

Installation Manual

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

Printed in Belgium

Changes

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

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

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

Copyright ©

All rights reserved. No part of this document may be copied, reproduced or translated. It shall not otherwise be recorded, transmitted or stored in a retrieval system without the prior written consent of Barco.

Guarantee and Compensation

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

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

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

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

Trademarks

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

Software License Agreement

You should carefully read the following terms and conditions before using this software. Your use of this software indicates your acceptance of this license agreement and warranty.

Terms and Conditions:

1. No redistribution of the software is allowed.
2. Reverse-Engineering. You may not reverse engineer, decompile, disassemble or alter this software product.

Disclaimer of Warranty:

This software and the accompanying files are sold "as is" and without warranties as to performance or merchantability or any other warranties whether expressed or implied. In no event shall Barco be liable for damage of any kind, loss of data, loss of profits, business interruption or other pecuniary loss arising directly or indirectly. Any liability of the seller will be exclusively limited to replacement of the product or refund of purchase price.

GNU-GPL code

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

Federal Communications Commission (FCC Statement)

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

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

EN55022/CISPR22 Class A ITE (Information Technology Equipment)

Class A ITE is a category of all other ITE which satisfies the class A ITE limits but not the class B ITE limits. Such equipment should not be restricted in its sale but the following warning shall be included in the instructions for use:

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.

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

TABLE OF CONTENTS

1. General	3
1.1 Safety	3
1.2 Installation requirements	5
1.3 Initial inspection	6
2. ICMP functionality	9
2.1 ICMP introduction	9
2.2 ICMP HDD	10
2.3 ICMP communication ports	12
2.4 ICMP source input ports	13
2.5 ICMP DisplayPort specifications	14
2.6 ICMP SDI specifications	16
2.7 ICMP HDMI specifications	20
2.8 ICMP status LEDs	21
2.9 ICMP HDD status LEDs	22
2.10 ICMP reset	23
2.11 ICMP device certificate	24
2.12 ICMP configuration via Communicator	26
3. ICMP installation	29
3.1 Process overview of ICMP installation	29
3.2 Preparing the projector for ICMP upgrade	30
3.3 Installing the ICMP	32
3.4 Installing a HDD into the ICMP	33
3.5 Obtaining the Barco ICMP certificate	35
3.6 Removing a HDD from the ICMP	35
A. Technical specifications	37
A.1 Specifications of the ICMP	37
A.2 About General Purpose Inputs & Outputs (GPIO)	38
A.3 Pin configurations of the ICMP communication ports	40
B. Environmental information	45
B.1 Disposal information	45
B.2 RoHS compliance	45
B.3 Production address	47
Glossary	49
Index	51

1. GENERAL

Purpose of this kit

This kit is designed to upgrade a Barco digital projector with a Barco ICMP (Integrated Cinema Media Processor), or to replace an installed ICMP of a Barco ICMP supported projector in the field.

Where to use

The ICMP is designed to use with Barco digital projectors which are ICMP supported.

List of Barco ICMP supported projectors:

- DP2K S
- DP2K Sx
- DP2K C
- DP2K Cx
- DP2K B
- DP2K Bx
- DP2K P
- DP4K B
- DP4K Bx
- DP4K P
- DP4K L
- DP2K E
- Galaxy 4K

About this document

Read this document before installing your ICMP in the projector. It contains important information concerning installation requirements for the ICMP, such as safety related issues, initial inspection, minimum version of projector software, etc.

This document can be used as a guideline to upgrade the Barco projector with the ICMP or to replace an installed ICMP in the field.

The latest version of this document can be downloaded from the Barco website www.barco.com or from the secured Barco website <https://my.barco.com>.



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

Overview

- Safety
- Installation requirements
- Initial inspection

1.1 Safety

Notice on safety

This equipment is built in accordance with the requirements of the international safety standards IEC60950-1, EN60950-1, UL60950-1 and CAN/CSA C22.2 No.60950-1, which are the safety standards

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

User definition

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

Important safety instructions

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

- Read these instructions.
- Keep these instructions.
- Heed all warnings.
- Follow all instructions.
- Only trained and authorized technicians may install the ICMP.
- Install and use the ICMP exclusively on a Barco digital projector mentioned in the list "Where to use" (page 3).
- Installation of the ICMP must be done in a dust free area.
- Only use attachments/accessories specified by the manufacturer.
- CAUTION: Troubleshooting must be performed by a trained technician. To reduce the risk of electrical shock, do not attempt to service this equipment unless you are qualified to do so.
- Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as liquid has been spilled or objects have fallen into the apparatus, or the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
- FRAGILE: The ICMP is fragile. Handle the ICMP with care at all times.
- Always switch off the projector and unplug the power cord before removing one of the covers, unless otherwise stated.
- Always wear a wrist band which is connected to the ground while handling the ESD sensitive parts.
- Wear insulating gloves during the execution of the installation and maintenance actions to avoid short-circuit.
- Switch off the projector and unplug the power cord from the UPS INLET for removal of all power from the projector (not applicable for DP2K S series).
- Be careful never to drop anything into the ICMP assembly during the procedure. The fall of a tool or a spare part in the ICMP or in the projector could have catastrophic consequences when you will restart the system.
- Be careful to always follow strict procedures during maintenance operations (Battery replacement, assembly replacement).
- 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.

-
- Rated maximum ambient temperature, $t_a = 35^\circ\text{C}$ (95°F).
 - Danger of explosion if battery is incorrectly installed.
 - Replace battery only with the same or equivalent type recommended by the manufacturer.
 - For disposal of used batteries, always consult federal, state, local and provincial hazardous waste disposal rules and regulations to ensure proper disposal.
 - To avoid any risk of injury, the SERVICE PERSONNEL that do the installation or maintenance of the ICMP must respect the same rules as for the projector. Follow the safety instructions listed in the projector manuals.

1.2 Installation requirements

Environment conditions

The requirements for the physical environment in which the ICMP may be safely operated or stored are the same as these for the projector. See user and installation manual of the projector for details.



CAUTION: Let the ICMP acclimate to the ambient temperature after unpacking. Ensure that the humidity is within the specification of the projector (between 5% and 85% RH Non-condensed) Neglecting this may result in startup failure of the device.



CAUTION: Wear a wrist band which is connected to the ground while handling the ICMP.

Projector software package

The software package installed on the projector must be at least:

- **version 1.12** for DP2K C, DP2K B, DP4K B, DP2K P, DP4K P and Galaxy series.
- **version 1.04** for DP2K S and E series.
- **version 1.0** for DP4K L series.

Communicator software

The Communicator software to support ICMP must be at least:

- **version 5.1.4**

ICMP software package

The software package installed on the ICMP must be at least:

- **version 1.2.4**

ICMP clone package

The ICMP clone package must be at least:

- **version 2.7.0**

Note that for Galaxy 4K projector series a dedicated ICMP clone package exist having the same version as the standard ICMP clone package for Digital Cinema projectors. Ensure to use the appropriate clone package and corresponding projector software package.



The ICMP software offers the ability to import or export setting parameters. Properly used, this feature saves time when you have to replace the ICMP, or in case of a large deployment (several ICMP settled with the same configuration). For details see user guide of the Communicator.

1.3 Initial inspection

General

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

Unpacking

At delivery the ICMP is packed in a cardboard box. Place the cardboard box on a stable (solid), flat and insulated support during all the unpacking. Open the box from the top. Remove the ICMP that is packaged in an antistatic bag. Check the box content after unpacking.



After unpacking let the ICMP acclimate to the room temperature which must be higher than 10°C (50°F) and lower than 35°C (95°F). Neglecting this may result in startup failure of the device.



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

Box content

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

- ICMP assembly.
- Installation manual (this document)

(*) For the Galaxy series the hard disc slots are covered with a plate because no hard drives are required.

Mechanical check

This check should confirm that there are no broken knobs or connectors, that the front face is free of dents and scratches, and that the different elements (main board, HDD plate and front face) forms a unified and coherent assembly. The Barco Sales and the Service office should be notified as soon as possible if this is not the case.

Tamper labels

Prior to installation inspect the tamper labels of the ICMP assembly. If the tamper labels are damaged please contact Barco technical support.

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

These tamper labels can be found on top of the ICMP assembly (reference 1 image 1-1). Damaged tamper labels may indicate an intrusion attempt into the security module of the ICMP. This should be reported immediately to the Barco Sales and the Service office.

