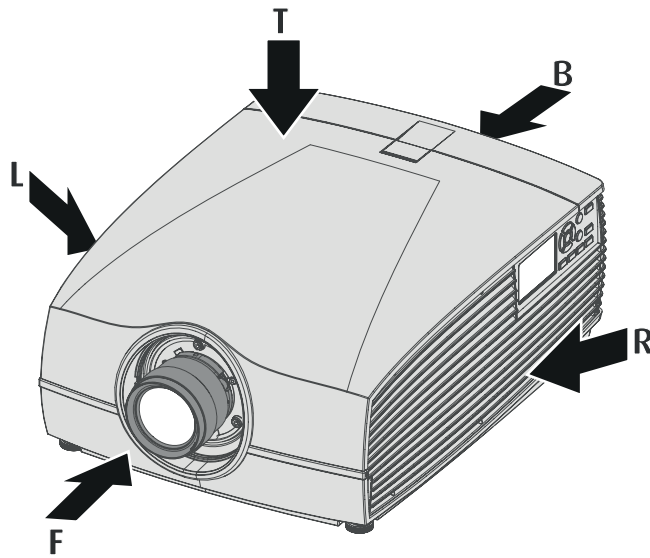## 2.1 Main components

Naming conventions

Image 2-1
L   Left
T   Top
B   Back
R   Right
F   Front

Projector Front

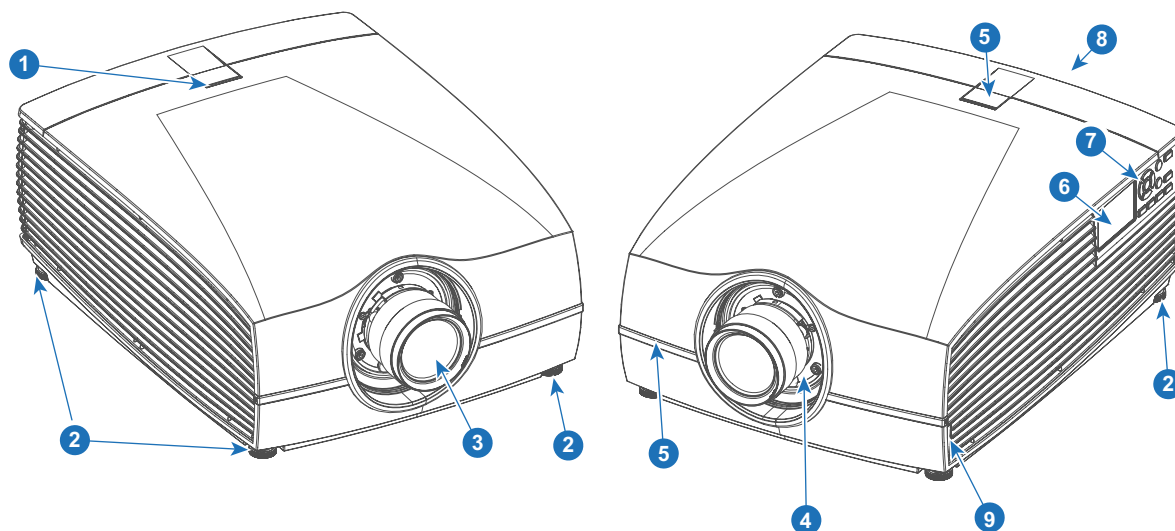

Image 2-2
1   LED status light
2   Adjustable feet
3   Projector lens
4   Lens holder
5   IR Receiver: for remote control communication
6   LCD panel
7   Keypad
8   Connector panel
9   Front USB and triggerboard

2.2   Service and maintenance

General

The F90 does not have any user-serviceable parts.

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

The projector color wheel is a designed consumable that can be replaced by users in the field. See "Change the color wheel ", page 24 for more information.

2.3   LED status light

About

The F90 status indicator is located on the top side of the projector, near the IR receiver (ref. 1, image 2-2).

During normal operation the LED is unlit. In the event of a critical error or high temperature, the LED will display red.

In event of a critical error, the projector cannot be restarted until the projector is disconnected from the power supply and then reconnected again. If the reason for the error persists, the projector will again go to critical error status.

If the root cause of the error is high temperature, the projector will restart when it has cooled down, and temperatures are back within the normal operating limitations.

2.4   Power on / Standby button backlight indications

Indicator

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

The table below shows the details regarding this indications.

Operating Status	Indication Color / Behavior
On (active)	Blue

Operating Status	Indication Color / Behavior
Wait on	Blue flashing
Standby (off)	White
Wait	White short flashing
Overheating	Red flashing
Configure/upgrade	White fast flashing
Standby ECO	White heartbeat

2.5 LCD panel

About

The LCD panel (reference 1, image 2-3) is located on the right side of the projector, and has two main functions:

1. Showing the menus and adjustment information. and also a mirror of the OSD, (On Screen Display) described in *User Interface* when this is enabled.
2. Information regarding the status of the projector showing this data:
   - Projector status
   - Network address
   - Active source
   - Current firmware version
   - Operation Data
   - Active functions (Enabled Functions).

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

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

2.6 Local keypad

About

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

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

The keys are equipped with white and blue backlit LEDs. Power button is equipped with white, blue and red backlit. The LEDs are controlled according to the features available.
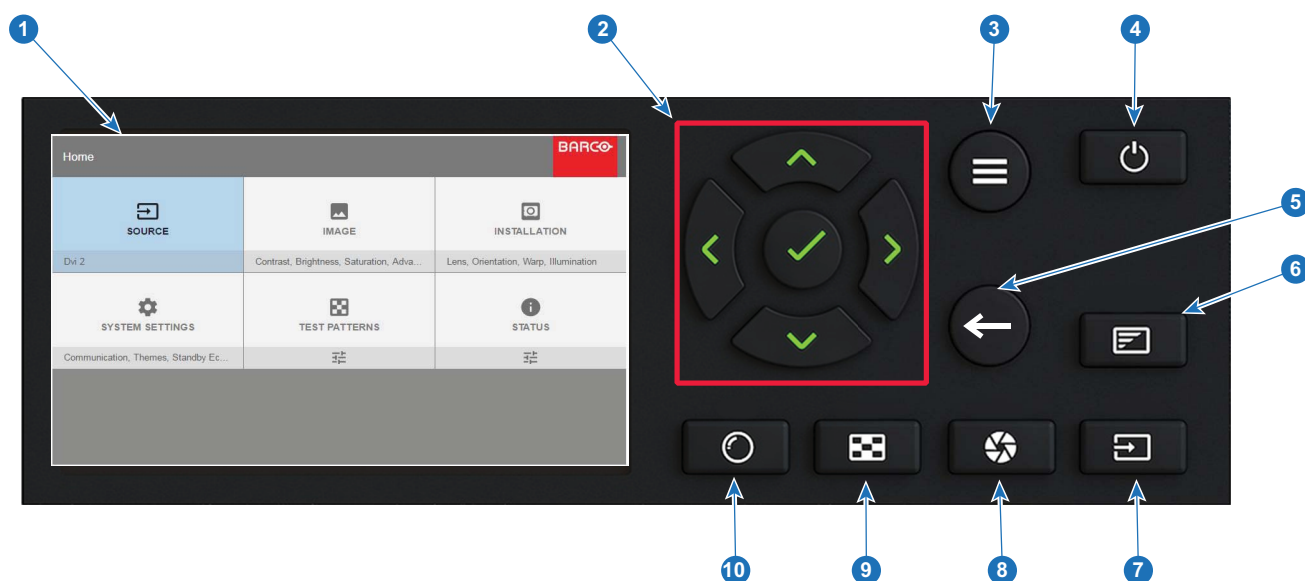

Image 2-3

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

2.7   Remote control, Battery installation

Where to find the batteries for the remote control ?

The batteries are not placed in the remote control unit to avoid control operation in its package, resulting in a shorter battery life time. At delivery the batteries can be found in a separated bag attached to the remote control unit. Before using your remote control, install the batteries first.

How to install

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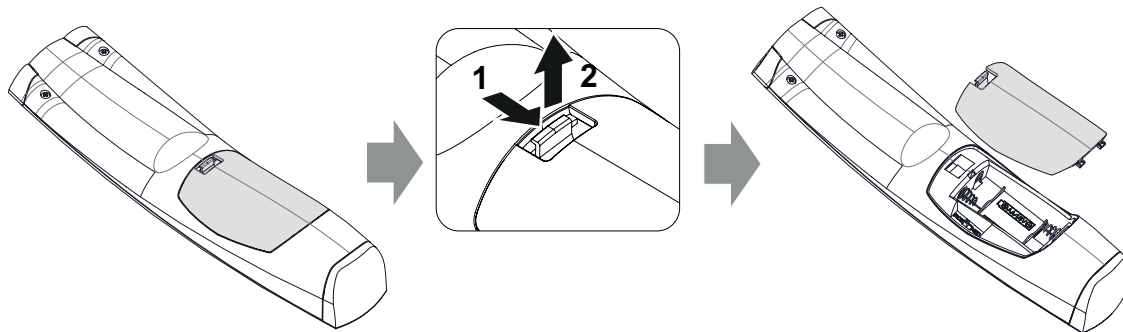

Image 2-4

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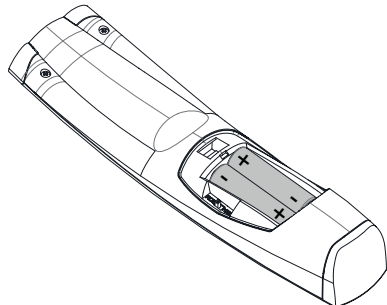

Image 2-5

3. Insert (1) both lower tabs of the battery cover in the gaps at the bottom of the remote control, and press (2) the cover until it clicks in place.
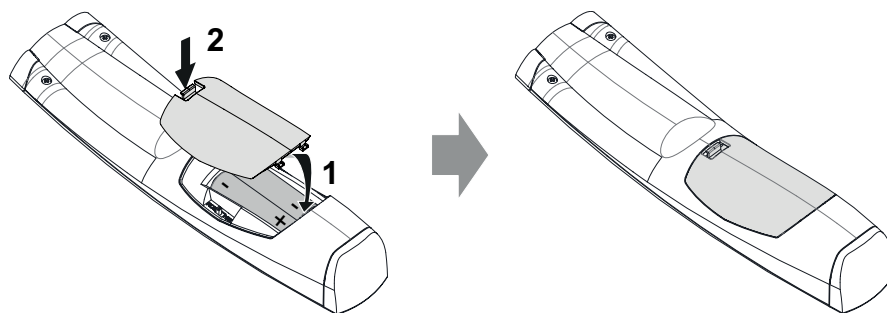
Image 2-6

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

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

	CAUTION**: Replace the battery as explained above. There is a risk of explosion if the battery is incorrectly installed.**

2.8   Remote control, protocol setup

About the used protocol

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

Which protocol to use

- The **NEC** protocol have to be used for Barco projectors based on the Pulse platform: F70, F80, F90, HDX 4K, UDX, ...
- The **RC5** protocol have to be use all other Barco projectors: HDX W, HDF W, HDQ 2K, ...

How to set

1. Remove the cover. For more info on how to remove, see "Remote control, Battery installation", page 20.

2. Place the switch in the NEC position.

Image 2-7

2.9   Functionality overview
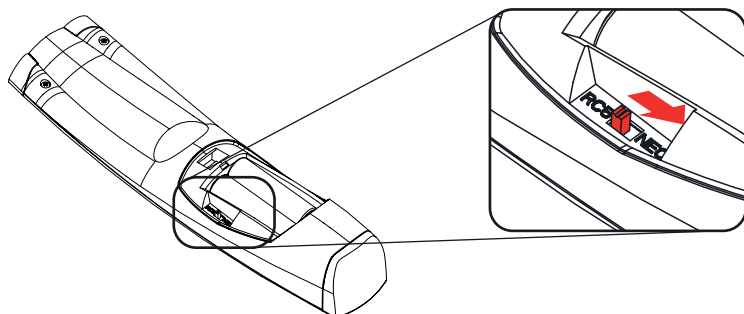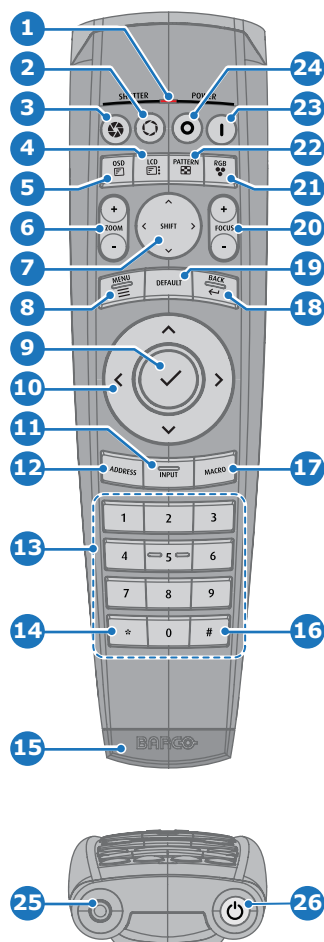
Remote Control Unit buttons

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	Touch Panel On/Off. (Not in use).		17	Macro button. (Not in use)
5	OSD On/Off.		18	Menu Back.
6	Lens Zoom.		19	Default button. (Not in use).
7	Lens Shift.		20	Lens Focus.
8	Menu Activation.		21	Real Color menu..
9	Menu Selection, OK button.		22	Test Patterns.
10	Menu Navigation.		23	Power On.
11	Input Selection.		24	Power Off.
12	Address button.		25	Stereo Jack.
13	Numeric buttons.		26	RCU On/Off.