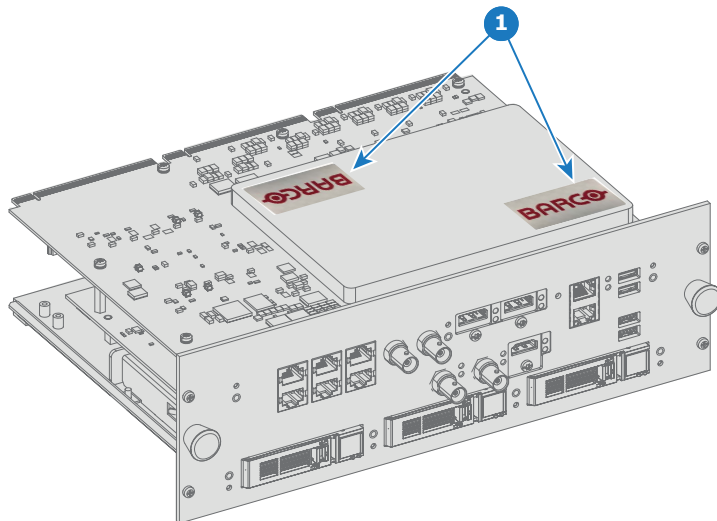


Image 1-1

Battery tamper check

Prior to installation inspect the tamper labels (reference 2 image 1-2) of the battery slots on the main board. Damage labels could indicate an intrusion of the battery sockets.

If there is no battery present or the battery was temporarily removed the DCI certificates stored on the ICMP are deleted. As a result the ICMP goes into a non recoverable FIPS¹ error state and makes the ICMP out of order. If this is the case, the ICMP must be sent back to factory to install new DCI certificates. Contact Barco technical support.

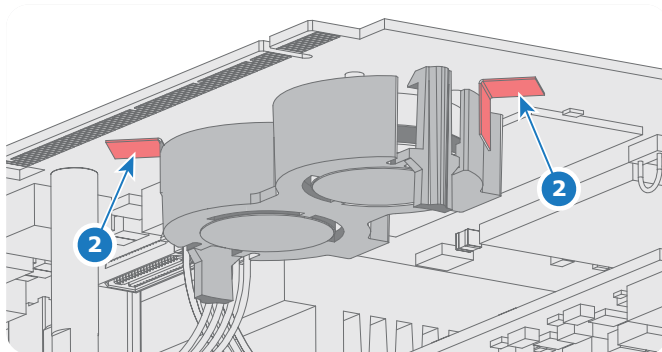


Image 1-2



CAUTION: Always leave a working battery on the ICMP. Removing all the batteries at the same time will cause immediate failure of the ICMP. The only way to recover the functionality of the ICMP is return it to the manufacturer. New DCI device certificates have to be installed, rendering existing KDMs useless.



The lifetime of the battery is approximately 5 years. When the battery voltage is low the ICMP will throw a warning message to replace the battery immediately.



CAUTION: Only certified service technicians are allowed to replace the battery of the ICMP.

¹. Federal Information Processing Standard

2. ICMP FUNCTIONALITY

About this chapter

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



Image 2-1

Overview

- ICMP introduction
- ICMP HDD
- ICMP communication ports
- ICMP source input ports
- ICMP DisplayPort specifications
- ICMP SDI specifications
- ICMP HDMI specifications
- ICMP status LEDs
- ICMP HDD status LEDs
- ICMP reset
- ICMP device certificate
- ICMP configuration via Communicator

2.1 ICMP introduction

About ICMP

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

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

2. ICMP functionality

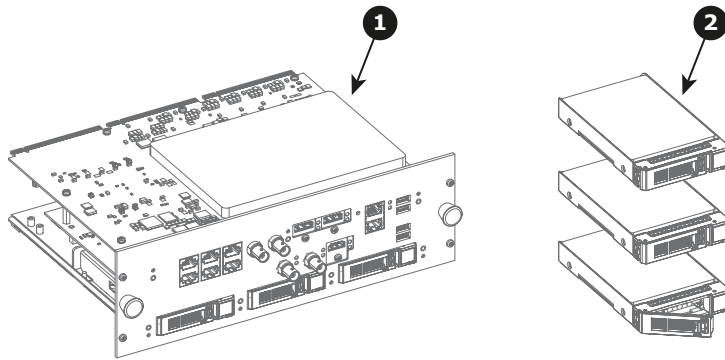


Image 2-2
1 ICMP with video mezzanine
2 HDDs for ICMP

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

For order info see www.barco.com.

Front face of the ICMP

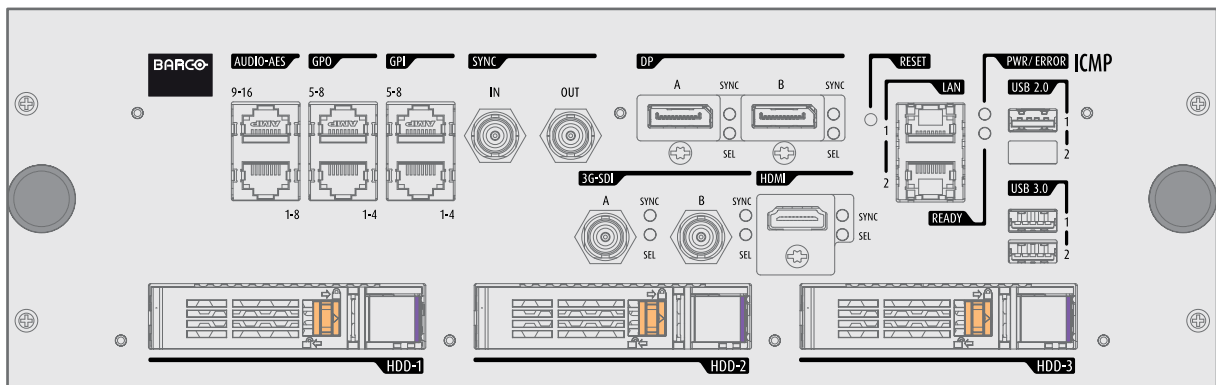


Image 2-3
Front face ICMP with video mezzanine

Card Cage slot location

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

2.2 ICMP HDD

About ICMP HDD

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

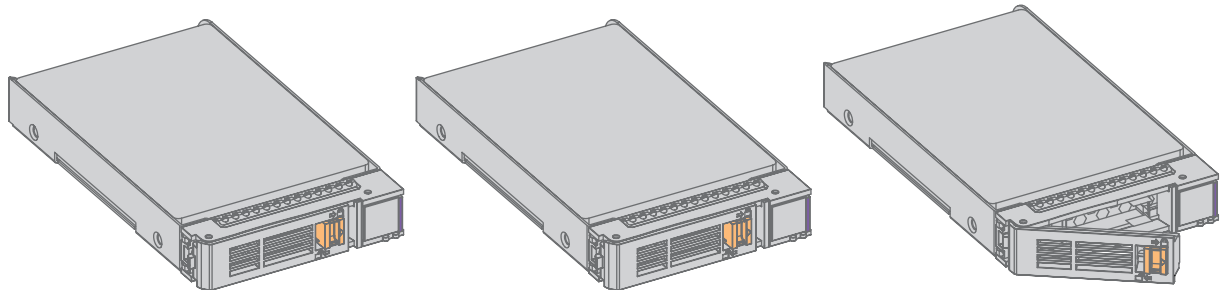


Image 2-4



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

About degraded mode

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



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



A failed drive should be replaced as soon as possible.

About “RAID recovery” process

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



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

About RAID broken

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

Exchange or re-use of a disk set

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

HDD storage capacity

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

HDD storage

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

2.3 ICMP communication ports

Location of the communication ports

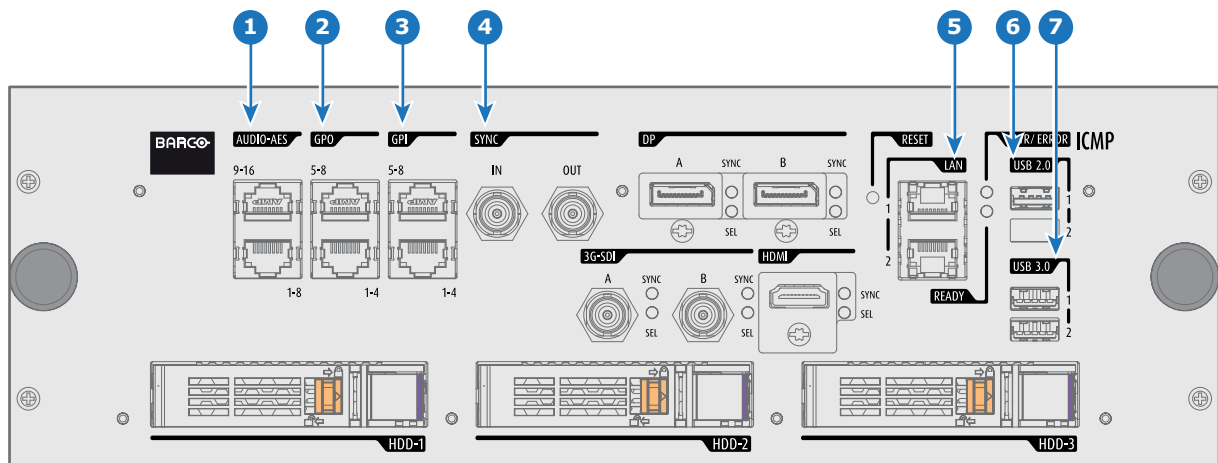


Image 2-5

Functionality

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

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

2 GPO 1-4 (5-8)

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

3 GPI 1-4 (5-8)

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

4 SYNC IN / OUT

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

5 LAN 1 (2)

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

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

6 USB 2.0

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

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

7 USB 3.0

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

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

**USB**

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

2.4 ICMP source input ports

Location of the source input ports

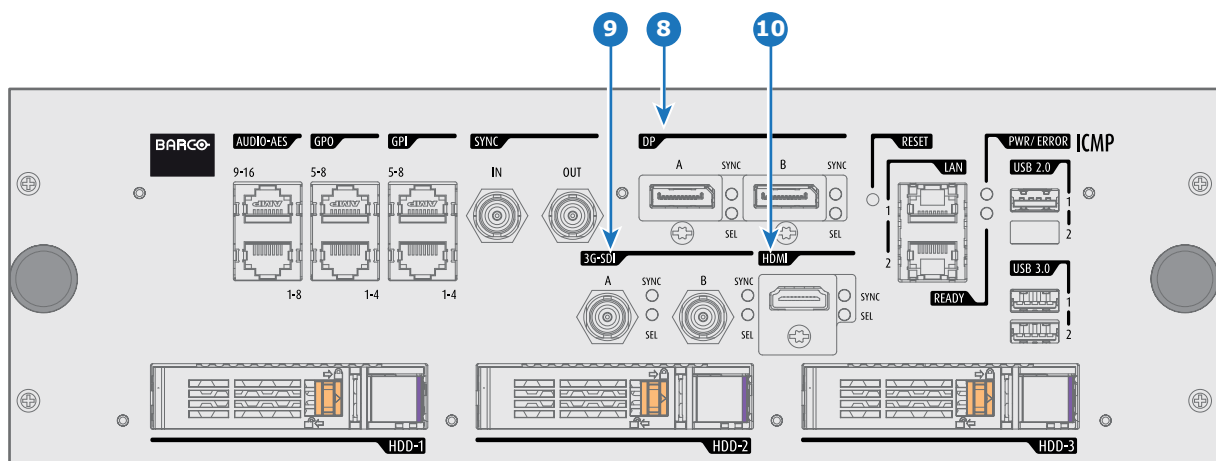


Image 2-6

Functionality

8 DisplayPort A (B)

DisplayPort connector to connect a video source.

9 3G-SDI A (B)

SDI connector to connect a video source.

10 HDMI

HDMI connector to connect a video source.

2.5 ICMP DisplayPort specifications



DisplayPort

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



HDCP

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

DisplayPort specifications

Supported Modes:

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

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

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

2D Formats / Single DP	Color depth	Port	Display Mode
2048 x 1536 @ 60 fps	8 bpc, 10 bpc	Single	2D
2048 x 2160 @ 30, 48, 50, 60 fps	8 bpc, 10 bpc	Single	2D
3840 x 2160 @ 24 fps	8 bpc, 10 bpc	Single	2D
3D Formats / Single DP	Color depth	Port	Display Mode
1920 x 1080 @ 60 fps	8 bpc, 10 bpc	Single	3D
2048 x 1080 @ 60 fps	8 bpc, 10 bpc	Single	3D
4K Horizontal SPAN 2D - Full	Color depth	Port	Display Mode
2048 x 2160 @ 30, 48, 50, 60 fps	8 bpc, 10 bpc	A+B span	2D
4K Horizontal SPAN 2D - Flat	Color depth	Port	Display Mode
1920 x 2160 @ 30, 48, 50, 60 fps	8 bpc, 10 bpc	A+B span	2D
4K Horizontal SPAN 3D	Color depth	Port	Display Mode
2048 x 2160 @ 60 fps	8 bpc, 10 bpc	A+B span	3D

Audio formats

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

Notes:

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

2.6 ICMP SDI specifications

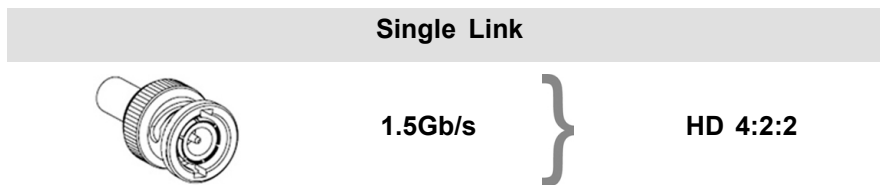


3G-SDI

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

SDI terminology

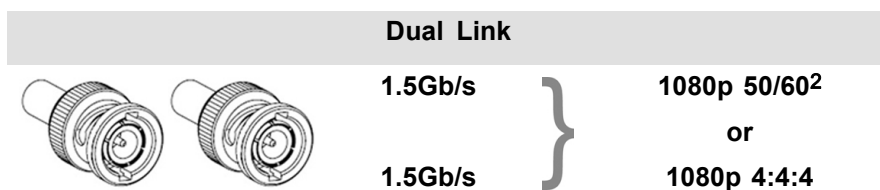
Standard HD-SDI signal



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

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

Dual-Link HD-SDI signal



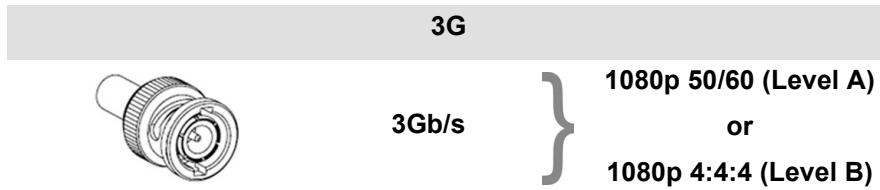
Dual-Link HD-SDI is mainly two standard HD-SDI signals carrying a single image stream split between the two cables. The main advantage is that color subsampling is no longer required, and the image can be transmitted in 4:4:4 quality, which then also allows the RGB (or XYZ) color space to be used.

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

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

2. Not supported in Alchemy

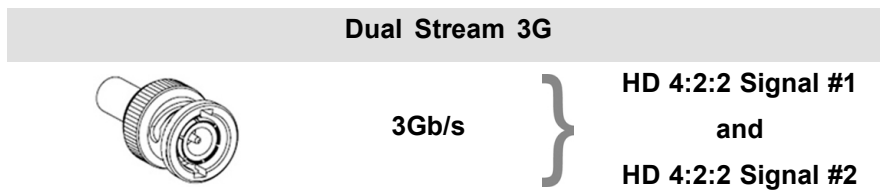
3G HD-SDI signal



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

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

Dual Stream 3G HD-SDI signal



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

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

Standard HD-SDI (SMPTE 292M) formats

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

2. ICMP functionality

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

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

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

Standard HD-SDI (2 × SMPTE 292M) formats³

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

3. mainly used to carry stereoscopic images.