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

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

2.10   Projector Address

Projector address

Address installed in the projector to be individually controlled.

Broadcast address

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

2.10.1   Controlling the projector

Why a projector address?

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

Set up an individual Projector Address

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

Projector controlling

Every projector requires an individual address between 0 and 255.

When the address is set, the projector can be controlled now:
- with the RCU: only for addresses between 0 and 31.
- with a computer: for any address between 0 and 255.

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 XLR cable will automatically reset the address back to its default value '0'.**

2.10.2 Displaying and Programming addresses into the RCU

Displaying the Projector Address on the Screen.

1. Press the **Address** button to see the projector address (proximately 2 seconds).

   The projector's address is displayed on the LCD status screen.

How to Program an Address into the RCU?

1. Press the **Address** button until the *Button pressed indicator* lights up continuously (proximately 5 seconds).

2. Enter the address with the digit buttons within the time the indicator lights up (also proximately 5 seconds).
   Note: That address can be any value between 0 and 31.

   Tip: A few examples:

   To enter address 3, press "3" digit button on the RCU to set the RCU's address to 3 and wait until the button pressed indicator is out. Alternatively, you can also press "0" and "3". This way, he button pressed indicator goes out immediately.

   To enter address 31, then press "3" and "1" on the digit button on the RCU and the button pressed indicator goes out immediately.

2.11 Connector panel

General

The source input panel is located at the back of the projector. For source specifications, see "Connector specifications", page 45.
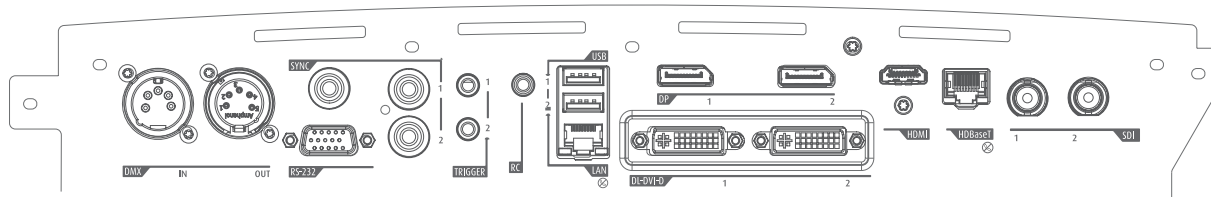
Image 2-8

Name	Pcs	Description	Purpose
DMX IN	1	DMX 512 input	For Projector Control
DMX OUT	1	DMX 512 output	For Projector Control
RS-232	1	9–pin DB9 connector	For Projector Control. Allows for wired remote control and monitoring of many projector functions used in installation environments
Sync	3	BNC Sync Port IN/OUT; Bidirectional mini-DIN (1x 3D sync Out, and 2x Sync In/Out)	For Projector ControlThis is mainly used in multiple projector installations with requirement of synchronization between the units
Trigger	3 (one in front, two on rear panel)	12VDC - 0,5A (6W)	For Controlling Peripherals, like motorized screens, curtains etc. Give 12V output when projector are switched on**See also the note below.**

Name	Pcs	Description	Purpose
RC	1	Jack connector for wired remote	For Projector Control
USB	3	USB 2.0 type A, 4 pin(2x Rear and 1x Front)	For Software upgrade
LAN	1	Standard RJ45 connector	For Projector Control
DP	2	Standard display port	For Projector Input
DL-DVI-D	2	Dual DVI-I 1.0 (DVI_D Functionallity).	For Projector Input. These connectors can also be used to form one uniform image by feeding half of the image into each connector. HDCP compliant for sources up 165 Mhz
HDMI	1	Standard HDMI 2.0	For Projector Input
HDBaseT	1	Standard RJ45 8P8C Connector	For Projector Control
SDI	2	SDI1 is Input, SDI 2 is pass through. (out)	For Projector Input

Regarding the Trigger Output: If these 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.

Connectors

2.12 Color Wheels

Overview

- Color Wheel range
- Change the color wheel

2.12.1 Color Wheel range

About

The F90 is delivered with two (2) different color wheels: COLOR and BRIGHTNESS.

COLOR delivers great depth of color and a broad gamut.

BRIGHTNESS provides an extra boost to white segments and very good primary and secondary colors, which makes it ideal for brightness critical applications.

The F90 is designed so that users can change the color wheel quickly and easily whilst on site, without the use of special tools.

2.12.2 Change the color wheel

CAUTION: The F90 contains no user serviceable parts except the Color Wheel. Attempts to modify/replace mechanics or electronics inside the housing or compartments will violate any warranties and may be hazardous.

CAUTION: When placing the projector on the right side for colorwheel replacement, ensure that the projector are properly secured in this position. Ensure also that the surface used for this operation is suitable with respect to flatness. It may result in great danger to personnel and equipment if the projector overturning from the upright position.

The system is automatically configured with the correct CW algorithms following the product ID of the CW.

The CW assembly contains no serviceable parts, and further de-assembly should not be attempted.

> The bottom of the packaging container have a cut out that is intended for placing the projector in a upright position, on the right side. This is suitable as docking during change of the colorwheel. Remove the middle longitude spacer in the container bottom in order to release this cutout.

> A video illustration of the complete Colorwheel change process is available in the F90 product site on the web, under the file "Media & Assets". https://www.barco.com/en/Products/Projectors/Venue-projectors/11800-lumens-4K-UHD-DLP-laser-phosphor-projector.aspx#!media
>
> **This video visualize the process described below.**

How to replace the color wheel (CW)

1. Place the projector on its side (right or left) on a flat surface.

2. Release the seven (7) captive screws on the projector bottom. Remove the bottom cover carefully.

3. Release the three (3) captive screws to open CW cover.

4. Release the three (3) captive screws holding the CW in place.

5. Carefully remove the color wheel.

6. Replace with the new color wheel.

7. Reinstall the three (3) captive screws for holding the CW in place.

8. Reinstall the three (3) captive screws of the CW cover.

9. Replace the projector bottom cover, and reinstall the seven (7) captive screws.

10. Reposition the projector so that its bottom is sitting flat on a level surface.

2.13 Optional accessories

> **WARNING**: Always use Rigging Frame when the projector are installed outside a flat horizontal surface, or being stacked together with several projectors.

Rigging frame

Item number	Item description
B593624	Rigging frame
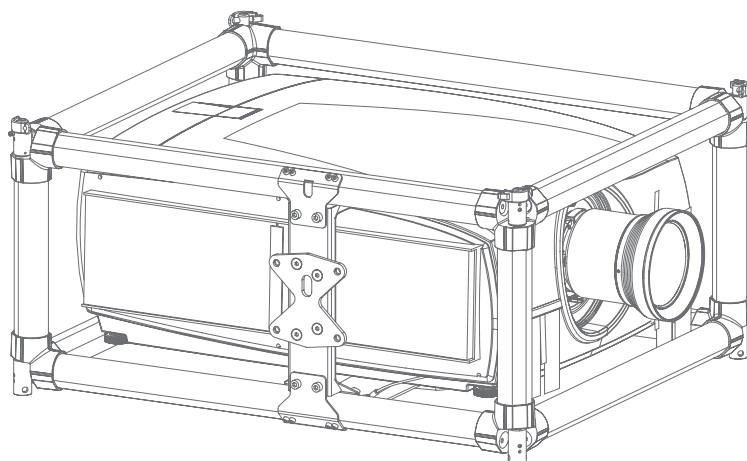
Image 2-9

The F90 rigging frame is a rugged, easy to install frame designed to streamline the process of installing one or more projectors.

When installed in the frame, the projector:

- can be rotated around x, y and z axis in order to obtain a seamless adjustment.
- can be installed from a truss or on pedestal
- can be easily stacked one on top of one another, for instance in dual- or multi- channel installations

Flight case

Item number	Item description
B593624	Flight case

Image 2-10

The F90 flight case is custom-designed to ship the projector, including flight frame, signal and power cords and up to two lenses. The case is fully-lined to protect the projector and lenses during transit and storage.

3. LENSES

About

Overview

- Approved Lenses
- Lens range
- Replace a lens
- Lens shift
- Adjust zoom, focus and iris

3.1 Approved Lenses

Approved Lenses

Partnumber	Description	Compliance
R9801214	FLD 1.6 - 2.32 : 1 (EN11)	approved
R9801218	FLD 0.74 : 1 (EN12)	approved
R9801228	FLD 1.24 - 1.6 : 1 (EN13)	approved
R9801209	FLD 2.37 - 3.79 : 1 (EN14)	approved – professional use only
R9801225	FLD 1:16 : 1 (EN15)	approved
R9801249	FLD 3.8 - 6.5 : 1 (EN16)	approved – professional use only
R9801216	FLD+ 1.7 - 2.5 : 1 (EN41)	approved
R9801226	FLD+ 0.8 : 1 (EN42)	approved
R9801230	FLD+ 1.2 - 1.7 : 1 (EN43)	approved
R9801211	FLD+ 2.5 - 4.6 : 1 (EN44)	approved – professional use only
R9801220	FLD+ Long Focus 0.8 - 1.21 : 1 (EN45)	approved
R9801221	FLD+ Short Focus 0.8 - 1.21 : 1 (EN46)	approved
R9801295	FLD+ 0.65 : 1 (EN47)	approved
PN_EN58	FLD+ 0.28 : 1 (EN58)	approved

This projector may become Risk Group 3 (RG3) when an interchangeable lens with throw ratio greater than 3.15 is installed. For Northern America, installation requirements according to Risk group 3 (RG3) must be followed when interchangeable lens with throw ratio greater than 2.33 is installed.

Refer to the manual chapter 1.7 for the throw ratio versus hazard distance before operation.

3.2 Lens range

CAUTION: **Always remove the lens from the lens holder before moving or transporting the projector. Failure to do this may cause damage to the lens holder and prism.**

Available lenses — WUXGA

The FLD lens range is custom-engineered for WUXGA and 1080 projectors.

The electrical connection to the lens motors is via a spring probe contact (pogo) pin array on the bayonet mount.

The projector will automatically detect and identify the lens when it is installed. Automatic detection is not available for 3rd party lenses.

EN11   EN12   EN13   EN14   EN15   EN16   EN33
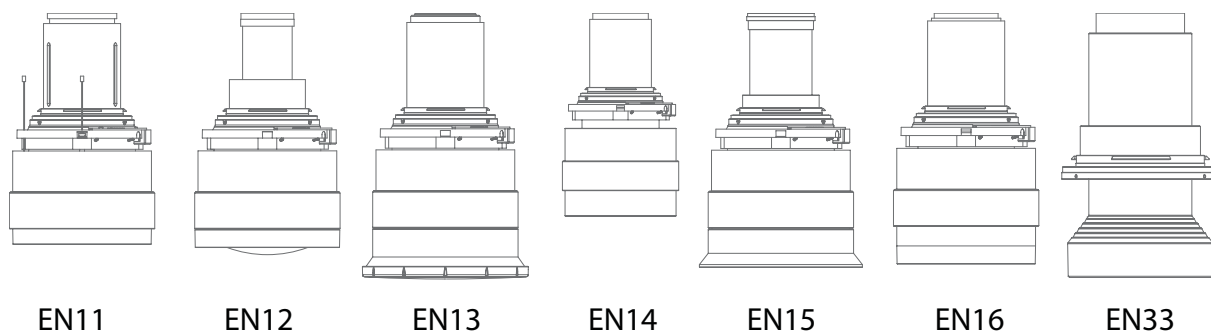
Image 3-1

Name	Description	Part number	Weight
FLD Lens 1.6 - 2.32 : 1 (EN11)	1.6-2.32 : 1 (WUXGA)	R9801214	2.2 kg
FLD Lens 0.74 : 1 (EN12)	0.74:1 (WUXGA)	R9801218	1.9 kg
FLD Lens 1.24 - 1.6 : 1 (EN13)	1.24 - 1.6 : 1 (WUXGA)	R9801228	2.6 kg
FLD Lens 2.37 - 3.79 : 1 (EN14)	2.37 - 3.79 : 1 (WUXGA)	R9801209	2.5 kg
FLD Lens 1.16:1 (EN15)	1.16 : 1 (WUXGA)	R9801225	2.4 kg
FLD Lens 3.80 - 6.50 : 1 (EN16)	3.8 - 6.5 : 1 (WUXGA)	R9801249	2.5 kg

Name	Working F#	Iris / Iris F#	Zoom Ratio	Focal Length (mm)	Focus Range (m)
FLD Lens 1.6 - 2.32 : 1 (EN11)	2.1-2.52	Yes 2.1-6.5	1.45	33.2-48.1	2.0-15
FLD Lens 0.74 : 1 (EN12)	2.1	Yes 2.1-6.5	-	16.35	0.5-5
FLD Lens 1.24 - 1.6 : 1 (EN13)	2.1-2.22	Yes 2.1-6.5	1.3	25.59-33.24	1.0-15
FLD Lens 2.37 - 3.79 : 1 (EN14)	2.1-2.72	Yes 2.1-6.5	1.6	49.1-78.6	3.0-30
FLD Lens 1.16:1 (EN15)	2.1	Yes 2.1-6.5	-	23.98	1.5-15
FLD Lens 3.80 - 6.50 : 1 (EN16)	2.1-2.66	Yes 2.1-6.5	1.74	78.3-136.2	4.0-40

Available lenses — 4K, WUXGA, WQXGA

The FLD+ (EN4X) lens range is custom-engineered for WQXGA projectors.