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

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

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

3G HD-SDI (SMPTE 425) formats

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

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

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

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

2.7 ICMP HDMI specifications



HDMI

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

HDMI specifications

HDMI1.4a, including HDCP1.4

2K Video-timings:

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

4K Video timings (ICMP 1.2.0)

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

3D Video timings (ICMP 1.2.2)

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

Color Space - Color Sampling:

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

Audio formats:

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

- 7.1 format / LPCM / 20 bits / 48 kHz

Notes:

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

2.8 ICMP status LEDs

ICMP status LEDs and Reset button

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

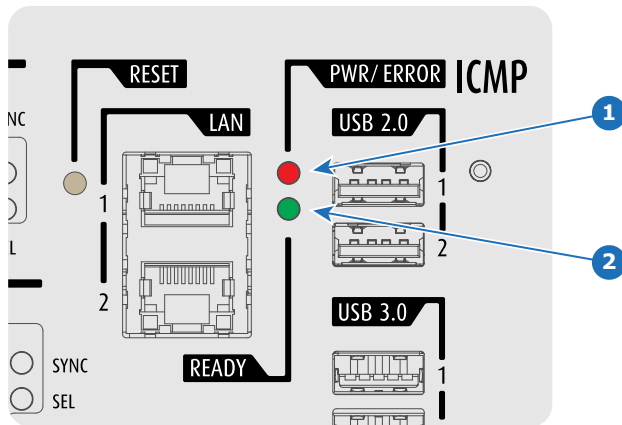


Image 2-7

Status overview PWR/ERROR and READY LEDs:

1	2	ICMP Status
PWR/ER-ROR	READY	
Off	Off	Turned off
Red	Off	Board reset
Blinking Green	Off	Boot loader
Blinking Green	Blinking Orange	Operating System start up
Blinking Green	Orange	Security Manager - Image Integrity tests
Blinking Green	Blinking Yellow	Security Manager - Self Test
Blinking Green	Yellow	Security Manager - FPGA self-test
Green	Blinking Orange	Update ongoing
Green	Blinking Green	FIPS ok - Application startup
Green	Green	Power on & No Error
Blinking Red	Off	FIPS error

2.9 ICMP HDD status LEDs

ICMP HDD status LEDs

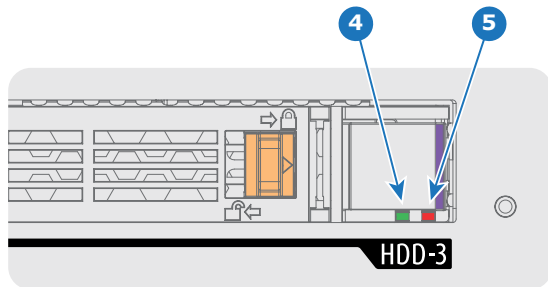


Image 2-8

Status overview PWR/ERROR and READY LEDs:

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

Troubleshooting

Situation	Solution
<p>One disk failed (red LED) + RAID degraded.</p> <p>The ongoing event is not interrupted.</p> <p>Note: The disk status (RAID degraded) can be retrieved via the (Web) Commander. See user guide of the (Web) Commander.</p>	<ol style="list-style-type: none"> Switch off the power. Replace the defect HDD with an original HDD spare part. See procedure "Removing a HDD from the ICMP", page 35, and "Installing a HDD into the ICMP", page 33. Ensure to insert the HDD firmly. Switch on the power. <p>Result: As soon the new HDD is detected by the ICMP the rebuild of the RAID is started (Blinking red LED).</p>
<p>One disk failed (red LED) + Error 10580 "local storage not available".</p> <p>Note: The disk status (Error code) can be retrieved via the (Web) Commander. See user guide of the (Web) Commander.</p>	<ol style="list-style-type: none"> Switch off the power. Replace the defect HDD with an original HDD spare part. See procedure "Removing a HDD from the ICMP", page 35, and "Installing a HDD into the ICMP", page 33. Ensure to insert the HDD firmly. Switch on the power. <p>Result: As soon the new HDD is detected by the ICMP the rebuild of the RAID is started (Blinking red LED).</p>

Situation	Solution
<p>Multiple disks failed (multiple red LEDs) + RAID broken.</p> <p>Note: The disk status (RAID broken) can be retrieved via the (Web) Commander. See user guide of the (Web) Commander.</p>	<ol style="list-style-type: none"> 1. Switch off the power. 2. Replace all defect HDDs with original HDD spare parts. See procedure "Removing a HDD from the ICMP", page 35, and "Installing a HDD into the ICMP", page 33. Ensure to insert the HDDs firmly. 3. Switch on the power. 4. Start "RAID Initialize". See user guide of the Communicator. <p>Result: a new empty RAID is created.</p>
<p>All HDD LEDs remain off + Error 10580 "local storage not available".</p> <p>Note: The disk status (Error code) can be retrieved via the (Web) Commander. See user guide of the (Web) Commander.</p>	<ol style="list-style-type: none"> 1. Switch off the power. 2. Reseat all HDDs. See procedure "Removing a HDD from the ICMP", page 35, and "Installing a HDD into the ICMP", page 33. Ensure to insert the HDDs firmly. 3. If problem remains try "RAID Initialize". See user guide of the Communicator. Note that all content will be lost! 4. If problem remains contact Service for further instructions.



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

2.10 ICMP reset



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

ICMP reset possibilities

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

How to reset the ICMP?

1. Click on the ICMP **reset button** in the GUI of the **Web Commander**

Or,

Click on the ICMP **reset button** in the GUI of the **Commander**

Note: It can be that the Commander or WEB-Commander is not able to send the reset command.

Or,

click on the ICMP **reset button** in the GUI of the **Communicator** (recommended)

2. ICMP functionality

Or,

press the **Star button** on the **local keypad** for a few seconds (Not for C- and B-series)

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

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

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

2. Did the reset of the ICMP fail?

If yes, perform a hardware reset as follows:

a) switch off the lasers of the projector or switch of the projector lamp.

b) press the ICMP **hardware reset button** a few seconds (reference 3 image 2-9) .

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

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

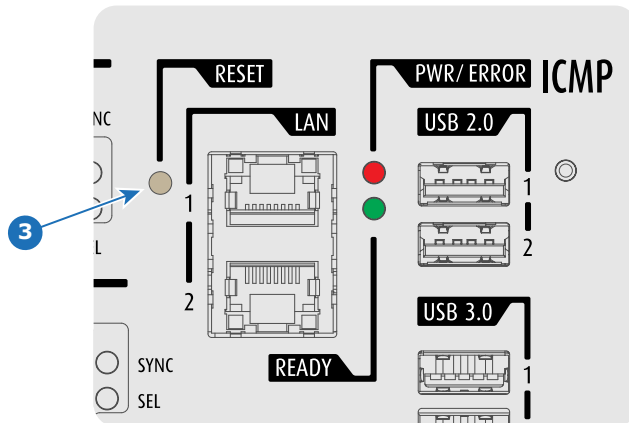


Image 2-9



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

2.11 ICMP device certificate

Purpose of the Barco ICMP device certificate

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

The (WEB) Commander or Communicator can be used to retrieve the device certificate directly from the ICMP. To retrieve the device certificate from the website the QR (Quick Response) code can be used. See procedure "Obtaining the Barco ICMP certificate", page 35.

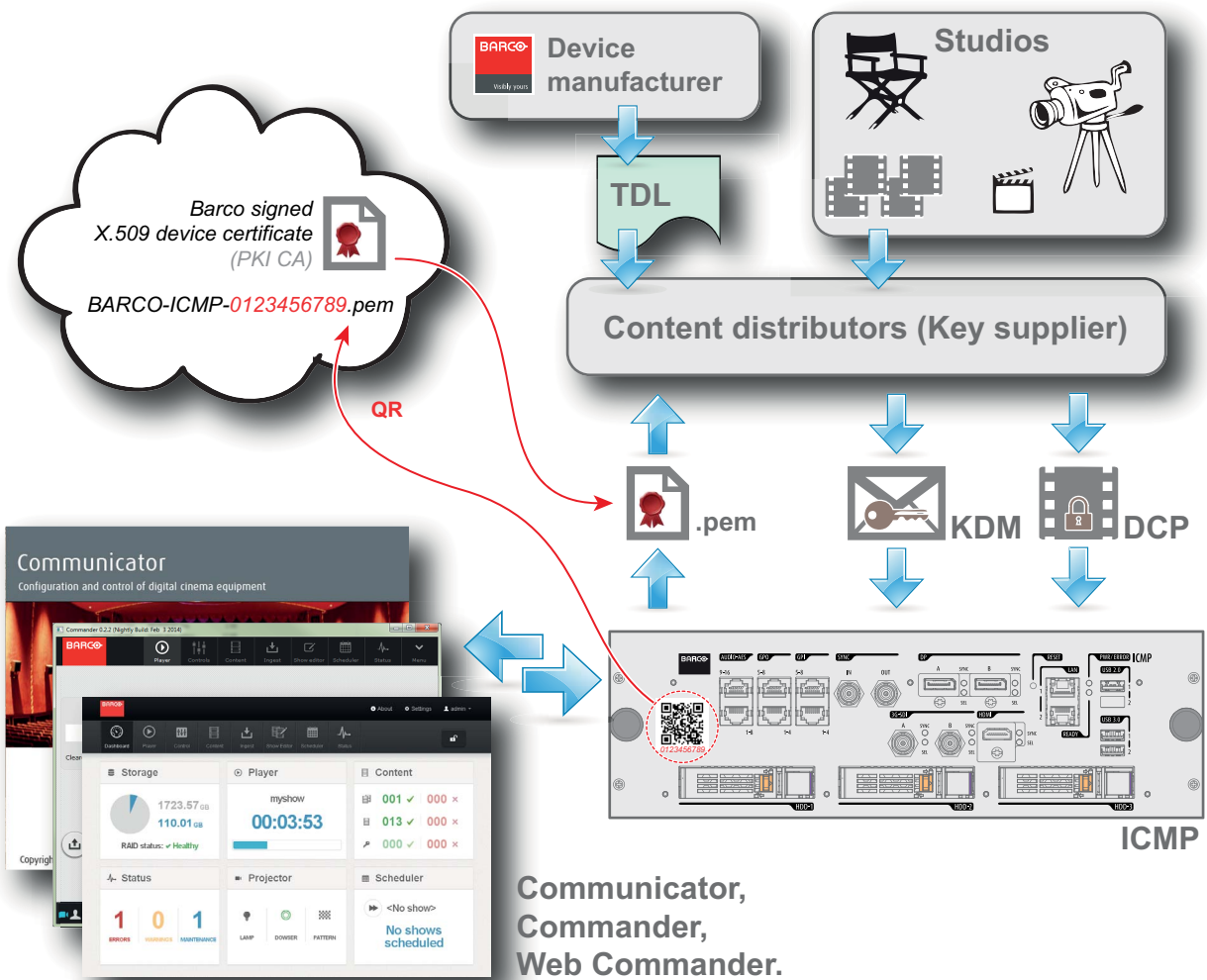


Image 2-10



Trusted Device List (TDL)

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



Public Key Infrastructure (PKI)

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



***.pem**

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



Key Delivery Message (KDM)

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



Digital Cinema Package (DCP)

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



Digital Cinema Initiatives (DCI)

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

2.12 ICMP configuration via Communicator

About ICMP configuration

Following parameters are available to configure the ICMP:

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

- Automation Cues: event cues that are triggered from different sources and to which can be assigned actions to be executed by the automation engine.
- Verify internal clock of the ICMP.



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

About Default settings

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

About the ICMP internal clock

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

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

2. ICMP functionality

3. ICMP INSTALLATION

About this chapter

This chapter describes how to upgrade the Barco projector with the ICMP or to replace an installed ICMP in the field.



After the installation, it is strongly recommended to backup the settings in a file so that they are available for later use in case the ICMP has to be swapped.

Overview

- Process overview of ICMP installation
- Preparing the projector for ICMP upgrade
- Installing the ICMP
- Installing a HDD into the ICMP
- Obtaining the Barco ICMP certificate
- Removing a HDD from the ICMP

3.1 Process overview of ICMP installation

Process overview

1. Mechanical upgrade:

- a) Prepare the projector for ICMP installation: First create a full backup clone package! Then, make free the ICP and IMB slot and remove the partition plate between these two slots. See procedure "Preparing the projector for ICMP upgrade", page 30.
- b) Install the ICMP into the Card Cage of the projector. See procedure "Installing the ICMP", page 32.
- c) In case the HDDs of the ICMP are delivered separated from the projector remove the protection tape from the HDD input slots and install all three HDDs as described in the procedure "Installing a HDD into the ICMP", page 33. Make sure that all HDDs in the ICMP HDD set have the same storage capacity. See label on top of the HDD to know the storage capacity.

3. ICMP installation

2. Software upgrade with Communicator:

- a) Check the software version of the Communicator. The minimum required software version of the Communicator is version 5.1.4. If needed, download and install the latest version available on the secured Barco website.
 - b) Check if the projector is updated with the latest software. The installed software package must be at least:
 - version 1.12 for DP2K C, DP2K B, DP4K B, DP2K P, DP4K P and Galaxy series.
 - version 1.04 for DP2K S and E series.
 - version 1.0 for DP4K L series.If needed, update the projector with the latest software. The latest projector software can be downloaded from the secured Barco website.
 - c) Check if the ICMP is updated with the latest software. At least version 1.2.4 should be installed. The (WEB) Commander or Communicator can be used to retrieve the version of the installed ICMP software. If needed, update the ICMP with the latest software. The latest ICMP software can be downloaded from the secured Barco website.
 - d) Load the "ICMP clone package" which contains projector's "macros and presets" adapted for the ICMP. Use ICMP clone package version 2.7.0 or later. The ICMP clone package can be downloaded from the secured Barco website.
 - e) Configure the ICMP. Parameters which can/need to be configured are listed in the chapter "ICMP configuration via Communicator", page 26.
 - **Note:** Import of configuration settings from XML backup file allows loading in one time all settings necessary to operate with the ICMP. Import of parameters can be very useful to reload an existing configuration during a server exchange, or when installing a multiplex with multiple identical installations. See user guide of the Communicator for details.
 - f) Create an XML backup file of settings from the ICMP.
3. **Obtain the device certificate of the installed ICMP.** This can be done by:
 - a) Using the QR code.
 - b) Using the control software (WEB) Commander or Communicator.
 4. **Send the device certificate to the content supplier and request KDMs and DCPs for the ICMP.**
 5. **Ingest the KDMs and DCPs into the ICMP.** Use for that the (WEB) Commander.
 6. **Setup a show and play the content.** Use for that the (WEB) Commander.
 - **Note:** after each show the security logs should be exported. See user guide of the Communicator for details.



When referred to the (WEB) Commander or Communicator see user guide of the (WEB) Commander or Communicator for detailed instructions.



There is a Touch Panel Controller (TPC) version and a PC version available for the Commander and Communicator. See secured Barco website to download either the TPC or PC version or both.

3.2 Preparing the projector for ICMP upgrade



This procedure describe how to prepare the projector for upgrading with an ICMP module. This procedure is not relevant in case of an ICMP module swap.

Necessary tools

- Communicator version 5.1.4 or later.
- 7mm flat screwdriver.
- PH2 Phillips screwdriver.
- 2.5mm Allen wrench.

How to prepare the projector for upgrading with ICMP?

1. Startup the projector and create a full backup clone package. For detailed instructions see user guide of the Communicator.
2. Switch off the projector and wait 15 minutes before proceeding with this procedure. This to allow the projector to complete the cooling down cycle and to discharge the capacitors.
3. In case this is not a DP2K S series projector remove the cover of the Card Cage. For detailed instructions see User & Installation manual of the projector. Use a 7 mm flat screwdriver.
4. Remove the ICP module from the projector. Use a PH2 Phillips screwdriver to release the two retaining screws (reference 1 image 3-1) at the front of the ICP module.

Note: This action requires to remove (destroy) the tamper label on front face of the ICP and IMB slot.

Note: The tamper label is required by DCI to provide easy visual indication if the equipment was tampered with.