The electrical connection to the lens motors is via a spring probe contact (pogo) pin array on the bayonet mount. The projector will automatically detect and identify the lens when it is installed. Automatic detection is not available for 3rd party lenses.
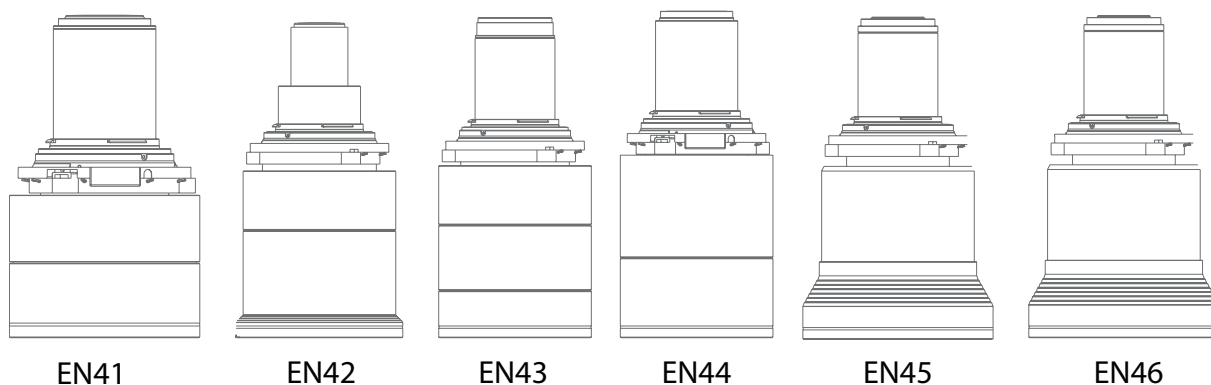

EN41   EN42   EN43   EN44   EN45   EN46

Image 3-2

Name	Description	Part number	Weight
FLD+ Lens 1.7 - 2.5 : 1 (EN41)	1.58 - 2.33 : 1 (WUXGA) / 1.7 - 2.5 : 1 (WQXGA)	R9801216	2.54 kg
FLD+ NV Lens 1.7 - 2.5 : 1 (NV41)	IR Optimized, 1.58 - 2.33 : 1 (WUXGA) / 1.7 - 2.5 : 1 (WQXGA)	R9801216	2.54 kg
FLD+ Lens 0.8 : 1 (EN42)	0.75 : 1 (WUXGA) / 0.8 : 1 (WQXGA)	R9801226	2.7 kg
FLD+ Lens 1.2 - 1.7 : 1 (EN43)	1.12 - 1.58 : 1 (WUXGA) / 1.2 - 1.7 : 1 (WQXGA)	R9801230	2.84 kg
FLD+ NV Lens 1.2 - 1.7 : 1 (NV43)	IR Optimized, 1.12 - 1.58 : 1 (WUXGA) / 1.2 - 1.7 : 1 (WQXGA)	R9801286	2.84 kg
FLD+ Lens 2.5 - 4.6 : 1 (EN44)	2.33 - 4.3 : 1 (WUXGA) / 2.5 - 4.6 : 1 (WQXGA)	R9801211	3.08 kg
FLD+ Lens 0.75 - 1.13 : 1 (EN45)	0.75 - 1.13 : 1 (WUXGA) / 0.8 - 1.21 : 1 (WQXGA)	R9801220	3.04 kg
FLD+ Lens 0.75 - 1.13 : 1 (EN46)	0.75 - 1.13 : 1 (WUXGA) / 0.8 - 1.21 : 1 (WQXGA)	R9801221	3.14 kg
FLD+ NV Lens 0.8 - 1.21 : 1 (NV46)	IR Optimized, 0.75 - 1.13 : 1 (WUXGA) / 0.8 - 1.21 : 1 (WQXGA)	R9801287	3.14 kg
FLD+ Lens 0.65 : 1 (EN47)	0.61 : 1 (WUXGA) / 0.65 : 1 (WQXGA)	R9801295	5.4 kg

Name	Working F#	Iris / Iris F#	Zoom Ratio	Focal Length (mm)	Focus Range (m)
FLD+ Lens 1.7 - 2.5 : 1 (EN41)	2.1-2.5	Yes 2.1-6.5	1.47	33.70-49.54	1.5 - 15
FLD+ NV Lens 1.7 - 2.5 : 1 (NV41)	2.1-2.5	Yes 2.1-6.5	1.47	33.70-49.54	1.5 - 15
FLD+ Lens 0.8 : 1 (EN42)	2.1	Yes 2.1-6.5	-	16.12	0.7 - 7
FLD+ Lens 1.2 - 1.7 : 1 (EN43)	2.4-2.7	Yes 2.4-6.5	1.42	23.95-34.02	1.5 - 15
FLD+ NV Lens 1.2 - 1.7 : 1 (NV43)	2.4-2.7	Yes 2.4-6.5	1.42	23.95-34.02	1.5 - 15
FLD+ Lens 2.5 - 4.6 : 1 (EN44)	2.1-2.93	Yes 2.1-6.5	1.85	49.52-91.60	2.5-25
FLD+ Lens 0.75 - 1.13 : 1 (EN45)	2.4-3.29	Yes 2.4-6.5	1.51	15.85-23.93	5.0 - 30
FLD+ Lens 0.75 - 1.13 : 1 (EN46)	2.4-3.29	Yes 2.4-6.5	1.51	15.98-23.99	0.7 - 7
FLD+ NV Lens 0.8 - 1.21 : 1 (NV46)	2.4-3.29	Yes 2.4-6.5	1.51	15.98-23.99	0.7 - 7
FLD+ Lens 0.65 : 1 (EN47)	2.1	Yes 2.1-6.0	-	12.6	0.5 - 4.0

3.3 Replace a lens

Lens lever

The F90 lens mount and lens lever is designed to prevent damage to the lens board while providing an easy and stable lens change procedure.

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

> **Always activate the projector shutter before attempting to remove or install a lens.**
>
> **To do this, press the shutter button on the keypad, or shutter CL on the remote, to activate the shutter. The keypad button will illuminate red when the shutter is activated.**
>
> **Press the shutter button again, or shutter OP on the remote, to deactivate the shutter and resume normal operation. The keypad button will illuminate white when the shutter is deactivated.**
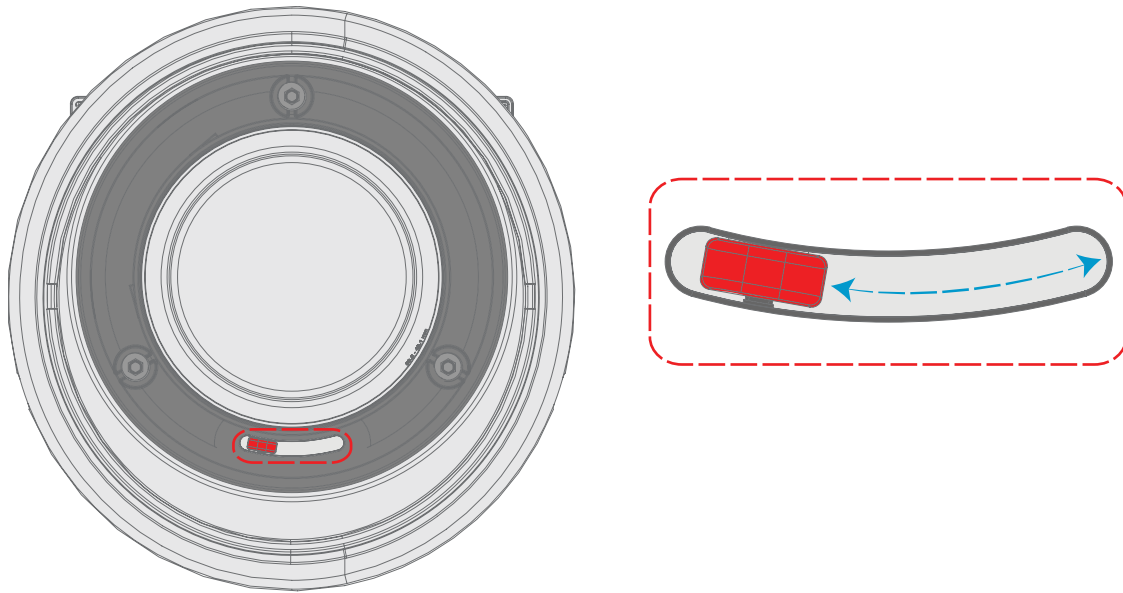
Image 3-3

Install a lens

1. Verify that the projector shutter is deactivated (shutter is deactivated when the shutter icon on the projector keypad is red).

2. Verify that the lens release lever is in its default position at the far left of the slide, as illustrated.

3. Remove the protective cap at the lens bayonet end

4. Align the lens so that the red marking on the bayonet is facing upwards, towards the red marking on the top of the projector cabinet.

5. Position the lens bayonet into the projector lens mount and support in place with one hand.

6. Slide the lens lever to the far right.

7. Verify that the lever is firmly in place at the far right end of the slide before removing your hand from the lens.
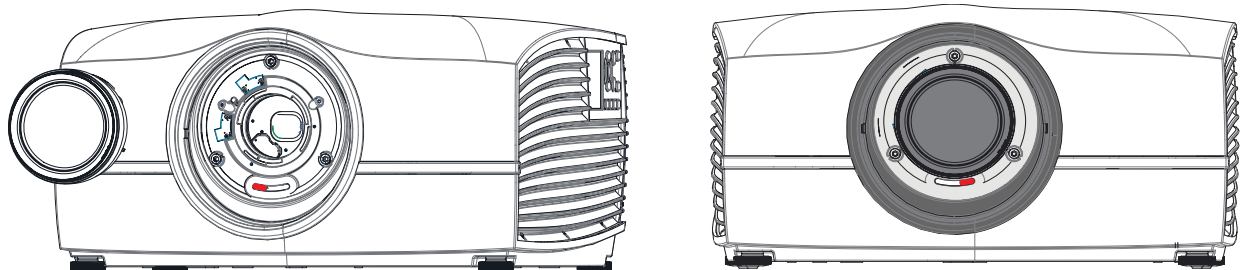

Image 3-4

Remove a lens

1. Support the lens with one hand.

2. Use the other hand to push the lens release lever in and then slide it to the far left of the slide.

3. Pull the lens straight out of the projector lens mount.

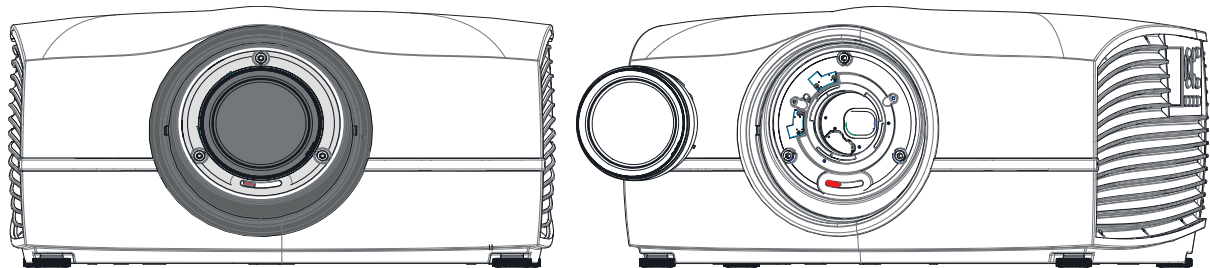4. Replace with another lens, or install the projector lens cap.

Image 3-5

3.4 Lens shift

General

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

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

If not possible to align the projector perpendicular to the screen, due to environmemt of other, see chapter "Warp", page 56

Indexing

The position (index) iris and shift (horizontal and vertical) can be read out and set. This allows for dynamic control of these functions from an external control system.

Indexing of zoom and focus are supported on lens ID EN6x (EN61) range

3.5 Adjust zoom, focus and iris

General

Zoom controls the size of the projected image.

Focus controls the sharpness of the projected image.

Iris controls the contrast and focus depth of the image. Decreasing the iris stop will increase contrast and image depth, at the same time as it decreases brightness.

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

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

	Iris will be available for future SW upgrades.

	EN11	EN12	EN13	EN14	EN15	EN16	EN33	EN41	EN42	EN43	EN44	EN45	EN46	EN47
Iris	✓	✓	✓	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓
Zoom	✓	✗	✓	✓	✗	✓	✗	✓	✗	✓	✓	✓	✓	✗
Focus	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

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

4. PHYSICAL INSTALLATION

About

This chapter describes the physical conditions and procedures required when installing the F90, as well as outlines some of the considerations you should take into account when designing and setting up the projector installation.

Each projector installation is unique, and as such the information in this chapter is only provided as a guideline. Likewise, any images or graphical representations shown here are for illustrative purposes only.

If you require further information and assistance during the installation process, contact a qualified projection technician or your local support office for advice.

Overview

- Installation process
- Installation conditions
- Initial inspection
- Positioning the projector
- Mounting the projector, general considerations
- Projector safe attachment points
- Throw distance
- Scheimpflug (Boresight) adjustment
- Scheimpflug adjustment procedure

4.1 Installation process

Recommended installation sequence

Item	Procedure	Read more...
1	Confirm that the installation area meets all technical and environmental requirements.	"Installation conditions", page 33
2	Decide where the projector will be mounted	"Positioning the projector", page 36
3	Unpack the projector and confirm that all equipment is present and in good working order.	"Initial inspection", page 35
4	Mount the projector	"Mounting the projector, general considerations", page 36
5	Install the projector lens	"Replace a lens", page 29
6	Connect the source	"Projector source and control connections", page 45
7	Power up the projector	"Power up the projector", page 48
8	Set up the image	"Image menu", page 53

4.2 Installation conditions

Environmental conditions

> **Barco projectors are manufactured according to specific design standards, which also include environmental conditions. Failing to follow the terms and conditions outlined in this chapter can result in loss of product warranty.**

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

Environment	Ambient operating temperature	Relative humidity	Storage Conditions
0 — 500 M	10 to 45 °C	10 to 65%	-20 to 60 °C, 10 – 90 %
0 – 500 M	10 to 40 °C	10 to 80%	-20 to 60 °C, 10 – 90 %
500 – 1500 M	10 to 40 °C	10 to 80%	-20 to 60 °C, 10 – 90 %

Environment	Ambient operating temperature	Relative humidity	Storage Conditions
1500 – 3000 M	10 to 35 °C	10 to 80 %	-20 to 60 °C, 10 – 90 %
Maximum air flow	900 m³ / hour	-	NA

AutoDim function

The F90 AutoDim function is integrated in the projector firmware. The projector continually senses and calculates the ambient temperature in the installation location and will, when necessary, automatically dim the light output if the projector is operating in the extreme ends of the recommended ambient environmental conditions, as illustrated in the graph below.
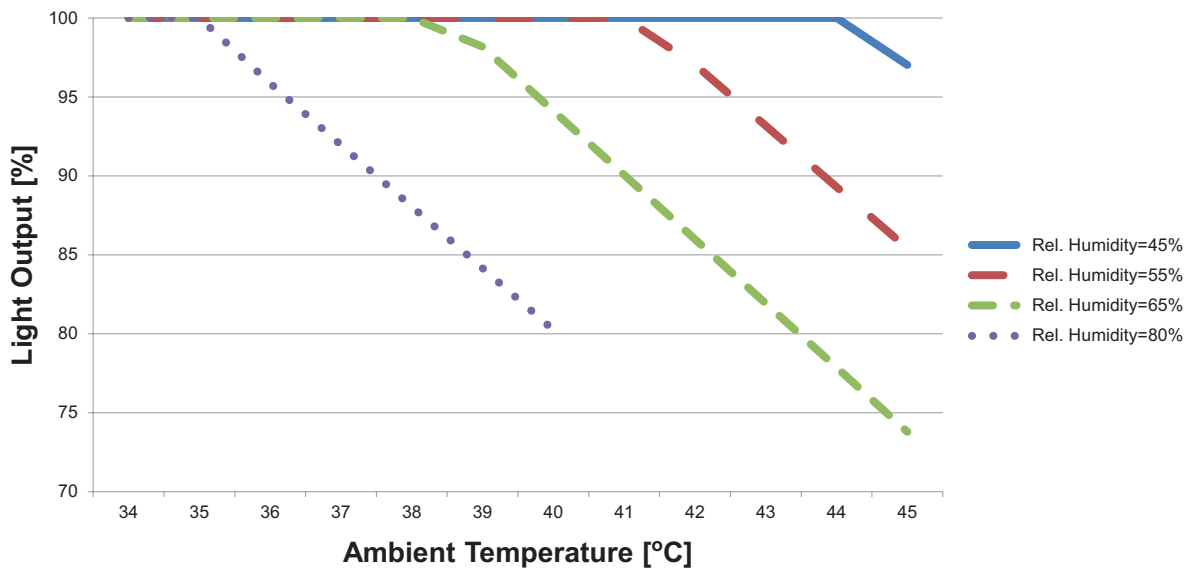

Image 4-1

Mains power requirements

Projector	Power requirements
F90	110 — 240 V, 50 — 60 Hz

To protect operating personnel, the National Electrical Manufacturers Association (NEMA) recommends that the instrument panel and cabinet be grounded.

In no event shall this projector be operated without an adequate cabinet ground connection.

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

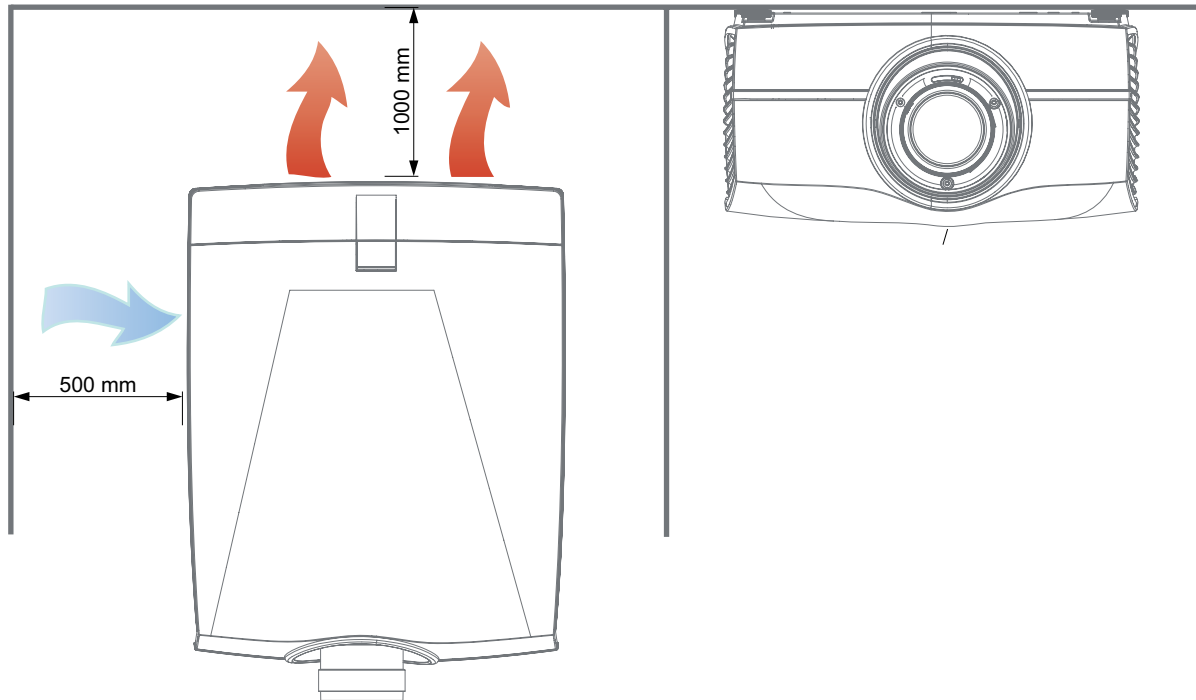AutoDim function will be activated when mains power are 110V or below.

Ventilation

Image 4-2

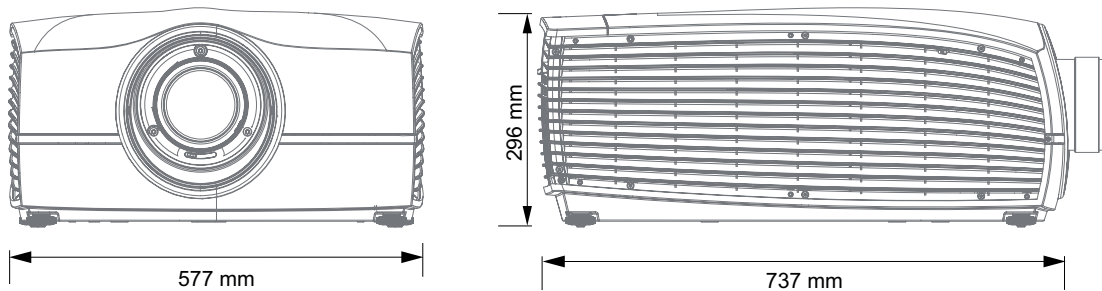**Projector weight and footprint**

Weight: 44.5 kg

Image 4-3

4.3 Initial inspection

General

Each projector is inspected and rigorously tested at our production facility to ensure that it is free from any mechanical or electrical defects.

Upon receipt of the projector, we recommend that customers inspect the projector for any signs of damage that may have occurred in transit. If damage is found, file a claim with the shipping carrier immediately. Notify the Barco Sales and Service office, or your preferred Barco agent, of the damage as soon as possible.

Box Contents

Your projector box should contain the following:

- Projector unit
- Power cord (suitable for region)
- Quick start guide
- Safety manual
- Remote Control
- Additional Color Wheel

The projector lens is delivered in a separate box.

4.4 Positioning the projector

CAUTION: The position and physical securing of the projector must be sufficient to prevent it from accidental or involuntary movement. Proper securing of the projector is the responsibility of the installer and user. The Projector are heavy, and can cause severe damage and injuries if falling.

General guidelines

Proper positioning of the projector lessens the overall picture setup time, and ensures a better image with fewer artifacts.

Focus and sharpness of the image can be adversely affected if the lens axis is not fully perpendicular to the projection surface.

Using extended cable lengths may result in reduced image quality as well as loss of control information such as EDID (Extended Display Information Data).

The following guidelines can help you determine the best physical location for the projector.

- Only install the projector on a sturdy flat surface, or in an approved rigging frame.
- Do not install the projector in a thoroughfare or other area where it is at risk of being pushed or jostled.
- Allow sufficient free space around the projector for ventilation and exhaust, as described in section "Installation conditions", page 33.
- Use the throw ratio of the installed lens as a guideline for the projector's physical distance from the screen.
- Wherever possible, the projector lens surface should be positioned so that it is perfectly perpendicular to the center of the screen.
  Use the projector offset (lens shift), rather than physical angling, to correct any off-center positioning.
- Minimize the source cable length as much as possible.
  In general HDBaseT and 3G-SDI are long-haul interfaces and suitable for bespoke installations using relatively long cables.
  DP, HDMI and DVI are short-haul interfaces using pre-assembled cables with limited cable lengths.
- Limit the use of power cable extensions wherever possible. Where physical limitations necessitate their use, make sure that the extension cord has adequate surge protection and meets all electrical requirements of the connection.
- Keep the projector away from equipment that emits electromagnetic energy for example, motors, transformers and elevators.

4.5 Mounting the projector, general considerations

Mounting safety

When mounting a projector in a rig, always use an interface plate (between the projector and the mount) that has provision for a safety wire or another safety mechanism, to ensure that the projector does not fall down should the interface plate come loose from the mount.

Always screw the interface plate securely to the projector body while the projector is on the ground (i.e. cannot fall down). Then attach proper safety wire between the interface plate and the rig before mounting the projector in the rig

Using 3rd party mounting equipment

The projector has features for mounting into various system environments using 3rd party mounts.

Four mounting inserts are located on the bottom of projector. The ceiling mount inserts have a pull-strength of more than 4x the weight of the projector.

The feets can also be removed and threads can be used for additional mounting points. See table below for dimensions.

Parameter	Value
Thread size	M12
Length 18mm max	18mm max

Where possible, the projector lens must be positioned exactly perpendicular to the center of the screen. Use the projector offset (lens shift), rather than physical angling, to correct any off-center positioning.

CAUTION: The position and physical securing of the projector must be sufficient to prevent it from accidental or involuntary movement. Proper securing of the projector is the responsibility of the installer and user.

CAUTION: Always use a Rigging Frame when the projector shall be mounted in other ways than on the feet, on a flat surface.

Installation and use of the Rigging Frame are described in document R5906768 F90 Multifunctional Frame — Installation Manual.

The threaded hole in the lower back end of the projector is NOT suitable for lifting or other heavy operations. Only for adjustment purposes.

Mounting on a flat surface

1. Position the projector at the desired location.

2. Power up the projector.

3. Go to *Main Menu / Test Pattern*s and select an internal hatch pattern to display on the screen.

4. Adjust the projector legs until the projected hatch pattern is a level and perfect rectangle.

Adjustable feet

Twisting the adjustable feet in either direction, left or right, allows you to fine-adjust the projector position for precise vertical mechanical alignment.

Image 4-4

Mounting to a ceiling
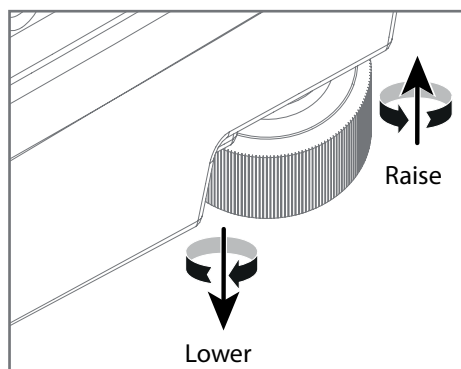
1. Install the projector in to an approved rigging frame.

2. Install the rigging frame to the desired location.

3. Power up the projector.

4. Go to *Main Menu / Installation / Orientation* and select the correct orientation for your setup.
   See "Orientation", page 55 for more information.