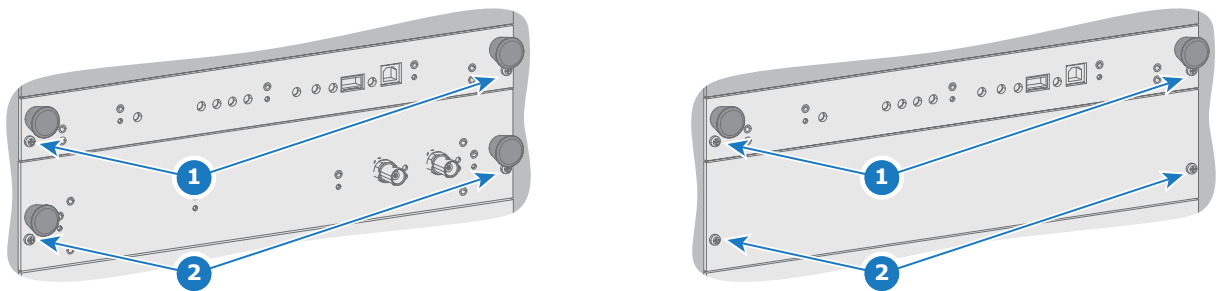


Image 3-1

5. Remove the cover from the IMB slot or remove the installed HSDSI or IMB or IMS module. Use a PH2 Phillips screwdriver to release the two retaining screws at the front (reference 2 image 3-1).
6. Remove the partition plate from the Card Cage. Use a 2.5mm Allen wrench to loosen the two fixation screws (reference 1 image 3-2 or image 3-3).

Note: Depending on the projector type the fixation screws of the partition plate are different oriented. See illustration below.

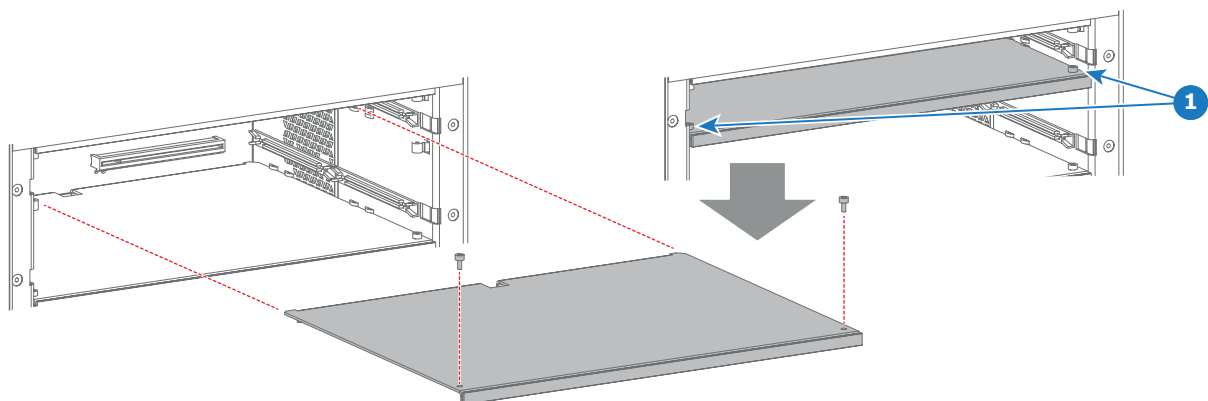


Image 3-2
Partition plate with fixation screws in vertical direction.

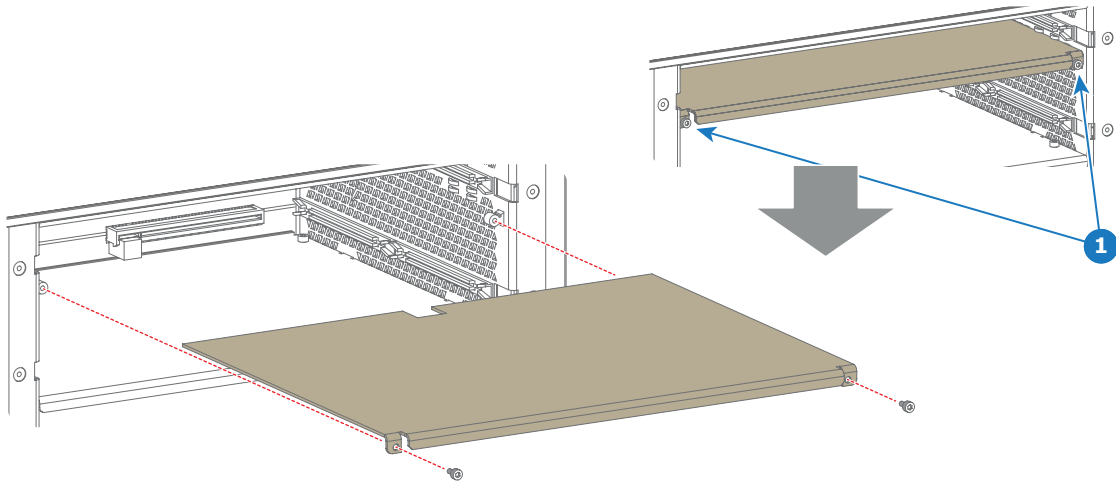


Image 3-3
Partition plate with fixation screws in horizontal direction.

3.3 Installing the ICMP



This procedure assumes that the projector has been made ICMP ready. In other words the Card Cage slots wherein the ICMP has to be inserted are empty and the latest projector software package is installed.



CAUTION: Wear a wrist band which is connected to the ground while handling the electrostatic discharge sensitive parts.

Necessary tools

- 7mm flat screwdriver.
- PH2 Phillips screwdriver.
- ESD wrist band.

How to install the ICMP into the Card Cage?

1. Gently insert the ICMP in the guides of the Card Cage as illustrated below.
Caution: Ensure that the both sides of the ICMP are captured by the guides inside the Card Cage compartment. See detail in image below.
2. Push (apply a little pressure) on both handles until the ICMP is fully inserted and the connection is made with the back plane.
Note: All connections are made via the board to board connection with the back plane.
3. Alternately fasten the four screws (reference 1) at the front side of the ICMP. Use a PH2 Phillips screwdriver.
Caution: Ensure to tighten the screws alternately!
4. Install the HDDs in case not yet installed. See procedure "Installing a HDD into the ICMP", page 33.
5. Install the cover of the Card Cage (not needed in case this is a DP2K S series projector). Use a 7 mm flat screwdriver.
6. Reconnect the power cord and switch on the projector.

7. Proceed with retrieving the device certificate from the ICMP for ordering the correct KDMs to play Digital Cinema Packages (DCPs). For detailed instructions see user guide of the (WEB) Commander or Communicator.



Replacing the ICMP in the Card Cage of the projector will result in tamper events (service door tamper, insertion tamper). An authorization to clear the security warning on the projector, after installation, will be needed. You will find in the installation manuals of each projector the way to clear the security warnings.



In the ICMP, the content is stored on removable disks that allow fast recovery of this content if you have to replace the ICMP. See chapters "Removing a HDD from the ICMP", page 35, and "Installing a HDD into the ICMP", page 33. However, take into account that the matching KDM file must be ingested into the ICMP to play the cinema content (DCP file) available on the HDDs.



A newly installed ICMP has the factory settings. The ICMP software offers the ability to import setting parameters from a backup file. For detailed instructions see Communicator user guide.

3.4 Installing a HDD into the ICMP



This procedure assumes that the HDD slot of the ICMP is empty. If not, see procedure "Removing a HDD from the ICMP", page 35.



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



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

How to install a HDD ?