5. Go to *Main Menu / Test Pattern*s and select an internal hatch pattern to display on the screen.

6. Adjust the position (height and angle) of the rigging frame until the projected hatch pattern is a level and perfect rectangle.

> **If applied in a motion rig, care must be taken to stay within the environmental specifications for vibration and shock. It may also be necessary to use additional, custom means to stabilize the projection lens to make sure that the projected image remains in position and properly focused.**

4.6 Projector safe attachment points

About

The projector has four anchoring points (ref 1, image 4-5) that can be used with the rigging frame and projector installation. There are an additional 9 fastening points (ref 2 and 3, image 4-5) that can used for attaching light weight accessories and other miscellaneous equipment. See table below for more information.
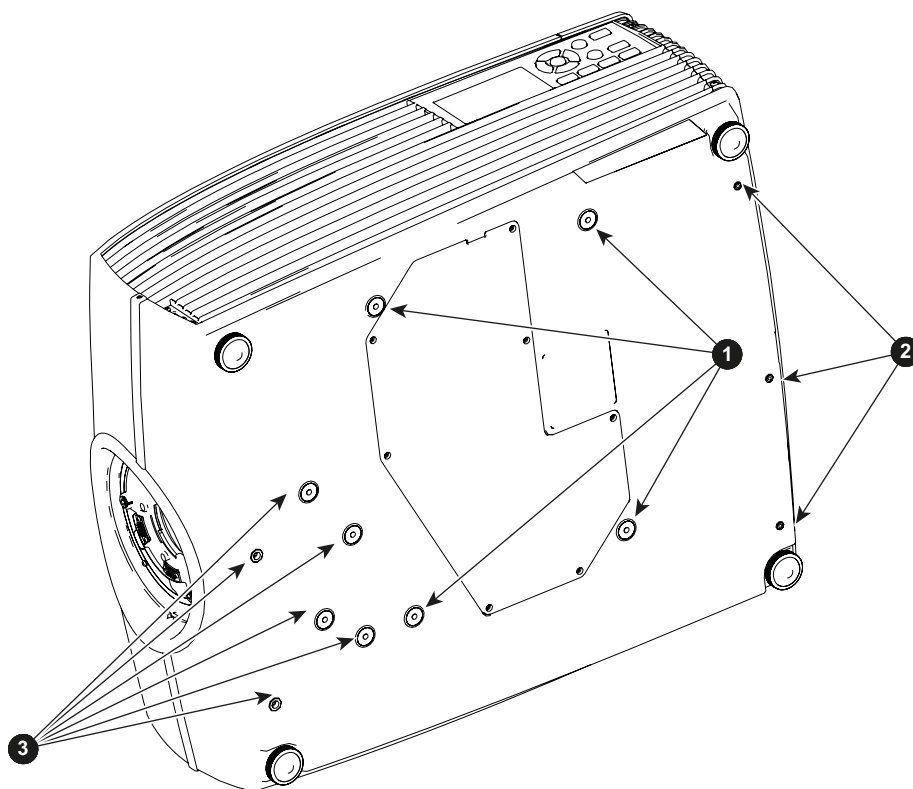

Image 4-5

Item	Thread dimension	Max hole depth	Application
1	M6	10mm	Anchorpoint /Ceiling / Rig mount
2	M4	6mm	Miscellaneous
3	M6	6mm	Miscellaneous

4.7 Throw distance

Calculate the installation throw distance

Throw is the distance (D) measured from your projector lens to the screen. To calculate the throw distance for an installation, you will need two pieces of data: the selected lens throw ratio (L) and the horizontal width (W) of the screen. For example, if the screen width (W) is 2.4 meters and the projector lens has a throw ratio (L) of 0.99:1, then the throw distance (D) will be 2.38 meters.

Calculation: 2.4 x 0.99 = 2.38

The following graphs illustrate the image size (W) and projection distance (D) for each of the projector lenses.

> **Tolerances are typically +/- 5% due to optical (lens) variation.**

Throw distance, FLD WUXGA
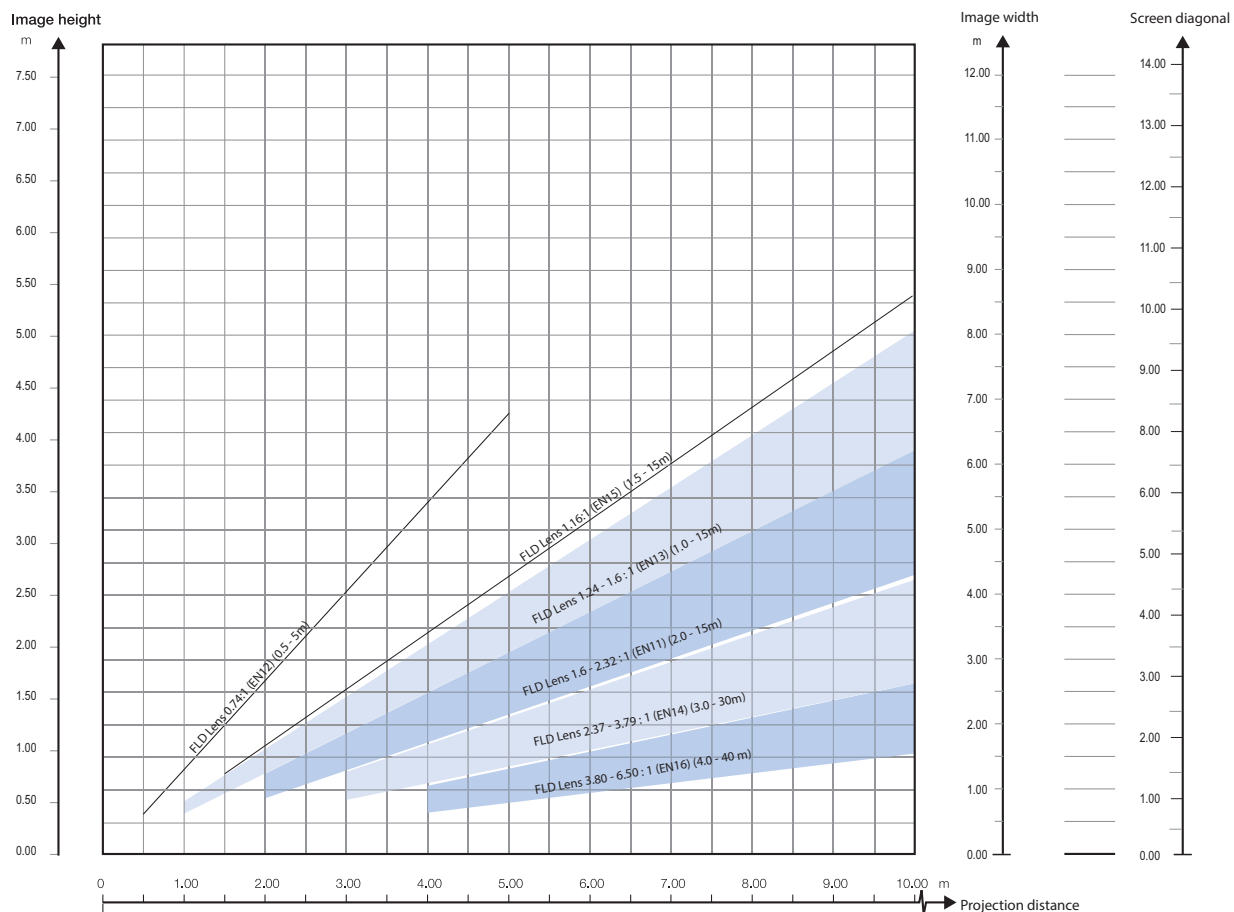
Image 4-6

Throw distance, FLD+ WQXGA / 4K UHD

Image height
m

Image width
m

Screen diagonal
m

FLD+ Lens 0.65 : 1 (EN47) (0.5 - 4m)

FLD+ Lens 0.8 : 1 (EN42) (0.7 - 7m)

FLD+ Lens 0.8 - 1.21 : 1 (EN46) (0.7 - 7m)

FLD+ Lens 0.8 - 1.21 : 1 (EN45) (5 - 30m)

FLD+ Lens 1.2 - 1.7 : 1 (EN43) (1.5 - 15m)

FLD+ Lens 1.7 - 2.5 : 1 (EN41) (1.5 - 15m)

FLD+ Lens 2.5 - 4.6 : 1 (EN44) (2.5 - 25 m)

Projection distance

Image 4-7

Throw distance, FLD+ WUXGA

Image height

Image width

Screen diagonal

FLD+ Lens 0.65 : 1 (WUXGA) (EN47) (0.5 - 4m)

FLD+ Lens 0.75 - 1.13 : 1 (WUXGA) (EN46) (0.7 - 7m)

FLD+ Lens 0.75 : 1 (WUXGA) (EN42) (0.7 - 7m)

FLD+ Lens 0.75 - 1.13 : 1 (WUXGA) (EN45) (5 - 30m)

FLD+ Lens 1.12 - 1.58 : 1 (WUXGA) (EN43) (1.5 - 15m)

FLD+ Lens 1.58 - 2.33 : 1 (WUXGA) (EN41) (1.5 - 15m)

FLD+ Lens 2.33 - 4.3 : 1 (WUXGA) (EN44) (2.5 - 25 m)

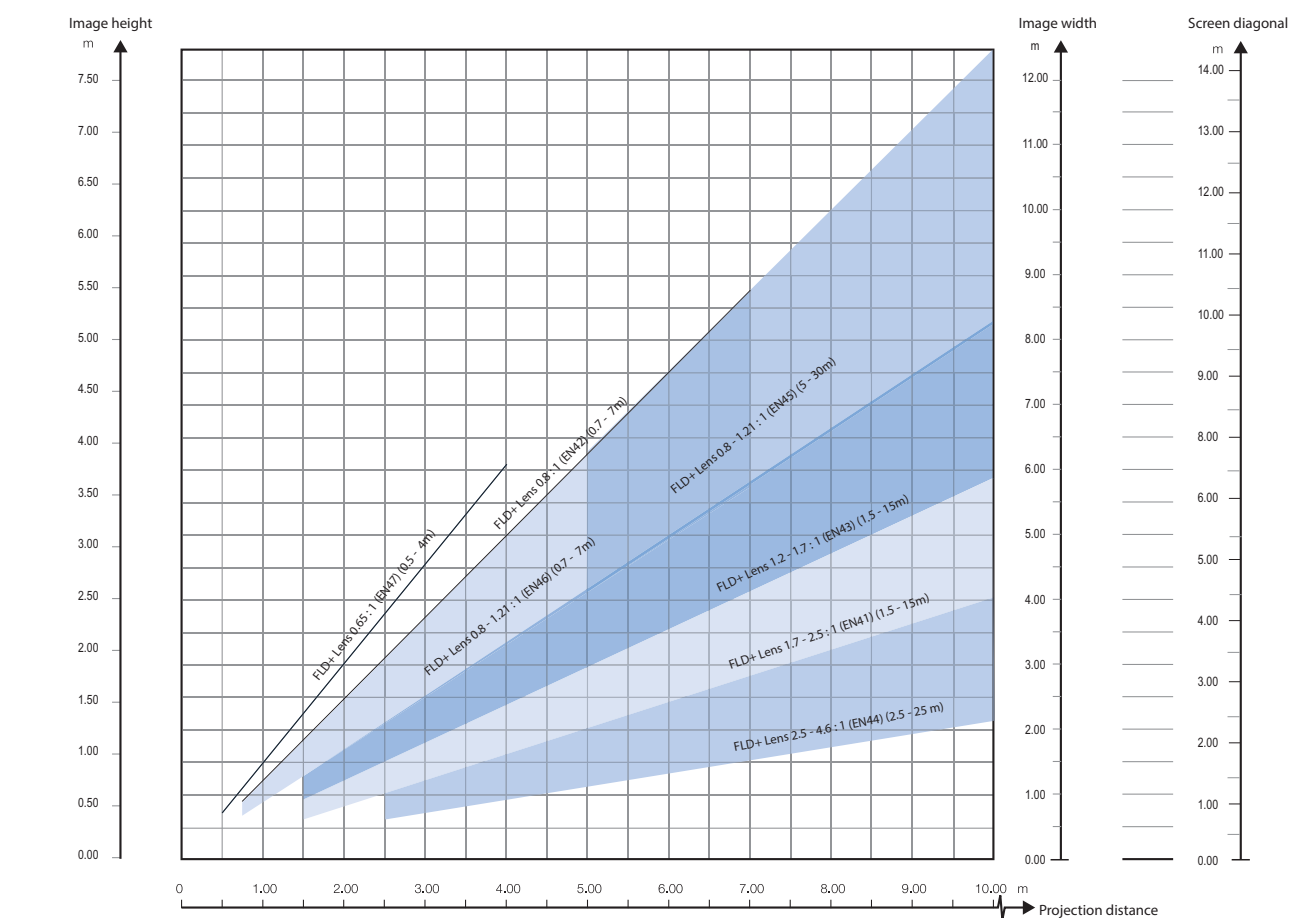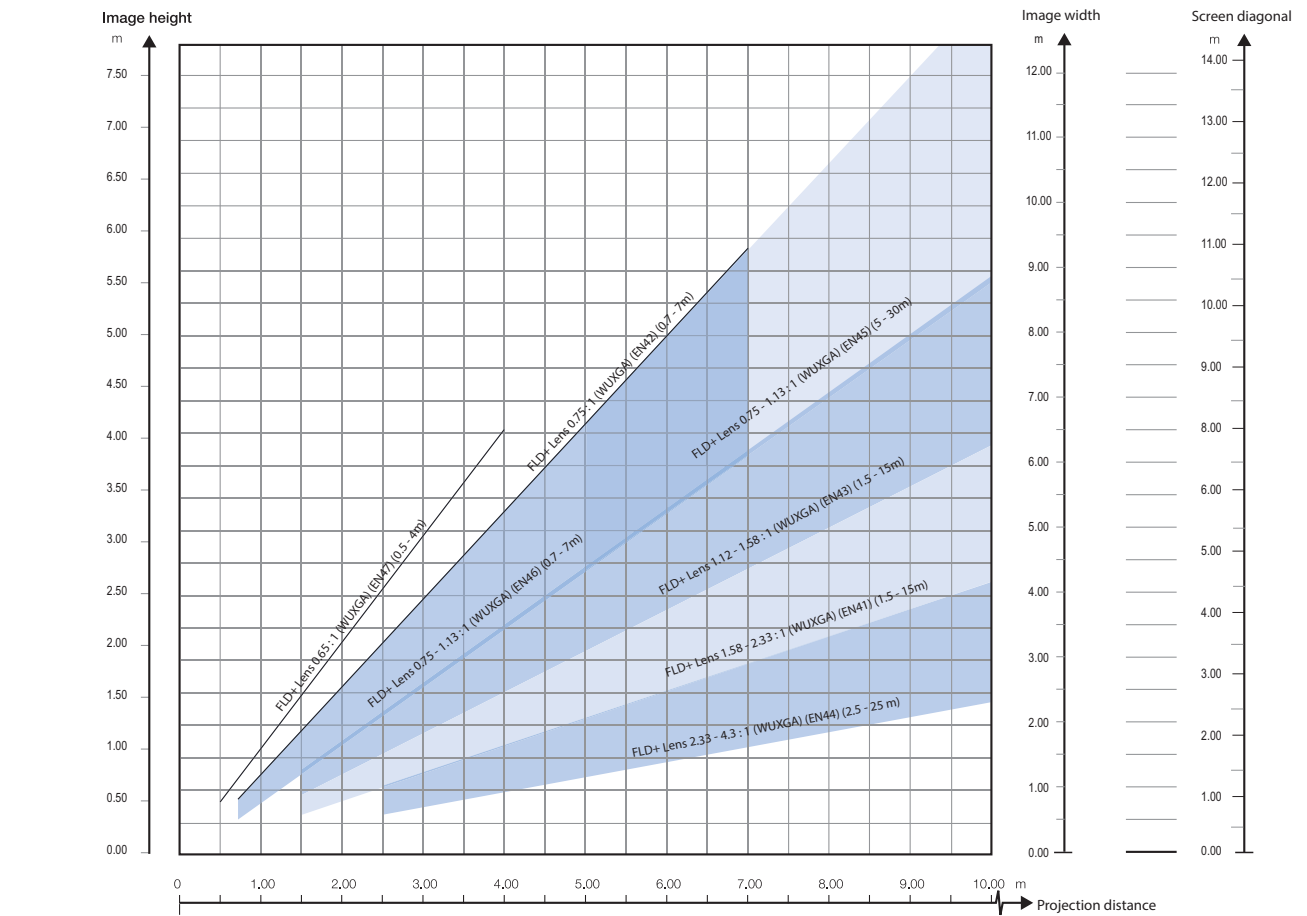Projection distance

Image 4-8

4.8 Scheimpflug (Boresight) adjustment

What is Scheimpflug?

The lens holder has to be adjusted so that the "sharp focus plane" of the projected image falls together with the plane of the screen (Fp1→Fp2). This is achieved by changing the distance between the DMD plane and the lens plane (Lp1→Lp2). The closer the lens plane comes to the DMD plane the further the sharp focus plane will be. It can occur that you won't be able to get a complete focused image on the screen due to a tilt (or swing) of the lens plane with respect to the DMD plane. This is also known as Scheimpflug's law. To solve this the lens plane must be placed parallel with the DMD plane. This can be achieved by turning the lens holder to remove the tilt (or swing) between lens plane and DMD plane (Lp3→Lp4).
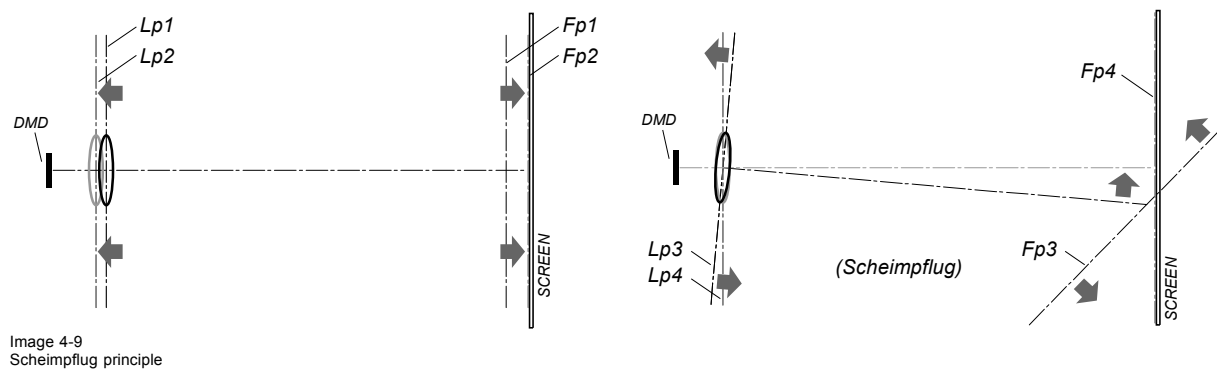
Image 4-9
Scheimpflug principle

Scheimpflug principle

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

Scheimpflug adjustment points

Scheimpflug adjustment points are located on the lens mount. The F90 has three (3) set screws and three (3) adjustment screws.

When to apply Scheimpflug?

Scheimpflug correction procedures may only be carried out by suitably trained and experienced technicians.

A Scheimpflug correction should only be applied when the overall focus of the projected image is not equally sharp (for example, if the projector is **NOT in parallel** with the screen or as a result of a previously misaligned Scheimpflug). Be aware that the consequence of applying Scheimpflug correction upon a screen not in parallel with the projector is that the projected image differs from the rectangle shaped image. In other words "**distortion**" of the projected image occurs. **Masking** will be required to solve the distortion.

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

4.9 Scheimpflug adjustment procedure

CAUTION: A Scheimpflug adjustment should only be carried out by properly qualified and experienced projection specialists. A poor Scheimpflug adjustment may result in an extremely degraded image and will require factory—servicing to the projector.

Necessary tools

- Allen key, hex size 4
- Allen key, hex size 6

Preparation

1. Prepare the test area. Barco recommends a projector-screen distance of 2 metres be used for all Scheimpflug adjustments. Verify that the throw ratio of the installed lens matches the requirements of the installation area (projection distance and screen size).

2. Check that the lens is correctly installed, and lens shift is in centre position.

3. If the installed lens has Iris control, open the Iris all the way up.

4. Open the focus ring all the way up.

5. Go to Main Menu / Test Patterns / Full Screen and select to display the Focus test pattern.

6. Zoom the lens to its widest opening (maximum image size on the screen).

Apply a Scheimpflug correction

1. Loosen the three set screws (reference 1b, 2b, 3b). Use a size 6 hex key to do this.
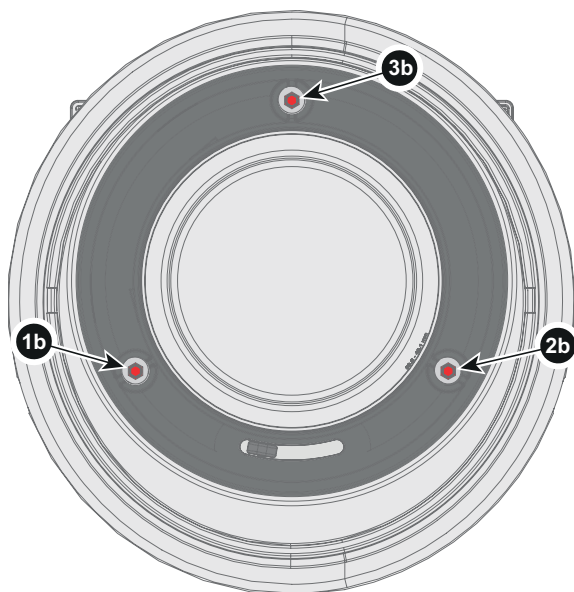
Image 4-10

2. Adjust the left side Scheimpflug adjustment screw (reference 1) until the test image in the top right side of the screen is in focus. Use a size 4 hex key to do this.
   Note: This process may cause the other areas of the image to slide out of focus. This is totally normal.
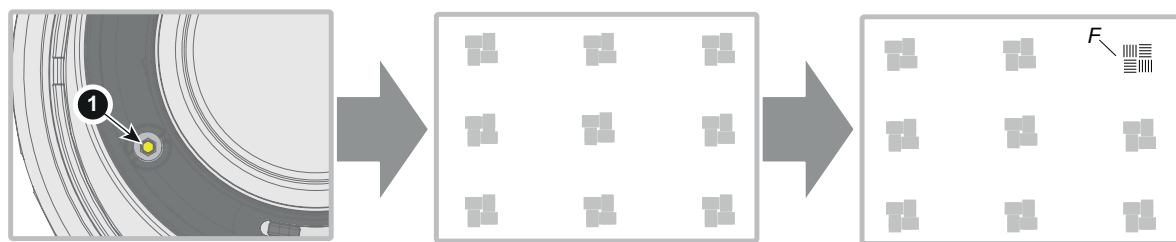

Image 4-11

3. Adjust the right side Scheimpflug adjustment screw (reference 2) until the test image in the top left side of the screen is in focus. Use a size 4 hex key to do this.
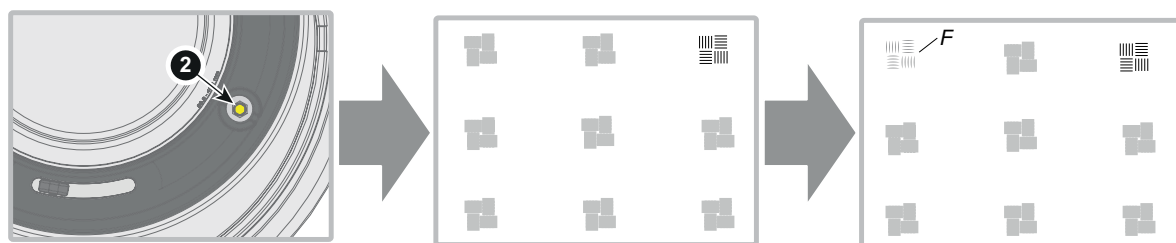   *Note: This process may cause the other areas of the image to slide out of focus. This is totally normal.*

Image 4-12

4. Adjust the top Scheimpflug adjustment screw (reference 3) until the test image in the bottom half of the screen is in focus. Use a size 4 hex key to do this.
   Note: This process may cause the other areas of the image to slide out of focus. This is totally normal.
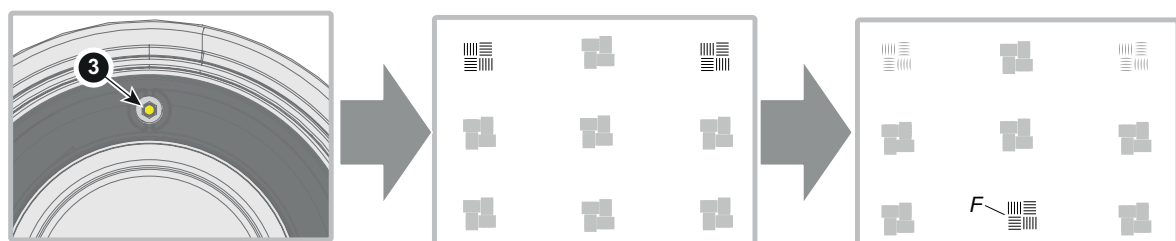
Image 4-13

5. Continue adjusting the screws one at a time until the test image is uniformly sharp across all areas of the display.

6. Test the focus by zooming out (minimum image size on screen) and then zooming in again. Verify the image is still sharp. If there are any deviations to sharpness, repeat steps 2 to 6 until the image is correct.

7. Tighten the three set screws in the following order: left (1b), right (2b) and then top (3b). Use a size 6 hex key to do this.

5. GETTING STARTED

About this chapter

This chapter describes how to set up and optimize your projector setup when the physical installation process is complete.