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

3. ICMP installation

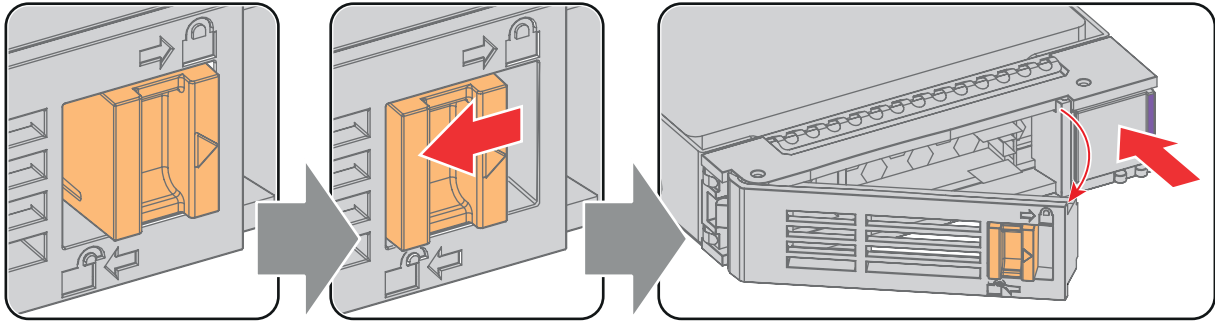


Image 3-4

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

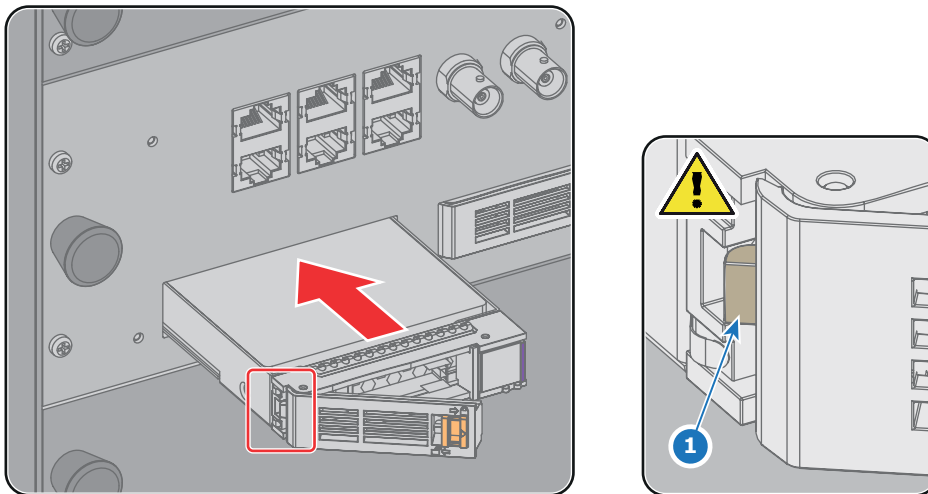


Image 3-5

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

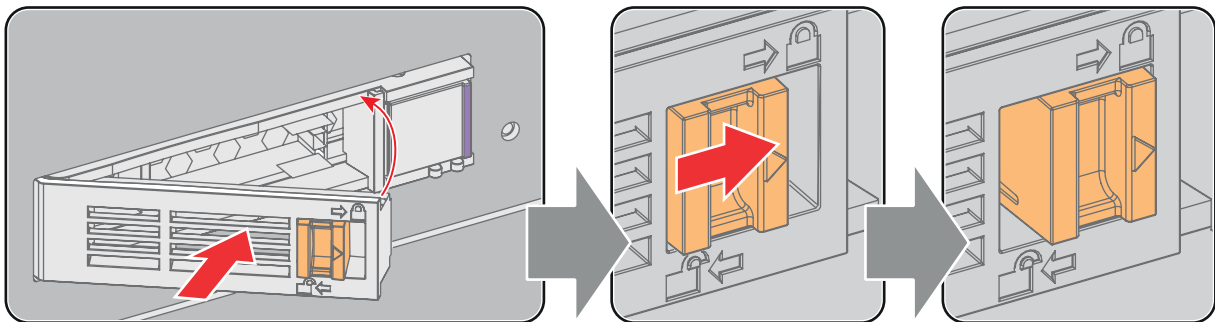


Image 3-6

5. Switch on the projector.



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



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

3.5 Obtaining the Barco ICMP certificate

Necessary tools

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

Using the CertID label to download the ICMP certificate

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

Note: Instead of downloading the ICMP certificate you can use the CertID number (reference 2), located below the QR code, in communication with your KDM supplier. Certified KDM suppliers can use this CertID number to retrieve the ICMP certificate directly.

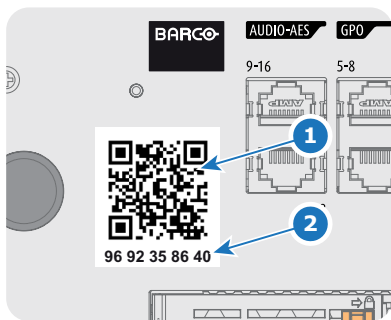


Image 3-7

Using control software to obtain the ICMP certificate

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

Or,

use the **Commander** to download the ICMP certificate from the ICMP main board. For detailed instructions see user guide of the Commander.

Or,

use the **Communicator** to download the ICMP certificate from the ICMP main board. For detailed instructions see user guide of the Communicator.

3.6 Removing a HDD from the ICMP



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

How to remove a HDD ?

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

3. ICMP installation

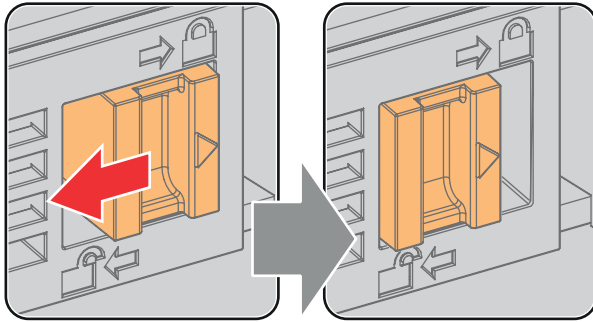


Image 3-8

3. Push the unlock button to open the handle.

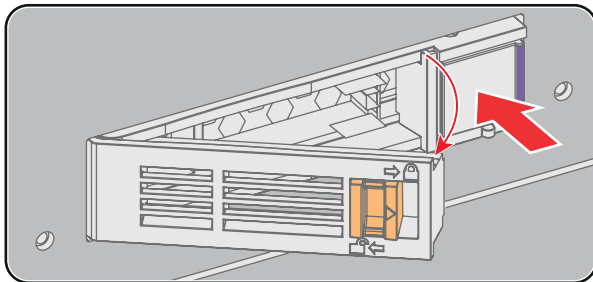


Image 3-9

4. Pull the HDD out of its slot.

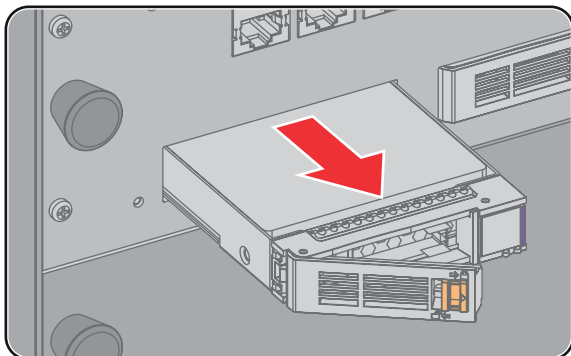


Image 3-10



To install the HDD see procedure "Installing a HDD into the ICMP", page 33.

A. TECHNICAL SPECIFICATIONS

Overview

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

A.1 Specifications of the ICMP

Specifications

Integrated Cinema Media Processor	<p>DCI 4K 2D up to 60fps*</p> <p>DCI 4K 3D (24 or 30 fps per eye)*</p> <p>DCI High Frame Rates 2K 3D up to 120fps (60fps per eye)</p> <p>JPEG 2000 bit-rates up to 625Mbps</p> <p>Dual-channel color-correction</p> <p>MPEG-2 (4:2:0 and 4:2:2 up to 60fps)</p> <p>2x DisplayPort 1.1a (up to 4K 2D 60fps and 4K 3D 30fps)**</p> <p>2x 3G-SDI inputs</p> <p>1x HDMI 1.4a (up to 4K 2D 24fps, support for BluRay 3D)</p> <p>16x AES/EBU audio channels (2x RJ45)</p> <p>8x GPI, 8x GPO (4x RJ45)</p> <p>2x Gbe for content connectivity & ingest</p> <p>2x front-accessible USB 3.0 for fast ingest</p> <p>2x front-accessible USB 2.0</p> <p>Video watermarking: Civolution NexGuard</p> <p>Audio watermarking: Civolution</p> <p>Closed captioning devices: Support for SMPTE 430-10</p> <p>* 4K 24fps is standard. For 4K 60p / 4K 3D on ICMP upgrade modules a license is required. Newly-built 4K Barco Alchemy projectors have the license standard included.</p> <p>** On B&C series projectors, the DisplayPort inputs replace the DVI inputs of the Cinema Controller.</p>
Integrated storage	<p>1.9TB effective storage (RAID-5) / 3x 1TB Hot-swappable 2.5" hard-drives</p> <p>3.9TB effective storage (RAID-5) / 3x 2TB Hot-swappable 2.5" hard-drives</p>