Overview

- Projector source and control connections
- Power up the projector
- Power down the projector
- Power modes
- Customize projector settings
- User interface

5.1 Projector source and control connections

Overview

- Making connections
- Connector specifications
- Control interfaces

5.1.1 Making connections

> **The source switching time varies from 0.5 to 5 seconds.**

Source signal connectivity

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

Source signal connectivity on the projector is:

- 2x Dual Link DVI-I (DVI-D functionality)
- 2x DisplayPort 1.2
- 1x HDMI 2.0
- 1x HDBaseT w/Ethernet
- 1x 3G SDI

5.1.2 Connector specifications

Overview

- DVI-I
- Display Port 1.2
- HDMI 2.0
- 3G-SDI
- HDBase T

5.1.2.1 DVI-I

Specifications

Parameter	Value
Connector	DVI-I female digital RGB
Signal characteristics	DVI 1.0, Digital, TMDS
Max. cable length	25 m (24 AWG)

Parameter	Value
Max. pixel rate	330 MHz (dual link), 165 Mhz (single link)
Scan format	Progressive
Max. input data resolution	1920x1200 60Hz (Single link), 2560x1600 60Hz (Dual Link).1920x2400 @60Hz
Bit depth	8 bit
EDID	Supported
HDCP	Supported

5.1.2.2 Display Port 1.2

Specifications

Parameter	Value
Connector	Standard Display port
Signal characteristics	DP 1.2
Functionality	Mandatory
Max. cable length	15 m (24 AWG) - RBR; 2 m (24 AWG) – HBR1, HBR2
Supported Link Rate	RBR, HBR1, HBR2
Scan format	Progressive
Max. input data resolution	1920x1200 @120Hz (WQXGA) 3840x2400 @60Hz (4K)
Bit depth	8, 10, 12 bit
EDID	Supported
HDCP	Supported

5.1.2.3 HDMI 2.0

Specifications

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

Parameter	Value
Connector	Standard HDMI
Signal characteristics	Digital, TMDS
Max. cable length	15 m (24 AWG)
Max. pixel rate	594MHz
Max. input data resolution	3840x2160 @60Hz
Bit depth	8, 10, 12 bits
EDID	Supported
HDCP	Supported
Ethernet	No
Audio return	No

5.1.2.4   3G-SDI

Specifications

Parameter	Value
Standard	SMPTE 424M-2006 10bit level A
Connectors	1x) BNC 75 ohm type IEC 60169-8, Amendment 2 1997, A
Bandwidth	>3 GHz
Return loss	>10dB at 3GHz
Impedance	75 ohm resistive

5.1.2.5   HDBase T

Specifications

Parameter	Value
Reference specification	HDBaseT 1.0 Specification, June 2010
Connector	Standard RJ-45, 8P8C
Signal characteristics	HDBaseT
Max. cable length (1080p/48b/60Hz)	100 m (Cat5e/6), Pixel Clock <=225HHz, Video Datarate <=5.3Gbps
	70 m (Cat5e/6), Pixel Clock >225HHz, Video Datarate >5.3Gbps
	100 m (Cat6a/7), Pixel Clock >225HHz, Video Datarate >5.3Gbps
Max TMDS Clock Frequency	270 MHz
Max video resolution supported	1920x1200 @60Hz (WUXGA 60Hz)
HDCP Pass-Through	Yes, from Source to Projector
IR Extension	Not Supported
RS-232 Extension	Not Supported
10/100Mbps Ethernet Pass-Through	Not Supported
Fallback to 100BaseTx, IEEE 802.3u	Not Supported
USB Over Centre Tap	Not Supported
Power Over Ethernet	Not Supported
Audio	Not Supported
LEDs - HD Base Status	Operation: Green, Left
	Link/Mode: Yellow, Right

5.1.3   Control interfaces

About

The following control interfaces are available on the projector:

- 1x RS-232 (for projector control)
- 1x LAN/Ethernet (for projector control
- 3x USB-A ports

Overview

- RS-232
- LAN/Ethernet
- USB-A port

5.1.3.1 RS-232

Specifications

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

5.1.3.2 LAN/Ethernet

Specifications

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

5.1.3.3 USB-A port

Specifications

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

5.2 Power up the projector

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

⚠	**CAUTION: Use only power cords following the unit, designed for your projector model. Do not use unauthorized replacements. Do not use power cords which are damaged.**

Power up the projector using the keypad or remote

1. Connect the line cord to the projector.

2. Plug the 3–pronged cord into a grounded AC outlet.
   The projector will begin warming up, and the backlight of the Standby /power button are flashing white.

3. When the backlight on the standby button are constant white, the projector are in standby mode, ready to be switched on.

4. Press the standby button on the keypad or the power button on the remote to bring the projector up to standby mode.
   The power button backlight on the keypad will flash blue while the projector is warming up.

5. When the power button backlight is steady blue, the projector is ready for use.

5.3 Power down the projector

Power down using the keypad or remote

1. Depress and hold the power button on the keypad or remote for four (4) seconds.
   The Projector is now in cooling down phase.

2. When the projector panel is no longer illuminated, remove the mains power cord from the projector.

5.4 Power modes

General

The table below details the F90 power modes.

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

5.5 Customize projector settings

About

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

Options include:*Home/System Settings/Themes*

•   Adjust the OSD menu color

5.6 User interface

Overview

•   On Screen Display (OSD)

5.6.1 On Screen Display (OSD)

About

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

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

There are six main menu tabs: Source, Image, Installation, System settings, Test pattern and Status.

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

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

User access levels

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

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

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

Navigation

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

Press the MENU button to display the OSD.

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

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

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

Press MENU again to exit the menu system.

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

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

Define values

Menu settings are displayed using checkboxes, barscale sliders, and drop-down lists.

To set a value:

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

Changes to values are implemented dynamically.

Menu memory

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

6. SOURCE MENU

About the Source menu

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

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

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

Overview

• Connector selection
• Connector Settings
• Using Dual DVI or Dual Display Port

6.1 Connector selection

About

Source / {Source}

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

The icon for the active source is highlighted.

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

The default selection of connectors displayed is:

• DVI 1
• DVI 2
• Dual DVI
• Display Port 1
• Display Port 2
• Dual Display Port
• HDBaseT
• HDMI
• SDI

6.2 Connector Settings

About

Home/Source/ConnectorSettings

The Connector settings menu allows to change settings for the DVI, Display Port, HDMI, HDBaseT and SDI inputs. Default value are set to Auto. When entering the menu for each input, there are some selectable choices.

6.3 Using Dual DVI or Dual Display Port

Dual Head Input.

For extended flexibility to connect high resolution sources with a pixel clock over 330 MHz, the projector is supporting a dual head input mode. In this mode, the left and the right half of the image can be connected to the DVI-I1 and DVI-I2 respectively, or DP1 and DP2.

To enable this mode, select the source menu *Source — Dual DVI (or Dual DP)*.

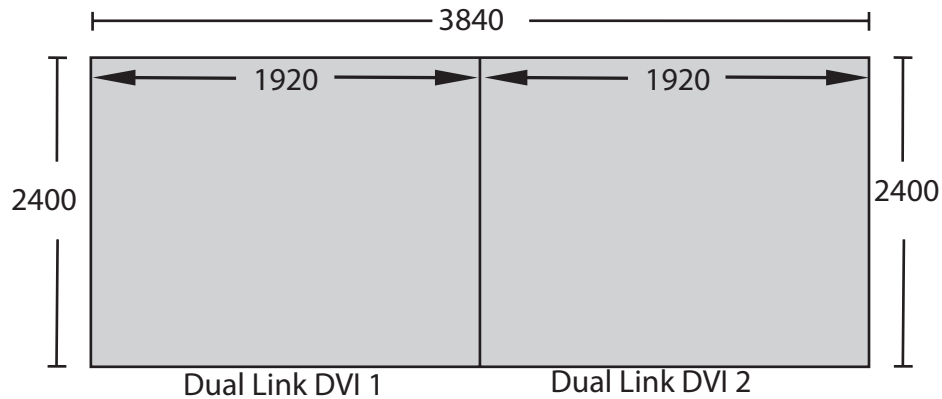It is important to set up the signal source in dual mode with the correct resolution,

Image 6-1

An example of this is feeding a WQXGA (3840 x 2400)source with 1920 x 2400 source resolutions at each DVI-I interfaces.

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

Signal source setup.

When using dual inputs, it is important that the signal sources are set up correctly, with the correct resolution. Please refer to the manual for the source itself (PC, Graphic driver card..) in order to obtain a correct setup. When not correct setup, no picture will be visible in dual mode. The resolution for each dual channel can be up to 1920x2400 pixels.

7. IMAGE MENU

Overview

- Output Resolution
- Contrast
- Brightness
- Saturation
- Advanced image adjustments

7.1 Output Resolution

About

Toggle between 4K UHD resolution and WQXGA Resoluton*Image/Advanced/Output Resolution*

Refer to Chapter 5, Getting started, regarding use of input sources in 4K mode.

7.2 Contrast

About

Image / Contrast

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

Available range: 0.00 to 2.00

Default value: 1.00

7.3 Brightness

About

Image / Brightness

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

Available range: −1.00 to 1.00

Default value: 0.00

7.4 Saturation

About

Image / Saturation

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

Available range: —1.00 to 1.00

Default value: 0.00

7.5 Advanced image adjustments

About

Image / Advanced

Advanced image adjustment settings that enable greater control, particularly during calibration.

> **Not all settings are available for all source types. Settings that are not available for the active source will be grayed out and not available for selection.**

P7 RealColor

Advanced functionality for color management.

Image / Advanced / P7 RealColor —>White point

Select how to adjust the white point. There are two alternatives: temperature and coordinate.

Temperature	The white point is specified on a Kelvin scale between 3200K – 13000K tracking along the black body curve.
Coordinate	Coordinate: The white point is specified using an x,y coordinate in the CIE 1931 Chart.

Color mode

Image / Advanced / P7 RealColor —>Color Mode

Used to set the coordinates for color processing mode: RGB, RGBCMY, White.

RGB	Red, Green and Blue are moved according to the specified desired coordinates. Cyan, Magenta and Yellow are calculated accordingly.
RGBCMY	Red, Green, Blue, Cyan, Magenta and Yellow are moved according to the specified desired coordinates.
White	White point only. No changes to RGBCMY. Default: White
Native	Native Colors. (Color Correction Off).

Native values

System Setting/ Service / Color —>Measured values

The current measured values (WRGB) used for RealColor processing.

These values must be accurate for RealColor to perform correctly.

Current values are presented in the color gamut diagram. Measured values are represented by a solid line.

Default: values measured at the manufacturers facility.

Custom values

Image / Advanced / P7 RealColor —>Desired values

Allows users to specificyn red, green blue, cyan, magenta and yellow color coordinates (x,y) and gain.

Default: REC 709 color points.

Current values are presented in the color gamut diagram. Desired values are represented by a dotted line.

8. INSTALLATION MENU

Overview

- Lens
- Orientation
- Warp
- Basic Blend
- Illumination

8.1 Lens

About

Installation / Lens

Manage lens functions: focus, zoom, shift, and iris.

All changes occur dynamically.

Focus and zoom

Installation / Lens / Zoom

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

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

Shift

Installation / Lens / Shift

Use the left, right, up and down navigational arrows to adjust the lens shift in four directions.

8.2 Orientation

About

Installation / Orientation

Rotate the image on the imaging device in table or ceiling and front or rear.

There are four options, as illustrated below: table / front, table / rear, ceiling / front, ceiling / rear.
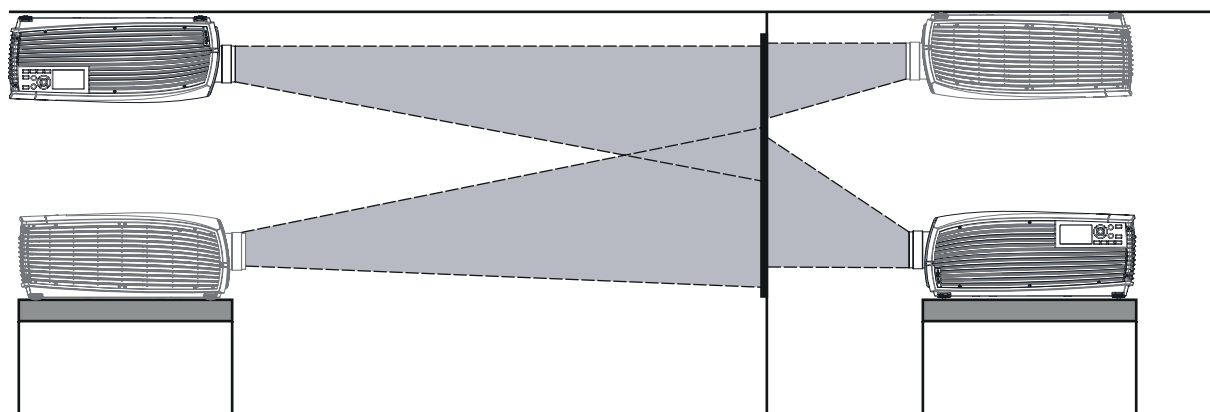
Default: Table Front.

Image 8-1

8.3 Warp

About

Image warping is the process of digitally manipulating an image to compensate for the distortion of the screen, typically by non perpendicular alignment of the projector versus the screen. The image will then typically occur as shown inimage 8-2.