Barco Web Commander	<p>Projector dashboard</p> <p>Projector control board</p> <p>Show player/editor/scheduler</p> <p>Automation, 3D, Ingest</p> <p>Smart projector status</p> <p>Via HTML5 web browsers including iOS & Android tablets</p> <p>Compatible with free Barco CineMate iOS & Android app</p>
Barco Commander (for touch panel controller)	<p>Projector control board</p> <p>Show Player/Editor/Scheduler</p> <p>Automation, 3D, ingest</p> <p>Dynamic DCP playlists & intermission</p> <p>Smart projector status</p> <p>Dual projector 3D: passive and active</p> <p>Auro 11.1 decoding</p> <p>Via HTML5 web-browsers including iOS & Android tablets</p>
Barco Communicator	<p>Projector installation & configuration</p> <p>Projector update & maintenance</p> <p>Barco CineMate App (iOS & Android) - free</p>
Options	<p>4K 60 fps / 4K 3D license*</p> <p>Auro 11.1 license</p> <p>Barco Escape license</p> <p>Dual Projector license</p> <p>Live 3D***</p> <p>Ghostbusting***</p> <p>* 4K 24fps is standard. For 4K 60p / 4K 3D on ICMP upgrade modules a license is required. New-built 4K Barco Alchemy projectors have the license standard included</p> <p>*** Software roadmap</p>

A.2 About General Purpose Inputs & Outputs (GPIO)



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

General Purpose inputs

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

Input voltage

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

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

External power supply

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

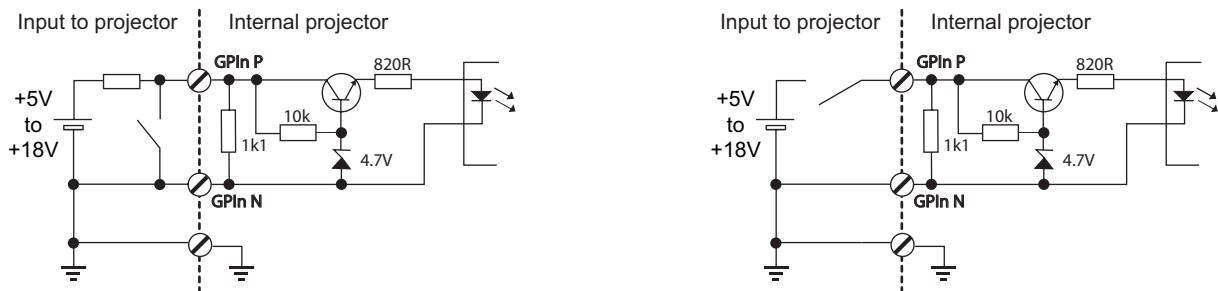


Image A-1

Cables

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

How to make the connection

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

General Purpose outputs

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

About an output

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

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

Output transistor

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

A. Technical specifications

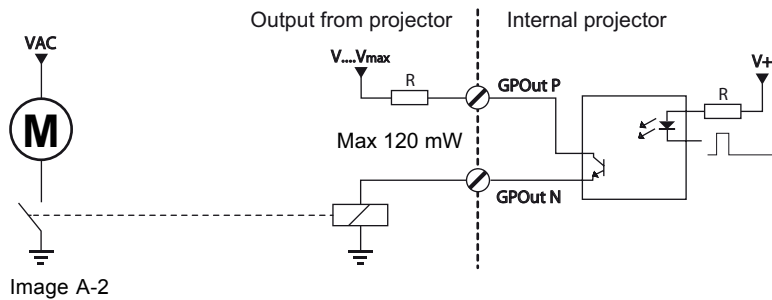


Image A-2



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

GPIO and projector Sleep mode

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

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

GPO and projector switching On or Off

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

A.3 Pin configurations of the ICMP communication ports

RJ-45 pin configuration

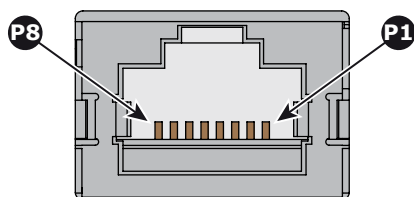


Image A-3

Audio Channels:

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

AUDIO-AES 1-8		
Audio channel	AES pair	RJ-45 pin
7, 8	4 +	7
	4 -	8

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

General Purpose Output:

GPO 1-4	
Definition	RJ-45 pin
EXT_GPOUT_1_P	1
EXT_GPOUT_1_N	2
EXT_GPOUT_2_P	3
EXT_GPOUT_2_N	4
EXT_GPOUT_3_P	5
EXT_GPOUT_3_N	6
EXT_GPOUT_4_P	7
EXT_GPOUT_4_N	8

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

General Purpose Input:

GPI 1-4	
Definition	RJ-45 pin
EXT_GPIN_1_P	1

A. Technical specifications

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

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

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

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

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

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

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

568A + 568B wiring is a crossover cable.

568A + 568A wiring is a straight cable.

568B + 568B wiring is a straight cable.

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

B. ENVIRONMENTAL INFORMATION

Overview

- Disposal information
- RoHS compliance
- Production address

B.1 Disposal information

Disposal Information

Waste Electrical and Electronic Equipment



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

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

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

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

B.2 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”.

零件项目(名称) Component Name	有毒有害物质或元素 Hazardous Substances or Elements					
	铅 Pb	汞 Hg	镉 Cd	六价铬 Cr6+	多溴联苯 PBB	多溴二苯醚 PBDE
印制电路配件 Printed Circuit Assemblies	X	O	O	O	O	O
内部线路 Internal wiring	X	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
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.



Turkey RoHS compliance



■ Türkiye Cumhuriyeti: AEEE Yönetmeliğine Uygundur.

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

B.3 Production address

Factory

Barco NV

Noordlaan 5, B-8520 Kuurne (BELGIUM)

GLOSSARY

***.pem**

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

3G-SDI

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

Digital Cinema Initiatives (DCI)

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

Digital Cinema Package (DCP)

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

DisplayPort

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

HDCP

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

HDMI

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

Key Delivery Message (KDM)

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

Public Key Infrastructure (PKI)

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

Trusted Device List (TDL)

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

USB

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

INDEX

Numerics/Symbols

3G-SDI 14

A

Address 47

AUDIO-AES 12

B

Battery check 7

C

CertID 24

Communication 12–13

AUDIO-AES 12

GPI 12

GPO 12

LAN 13

SYNC 12

USB 2.0 13

USB 3.0 13

Communication ports 12

Configuration 26

D

Degrade mode 11

Device certificate 24, 35

Download 35

ICMP 35

DisplayPort 13–14

Specifications 14

Download 35

Device certificate 35

E

Environmental information 45

Disposal information 45

RoHS compliance 45

F

Functionality 9

ICMP 9

G

General 3

ICMP 3

General Purpose I/O 38

GPI 12

GPIO 38

GPO 12

H

HDD 10, 12, 33, 35

Remove 33, 35

Storage 12

HDMI 14, 20

Specifications 20

I

ICMP 3, 9, 32

Functionality 9

General 3

Install 32

ICMP HDD 22

Status LEDs 22

Troubleshooting 22

ICMP installation 29

ICMP reset 23

ICMP introduction 9

Initial inspection 6

Install 32

ICMP 32

Installation 29

Installation requirements 5

Internal clock 27

K

KDM 24

L

LAN 13

M

Mechanical check 6

N

Network Time Protocol 27

Notice on safety 3

O

Obtain 35

Device certificate 35

P

Pin configurations 40

ICMP 40

Prepare 30

ICMP 30

Projector 30

Process 29

ICMP installation 29
Production 47
Purpose 3

R

RAID broken 11
RAID recovery 11
Remove 33, 35
 HDD 33, 35
Reset button 23

S

Safety 3
Safety Instructions 4
SDI 16
 Specifications 16
Source input 13–14
 3G-SDI 14
 DisplayPort 13
 HDMI 14
Source input ports 13
Specification 37
 ICMP 37

Specifications 14, 16, 20, 37
 DisplayPort 14
 HDMI 20
 SDI 16
Status LEDs 21–22
 ICMP HDD 22
SYNC 12

T

Tamper labels check 6
TDL 24
This document 3

U

Unpacking 6
Usage 3
USB 2.0 13
USB 3.0 13
User definition 4

W

website 3