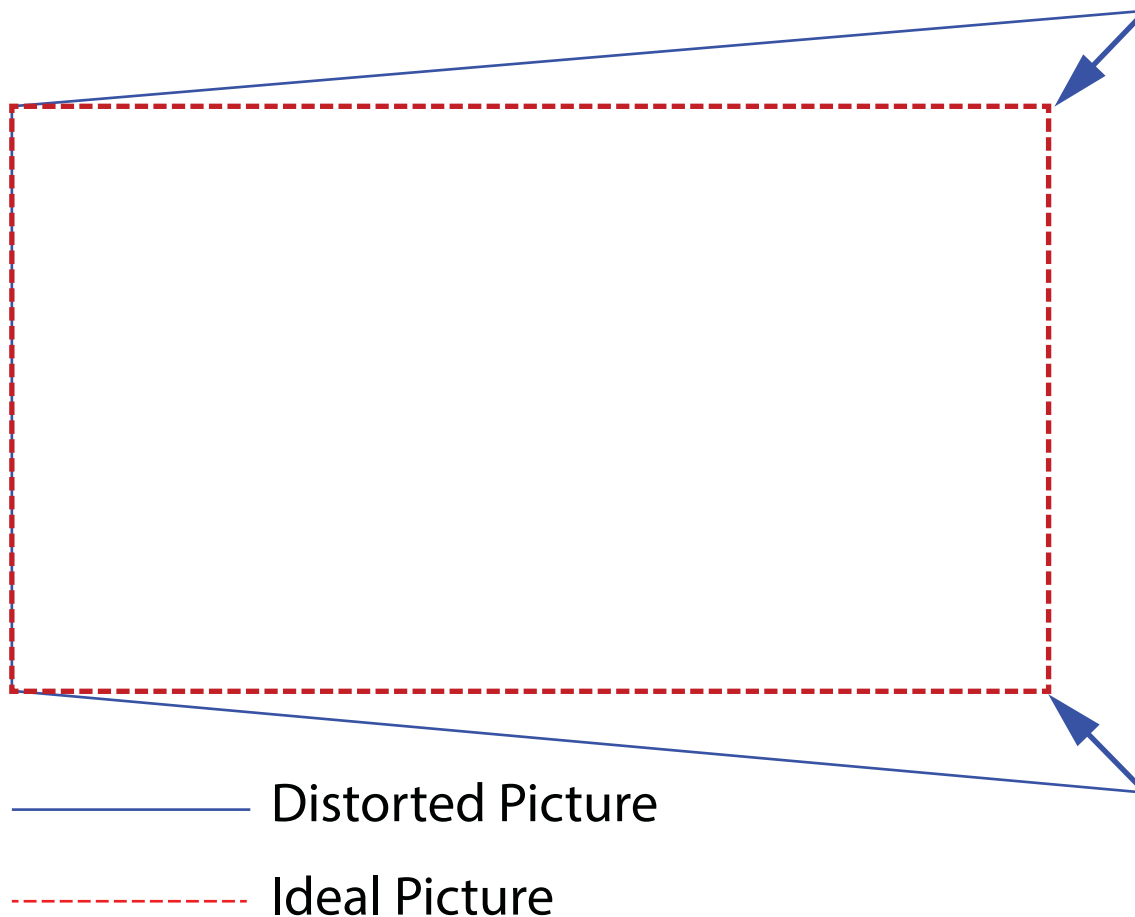While an image can be transformed in various ways, pure warping doesn't affect the colors.

Distorted Picture

Ideal Picture

Image 8-2

4 corners adjustment

Installation / Warp / 4 Corners Adjustment

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

To have a successful Warp correction, the size of the screen must be entered. The size are expressed in the X and Y measured values, independent of the term of the measurement. (mm, inches, yards or whatever), but must be expressed in whole numbers without decimals. This means that the accuracy are higher when given in mm than in inches. The projector then calculate the aspect ratio.

All four corners can be adjusted and the image correction is calculated accordingly using perspective algorithm. This can be used for keystone correction.

Use the navigational arrows to adjust the image.

Changes occur dynamically to the image display.

How to adjust Warp

Enter the Warp menu, Enable the Warp button, and select the corners that must be adjusted.

Use the arrow keys to move the corners.
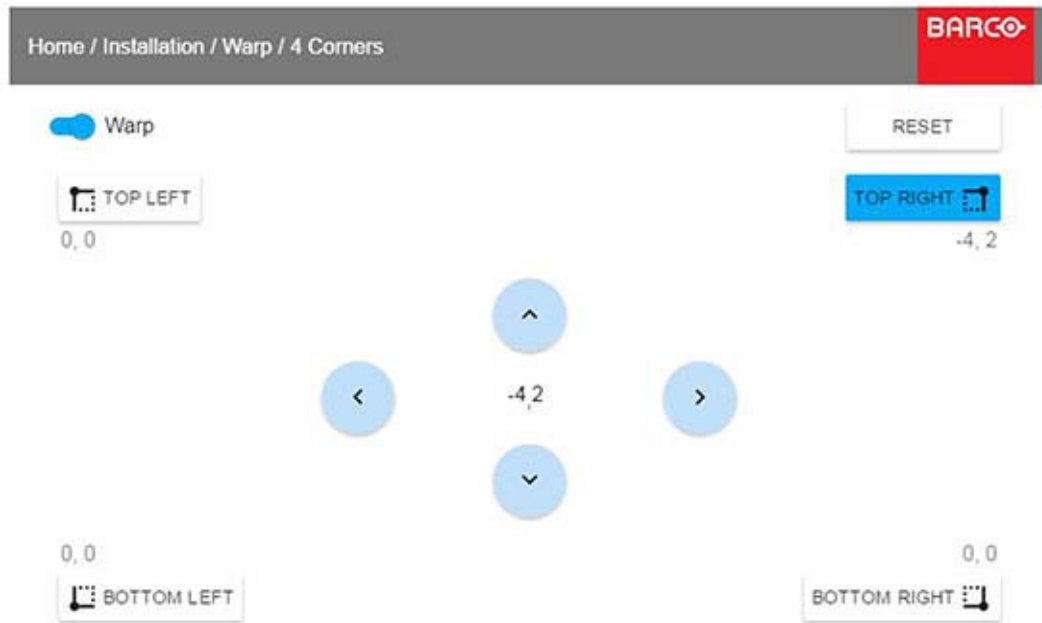
When finished, exit the menu.

Image 8-3

8.4 Basic Blend

About

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

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

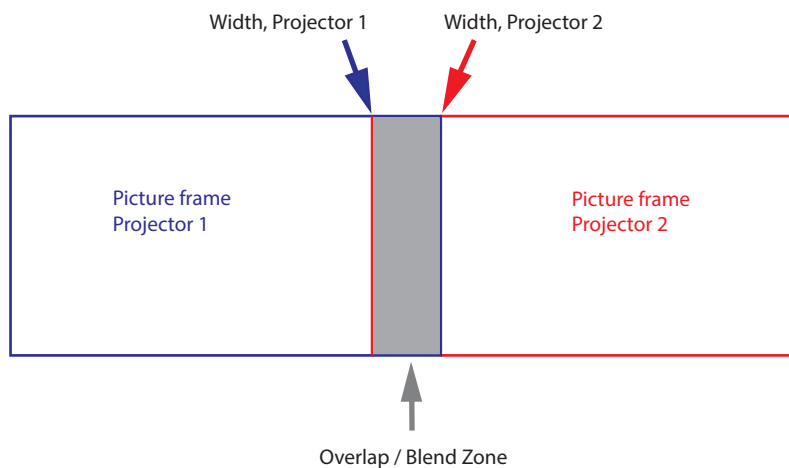The blend function can be enabled for both pictures over/under, and pictures side by side.

Image 8-4

How to set up the system

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

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

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

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

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

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

Adjust the Blend for the projectors as described below.

Blend adjustment procedure

Entering the Blend Adjustment from the Home menu, either by the remote control, or the keypad on the projector.*Home/Installation/Blend/Blend Zones*The menu shown below appears on the OSD.

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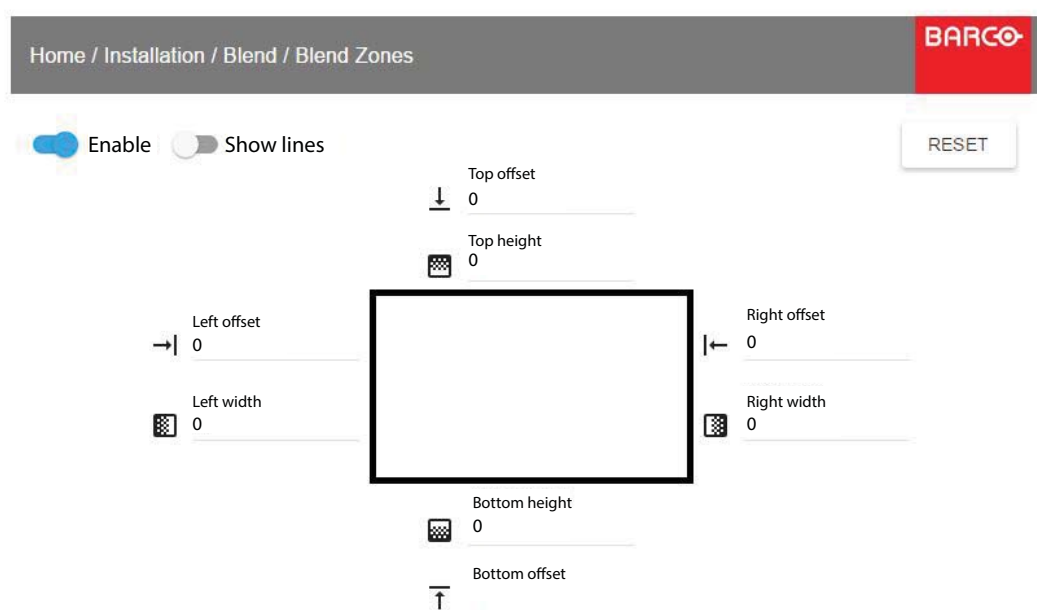

Image 8-5

How to calibrate the Blend Zone with pictures side by side.

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

For Blend adjustment in side by side configuration, the steps are as follows, starting with the left picture:

- By the arrow keys, place the display cursor on respectively the "Enable" zone and the "Show Lines" zone and activate them by pressing enter.
- Using the arrow keys, place the cursor on the "Right Width" zone, press enter.
- Adjust the width value by using the arrow keys up (or down), one step at a time. By pressing the key arrow constantly, the blend value will increase rapidly. The numeric value of the width is shown on the screen next to the alignment line. **The number entered represent the movement expressed in number of pixels.**Confirm position by pressing enter.
- Exit the menu by using the exit button on the remote control.

For the right picture, repeat the procedure, but adjust the Left Width instead of the right width.

When the projectors are correctly adjusted, the cursor lines shall be above the outer frame of the opposite screen.

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

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

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

The Offset adjustments.

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

8.5 Illumination

About

Installation / Illumination

Review light source status and adjust (dim) laser power from 0 to 100%.

Default: 100%

9. SETTINGS MENU

Overview

- Communication
- Apply a menu theme
- Service

9.1 Communication

About

System settings / Communication

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

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

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

Manually set up the IP adress

Go to the menu*System settings / Communication / LAN*

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

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

9.2 Apply a menu theme

About

System settings / Themes

Themes are used to apply a predefined functionality to the OSD display. There are two options: light (default) or dark.

9.3 Service

About

System settings / Service

The Service Menu is for service personnel and / or advanced users only.

The menu is password protected.

10. STATUS MENU

Overview

- Source status
- Product
- Illumination
- Communication

10.1 Source status

About

Home / Status / Source

Displays active source information:

> **This is a status menu only. No changes can be made to settings from this menu.**

10.2 Product

About

Home / Status / Product

Displays active product information:

Article number: Projector article / part number

Serial number: Projector serial number

Firmware: Projector software package version

Model name: Projector model name

> **This is a status menu only. No changes can be made to settings from this menu.**

10.3 Illumination

About

Home / Status / Illumination

Shows the current laser power (%) and laser runtime.

> **This is a status menu only. No changes can be made to settings from this menu.**

10.4 Communication

About

Home / Status / Communication

Lists the projector IP address.

11. RESET MENU

Overview

- Factory Reset
- Selectable Reset

11.1 Factory Reset

Reset

Enter Reset menu, Select Factory Reset, and confirm. This will turn back all settings to factory standard.

11.2 Selectable Reset

Reset

Enter the Reset Menu, Select the items to be reset, and Confirm. This will turn the selected items to factory standard.

12. USER MAINTENANCE

Overview

• Update Projector Firmware

12.1 Update Projector Firmware

⚠ **CAUTION: Do NOT turn off, power down or remove mains power supply when an upgrade is in progress.**

📄 **Once initiated, the upgrade procedure can take up to 20 minutes to complete.**

The LCD display will show the progression and status of the upgrade during the process.

Update

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

13. CLEANING THE PROJECTOR

13.1 Projector lenses

General guidelines for cleaning projector lenses

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

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

Wipe in broad strokes, in one direction only.

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

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

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

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

13.2 Projector cabinet

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

General guidelines for cleaning the projector cabinet (exterior only)

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

13.3 Filters

General info regarding Air intake and filters.

The product is shipped default without any filters and by avoiding filters, the ventilation system operates for longer periods between maintenance, since no clogging of filters means more air is allowed through the system, resulting in lower operating temperatures over time. The air intake are just protected by a mesh. This mesh has to be vacuum cleaned occasionally when needed. No specific interval for this operation, but to be performed when needed.

For more demanding surrounds both smoke and dust filters can be applied externally to the system to avoid internal fouling.

General guidelines for cleaning projector filters (external)

Remove the filter from the projector then use a vacuum to remove excess dust from the filter. Do not wet or soak the filter.

Cleaning of the projector filter should be done in a separate room to avoid dust contamination.